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ECONOMIC GEOGRAPHY OF EUROPE

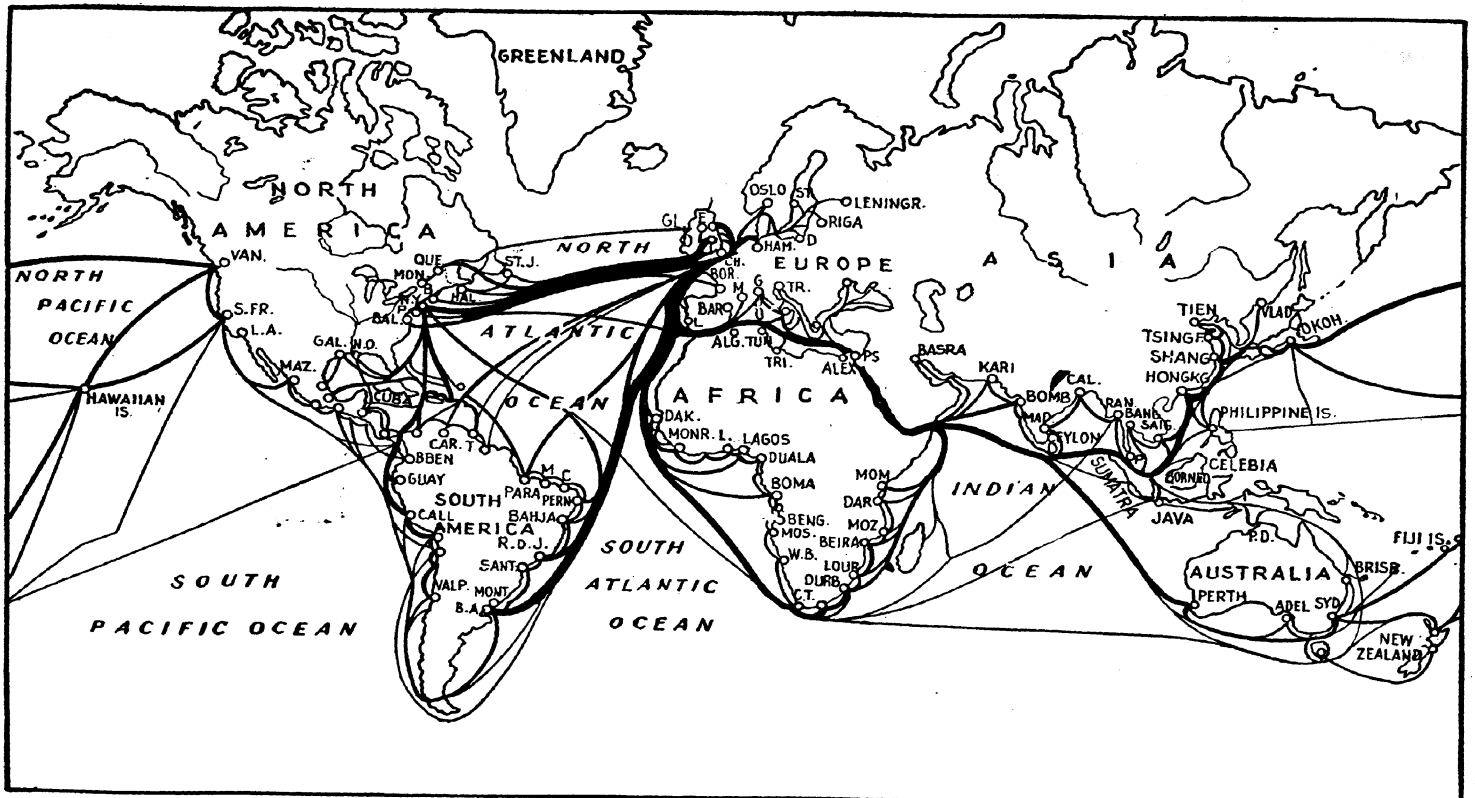


FIG. 1.—Shipping routes of the world. Width of the lines and bands are proportional to the tonnage. (*After Friedrich*, 1926; *from Bowman's The New World, 4th ed.*, 1928.)

(Frontispiece)

ECONOMIC GEOGRAPHY OF EUROPE

BY

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PREFACE

The lack of a textbook on the economic geography of Europe adapted to the use of American collegiate students is one that has been keenly felt by those called upon to teach an introductory course in this subject. American geographers have long hoped that Europeans would supply a suitable textbook, just as Europeans long waited for an American collegiate textbook on the geography of North America. The geography of a continent, is, however, such a comprehensive subject, and its adequate discussion presents such obvious difficulties to those most familiar with the subject, that no satisfactory textbook on Europe by Europeans has appeared. Hence it seemed desirable to have one prepared by Americans, rather than to wait indefinitely for a suitable book by Europeans. Two European authors, Jones and Bryan, similarly prepared the first collegiate textbook on the geography of North America.

This book represents a revision of material used by the authors in their university classes. Part I treats of the continent as a whole and Part II with the individual countries or groups of closely associated countries. The individual countries are the unit in most of the book because political and historical influences are powerful, especially in Europe. Most of the statistical data are, moreover, available by countries, not by geographic regions.

The spelling of the names of cities is that used officially in the country of their occurrence, as given on the 1920 National Geographic Society Map of Europe. The former names or the Anglicized forms are inserted in parentheses after the official name where first used in the text, if the official name is still rather unfamiliar in America.

The authors wish to acknowledge helpful suggestions from a number of geographers who have kindly read portions of the manuscript or proof: Professors Ellsworth Huntington of Yale University and O. D. von Engeln of Cornell University (Mr. Visher's chapters); Miss Muriel E. Poggi of the University of Illinois, and Professor R. H. Whitbeck of the University of Wisconsin. J. K. Rose of Indiana University read critically all of the proof. They are indebted to Professor A. K. Lobeck of Columbia University for permission to include, in the pocket, a copy of his Physiographic Diagram of Europe, which has proved of distinct aid to numerous students of the subject. The authors are under deep obliga-

tion to the many writers on the geography of Europe, especially those mentioned in the bibliographies, and to the numerous geographers and others who aided them personally during their reconnaisance studies in more than half of the countries of Europe. Acknowledgment is also gratefully made to the several individuals and firms who kindly permitted the use of photographs or other illustrations. The senior author wishes especially to acknowledge his great indebtedness to Mrs. Elizabeth R. Blanchard whose untiring labors have made possible the gathering of material and checking of his portion of the text.

Part I and three chapters of Part II, those on Belgium and the Netherlands, Russia, and Spain and Portugal, are by Mr. Visher, and the remaining chapters are by Mr. Blanchard.

W. O. B.
S. S. V.

URBANA, ILL.,
BLOOMINGTON, IND.,
March, 1931.

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PART I

EUROPE AS A WHOLE

ECONOMIC GEOGRAPHY OF EUROPE

CHAPTER I

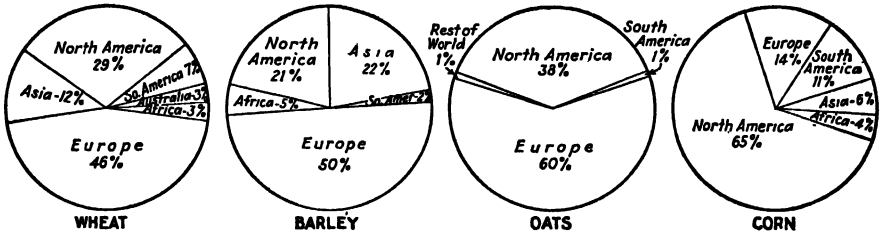
SIGNIFICANCE OF EUROPE

EUROPE COMPARED WITH THE REST OF THE WORLD

Although Europe comprises only about one-fifteenth of all the land, it contains about one-fourth of the people, or nearly four times its ratio. It produces more than one-half of all commodities, and deserves credit for a considerable fraction of those produced elsewhere and then sent to Europe. It has accumulated perhaps three-fourths of the tangible wealth of the world, and invested it in all lands, with the result that Europeans largely own many of the mines, railroads, and other improvements, and indeed a considerable part of the more valuable land itself, in the other continents (Fig. 125). The annual increment of wealth made in Europe and by European investments elsewhere is much more than half of the world's total, for most non-Europeans accumulate little and are almost satisfied merely to be no worse off financially at the end of the year than they were at the beginning (Fig. 145). As a result of this disparity in energy and thrift, Europe has been until recently the one continent where extensive surplus funds could be obtained for constructive development anywhere (Fig. 17). Although since 1914, citizens of the United States have loaned vast sums in Europe and elsewhere, experts estimate that the loans of Americans lack a good deal of equaling the total of European investments even in North America.

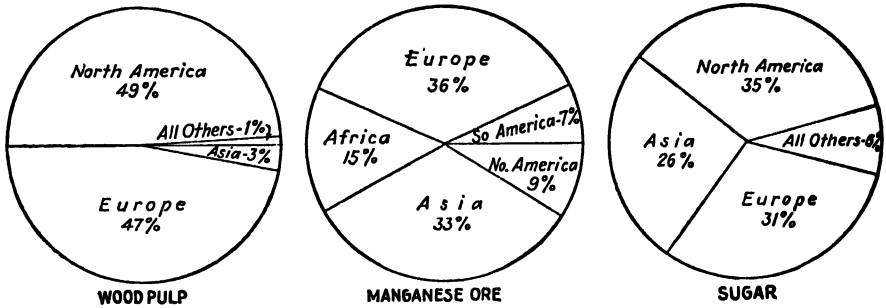
Europe Produces Much of the World's Output.—The significance of Europe in respect to production is suggested by the share it has in the output of various important commodities. Europe produces more than all the rest of the world combined of numerous valuable items. For example, it produced in 1928 more than four-fifths of the rye, potatoes, beet sugar, flax fiber, lignite, potash and pyrite; more than one-half of the oats, barley, grapes, apples, olives, milk, ships, rayon, synthetic dyes, iron ore, steel, aluminum, nitrate and phosphate fertilizer (Figs. 2 to 8). It produced practically one-half of the world's coal, horses, wheat, wood pulp, and cement, and more than one-third of the swine,

sheep, paper, and power derived from falling water (Figs. 9 to 15). If the contribution of the United States be excepted, Europe produces more than all the rest of the world of a variety of additional things including lumber, poultry, beef, corn, automobiles, locomotives, textiles, electrical and railroad equipment, and most other types of machinery (Figs. 58 to 64). Until very recent years it had a similar rank for copper, lead, zinc, and petroleum (Chap. V, Minerals and Water Power).



FIGS. 2 to 5.—Percentages of world's production of important items, 1927 or 1928.

Europe's High Commercial Rank.—Besides an exceptionally large domestic trade within most of the countries, Europe carries on more than half of the foreign trade of the world. In 1928 the foreign commerce of each of the continents was, in billions of dollars, approximately as follows: Europe, 35, North America 14, Asia 9, South America 3, Australia 2, Africa 2 (Figs. 13 to 16). Furthermore, most of the foreign commerce

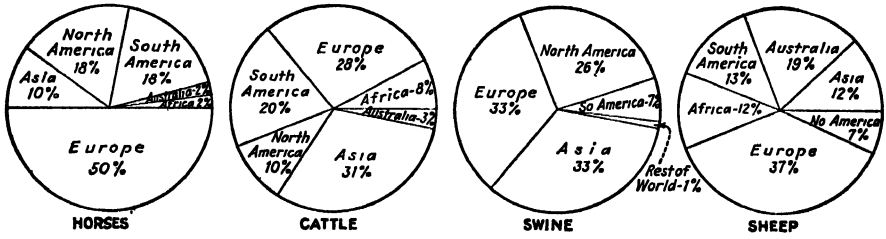


FIGS. 6 to 8.—Percentages of world's production of other important products, 1927 or 1928.

of the other continents is with Europe (Chap. IX, Commerce). The total commerce, within the various countries as well as between the countries, of Europe is far greater than of any other continent with the possible exception of North America.

Modern Civilization Essentially European.—The higher civilization of almost all of the world except eastern and southeastern Asia is European or slightly modified European, and nearly all modern advancements in Asia are directly attributable to European influences. Many centuries ago Asiatics and Africans made, it is true, very important

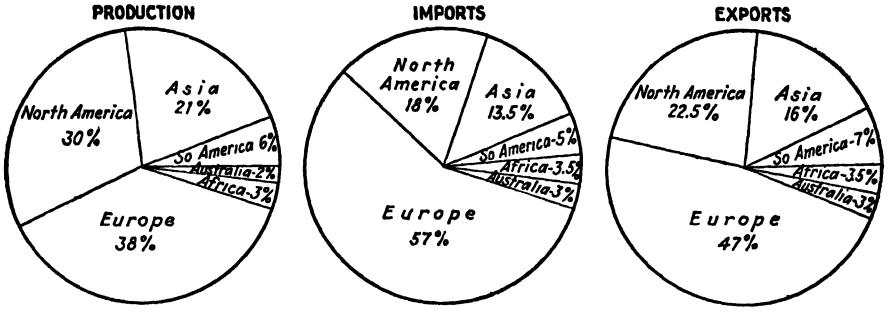
contributions to the development of civilization, but in the last 1,000 years or more they have done little to influence other continents except indirectly. Europeans, on the other hand, have explored all the seas and the lands, have learned to extract and use most of the minerals, and have selected, improved, and spread the use of superior plants and animals. The appearance of the landscape of a large proportion of the world has been profoundly altered as a result of their activities. Forests have been cleared away and replaced by crops, grasslands have been plowed, marshes drained, new plants and animals introduced, and the human population sharply changed racially. Not only have Europeans and their descendants colonized a large share of the lands, but they still control most of them politically and dominate the remainder (Figs. 141, 142). About 90 per cent of the land is governed by Europeans or descendants of Europeans, and fully 70 per cent of the world's population is under their direct political control. Furthermore, Europe is strongly in the lead in respect to several types of international agreements and organizations.



FIGS. 9 to 12.—Percentage of world's total live stock by continents, 1927.

Reasons Why Europe Is Not Fully Appreciated.—Europe has been so extremely significant that a detailed study of its contributions and of the various regions where they were made—in brief, of the conditions affecting Europe—is of interest to all who desire to be well informed. Theodore Roosevelt's statement, that whereas the North Atlantic had been the important ocean in the sixteenth to nineteenth centuries, the Pacific would take preeminence in the twentieth, suggests that he thought that Europe would cease to be relatively highly important. Many other people have also been much impressed by the enormous size of the Oriental population, and have believed that soon Asia will outdistance Europe. But as yet there is almost no indication that this is occurring. The Oriental peoples are progressing appreciably only so far as they adopt European methods and ideals. Hence the influence of Europe is growing instead of waning. In fact it is growing probably more rapidly than ever before, now that communication has become so efficient, and almost all peoples of the world are bound somewhat together (Figs. 18 to 20). Part of the recent growth in European influence is, however, readily misunderstood. For example, what is the desire of India and Egypt for

self-rule but a clear evidence that they have at last absorbed one of the fundamental European precepts? Another misconception has reduced the appreciation that Europe's influence is growing. It is the failure to realize that the United States is as truly an offshoot of Europe as are Canada and Australia. Although we consider ourselves independent, we



FIGS. 13 to 15.—The shares of the continents in the world totals of production, imports, and exports, 1927.

still receive much from Europe in the form of new ideas as well as of goods.

Not only is Europe the chief buyer of our exports, and the source of more of our imports than any other foreign continent (Fig. 121), but far more Americans visit Europe than visit all other continents combined. Hence an understanding of geographic conditions in Europe will not

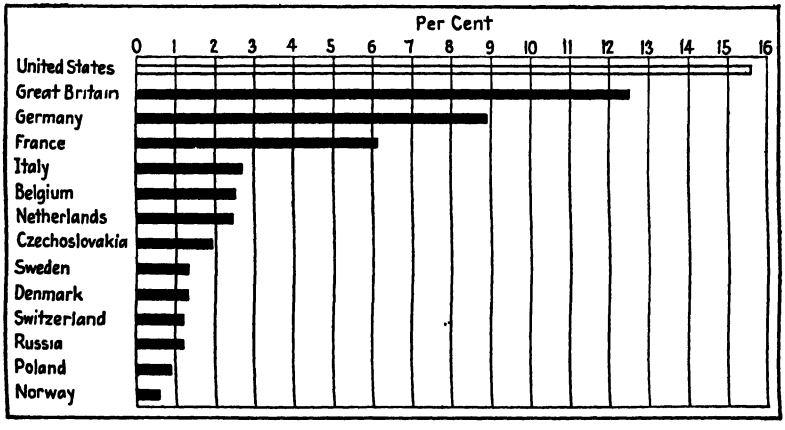


FIG. 16.—Foreign trade of leading countries, 1928.

only augment American appreciation of Europe and improve business relationships but heighten the pleasure of a large number of Americans.

Regional Contrasts in Importance.—Only a portion of Europe, however, has done much to influence the rest of the world. A considerable fraction has been not much more important than the more progressive

areas elsewhere; Japan, for example. The highly significant area is clearly revealed in Fig. 21, which shows the distribution of civilization in Europe according to the opinion of the fifty authorities who responded to Ellsworth Huntington's request for their opinion on geographic variations in the degree of civilization. Note how the darkest shading indicates that the highest civilization centers around the North Sea, with a Baltic arm and a projection southward to the Mediterranean. Note, too, how regularly civilization declines as one goes away from this center in any direction. Northward toward Lapland the decline is most rapid, but southward it is almost equally sudden. Eastward it is also surprisingly apparent, while even toward the west it is in evidence. The map suggests that when we say "European," we often do not mean "pertaining to the entire continent of Europe." Our meaning really is "pertaining to the small part of Europe extending northeastward, northward, and westward from northern Italy to the Baltic, the North Sea, and the

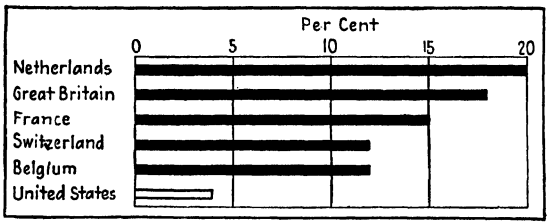


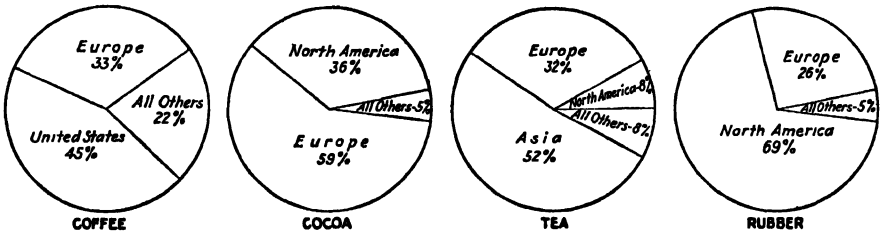
FIG. 17.—Approximate percentage of total wealth of certain nations which is invested in foreign lands, 1928.

Atlantic, but with special reference to the regions around the North Sea." There the peculiar qualities of European civilization now reach their highest development (Fig. 27).

EXPLANATIONS OF EUROPE'S DOMINANCE

Many theories have been advanced to explain the dominance of Europe and the prominence of the countries near the North Sea. The chief of these theories fall into three groups: geographic, ethnic, and historical. The chief geographic explanations are as follows: (1) It is often said that Europe owes its dominance to its latitude. Alone among the continents it penetrates only a little into the unfavorable latitudes of the depressing north or the enervating south (Fig. 1). (2) It is also said that the most essential feature in the supremacy of Europe and especially of the countries around the North Sea is their position in respect to the Atlantic Ocean and America. The degree of progress, it is claimed, is almost in proportion to the ease with which other parts of the world can be reached. Europe not only includes the center of the land hemisphere, but its position in respect to the Atlantic gives it access to the rest of the world by sea with the least possible hindrance. The

ocean also influences the climate favorably. (3) Again, good authorities hold that the small size of Europe is one of its most valuable assets. Being small, all parts, instead of only a small proportion, are strongly affected by oceanic influences. Hence, in spite of its small size, it has a relatively large habitable area, for it is not hampered by great deserts like those of the neighboring continents of Asia and Africa, of Australia, or even of North America. Thus it is relatively easy for cultural progress to spread from one densely populated area to another. (4) We are often told that Europe's dominance has been greatly aided by the fact that the continent is divided by its mountain ranges and the sea into many small units which, nevertheless, lie near together and are mutually accessible. The physiographic diagram, in the pocket, shows clearly many of these regions. (5) Of great importance, apparently, is the fact that Europe's shape is so unusual. It is, indeed, a great low peninsula rather than a continent and is itself largely composed of many smaller peninsulas. Thus, the sea penetrates far into the interior, the climate is ameliorated,



FIGS. 18 to 20.—Consumption of tropical products, 1928, percentage of world's total.

and trade and intercourse are fostered (Fig. 22). (6) From another point of view, the main geographic factor in putting Europe so far in the vanguard of civilization is its abundant supplies of the two most important minerals, coal and iron. This applies particularly to the countries around the North Sea where lies the world's greatest workshop. (7) Still another explanation is the climate. In no other continent is anything like so large a proportion of the area highly favorable both to agricultural prosperity and to human health and energy. (8) An eighth explanation is that the exceptional health and energy of the dominant part of Europe is the chief cause of the continent's high rank.

The Theories Compared.—These eight explanations sum up the chief geographical conditions which have been called upon to explain the dominance of Europe in general and of the North Sea regions in particular. The explanations appeal to each of the chief elements of physical environment, and in many cases call upon two or more at once. Thus, in the first explanation latitude is obviously a matter of location, but it has little significance except through its influence on climate. The second explanation also deals with location, but here latitude becomes a minor

factor and the location with respect to the ocean and the other continents, especially America, is the chief note. With the third, fourth, and fifth explanations the size, relief, and shape of Europe, that is, the form of the land and of its mountains, enter into the matter, but these conditions gain most of their significance in connection with the ocean on the one hand and with climate on the other. The sixth explanation pertains to minerals, but in other regions coal and iron have little effect on the inhabitants except where combined with certain other favorable conditions, such as favorable location and climate. The seventh explanation is purely climatic, but perhaps half of the influence of climate is exerted

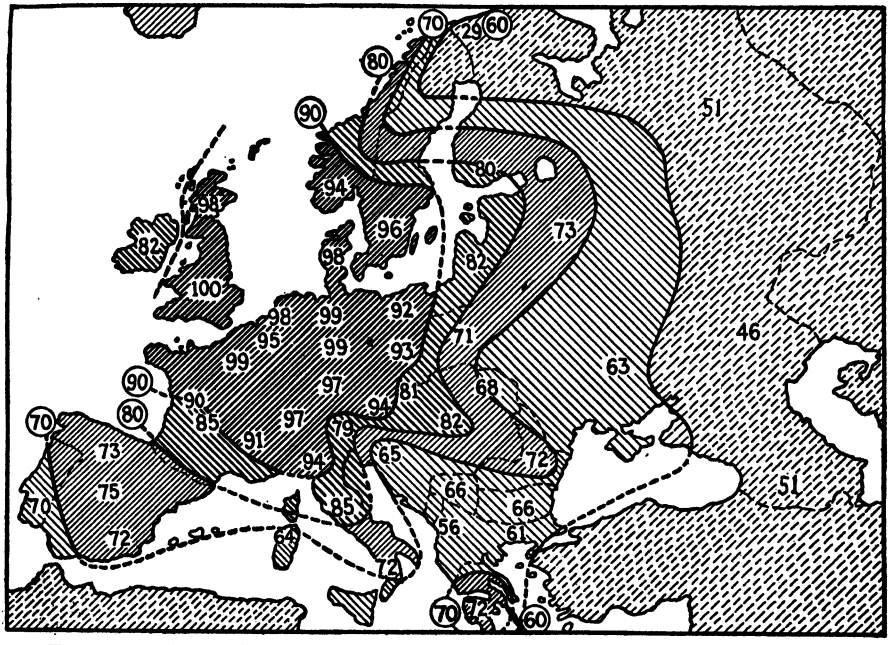


FIG. 21.—Distribution of civilization according to fifty competent Europeans, in percentage of the civilization attained in England. (*From Ellsworth Huntington, Civilization and Climate, Yale University Press, by permission.*)

indirectly through plants and animals rather than directly upon man. Finally, the eighth explanation depends on climate, diet, advancement, and success. Thus it appears that according to their individual points of view, various authorities call upon each of the great elements of geographic environment to explain the dominance of Europe and the supremacy of the regions around the North Sea. The fact is that Europe, and especially northwestern Europe, is exceptionally favored in practically every aspect of geographic environment.

Europe's Favorable Latitude, Shape, and Size.—A fuller statement of these advantages is appropriate. Some of them merit a whole chapter,

but others may be presented more concisely. So far as latitude is concerned, the location is better than that of any other continent, for the largest proportion is in middle latitudes, in the belt of the prevailing westerly winds where cyclonic disturbances are most numerous. In respect to size Europe is the smallest of the continents aside from Australia, and its small size has facilitated the exchange of goods and of ideas. Europe is also the most favored of the continents in shape, and would be almost ideal in this respect if Asia did not cut it off from the ocean on the east. In shape, as in size, an important advantage lies in bringing almost all parts of the continent near the sea, whereby the climate is rendered more favorable and transportation is facilitated.

Climatic Advantages.—Climatically Europe is also the most favored of the continents. No other has so large a proportion which receives appropriate rainfall for general agriculture. The area too dry for bountiful crops is very small, only a fraction the size of that of even North America. Indeed some geographers declare that no part of Europe is too dry

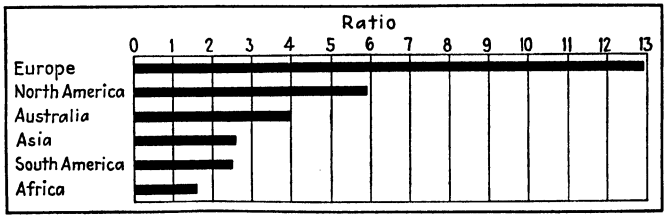


FIG. 22.—Coast-line ratio: 1,000 miles of coast per 1,000,000 square miles of area. (*According to Herbertson.*)

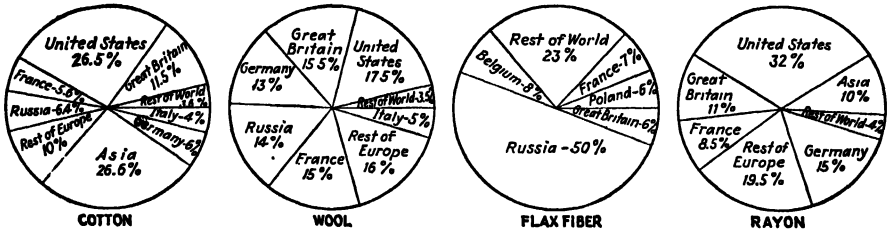
for some form of agriculture, that the driest sections, southeastern Russia and southern Spain, are relatively unproductive rather because the peoples of those areas have not had sufficient capital, knowledge, and experience to use such land. In parts of South Africa, Australia, and the western United States, where labor-saving machinery is extensively used, and water supplies are obtained from deep wells, equally dry land is more successfully used.

Another climatic advantage possessed by Europe is the large proportion of its area which has moderate ranges of temperature, sufficient to require numerous seasonal activities in preparation for the future, but not extreme enough to disarrange man's life too radically. Even in eastern Russia, where the extremes are greatest, they are less than in corresponding areas in North America and much less than in most of Asia.

Europe is fortunate also in that much of it enjoys frequent changes of weather. This is particularly true of the northwestern part, the region near the North Sea, where the people are exceptionally active. These changes of weather are produced by cyclonic disturbances, the more

severe of which are called storms. Relatively frequent changes of weather characterize all parts of the world which now have a high civilization, which suggests that such changes are stimulating. Obviously they introduce complications into the life of the people and put a premium on mental alertness and persistence. In regions which lack such weather changes, most of the people put off doing many things which it would be advantageous for them to do. The motto of many tropical people, where sharp changes of weather are relatively rare, has often been said to be "tomorrow, not today." Such a postponement is discouraged by the distinct seasonal changes of all parts of Europe and especially by the changes of weather, which are significantly most frequent in the most advanced areas. The intimate relations between climate and health are considered in Chap. II.

Advantageous Relief.—The relief features of Europe are more favorable, likewise, than those of any other continent. As may be seen on the physiographic diagram in the pocket, no large part is conspicuously



FIGS. 23 to 26.—Consumption of the chief textiles, 1928.

cut off from the sea by high mountains, nor is it nearly so difficult to go from one part of the continent to another because of the mountains as is true in the other continents. The seriousness of the Andean and Himalayan barriers is so well known as not to require comment. Now that there are several railroads across North America, the effectiveness of the barriers imposed by the Appalachian and the several western ranges may be overlooked, but a comparison with Europe reveals how fortunate Europe is in this respect. The Alps, although their summits are higher than any peak in the United States, are crossed in a few hours by several railroads, and the highest elevations reached in the tunnels of the main lines are only about 2,300 to 3,800 feet, or less than half the elevations required in crossing the western United States or Canada. Even in Australia, where the mountains are not nearly so lofty as in Europe, they have imposed a more serious barrier by their very steep eastern slopes. Indeed, even the hardy explorers failed for decades to find a way up to the plateau from the narrow eastern coastal strip. In Africa much of the area is a plateau, with the result that in the lower courses of even the largest rivers there are rapids and falls which have

interfered with penetration. Also in the better subtropical parts of the continent, both at the north and at the south, steep and lofty mountains seriously interfere with travel between the coast and the interior.

Valuable Water Gaps.—In Europe, on the other hand, not only are the chief rivers navigable for relatively great distances, but they have cut water gaps which serve as outlets for most of the areas which are nearly surrounded by mountains, thus greatly reducing their isolation. This is conspicuously true of the Swiss Plateau where the Rhine and Rhone afford outlets on nearly opposite sides. It is true of Bavaria, with the Rhine and the Danube; of Bohemia, with the Elbe and the Morava; and of the Hungarian Plain with the Iron Gate of the Danube.

Routes Leading to the North Sea.—A special respect in which the relief of Europe favors the North Sea area is the way several natural routes lead toward it. The north European Plain extending from Russia westward, becomes narrowest in Belgium, thus concentrating rail traffic on the shores of the North Sea. The Seine, Elbe, and especially the Rhine also direct traffic from central Europe to the same region. The Rhone and the lowland of western France lead toward the same area. The Baltic, helped by the Kiel Canal, contributes another stream of traffic, and through the English Channel come numerous ships from all the seas to this area, which, moreover, is at the center of the land hemisphere.

Great Mineral Wealth.—Only North America among the continents yields more useful minerals than Europe. Furthermore, North America's great mineral wealth was not drawn upon appreciably until after Europe had attained a conspicuous leadership in the use of minerals. The result is that until very recently North America frequently has contributed mineral substances to Europe instead of competing with it. In fact the mineral wealth of nearly the entire world has been exploited by Europeans, and, except for the part recently taken by the United States, the minerals have largely flowed promptly to Europe to be fabricated and mostly used there. A small part, however, has been exported at a large profit, perhaps to the area of its original production, as, for example, tin cans to the Singapore region for canning pineapples.

Favorable Distribution of Minerals.—The mineral wealth of Europe is widely distributed, but in coal, iron, and potash especially, and formerly also in lead, zinc, and tin, the area near the North Sea has been particularly rich. Coal fields extend, with some gaps, from southern Scotland and northeastern Ireland south across northern England and Wales. They reappear again in northeastern France and extend into Belgium, the Sarre (Saar) basin, and the great Ruhr coal field of western Germany. The coal-bearing formations extend eastward on the north side of the Carpathians and lesser ranges to the Donets field of Ukraine, the source of nearly all of Russia's coal. The Silesian coal field of south-

east Germany and Poland is in this belt, and the coal of Bohemia is a southern outlier. The rest of Europe has little or no good coal, but the abundant supplies just mentioned still yield almost half of the world's output. During the nineteenth century they provided two-thirds or more of the world's total. Formerly, near the coal on the western part of this zone, there were valuable deposits of iron ore as well as limestone for use as a flux. This condition together with the large local market, the energy and inventiveness of the people, and the exceptional opportunity to export led to a great development of the manufacture of iron and steel. The richer iron deposits have largely been depleted, except in and near Lorraine, France, where the supply is still very large. Furthermore, bountiful supplies of iron ore are found near the coast in Spain, northern Sweden, and Spitsbergen. Moreover, not far away in north Africa, Newfoundland, and Cuba, other deposits have been extensively and cheaply mined and shipped to Europe. These conditions have enabled Europe to continue to increase its output of steel.

Racial Strength.—Western Europe, particularly the North Sea region, has been the scene of the most extensive commingling of the three chief subraces of the Caucasian peoples, the fair Nordics, the brunet Mediterraneans, and the round-headed, brown- or gray-eyed Alpines. As each of these peoples has characteristics of great value, it has been assumed that the region where they have commingled most has been most favored racially. Ethnologists declare that very few persons whose ancestors have long lived in that favored area are pure representatives of any one of these subraces. Certain it is that most of the men who did much to advance civilization were mixtures of two or even three of these stocks, each of which contributed traits which helped make these people exceptionally strong. The Nordic traits of great energy, exceptional inventiveness, and conspicuous power of leadership and organization have often been especially mentioned as valuable contributions to the inheritance. Another characteristic of Europeans, which some experts say is due to biological mixing of closely allied peoples, and which others give as a Nordic trait, is great variability, which leads to the birth of men of genius. Unquestionably Europe has yielded many more men who have proved themselves geniuses than has Asia or Africa.

Non-geographical Influences.—The importance of the geographic explanations of Europe's dominance must not cause us to neglect the historical explanations. A large body of students, especially historians and anthropologists, hold that neither the purely geographic factors nor even the semi-geographic factor of race is mainly responsible for the present dominance of Europe. They point to the historical evolution of religion, philosophy, science, literature, art, politics, business, and war as the primary factor. Along all these lines, they say, the direction and speed of evolution depend largely upon accidental circumstances,

such as the particular line in which a man of genius happens to work, and the degree to which his new ideas fit those of his times and thus are accepted, or fail to fit and hence are rejected. This is doubtless partly true, but it is likewise true that geographic environment on the one hand and race on the other are equal partners with human ideas and institutions in bringing the world to its present position.

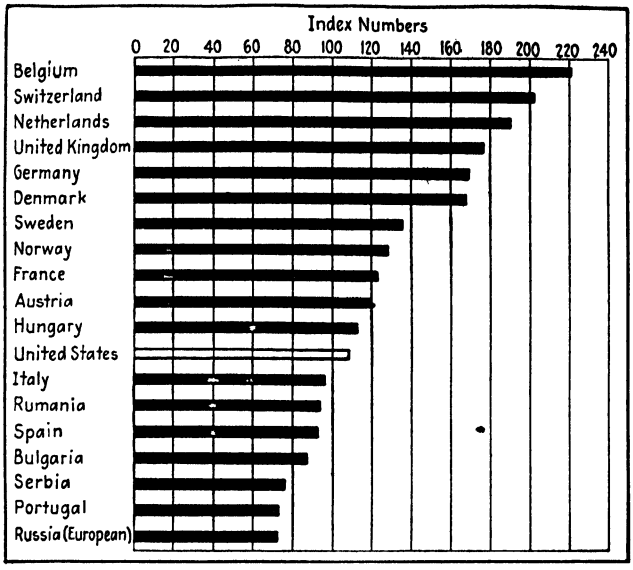


FIG. 27.—Contrasts in productivity of countries (prewar). (*From Yearbook of the U. S. Department of Agriculture*, 1921.)

This outline of the many and diverse factors suggested as explanations of European dominance illustrates the complexity and also the fascinating character of the problem of why Europe has been and is so significant.

CHAPTER II

CLIMATE, CLIMATIC REGIONS, AND HEALTH

Although the chief features of the climate have been given in Chap. I, climatic influences are so important that a more detailed discussion is desirable.

Temperature Conditions.—Almost all parts of the world are handicapped during at least part of the year by being either too cold or too hot. According to Ellsworth Huntington, a month is colder than is ideal if the average temperature for the month falls below 0° C. or 32° F.,

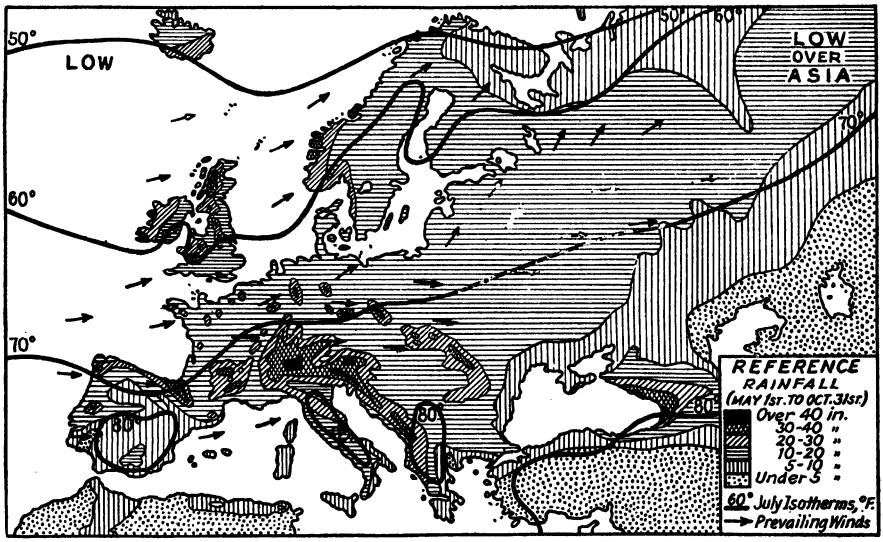


FIG. 28.—July temperatures, prevailing wind directions, and the total summer (May to October, inclusive) rainfall. (*From D. H. Smith.*)
("Low" over northwestern Asia and near Iceland refers to pressure.)

and warmer than ideal if the temperature of the month averages above 21° C. or about 70° F. Hence, in most of the half of the world between the thirtieth parallels, nearly all of the months are too hot, while in high latitudes most months are too cold. In middle latitudes many regions are too hot in summer and too cold in winter. In July most of Europe south of the mountain chains from the Pyrenees to the Carpathians is too warm, as is southeastern Russia. The rest of Europe, however, has an average temperature below 70° (Fig. 28). In general the July

isotherms run roughly east and west, but a given latitude is warmest in the east, that is, in the interior, and coolest in the west near the Atlantic Ocean, and hence the isotherms are farthest north in the interior. This tendency toward high temperature in the interior is also conspicuous in Spain, the interior of which has average temperatures above 80° in July. The January isotherms (Fig. 29) run, however, roughly at right angles to those of July, especially in the west. Because the isotherms bend so far northward in western Europe, instead of following the normal east and west course, nearly half of the continent, and by far the more populous half, has an average temperature above the freezing point in January.

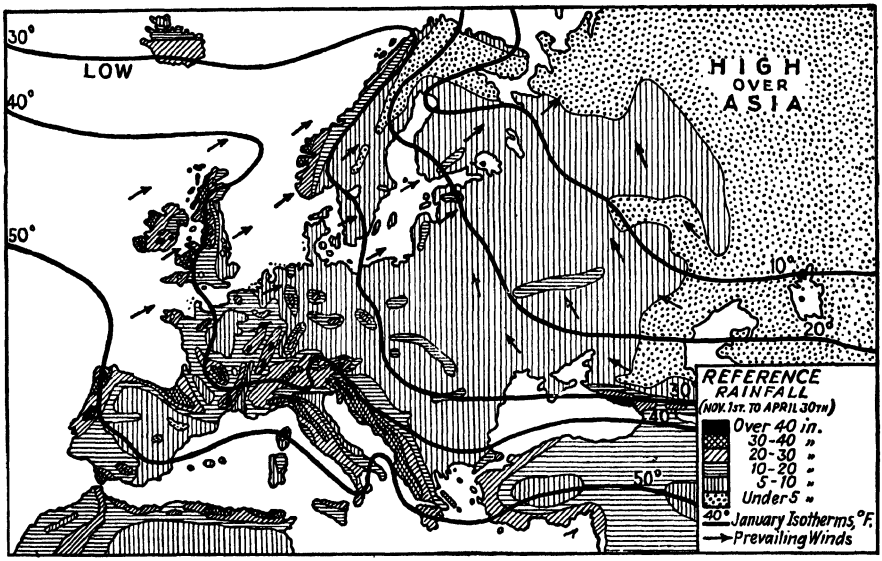


FIG. 29.—January temperatures, average wind directions, and winter precipitation. (*From D. H. Smith.*)
("Low" and "High" refers to pressure.)

The factors which raise much of Europe's temperature to such a beneficial degree in winter and keep it down in summer are the winds which blow rather steadily from the Atlantic. In winter, as Fig. 29 indicates, they usually blow from the southwest, or in the interior, from the south, bringing the warmth of lower latitudes as well as the tempering influence of the ocean. The North Atlantic is, furthermore, warmer than any other ocean in winter in these latitudes, because of the North Atlantic Drift, which raises the surface temperature in latitude 40 an average of a degree or two, and in latitude 55, four or five degrees. In summer, on the other hand, the normal direction of the winds is from the west and the then relatively cool ocean (Fig. 28).

Cyclonic Storms.—An important influence on the temperatures, and also on the rainfall, is the cyclonic disturbances, the more intense of which are known as storms (Fig. 30). They cause frequent variations in the temperature and other elements of the weather from day to day, and also induce a large share of the rainfall. Indeed when the disturbances are absent for a time, the changes of temperature are gradual and slight, and little or no precipitation falls except on the windward slopes of the steeper mountains. Hence without them much of Europe would have monotonous temperatures and would be too dry for general agriculture. Southern Europe illustrates this well. In summer when the

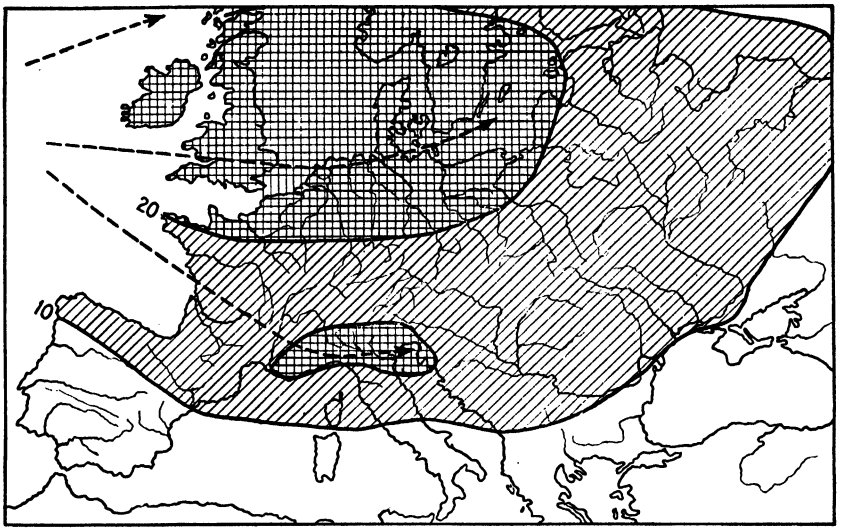


FIG. 30.—Frequency of cyclonic disturbances and (dashed lines) chief storm tracks. Crossed areas have more than 20 cyclonic centers crossing each year, on the average; unshaded areas have less than 10. (*After Kullmer.*)

subtropical belt of high pressure prevails, few cyclonic disturbances from the west penetrate the Mediterranean region, with the result that the weather is persistently hot and there is little rainfall (Fig. 28). In winter, however, when the high-pressure belt lies farther south, over northern Africa, cyclonic disturbances often traverse the Mediterranean, causing invigorating changes of temperature and inducing bountiful rains (Fig. 29). In summer the disturbances pass eastward north of the Alps and bring considerable variability and rainfall to Russia. Eastern Europe is a region which has long cold spells in winter and receives much less winter precipitation then does western Europe, largely because the Asiatic high-pressure area extends into Russia and interferes with the eastward advance of the cyclonic disturbances, diverting them to the north or the south or greatly weakening them.

Rainfall.—Although the amount of rainfall varies closely with the frequency and intensity of the cyclonic disturbances which induce it, the distribution of rainfall over the continent as a whole (Fig. 31) corresponds less closely with the distribution of storminess (Fig. 30) than might be expected. The regions having most frequent storms do not have as much more rainfall than the areas having fewest storms as the number of storms would suggest. This is because the amount of moisture that the air (or, more exactly, that space) can hold increases sharply with higher temperatures, doubling for each 10° C. (18° F.) rise. Hence warm air when it is saturated contains vastly more moisture than does cool air

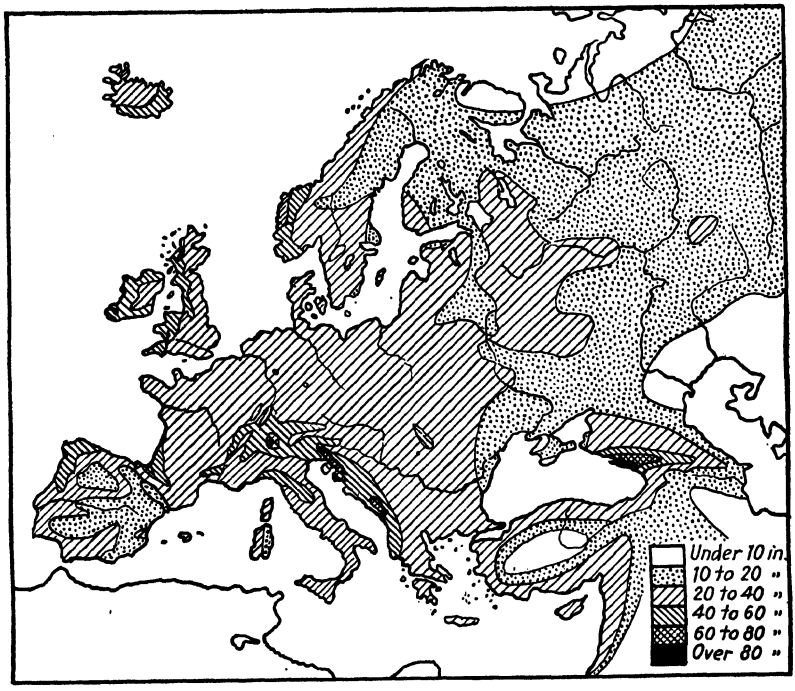


FIG. 31.—Distribution of rainfall, average annual totals.

and yields much more rainfall when caused to ascend by a storm and forced to give up its moisture. Consequently, in winter when both southern and central Europe are crossed by frequent storms, the precipitation is much less in the northern region than in the southern. For example, during the six cooler months the rainfall of London is 275 mm. (about 11 inches), Paris 259 mm., and Berlin 246 mm.; while that of Lisboa (Lisbon) is 547 mm. (about 22 inches), Roma (Rome) 502 mm., and Athenai (Athens) 280 mm. Even Athenai has more than any of the northern cities. In spite of this, the northern region is the moister because its lower temperature causes less evaporation than in the rela-

tively warm southern portion of Europe, and hence the soil dries slowly. During the four warmer months from June to September, however, which are much more important to agriculture, central Europe has numerous cyclonic storms while the southern peninsulas have very few. Consequently we find the following contrast in rainfall: London has 224 mm. (about 9 inches), Paris 210 mm., and Berlin 236 mm.; whereas Lisboa has 65 mm. (about 2.5 inches), Roma 148 mm. and Athenai only 54 mm.

Contrasts in Rainfall.—The figures given in the preceding paragraph bring out not only the difference in rainfall between the central and southern parts of Europe but between the west and the east. This appears more clearly in Table I, where temperature as well as rainfall is considered.

The table is divided into two parts, one concerning cities located within one degree of the latitude of Greenwich, which is approximately 52° N., and the other concerning places within one degree of latitude 38° N. In both parts the places are arranged in order from west to east, as appears from the longitude in column *A*. Column *B* shows the total rainfall in millimeters.

Notice that in Part I, where no bodies of water counteract the influence of the continent, there is a steady diminution of total rainfall eastward. Orenburg, at the eastern edge of European Russia, has only one-fourth of that of Valentia on the southwest coast of Ireland, and only 63 per cent of that received by Berlin. The southern group of cities, of Part II, shows a similar decline in rainfall toward the east, but it is less marked and less regular because we are here dealing with peninsulas and islands, and the water between them prevents the continental influences from producing their full effect. The next column *C* shows the rainfall during the warmer half of the year, April to September, while *D* states what percentage this is of the total precipitation. Column *D* is highly significant. Notice that in the higher latitudes the rainfall of the regions near the Atlantic is usually divided nearly equally between the warmer and colder halves of the year, Valentia having 48 per cent in the warmer half and London 51 per cent. Eastward, however, as the seacoast is left behind, the proportion received in the warmer half year rises until at Warszawa (Warsaw) 76 per cent is received. In Orenburg, June and July yield practically twice as much as February and March. In summer the prevalence of low pressure over the heated continent permits the storms from the Atlantic to continue eastward into Asia. In winter they are normally prevented from doing this because of the Asiatic area of high pressure. In Part II of the table, however, the subtropical regions in latitude 38 degrees show an irregular decline in the percentage of summer rainfall from west to east. This is associated with the fact that the subtropical belt of high barometric pressure interferes with the penetra-

tion of the cyclonic disturbances, few of which then travel far in this more southern region. Some, however, enter it not only from the west but also from the south and rarely from the north.

Contrasts in Temperature.—Turning now to the part of the table dealing with temperature, we find that from the coast inland the mean temperature for the year decreases steadily in latitude 52 degrees. The difference between Valentia and Orenburg, 65 degrees of longitude farther east, amounts to no less than 17° F. or almost 10° C. despite the sameness

TABLE I.—CLIMATIC COMPARISON BETWEEN LATITUDES 52 AND 38° N.

Cities	Longitude	Rainfall			Temperature, degrees Fahrenheit			
		Total, mm.	Apr.-Sept.		Mean, annual	Mean, Jan.	Mean, July	Difference between Jan. and July
			Mm.	Per cent				
I. Places close to Lat. 52° N.	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
Valentia	10° W	1,442	700	48	51	45	59	14
London	0°	616	311	51	50	39	63	24
Berlin	13° E	577	323	56	48	30	67	37
Warszawa (Warsaw)	21° E	475	349	76	46	23	66	40
Saratov	46° E	402	267	65	42	14	71	57
Orenburg	55° E	366	190	52	39	2	72	70
II. Places close to Lat. 38° N.								
Lisboa	9° W	744	181	24	59	50	70	20
Palma	3° E	480	172	36	65	51	77	26
Catania	14° E	625	126	20	64	51	79	28
Athenai	24° E	394	95	24	64	48	80	32
Urfa	37° E	391	56	14	65	39	89	50

NOTE.—25.4 mm. = 1 inch; 101 mm. = 4 inches.

of the latitude. Columns *F* and *G* indicate that this is largely due to the extremely cold winters of the continental interior. During the cold season the continental high pressure effectually keeps out oceanic winds, and hence eastern Europe and still more the great interior of Asia grow colder and colder until the returning sun is again able to warm them. In summer, on the other hand, the sun heats up the land much faster than the sea. Hence column *G* shows that the July temperature becomes higher as we proceed inland. The rise, however, is not nearly so rapid as the decline of temperature in winter in the same regions, the average

temperature differences between Valentia and Orenburg being 13° F. in July but 43° F. (24° C.) in January.

In latitude 38 degrees the change of temperature as one proceeds eastward is much less than the change in latitude 52 degrees because all the stations are near the sea. The July temperatures increase, however, with increased distance from the Atlantic, which remains cooler than the Mediterranean.

Finally, the last column in the table shows how the difference between January and July increases steadily and sharply as one goes eastward away from the ocean, in latitude 38 degrees and especially in latitude 52 degrees.

Great Oceanic Influence.—Table I reveals the fact that the climate of Europe is dominated by oceanic influences. This oceanic quality, through its effect on health and on agriculture, is presumably one of the greatest reasons for western Europe's supremacy.

Another way in which Europe is fortunate climatically is in having representatives of a large share of the world's climatic types and storms. It has been of advantage to the numerous sailors and colonists from northwestern Europe, when they went to other regions, that they were already acquainted with strong winds, including hurricanes and tornadoes, with waterspouts, thunderstorms, lightning, hail, snow, sleet, ice, and with sudden changes of temperature.

CLIMATIC PROVINCES

The preceding discussion of the chief characteristics of the climate and the factors affecting it has prepared the way for a division of the continent into climatic provinces. In four great regions or provinces, climatic conditions are sufficiently uniform throughout, except in and near the mountains, so that in a discussion no more detailed than this they can be treated as units. These provinces are (1) the subarctic or tundra province, (2) the marine or oceanic province, (3) the continental province, and (4) the Mediterranean province. These are shown in Fig. 32.

The reasons for the choice of the boundaries will aid in appreciating important characteristics of the provinces which they delimit. The southern limit of the subarctic province, the line *AB*, follows the northern margin of considerable growth of the cereals, and hence of ordinary agriculture. The central line *CD*, which extends north and south from the western Baltic to the northern part of the Balkan Peninsula, separates the marine, or oceanic, province from the continental. To the west of the line the contrast in average January and July temperatures is less than 40° F., while to the east it is more than 40°. The third line *EF* runs nearly east and west from the Atlantic coast of Spain to the Caucasus Mountains and is the line where the warmest three months have an average temperature of 70° F. North of it, while a single month

may be hot, the summer as a whole is moderate. It represents the southern margin of the marine and continental provinces.

The Subarctic or Tundra Province.—The northern fringe of Europe is a bleak region. Except in a few favored spots the average summer temperature fails to rise as high as 50° F. for as much as three months, although it occasionally is hot for a few days. In the winter even the warmest parts average below 12° F. for about three months. Storms are frequent at all seasons and killing frosts occur during nearly every month in the year. In summer the storms are invigorating, but in winter they are often so fierce as to be very unwelcome to the few inhabi-

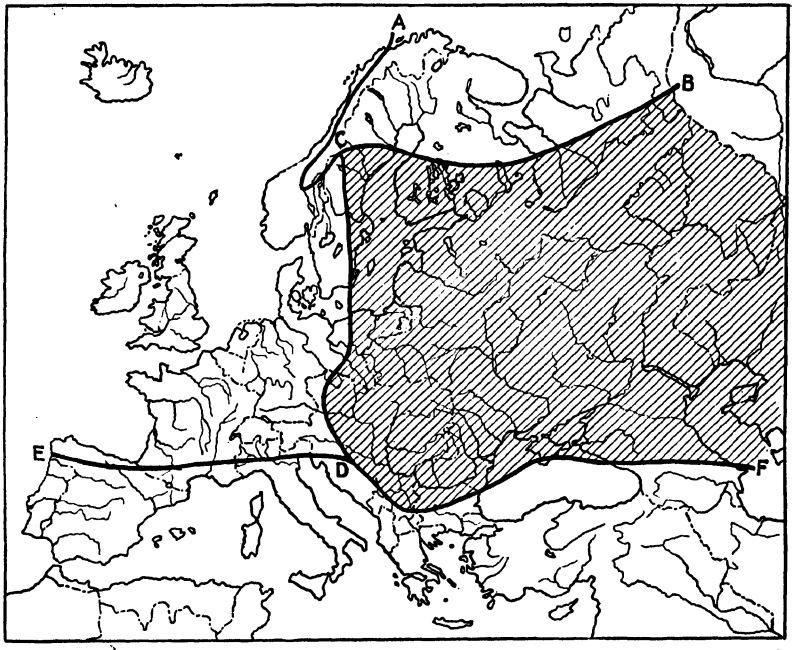


FIG. 32.—Generalized climatic regions: lined = continental; northern = subpolar; southern = Mediterranean; northwestern = marine.

tants, who are benumbed by the biting winds. Although the total precipitation is small (less than 10 inches), it is sufficient to keep the ground filled with moisture because the temperature is low. Whenever thawing temperatures occur the surface is wet because of the ice in the soil. The outdoor air is too cold to hold much moisture, and hence in heated homes its relative humidity is far below the optimum for mankind. This is decidedly the least important part of Europe and need seldom be mentioned in this book.

The Marine Province.—This is the most important province in modern Europe. It includes the areas where the people are most progressive, and where useful minerals are obtained most abundantly. Its countries

have the largest populations and the most commerce. Although this province extends from the coast of northern Portugal in latitude 42 degrees northward to the Arctic Circle on the coast of Norway, the difference in average temperatures is relatively small. The reasons for this remarkable fact were mentioned above when the isothermal maps were being discussed. Although Bordeaux in southern France and Bergen in southern Norway lie about as far apart as Key West, Florida, and New York, their average temperatures differ only about 3.6° C. (6.5° F.) in January, and 5.7° (10.3° F.) in July, compared with differences of 21.4° C. (38° F.) and 5.6° C. (10° F.) for the two American cities. In the interior of this province the differences between the north and the south are correspondingly small. For example, in January Wien (Vienna) is only 1.3° C. (2.3° F.) warmer than Stockholm, and in July 2.9° C. (5.2° F.) warmer; whereas, New Orleans, which bears a relation to Chicago like that of Wien to Stockholm, is 16.3° C. warmer than Chicago in January and 5.0° in July. Moreover, aside from the sparsely inhabited elevated parts of the northwestern highland, the important interior parts of the province lie close to sea level in the north, for example, in southern Sweden, but rise to altitudes of two or three thousand feet in many parts of the south, as in Bavaria and central France. Thus the effect of relief partly counteracts that of latitude. The result is that the marine province is remarkably uniform in temperature in proportion to its size.

Precipitation.—In respect to precipitation the oceanic province is more varied than in respect to temperature, but it possesses certain marked characteristics which are common to all parts. Chief of these is the fact that there is rain enough at all seasons, and that the heaviest precipitation takes place in the summer or autumn. The varied relief of the province, however, causes many of the western slopes and highlands to receive two or three times as much rain as the eastern lowlands. For example, on the western side of Wales, Ireland, northern England, and especially Scotland there are considerable areas where the rainfall is over 80 inches per year, while a little farther east in each of these countries certain areas have less than 30 inches (Fig. 31). Between western Norway and eastern Sweden the contrast is still greater, the extremes being about 120 and 16 inches. Similar but less extreme conditions prevail in many parts of France and Germany. Thus the relief exercises an important control over rainfall throughout the province. Yet almost nowhere does the precipitation fall so low as to greatly diminish the capacity of the country to support human life. In fact in this province the places where man finds it hardest to get a living are the wet areas rather than the dry.

In general the marine province is characterized by a summer temperature which is high enough for profitable agriculture but not too high for

human health, and by a winter temperature which is low enough to give the stimulus of marked seasonal changes but not low enough to be strongly depressing. Cyclonic storms occur almost as frequently as in the northeastern United States, and although along the coasts they are most frequent in winter, throughout the year they bring enough rainfall and sufficient variability for both man and agriculture.

The marine province was originally almost wholly forested, in the north with coniferous trees but in most of the region by a mixed growth of broad-leaved trees like the oak, beech, elm, maple, chestnut, and birch, and a fair sprinkling of pines, firs, and other conifers. Bushy areas were numerous, but on the whole the forests contained much less underbrush and were easier to penetrate than the forests of somewhat warmer or colder regions. Today most of the area has been cleared and a large part of the remaining forest is cared for in accordance with a highly advanced forestry policy.

The Continental Province.—The eastern climatic province includes the eastern half of the continent and is mostly a lowland, as the physiographic diagram, in the pocket, makes strikingly evident. Only in the Carpathians does relief play an important part, although the Urals rise high enough so that they contain only a few farmers. They would contain still fewer if the mining towns did not make it worth while to carry on agriculture in places where otherwise it would not pay. The summers of the continental province are sufficiently warm for agriculture, except occasionally at the north. They are seldom hot enough except at the south to be injurious to man (Fig. 28). They are also moderately rainy except in the southeastern section near the Caspian Sea, for cyclonic disturbances pass over the province fairly frequently in summer. In winter, on the other hand, the temperature is very low (Fig. 29). In the warmest portions it averages like that of New York City and in the coldest like that of the Hudson Bay region. Even in southern Russia snow covers the ground for an average of three months a year. During the long cold season the air contains so little moisture as to be harmfully dry for man, animals, and plants. A special feature of the climate of this province is the large percentage of the precipitation received in summer. One summer month, usually July, normally receives as much, or nearly as much, as February and March together. The scanty precipitation of the spring and fall is a major reason why the southern area, where the temperature is often high in those seasons, is grass covered rather than forested. Grasses can withstand drought much better than trees. In the north, although the total precipitation is little or no greater, the lower temperatures and consequent reduced evaporation decrease the amount of water needed. Hence forests prevail, deciduous toward the south and coniferous toward the north, with a transition zone between.

The Mediterranean Province.—This climatic type is also known as the "subtropical," and its counterpart in North America is frequently

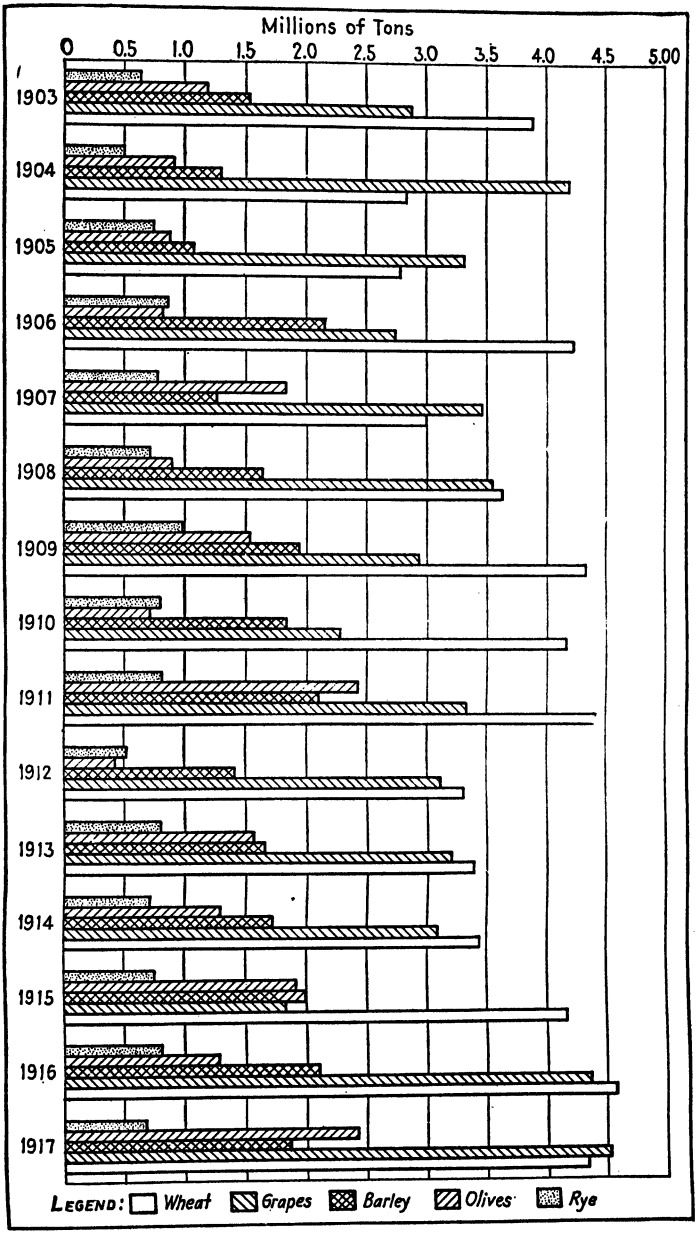


FIG. 33.—Illustrating the erratic yields of Spanish crops.

called the "California" type. It is characterized by rainy winters and hot, dry summers which have little variety—sometimes clouds are almost

lacking for weeks. The summers are less hot, however, than the drought and clear skies might lead one to expect, as they are tempered somewhat by the Mediterranean Sea and by the fact that the latitude of most of this region is higher than that of New York or Chicago. But they are decidedly hot, considerably above the temperature best for mankind, throughout at least three months. The excessive dryness of the air and dustiness of the fields, roads, and air in late summer is another undesirable characteristic of this climate. A dust haze normally increases in density as the dry season lengthens, until, in the autumn just before the rains come, it is often quite thick.

In winter, in contrast, conditions are usually desirable in most parts of this region. The temperatures are mild, the air is moist, rainfall is plentiful, and changes of weather are fairly frequent, with much but not excessive amounts of sunshine. In winter the climate approaches that most favorable for man except during spells of cold wind from the north and in spring, especially, during the occasional hot sirocco winds from north Africa.

Relief plays a prominent role in this province as compared with the part it plays in either the marine or continental provinces. Here even more than there the windward slopes and areas of high altitude are relatively well watered, while the leeward sides and areas in the rain shadows of the highlands are parched. Variation from year to year in the strength of winds from various directions affects the rainfall conspicuously and leads to notable contrasts in the yields of crops (Fig. 33).

CLIMATE AND HEALTH

Contrasts in Health.—There is in Europe a decided contrast in death rates, the rates increasing in all directions from the southern borders of the North Sea. The Netherlands and Denmark have the lowest rates, while the nations which are most remote in any direction have the highest in that direction. This is true not only of the death rates as reported by the various governments (Fig. 34) but also of the adjusted rates, those which consider the relative ages of the population, reducing each population to the same standard. The map (Fig. 35) shows the distribution of adjusted death rates in Europe for a recent period and reveals striking contrasts.

Possible Causes of the Contrasts. *Enlightenment and Diet.*—The explanation of these contrasts is by no means obvious, and several sorts of conditions have been called upon to account for this conspicuous difference in healthfulness. One is the contrast in the enlightenment of the people. But why should this decrease steadily in all directions from the center which has lowest death rates? Another explanation offered is the differences in diet. The nations which have the lowest rates have important dairy industries, and it is conceivable that the abundance of

milk and butter leads to a lower death rate. If so, the rates ought to be lower in Ireland than in England and in Russia than in Poland, for Ireland and Russia carry on relatively more dairying than England and Poland but have higher death rates.

Industries.—Another explanation has been that the death rates vary with industries. This may help explain the higher rates in industrial Belgium than in Netherlands, in England than in Denmark, in Northern Ireland than in the Irish Free State, but it will not explain the contrasts among the numerous nations which are predominantly agricultural.

Climatic Influences.—As the similarity between the distribution of health (death rates), Fig. 35, and that of the suitability of climate for man is close, the hypothesis that health varies with the climate is a plausible one.

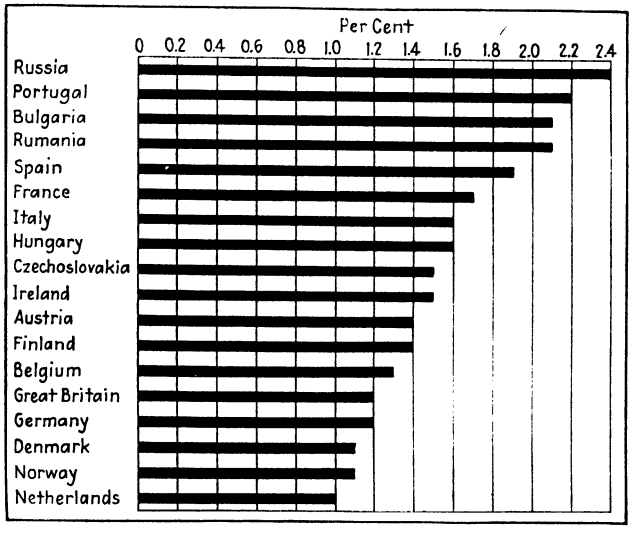


FIG. 34.—Deaths, percentage of total population dying per year, average 1923 to 1927. Since a rate of 1 per cent indicates an average age at death of 100 years, it is obvious that the death rates of the period 1923 to 1927 are lower than can be maintained.

Temperature.—The elements of the climate which most conspicuously affect health are temperature and the moisture content of the air. Prolonged and elaborate studies by Ellsworth Huntington and many others have disclosed much evidence that indicates that for man's physical health an average outdoor temperature of about 63° F. is best for most of the population, but that a considerably lower temperature is best for children and a somewhat higher one for old people. The Mediterranean climatic province has temperatures above the optimum for man during much of the year, and the subarctic has temperatures decidedly below the optimum practically all the year. The continental climate has similar low temperatures in winter. Hence none of these regions could be

expected to have very low death rates if the temperature is an important influence on health. The marine climate, however, has average temperatures close to the optimum, seldom more than a few degrees above it, and only in short spells in winter more than a few degrees below. Furthermore, within this province the portion bordering the southern part of the North Sea approaches the ideal temperature most closely, while in the more remote parts the departure is greatest.

Humidity.—Atmospheric humidity appears to be another important factor in health. For temperatures near the optimum, the evidence indicates that a relative humidity of about 80 per cent is best, and at

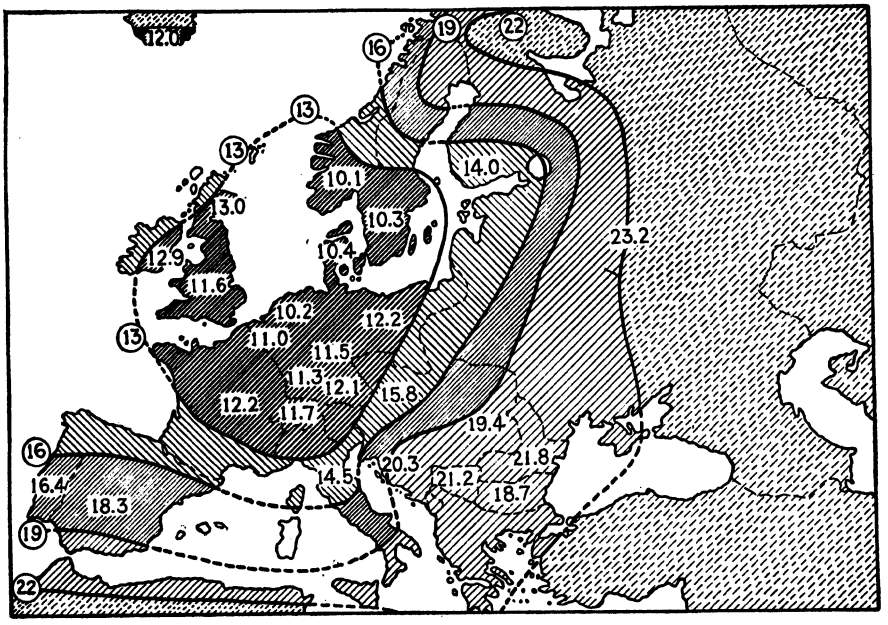


FIG. 35.—Distribution of health, so far as it is shown by the adjusted, standardized death rates. (*From Huntington and Williams' Business Geography, John Wiley & Sons, Inc., by permission.*)

temperatures of 70° F., one of about 50 per cent. At temperatures below freezing the air cannot contain enough moisture so that the lungs are not put under exertion to add enough water to saturate it when it is exhaled at 98.6° F. When the temperatures are low, as in winter in the continental and subarctic, climatic provinces, the air contains less, often very much less, than 1 grain per cubic foot. In order to saturate such air at blood temperatures, which means that each cubic foot must contain 19 grains of water, the body must yield much moisture. The large amount required comes chiefly from the mucous membranes of the air passages with the result that they are dried out and often injured so that

germs find favorable conditions, thus leading to infections, including some colds and pneumonia.

In the Mediterranean province where the relative humidity is low during the warm dry summer days, the air nevertheless usually contains much more moisture than does the cold air of the continental province in winter. This is because its capacity for moisture is so great. Indeed the air near the Mediterranean Sea nearly always contains 4 or 5 grains of moisture per cubic foot. The general lack of rain in the summer arises from the fact that the air is seldom cooled sufficiently to be compelled to drop part of its moisture. As apparently the human body is prepared to add several grains of water per cubic foot to the air inhaled, the harmful effects of the low relative humidity of the dry summers of the Mediterranean region presumably are largely due to their dustiness. There is much evidence that when the air is filled with dust, as it often is in warm regions which are dry for long periods, human health is impaired, and death rates rise. For example, in India the coming of the summer monsoon rains results in a sharp fall in death rates, although the moist heat is often popularly thought to be much less desirable than the dry heat. It certainly feels hotter.

Since in Europe there is a decided decrease in atmospheric moisture southward in summer and eastward in winter, it is plausible, in the light of the foregoing, that humidity conditions help explain the increase in death rates in those directions.

Variability.—A third climatic condition which has been found to have a distinct influence on health is variability of temperature from day to day. The evidence indicates that frequent changes of temperature of a few degrees are advantageous, but that sharp changes are harmful and monotony still more so. In Europe the climatic province having most frequent moderate changes of temperature is the marine. The continental climate has occasional extreme changes alternating with periods of monotony. During much of the summer the Mediterranean province has so few changes from day to day that temperature conditions are monotonous. Therefore in so far as the character of the variability is important in affecting health, its distribution in Europe helps explain the observed differences in death rates.

Sunshine.—Another climatic element having conspicuous influence on health is sunshine. The inadequacy of sunlight, especially of the ultra-violet rays, during the winter in northern Europe is proved by the prevalence of rickets there then. Rickets has increased greatly since window glass, which shuts out the ultra-violet rays, has been widely used, and with the great increase of the proportion of the population living in smoky cities. It therefore appears that European man was fairly well adjusted formerly, when he spent much more time outdoors, to the amount of sunlight in the North Sea region. If so, the excessive

amount of sunshine in the Mediterranean province is unneeded by people in normal health, and it may have a harmful influence on the nerves. This is suggested by the effort people take in very sunny regions to stay in the shade during the hours of greatest intensity of sunlight. The dark color of the skin characteristic of the people of very sunny regions is a protective response also, as a dark skin absorbs very much less of the ultra-violet rays than does a white skin.

In the less sunny parts of Europe the variation in sunshine may, however, help explain the variation in death rates; for example, part of the excess of Ireland and Scotland over England, and of North Ireland over the Irish Free State. This is because the amount and intensity of sunlight decreases in the British Isles northward and westward from southeastern England, the part bordering the southern North Sea. It clearly helps explain part of the excess of rickets and of deaths in the large smoky cities, such as London, over the death rates in sunnier places in the same general climate and country.

CHAPTER III

RELIEF AND SOME OF ITS EFFECTS

DIVISIONS OF EUROPE ON THE BASIS OF RELIEF

Europe consists chiefly of three major physiographic provinces which converge on the west and diverge eastward (Fig. 36). The more northern province is the northwestern highland. Its main portion consists of the Scandinavian mountains; but it has a large number of outliers, for the northwestern portion of Europe has been submerged in relatively

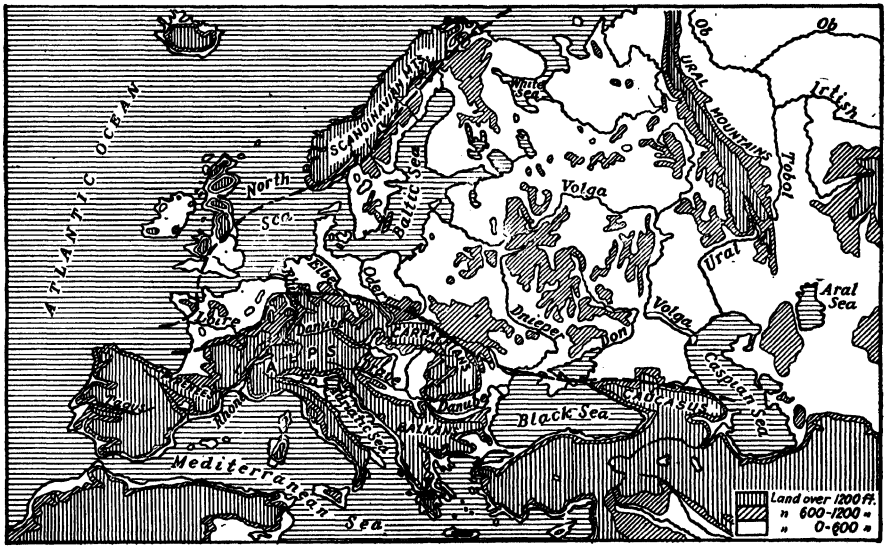


FIG. 36.—Generalized relief map of Europe. The upper dashed line marks the southeastern limit of the northwestern highland, and the lower dashed lines the northern limit of the southern complex. Between is the European Plain.

recent geologic times and parts of the highland have been drowned. In the north, Spitsbergen may be counted as a detached portion of the highland. Farther south not only the Faeroe and Shetland islands but Scotland, Ireland, northern England, Wales, Cornwall, and the hilly region of Brittany in western France all belong to this province.

The next province is the great central lowland or European Plain which extends from western France and southeastern England through Germany to Russia. There it expands so that it extends from the Arctic

Ocean on the north to the Black and Caspian seas on the south, a distance of 1,500 miles. The third province is the southern complex, an intricate mixture of mountains, plateaus, valleys, and plains. It begins in Iberia, extends through southern France and Germany to Czechoslovakia and Rumania (Romania) and includes all of Europe south of these countries. In its relief and drainage this province is so much more diverse than the others that it is desirable to subdivide it into four subprovinces: (*a*) the old central mountains and basins, (*b*) the young Alpine ranges, (*c*) the southeastern basins, and (*d*) the southern peninsulas. The accompanying small sketch map (Fig. 40) shows the approximate limits of these subregions. Along with numerous other significant physiographic features they are shown much more effectively in the large-scale physiographic diagram.

ADVANTAGES OF EUROPEAN RELIEF

Before considering the three great physiographic regions in detail, let us inquire whether their general arrangement and chief features are advantageous to Europe. In answering this question we shall have to take account of the effect of the relief on at least four conditions: (1) density of population, (2) communication, (3) relation of the people to the sea, and (4) climate. To make the matter concrete, we may ask: In what ways would a change in the relief of Europe be helpful to human progress, and in what respects does the relief of Europe put people there at an advantage or disadvantage compared with people in the other continents? Let us consider each of the main physiographic regions separately.

Handicap of the Northwestern Highland.—To begin with the northwestern highland: Mountains or highlands along the coast nearly always are a disadvantage. The exception is the trade wind belt which is dry except where mountains induce rainfall. As in all rugged regions the scarcity of level land and of deep soil greatly diminishes the number of people who can be supported locally, The mountains also render communication difficult not only because of the slopes which must be surmounted by roads and railroads, but because they decrease or prevent the navigability of the rivers. These effects pertain chiefly to the actual highlands. Likewise mountains along or near a coast tend to keep the inhabitants of the interior away from the ocean and thus to hinder commerce. The people who live immediately among the mountains may be driven to concentrate along the seacoast both because of the presence of relatively level land and because of the need of turning to the sea and its fish for a living, but those who live farther away are largely cut off from the advantages of the ocean. Still more important is the fact that the mountains interfere with or prevent the valuable climatic influence

of the ocean from penetrating far inland, while on the windward coast they often cause excessive rainfall and cloudiness.

The northwestern highland is no exception to the general rule in any of these respects. Throughout much of Scandinavia, Scotland, and wherever the highland is rugged, the mere roughness of the topography makes it almost impossible for a large population to support itself (Fig. 37). This is especially to be regretted, for throughout much of the highland the climate near sea level appears to foster health and make the people sturdy and adventuresome. Communication as well as agriculture is hampered. No railroad runs parallel with the western coast in Norway, Scotland, Ireland, or Wales, although the corresponding east

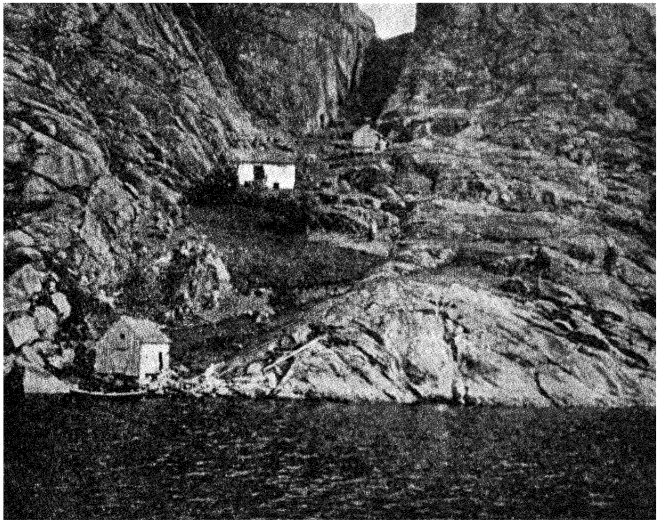


FIG. 37.—A view in the northwestern highland, a Norwegian farm. Rocky Norway has little soil. (*From Mark Jefferson, Man in Europe, Harcourt, Brace and Co., by permission.*)

coast with its gentler topography and denser population is in each case closely paralleled by a railroad (Fig. 240).

Climatic Handicap.—So far as climate is concerned, the northwestern highland presents a threefold disadvantage; it prevents the ameliorating and invigorating effect of the sea from penetrating as far into Europe as would otherwise be the case; it hinders agriculture by lowering the temperature, for even at an altitude of one or two thousand feet the growth of crops is hampered in such high latitudes; and it also renders parts of the region unproductive because of too much cloudiness, fog, and rain. Thus from most points of view the northwestern highland appears to be a disadvantage to Europe. It presents, to be sure, certain minor advantages such as deep fjords for harbors, and beautiful scenery

for tourists. Yet on the whole Europe would be much better off if the western highland could be transferred bodily to the eastern part of the continent. There it would cut off Europe from the backward regions of Asia instead of from the Atlantic. There its ruggedness would decrease the habitability of regions which are climatically far less favorable than those where it now lies; and at the same time it would increase the rainfall and thus improve the climate of those same regions. There it would send out great rivers to traverse the continent and thus improve the access to the sea.

In spite of the fact that the northwestern highland is a hindrance to Europe, the hindrance is far less than that arising from similar mountains in other continents. In both North and South America every one of the disadvantages arising from the northwestern highland is produced in far greater measure by the Coast ranges, Cascades, Sierras, Rockies, and Andes. In Africa and Australia the windward coasts are bordered by obstructive highlands, while in Asia vast ranges cut off a large part of the interior. Thus, compared with the handicap imposed by mountains on the windward side of all the other continents, Europe is highly favored. The reason is that Europe's windward highland is no longer continuous. Many parts of it have been worn low and much is submerged; and, furthermore, it fortunately does not connect with the southern highland.

Advantages of the European Plain.—The great lowland of Europe may be dismissed more briefly. In every respect where the highland is a disadvantage, the lowland plain is an advantage. The plain with its deep soil can support vast numbers of people. It is open to the ocean all the way from southwestern France to the head of the Gulf of Finland. Thus its gentle relief combines with the proximity of the ocean to favor transportation. Furthermore its east-west extent, in the direction of much of the world's commerce, is highly favorable. Although the Scandinavian mountains shut off oceanic influences from the comparatively small region to their east to a harmful extent, the British part of the highland is too small and broken to prevent the ocean from having great value in improving the climate of the plain at least as far east as Poland.

Europe alone among the continents possesses a great plain which opens freely to the ocean on the windward side in temperate latitudes. In South America the great interior plain reaches the sea not only in low latitudes but also in the highly favorable latitudes from 30 to 50 degrees from the equator. Unfortunately, however, it reaches the leeward east coast and not the climatically far more desirable windward west coast. So too, the plains of North America and Asia reach the coast in the far north, but there it is too cold to make the contact of the plain and ocean valuable. In Australia, likewise, the plain reaches the ocean at the north and also at the south, but in neither case does this do

much good, for the winds do not blow so as to carry the oceanic influence inland to any appreciable extent. It is the openness of the European Plain to the prevailing west winds that counts. Thus in its central plain, as in its northwestern or windward highland, Europe is much more favored than any other continent.

The Significance of the Southern Complex.—Turning now to the southern complex of mountains and plains: The fact that the Mediterranean Sea penetrates more than two thousand miles into the interior is an enormous advantage, such as no other continent possesses. On the other hand, the fact that a large part of Europe in the favorable latitudes of 35 to 50 degrees is rugged is a decided handicap. The mountains not only reduce the opportunities for supporting a large population, but they separate north and south Europe to a degree that is harmful. They cause rainfall on their windward slopes, but make the lee sides dry and tend to keep out the cyclonic disturbances which bring rain and weather changes. They also divide the southern part of Europe into many small regions, which tend to remain culturally isolated because of their physical barriers. Thus the relief of southern Europe is rather disadvantageous. Yet the handicap is slight as compared with Asia. Where Europe has a series of ranges with gaps and even passes much below the level of perpetual snow, Asia has the enormously longer, wider, and loftier Himalayas and Tibet (Fig. 205). Compared with either North or South America, however, Europe is in this regard at a disadvantage. Nevertheless the presence of the Mediterranean Sea adds so great an element of advantage that when relation to the sea as well as relief is considered, even Europe's southern portion is seen to be relatively favored.

THE NORTHWESTERN HIGHLAND

A Rugged Region.—Let us turn back to the three great physiographic divisions of Europe and learn something of their general appearance and other characteristics so far as these pertain to relief and drainage. The northwestern highland throughout almost its entire extent possesses four striking characteristics. First, the main outlines of the topography are those of old mountains of resistant rocks which have been worn down to moderate relief. Second, erosion by ancient glaciers has largely removed the soil from the uplands and has deepened some of the valleys and steepened their sides so that there is a marked contrast between the relatively gentle slopes of the uplands and the precipitous slopes bordering the deeper valleys. Third, there is superposed not only the peculiar carving and scraping of an ice sheet, but also many little irregularities due to the deposition of glacial materials here and there across the valleys, in the small plains, and even on the hilltops. The result is an extraordinarily varied topography, an abundance of lakes, and a great degree of irregularity in the courses of the rivers whereby waterfalls and rapids

have been created in great numbers. Many of the waterfalls in the more mountainous areas are of the hanging valley type (Figs. 41, 206). A fourth feature of the relief arises from a recent submergence of the coasts, by which most of the level land which usually borders the seashore has been submerged. Thousands of valleys have been converted into fiords or firths, partly by submergence and partly by glacial erosion below sea level (Fig. 224). Many of them extend miles between the mountains and are bordered by precipitous slopes of surpassing beauty and grandeur (Fig. 226); in the same way many hills and mountain ridges have been surrounded by water and now form countless islands. Nearly all of these special features are strikingly shown in the physiographic diagram.

Little Arable Land.—The net result of these several conditions of relief is that the arable land is reduced to small patches, conspicuous among which are deltas at the heads of the steep-sided valleys or on small natural terraces, and often separated from one another by slopes so

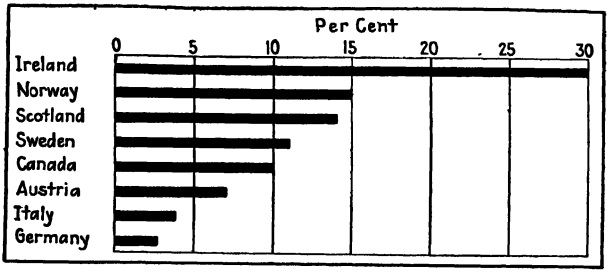


FIG. 38.—Emigration; approximate percentage of living persons born in these lands residing in the United States in 1920.

precipitous that roads to connect them can scarcely be constructed (Fig. 241). Everywhere in fact there is great difficulty in transportation unless the ocean is utilized, for the steepness of the sides of the glaciated valleys makes it hard to cross them, while the numerous lakes and irregular glacial deposits elsewhere interpose other difficulties. These conditions of relief naturally lead to a concentration of the people along the seacoast, and to emigration (Fig. 38). They also foster the development of a few well-defined industries. Chief among these industries is fishing (Figs. 242, 316), which in turn leads to seamanship and hence to commerce. Next comes forestry and its attendant occupations such as woodworking and furniture making, for the land if not too rugged is in many places adapted to forests (Fig. 229, 230). In recent years two other occupations depending in part upon the relief have risen into prominence. One is manufacturing by means of hydroelectric power from the many waterfalls and rapids (Figs. 73, 176) and the other is the care of summer tourists. The relief and the inland waters of Norway and Scotland,

combined with the cool invigorating summers, are in fact making those countries great playgrounds for people from farther south.

THE EUROPEAN PLAIN OR CENTRAL LOWLAND

The Flatness of Much of the Region.—The great central division of Europe is often called a plain but is better described as a lowland, for although it is a plain in its broad outlines it shows considerable variety of relief on a small scale. Some parts, such as the coasts of western France and Netherlands, the central part of Germany in the latitude of Berlin, and large areas in Poland and Russia, are almost flat. The rivers flow close to the surface and wander here and there. Their banks are often ill defined unless man has dyked them, and in times of flood the waters frequently spread widely. Such conditions are highly favorable to the use of inland waters for transportation. The streams are slow, the supply of water varies relatively little, and canals can easily be dug in the deep soil of the level stretches between the rivers. This is one reason why, aside from the Great Lakes and possibly part of China, the world's greatest system of inland waterways, including canals as well as rivers, has been developed in the flat part of the European Plain (Fig. 203).

The Shallow Basins toward the West.—Other parts of the European Plain show more variety in their relief. For example, both London and Paris lie in basins, around which hills rise a few hundred feet. Many of these hills are formed by alternately resistant and weak strata which slope from every side toward the center, Paris or London. These are well shown on the cross section of the physiographic diagram in the pocket. Because of the dip of the rocks, the slope of the hills is gentle toward the center of the basin but abrupt on the outer side. This fact, joined with the relative narrowness of the valleys where the streams break through the ridges, did much to help the French hold off the Germans from Paris during the World War. Elsewhere, for instance, in western France away from the seacoast and in southern Germany, much of the country is gently rolling. Much of Russia has this gently rolling character, also, and in many areas the rivers are intrenched in distinct though shallow valleys.

Influence of Ancient Glaciation.—The northern part of the great central lowland is diversified by glacial deposits north of a line extending from extreme northwestern France almost due east nearly to the lower great bend of the Volga. These deposits are most pronounced in southern Sweden and northern Germany, which were covered by the last, fourth, great advance of the ice as well as by the earlier ones. There many moraines occur. Locally the topography is rough, although rarely do the hills rise more than a few score feet. Innumerable hollows and hills, with almost uncounted lakes and swamps, make the country

locally difficult to traverse. However, especially in Germany, there are some east-west depressions, which have greatly facilitated canal construction and also railroad building. These were formed partly by the temporary streams when the ice front stood across the area. Several are conspicuously shown on the physiographic diagram. Here and there in connection with a variety of glacial deposits are extensive plains of sand where this material was spread abroad by glaciers and the streams that flowed from the melting ice sheets. Denmark and northern Germany contain thousands of square miles of this type (Fig. 39).

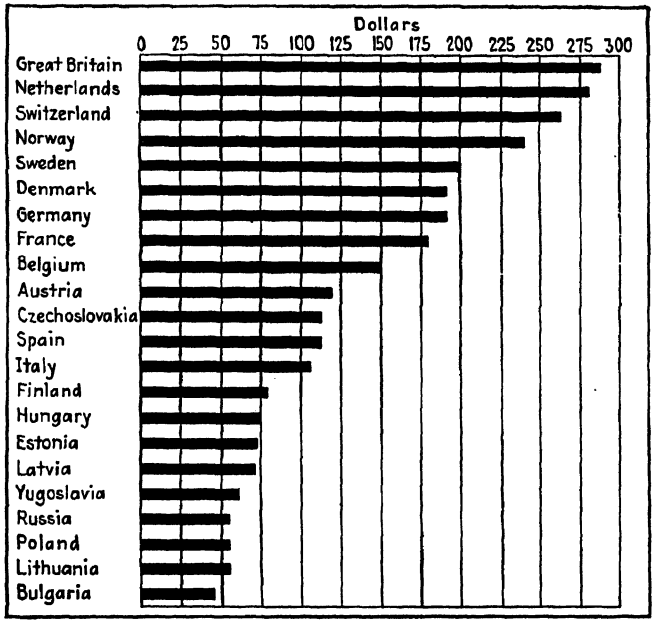


FIG. 39.—Contrasts in the per capita income, 1928.

Summary.—Thus, to summarize, the central plain is smoothest along a strip extending from the upper Dnepr (Dnieper) River through Berlin to the mouth of the Rhine and across the North Sea to the plain of Norfolk in England. To the south of this narrow strip the plain is gently rolling toward the east, but toward the west in northern France and southern England it is hilly, although the hills are never high. To the north it is also hilly, but there the hills are largely glacial in origin and are decidedly irregular in contrast to the regular hills of France and southern England. Everywhere the soil is relatively deep, although it varies much in quality, and rests on young and comparatively weak rocks or on unconsolidated deposits. Under these lie older rocks, but they are usually so deeply buried that they play little part in the life of the people, except where they contain coal.

THE SOUTHERN COMPLEX

The southern complex of Europe differs from the northwestern highland almost as much as from the central lowland. Its first subprovince is the old central mountains forming an arc from southern France to western Czechoslovakia (Fig. 40). The second is a series of great disconnected young mountain ranges running sinuously eastward from western Iberia to the Caspian, and including the Pyrenees, the Alps, Carpathians, Balkans and Caucasus. Third come the basins of Hungary, Rumania (Romania), and the Po. The last subprovince is the three great peninsulas of Spain, Italy, and the Balkans. These four subprovinces include so great a variety of geological structure and scenery that even though we confine ourselves to their main characteristics it necessitates a good many details and the use of unfamiliar names. The physiographic diagram, in the pocket, is especially helpful in studying this complicated region.

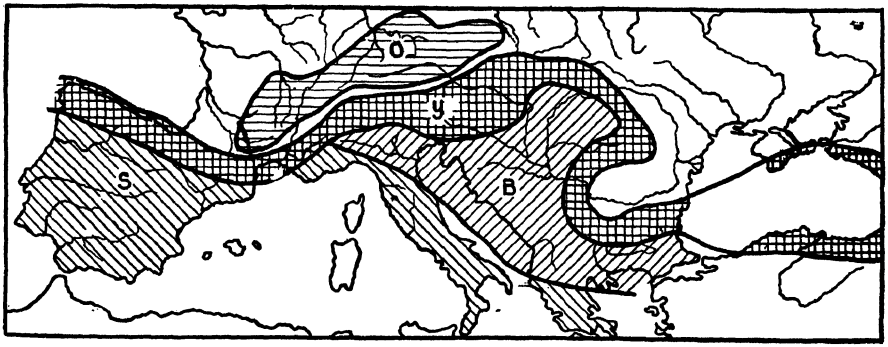


FIG. 40.—Physiographic subregions of southern Europe.

The Old Central Mountains and Their Basins.—From the plateau of Cevennes and Auvergne in southern France, as far as Bohemia, a series of low mountains forms an arc parallel with the Alps. The so-called "plateau of central France," which really lies largely in southern France, forms the portion of this province west of the Rhone Valley. The Jura Mountains and the plateaus of Vosges and Ardennes lie just west of the Rhine. To the east, all of southern Germany from the Schwarzwald (Black Forest) and the Swabian Jura in the south to the Harz Mountains on the north possesses a mountainous character. One of the chief characteristics of all these mountains and plateaus is that they are composed of relatively old rocks and have been worn down to a state of mature relief. Hence the valleys are usually broad with gently sloping sides, gorges are rare, and most of the slopes are well covered with soil. In the south, to be sure, the plateau of central France contains an area covered with recent lavas where the peaks of volcanoes

that broke through old crystalline rocks are still so fresh that the craters in their tops are almost perfect.

Low Timbered Mountains.—Characteristic of this region are the low timbered mountains, the so-called "forests" of eastern France and western Germany. The best known are perhaps the Vosges and Ardennes in France, the Schwarzwald in Germany, and the Böhmerwald (Bohemian Forest) in Czechoslovakia. They are merely relatively flat-topped masses of mountain or plateau broken by broad but rather imposing valleys, and partly covered with forests where they are too rugged and cool to warrant cultivation. The Swiss Jura is of another type geologically, for there sedimentary rocks have been thrown into folds and erosion has removed the weaker rocks, leaving a series of closely parallel ridges. The Swabian Jura, a little farther east, consists of sedimentary rocks with a general slope to the south, so that erosion has produced ridges of the cuesta type, with gentle slopes toward the south and steep slopes at the north, where the resistant layers end. Still another prominent feature of the old central mountains is the number of fault blocks. The plain of the upper Rhine, the so-called Rhine "graben," is bordered by faults, as is the basin of Bohemia locally on the north, in the Erzgebirge and the Riesengebirge. The Rhine graben is clearly shown in the cross section at the bottom of the physiographic diagram.

Bordering the various mountain masses of the complex central European area, and scattered here and there among them, lie a series of rich valleys. Those of the Rhone, the Meuse, the Moselle and the Rhine are famous. Those of the Meuse and Moselle have been cut into the plateaus by the rivers themselves, and hence are relatively narrow. The upper Rhine and Rhone were formerly occupied by glaciers that descended from the Alps. They have wider bottoms, and contain lakes and waterfalls. Farther east and south other valleys of central Europe shelter some of the most prosperous and progressive people in the world. Such are the rich lowland of Switzerland, the valley of the upper Danube in Bavaria, the valley of the Main in Germany, that of the Elbe and its tributary, the Moldau, in Bohemia, and of the middle Danube in Austria.

The Young Alpine Mountains.—South of the old and maturely dissected mountains of central Europe, three great mountain chains have been heaved up in relatively recent geologic times: the Pyrenees, the Alps, and the Carpathians. Farther east the same general line of uplift is continued in the Balkan Range, the mountains of Krim (Crimea), and the mighty Caucasus. The massiveness of most of these chains is in marked contrast with the diffuseness, so to speak, of their old neighbors to the north. From end to end the Pyrenees are a lofty range with no low passes. They form the most decisive kind of boundary between France and Spain and thereby contrast most markedly with the indecisive boundaries formed by the old mountains. In the Alps, open

valleys penetrate far more deeply, largely because the Alps were extensively glaciated. While the passes are generally at an altitude of 4,000 to 7,000 feet, they are relatively lower than those of the Pyrenees which were less extensively glaciated. Nevertheless, until modern roads and railroads were built it was not easy to cross the Alps or to go around them at the western end where they turn south and reach the sea in the Riviera. The Carpathians, although they were only locally glaciated, are enough lower so that they are not so difficult to cross as the other chains, but they form a very decided barrier, and the same conditions obtain to a lesser degree in the northern Balkans (Fig. 311). Still farther east the Caucasus Mountains form an even more distinct and insuperable barrier than the Pyrenees. Nowhere, except at the very ends—700 miles apart—are they crossed by a railroad, and only in the middle at the Dariel Pass is there a wagon road.

How the various ranges compare in effectiveness as barriers may be judged from the fact that the Pyrenees have been an international boundary throughout practically the whole of modern history and have never been crossed by a great army, although armies have gone around the ends. The Alps have usually formed an international boundary and have for long periods sheltered an independent country within their protected valleys, but they have been twice crossed by great armies, once under Hannibal and once under Napoleon. The Carpathians have less often formed the boundary between countries and have been crossed by armies many times. The Balkan Range, too, has been crossed by armies, for instance, by Alexander the Great, by the Russians in 1876, and it has rarely formed a political boundary. The Caucasus with their numerous snow-capped peaks present a curious anomaly. Though the greatest and most impassable of the mountains of Europe, and the natural frontier of the continent, they have been crossed frequently by small Russian armies at the Dariel Pass, and, presumably because of this great pass, they have been for long periods disregarded by the Russians as a political boundary. Indeed the Russians extend Russia in Europe beyond this range, putting it all in Europe, politically.

The Loftier Western Ranges.—Omitting from further consideration the Balkan Range and the lofty Caucasus, let us examine the appearance of the other three chains which form the young Alpine system. The Pyrenees are composed largely of limestones and other sedimentary rocks, and the ascent on either side is relatively sharp and short through steep-sided narrow valleys, which are often highly picturesque. For a considerable distance the peaks rise to about the same height, roughly ten thousand feet, but glaciers are now restricted to small patches, and even the area above forest level is small. The Alps, on the other hand, consist of a number of parallel ranges—the limestone Alps in front on the north, then the main granitic range, and again a limestone

range extending along the eastern part of the southern front. Although a general view of the Alps displays a fairly even crest line, individual peaks stand out much more than in the Pyrenees, as is clearly shown in the physiographic diagram in the pocket. Moreover, considerable areas lie at altitudes above the tree line, so that there are broad tracts of upland pasture, the grassy "alps," above which bare rock, snow, and ice prevail extensively. The most characteristic of all the features of the Alps is due to their extensive glaciation. During the glacial period ice not only filled the upper valleys, as it does today, but extended down to the lowlands. The resultant scenery is marked by flat-floored valleys with steep and often precipitous sides. Above the precipices another and gentler topography often contrasts with that which was formed by the great valley glaciers; and many tributary valleys are perched far above the main valleys into which they flow. The streams of such "hanging valleys" often cascade into the main valleys (Fig. 206). Thus Switzerland owes much of her fine scenery and water power to the fact that the minor valleys contained smaller glaciers and were not eroded so deeply as were the main ones with their great glaciers.

High among the mountains at the heads of the valleys the ice has, as it were, bitten deeply into the main mass of the mountains, cutting numerous rounded depressions (cirques) some of which contain small lakes. This gives to many of the peaks a triangular shape like that which has become famous in the Matterhorn. At lower levels glacial erosion and the morainal dams formed at the ends of the ancient glaciers have given rise to a series of famous lakes, among which the Bodensee (Constance), Luzern, Geneve, and the Italian lakes are especially popular with tourists (Fig. 294). In few parts of the world do the combined features of relief and drainage present so beautiful a picture, and in very few indeed are so many fine bits of scenery easily accessible. This accessibility is partly due to relatively gentle slopes of the larger glaciated valleys which facilitate travel far toward the heads of the valleys (Fig. 214).

Turning to the Carpathians, we find that in their western portion the High Tatry (Tatra) presents many "alpine" features, characteristics of high mountains that have been glaciated. Farther east the Carpathians are relatively low and unimpressive, except that in the extreme eastern portion in Rumania, where they bend to the southwest, they are rather lofty and picturesque.

The Southeastern Plains.—Within the arc of the Carpathians lies the plain of Hungary, while another, that of Rumania, lies between the Carpathians, the Balkans, and the Black Sea. The third plain, that of the Po, belongs in one sense to the Italian Peninsula, but is considered here because of its physiographic character. The three plains are alike in several important respects. Each is largely encircled

by mountains; each is traversed by a river and is largely the product of river deposition; each is flat, deep soiled, and fertile; and each has considerable swampy areas along the rivers. Between the Hungarian and Rumanian plains the Danube has cut a gorge, the Iron Gate, through the spur of mountains that connects the Carpathians and the Balkans. A notable feature of the Rumanian Plain is the swamps at its eastern end where the Danube, after being turned north around the low plateau

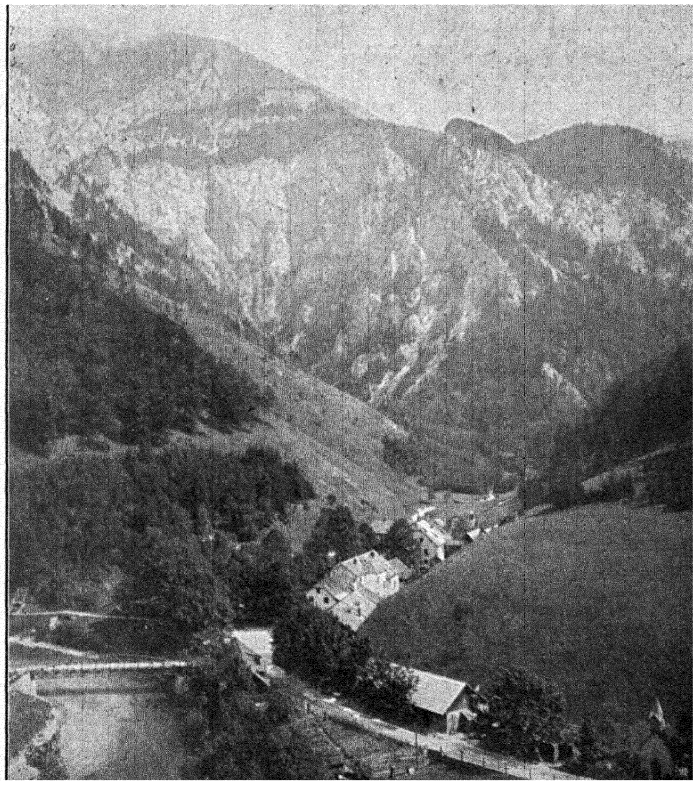


FIG. 41.—Kaiserbrunn in the Austrian Alps. (*Courtesy of the Austrian Legation, Washington, D. C.*)

of the Dobruja, approaches the Black Sea. The swamps at the mouth of the Po are as pronounced as those at the mouth of the Danube. The Po has extended the land at its mouth 13 miles since the days of Caesar, when Adria was a seaport.

The Southern Peninsulas.—The relief of the southern peninsulas is as complicated as that of the old central mountains, and the scale of the mountains is larger. The mountains are generally composed of limestone or other sedimentaries with only a small percentage of igneous

rocks, and the slopes are for the most part steeper and more difficult to scale than those of the old central mountains. The mountains are usually rocky in their lower portions, partly because of being given over so largely to the pasturage of sheep and goats, but still more because of the dry climate (Fig. 51). Higher up, where the rainfall is greater and evaporation less because of the lower temperature, forests of live oak, chestnut, laurel, and similar trees may be found, and at higher levels, pines. The lowlands may be plateau-like, as in Spain (Fig. 42), or valley-like.

The Balkan Peninsula.—In the Balkans and Greece there is a maze of mountains, plateaus, and tiny plains, as the physiographic diagram discloses. Except possibly for Bulgaria, no amount of skill in boundary



FIG. 42.—Terraced slopes above Campdevanol, Spain. The large buildings in the town are apartment residences, not factories. Terracing is common in the Mediterranean countries.

making can divide it into large sections that are naturally bound together. Almost every history of Greece emphasizes this heterogeneity, this division into a great number of small units with conflicting interests. The physiographic diversity of the country and its division into many little natural units is often said to have promoted the growth of democracy in the sense of popular government. If this were the case, we ought to find a democratic form of government in the rest of the Balkans and in other rugged lands, but often instead of democracy there is tyranny. The development of self-government in Greece was apparently due to something in Greek character. What the topography actually did was to promote the formation of many little states, just as happened among the old mountains of central Europe. It may almost be regarded as a geographic axiom that the size and stability of countries depend largely

on their topography. At one extreme lies Russia, the hugest of countries in the hugest of plains, which still hangs together in spite of the shock of revolution. At the other extreme lie the Balkan countries always pulling apart because of their own internal rivalries. A goodly share, although by no means all, of the faults and miseries of the Balkan states must be laid on the topography, which makes communication difficult and thus promotes ignorance and provincialism.

THE BARRIER AND THE OPENINGS BETWEEN NORTHERN AND SOUTHERN EUROPE

The southern highland of Europe forms a pronounced line of demarcation between a large northern and a small but historically important southern section of Europe. Beginning at the Bay of Biscay the line of demarcation follows the Pyrenees, the Alps, the Dinaric Alps, and the Balkan and Rhodope mountains to the Black Sea near Istanbul (Constantinople). In four places the continuity of the mountain chains is broken. First and most important, east of the Pyrenees along the shore of the Golfe du Lion, a broad and inviting gap 160 miles wide gives easy access from the Mediterranean Sea to the central plain either westward via Toulouse and the Garonne River, or northward via the Rhone, the Saône, and the Marne. Second, just east of the head of the Adriatic Sea the broad and lofty chain of the Alps with its high parallel ridges gives place to a single and much less lofty narrow ridge across which railroads have been built with comparative ease along an extraordinarily picturesque route. The third break in the mountains is much less marked than the others. It lies across the Balkan Peninsula by way of the valleys of the Morava and Vardar rivers between Beograd (Belgrade), and Thessalonike (Salonika). In its center there is a pass which is somewhat difficult, but compared with the routes across the mountains either on the east or the west for several score miles, this route is comparatively easy (Fig. 312). The fourth great break in the mountain barrier which separates both Europe and Asia into a northern and a southern section is the waterway of the Bosporus and Dardanelles. Here, as at the Golfe du Lion, the great central plain is brought into close touch with the Mediterranean. Such a narrow opening cannot fail to be a great strategic position. Among all the world's chief cities no other exercises such complete control over the crossing of great land routes and great water routes as does Istanbul. Suez, Gibraltar, and Panama hold similar positions, but none of them controls a comparable land traffic. Moreover, they are far more handicapped by climatic conditions than is Istanbul.

Importance of the Barrier.—The significance of the mountain barrier of central Europe and of the openings through it is simple in principle but complex in application. In general, the barrier has tended to keep

the dark, slight, Mediterranean race in southern Europe, while the fair, tall Nordics and the broad-headed, gray-eyed Alpine people have been kept largely to the north of the mountains. More specifically, the Pyrenees are one of the chief reasons why Spain has preserved its individuality so persistently throughout history. Almost never has there been any serious question as to her northern boundary, and only in rare instances have armies crossed her borders. In the Napoleonic wars she was drawn into the maelstrom much less than any other great country of the mainland of Europe; while in the World War she was not drawn in at all. Yet the Pyrenean barrier has been a hindrance by keeping out trade and northern culture.

The Alps have had a similar effect. Many armies have gone around their eastern end from Austria and contended on the plain of the Po,

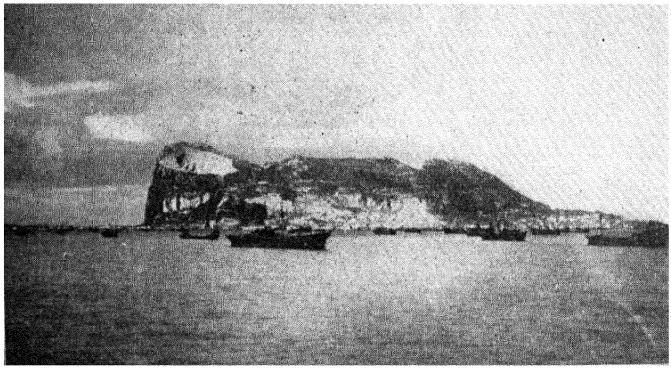


FIG. 43.—Gibraltar.

but it required the genius of Hannibal and Napoleon to take an army across them in the face of an enemy. Italy and Germany are only 45 miles apart in one place, while for 200 miles the distance between them is less than 70 miles. Yet because that 70 miles consists of the high Alps, Italy has had far less to do with Germany than with either France or Austria.

Significance of the Gaps.—Let us turn now to the openings between the mountain chains so clearly evident on the physiographic diagram. The streams of migration that have entered northern Europe have moved in general toward the west. Always, however, there has been a strong tendency to swing southward toward the rich countries which border the Mediterranean. Greece was invaded through the easterly gap by way of Thrace. Later, when Italy was in her prime, other barbarians—Scyths, Goths, Vandals, Huns—came across the plains of Russia and skirted the mountains of central Europe. Part of these invaders sifted down into

Greece from the northeast. Those who came to Rome almost never entered from the west or from the north across the Alps, but instead came from the northeast up the valleys of the Sava and Drava and hence through the Adriatic opening.

Northward Movements.—Thus far we have spoken of movements southward through the four openings, but there have also been northward movements of equal significance. The southward movements have been largely those of people; the northward movements have been those of culture and language. To begin in the east, although some Slavs have penetrated Greece, the Greeks themselves have again and again spread their culture around the shores of the Black Sea, *i.e.*, the Greek Catholic Church and some phases of Greek architecture have prevailed in modern Russia. Passing by the historically less important Balkan corridor, we come to the Adriatic opening, through which avenue Rome spread her power to the eastern plains south of the Carpathian and Transylvanian mountains. The Latin language and something of the Latin culture went with the Roman armies, and Rumania (officially Romania) is today the Slavic country that bears the name of Rome and looks to the Latin countries for its model in all things.

The northward flow of civilization through the opening at the Golfe du Lion was far more important than through any of the other openings. That way went Julius Caesar for the conquest of Gaul, and after him the hosts who Latinized France. Today it is hard to say which is more important in France, the dark Mediterranean peoples and Latin culture, the rugged Alpine people of the Auvergne Plateau, or the fair Teutonic complexion and nordic spirit of northern France. It has often been thought that to this full mingling of the great races of Europe France owes her versatility, her happy combination of a sturdy independence with a lightness of touch and a love of art that makes her the leader in many things.

The northern sweep of culture through southern France did more than this, however, for it gave the Roman church supremacy over all western Europe for a while. It likewise spread Roman law through most of western Europe and laid the foundations of the Holy Roman Empire, an ideal which helped to guide Europe's political development for more than a thousand years. Even beyond the English Channel the effect of the open road up the Rhone is still strongly felt, for through it early England received much of value.

CHAPTER IV

CONTRASTS IN SOIL, VEGETATION, AND AGRICULTURE

The soils and native vegetation have received incidental mention in the chapters on climate and relief, but they can advantageously receive a somewhat fuller discussion in connection with a survey of the agriculture.

CAUSES OF DIFFERENCES IN SOILS

As the character of the soil depends primarily upon climate, slope, and the nature of the parent rock, and as there are, as we have seen, considerable differences in these in Europe, numerous varieties of soil are present. The special characteristics of the soil are also strongly affected by the vegetation. The vegetation is in turn largely determined by climate, slope, drainage, and soil; so it will be best to consider the soil first.

Climate and Soil.—In regions which have a large number of permanent streams, because rainfall is in excess of the evaporation during much of the year, the escaping water carries off to the sea a large amount of mineral matter dissolved from the soil. Hence such regions normally have rather infertile soils.

Rich Soils of the Drier Regions.—In regions with very little rainfall, on the other hand, much of the soluble mineral matter remains in the soil. Indeed, whenever evaporation is in excess of run-off, the soluble minerals accumulate in the soil, with the result that the drier regions normally have a soil rich in the mineral plant foods. In many dry areas, wherever considerable underground water ascends and evaporates, the accumulation of soluble mineral matter is commonly excessive. This is true also in level areas that are flooded by the run-off caused by the occasional downpours, alkali tracts or salt flats are the result.

A large area near the Caspian Sea, considerable areas in southern Spain and Portugal, and smaller tracts elsewhere in southern Europe are damaged by an excess of soluble minerals in the soils of their flatter portions, because the evaporation in those areas notably exceeds the local rainfall. Despite the inflow from the longest river in Europe, the Caspian Sea is drying away so that the surface is now some 86 feet below the level of the ocean, and a considerable area in that region is below sea level. (See the physiographic diagram.) In the entire Mediterranean region evaporation exceeds rainfall, as is proved by the fact that a large volume of water is constantly entering the Mediterranean Sea from the Atlantic.

Therefore, on the average the level soils of the Mediterranean region are fairly rich in mineral matter unless depleted by agriculture. On the hillsides, however, run-off exceeds evaporation, and hence there the soils are leached unless they are carried away before this occurs. As there is a large amount of run-off in this region following the often torrential rains, there is considerable erosion on the steeper slopes, which therefore often have only a thin soil that has been exposed so recently to the action of the air and rain that it is not leached.

Poorer Soils of the Wetter Regions.—According to the general rule that rainy cool regions tend to have relatively infertile soils, much of northwestern Europe ought to have poor soils and does, except where the parent material is especially rich in mineral plant foods. Fortunately, however, a large share of northern Europe was recently glaciated and the fine materials made by the ice as it ground up the rocks normally still contain sufficient soluble mineral matter to produce fairly fertile soils. Where the glaciers ground up sandstone or other rocks composed largely of quartz, however, the glacial deposits are often excessively sandy and infertile so that the soils developed on them require extensive fertilization in order to yield bountiful crops. The remarkable potash deposits of Stassfurt, Germany, and the smaller deposits in Alsace have been used to especial advantage on soils of this sort. Northwestern Europe has also imported vast quantities of nitrate from Chile, and now is obtaining even greater amounts by chemically fixing the nitrogen of the air. The other critical mineral plant food, phosphate, is also imported in large quantities. Formerly much came in the form of guano chiefly from desert islands of the Pacific, but now it comes mainly in the form of phosphate rock from north Africa and Florida. Recently also much phosphate fertilizer has been made in Europe as a by-product of the smelting of phosphorus-bearing iron ores, the so-called "Thomas slag flour."

In addition to areas covered with glacial deposits which still contain much soluble plant food, northwestern Europe has some areas of relatively productive soil developed on impure limestones, as well as many small areas of fertile alluvial soils along the flood-plains or former flood plains of rivers or on their deltas.

Soils in Eastern Europe.—In much of eastern Europe, in the continental climatic province, there is relatively little run-off. The discharge of the Volga, which with its tributaries drains a large share of eastern Europe, is often very small indeed, and averages less than a fourth of the discharge of the Rhine, whose basin is small in comparison. According to the rule, therefore, the soils of eastern Europe ought on the average to be rich, and they are. Furthermore the northern half has been recently glaciated and is covered, except in much of Finland and northern Russia, with a deep layer of glacial drift which contains large amounts of soluble mineral matter. Southward beyond the area of the drift left by the later

advances of the glacier is a wide zone of an exceptional character, the black earths.

The Black Earth Belt.—The famous black earth soils of southern Russia are considered by experts to be among the best in the world. They were formed in a grass-covered plain, beyond the margin of the glacier at its last great advance. They consist of materials carried thence by streams and especially by the wind. The wind-blown glacial clays and fine sand lodged in the growing grass and accumulated to great depths. The abundant roots of the grass have added large quantities of humus, which gives the soil its black color. Forest soils, in contrast, normally are light colored and are rather poor in humus, as are also the soils of the drier regions wherever there is not an abundant growth of grass. In the Mediterranean region, therefore, and also in northwestern Europe light-colored soils predominate. In both regions, however, the alluvial soils are dark, and in northwestern Europe the soils are black in the many areas that were formerly marshy or which have long been used for meadows, even though they were originally forested. The latter have been decidedly improved in quality. But the opposite result has occurred in much of southern Europe where long cultivation of hillsides has resulted in a serious soil removal by erosion. Indeed innumerable small tracts which had fertile soil during the time of ancient Greece and Rome are no longer suited for tillage.

VEGETATION REGIONS

Europe has ten major vegetation regions, each with different agricultural conditions. Mention should also be made of a number of additional types of agriculture developed under special conditions within one or another of the major types of vegetation.

These major types are the tundra, the moors, the northern coniferous forest, the mixed forest, the deciduous forest, the prairies of tall grasses, the steppe of short or bunch grasses, the Mediterranean hard-leaved dry forest, the zone of coniferous forest on the mountains, and the Alpine meadows.

The distribution of these ten types of vegetation depends upon climate, relief, and soil; and hence the major areas of the occurrence of most of them have already been mentioned in connection with climatic types and relief features. The distribution of the larger areas of the chief types is shown in a generalized way in Fig. 44.

The Tundra.—This type prevails in the subarctic climatic province discussed in Chap. II but is also represented on some high mountains. Furthermore, the heaths or moors have many plants which are found in the tundra also, such as the cranberries, dwarf blueberries, dwarfed willow, birch, sphagnum mosses, certain sedges and grasses, and a variety of herbaceous flowers. The tundra's most useful plants are the grasses and

the lichen known as "reindeer moss." The tundra and the moors resemble one another in vegetation because in both the plants suffer from the cold and the excessive acid water in the soil. Although in winter the tundra is much colder than the moors of Ireland and northern Germany, for example, the tundra plants are there largely protected by snow and are less commonly winterkilled by the biting winds than are those of the moors in regions where the snow is less regular and persistent. The

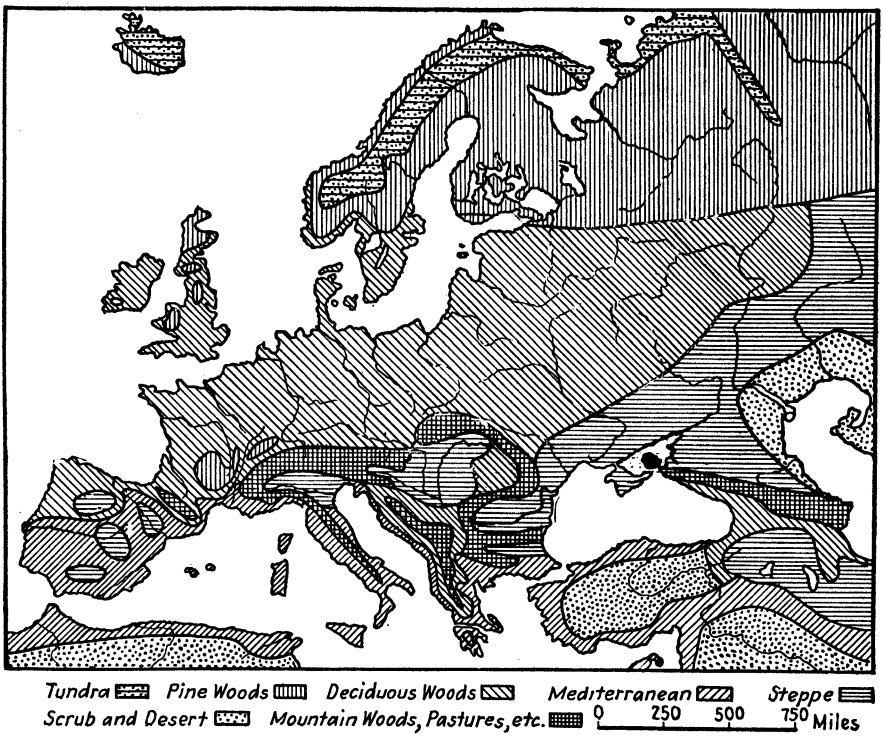


FIG. 44.—Vegetation regions, generalized. (*After MacMunn and Coster, Oxford University Press.*)

tundra is too cold, at night at least, for crops, and the only type of agricultural activity is the grazing of reindeer. The moors and heaths are likewise not tilled and are largely unoccupied despite their frequent proximity to dense populations. They are put to some use, however, as poor pasture lands for cattle and sheep, and are also the home of protected game animals such as the stag and the grouse.

The northern coniferous forest occupies the northern part of the continental climatic province and extends into the marine climate on the elevations. It is characterized by fir, spruce, larch, and pine of numerous varieties (Fig. 229). It also contains the small deciduous alder, willow, birch, and aspen, especially along streams. Between the trees, wherever

they are not too dense, there are numerous shrubs, herbs, and grasses. The grasses are not abundant enough, however, except in clearings, to make this zone important for grazing. Here and there in the northern coniferous forest, especially in its warmer southern half, there are clearings partly devoted to turnips, potatoes, oats, flax, and hay for cows kept for their milk. Lumbering is extensively carried on in this province, especially in Sweden and Finland (Figs. 246, 248).

The mixed forest is transitional between the northern coniferous and the deciduous and is widely represented in the marine climatic province, especially in sandy, rocky, or somewhat poorly drained soils. Its main development, however, is to the eastward, where it occupies a wide zone across central Russia. Extensive clearing has been made in this forest;

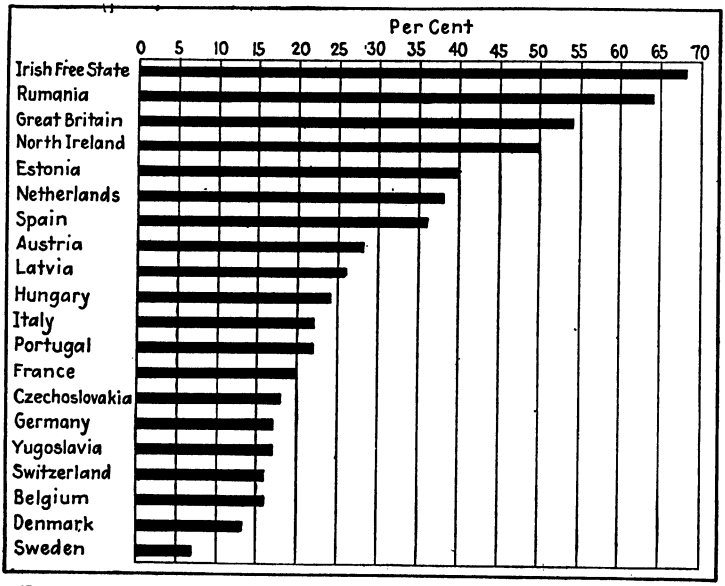
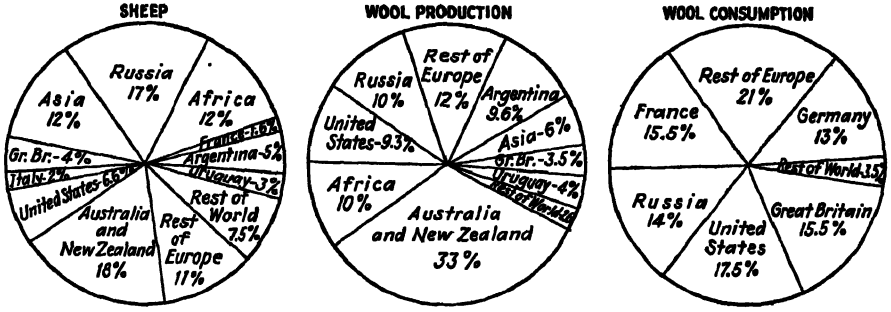


FIG. 45.—Permanent pasture and meadow, percentage of total area. (*Data from Huntington and Williams' Business Geography.*)

indeed in the west it remains only where soil conditions are unfavorable to agriculture (Fig. 45). In the Baltic states and Russia the cleared land is used extensively for the growing of forage and root crops, a large part of which are fed to cattle (Fig. 49). In addition flax for fiber and the hardier cereals, namely, rye, barley, and oats, are grown. In Denmark, Belgium, France, and especially Germany, this type of forest has received considerable care, the more valuable conifers being protected. Indeed considerable areas in this zone, such as sand-dune areas including the "landes" of southwestern France, have been planted with trees in rows, and the forest itself is really a phase of agriculture, which yields a crop of wood and turpentine of relatively high value per acre (Fig. 170).

The deciduous forest lies next south of the zone of mixed forest just mentioned. It has been largely cleared off because in general the oak, linden, beech, elm, and other trees of this type of forest thrive on land which is well suited to crops. The warmer lowlands of the north European Plain with their great agricultural development were originally nearly everywhere occupied by this type of forest. The type of agriculture displays, however, considerable regional contrast. In England, Belgium, Netherlands, and the northwestern part of France (Flanders), a very intensive type is carried on, with a strong emphasis on live stock. Dairy cows predominate in the wetter areas, and sheep in the drier (Figs. 46 to 48). Farther east, in Germany and Poland, on the sandier soils especially, the potato and sugar beet are grown intensively and rye widely but not so intensively. Swine are raised in exceptional numbers there. Still farther east, in Russia, the agricultural practice followed is much less intensive or specialized (Fig. 50).

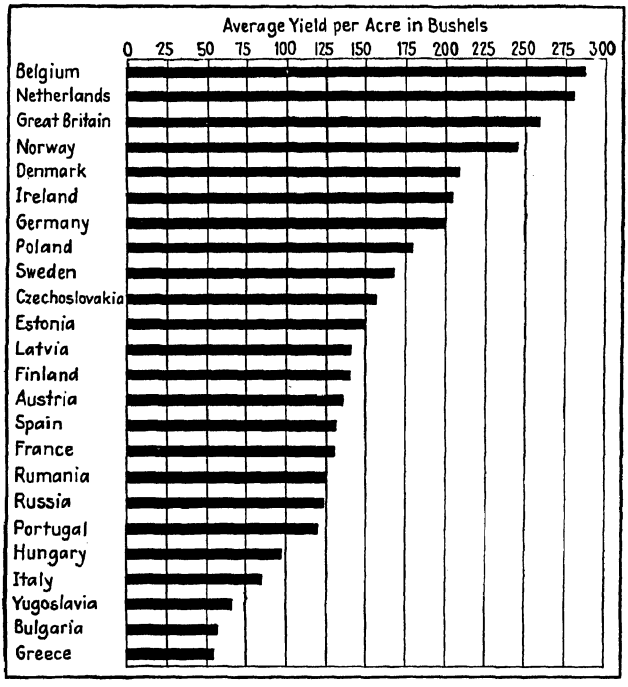


FIGS. 46 to 48.—Percentages of the world's sheep, wool production, and wool consumption, 1925 to 1927.

The Prairie.—On the south the western part of the deciduous forest zone passes through a transition forest type into the Mediterranean scrub forest, but in Hungary, Rumania, and Russia a belt of prairie intervenes. The western transition area includes the oak forests of Portugal, upon which are pastured many swine. Natural or artificial clearings in this transition zone produce much corn in northern Iberia and southwestern France, for the climate approaches that of the prairie states of the American corn belt. The Russian prairie includes the western more humid part of the belt of black earth soils, which is the best agricultural region of Russia. Wheat is grown extensively, especially in Ukraine (Fig. 262). The prairie zone narrows decidedly toward the east from Ukraine but is everywhere extensively farmed in Russia. In Rumania, Hungary, and southwestern Russia considerable land is devoted to corn (Fig. 256).

The Steppe.—Southeastern Russia contains a considerable area of steppe. These are grassy plains covered with short grasses or with scattered clumps of tall grasses, between which the ground is largely bare.

This area is often too dry for crops, and the more nearly the Caspian Sea is approached, the more frequent are the crop failures. In the better parts of the steppe the average yields are low. In its poorer parts they are so low that the chief dependence of the population is on grazing. Sunflowers, barley, and various other hardy plants are grown increasingly, however, as the population pressure becomes more intense. Recently, the Soviet Government is raising, with the help of the most modern machinery for extensive farming, considerable winter wheat during



IG. 49.—Potatoes, average yield 1922 to 1928. The countries near the southern shores of the North Sea rank highest, and, with slight exceptions, the decline is rather steady in all directions thereform. The yield is lowest at the southeast. (The post-war average yield is higher than the prewar except in Germany, Hungary, Italy, and Switzerland.)

favorable seasons. A part of the plain of Hungary is also dry enough so that it is devoted to grazing rather than to crops (Fig. 254).

The Mediterranean Scrub.—The Mediterranean type of vegetation is characterized by scrubby trees, especially the evergreen oak, chestnut, laurel, and in the warmer places, the olive. Quite as representative are the numerous bulbous perennials like irises. These are conspicuous in the spring because of their leaves and showy flowers, but when the summer drought sets in, they die down and only the bulbous root remains. The hyacinth, tulip, leek, and onion are other well-known examples. The Mediterranean trees are drought resisting, and have leaves that are either

thick and shiny or small and pubescent. Their nutty seeds, such as the walnut and chestnut, are valuable sources of food. In case of the olive the cover of the seed produces a valuable oil. Large numbers of swine are reared in the oak forests of the Balkan Peninsula especially, and cork is removed extensively from one species of oak in Spain and particularly in southern Portugal (Fig. 52).

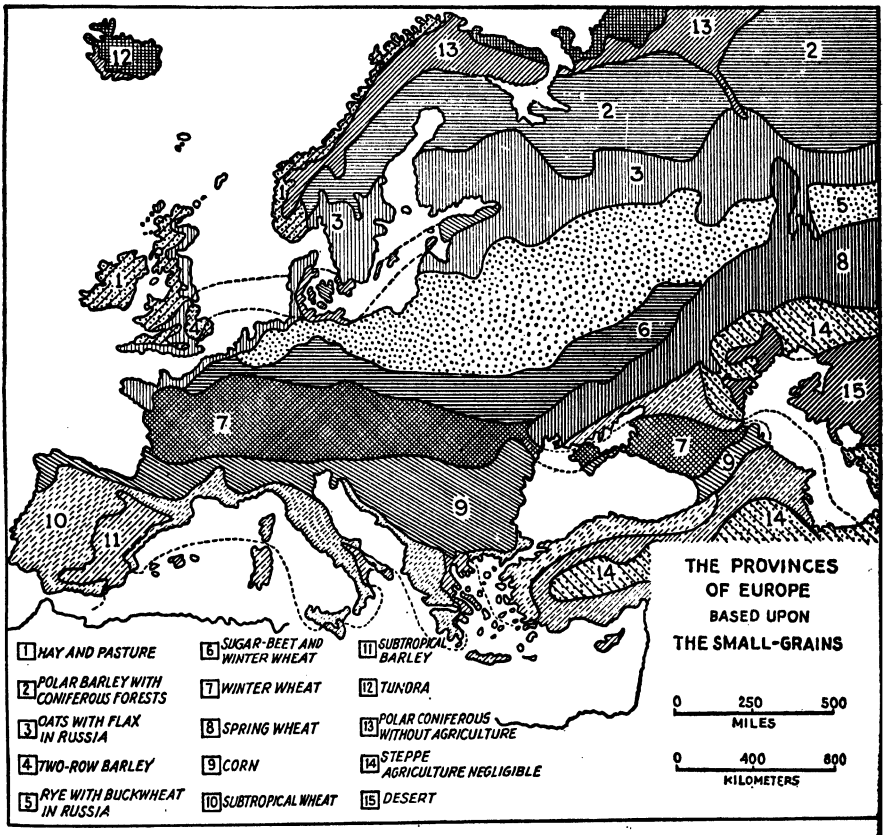


FIG. 50.—Agricultural regions, generalized. (*From D. Jonasson, Agricultural Regions of Europe, in Economic Geography, published by Clark University, October, 1925, by permission.*)

Among the trees and the bulbous perennials grow many small hardy shrubs and considerable wiry grass upon which brouse large numbers of sheep, goats, and asses. These animals are especially numerous in the Balkan Peninsula.

Mediterranean Agriculture.—The agriculture of the Mediterranean region is dominated by the growing of winter cereals, the vine, tree crops, especially citrus, olive, mulberry, nut-bearing sorts, and grazing. The growing of lucerne (alfalfa) is also widespread. The cereals are sown in

the autumn, grow throughout the moist mild winter, and ripen as the dry summer comes on (Figs. 56, 57, 170). The peach and almond blossom with the first warm weather and ripen their fruit if possible before the

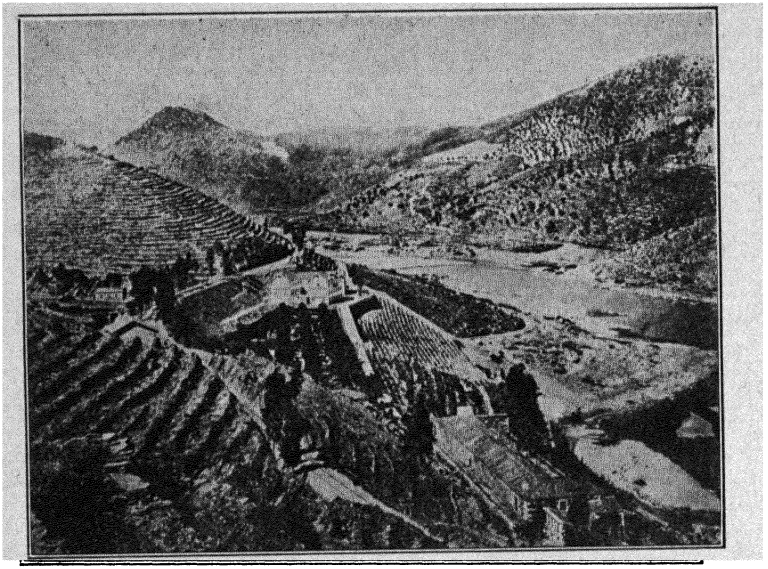


FIG. 51.—Terraced slopes in the Oporto district, Portugal.

drought of the summer. The olive is drought resistant but yields little except where watered by run-off or irrigated (Figs. 55, 279). The citrus trees are irrigated as is the mulberry and lucerne. Indeed throughout

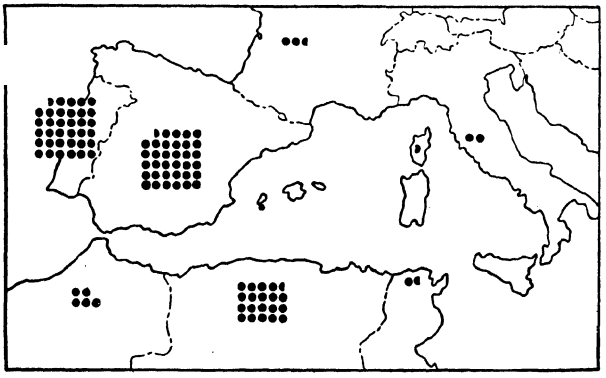


FIG. 52.—Cork oak trees. Each dot represents 1 per cent of the world's total. (*Data from Zon and Sparhawk.*)

the Mediterranean region irrigation is carried on as extensively as possible among people with little capital with which to construct expensive reservoirs and other irrigation works (Figs. 51, 173). The mulberry is used chiefly as feed for the silkworm, which is extensively raised in Italy,

southern France, and southern Spain. The vine yields vast quantities of fruit that is eaten fresh, much that is dried into raisins or Grecian "currants," and still more which is used in making wine (Figs. 174, 298). The chestnut is particularly important in Italy and southern France, and the Circassian, Persian or English walnut in the northern Balkan peninsula. The area of most intensive orange production is in southern Spain and of lemons in Sicilia (Sicily), Figs. 53, 280. Some lemons and more oranges are grown as far north as the Riviera of southeastern France and northern Italy, even though this area is as far north as Toronto and Milwaukee. This is possible largely because the lofty Alps shut out the cold winds from the north—in fact convert any winds which cross them into warm winds (foehns). Lemons and oranges are grown

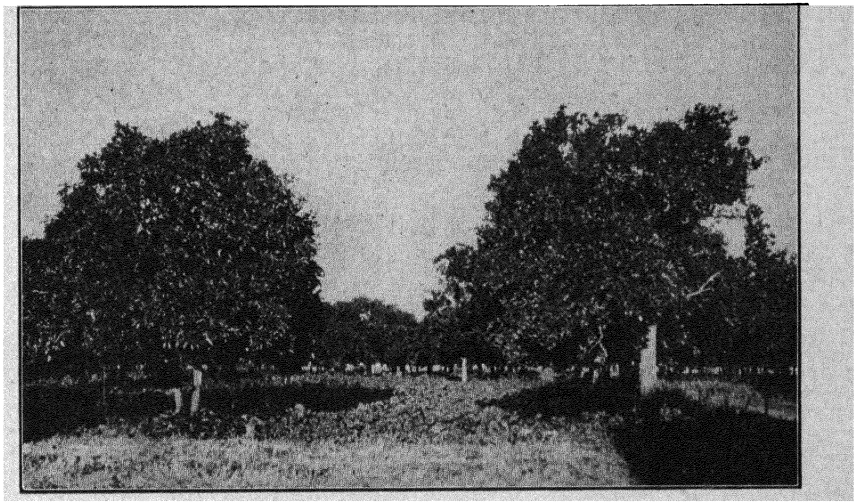


FIG. 53.—A Spanish orange orchard.

thus far north only against south-facing walls or cliffs which receive a maximum of heat from the sun. The reflection from the Mediterranean or other water bodies often increases the heat received. Also the sea gives up enough heat to prevent the temperature from falling too low at night (Fig. 54).

Other special phases of the Mediterranean agriculture merit mention here; one, the extensive growing of vegetables and flowers which are sold in winter and spring in the cities of northern Europe. Many flowers are also used for the making of perfumery. Southern France yields most cut flowers and Bulgaria most perfumery. Another specialty is the growing of "Turkish" tobacco, especially in northern Greece.

Mountain Forests.—The remaining great vegetation types of Europe are the coniferous forest on the mountains and the Alpine meadows. The former resemble the northern coniferous forest in several respects

and might have been included with it. Coniferous forests occur, however, on the mountains which are high enough, even in southern Europe. They are extensively used especially in central Europe as a source of wood, but only a little agriculture is carried on in their midst. Most

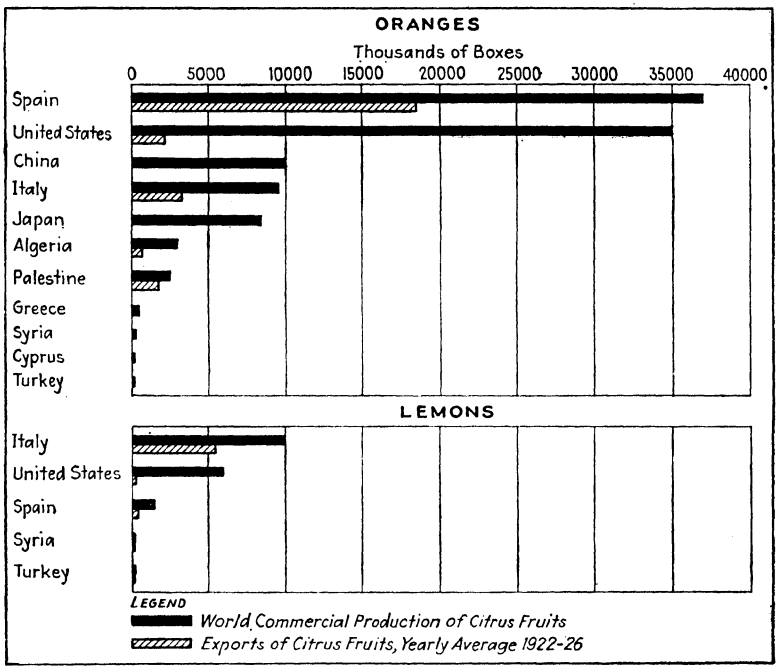


FIG. 54.—Production and export of oranges and lemons, average 1922 to 1926.

crops are barred by the low temperatures, and grazing is limited by forest growth and the desire not to injure the young trees.

The Alpine Meadows.—Above the timber line on the mountains are meadows which contain a multitude of flowers that are very showy for

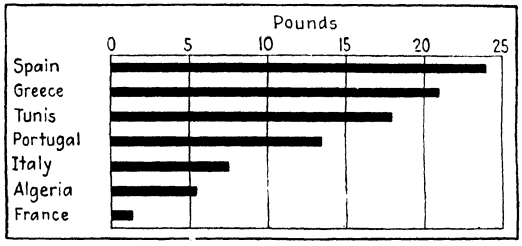


FIG. 55.—Olive oil consumption, per capita, average 1923 to 1927.

a short time in the summer, and also much grass. The meadows are used extensively for pasture during the summer. Goats, sheep, and especially cattle are driven up to them for a stay of a few weeks under the supervision of herders.

OTHER REGIONAL CONTRASTS IN AGRICULTURE

Another sort of survey of the agriculture of Europe is now desirable. It considers the regional contrasts in the intensiveness, the thoroughness, and the success of agriculture.

Contrast in Crop Yields.—It is rather astonishing to note to what degree and how systematically and progressively the per acre yield of crops declines in all directions from the countries bordering the southern part of the North Sea (Figs. 45, 49, 57, 297). Accompanying this is an equal deterioration in respect to live stock both in numbers and in quality, with a few special exceptions, such as the increase southward in mules, asses, and goats (Figs. 313, 314), and the fact that the Balkan Peninsula has even more sheep per square mile than the average for the North Sea countries, though no more than has a large part of Britain

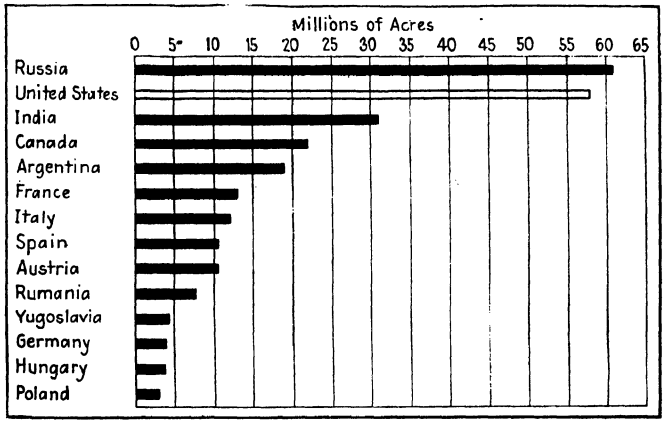


FIG. 56.—Wheat acreage, average of 1922 to 1928, millions of acres.

(Fig. 152). Of course the crops which are not adapted to the North Sea region can not show any such decline as one goes away from that region. Nevertheless around the North Sea and especially in Belgium a surprising area is under glass. This produces either crops such as grapes, which are not adapted to the region, or crops which are out of season. In such greenhouses it is quite probable that the yield per acre is higher than anywhere else on the continent.

Regional Contrasts in the Quality of Live Stock.—An important way in which the North Sea region leads in respect to live stock is that most of the important breeds were developed there. Of *beef cattle* the world's chief breeds are the Hereford, Aberdeen-Angus (blackpolled), and Shorthorn or Durham, all British. Of *dairy breeds* those most widely used are the Jersey and Guernsey, from the British Channel Islands, and especially the Holstein Friesian from Netherlands. The Shorthorn is the world's chief dual-purpose cow. Of *sheep*, all the leading breeds

are British in origin except one, the Merino, developed in Spain. But the variety of the Merino which is most widespread and valuable is the Rambouillet, which originated in northwestern France. Of *swine*, the important breeds are also from Britain except the American kinds developed therefrom. Of *horses*, the world's leading draft breeds are the Percheron from northwestern France, the Belgian or Flemish, and the Clydesdale and Shire from Britain.

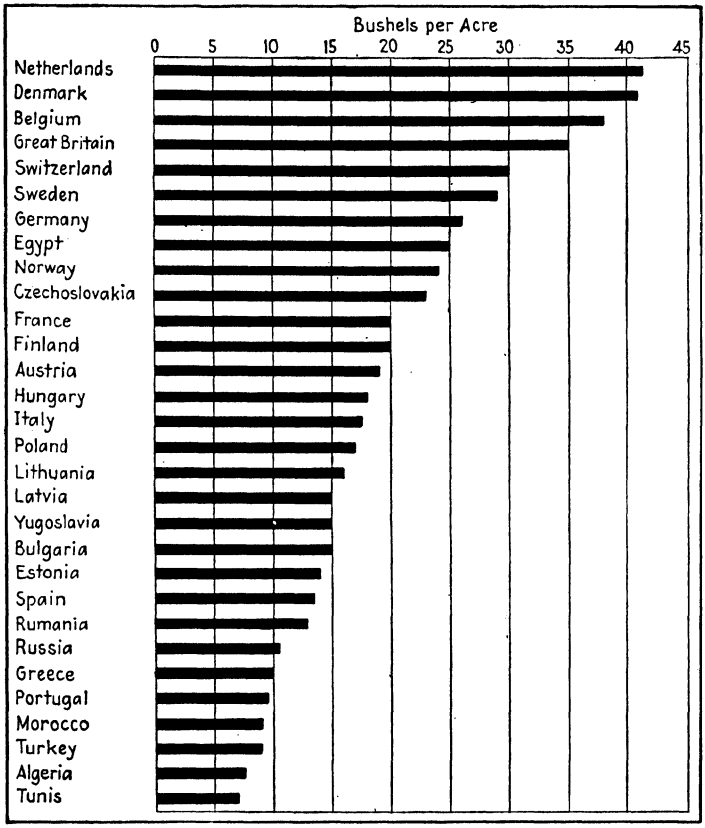


FIG. 57.—Wheat yield per acre, average of 1922 to 1926 inclusive, bushels. The decline with increased distance from the southern shores of the North Sea is shown rather strikingly.

These breeds of live stock developed in the North Sea region and especially in Great Britain have spread widely over the world and are now much the most important except in certain tropical areas not adapted to them. This is because experience has proved them to be decidedly the most profitable, yielding more meat, wool, milk, or strength per unit of food and care than do any other breeds (Fig. 184).

Centers of the Production of Certain Crops and Animals.—Although many of the areas specializing in particular crops or farm animals have

been mentioned already, a summary of this topic may close the chapter.

Wheat, perhaps the most valuable crop taking Europe as a whole, is grown widely, but areas where it is particularly prominent are France, Italy including Sicily, southern Russia, the Hungarian Plain, and southern Rumania (Figs. 56, 57, 173, 262). *Rye.* Germany, Poland, and central Russia. *Oats.* The coastal region from western France to Denmark. *Barley.* Southern Russia (Fig. 263). *Corn.* Northwestern Portugal and adjacent Spain, the Po Valley, the Hungarian and Rumanian plains; the coastal parts of central Italy (Fig. 258). *Potatoes.* Germany, western Poland, Netherlands, Belgium, Ireland, and less intensely from France to central Russia (Figs. 49, 252). *Grapes.* Southern France (particularly in the extreme south and near Bordeaux), Italy, Iberia (Figs. 174, 298). *Sugar Beets.* Extreme northeastern France, central Germany, central Ukraine (Figs. 193, 221). *Cattle.* Ireland to Brittany and thence east to Denmark and Germany. *Swine.* Belgium, northern Germany, southern Denmark (Fig. 196). *Sheep.* Britain, northern Netherlands, the Balkan Peninsula, especially the northern part, and Turkey in Europe (Fig. 152).

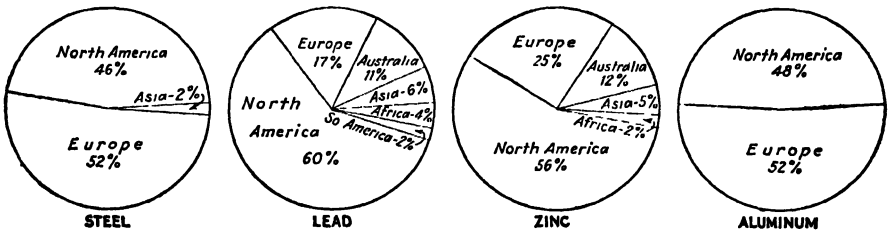
CHAPTER V

MINERALS AND WATER POWER

Europe is the world's greatest mining camp. We rarely think of it in that way, for places like Australia, Mexico, the western United States, and South Africa usually occur to us when mines are mentioned. That, however, is merely because in those regions mining is the main or at least a major industry, whereas in Europe it is less important than agriculture, manufacturing, or commerce. Yet of the total mineral wealth taken from the ground, Europe digs out approximately one-half.

EUROPE'S PERCENTAGE OF PRODUCTION

Of the more important mineral raw materials, Europe's production in the most recent year for which full information is available (1928 or 1926) amounted to more than four-fifths of the world's output of four;

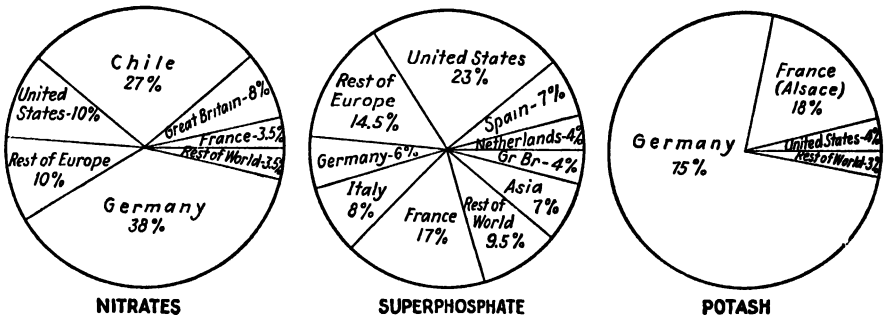


FIGS. 58 to 61.—Percentages of world's total production of essential metals by continents, 1927 or 1928.

namely, potash, 96 per cent; mercury, pyrite, and fluorspar, each about 87 per cent. It produced more than one-half of the supply of seven; namely, iron ore, 57 per cent; aluminum ore (bauxite), 57 per cent; nitrate, barite, graphite, each about 60 per cent; magnesite and china clay, each about 70 per cent. Europe produced practically half of the coal and more than a quarter of the gypsum, 40 per cent; manganese 36 per cent; talc 35 per cent; and zinc, 26 per cent. It also produced important parts of the phosphate, sulfur, 20 per cent; chromite, 18 per cent; lead, 17 per cent; petroleum, 10 per cent; copper, 9 per cent; antimony, 9 per cent; asbestos, 7 per cent; and mica, 6 per cent. Finally, production of about 3 per cent of the world's tin and tungsten were also scarcely insignificant as these are relatively rare metals (Figs. 58 to 61).

The foregoing 26 minerals include all of those selected for discussion in the survey of the most important mineral raw materials made by the U. S. Department of Commerce in 1929 except nickel, the production of which is almost restricted to the Sudbury district of Canada and the South Pacific island of New Caledonia.

A more complete survey of the mineral industry in 1913 was published by the U. S. Geological Survey in 1921 as part of the unique World Atlas of Commercial Geology. It shows that in 1913 among minerals not mentioned above, Europe supplied 65 per cent of the arsenic, 99 per cent of the oil shale, 93 per cent of the platinum, 25 per cent of the molybdenum, 7 per cent of the silver and 1 per cent of the gold. In the long list studied by the U. S. Geological Survey vanadium alone was supplied by Europe to the extent of less than 1 per cent, and of only gold, nickel, tin, and vanadium did Europe produce in 1913 less than its proportion based on area. Of only four others, chromite, copper, phosphate, and silver, did it produce appreciably less than its share on the basis of



FIGS. 62 to 64.—Mineral fertilizers, percentages of world's production, 1928.

population. Since 1913 Europe's production of phosphate fertilizer, to a considerable extent as a by-product of the smelting of phosphorus bearing iron ores, has increased so greatly that now it is more than half of the world's total.

In brief, in proportion to area Europe produces more than four times her share of more than half of the important minerals. Of coal and iron ore and the critical mineral plant fertilizers, which are by far the most important, her production is over eight times her share (Figs. 62 to 64). Europe is especially ahead in the use of low-grade deposits, of which the world possesses much more than of high grade. Of lignite and of oil from shale Europe now produces nearly the entire world output.

EUROPE'S MINERAL RESOURCES COMPARED WITH THOSE OF OTHER CONTINENTS

The mineral resources or reserves of a country are a very different matter from its actual production. The production shows little as to the

actual amount of ore in the rocks. Europe has developed her resources so much more fully than has any other continent that in some instances, such as magnesite, pyrite, oil shale, platinum, and potash, she produced in 1913 almost the total output, although her actual supplies are perhaps only a few per cent. Potash is a striking example of this. As late as 1914 the whole world relied on the supplies which Germany had developed at Stassfurt. Then the war stimulated a search and deposits of considerable magnitude were found in the United States and Africa. In the vast desert regions of Asia, north Africa, and Australia, the climatic conditions have been so favorable to the formation of salt lakes that there is possibly even more potash in those regions than in either Europe or

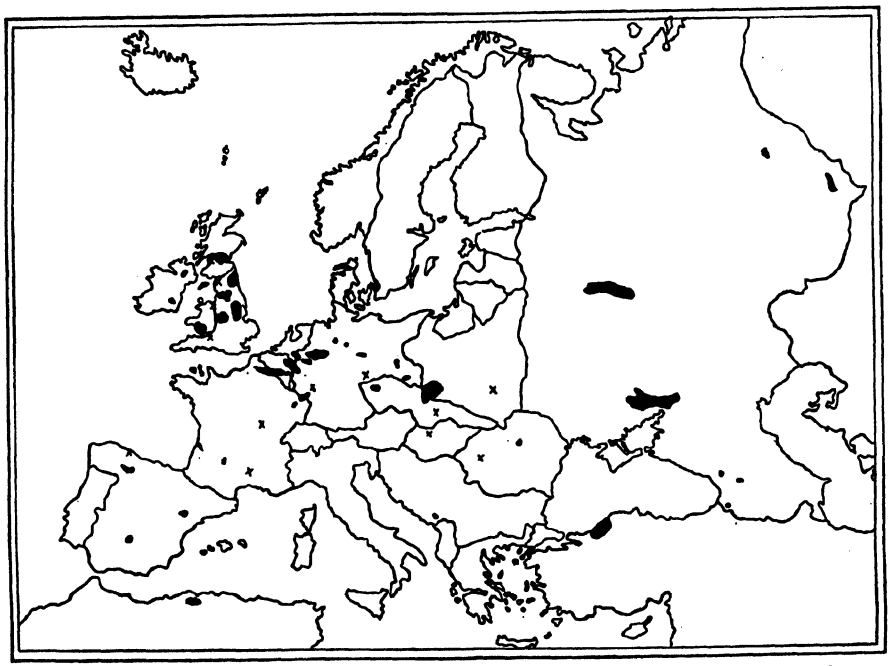


FIG. 65.—The coal fields, larger areas underlain by coal in black, smaller ones shown by crosses. (Area of coal fields does not show amount of coal.) (*From U. S. Geological Survey, World Atlas of Commercial Geology*, 1921.)

the United States. It will remain undeveloped, however, until reached by the same conditions of energy and progress which caused Europe's supplies to be developed first, and then those of the United States. Taking into account the completeness with which Europe's mineral resources are known and the paucity of our information as to the other continents, especially Asia, Africa, and South America, it appears that, aside from coal and iron, Europe is probably the poorest of the five large continents in mineral wealth. In iron, North and South America at least surpass Europe, and in coal, North America far surpasses.

According to the authentic World's Coal Resources, International Geological Congress, 1913, Europe has only about 17 per cent of the world's reserves of high-grade coal, yet she produces almost 50 per cent of the annual output (Fig. 65).

CONDITIONS WHICH GOVERN EUROPE'S PRODUCTION OF MINERALS

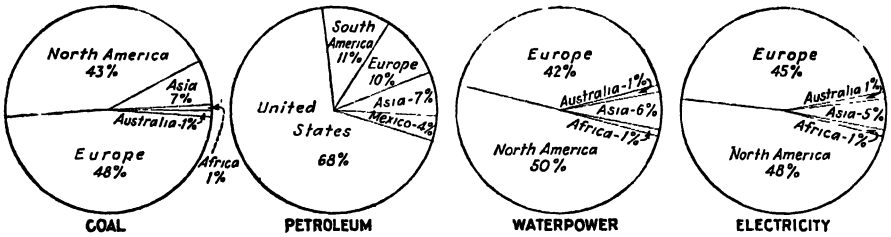
Having seen that Europe produces vastly more than any other equal area, we shall next study the conditions which govern her production. Two are of chief importance: the accessibility of the minerals in the sense of the extent to which they are visible on the surface and hence can easily be discovered, and second, the mental and physical activity of the people, and their advancement, with their consequent desire to use minerals on the one hand, and their ability to find and exploit them on the other.

The accessibility of minerals, as here defined, depends on the extent to which they are hidden by soil and vegetation. In this respect Europe is at a disadvantage. Most of Europe is covered with deep soil—glacial, fluvial, or residual—while generally there is a thick cover of vegetation which makes it difficult to discover whether or not the rocks of a given area really contain any metals, fuels, or other materials that man can utilize. In North America, Asia, and Australia, on the other hand, vast areas where the rocks are highly mineralized are relatively dry. Hence, the soil is thin or lacking and the prospector, being able to see the nature of the rock, can the more easily search thoroughly. Even in Africa the areas where such intensive search is possible are far larger than in Europe, although other vast areas of tropical forest will long discourage the prospector. Only in South America is the continent as a whole so largely covered with vegetation and deep soil as is Europe.

Even in Europe there are two large areas where the soil is generally thin and the cover of vegetation scanty, the northwestern highland on one side and the southern peninsulas on the other. In the northwest the ice sheet carried away the soil from the more rugged regions and hence vegetation is locally absent. In the south the dry climate interferes with the growth of thick vegetation, and the occasional torrential rains, as we have seen, carry away much soil. If accessibility alone were the main factor, and if the mineral wealth of Europe were evenly distributed, we should find the greatest mining industries in northern Scotland, Norway, Sweden, and Finland, on the one hand, and in Spain, Italy, and the Balkan Peninsula on the other hand, while central Europe, even in its mountainous portions, would be poor. The actual facts, however, are utterly different, for the order of importance is first the center, then the south, and last the north.

The Human Activity Factor.—The most important factor in Europe's striking dominance in the field of mineral exploitation apparently is

the energy and advancement of her people. Because the people have these qualities they have analyzed every kind of rock and have discovered for the first time at least nine-tenths of all the chemical elements including metals. They have, also, discovered most of the uses for the minerals, which uses have encouraged a systematic search for additional valuable deposits. In the other continents the typical searcher for mineral wealth is the prospector who traverses the half-naked mountains on foot and looks everywhere for bits of rock that seem rich. In Europe, on the contrary, the typical searcher is the trained geologist or mining engineer. Of course the scientific study of the earth's crust is now progressing steadily all over the world with the help of Europeans, but nowhere else is it so advanced. Europe has been examined so thoroughly that it cannot expect to yield the great



FIGS. 66 to 69.—Percentages of world's total production of sources of power, by continents, 1928.

discoveries of new and easily exploited mineral wealth which are sure to occur in the other continents.

DISTRIBUTION OF PRODUCTION

The production of minerals in the countries yielding most is given in Table II. The areas of chief production of the chief minerals are indicated in Figs. 65, 157 and 201.

In the importance of all mineral production combined there are five belts corresponding more or less closely with the belts of relief discussed in Chap. III and yet differing from them in certain respects. From north to south these are as follows: (1) the northern slightly mineralized belt; (2) the north central belt of coal and iron; (3) the central belt of varied minerals; (4) the poorly mineralized mountain core; (5) the mining regions of the southern peninsulas.

The Northern Slightly Mineralized Belt.—This belt includes most of the northwestern highland and most of the northern lowland (Fig. 36). The highland portion consists chiefly of northern Scotland, Norway, and Sweden. Despite the relative accessibility of this region to large numbers of exceptionally energetic, competent, and educated people, mining is rare. The most important mines are in the far northern Swedish

TABLE II.—MINERAL PRODUCTION IN EUROPE
(Thousands of metric tons)

	Coal	Lignite	Iron ore	Lead	Zinc	Copper	Aluminum (al.) petroleum (1,000 bbl.)
Great Britain							
1913	292,000	. .	16,000	18	7	0.4	12 al.
1928	242,000	. .....	11,000	16	1	0.2	
Germany							
1913*	192,000	87,000	36,000	51	88	27	
1913	142,000	87,000	7,300	48	88	27	
1928	151,000	166,000	6,500	50	110	26	31 al.
France							
1913*	40,800	4,000	22,000	9	18		
1913	44,000	..... .	43,000				
1928	52,000	4,000	40,300	20	4	3	27 al.
Italy							
1913	701	317	600	22	54	2	
1928	.. ...	555	609	21	72	0.4	
Spain							
1913	4,300		10,000	186	48	31	
1928	6,600		5,500	113	44	58	
Russia							
1913*	33,800		9,500	3	12	34	68,000
1913	29,000		9,200	.....	.....	....	68,000
1928	35,000		6,000	18	2	13	86,000
Belgium							
1913	23,000		150	15	0.4		
1928	27,500		150	88			
Sweden							
1913	360		7,500	2	15	4	
1928	270		8,000	0.5	9	4	
Norway							
1913	. ....		540	.....	0.2	3	
1928	.. ...		500	0 4	5	0.2	20 al.
Austria							
1913	87	2,600	2,000	4	21	3	
1928	202	3,200	1,900	8	1	3	
Poland							
1913	41,000		474	42	192	....	7,900
1928	40,600		700	36	162	....	5,800
Rumania							
1913	453	2,600	465	.....	.....	....	13,500
1928	374	2,800	97	1.3	.....	0.2	30,600
Czechoslovakia							
1913	14,000	23,000	2,200				
1928	15,000	21,000	1,800	2.3	3	0.3	
Greece							
1913	.....		313	18	18		
1928	143		124	5			
Hungary							
1913	840	6,200	400				
1928	780	6,500	203				

* Prewar boundaries.

province of Norrbotten which supply about 5 per cent of the world's output of iron ore. Another 1 per cent is obtained in central Sweden (Fig. 244). About 7 per cent of the world's pyrite comes from central Norway and 2 per cent from Sweden. About 1 per cent of the zinc comes from the island of Gotland of southern Sweden.

The rest of the poorly mineralized northern belt comprises almost the whole of the northern lowland. Southern and central Ireland may be included, but they are cut off from the remainder by the coal and iron belt. Then from southeastern England and Holland the non-productive belt extends eastward and northeastward including Denmark, southern Sweden, northern Germany, much of Poland, and northern Russia. In this belt there are a few deposits of secondary importance including some brown coal near Moskva (Moscow), but throughout the whole area the bed rock is nearly everywhere deeply covered. Hence, nearly half of the area of Europe produces almost no minerals despite the intelligence and activity of its population. Although Denmark and Netherlands stand near the forefront of modern progress, they have attained this rank almost without the help of mines of their own, although in recent years Netherlands has mined some coal.

The Belt of Coal and Iron.—The belt of intensive coal and iron mining includes the Scottish lowland, southern Wales, and most of England except the southeastern plain. Across the channel it includes Belgium, northern France, and a strip across western Germany to Saxony, thence along the border of Germany and Czechoslovakia to Poland (Fig. 65). The Donets basin north of the Sea of Azov may be considered as an outlier. Although this belt is by no means continuous, it is sufficiently so to warrant us in thinking of it first as a whole and then in its separate parts.

The outstanding feature of the central belt is that it contains both coal and iron, and that they are so near to each other that the iron ore can be brought to the coal at slight expense. The coal, however, is the primary factor. Equally good deposits of iron are found in other parts of Europe, such as northern Sweden and northern Spain, but nowhere else is there any such coal.

Over 40 per cent of the world's entire mining output comes from small areas comprising perhaps a thousandth part of the lands of the earth. The chief of these areas is where high-grade coal and good iron are found close together. In Europe these areas are (*a*) England, Wales, and Scotland; (*b*) the world's greatest industrial region which is divided among three countries, Belgium, northern France, and western Germany; (*c*) the relatively small but highly active industrial area of Saxony; (*d*) Upper Silesia, where three nations, Germany, Czechoslovakia, and Poland divide the industrial area; and (*e*) the Russian coal and iron fields of or near the Donets basin. So important are these that nearly half

of the mining, metallurgy, and metal manufacturing of the world is carried on in them (Figs. 66, 69).

The Belt of Varied Minerals.—South of the north central belt of coal and iron the old mountains of central Europe contain a highly varied assortment of minor minerals. France, chiefly from this belt, supplies about 28 per cent of the world's arsenic, about 34 per cent of the bauxite, 18 per cent of the potash, from Alsace, some 9 per cent of the antimony, 5 per cent of the pyrite, and a little gold and silver. In the same way Austria and Czechoslovakia provide about 40 per cent of the magnesite; the northeast margin of Italy about 45 per cent of the mercury; while Bohemia, Austria, and southern Germany together furnish about 40 per cent of the graphite; Germany more than three-fourths of the potash,

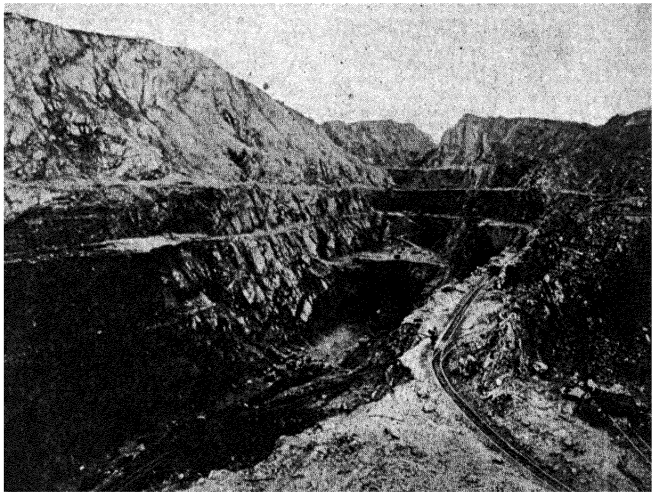


FIG. 70.—An open pit iron mine near Rio Tinto, Spain.

and Silesia about 15 per cent of the zinc. The petroleum fields of Poland and Rumania also belong within this general belt, and supply about 3 per cent of the world's total.

The Poorly Mineralized High Mountains.—In Switzerland and Bulgaria the production of minerals is so small that it is almost nil. The high Pyrenees contain only a few minerals, although their flanks are locally rich. Moreover, far to the east the mountains of the Krim (Crimea) and the Caucasus have thus far yielded almost no minerals. Considerable beds of ore may, of course, be found in these mountains, especially in the little known eastern ranges. For example, the world's largest single source of manganese ore was, in 1913, near Kutais in the southern foothills of the Caucasus near the eastern end of the Black Sea.

It does not seem probable, however, that the cores of Europe's higher mountains will ever be great mining regions.

The Mining Regions of the Southern Peninsulas.—The number of minerals produced in appreciable quantities is large in all the countries of the southern peninsulas: Spain, 16; Italy, 15; little Portugal, 13; and tiny Greece, 9. Greece furnishes about 15 per cent of the world's magnesite, 5 per cent of the chromic iron ore, 2 per cent of pyrite, and a little lead.

In the western peninsula, the iron mines of northwestern Spain near Bilbao have constituted a really important mineral resource, which, however, has benefited England more than Spain, for England has the coal with which to smelt the ore and the energy, skill, and capital to develop it (Fig. 70). The pyrite, about 60 per cent, mercury 40 per cent, and lead 9 per cent helped give Spain a high rank in 1926 as a producer of minerals other than coal and iron. Spain's copper, 4 per cent, makes it the most important European country in the metal which ranks next to iron in importance, while 4 per cent of all the world's zinc is a thousand times as large as Spain's percentage of the world's land area (Fig. 283). Finally the tungsten of the Iberian Peninsula, found chiefly in Portugal, amounts to about 3 per cent of the world's supply.

In the same way the sulfur, 14 per cent, mercury, 45 per cent, and graphite, 8 per cent, from Italy are relatively large resources; as to pyrite and zinc, both about 5 per cent, Italy is about twenty-five times as important as its size would warrant.

The relatively high development of the mineral resources of the southern peninsulas is due to a combination of conditions, some of which are often overlooked. The population is fairly dense, for even in Greece it is over 100 to the square mile. The people are intelligent and progressive compared with those of many parts of the world. All of the countries have long been inhabited by comparatively progressive people so that there has been a chance for full development. The dry climate, as we have seen, causes the vegetation and the soil to be scanty on the hillsides, so that the rocks are exposed wherever there is a steep slope. This is highly important, for the ability to see the rocks aids greatly in detecting unusual minerals which occur in small deposits. The prevalence of sheep and goats is also of importance. The shepherds with their flocks scour the mountains, and often amuse themselves by gathering and piling up rocks. Any minerals of unusual color or luster are almost sure to attract their attention, and thus, in progressive lands, ultimately to become known to others.

HOW MINING AND MINERALS HAVE INFLUENCED EUROPEAN CIVILIZATION

Stability of Exploitation.—Many of the effects of mining and of the use of minerals need only to be mentioned. Everyone knows that when

new mineral fields are discovered there is usually a rush to them, and at such times lawlessness is likely to be rampant. In Europe, however, this sort of thing has not occurred on a scale at all comparable to the well-known instances in the United States, Alaska, Australia, and South Africa. The reason is threefold. In the first place, Europe's mineral wealth has been developed much more gradually. It began to be developed long before extensive mining was done in the other continents, and before modern means of communication and transportation had made it easy to spread the news of mineral discoveries and then for people to flock in rapidly. In the second place, the regions where Europe's minerals are found were nearly all densely populated before the minerals were developed, so that the forces of law and order were well established, the methods of acquiring land stereotyped, and there was little chance to gain wealth by illegal methods. Third, Europe's chief mineral wealth consists of materials where prolonged work, much machinery, and a well-developed system of transportation are necessary to make it pay. Rich beds of gold, silver, or diamonds where a man can hope to make a fortune in a day have not been discovered in Europe. Few people are moved to give up their regular pursuits on the occasion of the discovery of coal, pyrite, potash, iron, and other minerals of low value per ton. Hence, European mining has lacked the more spectacular features of the mining booms of newer countries. There has been less excitement, less gambling, less drunkenness, and less enthusiasm. The miners are comparatively homogeneous, and only in a few cases, such as the Germans in Transylvania, do they come from a distance. Briefly, mining differs from manufacturing and commerce much less in Europe than in most parts of the world.

On the other hand, the harsh sordid features of mining are developed in Europe quite as highly as anywhere else. Whether the miners are digging coal in Wales, iron in Lorraine, lead in Upper Silesia, or manganese ore in Russia, the work is hard and poorly paid. The men who do it are comparatively ignorant, because there is almost no incentive to the better educated to stay in it. The miners live in miserable houses; they are often idle for long periods; and they are politically restless.

Effect on Rank of Countries.—One more question remains to be answered in respect to the importance of Europe's minerals. How far has their development caused a change in the respective positions of the various countries of Europe in the scale of progress? To answer this, let us go back to about A.D. 1750. At that time, iron was still rare, and was used chiefly for weapons, tools, hinges, horseshoes, nails, and a few simple machines. Such a thing as an iron bedstead, a steel rail, or a steel frame for a building was unheard of. Nails were so great a luxury that they were used very sparingly. Beams were still morticed together in many parts of Europe and were held in place by wooden pegs. Pins were

so scarce that many proverbs grew up about saving them. In 1750 coal was burned by a few people, chiefly in England, who lived close to the places where it cropped out most conspicuously. In England it was carried in small quantities to the cities where it was one of the luxuries of the well to do. Otherwise, practically all the inhabitants of Europe burned wood, and smelted what little iron they had with charcoal. Probably not one person in a thousand outside of England made any real use of coal, and perhaps not one in a hundred had ever seen it burn. Of course, we have no data for a reliable estimate of how much it was actually used, but certainly it played an almost negligible part in the life of Europe as a whole.

Comparisons of Earlier and Present Rank.—Consider, now, the distribution of civilization two centuries ago, before iron and especially coal had begun to play their modern roles. Machinery then consisted only of such simple things as looms run by hand and flour mills run by water or wind; people still traveled on horseback or in simple horse-drawn vehicles little more advanced than those of the days of Caesar. So primitive was life that a country family equipped with an axe, a knife, chisel, spade, plough, two sheep, and a cow could provide for itself practically all the necessities of life, including home-grown food, homespun clothes, and a homemade house, barn, and mill. Yet the distribution of civilization was not essentially different from what it is today. The countries bordering the southern shores of the North Sea led in political and religious liberty, in commerce and manufacturing, in culture and clear thought as to the great problems of human progress, and science. Then, as now, the Netherlands was prominent in commerce. Switzerland was famous for its democratic spirit, its religious toleration, and its devotion to science; while Norway, Denmark, and Sweden were all known as sturdy, self-reliant nations where the laws were well obeyed, life and property were comparatively safe, and education was rapidly advancing. At that time, Spain had already fallen from her brief supremacy. Italy, though fairly progressive in the north, was afflicted with misgovernment and poverty in the south. Ireland, then, as for several previous centuries, was chronically afflicted with social and economic ills which were invariably attributed to English bad government. In the east, Russia was hailed as a coming nation, but was struggling along in the rear guard of European civilization; the Balkans were afflicted with the present Balkan maladies; Greece was groaning under the heel of Turkey, but her citizens were making money out of the Turks in Constantinople, just as they do today; and some Turks were massacring Armenians and misgoverning other people, quite as ruthlessly as during the twentieth century.

Thus, in all parts of Europe the fundamental conditions were surprisingly like those of today. Politically, there have been great changes,

but essentially, places that had the greatest freedom then are those of greatest freedom today. The same is true socially, commercially, educationally, religiously.

Mineral Wealth Increases the Contrasts in Advancement.—Thus it appears that so far as minerals are concerned, the chief difference is this: when the possibilities of iron and coal were discovered, the nations already

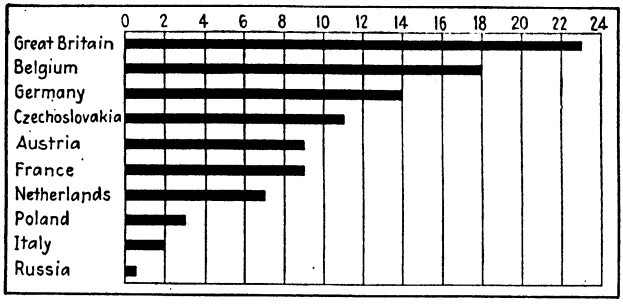


FIG. 71.—Use of power; estimated number of times that the power obtained from coal, oil, horses, etc., is greater than human muscular power used. (*Data from Killough and Killough.*)

progressive and dominant seized upon them. In fact, only those nations had the ability to see how the two great minerals could be used extensively (Fig. 71). Their use has brought many new problems and powers to all the world, especially to their users. It has widened the gap between the strong and the weak; it has given the nations which were leaders in 1750 a firmer hold on all the means of subsistence and on commerce, industry, and science, as well as increased strength in war. It has done just what new opportunity always does; that is, it has benefited the strong

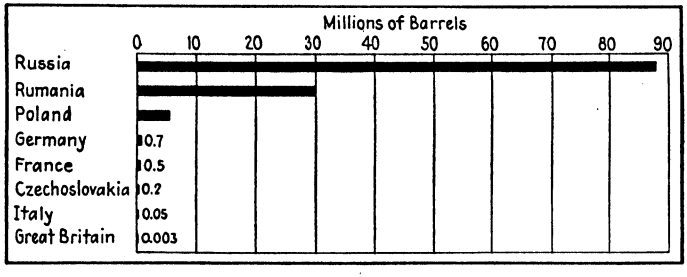


FIG. 72.—Petroleum production, millions of barrels; 1928 for three leaders, 1926 for others.

more than the weak. Nevertheless, the benefit to some countries without coal and iron has been almost as great as to those with an abundance. Denmark, Norway, and Switzerland have gone ahead with strides almost as rapid as those of England, Belgium, and France. They have gone ahead faster than Poland and Russia, even though those two countries have good supplies of coal and iron. Thus, minerals, like the relief of

the lands and the quality of the soil, have been a great help to the people of Europe who possessed the capacity and energy to use them, but they have not determined the location of civilization or even the amount of progress (Fig. 72).

WATER POWER

Comparative Rank.—Europe is surpassed only by North America in the amount of developed water power, having about 13,000,000 horsepower in 1929 in contrast with about 18,000,000 in North America and only 3,000,000 in the rest of the world combined. Europe leads in the percentage of the potential power which is now put to use and is surpassed only by North America, Asia, and Africa in potential power available, according to the official estimates presented by the U. S. Geological Survey. Europe, with 58,000,000 horsepower is credited with almost as much water power as Asia, which is 4½ times as large, and more than South America. North America, considerably over twice as large, has only about one-fifth more water power, and Africa, about three times as large, has about three times as much potential power.

Favorable Distribution.—Europe is fortunate in the possession of numerous power sites well distributed, being most numerous in the sections where coal or oil are relatively scarce or lacking. The northern highland and the south central chains of young mountains have most water power, and the great coal fields have little, except the Donets field of southern Russia. No large section of Europe except perhaps northern and eastern Russia lack both coal and considerable water power.

Reasons for Europe's Rank.—The facts that although more than half of Europe is relatively near sea level, less than 600 feet above sea level, only one-sixth more than 1,500 feet above sea level, and the average elevation less than 1,000 feet, suggest that the explanation of the relatively large amount of water power on this one-fifteenth of the land area of the world must be the exceptionally favorable features of the climate and the surface in spite of its small vertical scale.

Effects of Topography.—The number and distribution of the water-power sites reflect the effects of relief, glaciation, and climate. First, let us consider the great number of sites. About half of Europe was glaciated in relatively recent geological times, and as glaciation always disarranges the drainage the glaciated northern part of Europe and the glaciated mountains abound in power sites. Furthermore, the numerous lakes and marshes serve as retarders of the run-off and thus make the stream flow more regular and valuable for power (Fig. 73). Among the inhabited continents only North America was so largely glaciated. Another condition also increases the number of water-power sites, namely, the juxtaposition of low plains and mountains. All of the

chief mountains are closely approached on at least one side by plains which are almost at sea level. None stand upon extensive high plateaus, as is true of many of the mountains of other continents. This striking feature of Europe's relief is clearly shown on the physiographic diagram in the pocket.

One phase of the relief, however, diminishes the available water power, although it leads to a scattering of sites. This is the fact that

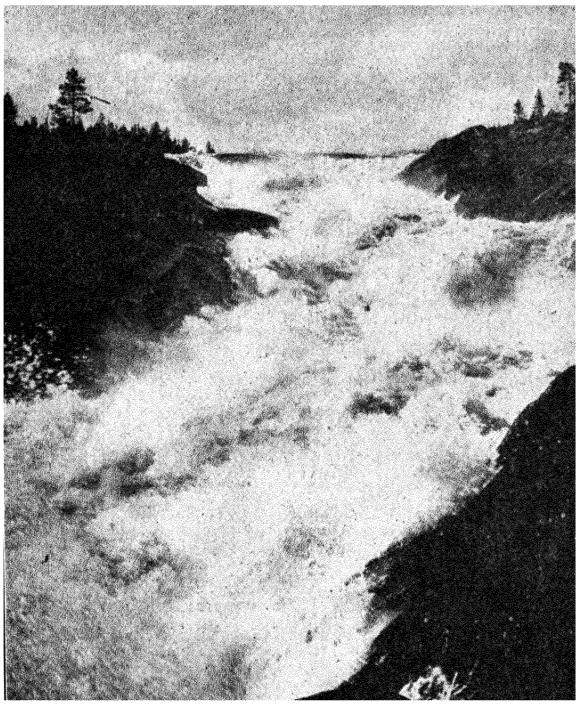


FIG. 73.—Harspranget Falls at Porjus, northern Sweden. A 136,000 horsepower power plant is to be erected here to supply the electric railways and mines of northern Sweden.

the proportion of Europe rising above 1,500 feet is very much less than that of any other continent except Australia. Hence, only a small fraction of the total precipitation on the continent needs to descend far to reach sea level. In contrast, a major part of the total precipitation in Africa must descend more than 2,000 feet. In fact the percentage that must descend 5,000 feet is more than the percentage that needs to descend 1,500 feet in Europe. Although Asia has by far the largest lofty plateau, this plateau unfortunately receives very little precipitation except on a part of its southern and eastern edges. Moreover, these exceptional parts receive most of their precipitation during the summer

when the monsoon winds blow from the ocean, and, hence, yield relatively small amounts of water power in other seasons. Such water power available only part of the year is as yet of value only in areas which are highly developed industrially.

Climatic Effects.—The regular rainfall of northwestern Europe, coming as it does in almost equal amounts in all months, is very favorable for water power. The cool summers, which retard evaporation, and the mild winters, during which stream flow is seldom seriously interfered with by ice, are also highly desirable from the standpoint of water power (Fig. 74). The dry summers of southern Europe are decidedly unfavorable, but, fortunately, sufficient snow accumulates during the cooler months on the higher mountains, especially the Alps, Pyrenees, and Caucasus, to furnish enough run-off to maintain sizable rivers throughout most if not all of the summer. During the winter, the precipitation and temperature of southern Europe are distinctly favorable for water power.

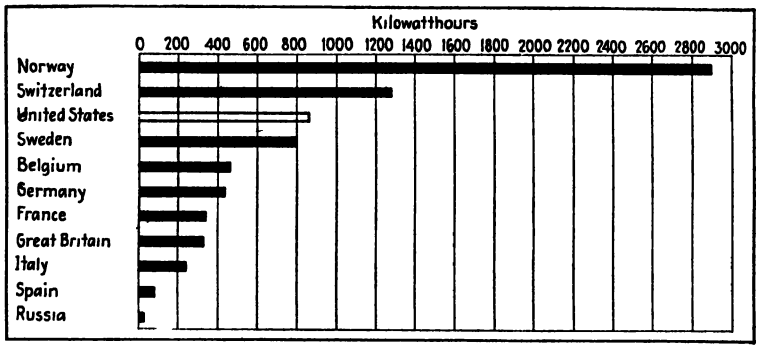


FIG. 74.—Electricity used per capita, 1928.

Nearly all of Russia is a plain with an average elevation of less than 500 feet, upon which the precipitation is scanty. The run-off is relatively still more scanty, since much of the precipitation comes during the warmer season when evaporation is relatively rapid. Hence Russia would have little water power except for the effects of glaciation and of a favorable outcrop of granite. The glaciation of the northern half has resulted in many favorable though small sites where lakes and marshes regulate the flow of water. Fortunately for Russia's water power, the Dnepr (Dnieper) River, which drains a considerable share of the part of Russia having most run-off, is crossed near its mouth by a low ridge of granite, which creates rapids and is the site of the largest hydroelectric development in Europe. When it is completed, it is expected to yield 455,000 horsepower.

Water Power by Countries.—The following table, based on data compiled by the U. S. Geological Survey, shows the regions having

most potential and most developed power. A graphic presentation of these data is given in Fig. 176.

TABLE III.—POTENTIAL WATER POWER AND THE AMOUNT DEVELOPED IN 1926
(Thousands of horsepower)

Areas	Potential	Developed	Areas	Potential	Developed
Sweden	8,000	1,350	Rumania	1,600	30
Norway	9,500	1,900	Bulgaria	1,200	18
Finland	1,800	220	Greece	250	8
Russia	3,000	230	Albania	500	1
Ukraine	425	40	Italy	3,800	2,300
Caucasus	5,000	5	Switzerland	2,500	1,850
Estonia	125	17	Germany	2,000	1,100
Latvia and Lithuania	100	5	France	5,400	2,000
Poland	1,400	90	British Isles	850	250
Czechoslovakia	1,000	155	Spain	4,000	1,000
Yugoslavia	3,000	180	Portugal	300	10
Austria	1,660	325	Iceland	500	
			Total	58,000	13,100

CHAPTER VI

TRANSPORTATION FACILITIES

Europe is rich in transportation facilities. No other continent is served so effectively by ships, in none is so large a share of the population within 10 miles of a railroad, in none are airplane routes more numerous or more used, no other has nearly so many good roads in proportion to area or population, and in none is internal transportation so much facilitated by rivers and canals. Moreover, telegraph and telephone lines are exceptionally well developed.

Regional Contrasts.—The distribution of transportation facilities in Europe is, however, by no means uniform. Figures 79, 80, and 81 show in a striking way some contrasts in the abundance of railroads and Fig. 85 of air routes. The intensity of ocean traffic is suggested by the distribution of the greater ports (Figs. 1, 189). In respect to each of these the concentration of facilities near the North Sea is striking and the decrease in all directions therefrom rather uniform. This condition closely resembles the decrease in healthfulness as shown by increased death rates and the corresponding decrease in intensity of production and in literacy (Figs. 27, 35, 96).

OCEAN SHIPPING

Influence of Commercial Activity.—Several conditions favor a high degree of development of transportation facilities. Europe is well served by ocean ships partly because its population is so active commercially and buys such a volume of imports and sells such valuable exports. Ships also carry far more passengers to and from Europe than to and from any other continent (Fig. 1).

Access to the Sea.—The shape of Europe, particularly the fact that so large a share of the more industrially active part is relatively near the sea, has been significant in the development of ocean traffic. Even eastern Russia, the part most remote from the ocean, is much nearer than a large share of each of the other continents except Australia (Fig. 22).

Favorable Climatic Conditions.—The early development of navigation was much facilitated by the comparative calmness of the Mediterranean, Black, and Baltic seas, and the protection afforded by numerous coastal islands. The presence of high tides on the coasts of northern France and

Britain also augmented the use of the ocean when ships where small and could readily ascend the rivers a considerable distance (Fig. 78).

Climatic conditions are, moreover, generally conducive to ocean traffic. The only ports closed by ice are those in Russia and on the Baltic, and the latter, as well as the ports of southern Russia, are used all or nearly all the winter with the help of ice breakers (Fig. 251). The storms of the eastern North Atlantic and North Sea, although far more numerous, are less serious than the more intense tropical cyclones (typhoons) of eastern Asia or the hurricanes of the western Atlantic. Indeed, the presence of numerous storms of moderate severity in the North Sea region has probably aided shipping by familiarizing seamen with rough water, and also by encouraging the construction of ships strong enough to weather all but the worst storms of other seas. The

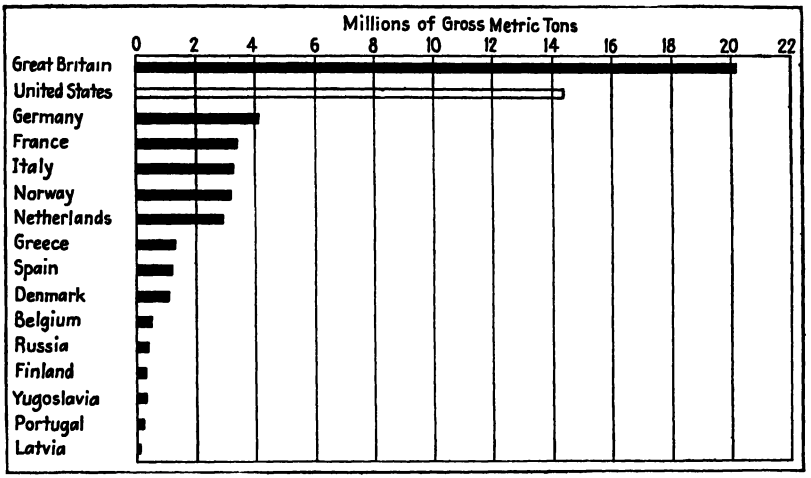


FIG. 75.—Merchant marine, 1929.

prevalence of wind and its frequent changes in direction because of the numerous cyclonic disturbances (Fig. 30) also aided the development of sail boats, which prepared the way for steamships (Fig. 78).

Inventions.—The later great development of ocean commerce was profoundly affected by the British invention of the steam engine, of steel ships, and of an effective mariners' compass. The Diesel motor ships, invented in Germany, have also been important recently, as now about one-fourth of all tonnage and nearly one-half of that which is new is of motor ships (Figs. 76, 77).

Distribution of Ocean Shipping.—Since most of the ocean tonnage is now made up of large ships with a high daily overhead cost of operation, a few ports receive most of the traffic. Instead of the hundreds of ports of the pre-steamship times, a dozen do most of the business (Figs. 1, 189).

But even a small port which is entered only occasionally by a small ship is of advantage to its hinterland, and its traffic helps to swell the total.

Almost all of the trade between either Britain or Norway and Sweden and the rest of Europe must be carried on by boat, for the air still carries relatively little. The same is true for the almost innumerable islands from Spitsbergen to the Aegean. A large part of the trade between areas connected by land is also by boat. For example, the trade between Russia and Belgium and between Italy and Spain. This is partly because of the physical barriers to land travel, and the indirect land routes caused by the great coastal indentations, but it is also greatly influenced by the customs difficulties in crossing national boundaries. For all these reasons as well as others common to shipping in general, it is often more advantageous to transport by ship than by rail.

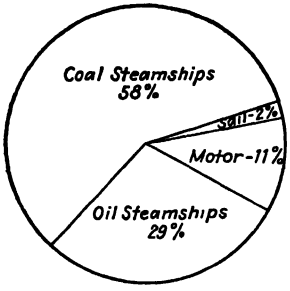


FIG. 76.—Percentage of all merchant ship tonnage by type, 1929.

Chief Ports.—Among the local trade routes by sea, the North European and Mediterranean routes are especially important. The chief ports of the former are Stockholm, Helsinki, Leningrad, Riga, Danzig, Stettin, København (Copenhagen), Oslo, Hamburg, Bremen, Amsterdam, Rotterdam, Antwerpen (Anvers) Ostend, Calais, le Havre, Southampton, Liverpool (Fig. 166) Belfast, Glasgow, Hull, and London. London receives about one-third of the British imports, by value, and Liverpool one-fourth, but Liverpool exports more than London.

Ships from the northern harbors also follow the other route, visiting many Mediterranean cities including Valencia, Barcelona, Marseille, Genova (Genoa), Napoli (Naples), Trieste, Piraeus [Athens], Thessalonike (Salonika), Istanbul (Constantinople), Odessa, Nikolaev, and Batum. In addition many ships ply only between Mediterranean ports. Ships from distant harbors also visit these Mediterranean ports. For example, some boats which ply between southeastern Asia and Europe have their European terminus at Marseille, and some that go to South America start from Genova.

RIVER TRAFFIC

Influences Affecting River Traffic.—Much traffic is carried upon the numerous rivers. The Rhine, Danube, Elbe, Volga, Seine, and Dnepr (Dnieper) are especially thronged with boats, though these are fewer now than formerly. Indeed before the coming of railroads, even small rivers carried some commerce.

Climatic Conditions.—The use of the rivers as highways has been facilitated by the climate, the topography, and the direction of flow.

Aside from eastern Europe the rivers are rarely closed by ice even in western Germany, and almost never farther south and west. The cool rainy summers of western Europe also lessen the common tendency toward low water in summer.

Topography.—Relief conditions are favorable for the use of the rivers of much of northern and eastern Europe. Upon the plain their valleys are not sunk very deeply below the general level, their currents are not swift, and few are interrupted by rapids, at least in their lower courses. Several of the rivers have been made navigable almost to their sources, and many are connected with one another by barge canals both in their upper and lower courses. It is possible, for example, to cross in a barge either France or Russia from north to south going up a northward flowing river, then following a canal, and thence down a southward flowing river. Germany, Netherlands, and Belgium can likewise be crossed on canals that extend west and east across the natural drainage (Figs. 181, 203).

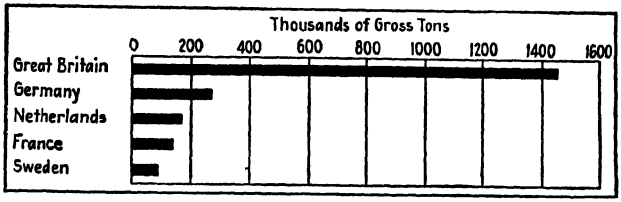


FIG. 77.—Merchant ships under construction June 30, 1929. One-fourth of the German tonnage was of motor ships, one-half of the British, two-thirds of the Dutch and French, and three-fourths of the Swedish.

Direction of Flow.—The courses of the rivers are mostly favorable to navigation in that they lead rather directly from the interior of the continent toward the ocean. The chief exception is the Volga which follows a decidedly indirect course to the enclosed Caspian. The courses of the Rhine and Elbe and Thames rivers are especially favorable as they lead directly toward the southern part of the North Sea. Several other rivers, including the Seine, Oder, Vistula, and western Dvina flow in the same general direction.

The Rhine is the most used river chiefly because of its exceptionally favorable location and because ocean-going ships can ascend its lower course to the great industrial region of the Ruhr (Fig. 204).

The Danube River.—This river, known as the Donau in Germany and Austria, Duna in Hungary, Dunav in Serbia, and Dunarea in Rumania, has long been one of the great thoroughfares across Europe. It twice entirely crosses the central chains of mountains, as is clearly shown in the physiographic diagram in the pocket, once at Wien and once at the Iron Gate. Although the Danube is not nearly so important a highway as is the Rhine, Elbe, or Volga, it flows through or along a number of countries. Whereas the Volga is discussed in the chapter on

Russia, the Rhine and Elbe in the chapter on Germany, and various other rivers in the chapters dealing with the countries through which they chiefly flow, the discussion of the Danube can not appropriately be confined to any particular country. It merits discussion, however, and can here be used as an illustration of river transportation.[1]

The Danube is the great drainage artery of central Europe, and the only large river which flows eastward a considerable distance. In length and drainage area it is exceeded only by the Volga, which it surpasses in volume. The divides separating the Danube from the North Sea-Baltic drainage are so low that three canals thence have been constructed, thus affording water routes entirely across the continent. These canals attain to maximum heights of only 870 feet on the Oder-Danube route, 1,214 feet toward the Elbe, 1,330 feet toward the Main, and 1,870 feet toward the Rhine.

In spite of these advantages, traffic on the Danube is small, only about one-fifth of the 1912 traffic on the Rhine, and smaller than that on the Elbe or the Berlin canal system. It was, however, somewhat larger, than that on the Oder or the Weser-Ems. The reasons for this slight utilization are to be found chiefly in the physical characteristics discussed below, but also partly in political and economic restrictions.

The upper Danube is entirely within Bavaria. At certain seasons barges of 100 tons ascend to Ulm, but little else than lumber gets that far, and the total traffic is small. Grain, which constitutes the chief upriver cargo, is usually unloaded at Passau. The upper Danube is often a raging torrent in spring and early summer, when heavy rains in the Black Forest and melting snows in the Alps contribute their run-off, but in other months it usually is a small stream. The canal which joins the upper Danube and the Main is little used at present but a new and larger one is now under construction.

The middle Danube includes the stretch between the narrows at Passau and the Iron Gate. Additional obstructions occur near Bratislava (Pressburg) and near Budapest where spurs from the Carpathians approach the Alpine ridges and Bakony Forest. These spurs separate the middle Danube section into three basins: the Wien (Vienna) Plain, the Little Alföld, and the featureless Hungarian Plain. The Tisza (Theiss) parallels the Danube for 150 miles with a fall of only 15 feet, and, in time of flood on the Danube, this tributary also floods large areas despite much dyking. The principal cities on the middle Danube are at points where the river narrows and the land routes focus. Wien is perhaps the best example of such a site.

The middle Danube section is the most important one commercially, having in 1912 about seven-eighths of the total traffic of about 8,800,000 metric tons.

[1] The following discussion of its navigation problems was contributed by Professor Blanchard.

Lower Danube.—The Iron Gate marks the division between the middle and lower sections and is the site of the most serious obstruction of the river from Austria to its mouth. In spite of a channel blasted through the narrows in 1896, the rapidity of the current and the narrowness and crookedness of the course make the passage dangerous and expensive. Special tugs have to drag the barges up through the rapids, and the narrowness of the channel closes it to larger vessels. In addition to the difficulties of swift current in these narrows and marked fluctuation in volume, particularly in the upper river, there are other obstacles to navigation. Although the river freezes across only locally, floating ice greatly interferes with navigation. At Galatz, for example, the ice forms blockades for three months on an average. As a consequence of the ice and the low water, the traffic in winter is only half as much as in summer, although winter is the time of the heaviest grain movement so that then the need of the waterway is greatest.

A fundamental disadvantage of the Danube is the direction of flow, from an industrial region to one of raw materials. The current leads Bulgaria and Rumania to use the Danube chiefly as a route to the Black Sea, whence steamships go via the Mediterranean to northwest Europe. An additional disadvantage is that the lower Danube swings far north, to enter an almost inland sea into which much Russian grain is carried, with which the Hungarian grain must compete.

The Danube Valley provides a graded course for railways, which are serious rivals of the river as highways. Furthermore important railways from the Danube to the Aegean and Bosporus avoid the Iron Gate and the long roundabout route via the lower Danube by leaving the Danube at Beograd (Belgrade). One reaches Thessalonike via the Morava-Vardar depression (Fig. 312), the other reaches Istanbul via the Morava and Maritza valleys.

The political obstacles to the use of the Danube may be temporary, as internationalization may eventually eliminate national favoritism, but certain fundamental difficulties are permanent and serious. The tonnage will perhaps increase above the present but the river is not now, and probably never will be, used for much through traffic. The railroads offer too many advantages for such transport.

CANALS

Barge canals are especially numerous in northern Europe and were extensively used before railways became locally available. In Germany their use was fostered by legislation preventing railways from carrying certain commodities which could be shipped by canal. The German militarists believed that when the anticipated great war came the railways might be used exclusively for military purposes while the canals could carry the other traffic. During the World War, however, they found that

canals were too slow and too costly in man power, and hence they were practically abandoned. Now barge canals are of relatively little importance anywhere in Europe, except for the local handling of sand and gravel for construction purposes. The chief exception is the considerable traffic (some 9,000,000 tons in 1928) carried on the canals of the Berlin district. But Berlin is a huge inland city with an exceptionally favorable situation for canal traffic. Most of the numerous German canals lead thither, including canals from the nearby Elbe and Oder rivers, at the mouths of which lie the ports of Hamburg and Stettin (Fig. 203).

Ship canals are of course quite another matter. Of the five chief canals, the canalization of the Schelde, which has opened Antwerpen to large ships, has had the most striking results. From a port of slight importance, Antwerpen has become Europe's busiest. The canal from

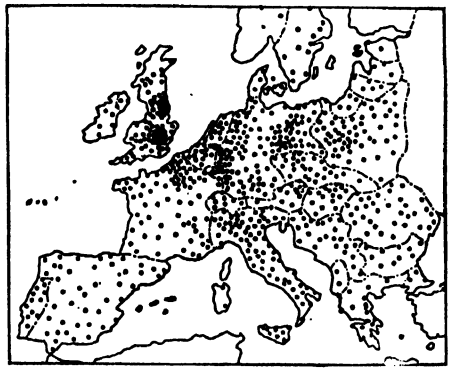


FIG. 78.—Shipping wine down the Douro to Oporto, Portugal.

the North Sea to Amsterdam has been far less significant, presumably because Rotterdam is more favorably situated than Amsterdam. The Manchester Canal has likewise failed to accomplish fully its intended purpose, as Liverpool continues to be the main terminus. The Corinth ship canal (Fig. 315) is used by numerous small ships but by few large ones because of its narrowness, and it has not been a financial success. The Kiel Canal was extremely valuable to Germany in the World War. It was constructed chiefly for military uses but recently has become commercially rather important.

RAILWAYS

Distribution.—Europe has about 230,000 miles of railways, or about 10,000 less than the United States, but Europe is much more effectively served by boats than is the United States, and the railways are used much more nearly to their capacity. As appears conspicuously in Fig. 79, a large region in west central Europe is practically without

areas which are farther than 10 miles from a railway. In England and the continental section near the North Sea there are in fact only tiny scattered areas that are more than 5 miles from a railroad. Not only are railroads very numerous in much of Europe but trains are frequent and dependable and wrecks few. Crossing accidents are likewise few or lacking in much of western Europe, where there are few grade crossings.

Although the first railroads were constructed in Europe, and a large share of the continent was well supplied decades ago, construction is still taking place in the less adequately served areas, and to replace the barge canals and rivers which are being abandoned. Whereas the United States has something like 15,000 fewer miles of line than in 1914, Europe has increased her mileage notably, more than 4,000 miles in Poland alone.

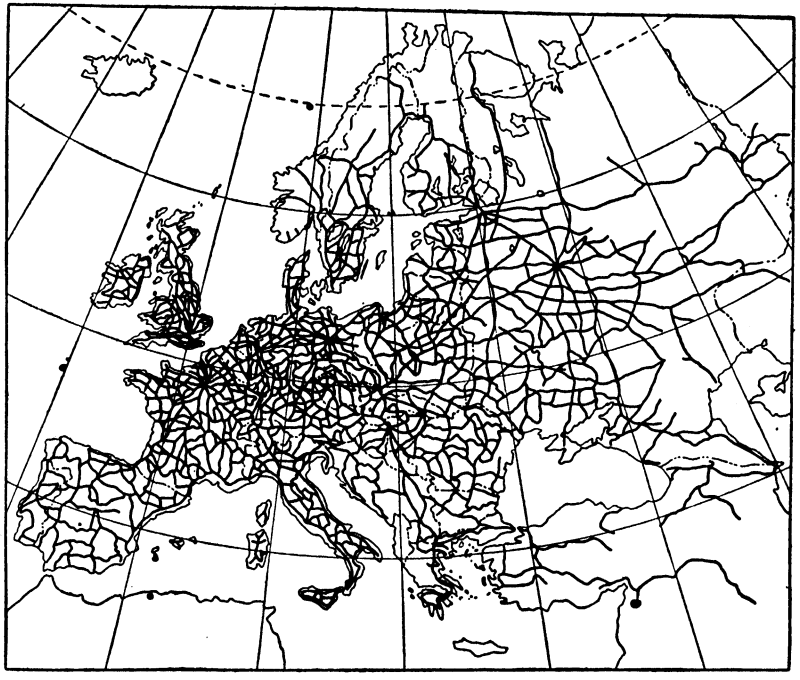


FIG. 79.—Railroads. Some of the lesser lines are not shown, in the more crowded areas.

Conditions Affecting Railways.—The construction of railroads has been facilitated in Europe by the large share of the continent that is a lowland, by the large and commercially active population to be served, and by the availability of relatively cheap steel and coal (Figs. 80, 81).

Shape.—The irregular shape of the continent has interfered with railroad construction at the same time that it facilitated ocean navigation. Likewise, numerous marshy tracts, many rivers, and several mountain ranges have been handicaps.

Political Subdivision.—The numerous international boundaries have also been obstacles to railway extension, as fear of invasion encouraged Russia and Spain to adopt peculiar rail gages. The delays due to custom officers are also considerable, even where change of cars is not necessary.

International boundaries have also interfered with the development of long traffic sections, except in Russia. In general the capital is the focus of the railways in each country, and through traffic is relatively small. Most European railways are somewhat comparable to the suburban railway development around the larger American cities. There are an increasing number of "international routes," however, over which sleeping cars are hauled. One of the chief of these is from Paris to Milano and Venezia, Italy, through the Simplon Tunnel; another is from Berlin to Istanbul, via Wien (Vienna), the Danube Valley and Sofia; a third extends along the north European Plain from Paris to Bruxelles, Berlin, Warszawa (Warsaw) to Moskva (Moscow). Other routes upon which

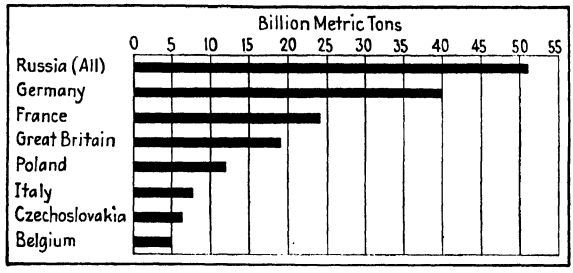


FIG. 80.—Railroad freight, 1927.

sleeping cars are carried are the Paris to Madrid and Paris to Monaco. There is heavy rail traffic also along several of the river valleys, especially the Rhone, Seine, Rhine, Po, and Danube.

Short Haul.—The fact that most of the railroad traffic moves in short hauls between a port and the interior of a small country has made it feasible to use freight cars that are much smaller than those in this country. Furthermore, as few passengers care to travel by night, or find it necessary to do so, the passenger trains nearly all run by daylight, and there are few sleeping cars except on the longer international lines already mentioned.

Classes of Traffic.—Another conspicuous difference between European and American railways is the presence in Europe of classes of traffic. Large numbers of people financially unable to afford luxurious travel are carried in plain third-class coaches at a fraction of the fare charged for the first-class coaches. Likewise, in several countries the freight to be exported is charged especially low rates.

Mountain Crossings.—Although numerous relatively lofty mountain ranges are widely distributed in Europe, they have interfered with railway

construction and operation much less than have the mountain ranges of the other continents. This is because of the several exceptional conditions discussed in Chap. III which need only be summarized here.

1. The northwestern highland is broken by several gaps and only in Scandinavia does it impose for a long distance a serious obstacle to the penetration inland of railroad lines. Even in Scandinavia it is crossed at four places in the south, where the range is less lofty, and also at the

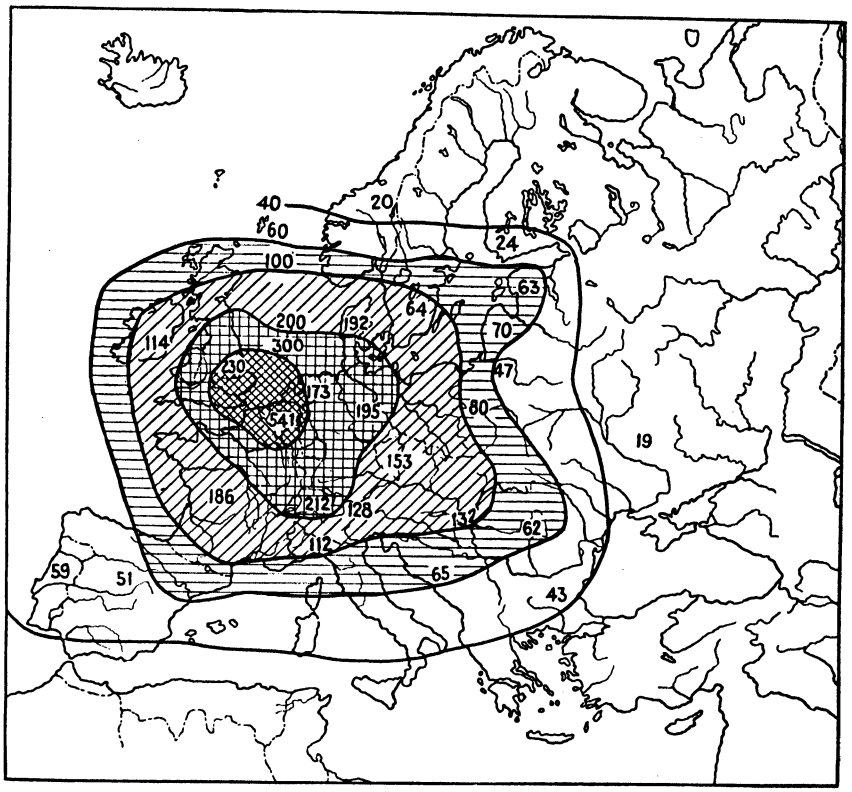


FIG. 81.—Railroad mileage. Isopleth map showing the concentration of mileage. Figures are the approximate number of miles of railroad per 1,000 square miles of area, 1927, by countries.

north where some Swedish iron ore is sent to the Norwegian port of Narvik. These crossings have been greatly facilitated by the deep glacial erosion which converted the seaward ends of the valleys into fjords.

2. The series of lofty mountains which extend from western Iberia eastward to the Caspian Sea are interrupted by several gaps, and the ranges themselves are crossed by several passes. The passes of the Alps and especially the approaches to the passes are exceptionally low, partly as a result of profound glacial erosion of the valleys during the Ice Age. Furthermore, it has been feasible, because of the large traffic and other

favorable conditions, to construct tunnels under several of the ranges, with the result that the highest elevations reached by the railroads are remarkably low considering the loftiness of the higher peaks. For example, by way of the twin Simplon tunnels, the maximum railway elevation is only 2,313 feet. Some facts concerning tunnels of importance are as follows:

Name	Between	Length, miles	Maximum elevation, ft.	Completed
Simplon	Geneve, Milano	12.3	2,313	1906, 1921
St. Gotthard	Zurich, Milano	9.3	3,785	1882
Mount Cenis	Lyon, Torino	7.6	4,380	1871
Maritime Alps	Nice, Torino	6	.....	1928
Pyrenees	Pau, Zaragoza	4	3,940	1928

The location of most of these passes is shown on Fig. 214. The Brenner Pass between the head of the Adriatic and Austria is low enough (4,470 feet) so that no tunnel has yet been considered necessary along this scenic route.

3. Because of the location of the Pyrenees, railways along the coast at either end have sufficed until 1928. Likewise, the demand for a railroad across the Caucasus has been insufficient to lead to its construction. This is partly because this range is readily rounded on the east by a railroad while at the west the coast of the Black Sea trends so as to encourage shipping by sea from the northern side of the range to the southern.

Most of the world's scenic railways are in Europe, especially in central Europe. In the Alps, which are visited by many thousands of tourists annually, there are several marvelous scenic railways leading almost or entirely to the summits of famous peaks, from which superb views may be obtained in fair weather.

ROADS

Road construction in Mediterranean Europe reached a relatively high stage under the Roman Empire, and some of the old roads are still in use. Roman roads also extended across what is now France, and since Roman days much of France has had relatively good stone roads. The early roads of much of Europe were, however, often rendered almost impassable by mud, but, after the invention by the Scotchman, MacAdam, of the method of road construction named after him, firm roads soon became general in the more advanced, densely settled regions. In Russia and Poland, however, a general lack of stone for road metal has

greatly retarded the construction of firm roads. But in winter that part of Europe is usually mantled with snow for three months or longer and

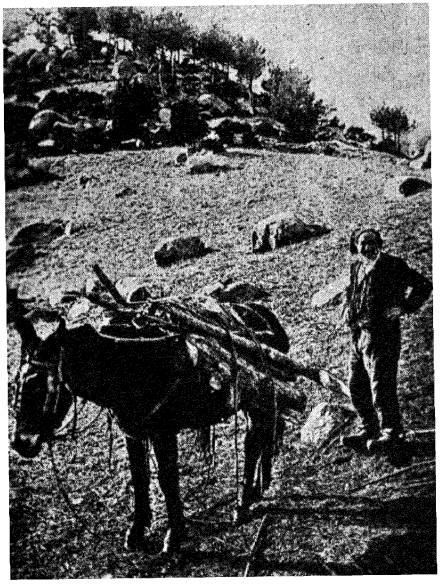


FIG. 82.—Gathering wood for charcoal making in one of the slightly wooded mountains of Spain. Very few wagons are seen in most of Iberia.

then the roads are often smooth and, where much traveled, also hard (Fig. 82).

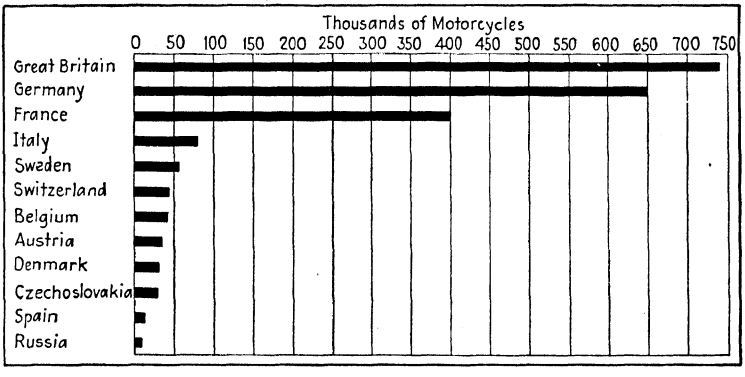


FIG. 83.—Motorcycles, 1930.

In recent years numerous automobile roads have been constructed in the countries having most automobiles (Fig. 84) and to accommodate tourists to Italy.

The bicycle is vastly more used in Europe than in the United States and the same is true of motorcycles (Fig. 83) and buses. The use of automobiles is also extending very rapidly and in some countries their frequency per mile, though not per capita, is fast approaching that in the denser settled parts of the United States (Fig. 84). Three geographic conditions have favored automobiles of small gasoline consumption: (1) the fact that most automobiles are used in places where the roads are almost level; (2) the short distances traveled, which reflects the small size of the political units and the appreciable difficulty of going from one country to another; (3) the relatively high price of gasoline, as com-

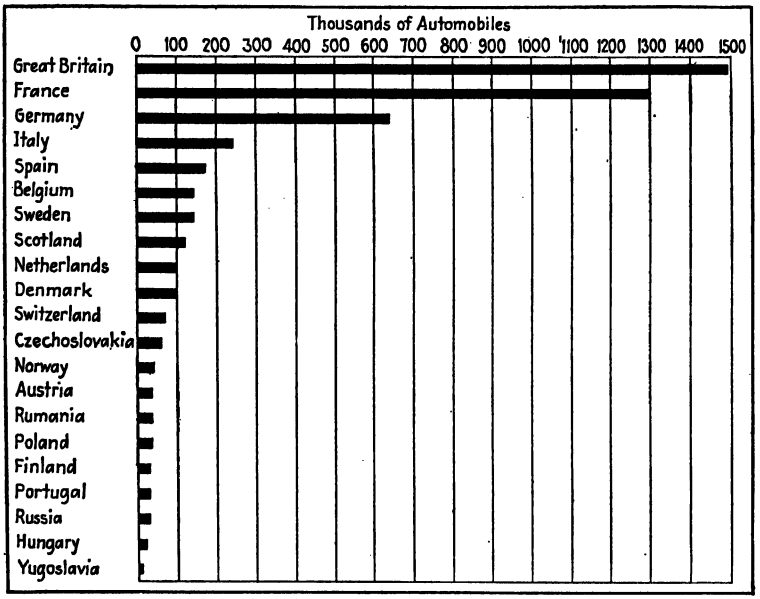


FIG. 84.—Automobiles, 1930.

pared with wages, which is partly because of the inadequate petroleum resources of Europe. This last condition has encouraged the development of steam trucks in England and of substitute motor fuels, especially in Germany.

AIR TRAVEL

In the use of the airship and airplane Europe excels and it is now possible to travel to most of the main cities by plane, often at a money cost comparable to that on the railway, even second class, if meals and sleeper are included. The main routes are shown on Fig. 85. A study of the miles flown in proportion to the area of the countries reveals the fact that the region bordering the southern North Sea again excels notably. Although Germany is a close second to the United States, which

is about fifteen times as large, Netherlands and Belgium surpass Germany, in proportion to area, in miles flown and traffic carried. The British Isles use airplanes less extensively, however, except between London and the

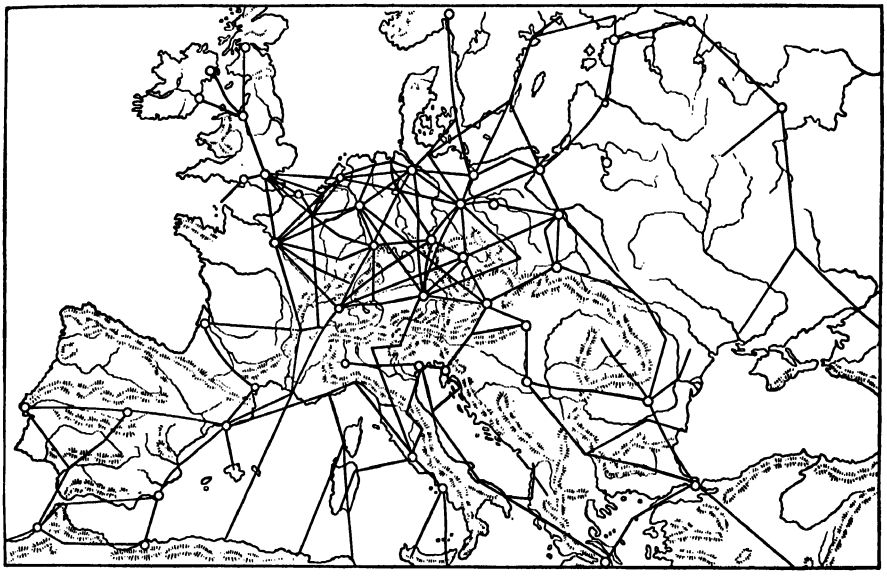


FIG. 85.—Chief airplane routes, 1930.

Continent, where they are used perhaps more than anywhere else in the world. The small size of Britain and the short time required to go between the larger cities by the numerous fast trains or automobiles have tended to discourage the local use of airplanes.

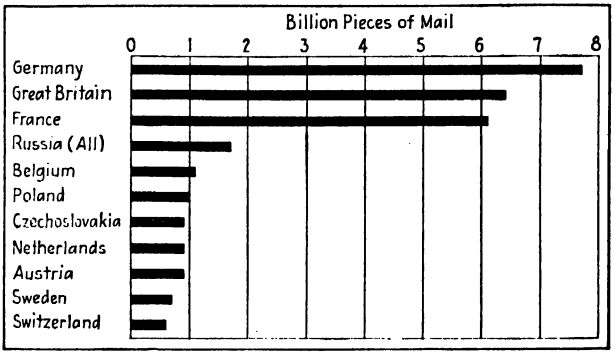


FIG. 86.—Pieces of mail, 1927.

The comparative efficiency in the various countries of the several agencies of transportation combined is reflected by the mail service rendered (Fig. 86).

CHAPTER VII

DISTRIBUTION OF POPULATION AND CITIES

GENERAL DISTRIBUTION

The general distribution of population is effectively shown in Fig. 87 which reveals sharp contrasts. The black areas have more than 250 people per average square mile and the white have less than 5. The white areas are of three types: (1) the subpolar regions, almost without people; (2) the mountains including only the highest at the south but even the low ones in Scotland; and (3) the drier southeastern part of

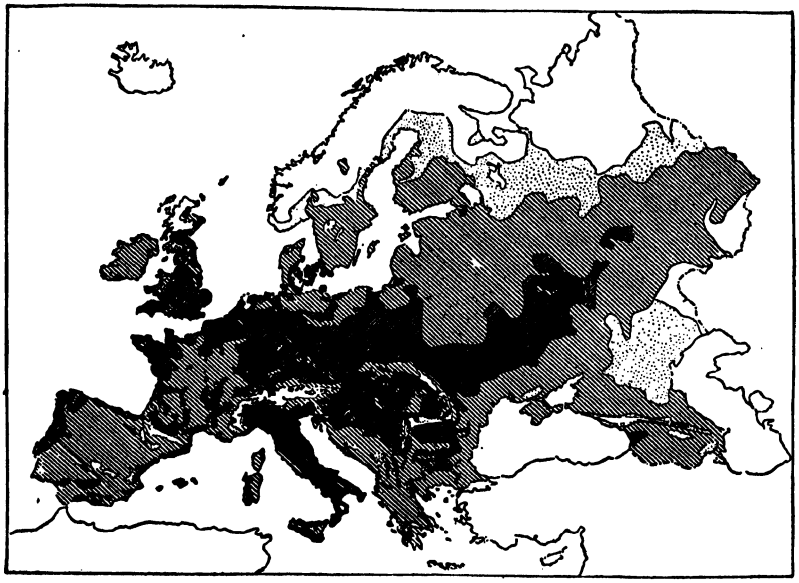


FIG. 87.—Distribution of population. The black areas have more than 250 per square mile and a part of them at the west have more than 500 per square mile. The white areas have less than 5 per square mile. (*By Mark Jefferson, in Bulletin American Geographical Society, after Dr. Weise, in Petermann's Mitteilungen.*)

Russia. The largest white area is in northern Russia and Scandinavia, where it extends along the mountains almost to southernmost Norway. Iceland is also white because most of it is without population. Half of Scotland is also white, for the northern interior section is mountainous. Among the other mountains, the largest area which is sparsely populated lies in the Alps. This is followed in size by areas in the higher Caucasus, the Tatry section of the Carpathians, and the Pyrenees.

Areas with from 5 to 25 persons per square mile (stippled) border those with fewer than 5 per square mile at the north and northeast and also occur in the drier and the more rugged parts of Spain. Most of the rest of Russia, most of Iberia, Ireland, and the Balkan Peninsula have from 25 to 125 persons per square mile. The areas with more than 250 per square mile (black on the map) largely occur in the central part of Europe, especially in the coal-bearing zone. A narrow black belt extends continuously from Ukraine at the east to northwestern France at the west. It is broadest in Belgium and southern Netherlands and again in England. From this belt an extension follows the Rhine to Switzerland. Several other lesser areas have a population of more than 250 per square mile. These occur especially in Italy, where they include all of the northern lowland, and a strip along the east coast as far south as the latitude of Roma (Rome), a considerable area near Napoli (Naples), half of Sicilia (Sicily) and several smaller areas. Black tracts are also scattered along the coast of Iberia and are present in fertile lowlands in France, Austria, Hungary, and especially in Great Britain.

Areas with Dense Population.—The areas having 250 or more people per square mile include a few that have more than 500 per square mile. The largest of these extends with some slight gaps from the eastern margin of northern France across Belgium to beyond the Ruhr Valley of western Germany, and from southern Netherlands up the Rhine Valley to Mannheim. The second largest is just northwest of Bohemia in Saxony. Britain has several small areas with more than 500 per square mile, the largest having Liverpool at its western margin. The next largest is the London basin, the third is the Scottish lowland, and the fourth is south Wales. Italy has several in the Po Valley, the largest being about Milano. Another large one is located on the Ligurian Coast and extends up the Arno Valley to Firenze (Florence). Still others lie elsewhere along the coast, especially near Napoli. France has four, two in the middle Rhone Valley and the others in the Paris basin and the industrial area surrounding St. Etienne. All of these areas with more than 500 persons per square mile are highly industrial; some are also very important commercially and as capitals of their countries.

Areas of Lesser Density.—On both sides of the great belt of dense population (250 or more per square mile) which extends from southern England and northwestern France almost due east to Ukraine, there are wide areas with more than 125 people per square mile. The chief exception is along the Carpathians, where the dense population prevails as far as the lower slopes, above which the population is sparse. Another region where the decline in density is conspicuously rapid is in southeastern Poland and adjacent Russia towards the Pinsk marshes. A third is in northwestern Germany toward the marshes and heaths of Oldenburg and western Hannover.

Even within the regions of relatively dense population many marshy and sandy tracts are sparsely settled. One of the largest of these, the malarial Campagna, extends from Roma northward for about a hundred miles, but it is now being drained and gradually reoccupied. Mention has been made of the reclamation of the sandy and formerly also marshy "landes" of southwestern France, and of extensive marshy lands in the Netherlands. Numerous smaller tracts of marsh have been reclaimed in England, especially about the head of "The Wash," in northern Belgium, and in Germany. Few of these, however, have attained a comparatively dense population, the chief exception being the southwestern section of the Netherlands known as the province of Holland, which contains the chief cities, and which is at or below the level of the sea at high tide.

Chief Influences Affecting Density.—The general features of the distribution of population in Europe are related conspicuously to contrasts

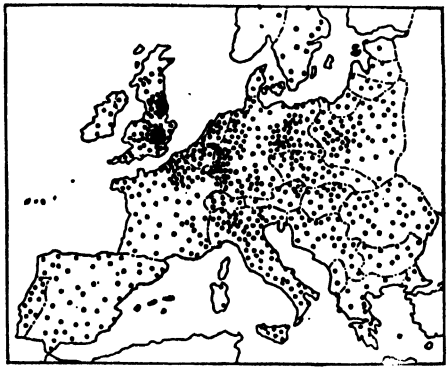


FIG. 88.—Population of Western Europe. Each dot represents 500,000 people.

in climate, mineral wealth, topography and soil (Fig. 88). The areas that are too cold for general agriculture, either because of high latitude or high altitude, are sparsely settled. Those that are too wet or too dry are much smaller in extent but are almost as scantily peopled. The merely rugged tracts have many more people, but only a fraction of the number found in the fairly level areas of fertile soil. The largest area of dense population occurs, however, chiefly in or near the great coal fields, "the mineralized belt" of Chap. V. In that belt the population is as dense as anywhere in the world, with the exception of a few especially fertile tracts in China, India, Java, and in urban centers.

In other words, the distribution of population in Europe varies chiefly with agricultural possibilities, secondarily with industrial possibilities, and still less, except for the cities, with commercial possibilities. Of relatively little apparent effect on population density are the opportunities for the extraction of minerals, fishing, or recreation. Difference

in the standard of living, has, however, influenced population density significantly, and it reveals distinct regional contrasts. Toward the east and south especially, but also in Iberia, the population is much denser than it would be if the standards of living were as high as they are in the North Sea countries. And within the latter area also the standard of living varies from section to section with soil, relief, and climate and helps explain some contrasts in population density.

DISTRIBUTION OF CITIES

Urban Centers.—Europe contains many hundreds of urban centers of more than a thousand people each, about 70 of one-fourth million to nearly a million, and a dozen of more than a million population each. Moreover, until very recently it has included the largest urban centers of the world, except New York, and a larger number of huge cities than any other continent. Although a smaller percentage of the population is urban in Europe than in Australia or some South American countries and American states, Europe is, nevertheless, most truly the land of cities, for the Europeans in large cities are more numerous than all the rest of the people in the large cities all over the world.

The unit used in this discussion is the urban center rather than the political city because the commercial and social unit rather than the political is the more significant. The term "urban center" as here used includes not only the political units commonly known as "cities" but tributary suburbs and subsidiary cities and sometimes companion cities. In some great urban centers, the political city which gives the center its name contains less than half of the total population. This is true of London, Sydney, Boston, and Tokio. In other instances two or more large cities are so closely associated as to form in fact a single great urban center. Examples are Minneapolis and St. Paul, Liverpool and Manchester, and Ruhr (Duisburg, Essen, Dortmund), Fig. 91.

Students of geography can much more profitably learn the names, locations, and approximate population of the chief urban centers rather that those of the chief cities as political units. Even some advanced students of geography may be surprised at the relative rank of some cities when their suburbs are added.

The data as to the populations of the urban centers are not easy to compile, because most census returns give the population only of political units. Consequently, it is necessary to discover and add together the totals of all the political units which are a part of the urban center.

Figure 89 shows the distribution of the urban centers of the world having a population of a million or more according to recent information. It reveals strikingly the predominance of such cities in Europe. They are so numerous there that on the scale here used the circles representing them overlap. Hence Fig. 90, which deals with a part of Europe on a

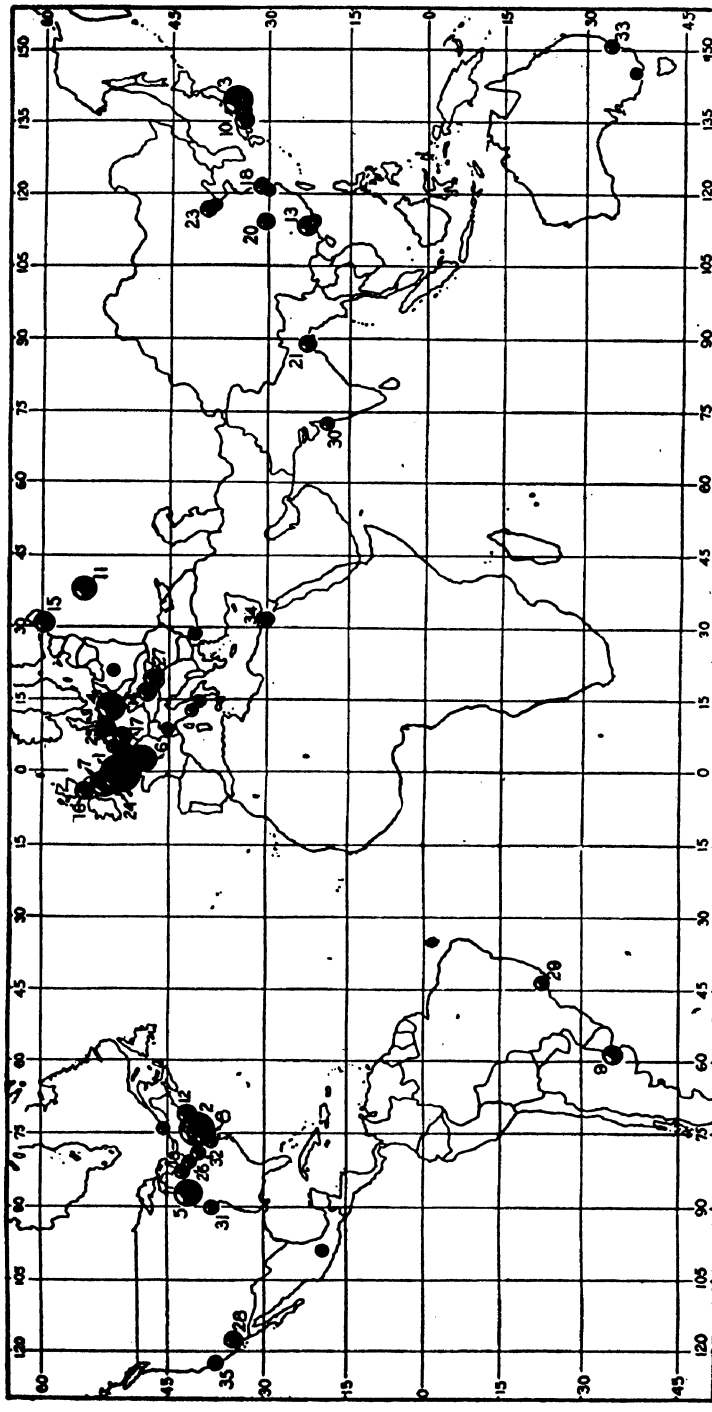


FIG. 89.—Urban centers (cities and their suburbs or associated cities) having more than a million people, numbered in order of size. Also 16 centers of almost a million population, not numbered. (*Drawn by Guy-Harold Smith. From Visher, Journal of Geography, September*, 1929.)

larger scale, is needed. The numbers near the circles give the rank of the urban center among those of the world as a whole. London was given first place, but the 1930 census shows that Greater New York is now the larger, if Newark be included. This may properly be done, despite the fact that Newark is politically, and in some other respects, an independent city, because it is within 12 miles of the center of New York. For London the radius commonly used is 25 miles.

The following list of the 83 European urban centers having more than one quarter million people should facilitate acquaintance with the more important. The location of most of them is given on the physiographic diagram in the pocket, the first letter of the name and a small circle alone being used. The location of the larger centers is shown, without names, on Fig. 90. Figure 91 reveals their sizes in another way.

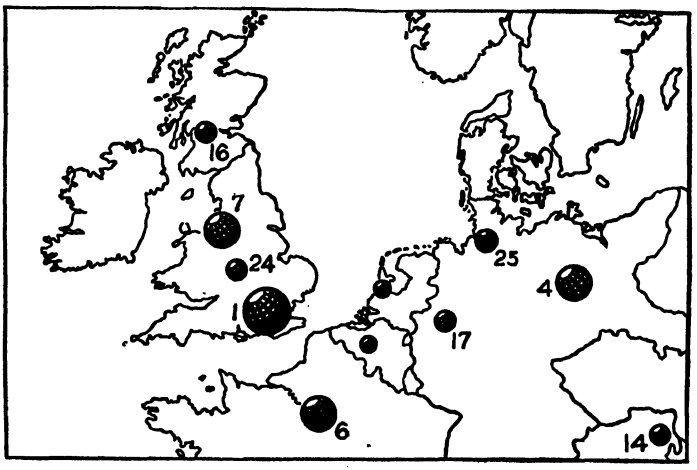


FIG. 90.—Urban centers of a part of Europe, numbered for the world, except two centers of nearly a million that are unnumbered. (*Drawn by Guy-Harold Smith.*)

Types of Cities.—The 83 cities listed belong to one or more of the following categories: Twenty are the capitals of their countries, and in every instance are the largest cities thereof. The letter *c* follows the names of each of these in the following list. Some 40 are seaports and 3 others are on the Rhine some distance above the delta where it is navigated by seagoing ships. Those to which ocean-going ships can approach are followed by *s* on the list. Some 30 are on or adjacent to coal fields. These are followed by *cl* on the list. Practically all, whether on the coast or in the interior, are on rivers, although in some instances the streams are small. Most of the cities are near sea level and practically all within about 500 feet of sea level. The chief exceptions are Madrid (elevation 2,100 feet), München (Munich 1,700 feet), Chemnitz (1,000 feet), Nurnberg (960 feet), and Stuttgart (800 feet).

Chief European Urban Centers Arranged by Countries, but Numbered for Europe as a Whole

	Name	Population
	Britain and Ireland	
1	London (c, s)	8,000,000
4	Liverpool-Manchester (s, cl)	3,500,000
8	Glasgow (s, cl)	1,500,000
10	Birmingham (cl)	1,300,000
22	Leeds-Bradford (cl)	760,000
35	Sheffield (cl)	530,000
40	Newcastle (s, cl)	470,000
45	Edinburgh (s, c)	430,000
46	Belfast (s, cl)	430,000
48	Dublin (c, s)	420,000
54	Bristol (s, cl)	390,000
63	Cardiff-Newport (s, cl)	330,000
67	Hull (s)	290,000
71	Stoke-on-Trent (cl)	280,000
73	Nottingham (cl)	270,000
	Total	15
	Germany	
2	Berlin (c)	4,500,000
9	Ruhr (Duisburg, Essen, Dortmund) (s, cl)	1,500,000
11	Hamburg (s)	1,300,000
25	Köln (Cologne) (cl)	700,000
26	Leipzig (cl)	680,000
27	München (Munich)	680,000
32	Dresden	620,000
33	Breslau	560,000
34	Frankfort-Offenbach (cl)	550,000
38	Hannover (cl)	510,000
41	Nurnburg	470,000
52	Danzig (s)	400,000
54	Bochum-Gelsenkirchen (s cl)	370,000
57	Barmen-Elberfeld (s, cl)	350,000
58	Mannheim-Ludwigshafen	350,000
60	Stuttgart	340,000
61	Chemnitz (cl)	340,000
65	Bremen (s)	300,000
68	Magdeburg	290,000
69	Konigsburg (s)	280,000
78	Stettin (s)	250,000
	Total	21
	France	
3	Paris (c, s)	4,000,000
30	Marseille (s)	650,000
31	Lyon (cl)	630,000
53	Lille-Roubaix-Tourcoing (cl)	400,000
75	Bordeaux (s)	260,000
	Russia	
5	Moscow (Moskva) (c, cl)	2,300,000
7	Leningrad (s)	1,600,000
39	Kiev	500,000
44	Baku (s)	450,000
49	Odessa (s)	410,000
50	Kharkov (cl)	410,000
64	Rostov (s)	310,000
72	Tiflis	280,000
84	Dnepropetrovsk (cl)	250,000
	Italy	
14	Milano (Milan)	900,000
15	Roma (Rome) (c,)	900,000
16	(Napoli) Naples (s)	850,000
37	(Torino) Turin	520,000
51	Palermo	400,000
62	(Genova) Genoa (s)	330,000
77	Catania (s)	260,000
79	(Firenze) (Florence)	250,000
	Belgium-Holland	
17	Amsterdam (c, s)	830,000
18	Bruxelles (Brussels) (c, cl)	830,000
29	Rotterdam (s)	650,000
42	Anvers (Antwerp) (s)	450,000
47	s'Gravenhage (Hague) (c, s)	430,000
83	Liege (cl)	250,000
	Spain and Portugal	
19	Madrid (c)	820,000
21	Barcelona (s)	770,000
36	Lisboa (Lisbon) (c, s)	530,000
76	Valencia (s)	270,000
	Scandinavia	
23	Kobenhavn (Copenhagen) (c, s)	730,000
24	Stockholm (c, s)	700,000
74	Oslo (c, s)	270,000
80	Göteborg (s)	250,000
	South Central Europe	
6	Wien (Vienna) (c, cl)	1,900,000
12	Budapest (c)	1,200,000
20	Istanbul (Constantinople) (s)	810,000
28	Praha (Prague) (c, cl)	680,000
55	Athenai (Athens) (c, s)	390,000
59	Thessalonike (Salonika) (s)	350,000
66	Bucarcsti (Bucharest) (c)	300,000
81	Beograd (Belgrade) (c)	250,000
	Poland-Latvia	
13	Warszawa (Warsaw) (c)	940,000
42	Lodz	450,000
52	Danzig (s)	400,000
70	Riga (s)	280,000
	Grand Total	83

CHANGES IN POPULATION DENSITY

Historical Changes.—At the dawn of history most of the small population of Europe was found in the Mediterranean region. Anthropologists have decided that the density was very low in the other climatic regions and not over 10 per square mile in southern Europe on the average. The marine climatic province had a few people along the seacoast, and in the occasional natural clearings in the generally dense woods. There were more people above the forest zone in the Alps, and some nomads were present in the grassy plains of southern Russia. But while most of the continent was almost empty, a rather dense population was found on the little coastal plains of southern Europe. After steel axes became sufficiently common, about the year A.D. 1000, the northern forest was gradually cleared away, and before the industrial revolution commenced the marine province contained about as many people as the

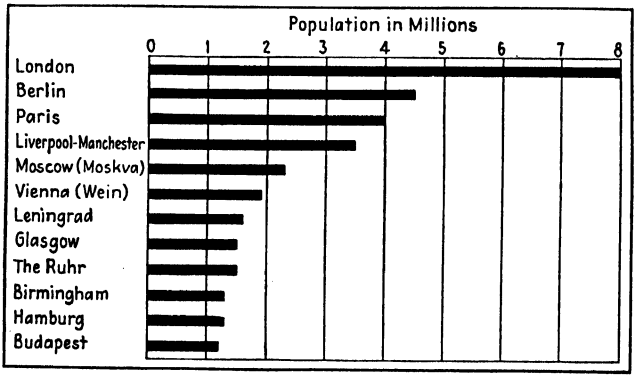


FIG. 91.—Chief urban centers; the cities, their suburbs, and closely associated cities.

Mediterranean, but the continental province remained sparsely settled.

With the invention of steel plows capable of breaking the firm sod and the development of a market for exports, the population of the continental province began to increase rapidly, until now it contains somewhat more than one quarter of the total. But since it includes more than half of the area, it is still the least densely peopled large climatic province except the subarctic. The population of the marine climatic region grew rapidly following the introduction of the use of window glass, coal, and machinery, and it now contains about one-half of the total despite the large population of the better parts of southern Europe (Fig. 87).

Experts consider that most of Europe is rather fully populated now. Throughout most of the historical past the same has been true, for the population in any area at any given time has been practically as large as it could then support. Only when some new resources were developed has there, for a time, been room for large increments in the population.

The great new areas made available for settlement by the introduction of the axe, and the steel plow, improved transportation facilities, the increased output following improvements in agricultural methods, fertilization, and the development of new varieties of plants and animals have each been followed by notable increases in total population. The opening of mines, the harnessing of water power, and the increased catch of fish have had the same effect. The drawing upon the resources of other parts of the world to a notable degree, as was done after the invention of the steamship and locomotive, permitted large increases of population. The present tendency toward "rationalization" or "Americanization" of European industries could doubtless permit a further notable increase in population, but instead the increased efficiency of the workers may lead to a desirable rise in the standard of living.

Possible Future Changes.—If the present large expenditures for preparation for possible wars were greatly reduced, and if tariff warfare were abolished, Europe could support a considerably larger population

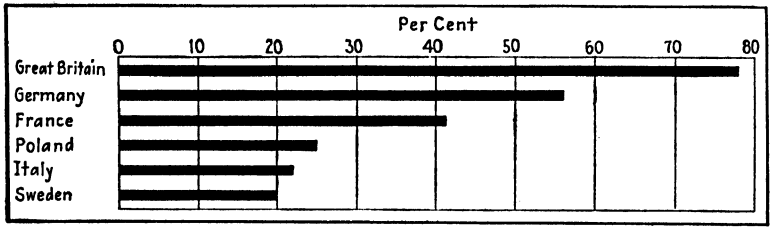


FIG. 92.—Urban population; percentage of the total population that lives in cities of over 10,000 population.

than at present, with a distinctly higher standard of living. The distribution of population, however, would presumably be different if there were virtually free trade and low militaristic expenditures. The more favored areas would doubtless gain and the less favored lose. Indeed many millions of people in Europe are now struggling against such handicaps of unfavorable environment that their farms or other sources of livelihood should be combined with those of a neighbor or else abandoned. The virtual abolishment of tariffs would unquestionably lead to the abandonment of many of the less propfitable mines and factories and the return of much marginal farm land to forest or pasture. Large bodies of good farmland would also be put to different uses than at present, and probably much of the land would require relatively fewer workers.

The relative growth of the urban centers which has been so striking a feature during the last century is likely to continue, but it is to be hoped that with cheaper transportation the centers will cover much more ground and be far less congested. Many of the people may, indeed, do considerable gardening for their family use, as is already being done in Belgium and to a lesser but increasing extent about other urban centers.

LOCAL DISTRIBUTION OF POPULATION

Europe contains relatively few farmsteads, as most of the farmers reside in country villages. This is least completely true in the favored North Sea region and most true in the remote areas of Russia, Italy, and Iberia. Except for some parts of central Sweden most of the agricultural workers need to walk considerable distances from their homes to their fields. The location of the villages commonly depends on the availability of a water supply, and, if this is widely available, upon the location of highways. Some villages occupy land less desirable for agriculture than adjacent tracts. The materials used for the construction of residences vary to a striking degree. Lumber is commonly used in and near the forested regions of the northeast and north and near the higher mountains but is sparingly used in other places, where brick, stone, or adobe prevail. The heights of the city dwellings vary with the latitude, being greatest in the comparatively sunny Mediterranean lands and distinctly less in the darker north. The deficiency of daylight in winter in northwestern Europe is one reason why skyscrapers are less popular there, as they shut out light from adjacent buildings.

RACIAL TYPES

A special phase of the distribution of the population is the distribution of racial types. Three major subraces are well represented: (1) the brunet long-headed Mediterranean in the south and also in the west as far north as Britain; (2) the blond, long-headed Nordics in the north; and (3) the intermediate Alpine in the east and center, with many representatives in the Balkan Peninsula. The Mediterraneans were present in Europe during the glacial period, and dominated Britain in pre-Roman times. The Nordics spread widely during several centuries, but during the last century or two have been gradually displaced by the most recent great arrival, the Alpine. The rapidly increasing Russians are a branch of this subrace as are most east central Europeans. Another noteworthy racial change in Europe is the recent increased significance of the Jews, not in matter of numbers, as there are still relatively few, but in commercial, educational, and political influence. Jews are especially powerful in Russia, Germany, and Poland.

MIGRATION OF THE CENTER OF POPULATION AND OF INFLUENCE

During historical times density of the population has increased greatly in almost all parts of Europe but especially in the northern and western sections. Although there are now at least twenty times as many people per average square mile in the Mediterranean province as at the dawn of history, according to the estimates of anthropologists, the increase in the marine climatic province of northwestern Europe has been much greater, because the population was formerly much smaller, but now it is

nearly double the average for Mediterranean Europe. Furthermore, partly because of the greater use of local coal and of the resources of other parts of the world, the northern people are more productive as individuals and have accumulated more wealth and attained more influence than have the southern (Fig. 93).

Another important cause for the relative decline of southern Europe has been that its "functional location" has changed from being the front door of Europe to being the back door. Formerly, not only did most Europeans face the Mediterranean commercially but most of the imports from India and the Indies entered Europe from the southeast. When

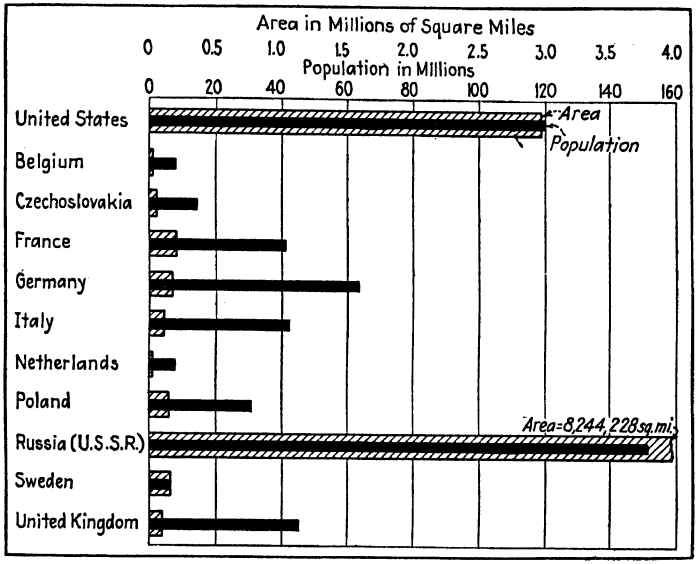


FIG. 93.—Area and population of specified countries.

the Turks practically stopped the traffic between the Mediterranean and the East, and the trade went around Africa, the Mediterranean was replaced by the Atlantic as the more important avenue of approach, and Europe began to face westward. Furthermore, western Europe is closer to North America and has benefited more by its resources as well as those of other continents than has southern Europe.

A third influence which helped northern Europe to replace Mediterranean Europe as the most important part of the continent was the greater depletion of some of the resources at the south, while at the north new resources were being made available and the soil improved by drainage, tillage, and fertilization. The cutting away of the forests, the carrying away from the steeper slopes of part of the soil, and the gradual deterioration of much of that remaining have all hastened the decline in the south, while the opposite result was taking place in the north.

Although some new mineral wealth has been discovered in the south, much more has been found in the north. The use of the coal alone is of enormous importance in this respect, but numerous mines of iron, potash, zinc, etc., have also been opened. Conversely, the exhaustion of southern mines has been far more significant than has the exhaustion of northern mines as yet.

There is some evidence, moreover, that the climate of southern Europe was better formerly for mankind than at present, while unquestionably conditions were less favorable in northern Europe. Ellsworth Huntington and various others have concluded that during the classical period and at various other times the Mediterranean region had dis-

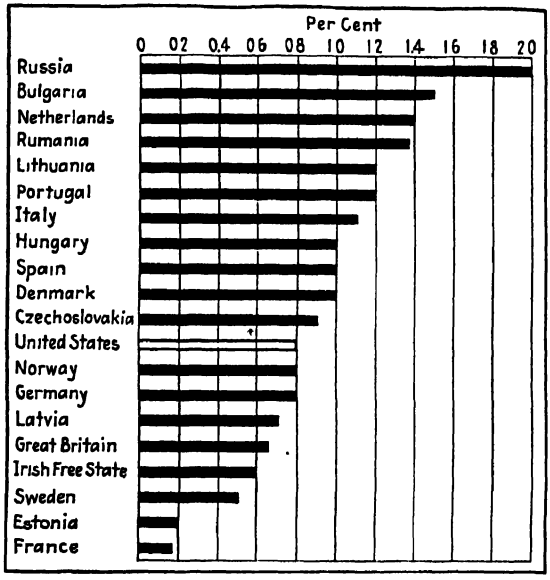


FIG. 94.—Natural increase of population, excess of births over deaths, average annual increase, 1923 to 1927.

tinctly better summers—less persistently dry and monotonous—because cyclonic disturbances more often affected them. Northern Europe, on the other hand, had distinctly more severe storms and harsher extremes at various times in the past than at present. Furthermore, the widespread use of window glass, the artificial heating of houses with wood and coal, and improvements in overcoming the inclemency of the weather have all made northern Europe better suited for mankind, so far as climatic conditions are concerned. These cultural advances helped southern Europe less. Just how significant the changes in climate and adaptation to it by cultural improvements have been, it is not now possible to determine; but presumably they have been important.

A considerable amount of racial deterioration has occurred in the south partly because of malaria, typhoid, syphilis, and various other diseases which have spread more widely there than toward the north. Another cause of racial deterioration has been the increasing proportion of the population that belonged to the peasant and servant classes. Such an increase has occurred seemingly quite generally in centers of civilization, which tend likewise to become centers of luxury, where there are few children in the families of the more intellectual classes.

These several influences and historical changes seem to offer a rather satisfactory explanation of the northward and westward migration of "the star of empire" or the "center of civilization" which has occurred in Europe.

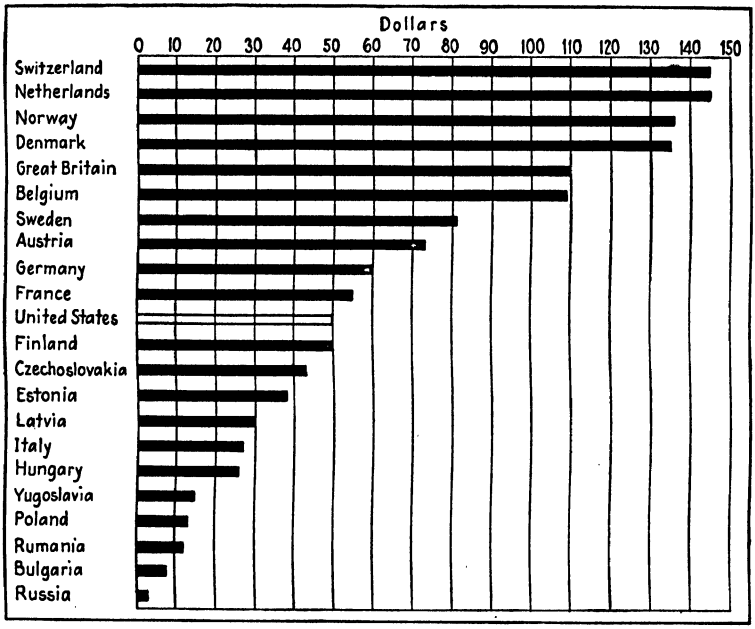


FIG. 95.—Per capita consumption of imported commodities, 1928.

Let us briefly sketch the major shifts in the location of the centers of most advanced civilization in Europe during historical times. About 1000 B. C. the island of Crete, which is the most southern part of Europe, was, according to archeologists, the most advanced in civilization of any part of Europe. A few centuries later the center of civilization had shifted to Athens, which is about 200 miles northward and a little westward from Crete. After a glorious development in Greece from about 500 to 200 B. C. civilization waned there and the center was for quite a time at Rome, some 300 miles north and 600 miles west of Athens. During the Middle Ages, especially during the Renaissance, northern

Italy and eastern France appear to have contained the rather diffuse center of civilization, with temporary outliers in other lands. During the modern period the areas bordering the southern shores of the North Sea have clearly led, and London has been approximately the center of greatest advancement.

With each shift of the center there has been improved accessibility to a larger and richer area, one that contains more people living on a higher plane. It has also meant an improvement in climate which has been discussed at some length in Chap. II.

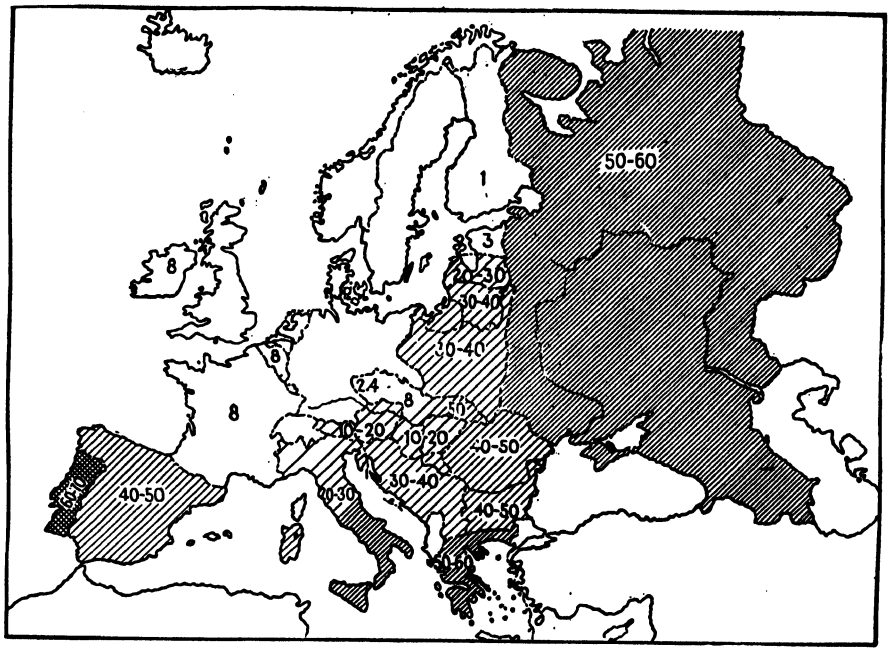


FIG. 96.—Illiteracy; the heavier the shading the greater the illiteracy. White is less than 10 per cent of those over ten years of age; white areas with no figure have practically no illiteracy.

Some people have suspected that the honor of leading Europe in civilization passed from Britain to Germany shortly before the World War, and since then has passed to Russia (Fig. 94). Obviously both Germany and Russia are more populous than Britain, their capitals are farther north, and both have made social experiments which may prove to be important advances. But also unquestionably the per capita resources of Russia are far less than those of Britain, the climate is distinctly inferior, and the accessibility of the country from other advanced regions is less. In far milder measure, Germany also seems to fall somewhat short of Great Britain in these respects. Hence, from a

geographic viewpoint, it seems improbable that the center of civilization has shifted to Russia or even to Germany. As the resources and cooperation of other parts of the world are having increased significance, it appears that Britain's advantages of location and resources at home and abroad and exceptional cooperation from related peoples will continue to give that country a distinct advantage for a long time to come (Figs. 95, 96).

CHAPTER VIII

DISTRIBUTION OF MANUFACTURING

Comparative Importance of Europe in Manufacturing.—Europe is by far the most important of the continents in manufacturing. Only very recently, in fact, has any other done even a sizable fraction as much. Furthermore, although Europe has long been comparatively significant for manufacturing, Asia, with its much greater population, was not so far behind until the industrial revolution introduced machinery run by power, a century and a half ago.

The comparative significance of manufacturing in the various parts of the world is suggested by Fig. 97. This shows that in only a small

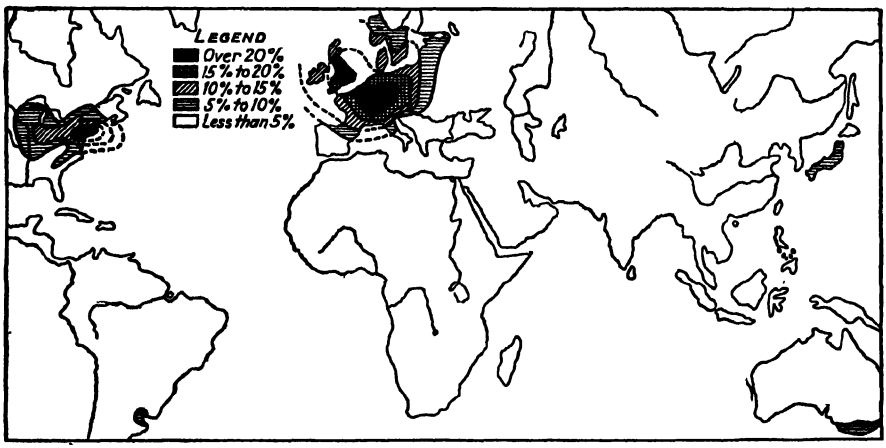


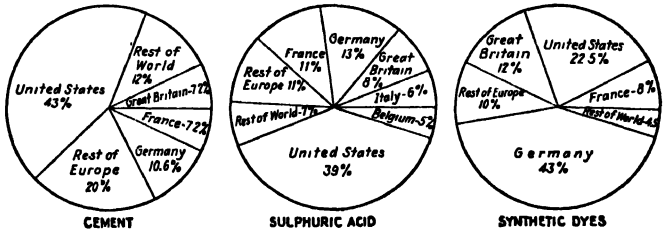
FIG. 97.—Distribution of intensity of manufacturing so far as it is shown by the percentage of the gainfully employed population engaged in it. (*From Huntington and Cushing, Principles of Human Geography, John Wiley & Sons, Inc., by permission.*)

percentage of the land are as many as 5 per cent of the gainfully employed persons engaged in manufacturing. In northwestern Europe, however, and in a small part of the United States, more than 20 per cent of the working people are engaged in manufacturing. As the percentage decreases rather rapidly eastward and westward and still more rapidly southward from the European area of most intensive manufacturing, it is apparent that most of Europe's preeminence as a manufacturing region is caused by the exceptional output of only a small part of the continent. This is the same region, moreover, that is exceptionally active in agriculture and mining, especially supplied with transportation facilities,

particularly active in commerce, and also most healthful (Figs. 16, 75, 79, 95, 98, 100).

Before discussing the distribution of manufacturing in Europe in some detail, a historical resume of the development of manufacturing and of the progressive changes in its distribution will be of interest.

Changing Significance of Manufacturing to the Individual.—The total amount of manufactured goods has increased enormously in the last century and a half, but even at the dawn of history such goods made up a large share of human wealth. At that time, indeed, little of the land surface had value, and in only a few spots was value attached to the mineral wealth underground. Hence wealth consisted largely of domestic animals, including slaves, and of buildings and other manufactured goods. Although the latter were comparatively limited in quantity and not very diversified, they were often precious because their manufacture entailed so much labor, and the requisite skill for their production was so rare. For example, a good sword was worth more than numerous good horses or even many slaves, while tapestries often represented many years work



FIGS. 98 to 100.—Percentages of world's production of important basal materials, 1927 or 1928.

of several people. Not uncommonly a building of a size and quality which could now be erected in a few months, at the cost of the total annual earnings of only a few score laboring men, required decades or even centuries to construct and hence had great comparative value. For example, the possessor of a good castle was so much more powerful than his neighbors without one that he commonly dominated them and received homage and free service from them. Even the wealthiest men of today are less conspicuously better off than the generality of their fellow men. Indeed experts have concluded that the average man has increased in comparative value century by century, as is shown by the gradual rise in real wages and by increased privileges, while the possessors of vested capital, the aristocracy, have come to have fewer and fewer advantages over their humbler fellows. During the last century there have been, indeed, very numerous instances of individuals previously poor who accumulated large fortunes within a few years, proving the lessened significance of the possession of accumulated, inherited, goods.

In other words ability, training, objective, energy, and persistence are of increasing importance, and inherited capital of decreasing significance.

Increasing Use of Manufactured Goods.—Although the possession of manufactured goods no longer entails the same power to the possessor that it did in ancient and medieval Europe, chiefly because now even those too poor to have many goods of their own commonly have the use of those owned by companies or by the government, nevertheless, manufacturing is of increasing importance. This is because more and more power from other sources than man's muscles has been applied to the production of goods. Hence manufactured goods have become progressively cheaper. Accompanying this cheapening there has been an enormous increase in the number of people who use them, and an equally vast expansion in the consumption of goods by each of the individuals who use them.

Distribution of Early Manufacturing.—Before the industrial revolution the amount of manufacturing varied in rather close harmony with the density of population and its advancement. Hence in early ancient times it was carried on in Europe mainly in the eastern part of the Mediterranean region. During the period when Crete led in civilization, much fine manufacturing was done there, as is shown by numerous works of art recently uncovered by archeologists working on that island. The manufacturing of ancient Greece included certain types, particularly sculpture and architecture, that have scarcely been excelled. When southern Italy led, much manufacturing was carried on there, and many interesting samples have been disclosed in the excavation of the ruins of Pompeii, covered by ashes from Mount Vesuvius in A. D. 79. Likewise during the Renaissance, the cities of northern Italy were comparatively very active in manufacturing, and some of the more valuable things made there then, particularly the works of art, armor, and church furniture, are still extant. (The activity of the period is vividly described in Benvenuto Cellini's autobiography.) During the so-called Middle Ages, manufacturing was carried on in guilds in various towns and in the feudal manors. The former type was relatively important in what is now Germany and the latter in England and France.

Previous to modern times the presence of sources of power or even of superior transportation facilities had relatively little influence upon manufacturing. One of the chief exceptions was the flour mills run by water wheels in England where such mills became rather common several centuries ago. Of most importance in locating manufacturing, aside from the concentration of population in towns, was the interest of the more influential people. Some feudal barons scorned all but the crudest homemade furniture, clothing, and other equipment. In the territory of such barons relatively little manufacturing was carried on as compared with the amount in the territories of barons who actively

encouraged manufacturing, and who frequently brought skilled workers from a distance.

Local Market for Early Manufactures.—During the Middle Ages manufacturing was carried on chiefly in the immediate vicinity of the places where the goods were used. Some important reasons for this were (*a*) the poor transportation facilities, (*b*) the numerous tariffs and tolls extracted when goods entered other feudal domains, and (*c*) the great danger of their being stolen by pirates on the sea or rivers, or by robber bands upon the land. Other conditions also discouraged the manufacture of more of any commodity than required locally. For one thing the sale of the surplus in other areas was rendered difficult by sharp local differences in style, and also by the lack of confidence in the quality of the goods. Whereas at present people in many lands use identical types of many sorts of goods, some of which are made far away by an alien people, in the Middle Ages each community took pride in the distinctiveness of its wearing apparel, furniture, ornaments, and also

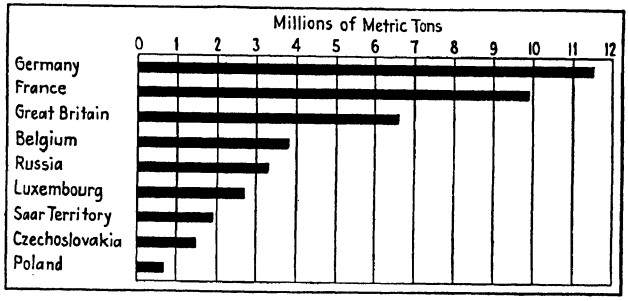


FIG. 101.—Pig iron production, 1928.

even of its language. The numerous dialects and mediums of exchange in use also interfered with widespread trade, as did religious intolerance and intense suspicion amounting almost to hatred of all "foreigners."

RISE OF SPECIALIZATION

Gradually, however, certain localities were able to specialize more and more in manufacturing as the market for their goods expanded. The Hanseatic League of north Germany and the Baltic countries extended the trade in that part of the world notably and thus facilitated manufacturing. The commercial activities of the Dutch in the sixteenth and seventeenth centuries afforded a market for some local manufactures, and hence a considerable expansion of the manufacture of woolens and linens occurred. With the help of Flemish weavers the woolen industry of England expanded, and before long there was a surplus for export.

Thus even before the industrial revolution commenced, the area bordering the North Sea was conspicuous for the amount of manufactur-

ing carried on by the guilds of the Hanseatic League, in the Low Countries, and in England. At that time there was, however, little manufacturing in most of Europe, even for local use, as most of the people had very few belongings. The chief exceptions were cities and towns of eastern France, northern Italy, and those on the trade routes between the latter and the Hanseatic cities.

The Industrial Revolution.—The industrial revolution and the resultant concentration of manufacturing in factories greatly cheapened manufactures and therefore helped to extend their use. Not long after the revolution commenced in England, the steamboat was invented and before long the locomotive. These assisted enormously in assembling raw materials and in distributing manufactures. The invention of the cotton gin permitted cotton, which had previously been of almost insignificant importance, to become the chief textile, and the discovery of far cheaper methods of making good iron and steel aided conspicuously (Figs. 101, 102).

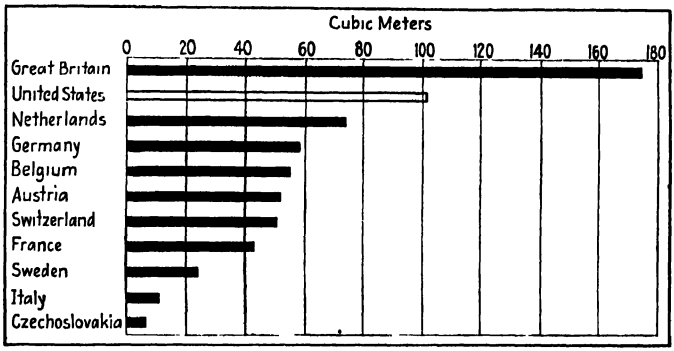


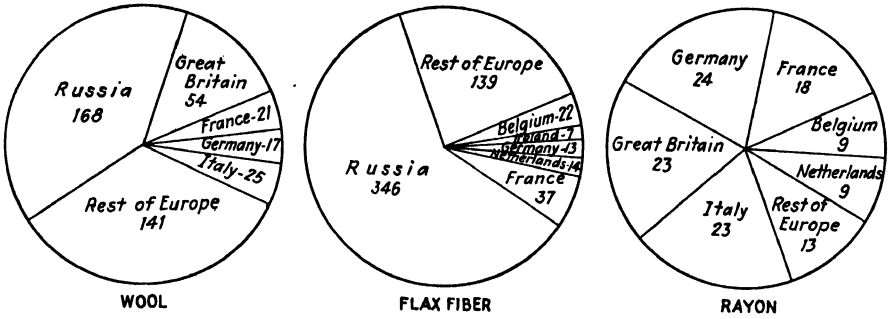
FIG. 102.—Gas used per capita, 1928.

Multiplication of Manufacturing in Britain.—Manufacturing soon expanded enormously in England in response to several favorable conditions including the following:

It happened that Britain possessed excellent deposits of coal, favorably distributed and cheaply mined, as well as good deposits of iron ore and comparatively large local supplies of wool. Furthermore, Britain is the nearest part of Europe to the South, where cotton was chiefly grown. The further fact that the chief cotton growing region was a former English colony aided the British in obtaining their chief textile, the raw material of their most valuable export. Until comparatively recently cotton goods have been manufactured in other lands almost exclusively for local consumption, with the result that Great Britain has exported more by far than has all the rest of the world combined (Figs. 103–106). The great expansion of industry was also aided by her numerous colonies and

by the fact that skilled workers and other experts from less favored lands were encouraged to settle in England and contribute to its prosperity.

Spread of the Revolution from Britain.—The use of machinery and power spread gradually from Britain, first to Belgium and northwestern France and then to adjacent Germany. In most parts of the world the steamship and the locomotive were the first great illustrations of the use of power and extensive machinery, but these are not used directly for



FIGS. 103 to 105.—Production of the textiles, 1928, in thousands of metric tons. Totals: wool 427, flax fiber 577, rayon 119.

manufacturing. The first factories to be introduced in other lands were usually flour mills and the next knitting mills, which often used yarns imported from England. Later textile mills capable of using the raw materials were constructed with machinery from England and often also with skilled British supervisors.

The spread of the factory system from England and Belgium into other lands was delayed by several conditions. One was that the British

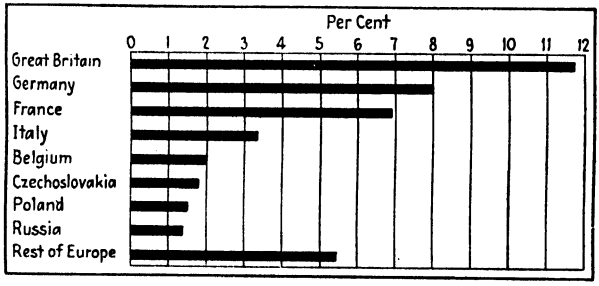


FIG. 106.—Jute consumption, 1928, percentage of world's total.

and Belgians were so favored by natural resources, location, and the possession of an unusually energetic population, presumably partly due to their exceptionally favorable climate, that they could produce manufactures of good quality more efficiently, and hence cheaper, than could other lands. Therefore until the spirit of nationalism had intensified sufficiently so that people were willing to pay a higher price for inferior

goods made in their own country than for superior imported goods, the spread of factories was slow. As nationalism intensified, however, tariff barriers were raised (Fig. 135) and even bonuses paid to encourage exportation, and these procedures permitted factories to develop in many places far less favored than Britain. In recent years it has been the ambition of many of the popular leaders in a large number of countries to have their countries cease importing any manufactures that can presumably be produced with any considerable degree of efficiency in their own lands. As a result, the citizens of many countries have borrowed capital, imported machinery, and often also the raw materials and even the fuel, and have commenced competing, at least locally, with the well-established, more efficient manufacturers of other lands.

Trends in the Spread of Manufacturing.—Some of this spread doubtless will be permanent, but presumably as tariff walls are lowered, the geographical advantages of certain favored areas will again have greater influence in localizing manufacturing. It seems not altogether impossible that in the distant future if the United States of Europe becomes an actuality, instead of merely a desired objective, manufacturing may be distributed somewhat differently than at present. What has happened in the United States suggests, perhaps, what may occur in Europe. Despite the lack of tariffs between the states, the intensification of sectionalism, the counterpart of nationalism, favored the local manufactures and helped manufacturing spread widely from the region of its first great development. This was aided of course by the considerable cost of transportation from that area, which is far from the center of population. Furthermore it gradually became apparent that the New England region was less favored geographically in several important particulars than either the adjacent area to the south, a considerable area in the Middle West, or a small part of the Pacific states. Hence there has been presumably a permanent extension of the area of intensive manufacturing. Despite innumerable attempts to carry on extensive manufacturing at considerable distance from the favored area, however, success there has been chiefly limited to items for which especially favorable local conditions prevail.

Presumably the amount of manufacturing done in each country of Europe will increase decade by decade, because of progressively higher material standards of living and the persistent tendency to prefer goods made in one's own land, if not conspicuously inferior in quality or style and if not higher priced. The saving of time also favors local goods. Doubtless certain areas, not now very important for manufacturing, including northern Italy, Bohemia, and some other localities, have sufficient advantages to offset their disadvantages and permit them to become important. Moreover for the production of some commodities various other localities are favored, and in such places a great expansion

may occur in the items favored, and to supply the more immediate needs of the increased population that will be supported thereby.

PRESENT DISTRIBUTION OF MANUFACTURING

Statistics as to the value added by manufacture are available for very few European countries, and even the total value of manufactures is not available for nearly all. Perhaps the most satisfactory statistical evidence of the contrasts in the importance of manufacturing, therefore, is the percentage of the gainfully employed who are engaged in manufacturing. This is shown approximately in Figs. 97, 209, which reveal a striking contrast. The black area of Fig. 97, which includes much of Germany, eastern France, the Low Countries, most of England, and southern Scotland has more than one-fifth of its workers engaged in manufacturing. From this small area the percentage falls off rapidly in all directions, most rapidly toward the southeast and least rapidly northeast, toward Finland. In most of Europe fewer than 5 per cent of the employed people are engaged in manufacturing.

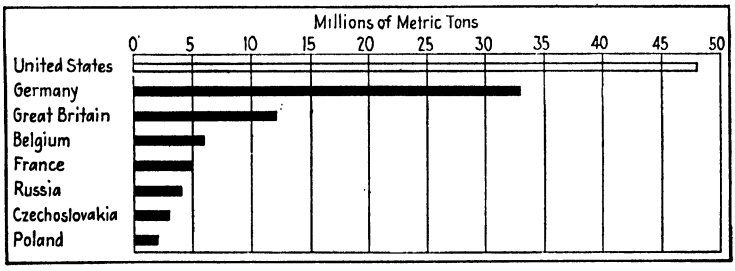


FIG. 107.—Coke production, 1928.

Analogies in Intensity.—The distribution of intensity of manufacturing resembles in a general way the distribution of civilization (Fig. 21), of healthfulness (Fig. 35), of most favorable climate, and of the use of power (Figs. 102, 107, 158, 160). It also shows considerable correspondence to the map of density of population (Fig. 87).

The area of most intense manufacturing is conveniently situated with respect to coal, but part of it, southeastern England, most of Netherlands, the upper Rhine Valley in Germany, and Switzerland, has no coal. Conversely, the Donets coal field of eastern Ukraine, although now the chief industrial area of Russia, had recently less than 5 per cent of its population engaged in manufacturing. It is apparent, therefore, that the mere presence of coal is far less significant in determining where manufacturing is important than are certain other conditions. One of these is the energy of the people and another is the availability of electric power, from hydroelectric plants or from perhaps distant power plants that are so situated that coal can be obtained readily, London, for example.

Subregions of Intensive Manufacturing.—Within the black area of Fig. 97 four subregions may be recognized (1) the British part, (2) the area extending from extreme northern France across Belgium and southern Netherlands to include the Ruhr district of Westphalia, Germany, (3) extreme eastern France and southern Germany, (4) the area from Berlin to Bohemia. The second of these, from France to the Ruhr, is the most important, for it produces a considerable share of the world's steel, chemicals, glass, electrical equipment, and innumerable lesser items. But as it is divided between four countries its comparative importance is not readily apparent. Next in importance is the British subdivision, in which something like $5,000,000,000 was added by manufacture in 1924. About $1,700,000,000 of this was added to the value of the raw materials in the manufacturing of ships, machinery, hardware, rails, autos, etc., chiefly from steel. Other chief items in this area are textiles ($1,200,000,000 added), foodstuffs ($1,100,000,000), paper and printing, chemicals, and the manufacture of products of clay, glass,

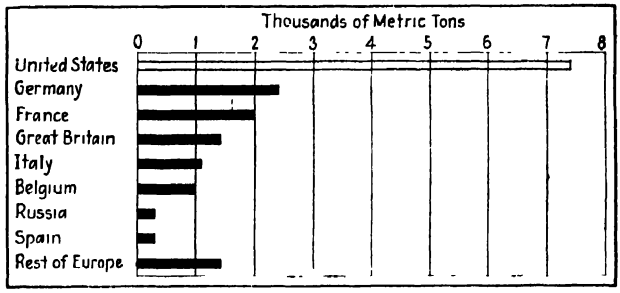


FIG. 108.—Sulfuric acid production, 1928.

and stone (total $1,000,000,000). The third area, easternmost France, southern Germany, and northern Switzerland, is also important for the manufacture of steel, textiles, chemicals, and electrical equipment. Other items meriting mention are instruments of precision, including optical instruments, watches and clocks, toys, and dyestuffs. The fourth area, Berlin to Bohemia, carries on a great variety of manufactures including textiles, glass, bookmaking, beer, and sugar (Fig. 108).

The noteworthy physiographic diversity within any of these several important manufacturing districts, as appears conspicuously on the physiographic diagram, makes it evident that relief is only one influence and often a minor one, provided a small amount of fairly level land is available for factories.

Lesser Subregions.—Beyond the area of most intense manufacture five areas of considerable importance may be mentioned. (1) The Lyon-St. Etienne and Marseille region of southeastern France, important for its production of soaps and other products of vegetable oils in Marseille,

lace and other textile goods in Lyon, and steel and aluminum in St. Etienne. (2) Northern Italy, especially the Po Valley, has long been of considerable importance as a manufacturing center. Moreover many new or enlarged factories have recently been constructed to manufacture silk, rayon, machinery, and a large share of the other manufactured products used in Italy. (3) Barcelona is the chief manufacturing center of Spain, and though far less important than the foregoing it may be mentioned as a center of considerable significance. (4) The region from southern Norway to southern Finland is of importance for high-grade steel, paper pulp, lumber, and matches and likewise in Norway the production of aluminium and nitrates is appreciable. (5) Most of Russia's manufacturing is done in the Moskva (Moscow) region and on or near the Donets coal field of Ukraine. Although the output is still relatively small, there has been so great an expansion recently that it seems likely that the Moskva to the Black Sea area may soon become

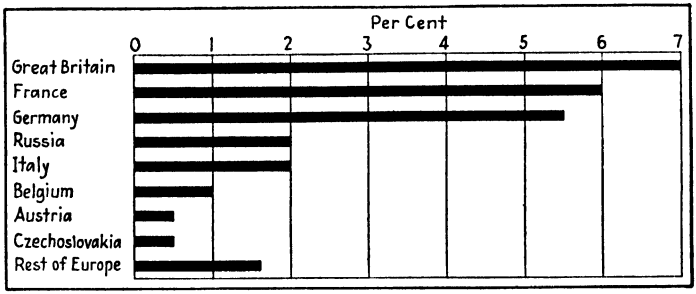


FIG. 109.—Rubber consumption, 1928, percentage of world's total.

one of the secondary centers of European manufacture. Textiles are chiefly manufactured in the Moskva district, while flour, steel, machinery, and tractors are of importance in the southern, Ukraine, section.

Conspicuous City Centers.—Within each of the several subregions mentioned in the two preceding paragraphs are numerous cities, most of which produce in addition to almost innumerable other items, some one or two items that are especially prominent. An attempt is made on Figs. 110 to 115 to show the more conspicuous centers for the manufacture of some thirty especially important items. The selection of the cities designated does not imply, however, that these items are made chiefly there, for some of them, such as leather goods, flour, brick, toys, and wearing apparel, are made in every large city, and hence the conspicuous centers produce only a small fraction of the total for Europe. Furthermore in even the most specialized of the centers a great variety of manufacturing is done in addition to the items specified. For example, although London, Paris, and Berlin are marked as conspicuous centers in the manufacture of only a few items, they are in fact important centers

in the manufacture of many hundreds of items. Obviously in such a case only those items that are exported in largest amounts can be shown on such maps as these. Furthermore some cities not designated on these maps as "conspicuous centers" in the production of any one of these items may merit such designation, but in order not to crowd the maps too badly they have been omitted. Finally, the available information as to the comparative rank of cities in the production of specified manufactures

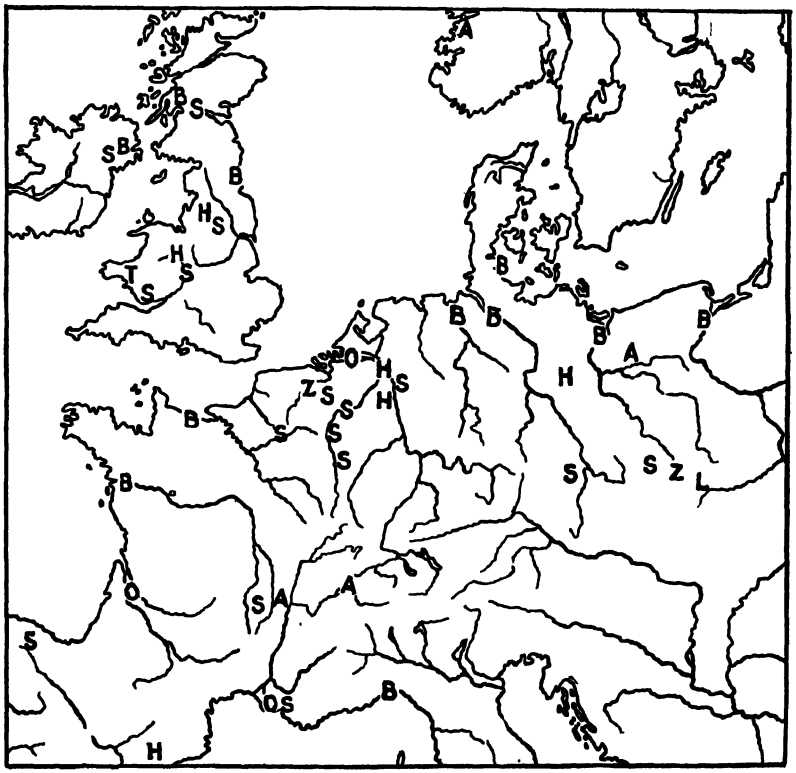


FIG. 110.—Conspicuous centers of the manufacture of steel *S*, ships *B*, hardware *H*, the smelting of zinc *z*, tin *T*, aluminum *A*, lead *L*, and the refining of petroleum *O*. Baku and Groznyi, in Russia, also have important oil refineries and Nikolaev a considerable steel industry.

is far from satisfactory, and some centers which should be shown are omitted because information concerning their rank was not available.

Geographic influences have affected conspicuously the localization of the manufacture of nearly all the items dealt with in Figs. 110 to 115, but space is available to discuss briefly the conditions affecting only the more important items.

Steel.—The several centers conspicuous in the production of steel shown in Fig. 110, Birmingham, Middlesborough, Lille, Essen, Praha, Breslau, etc., are alike in having both local supplies of coking coal and of

iron ore, although in several instances the local supplies are now supplemented by imported ore or, in fewer cases, by imported coal. Of the latter type, Bilbao, Spain, which uses considerable coal brought as a return cargo from England by ships coming for ore, is the chief example. The Belgian and west German steel centers now import most of the required ore, chiefly from Lorraine or Sweden, while England imports more than one-half of its ore from varied sources including Sweden, north Africa, and Spain. Because the raw materials and also the finished products can be transported to advantage on ships, most of the centers

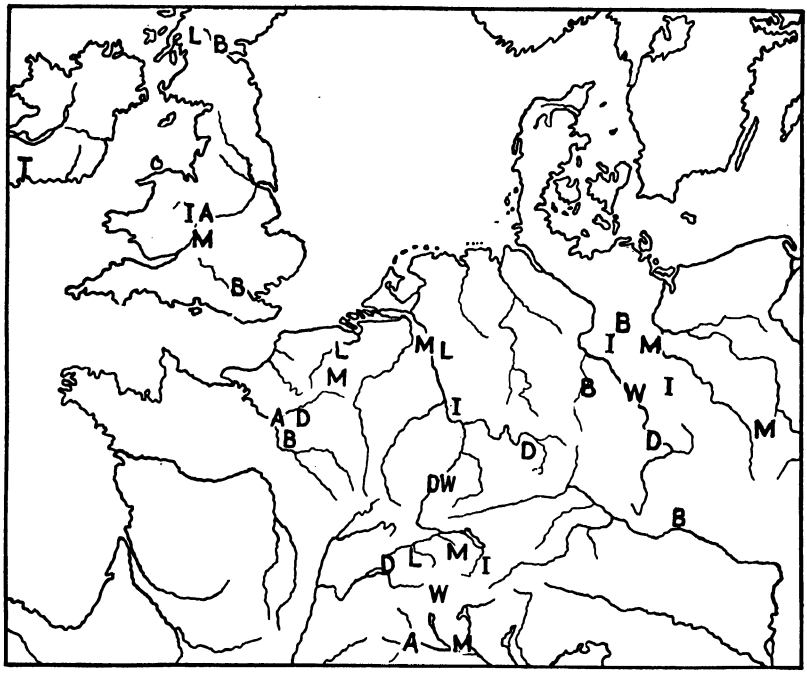


FIG. 111.—Conspicuous centers in the manufacture of machinery including agricultural machinery *M*, locomotives *L*, automobiles *A*, tractors *T*, instruments including optical *I*, clocks and watches *W*, dolls and toys *D*, books *B*; Rostov, Russia, is also important for agricultural machinery and Stalingrad for tractors.

of steel production are on the coast or, in the case of the Ruhr district, on a navigable river, the Rhine. Among the numerous centers that were formerly important, those that can not be served by ships have nearly all suffered a relative decline. The Belgian center is the chief exception, and the far less important Silesian center a minor exception.

The manufacture of machinery (Fig. 111), hardware, and ships (Fig. 110) is carried on largely in or near the centers of steel manufacture which are most commercialized. Ships are, of course, built upon the coast or on a canalized river. but hardware, having a high value per ton, is often produced inland.

Textiles.—The textiles are manufactured very widely, but there are centers in respect to each of the types (Fig. 112). Woolens are manufactured chiefly in areas which were important sources of wool before the industrial revolution. In Britain most of the woolen mills are on the eastern side of the Pennine Range, where coal is available but where the climate is less moist than on the western side, and where sheep thrive better. Conversely, cottons are largely manufactured on the humid western slopes of the Pennines, partly because, before the cotton factories were all artificially humidified, the cotton thread was less likely to break during manufacture there than in drier more eastern England. The importance of woolens in Russia is related to the long cold winters there;

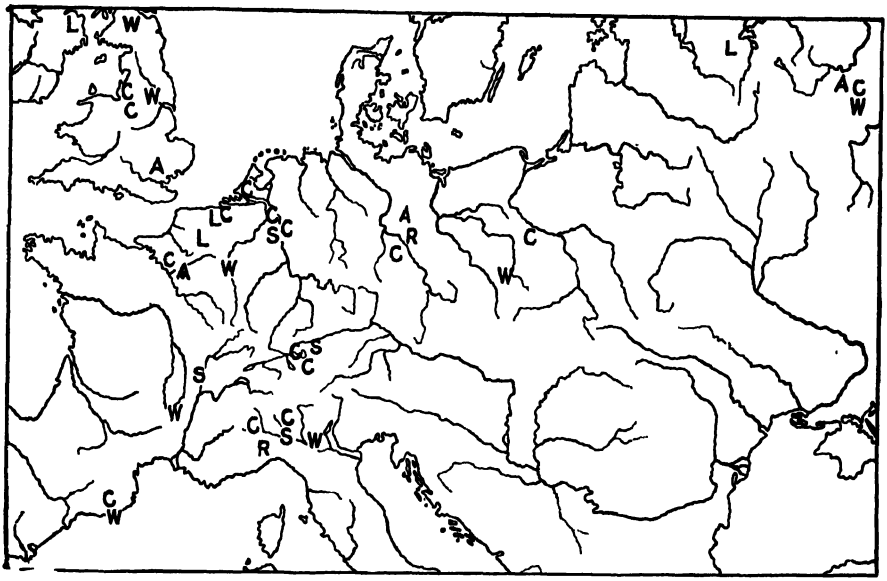


FIG. 112.—Conspicuous centers of the manufacture of textiles: wool *W*, cotton *C*, silk *S*, linen *L*, rayon *R*, and wearing apparel *A* (Wien should be marked *A*).

and the winters of Germany also help explain the considerable manufacture of woolens there. In France, on the other hand, the large export of stylish wearing apparel of light-weight woolens helps account for the large amount of wool used in manufacture (Fig. 26).

Silk manufacturing in Europe centers largely in the areas where the raw silk is produced, where the mulberry thrives, and where, partly because of the mildness of the climate, the population is fairly dense but skilled. The chief exception is Krefeld, Germany. However, most of the silk used, except in Italy and Spain, is imported.

Rayon depends largely on wood pulp for its raw material and on chemical and mechanical rather than manual skill. Its production has spread much more widely than that of silk especially toward the north.

This is partly because rayon in many ways takes the place of silk. Nevertheless, the Italian silk-producing area is important for rayon also.

Linen is produced in areas important for flax growing, although the Irish center now imports nearly all of the raw material from Belgium. That country, in turn, imports from Russia. There and in Poland and the Baltic states much flax fiber is made into linen by hand in the peasants' houses as well as in factories.

Chemicals.—The distribution of centers of the production of chemicals depends upon the availability of the raw materials, such as the great

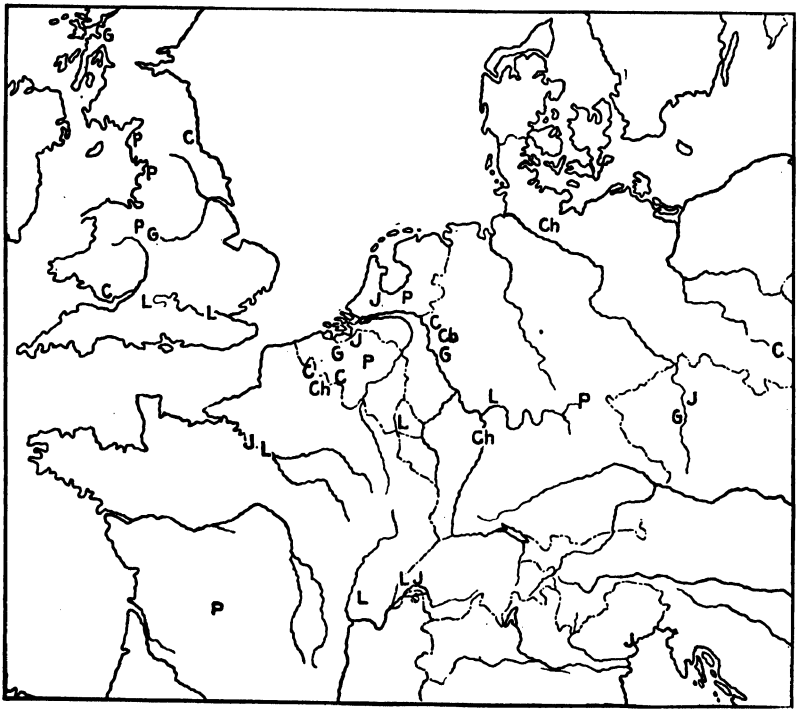


FIG. 113.—Conspicuous centers for the manufacture of glass *G*, porcelain and pottery *P*, coke *C*, chemicals *Ch*, leather goods including gloves *L* (Moskva is also important), jewelry including diamond cutting *J* (Dresden and Sévies should be marked *P*).

deposits of various salts at Stassfurt, Germany (Fig. 197) and the numerous by-products remaining after the making of coke in the Ruhr and west Britain (Fig. 107). It also depends on the special skill of some of the people, for example, the chemists of Germany and, of course, on the local demands for the products. The demands are greatest in the most advanced areas, and hence the chemical industries are located there, even if the raw material has to be imported (Fig. 113). For example, most of the 22,000,000,000 pounds of sulfuric acid made in Europe in

1928 was made with imported sulfur, Italy, the chief European source of sulfur, producing only 6 per cent (Fig. 108).

Smelting.—The smelting of tin, lead, and zinc is largely done in localities having abundant fuel that have, or formerly had, local supplies of the ore, and which are located so that foreign ores can readily be imported (Fig. 110). In Wales, however, the tin smelters and especially the main factories using tin are partly a response to the exceptional ability of the workers to withstand high temperatures. Wherever workers are required to withstand intense heat for long periods, as in factories where tin plate is being rolled out or in stoking the fires of steamships, it has been found by abundant experience, according to J. W. Gregory and numerous others, that Welchmen can stand the heat with fewer cases of heat prostration than can any other people.

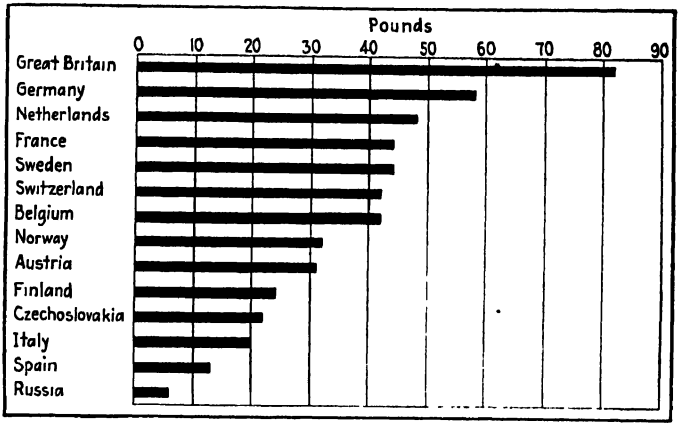


FIG. 114.—Paper consumption per capita, estimate for 1927.

The *zinc* smelters of Belgium, among the largest in the world, now use only imported ore, but the Silesian smelters use almost exclusively local ore.

Oil is refined not only near the chief oil producing areas, Baku, Groznyi, and Galati, but also at certain ports into which much crude oil is shipped, especially Hamburg, London, Marseille, and Rotterdam.

The manufacture of *aluminium* depends chiefly on the availability of cheap power for smelting the highly refractory ore. As southern Norway has more hydroelectric power than can be sold at a good price, an increasing amount is being used to smelt bauxite and also to make artificial nitrate. A similar situation obtains in parts of Switzerland and in the upper Rhone Valley, near the source of much of the ore. The considerable German output of aluminium depends, however, on cheap lignite rather than on water power.

Tractors.—Fordson tractors are built in a large factory in Ireland. This is partly a response to relatively cheap labor, but it is also due to the fact that tractors are on the American free list, and also can be carried cheaply in the partly empty ships which go from Britain to all the great regions exporting foodstuffs. In order to avoid paying tariff duties, automobiles are made by subsidiaries of American companies in each of the countries having a large market. As France offers the largest market, automobile production near Paris is especially important. Brit-

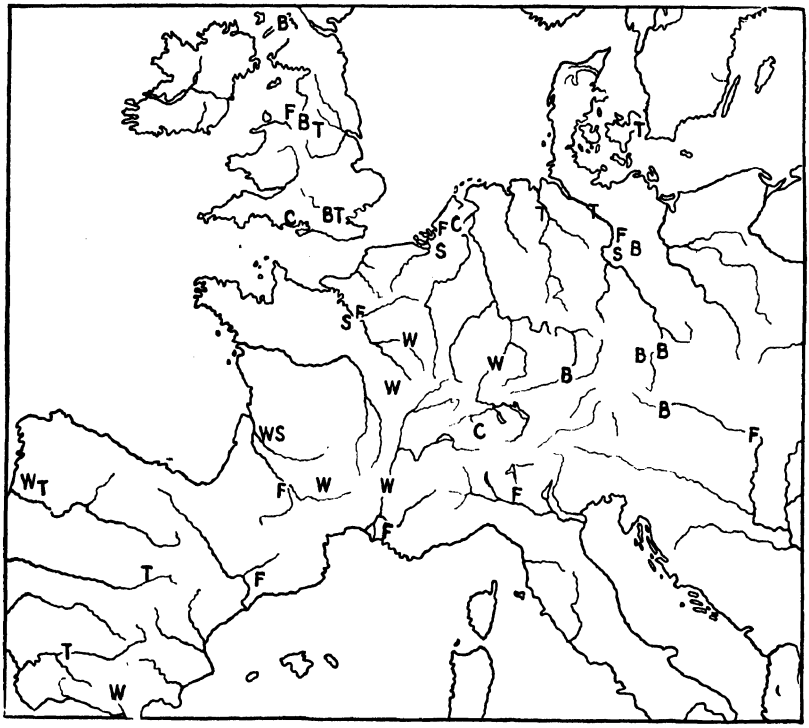


FIG. 115.—Conspicuous centers in the manufacture of flour *F*, sugar *S*, beer *B*, wine *W*, chocolate *C*, tobacco *T*; Odessa, Russia, is another important flour-milling center and Kiev is important for sugar refining (*B* at Dortmund and *W* at Torino).

ish, French, and Italian cars are produced in these same countries, mostly in the areas marked *A* on Fig. 111.

Locomotives are made chiefly in the great steel-producing districts of northern England and the Ruhr. They are made in England partly because of the ease with which they can be exported to overseas areas in which British capital has been invested. They are made in the Ruhr partly because of that region's convenience to a large continental market (Fig. 111).

Books.—The production of books is chiefly in the more advanced region, (Fig. 21), especially in the larger countries. Although there is

little illiteracy in several of the smaller countries from Netherlands to Finland and the per capita sale of books is large, the total sale is larger in Germany with its much larger population and its many expatriates in America. The advantages possessed by the publishers in Britain are even greater, as the public that reads English is at least three times as large as that which reads German (Figs. 111, 114).

Summary.—The chapter can be closed to advantage by a brief summary of the conditions favoring the great development of manufacturing in the so-called North Sea countries. This area is one of the world's most fortunate in respect to coal, density of an advanced population, healthfulness and skill of the people, facilities for transportation and communication, stability of government, and commercial activity. Because of the large population and its comparatively high material standard of expenditure, the local market for manufactures is far larger than anywhere else in the world, with the possible exception of the United States. Furthermore, from almost no other area is it so convenient to export the surplus, partly because no other area imports such abundant foodstuffs and raw materials. Of especial significance, however, in explaining the comparatively intense development of manufacturing, is the exceptional energy of the people. Whether this great energy is largely due to the stimulating climate or whether it is chiefly the result of the combined effects of a number of influences including that suggested by "nothing succeeds like success" it is not now possible to determine.

CHAPTER IX

THE COMMERCE OF EUROPE

Early Importance.—Europe has long been important commercially. In Egyptian tombs dating from the second millenium B. C. have been found numerous amber gems which good authorities declare must have come from the south shore of the Baltic Sea, the one important source of amber. By 1100 B. C., the Phoenicians made regular trips from their home in western Asia to the Iberian Peninsula for silver and lead and to Cornwall for tin. Shortly afterward, the Cretans carried on considerable commerce with the northern shores of the Black Sea. The ancient Greeks had an active trade, obtaining much of their wheat from what is now southern Russia. Even more important was their trade with westernmost Asia and northernmost Africa. The Romans extended trade relations still farther and obtained some goods from Persia and India. Their trade with northern Europe was much greater than that of the Greeks.

Some Effects of Trade.—The commercial activity of Europe was the basis for much exploration, because most early explorers were looking for easier routes for commerce. Columbus, da Gama, Magellan, and Hudson are examples. European commerce has also led to much settlement of other regions by Europeans. It has supplied other regions with European goods, ideas, and inventions, and has, in turn, enriched Europe by bringing back the products of many lands, and, occasionally, valuable ideas. Furthermore, it has served as a broadening training for many European citizens. Within the continent, the spread of early culture from the Mediterranean region, discussed in Chap. III, was partly a direct result of commercial relations, and commerce has continued to spread new ideas and inventions from one section of the continent to another.

MODERN GROWTH OF COMMERCE

Europe's commerce has grown rapidly in volume and value in recent centuries. In 1500 most of the commodities were of small bulk and high value, such as jewels, spices, silk, and precious metals. Now, although these costly items are carried in ever increasing amounts, they form only a trifling share of the total commerce, which is chiefly in bulky and relatively cheap substances. The main items are wheat, coal, lumber, iron ore, iron, steel, raw cotton, wool, petroleum, and manufactured cloth and machinery. Not only has the list changed, but it has been extended to include thousands of items instead of the scores carried a few centuries

ago. An illustration of how greatly commerce has grown in bulk is the fact that in a year all the seagoing ships in the world at the time of Columbus could not carry as much freight as can one of the larger ocean greyhounds of today. A further illustration of this growth in total commerce is the fact that the total value of the world's commerce is now about thirty-five times its value a century ago. The growth is shown, in round figures, for four leading nations and the world as a whole in Table IV and Figs. 116, 122.

TABLE IV.—FOREIGN COMMERCE OF LEADING NATIONS
(Millions of dollars)

Year	Britain	Germany	United States	France	World
1800	325	175		130	1,500
1820	375	225	..	165	1,700
1840	575	250	200	300	2,790
1860	1,875	400	650	550	6,130
1880	3,500	1,450	1,550	1,450	14,760
1900	4,350	2,275	2,250	1,900	20,110
1913	6,472	5,365	4,530	2,953	40,420
1928	9,900	6,260	9,220	4,100	68,000

This great increase in commerce is related to the use of coal, to the discovery of cheap methods of making steel, to the invention of power-run machinery, to improvements in transportation including sending of power over electric wires, and to the use of labor-saving machinery in agriculture. As Europe made nearly all of these great inventions and discoveries, the commerce of other parts of the world has increased only slightly, except with European encouragement and assistance. Europe's commerce, on the contrary, has been multiplied many fold.

Spread of Commerce.—Much more than one-half of all the commerce of the world, aside from local trade, is carried on by Europe. Even the United States from 1910 to 1914 inclusive obtained just one-half of its imports from Europe and sent nearly two-thirds of its exports thither. From 1926 to 1929 Europe bought 47 per cent of our exports and sold us 30.5 per cent of our imports. Great Britain alone has for many years bought from two to six times as much from the United States as has all of South America and has sold us as much or more than all South America. Other nations illustrate the prominence of Europe in commerce quite as well as does the United States. For example, Brazil and Argentina receive more than one-half of their imports from Europe, Australia and India each nearly three-fourths and even Japan about one-third. Europe buys a large share of the exports of all parts of the world. For example, over four-fifths of the exports of Africa go to

Europe, three-fourths of those from Australia, and over one-half from North and South America. The character of the imports of six chief European nations from the United States is shown in Figs. 121, 122.

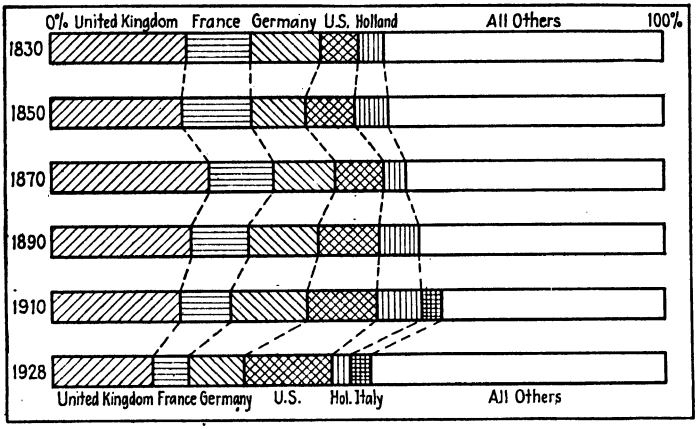


FIG. 116.—Share of the leading nations in the world's foreign commerce in different years.

As most of the world's commerce, aside from local trade, is carried on with the help of seagoing ships, it is interesting to note in this connection

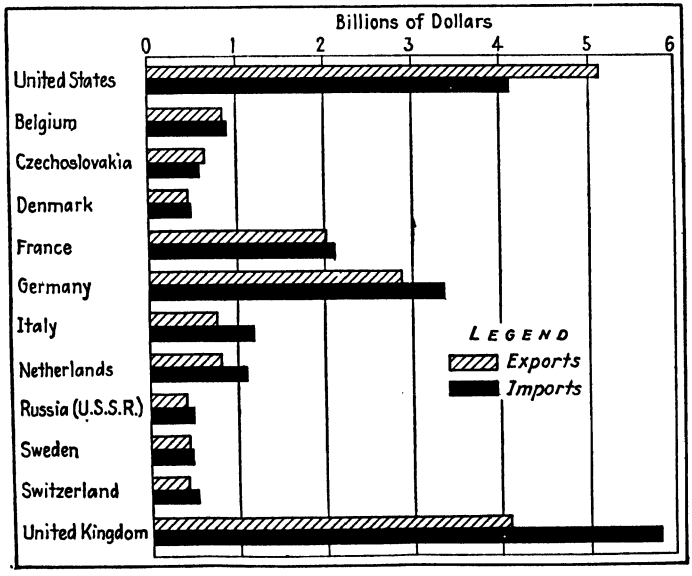


FIG. 117.—Total foreign trade of leading countries, 1928.

that, in 1929, 71 per cent of all merchant tonnage was owned in Europe, distributed as to countries as shown in Fig. 75. The United States with 21 per cent of the world's total and Japan with 6 per cent are the

only non-European nations which have any appreciable share. Furthermore, of the new ships launched during 1925 to 1928, more than nine-tenths of the tonnage was European.

Commercial Regions.—Europe's trade with the world is divided among four sorts of regions: Those which are less advanced industrially than Europe and which therefore import Europe's manufactures and export products of the soil, forest, mine, or sea. Most of South America is a good illustration of this class. South America sends wheat, meat, skins, hides, wool, flaxseed, coffee, rubber, and minerals to Europe and buys all sorts of manufactured goods. Whereas Great Britain and Belgium produce less than one-half as much food as they use, Argentina and Canada produce from 25 to 50 per cent more than they require, and hence have a large surplus for export. On the other hand, these European countries export vast quantities of manufactured goods to Argentina and Canada. The annual value of goods exported from Britain and Belgium has averaged nearly $100 per capita recently, 2½ times the figure for the United States and 6 times the world average (Figs. 128, 191).

Source of Minerals.—The second great commercial type consists of regions possessing minerals which are in demand in Europe, such as copper, petroleum, silver, and tin. The United States and Mexico are rich in the first three, Canada in silver, nickel, mica, and asbestos, and the East Indies and Bolivia in tin. As Europe possesses none of these minerals in sufficient abundance and requires large quantities of each, these regions export them to Europe. In addition, South Africa sends gold, diamonds and chromite; North Africa sends copper, iron ore, and phosphate; and Asia sends manganese ore, tungsten, and antimony.

Warmer Regions.—Regions possessing a warm climate and therefore able to produce plant and animal products which Europe cannot advantageously produce form another great type. Tropical regions have long contributed an important share of Europe's trade, chiefly because of this climatic difference. India and the Indies are examples. They send to Europe cane sugar, vegetable oils, copra, rubber, coffee, cacao, spices, cabinet woods, and tobacco (Figs. 18 to 20) and purchase from her cotton goods and other manufactures (Figs. 123, 124), as well as certain other products advantageously produced in Europe's climate, such as preserved fish and lumber. The cotton trade with the southern United States also depends in large part upon Europe's climate which makes cotton growing impractical (Fig. 122). Most of Europe is too cold to grow cotton, while the warmer southern peninsulas have a dry summer, whereas cotton needs much moisture as well as heat.

Other Specialties.—The fourth great type of region with which Europe trades extensively comprises countries which specialize in commodities

in sufficient quantities. A considerable share of the imports from the eastern United States are of this sort—automobiles, typewriters, phonographs, and so forth. The importation of silk from the Orient is of this class, as is also that of butter and cheese from Canada, Australia, and New Zealand. In 1928 Great Britain imported over 1,000,000,000 pounds of butter and cheese, valued at over $320,000,000. Denmark furnished nearly one-half of the butter, the Netherlands one-seventh, and Russia, the Irish Free State, Finland, Sweden, and France together made up about one-fourth. Thus it is evident that butter is very largely produced in Europe, and that she could supply her own demands if it seemed sufficiently desirable. The same is true in respect to cheese and many other commodities which Europe imports.

Great Trade Routes.—The trade with these four great types of commercial regions follows four main trade routes (Fig. 1):

1. The North Atlantic route, with New York as the chief western terminal, and Liverpool, London, Anvers (Antwerp) Rotterdam, and Hamburg as the chief European ports.

2. The Suez trade route to India, the East Indies, China, Japan, and Australia. The more important eastern ports are Bombay, Calcutta, Singapore, Hongkong, Shanghai, Yokohama, and Sydney.

3. The South Atlantic route, with Rio de Janeiro, Montevideo, and Buenos Aires as chief western terminals. This route has grown rapidly in importance during the past few decades but still is third and is likely to remain so.

4. The American Mediterranean route, with Habana (Havana), Galveston, Tampico, Vera Cruz, and Colón as important western terminals. Ships plying between these ports and the North Sea regions commonly are induced by the saving in miles secured by following a great circle to continue northward along the eastern coast of the United States and hence join the North Atlantic route. The Panama Canal is diverting an increasing amount of the Oriental trade from the Suez route, as well as some from the South Atlantic route. Hence the North Atlantic route is surpassing its former rival, the Suez route, by an increasing margin.

Figure 189 shows the tonnage of the ships entering and leaving the more important ports. It indicates that 8 of the 11 chief ports are in Europe.

Importance of Trade with Near-by Nations.—Most of the foreign commerce of any European nation is with its neighbors. For example, at the outbreak of the World War, the commerce between Germany and Great Britain was greater than the commerce between either and any non-European nation except the United States, and this is still true, with the exception of the British trade with India. Europe is so diversified that each of the four great types of commercial regions is represented.

Russia is an illustration of the industrially young nation. Until recently its exports have been chiefly products of the soil and forest, about 40 per cent cereals, 10 per cent timber, 8 per cent flax and hemp, 5 per cent

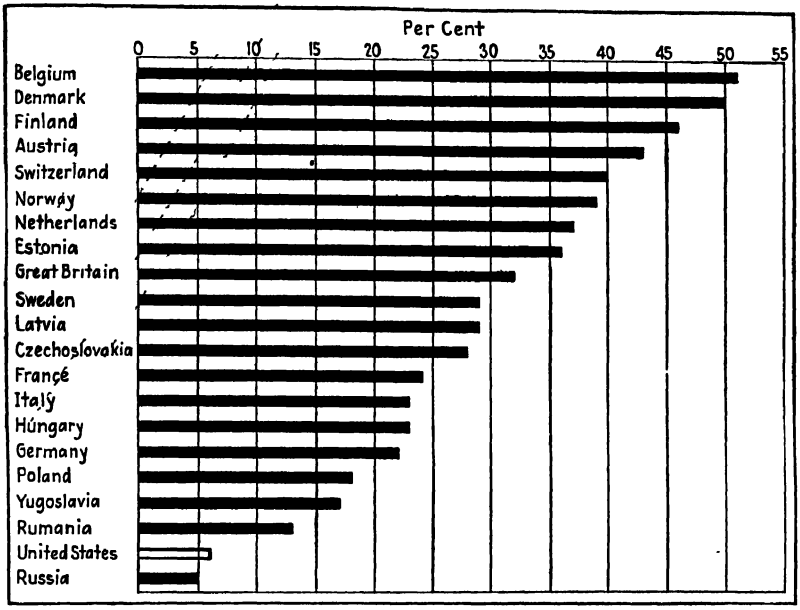
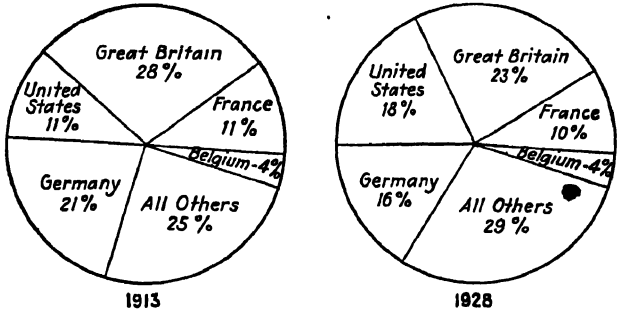


FIG. 118.—Percentage that all imported goods formed of all goods consumed in 1928.

eggs, and 4 per cent butter. Spain, northern Sweden, and Spitsbergen are examples of European sources of mineral wealth (Figs. 288 to 289). The vineyards and olive orchards of southern Europe yield products which cannot effectively be produced in the colder climate of industrial



FIGS. 119 and 120.—Exports of manufactured goods, percentages of world's total 1913, 1928.

northern Europe. Finally, much of the commerce between Britain, Germany, and France is in products which each can produce, but which because of conservatism and other reasons, the other nation has specialized in. German dyestuffs and chemicals are examples, as are French

silks and works of art, and British cottons, woolens, ships, and mechanical and electrical devices. The importation of such specialties causes manufactured goods to form an astonishingly large proportion, one-fifth more or less, of the imports of countries which are themselves great manufacturers (Figs. 119, 120).

As a result of this extensive trade with neighbors, somewhat more than one-half of Europe's imports come from European countries and about two-thirds of the exports find their market within Europe. In contrast Asia supplies only about one-twelfth of the imports and takes only about one-eleventh of the exports.

Conditions Favoring Commerce.—Trade with neighboring countries is facilitated by several conditions discussed in previous chapters, particularly those dealing with relief and transportation. Of especial importance is the fact that so much of Europe is a low productive plain from which access to the sea is exceptionally easy and upon which railroads can readily be constructed, while the rivers are peculiarly useful (see the

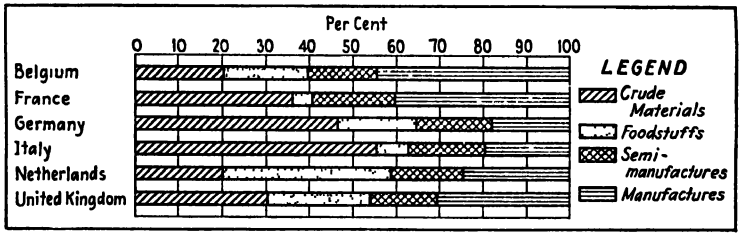


FIG. 121.—Imports from the United States, 1929, by types.

physiographic diagram). Of great importance also is the fact that the mountains form much less serious barriers than in most continents, not only because of the presence of gaps and low passes but also because of their trend. Since a large share of the world's commerce, including domestic as well as foreign, flows in an east-west direction, the roughly east-west trend of the loftier chains, the Pyrenees, Alps, Carpathians, and Caucasus, is fortunate, as is also the east-west trend of the western part of the chief plain and of the Mediterranean Sea. The north-south trend of the mountain chains and plains of the United States is so obviously less favorable for both domestic and foreign commerce that Europe's comparative advantage in the trend of its two major features of relief, as well as in the trend of the Mediterranean Sea, should be readily apparent.

Excess of Imports.—A special phase of the commerce of parts of Europe has often been misunderstood. It is the fact that Great Britain in particular, but Netherlands, France, Belgium, Germany, and several other nations to a lesser degree, normally import more than they export (see Table V).

TABLE V.—FOREIGN TRADE OF CHIEF EUROPEAN NATIONS
(Millions of dollars, and percentage of world's total)

Country	Year	Imports	Per cent	Exports	Per cent	Excess of imports	Per cent excess is of total imports
Austria	1928	450	1.3	330	1.2	120	26.6
Baltic States	1928	130	0.4	110	0 3	20	15.4
Belgium	1913	891	4.8	695	2.9	196	22.2
	1928	900	2.6	850	2.6	50	5.5
Bulgaria	1928	50	0.1	48	0.1	2	4.0
Czechoslovakia	1928	600	1.7	650	2.0	50	8.3
Denmark	1913	231	1 1	195	1.0	36	15 6
	1923	400	1.4	450	1.4	10	2.5
Finland	1923	200	0.6	160	0.5	40	20.0
France	1913	1,625	7.6	1,328	6.6	297	18.3
	1923	2,500	6.5	2,500	6.7	0	0.0
Germany	1913	2,773	14.0	2,592	13.0	181	6.5
	1928	3,500	10 0	3,000	9.0	500	14.3
Great Britain	1913	3,741	18.5	3,089	15 4	652	17.4
	1929	6,110	17.0	4,200	13.0	1,900	31.1
Greece	1913	23	0.1	22	0.1	1	4.0
	1928	170	0.5	85	0.3	85	50.0
Italy	1913	703	3 5	484	2.4	219	31.0
	1928	1,200	3.3	800	2.6	400	33.3
Netherlands	1913	1,575	7.6	1,239	6.2	336	21.5
	1928	1,100	3.2	830	2.5	270	24.5
Norway	1913	148	0 7	105	0.5	43	29.0
	1928	260	0.8	190	0.6	70	26.9
Poland	1928	385	1.0	285	0.9	100	28.0
Portugal	1913	119	0.6	61	0.3	58	48.5
	1928	140	0.4	38	0.1	102	73.8
Rumania	1913	115	0.6	130	0.7	−15	13.0
	1928	210	0.6	180	0.5	30	14.3
Russia	1913	708	3.4	783	3.6	−75	10.6
	1929	420	1.3	370	1.3	50	11.8
Spain	1913	235	1.1	190	1.0	45	19.0
	1928	600	1.7	440	1.3	160	26.6
Sweden	1913	227	1.1	219	1.1	8	3.5
	1928	480	1.3	440	1.3	40	8.4
Switzerland	1913	371	1.8	266	1.3	105	28.0
	1928	503	1.5	402	1.3	101	20.0
Yugoslavia	1928	144	0.4	120	0.4	24	16.6

An excess of imports over exports gives rise to what is often called "an unfavorable balance of trade." A nation, such as Russia or the United States, which exports more than it imports is spoken of as having "a favorable balance of trade." The misconception illustrated by the

words "favorable" and "unfavorable" has been so great that many legislators have endeavored to discourage importation and to encourage exportation. The fact is that "an unfavorable balance of trade" in the case of these European nations is a proof of their financial strength

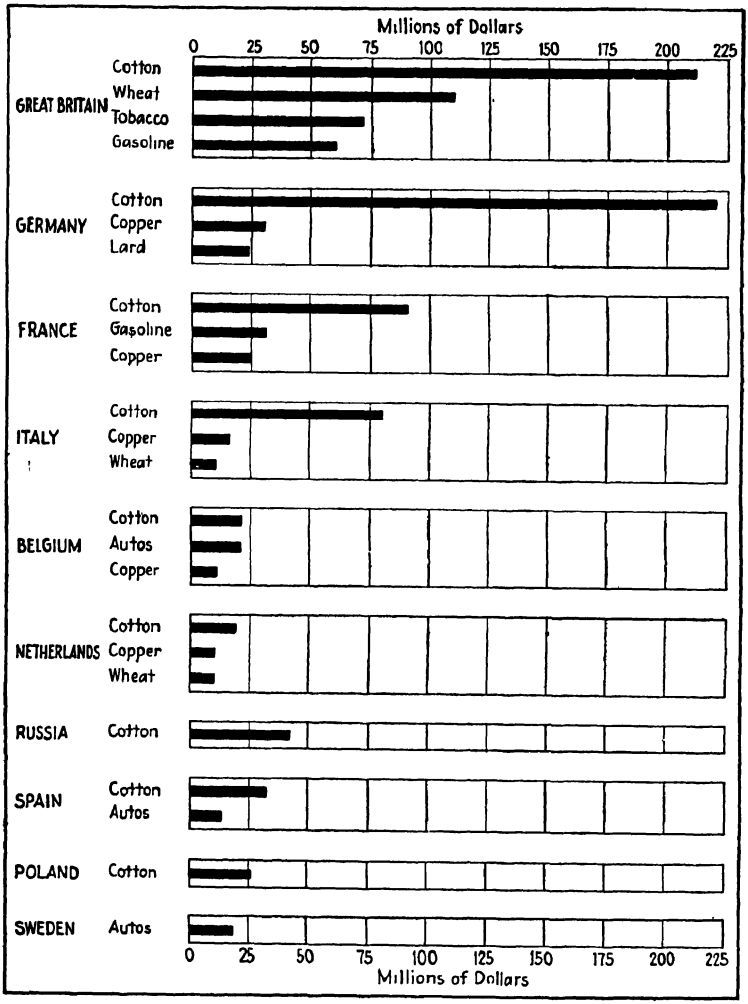


FIG. 122.—Chief exports from the United States to specified European countries, 1928; raw cotton is the chief export from the United States into Austria and Czechoslovakia (about $12,000,000 each).

instead of the reverse. Great Britain, for instance, is able to import $1,000,000,000 worth a year more than she exports because the interest on her investments abroad and the earnings of her merchant marine are nearly $1,000,000,000 a year more than the interest on British securities held abroad. Furthermore, travelers in Britain, retired colonial officers,

and colonial business men spend much money in Britain which was earned abroad. Thus there is a constant flow of wealth toward Britain (Figs. 125, 145). Among the less wealthy nations an excess of imports over exports sometimes means that they are going into debt, and hence that they, of course, will have to pay interest and later return the capital. If they are going into debt for improvements, such as railroads, which

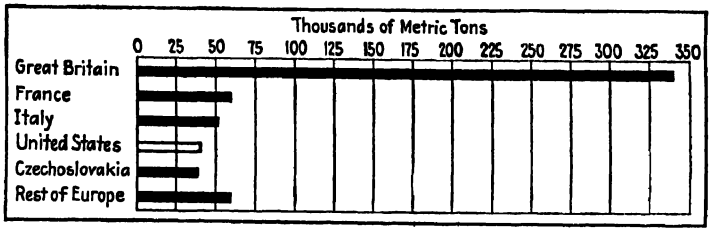


FIG. 123.—Cotton piece goods; excess of exports, average 1925 to 1928. India and China each imported about one-third of the world's export.

will facilitate their development, however, it is much more desirable to borrow than to get along without the railway. But where the nation is wealthy and the people hold many foreign securities, the situation is even more obviously a good sign.

Reasons for Savings.—The northwestern portion of Europe has long been the only area, aside from a small part of the United States, that has had much capital to spare (Figs. 138, 139, 140). Why has this small region, perhaps 1 per cent of the land of the earth, had capital to spare,

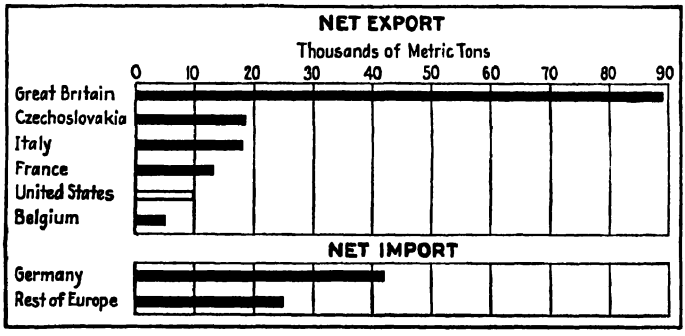


FIG. 124.—Cotton yarns; excess of exports or imports, average 1925 to 1928.

while the other 99 per cent has had insufficient capital with which to build railroads, improve harbors, or carry on other costly developments? The people of that part of Europe are energetic and also thirfty. They earn much and they save much, and hence have much to spare. On the other hand, the people of most of the world earn only a little more than is necessary to keep themselves alive. If exceptionally favorable weather conditions or other fortunate conditions cause their crops to be exception-

ally large they are likely to spend the excess extravagantly, for example, in giving feasts.

Reexportation.—Another less important special phase of the commerce of Europe is the large amount of reexportation. Many nations, particularly Britain, Netherlands, and France, import much from their colonies and from other parts of the world and reexport it. For instance, England both imports and exports much raw wool, tin, tea, rubber, and

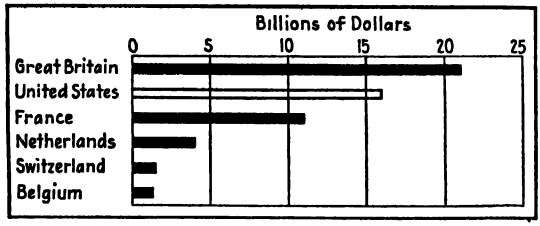
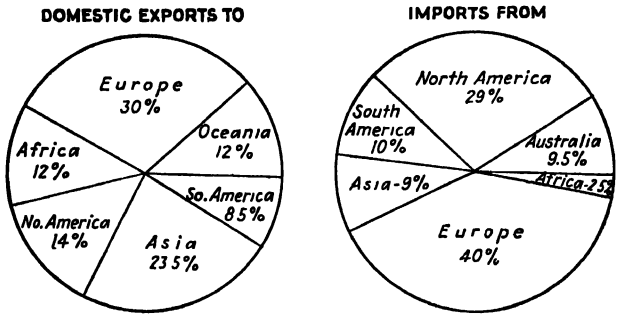


FIG. 125.—Foreign investments, 1928, approximate amount in excess of those owned by foreigners in the country shown.

raw cotton. About one-fifth of Britain's exports are reexports and their value exceeds the total value of the exports of such nations as Russia, Belgium, and Italy. Netherlands repacks and then exports a considerable share of the cacao, rubber, spices, etc., received from her East Indian possessions and neighboring regions. Also many German, Swiss, Czechoslovakian, and Austrian imports and exports pass through Belgium or Netherlands. If they also pass through the hands of Belgian or Dutch business men they are likely to be counted in both the imports



FIGS. 126 and 127.—British foreign commerce, 1928.

and the exports of those lands, although not among "domestic exports" and "imports for consumption," the items used in making Figs. 190, 191.

BRITISH COMMERCE

After these remarks upon European commerce in general it will be well to consider the commerce of Great Britain, the chief commercial

nation, in greater detail. Britain trades with the entire world. Table VI and Figs. 126 to 134 illustrate this.

TABLE VI.—BRITISH EXPORTS AND IMPORTS, 1928
(Millions of dollars)

Country	Exports to	Imports from	Country	Exports to	Imports from
Argentina	155	374	Italy	80	77
Australia and New Zealand	380	495	Japan	72	43
Belgium	133	211	Netherlands	130	209
Canada	180	228	Norway	41	58
China	104	61	Russia	32	105
Denmark	55	253	South Africa	205	155
East Indies	91	90	Spain	52	89
Egypt	55	128	Sweden	53	108
France	213	295	Switzerland	44	70
Germany	328	310	United States	335	918
India	444	381	Other countries	710	1,140
Irish Free State	218	220			
			Total	4,110	5,825

Nearly half of Britain's exports go to other parts of the British Empire (Fig. 130) and about one-third of the imports come from them. The imports have a per capita value of about $130 and the exports of about $90. Britain purchases about $1,000,000,000 worth of commodities from the United States (1926 to 1929) and sells us about one-fourth as much (Figs. 132, 133). The countries supplying the largest percentages of the imports and purchasing most exports are shown in Figs. 129, 130

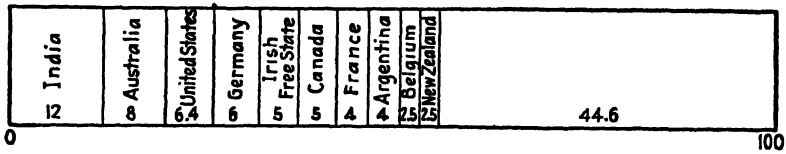


FIG. 128.—British exports, 1928; share received by specified countries; percentages of total.

which also show the changes in the relative importance of these countries since 1870.

Exports.—Great Britain's export trade has grown rapidly, as is shown by Table IV, and has become diversified to a marked degree. Whereas in 1800 her exports were almost wholly textiles, by 1890 textiles formed 60 per cent, in 1913, 36 per cent, and in 1928 only 32 per cent. On the other hand, in 1890 steel and its manufactures made up one-ninth while in 1913 and in 1928 the same group made up about one-fourth of the exports. Coal likewise increased from about 4 per cent in 1870 to nearly

10 per cent for the decade before the World War, but in recent years it has declined to about 6 per cent. The countries receiving most coal in 1928 are shown in Fig. 159. Although about two-thirds of the British exports fall into three main groups, textiles, steel and other metal manufactures, and coal, there is a long list of products. Indeed the British are conspicu-

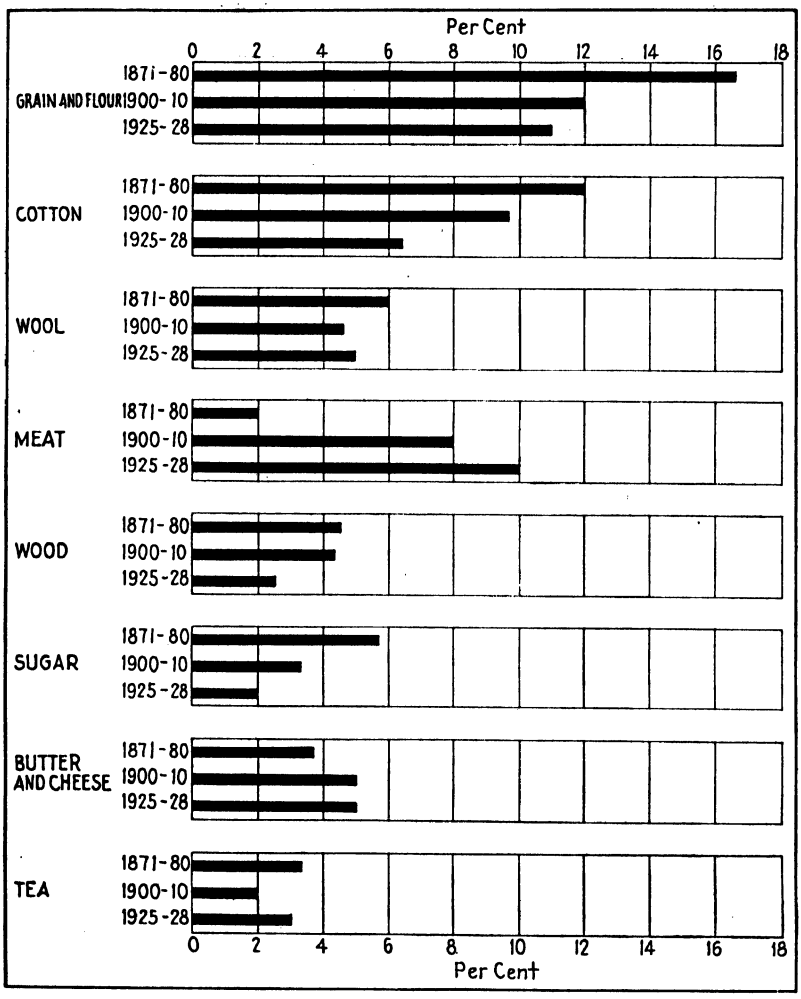


FIG. 129.—Chief British imports by groups; percentages of total imports in various periods.

ous for supplying the needs of any group of people able to purchase commodities. Not only are numerous strange items manufactured for export, for example, flintlock rifles and even flint arrow points, but numerous commodities are imported from wherever available and reexported. The value of the reexports is more than the entire export of any nation except the dozen with most exports.

Figures 132, 133 give the more important items exported to or imported from the United States in 1928.

The trade with South America illustrates the diversity of the exports also (Fig. 134). Despite the facts that Great Britain has no political

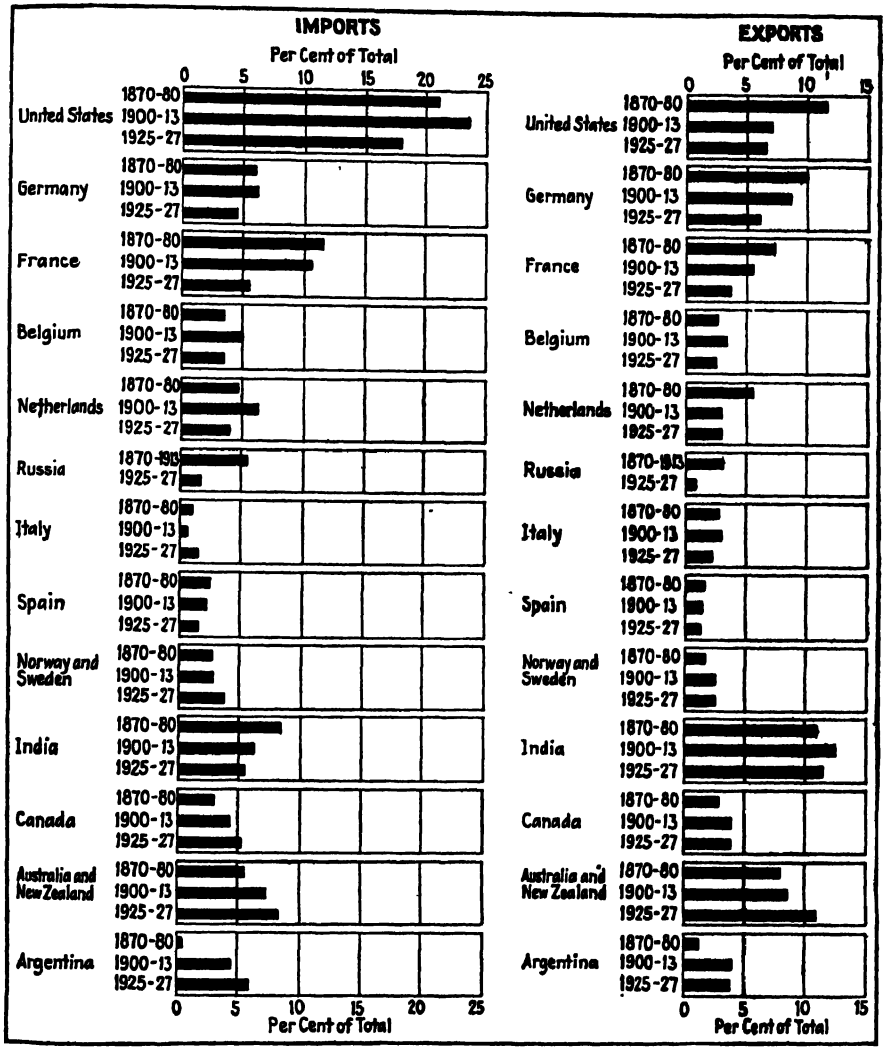


FIG. 130.—British foreign trade; countries supplying imports and taking exports, at different periods.

advantage there, and little or no advantage of proximity, and that several strong nations are actively competing in the trade, Great Britain has supplied a larger share of South American imports than has any other nation. The proximity of the United States, however, and the frequent

boat service afforded by the banana-carrying steamers have caused that country to surpass Britain in the northern countries.

The variety of the British exports to South America, and the average value of each of the 23 items of which more than $1,000,000 dollars worth are exported are shown in Fig. 134. The following additional items each had a prewar value of over $500,000; cotton yarn, copper manufactures,wood manufactures, spirits, rubber goods, glass, paper, brass goods, cutlery, silk goods. In addition several items, such as hats, oilseeds, drugs, candles, oilcloth, and soap, were valued at $200,000 to $400,000.

Imports.—Although a considerable share of England consists of choice agricultural land, the great increase in population following the industrial revolution led to a demand for food greater than could readily be supplied locally. At first agriculture was stimulated by laws restricting the importation of grain, and, until 1856 when they were repealed, most of the wheat was home grown. Under free importation, however, the per-

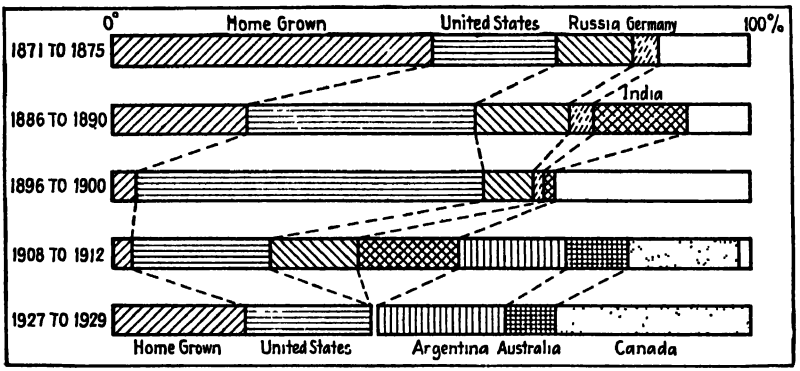


FIG. 131.—Sources of wheat used in Great Britain, 1871 to 1929.

centage grown at home declined to an average of only about 5 per cent from 1896 to the World War. Indeed at the outbreak of the war Britain imported four-fifths of her food, according to J. Russell Smith. The submarines led to a great expansion in agriculture and since then home-grown wheat has formed about 20 per cent of the wheat consumed. Wheat is grown extensively partly because the yield per acre is exceptionally large and regular. The chief sources of imported wheat and the fraction they made of the total wheat consumption at various periods are shown in Fig. 131. Foodstuffs comprised about 44 per cent of the total value of imports in recent years in contrast to about 40 per cent in 1913. The sources of meat, now an import of considerable value, are shown in Fig. 155.

The textile raw materials are imports of major significance. Raw cotton has made up about 10 per cent of the total value of imports during

the past 60 years, wool about 5 or 6 per cent, and flax and jute together about 2 per cent. Britain has been surpassed only by the United States in the amount of cotton and wool consumed, except that in 1927 France consumed slightly more wool. The British have been very active in promoting the widespread production of cotton and wool. They have succeeded well with respect to the wool, nearly 45 per cent of which comes from the British Empire, especially from Australia and South Africa (Figs. 46 to 48). With cotton, however, their efforts have been far less successful, and the United States still supplies about three-fourths of the import, followed by Egypt and India.

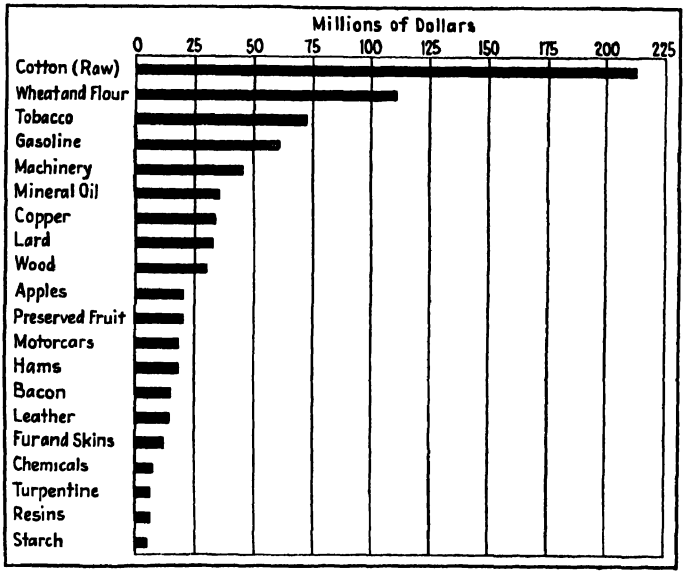


FIG. 132.—Great Britain's chief imports from the United States, average of 1927 and 1928.

Basis of Trade.—British commerce rests upon three broad bases. The first is the energy, initiative, inventiveness, and ambition of the British people. The second is the coal and other natural resources of Britain. The third is the excellent world market for British goods. The character of the people depends partly upon several geographical conditions—the favorable, stimulating climate, the highly significant, complex results of insularity, and the advantageous location for trade with the rest of the world. The coal is important because it is effectively used to run factories, trains, and ships, and because it also forms an important export—a return cargo for ships which have come loaded with grain, lumber, ore, and other bulky imports (Fig. 71). The third great basis of British trade, the excellent world market for British goods, depends partly on the friendly attitude of many foreigners toward

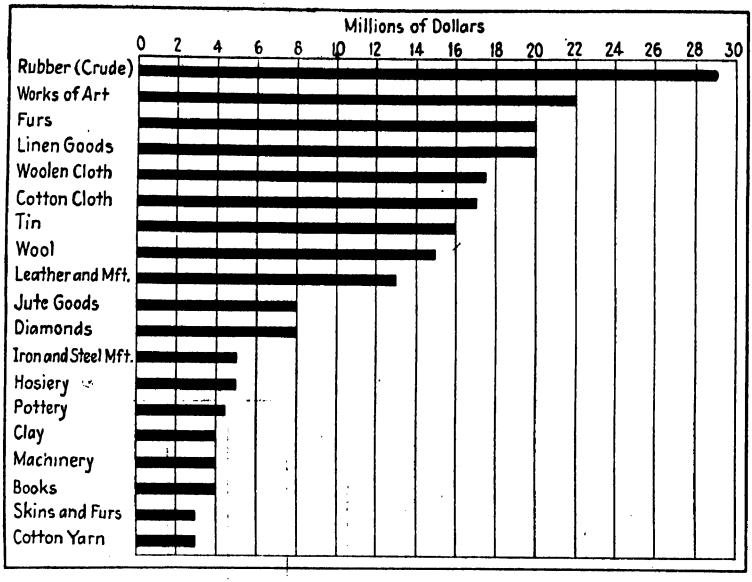


FIG. 133.—Great Britain's chief exports to the United States, average of 1927 and 1928.

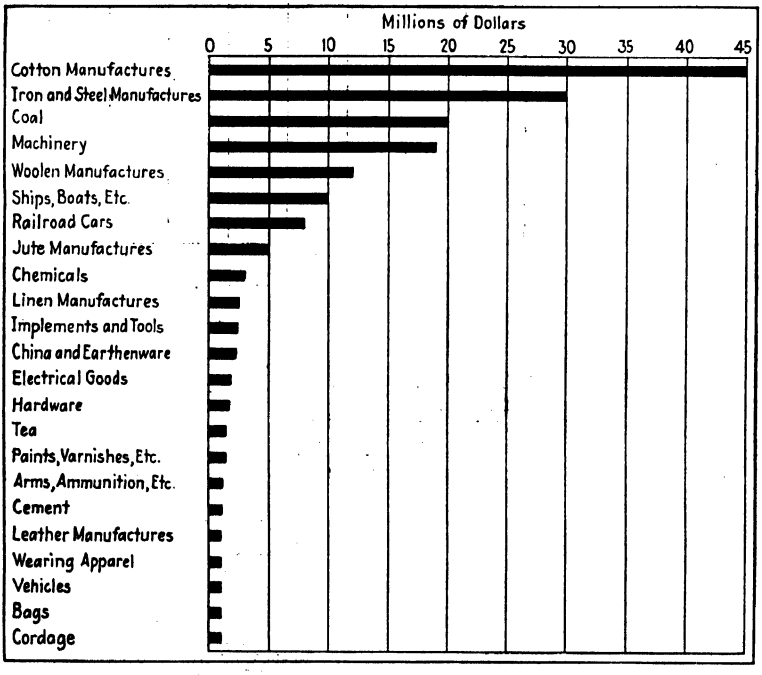


FIG. 134.—Principal British exports to South America, average annual values 1906 to 1910, in millions of dollars.

British goods. This attitude in many areas is fostered by racial kinship or by identity of language. Emigrants from Britain and the descendants of emigrants are found in relatively large numbers in all lands, and English is spoken by more commercially active people than any other language. The friendly attitude toward British exports depends in part on the dependably high quality of the goods. Indeed most British exports are the standard of excellence in their respective lines. British trade has been increased also by the large foreign investments of British capital, which commonly stimulate the use of British goods. For example, when British capitalists have invested a large sum in an Argentina railway, the money is largely used to buy rails, locomotives, and cars from British manufacturers. Furthermore, when the dividends are paid, they commonly take the form of Argentina wheat, meat, wool, and other products.

Another condition favoring British foreign trade is that the financial transactions are facilitated by the numerous foreign branches of strong British banks. Furthermore, the British pound sterling has long been the world's standard medium of exchange.

CHAPTER X

POLITICAL GEOGRAPHY OF EUROPE

Importance of Political Affiliation.—The economic development of the various parts of Europe depends only in part upon the local geographic conditions. In most instances it has been profoundly affected by political affiliations, as is shown by the fact that the use made of the mineral resources, forests, and soils has sometimes varied sharply with changes in political control. Governmental encouragement by protective tariffs (Fig. 135), bonuses, and special railroad rates or by nationally supported geological surveys and departments of agriculture and forestry have all played important roles in determining Europe's use of the land, and so have policies of land settlement. In other words, the economic development has often depended on conditions which are not geographic in the local sense. Human factors, particularly the historical ones, have been especially significant. Nevertheless, since the historical factors have been conditioned throughout by geographic influences, it is more correct to say that many phases of the local development depend largely upon geographic conditions elsewhere.

Hence not only is a consideration of the existing political entities of Europe essential in a discussion of the economic geography but a study of the geographic influences which have affected their development is appropriate and desirable.

Numerous Political Units in Europe.—Europe contains 34 nations if Andorra, Liechtenstein, Luxembourg, and Monaco are counted. Many of the larger nations include subdivisions that are independent in some respects, for example, Scotland, Serbia, Corse (Corsica), and Bayern (Bavaria). Each of the numerous Soviet republics which comprise Russia have also considerable independence, Ukraine in particular.

In contrast to these numerous political units in Europe, the rest of the world is divided into scarcely more independent nations than is Europe. Africa has 4, South America, North America, and Asia, each about 10, and Australasia 2, a total of about 36. But several of these, such as Egypt and the Central American republics are so closely controlled by Great Britain or the United States as to be scarcely independent.

The multiplicity of political units in Europe reflects the presence of numerous areas which were somewhat isolated before the modern period of ready communication and transportation. In several instances these areas are separated by the sea, in many others by sea and moun-

tains, and in the remaining instances largely by tracts which remained sparsely settled because they were rugged, marshy, sandy, dry, or otherwise unfavorable for close settlement. The islands, too, tend to be independent or semi-independent, as in the case of Great Britain, Ireland, Iceland, Kriti (Crete), Corse (Corsica), Sardegna (Sardinia) and Sicilia (Sicily).

Three peninsulas are largely occupied by single independent nations, Jutland, Italy, and Greece. Three others have two or more nations, Scandinavia, Iberia, and the Balkan Peninsula. Two other peninsulas Krim (Crimea) and Brittany have long contained distinct political units although no longer independent.

The Coast as a Boundary.—The sea has been of profound significance in setting off certain countries in addition to the islands and peninsulas already mentioned. For example, Finland and Estonia are separated by the Gulf of Finland, Estonia and Lithuania partly by the Gulf of Riga, and East Prussia and Poland partly by the Gulf of Danzig.

The coast is much more important as a delimiting agent than as an isolating one. Roughly measured, the marine boundaries were, in 1914, 2¼ times as long as the land ones. The creation of the several interior nations since 1914 has reduced the ratio, but still the sea is the major type of boundary. Yet to a nation which is particularly active, the sea offers an ineffectual barrier. For example Denmark and Norway, though separated by water, were connected politically much longer than Norway and Sweden. Venice held the Dalmatian Coast against the Turks, and England still holds the Channel Islands off the coast of France.

Mountain Boundaries.—Next after seas in efficacy as isolating barriers come mountains, distinctly shown in the physiographic diagram in the pocket. The Pyrenees have rather effectively cut off Iberia from France and have formed an international boundary during most of modern times. The Alps have formed the northern boundary of Italy or of its predecessors as far back as the days of ancient Rome, except for short periods. In modern times they have also formed part of the southern boundary of Germany. The Juras separate the Swiss plateau from the French plain and have long served as a large part of the boundary between France and Switzerland. Another chain of persistent significance as an economic barrier is the Kjolen Range which partly separates Norway and Sweden. Its effectiveness as a barrier is increased by the fact that it is also a climatic barrier. On its western slopes the rainfall is heavy and the winter temperatures are kept mild by the winds from the adjacent Atlantic, while its eastern slopes receive little precipitation and have very much colder winter temperatures. The Carpathian Mountains, with their southern extension, the Transylvanian Alps, have served as political boundaries for considerable periods. Similarily

Bohemia, surrounded on three sides by low ranges, has had a considerable degree of economic independence and political individuality.

Mountain ranges however, have exerted quite varying degrees of influence. Now that airplanes are numerous and long railroad tunnels are dug wherever economically justified, mountains are much less effective economic barriers than they were a short time ago. But at a still earlier period, when all travèl was very slow, steep slopes were less of a barrier than when railroads first came but before numerous and long tunnels could be afforded.

In medieval times mountain ranges frequently failed to be political boundaries, for people inured to the poverty-stricken life of mountains tend to develop small nations which hold both sides of the range. Andorra, Montenegro, and, in less degree, Switzerland are late survivals of this condition. Similarly, the Pyrenees, one of the most effective commercial barriers, seldom served as a political boundary before the eleventh century.

Inland Waters as Boundaries.—*Lakes and swamps* are effective local economic barriers and frequently form sections of political boundaries. The eastern border of the Netherlands, stable for the last 400 years, is perhaps the best example of a marsh boundary. The southern part of the boundary between Norway and Sweden is also in a region of numerous glacial lakes and marshes and a sparse population. The eastern boundary of Estonia is mostly formed by Lake Peipus, and the southeastern boundary of Finland by Lake Ladoga. Parts of the boundary of Switzerland are also formed by lakes Geneve and Bodensee (Constance). Poland is somewhat separated from Russia for a considerable distance by the extensive Pinsk marshes. Furthermore, many of the states of feudal Germany were partly delimited by marshes. Swamps were far more serious barriers in the past than today, however, for now they are often crossed by railroads and roads on embankments, if indeed they have not been completely drained.

Rivers have been frequently used locally as boundaries, but they seldom have served long. The lower Danube has been frequently a boundary, partly because it expands below Serbia into a belt of channels and marshes 10 miles wide and is a really formidable obstacle to travel. Yet even here the Rumanian speech prevails on both sides. The Dnestr (Dniester) has long served as a boundary between Bessarabia and Ukraine, the upper Rhine between Germany and France, and the lower Guadiana between Spain and Portugal. Most rivers instead of separating regions tend to unite them, however, and in several parts of Europe they have displayed this role to a striking degree. Silesia, for example, is rather distinctly the valley of the upper Oder, and Bavaria of the upper Danube. Many Germans also contend that the Rhine Valley is a unit, and that the Rhine River is not the boundary of Germany.

Climatic Boundaries.—Climatic contrasts have played a part in separating the countries of Europe. The ancient Greek colonies were restricted to places having the Mediterranean type of climate. The Roman Empire spread for short periods beyond this climatic province, but its real conquests were almost confined to it, Rumania, northern France, and Britain forming the chief exceptions. Russia, since the revolution of 1917, has lost the western parts of the czars' empire, the parts where the influence of west winds from the open ocean made the climate less strongly continental than in the great bulk of the realm. The climatic contrasts between Sweden and Norway have already been mentioned. Another instance where climate plays a part is in separating Portugal from Spain. Most of the people of Portugal live in a climate sufficiently less arid and less extreme than that of most of Spain, including the dominant parts, that there is a strong tendency to take different attitudes and be uncongenial. Furthermore, much of the land along the boundary is sparsely peopled, as it is unattractive to the Portuguese partly because of its different climate.

Human Differences. *Language.*—Differences in language have been, and remain, a great barrier to trade. They tend to produce isolation and to retard the full development of resources. Next to the physical features already discussed, language appears to have been the most important factor affecting the location of European boundaries. Nations tend to expand politically to include those who speak the mother tongue, and if no neighboring nation speaking the language exists, a new one may be established, as was done in the case of Latvia. Such people are commonly assumed to be racially of the same stock as their conquerors, but it is now known that often this is not so. Peoples quite unrelated in race often speak the same language, while members of the same racial group speak different languages. Of the latter type the many dialects or vernacular form the most numerous examples. Many of these are known only locally and are not written, yet they form the everyday speech of the multitude. It is the cultural language, the one that is written and used by the educated classes, that counts most, not the everyday speech of the great mass of the people. As the importance of reading and writing is increasing rapidly, it seems inevitable that the vernaculars and minor languages will gradually disappear. In the not distant future instead of the several scores of dialects now in use it is probable that nearly all of the people of Europe will use one or more of a few major cultural languages, English, French, German, Russian, Italian, Spanish, and possibly one or two others. If so, one of the chief bases for the independence of the eight new nations recently established will be removed.

Cultural Influence.—Perhaps the most powerful of all cultural influences since 1700 in the making of nations has been nationalism. With its aid the medieval swarm of petty sovereignties were welded into

nations. Nationalism has almost always aimed to unite as a nation the territory in which a distinctive language is used or has been used (as in Ireland). As the vernaculars gradually become less significant, nationalism should decrease, being superseded by a wider view, not cosmopolitan in scope but trending that way. Under it, the question will be not, Do the people of this other area speak my language? but, rather, Can we by cooperating and exchanging goods and ideas both live on a higher plane than at present?

Dynastic and militaristic influences, though often affecting the boundaries of countries in the past, have seldom led to the creation of permanent boundaries. For example, the areas welded together by Napoleon soon fell apart, and areas united by the marriage of rulers and of their heirs have only for short periods held together, unless in accord with geographic principles.

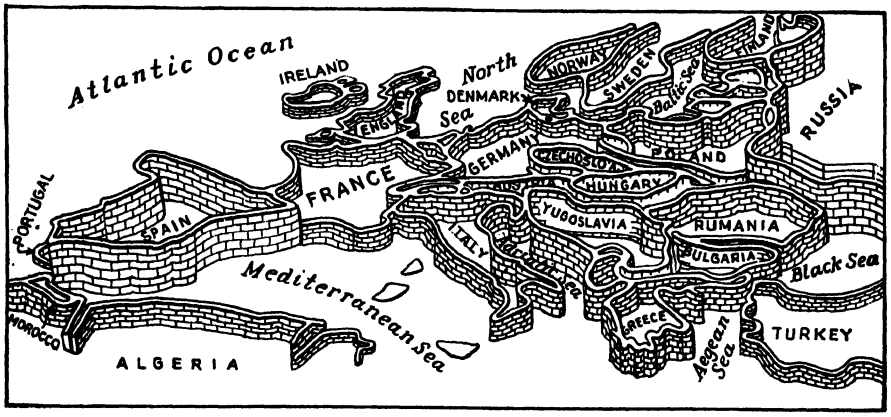


FIG. 135.—Relative height of the tariff walls. (*From A. P. Dennie, Saturday Evening Post, 1927, by permission.*)

Race seems to have had almost no influence on boundaries in Europe. The Highland and Lowland Scotch are of distinctly different race, yet joined hands centuries ago. Likewise the Magyars have always allied themselves with the Teutons. Within France the three great subraces of Europe, the Mediterranean, Alpine, and Nordic, are well represented but do not prevent a close national union. In Germany also the South German is of the Alpine subrace and the North German of the Nordic. And in most of the European countries the Jew is an influential element politically, economically, and educationally, often becoming an integral part of the nation.

Generalizations as to Extent of Growth.—In addition to the tendency for nations to expand until they come to sufficient physical barriers or to a stronger, more advanced people, three other generalizations may be made. First, islands are conquered and held by adjacent nations on the

mainland. Great Britain forms a partial exception, for although conquered by the Normans in 1066, it has long been independent of France. The geographic reason why islands are seldom completely independent appears to be that their resources are commonly fewer and their social and economic conditions simpler than on continents. Thus they tend to be less advanced than the mainland and less powerful. This is conspicuously true as to Sicilia(Sicily) and especially as to Sardegna (Sardinia) as compared with peninsular Italy, of Corse(Corsica) as compared with the rest of France, of the Balearic Islands, as compared with Spain, and of the numerous Greek islands as compared with continental Greece. The British Isles were also relatively backward at the time of the Norman Conquest, but a fortunate combination of resources and circumstances has enabled Great Britain to take leadership. In the British Isles the dominance of the main island over Ireland and the Shetlands, Hebrides, and Orkneys suggests, as do the greater resources and progress of the larger island, that it approaches the continent in these respects.

The Larger Nations Tend to Expand.—The second generalization as to the growth of European nations is that the larger ones tend to grow at the expense of the smaller. Instead of the thirty nations of today there were many more formerly. Twenty-nine principalities were united in 1860 to 1871 to form Germany. Nine were united in 1859 to 1866 to form most of modern Italy, a score to form Switzerland, a dozen to form Spain, and several to form modern France. To be sure, as a result of the World War, the number of states in Europe was increased by the partition of Austria-Hungary and Russia, but this is presumably merely a temporary partial reversion to the antiquated policy of political isolation.

Increased Strength.—The surviving European nations have not only become larger in area and population but they have become much stronger economically, educationally, and commercially. At various times in the past considerable areas of Europe were for a time nominally united politically, for example the Napoleonic Empire, the Holy Roman Empire, and the kingdoms of Poland, of the Franks, of Charlemagne, etc. But most of these principalities were not truly nations and had little lasting influence on the life of the great majority of their people. Gradually, however, the nations have come increasingly to protect life and property, improve transportation facilities and trade, and more recently also to augment popular education in numerous ways, to improve health, and increase the utilization of natural and human resources.

The effectiveness of a government in aiding its people is moreover not a function of size. The largest nations have often been of less service in the significant ways just enumerated than have some of the smaller ones. This is partly because there is a strong tendency for the larger

nations to become militaristic and to devote much of the taxes to maintaining an expensive military machine. Then they go to war, to the detriment of most of the people. In contrast, the smaller nations, such as the Netherlands, the three Scandinavian nations, Belgium, and Switzerland have been discouraged by their comparatively small number of available soldiers from spending much on armaments. Instead they

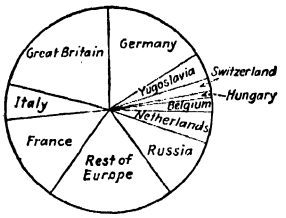


FIG. 136.—Estimated total wealth by countries, 1928; total, $390,000,000,000.

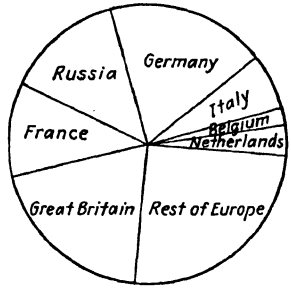


FIG. 137.—Estimated total annual income by countries, 1928; total $65,000,000,000.

have advanced popular education until illiteracy is much less than in their larger neighbors. They likewise have aided the economic welfare of the people in a thousand ways, with the result that their people are comparatively well off. So far as the individual is concerned, the comparative size of the nation to which he belongs is of much less significance than whether conditions are favorable for his life and work (Figs. 136 to 140). The prosperous smaller nations appear to realize this, while

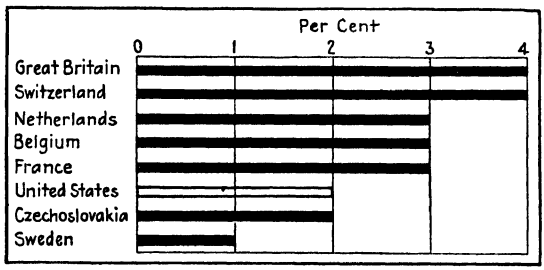


FIG. 138.—Percentage of national income invested abroad in 1928.

many of the influential people of the larger nations still have the illusion that the larger the area of a country the better off it is. The illusion, that war benefits the winner, discussed so ably by Norman Angell in "The Great Illusion" has also been unfortunately prevalent.

Boundaries in Peace and War.—The war psychology affects conspicuously the attitude toward boundaries. The best kind of boundary in peace time is the one most readily crossed. Boundaries that are

barriers are only desirable in defensive warfare waged with either soldiers or tariffs. And as tariffs are now a major influence leading toward military war, boundaries across which goods can readily be smuggled tend toward a reduction of tariffs and hence toward peace.

Regional Contrasts in Democracy.—Another phase of the political geography of Europe which merits attention is the regional contrasts in democracy. As is well known, the countries bordering the North Sea rank highest in democracy, on the average, and there is a progressive decline in all directions therefrom, corresponding with the decline in health, productivity, and civilization. Russia and Turkey characteristically have been autocracies, most of the Balkan countries have been almost anarchies, and Iberia and Italy are far from being democracies. There is, however, one exception to the general decline in democracy with increasing distance from the North Sea, namely the mountain

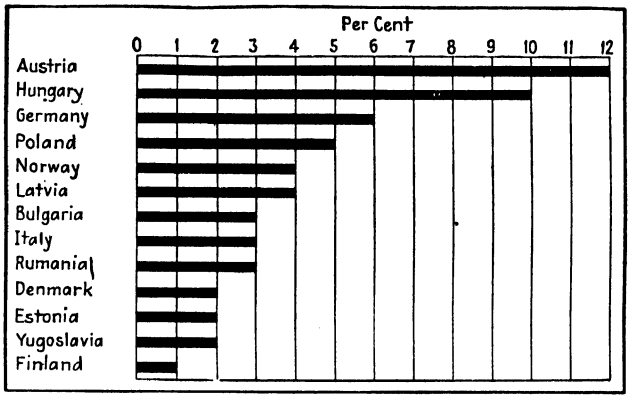


FIG. 139.—Percentage of national income obtained by borrowing from abroad in 1928.

republics of Andorra, San Marino, and especially Switzerland. These show that in certain mountainous areas conditions favoring the development of democratic governments exist. But these conditions do not necessarily dominate, as is shown by the prevalence of semianarchy in the mountains of the Balkans and Sardegna (Sardinia).

EXPANSION OF THE LARGER NATIONS

Russia.—We will now turn to a brief discussion of the expansion of each of the larger European nations commencing with the largest (Fig. 93). The expansion of Russia was influenced profoundly by five geographic conditions:

1. It had its inception in the western part of a great plain and has expanded to include most of it.

2. The spread was facilitated by the rivers that radiate from the Valdai Hills, near the early kingdom of the Moscovites. The people slowly spread out southward down the Dnepr (Dnieper) and Don, eastward and southeastward down the Volga, northwestward down the western Dvina, and later northward down the Dvina. The spread was gradual, beginning 1,000 years ago and is still continuing.

3. Except toward the west, the spreading Russians found the lands they entered sparsely populated with less advanced and weaker peoples, and hence they had no great difficulty in expanding.

4. To the west, however, not only was the land well occupied, but the people were not weaker; indeed, as climatic conditions improve toward the west, the people are distinctly more energetic and advanced. Hence,

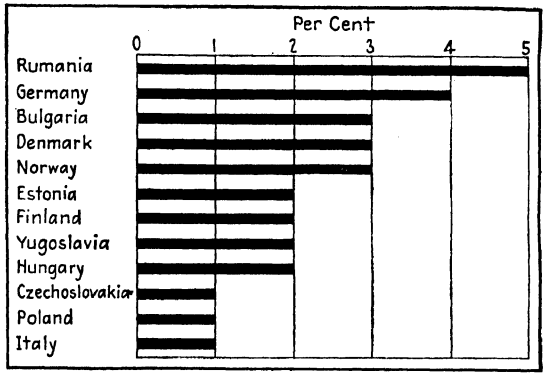


FIG. 140.—Percentage of national expenditures sent abroad in 1928 as interest and dividends or reparations (net, more than that received from abroad).

although the powerful czarist empire was able to expand slightly westward, since its downfall Finland, Estonia, Latvia, Lithuania, and Poland have become independent, and Bessarabia has been lost to Rumania (Fig. 141).

5. The fact that Russia is essentially an interior land, with no free contact with the modern world of western Europe until the extensive building of railroads, telegraph lines, and the coming of the wireless and the airplane, has also been of profound significance in the expansion and development of Russia. One of the great objectives of the government has been to obtain an ice-free port so situated as to serve the country advantageously, even in time of war. This objective has led to a number of wars but has not yet been attained. The former cultural isolation has also retarded the development of natural resources, the rise of the cultural and economic standards of the people, and the influence that Russian leaders have had in other lands. The expansion into other lands of Russian ideas and ideals has, however, been appreciable in recent

decades, since Tolstoy and a few other men of genius have become widely known.

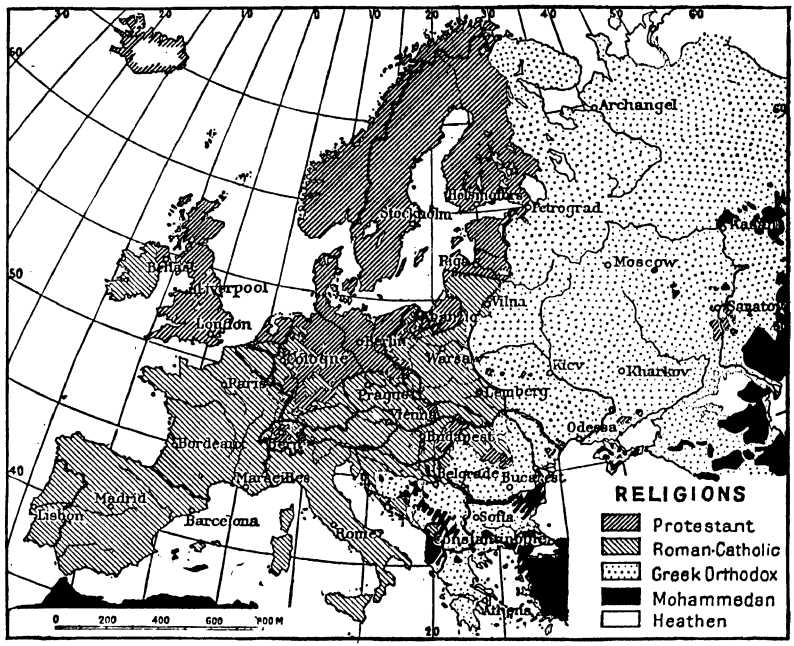


FIG. 141.—Chief religions of Europe. Note the religious differences between Russians and the people of the western border states that have broken away to form independent national units. The creation of Poland adds a powerful unit to the Roman Catholic bloc. (*Boundaries of religions after Debes, Handatlas. From Bowman, The New World.*)

France.—The expansion of France to include the region most clearly delimited by physical features required many centuries, especially at the north because the people there and in lands bordering thereto were energetic and advanced and withstood the French. The Pyrenees afford such a distinct barrier that there is no modern tendency to expand into Spain, despite the lesser strength of the people there. The Alps and Juras likewise have restricted eastward expansion at the southeast. So the efforts to expand have been largely at the northeast and across the sea. The region of Alsace-Lorraine and Belgium has been fought over many times by French armies. Expansion across the sea was early commenced and at one time or another much of North America was nominally under the French flag. It was lost, however, chiefly because the British were stronger as colonizers. The French were too much attached to France to leave in large numbers—it is said indeed, that the 3,000,000 French Canadians have all descended from only about 5,000 emigrants. The present French Empire (Fig. 168) is almost altogether non-French—indeed most of the 5,500,000 square miles is nearly unpopulated desert. Its location chiefly in north Africa reflects

geographic influences, since it is logical that north Africa should be controlled by the leading Mediterranean country, if by any European nation.

The cultural expansion of France has been as strikingly facilitated by geographic conditions as its real territorial expansion has been made difficult. For centuries France has been near the center of the more highly civilized part of the world, and its capital has been almost a Mecca for people seeking "culture" (Fig. 144). As a result of these

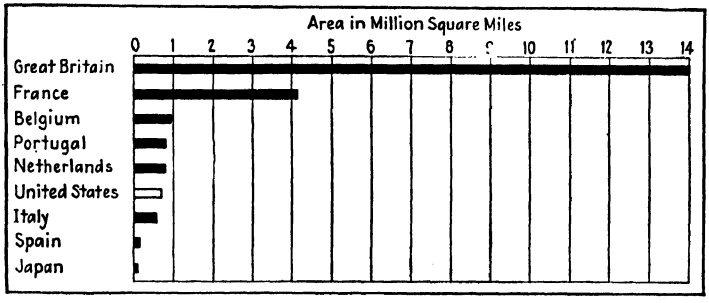


FIG. 142.—Areas of the colonial possessions of various countries, excluding the homeland.

influences and the great strength of French culture, France has had a profound influence on the cultural development of much of the world.

Germany.—The territorial expansion of Germany toward the west has been prevented by France, toward the east by Russia, toward the north by the sea and by three small nations, Belgium, Netherlands, and Denmark who are either protected by the larger nations or are not worth the high cost of conquering and holding. Toward the south the

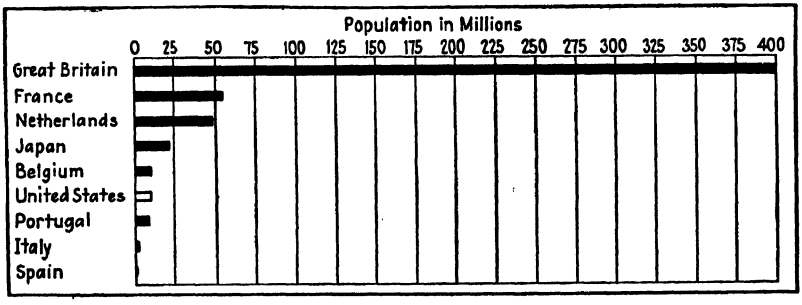


FIG. 143.—Population of the colonial possessions of various countries.

Alps impose a barrier at the west, but toward the southeast, down the Danube Valley and the lands on either side, Germany had a better chance of expanding. The lands were all densely peopled and the undeveloped resources comparatively small, so if the expansion was to stop short of the Mediterranean it would afford little real advantage. The German imperialists looked toward Mesopotamia, however, a land where cotton can be grown under irrigation and known to be rich in petroleum. The

nations between Germany and Mesopotamia were not powerful enough to long stop the expansion of Germany, and hence the shibboleth "Drang nach Östen" became increasingly popular with the imperialists as Germany grew in strength. An economic and commercial expansion in that direction could have been readily carried out but would have required decades. So a military expansion was undertaken and the objective promptly attained for a time in 1915 to 1918, but, with the end of the World War, political expansion in that direction ended. Now, however, the quiet economic penetration which is logical is taking place and the natural resources are being developed with the help of the people, capital, and accumulated knowledge of Germany, a region which is more favored in climate, location in respect to advanced neighbors, and in resources.

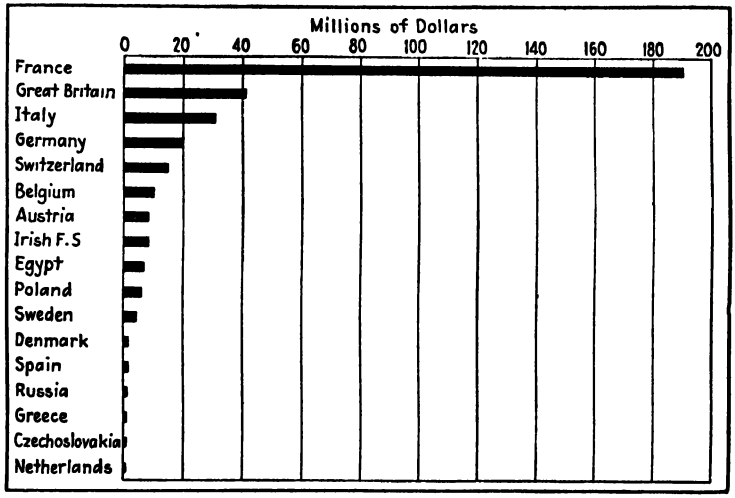


FIG. 144.—Expenditures of American tourists, 1927, official estimate.

Germany now has no possessions in other continents and never had any real colonies, because the millions of German emigrants went almost exclusively to the United States or other established nations. Extensive German emigration did not commence until after the desirable lands were already appropriated. The possessions which the imperialists of Germany acquired after the formation of the German Empire in 1871 had been considered by the British imperialists as scarcely worth having, and the Germans found them all an economic liability rather than an asset, just as France and Italy have found theirs.

The spread of German ideals, especially as to the value of thoroughgoing scientific research, has been facilitated by Germany's fairly central location and by the accident that it contains the remarkable deposits of potash and other salts at Stassfurt and much sandy land requiring

fertilization (Fig. 198). These latter conditions have greatly encouraged the development of the science of chemistry. The spread of German culture has also been conspicuously aided by the strong central government which grew up partly as a reaction from the numerous petty principalities which were welded together by Bismarck.

Great Britain.—The development of the British Empire has been along quite different lines than that of Russia, France, or Germany. It includes much land in temperate latitudes. Its extent is shown on a map in the chapter on Great Britain (Fig. 164). The loss of the United States was largely due to French aid in the Revolutionary War and, furthermore, was chiefly a political loss, as the United States has continued to be culturally and commercially, to a very large degree, an offshoot of the British Isles.

The consolidation of the islands into the United Kingdom required centuries, because the various sections differed little in strength. First several principalities were united into England, then adjacent Wales was included, then more remote Scotland, and lastly insular Ireland. Before Scotland and Ireland were incorporated, a long attempt was made by the English to expand territorially upon the continent, but the Hundred Years War rather clearly proved the impracticability of expansion in that direction, and henceforth the territorial expansion was essentially all in other continents.

Of great significance in the spread of the British was the fact that Britain is an island. Because of the choppy sea and the strong British fleet it has been so difficult to invade that there has been no successful invasion since 1066. Hence the internal development along peaceful lines has proceeded without the numerous serious military interruptions which have occurred in most European countries. This internal development has been abetted by the fact that there was no need for an extensive standing army. Instead of largely wasting a year or two in compulsory service in the army, the young men could train themselves along constructive lines without interruption. Insularity has meant, also, that all foreign commerce must be by boat. But once loaded on ships, the distance that the cargo is hauled makes comparatively little difference. Hence the foreign trade was not at all restricted to Europe. The trade with other continents led to the acquiring of possessions in sparsely settled regions, or where the people were comparatively weak. These possessions were secured with relatively little warfare—less than one-tenth the cost which was expended, for example, by France under Napoleon and numerous other generals through many decades to incorporate a few more square miles of densely peopled, advanced, adjacent territory (Fig. 142).

Of profound significance in the growth of the British Empire was the fact that the industrial revolution commenced in Britain and made

possible a great increase of population there. A great reduction in the death rate, as a result of the scientific discoveries made there and in neighboring lands, also aided powerfully in one of the greatest natural increases in population that the world has known. Partly because the increase was largely rather readily absorbed in the expanding industries and commerce of the British Isles or in their colonies in congenial mid-latitudes, the practice of rigorous birth control, which had reduced the French birth rates to low figures, did not spread rapidly in Britain until the World War. Its widespread practice in France a century and a quarter earlier was augmented by the long Napoleonic wars during which there were such great casualties that parents generally came to fear that their sons would be killed or maimed in warfare. Few thoughtful parents will deliberately rear sons for such an end.

The industrial revolution spread from Britain into other lands but did not reach Germany to any large extent until nearly a century after it started in England. Even now it has barely reached large parts of

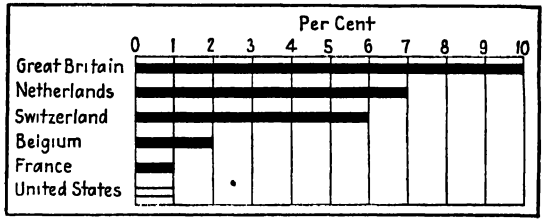


FIG. 145.—Net income from foreign investments, percentage of total national income, 1928.

southern and eastern Europe. Its spread was retarded by the fact that Britain possessed a superior coal supply, numerous able, trained workers who could readily and cheaply supply a large share of the demand for manufactured goods, and commercial, financial, and social machinery to handle the export of manufactures. The spirit of nationalism, however, has encouraged the construction of competing factories in many lands, for nationalists contend that their own nation should be as self-sufficient as possible. In order to permit factories to operate profitably, the nationalists often have raised tariffs and given bonuses.

Although the earlier development of the factory system in Britain was of great importance in the acquiring of numerous valuable coaling stations and other possessions, it is obviously not the major factor in British expansion. The characteristics of the people themselves are of prime significance, as is proved by the fact that most of North America was made English before many factories were established in England, before much coal was used, before there was much foreign trade, and also before the population of Britain was nearly as large as that of France. The superior energy of the British may be partly due to the stimulating

effects of their climate, and to the selective effects of migration from the continent. As to the latter, it is established that the sections of England which yielded most early New Englanders and leaders among the early colonies elsewhere are the sections into which contingent after contingent of ambitious peoples came from the Continent.

Not only has there been a remarkable territorial expansion of the British but their cultural expansion has been even more noteworthy. English is spoken by many more people than any other language and the number of books read in that language is many times as large as in any other. British ideas and ideals, inventions and methods have spread into all lands. Furthermore, English speaking persons own most of the mines, waterfalls, oil wells, and irrigation works of the entire world (Fig. 145). If the English speaking nations should work together they could easily dominate the world.

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PART II

THE INDIVIDUAL COUNTRIES

A. NORTHWESTERN EUROPE

CHAPTER XI

THE BRITISH ISLES

The advantageous position, the highly favorable physical features, the stimulating climate, and the abundance and variety of natural resources which have been such important factors in accounting for Europe's leadership among the continents are epitomized in the British Isles. The fortunate combination of such an environment and an excellent racial stock has made these island peoples, on an area smaller than the state of New Mexico, one of the world's greatest nations. Few regions of equal size have so influenced the world at large. Through conquest, both military and economic, they have acquired one of the greatest empires of all time and have been, until recently, the world's leading nation in commerce and industry.

PHYSICAL FEATURES

The British Isles were formerly joined to the European mainland, the connection having been severed only in comparatively recent geologic times. Consequently, many of the major physical features of Great Britain are extended westward into Ireland and eastward into the continent. Thus the old resistant rocks of north Ireland and north Scotland are prolongations of those of Scandinavia; those of south Ireland have their counterpart in South Wales and Cornwall and Brittany. Likewise, the chalk cliffs of Dover are duplicated across the strait in France.

Though limited in area the relief is extremely varied. The physical map[1] shows the major highland areas extending in an almost continuous chain from northern Scotland to Cornwall, while westward projecting extensions form the marginal highlands of Ireland. The plains areas are in two sections: the English Lowlands occupying southeastern England, and a second lowland running across the backbone of older rocks through central Scotland and Ireland.

During the glacial period the ice covered all of the British Isles except that part of England south of the Severn-Thames rivers. North of this line the work of the ice is everywhere evident, both in its depositional and erosional features.

[1] The student will find it most helpful if the physiographic diagram in the pocket of the cover is spread out before him as he reads the text.

The Highlands.—*The Scottish Highlands* are westward extensions of the Scandinavian mountains and, like them, are a rugged mass of ancient crystalline rocks, dissected by water and ice, which show marked relief, in some areas as much as 2,000 feet. A narrow gash, Glen More, indicates a northeast-southwest fault, south of which the highlands are known as the Grampians. This trench has been taken advantage of in the construction of the Caledonian Canal, although as a commercial waterway it is too small to be of economic importance.

The eastern and western coasts of the highlands are in marked contrast. The latter is made up of bold rocky headlands deeply indented by fjords and bordered by numerous rocky islands. The general slope of the highlands is eastward, providing on the North Sea coast a narrow, although practically continuous, coastal plain. In contrast to the west coast, the eastern fringe has more fertile soil, warmer summers, less rainfall, more level land, and better transportation facilities. Consequently the scanty population is chiefly on this margin where oats, barley, and cattle can be raised, and where fishing is important.

The interior of the highlands is of little economic value. The rocky slopes are mostly treeless, bog and heather covering the lower parts, while above they are practically bare. Some of the valleys, such as the Trossachs, attract many tourists, while game preserves also yield a small return; however, the native population is decreasing and the numbers of sheep and cattle show a constant decline.

The Southern Uplands of Scotland differ in several important respects from the highlands with which they were formerly continuous. They occupy a much smaller area, their relief is much more subdued, and they lie between two important economic regions. Their position between the more densely populated regions to the north and south has made them a transit zone. In early days as the "border country" and the meeting place of Scots and English, this region was the scene of almost perpetual strife. As a consequence of their lower average elevation and more southerly latitude, the vegetation cover is much heavier, and they have long been one of the most important of British sheep-raising areas. In several counties the numbers average over one to the acre, and woolen manufactures, especially tweeds, are important.

The Pennines are topographically, though not geologically, a prolongation of the Southern Uplands of Scotland. Like the latter, they separate important industrial areas based chiefly upon the coal found on their flanks. The ridge is an anticlinal fold of sedimentary rock whose upper portions, including the coal layers, have been removed by erosion. The scanty soils are treeless, but support a grass cover extensively used for sheep pasture. Two breaks across the range, the Tyne and Aire gaps, provide important communicating routes between east and west England.

The Lake District of northwestern England is a dome-shaped elevation on the slopes of which lie several long narrow lakes. These have been formed by valley glaciers which dammed several of the stream channels radiating from the central elevation. The beauty of the scenery attracts many visitors, although the rainfall is very heavy, one place having 131 inches annually.

The Welsh Mountains occupying practically all of Wales with only narrow coastal plains on their seaward margins represent a further continuation of the Scottish Uplands and, like them, are thoroughly dissected, making both agriculture and transportation difficult. Except for the excellent coal in the south, Wales is but poorly endowed by nature. The mountains contribute building stone and slate, while their scenic attractions and water supply are of interest to the English industrial regions near by. Agriculture on the margins of the country includes the raising of oats, barley, sheep, and cattle. Coastal plains along the northern and southern borders afford the major routes from London to Ireland. Outside of the coal basin of South Wales which supports an important commercial and industrial population, the poverty of resources has led to much emigration to the richer English lands to the east.

Cornwall.—Another outlier of the Northwest Highlands, Cornwall, was formerly noted for its tin and copper deposits. These ores were carried across the Bristol Channel to the coal of South Wales and were important in initiating the metallurgical industry there. The mines have long since been practically exhausted, although Cornwall possesses excellent china clay, much of which is shipped to the potteries of Staffordshire. The chief occupation on the peninsula today is agriculture, for while there is much rough land, the southerly position and marine influence provide favorable conditions for early vegetables, fruits, and flowers. The dairying industry is likewise well developed, and Devonshire cream is famous.

The Lowlands.—The English Lowlands occupy all of England except the Pennines, the Lake District, and Cornwall. It is an old coastal plain across which, from north to south, run two cuestas with westward facing escarpments. Thus both topography and soils show a zonal arrangement, the resistant limestone and chalk escarpment belts alternating with the weaker clays which form the back slopes or vales of the cuestas. These features are well shown in the physiographic diagram. The western limestone escarpment in the south is known as the Cotswold Hills, in the north, as the Lincoln Heights. Similarly the eastern, a chalk formation, in the south is known locally as East Anglican Heights, while, north of The Wash, it meets the sea as Flamborough Head. To the south of London is the truncated dome formation known as the Weald, with bordering escarpments, the North and South Downs. From the broad area south of the Pennines, the Midlands, extensions of the lowland, run northward on either side of that range. On the west this

region opens into Lancashire and to Ireland through the Midland Gate, while on the east it forms the Yorkshire Plain.

The Scottish Lowlands occupy a graben valley which separates the highlands on the north from the uplands on the south. The sedimentary rocks and coal beds whose settling made this structural valley, were thus preserved from the rapid erosion which removed the rest of the same formations from the structurally higher elevation on either side.

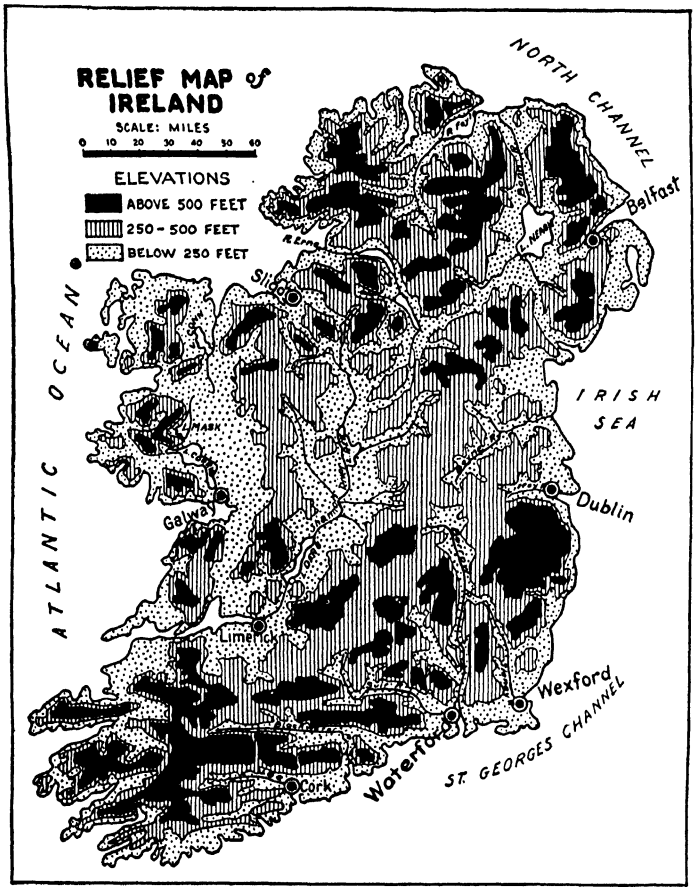


FIG. 146.—Ireland's mountainous rim is not continuous, the interior plain reaching the coast in many places. (*U. S. Department of Commerce.*)

A level topography, fairly fertile soil, with deposits of coal and iron, have enabled three-fourths of the people of Scotland to make this depression their home. The firths of Clyde and Forth almost meet here—less than 30 miles separating their heads. An additional subsidence of less than 100 feet would transform the lowland into a strait.

Here as in Britain as a whole, climatic contrasts between east and west make agriculture in the latter primarily pastoral, in the former a

producer of cereals. The contrast is, however, mainly due to the coal and iron of the west which have made of the Clyde district a great industrial region, while the Forth is primarily agricultural. The Glasgow area is the world's greatest shipbuilding section, while Edinburgh is a cultural center with great printing and publishing establishments.

The Surface of Ireland.—Ireland consists of an extensive inland plain surrounded by a more or less continuous mountainous rim (Fig. 146). The frequent and fairly wide gaps in the mountains, however, provide ready access to the seacoast in many places. This central plain of the island is a drift-covered limestone lowland occupying about a third of the area. The surface is undulating, the main drainage being by the Shannon toward the west. The poor drainage and moist cool climate have combined to promote the formation of peat bogs which cover approximately a seventh of the country—mostly in the central plain. Peat is the chief fuel for domestic heating, and it is estimated that the 6,000,000 tons removed annually only equal the new growth. The peat reserves are estimated in heating power to be equivalent to about 2,500,000,000 tons of good coal. The depth of drift covering, as well as the fertility and drainage, varies much from place to place and is important in accounting for the population distribution.

CLIMATE

A Typically Marine Climate.—Because of their position on the leeward side of the Atlantic, the British Isles, although in the latitude of Labrador, have a remarkably mild climate. No part of the islands has, in the coldest month, an average temperature below freezing, nor is their average for July anywhere above 63° F. The greatest annual range of the average daily temperature of only 25° in the southeast about London is, on the western margins, reduced to 15°.

Temperatures.—The contrast between winter and summer conditions as influenced by the ocean is most remarkable. Thus, the July isotherms run in a general east-west direction, the temperature decreasing with latitude. In winter, however, the influence of the North Atlantic Drift is much stronger, the warm waters being pushed far to the northeast between Iceland and Norway. As a consequence January land temperatures decrease eastward rather than northward, that is, it is a question of distance from the Atlantic rather than from the equator (compare Figs. 28, 29). Thus the January average for the northernmost point of Scotland (40° F.) is the same as for Southampton, while from western Ireland, almost 600 miles farther south, eastward to Dover, there is a drop of 6°. Because of this beneficent influence of the surrounding waters, the average January temperature about the islands is approximately 30° higher than is normal for that latitude, although the summers are about the average. January in London is warmer than Nashville,

Tenn., 1,100 miles farther south. Thus the winters may be classed as mild, the summers cool and cloudy.

Rainfall is everywhere sufficient for crops and decreases from west to east. In some of the more exposed western slopes the precipitation is too heavy, especially for cereals. Since the higher elevations are mostly in the west, the rainfall in the east is dependent upon the cyclonic storms in whose paths the islands lie. London receives only 25 inches of rain annually, but, since a fair share of it comes during the growing season and the cool summers result in little evaporation, the supply is ample for ordinary crops. The sunshine, as in most of northwestern Europe, is deficient, averaging between 3.5 and 4 hours daily and diminishing from 38 per cent of the possible amount in the southeast to 27 per cent in the northwest.

In general the climate is well suited for both agriculture and human activities. Both temperature and rainfall conditions favor grass rather than grain, so that there is a strong emphasis upon the pastoral phase, while the mild winters make outdoor labor possible practically throughout the year.

AGRICULTURE

Subordination of Agricultural to Industrial Interests in Great Britain.—Until the close of the eighteenth century Britain was predominantly

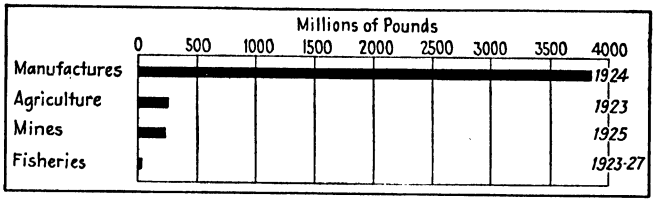


FIG. 147.—Relative importance of primary production and manufactures in Great Britain according to value in pounds sterling.

agricultural, and even up to 1875 farming was fairly prosperous, but during the past 50 years it has shown a marked decline. From the peak of agricultural activity in the seventies up to 1914, the arable land of England and Wales decreased by one-fourth. Even the World War with its threatened food shortage was able to stem the tide only temporarily. Less than 7 per cent of the population are engaged in farming, about the same number as are employed in mining or in a single branch of industry —that of textiles (Fig. 147). About one-fourth of the area of the United Kingdom is cultivated, while more than twice that amount is in permanent grass and pasture (Fig. 148). Much of the latter, however, is highly productive. No other of the great nations is so highly industrialized, no other has allowed its agricultural output to become so small, resulting in so great a dependence upon the rest of the world for foodstuffs. Under

normal conditions, Britain produces sufficient food to support her for only 6 weeks. It seems an anomaly that with such a vast industrial population requiring foodstuffs and with unemployment which for several

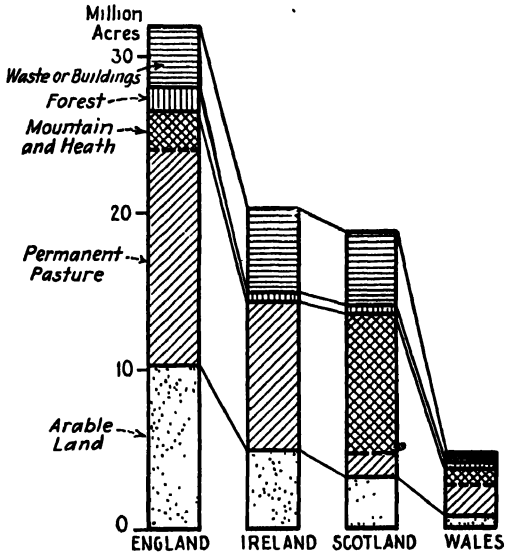


FIG. 148.—Forest, pasture, and arable land in various parts of the British Isles.

years has run well over a million, there should be large and increasing areas of potentially productive land either idle or inefficiently used.

The physical conditions affecting agriculture in Britain help to explain some of these trends. Thus the marine climate is in general much better

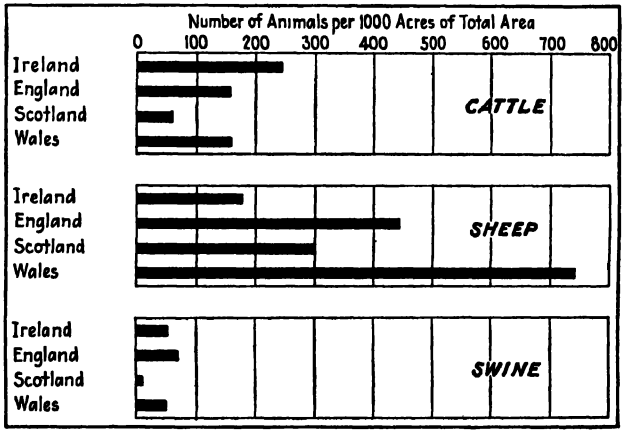


FIG. 149.—Density of animal population in the major divisions of the British Isles.

suited to pastoral than to cereal production; persistent rains frequently delay seeding and interfere with the harvest; northern and western Britain have much hilly and mountainous land unsuited for cultivation

and even the chalk downs of the English Lowland, while productive of short sweet grass, are poorly adapted to cultivated crops (Fig. 45). While it is true that these conditions have been of long standing, their influence could be ignored only under the relatively non-competitive conditions preceding 1875.

Beginning about that time, however, western Europe began to be flooded with machine-raised wheat from the cheap virgin lands of the New World. The British government, moreover, maintained a free-trade policy to insure cheap food for its industrial workers, and English ploughlands were turned into sheepwalks. The competition of oversea foodstuffs was naturally least in the perishable materials, so that the British farmer turned more to the production of fresh meat, vegetables, fruits, and dairy products. With the advent of refrigerated meats, he has emphasized more and more the raising of pure bred stock and the production of fresh milk. Quality of product rather than cheapness has enabled him to retain a part of the domestic market.

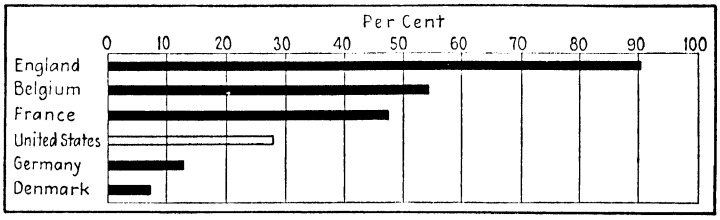


FIG. 150.—Percentage of farm acreage operated by tenants in selected countries. (*U. S. Department of Agriculture.*)

The reaction of English farming interests to the change in world agricultural conditions is quite different from that in Germany. The policy of the latter was designed to protect and foster agriculture by tariffs, bounties, cheap rates on government owned railways, agricultural education, and experiment stations. Their policy was not to substitute animal for cereal farming, but, by a proper combination of the two, through scientific agriculture to add the animal industry without reducing the harvested crops. They have made a conspicuous success of their plan, and agriculture occupies an important place in their national economy, although industry has helped to foot the bill.

Farm Ownership and Operation.—In response to this difference in national policies, there appear marked contrasts in the size of holdings, the returns per acre and per person. Thus the typical farm in Germany is from 12.5 to 50 acres; in England the average holding is 94 acres. Farm wages in the former are lower, the hours of work longer, and a larger dependence is placed upon the labor of women and children. In prewar days the average number of workers per 100 acres was 18.3; while in Britain it was 5.8, or less than one-third as many. The output

per agricultural worker in Great Britain is considerably higher than in Germany (Fig. 297).

One of the most striking characteristics of British agriculture is the existence of large estates and the prevalence of tenancy. Over 90 per cent of the farm acreage is operated by tenants, a proportion almost double that of France, and about seven times that of Germany (Fig. 150). Tenant leases in the British Isles, however, unlike the usual practice in the United States, are for long periods—often 99 years—so that it is customary for the same holding to be occupied and worked by successive generations of the same family. Thus many of the ills we ordinarily associate with tenancy are absent. Furthermore, the last two decades have witnessed a rapid breaking up of the large estates. Prior to 1914 two-thirds of the land in England and Wales was owned by about 10,000 people. Much of the land in the large holdings was, however, not very valuable.

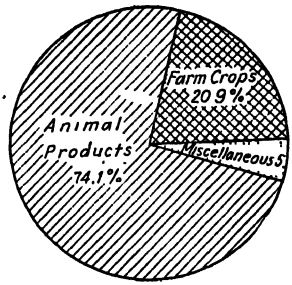


FIG. 151.—Animal products account for about three-fourths of the value of farm products in Britain.

Cereals vs. Animals.—Of the crops, oats, hay, wheat, and barley are, in the order given, the most important according to acreage occupied. Oats, adapted to a cool moist climate are raised almost everywhere, as are potatoes, while wheat is most important in the drier east. Yet, as indicated above, the emphasis is largely upon live stock (Fig. 151). With sheep about six times as numerous as swine and over three times as

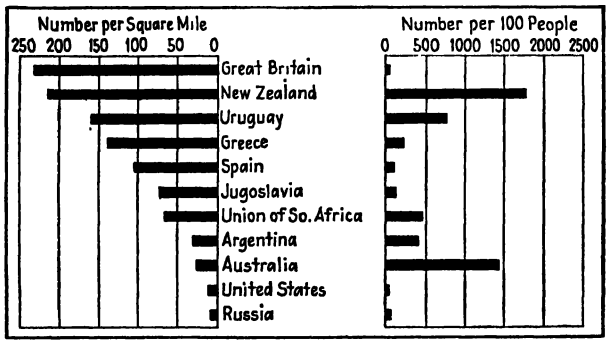


FIG. 152.—Relation of sheep to land area and to population in important countries.

numerous as cattle, Britain holds in wool production high rank among European countries, normally next to Russia (Fig. 152). The returns from the sales of pedigreed stock, while considerable, are far less than those from the meat and dairy products, especially the latter. It is estimated that about 38 per cent of the value of Britain's farm products are from cattle alone. In spite of this, 66 of the 127 pounds per capita

meat consumption are imported, while the dependence upon foreign supplies of cereals is still considerably greater. It should be further noted that part of the home-grown beef and mutton (about 13 per cent) is raised on imported feed. Thus in Great Britain a combination of physical and economic factors have served to subordinate the interests of the farm to those of the factory. The British landowner was on the one hand compelled to bid against the factory and mill for his labor, while on the other hand he had to sell his produce from high-priced fields in an open market in competition with foreign foodstuffs. The natural response has been broad pastures with flocks and herds requiring little labor and yielding perishable meats and dairy products better able to withstand competition in the local market.

Agriculture in Ireland.—*The backward state of agriculture* in Ireland, as well as the economic conditions in much of that island, warrants special attention. To a considerable extent the explanation rests upon non-geographic factors—matters of political and commercial relations with England—as well as upon the local physical environment.

Historical Background.—Ireland and Great Britain are separated only by narrow waters, yet that slight physical separation has added its influence to the racial, cultural, and religious factors in accounting for the lack of sympathetic understanding and cooperation so long characteristic of Anglo-Irish relations. The conquest of Ireland begun some eight centuries ago was never entirely completed, and the intervening period has been one of almost constant strained relations, often breaking out into open warfare. Centuries of oppression and mismanagement of an intensely individualistic people left a heritage of hate which has made recent efforts to arrive at an amicable understanding extremely difficult. The situation was complicated by the fact that in the northeastern part of the island, in Ulster, there had been planted extensive settlements of English and Scotch. This section desired close union with Britain and bitterly opposed all efforts of south Ireland to make the island independent. Political, social, and religious differences were reinforced by marked contrasts in economic opportunity. A compromise settlement has finally been agreed upon which leaves Northern Ireland united with Great Britain, while the Irish Free State receives dominion status.

A Land of Retarded Development.—Thus the lot of Ireland for many years was not a happy one. Handicapped in natural resources as well as by centuries of political and economic restrictions and civil strife, she has lagged far behind Great Britain in economic development. Since 1841 the population has been reduced almost half, chiefly through emigration. The potato has been the main dependence of the poverty-stricken masses and so closely did the population press upon the meager resources that when the crop failed thousands were forced to emigrate or starve. A bad land system and overpopulation have been largely corrected, and

there is today less of a land monopoly in Ireland than in England. The future of the Irish Free State seems promising, although much time will be required to repair the damages of civil war and political mismanagement.

Although area and population are about the same as those of Scotland, the two countries are, in most respects, quite dissimilar. The keynote of Ireland is uniformity; of Scotland, contrast. In the former, climate, topography, population density, and human activities vary little from place to place. In Scotland, there are wide differences both in the natural setting and in the human adaptations. Ireland is dominantly plain, Scotland, mountain. The former has, therefore, considerably more arable land, over three times as many cattle, and six times as many swine, but less than one-half as many sheep as has Scotland (Fig. 149). In the latter a narrow zone 50 miles wide supports three-fourths of the whole population; in Ireland, the people are more evenly distributed.

Ireland, a Land of Farms.—Unlike Great Britain with its vast mines and factories, Ireland is lacking in the fundamentals of industrialism, so that whether they will or not the great majority of the Irish are compelled to be farmers. While in Ireland about two people in every five are employed in agriculture, in Great Britain two out of five are engaged in industry. With the soil as the one great resource, its utilization is, on the other hand, rather narrowly restricted. The position to the west of Great Britain results in an even more pronounced marine climate. Furthermore, the saucer-like form of the surface, recently glaciated, a fairly heavy rainfall, and low rate of evaporation have resulted in extensive areas of poorly drained land, including much bog, a very real obstacle to progress in both agriculture and transport. In general, Irish farms are small, averaging about 28 acres as compared with 94 acres per holding in Great Britain. Moreover, in the former, farm wages are lower, since there are no extensive industries to compete for labor, and poverty is widespread.

Crops and Live Stock.—Though too damp for many cereals, Ireland's climate favors a luxuriant growth of grass with a large carrying capacity for live stock, the pivot of Irish agriculture. One-half of the cropped acreage is in hay and the emphasis upon the animal industries is even more pronounced than in England (Fig. 153). Eastern Ireland has more fertile soil as well as the more moderate rainfall, so that this is the chief region of tillage. Oats and barley are the principal cereals, while potatoes, raised mainly as a supply crop, are grown everywhere. Flax, as already suggested, is the characteristic product of Ulster, although the acreage is now small. The output of animals and animal products in 1912 to 1913 was valued at over four times that of the crops and essentially the same conditions maintain today (Fig. 154). There are more cattle than people, and dairying is an important and growing industry with bacon, poultry, and eggs important by-products.

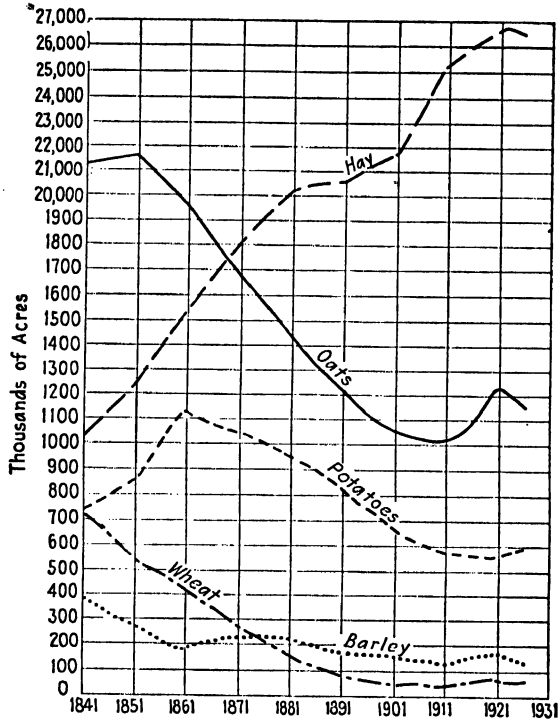


FIG. 153.—Trends in land utilization in Ireland. Compare with Fig. 154. (*Courtesy of H. B. Smith.*)

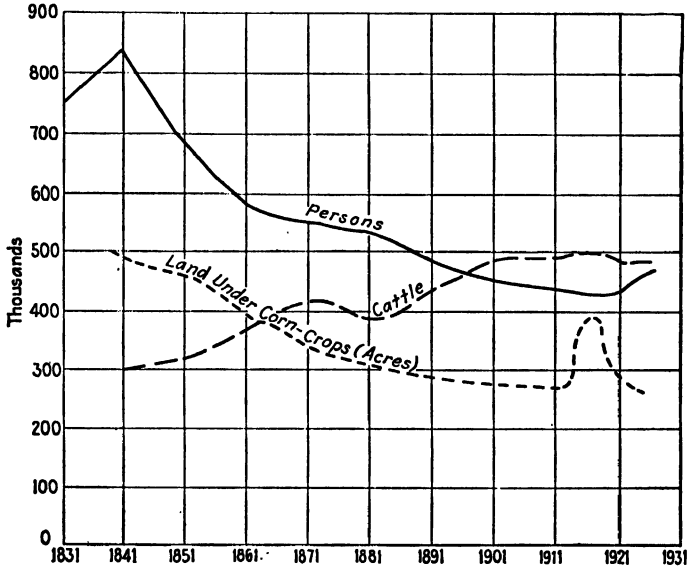


FIG. 154.—As in much of northwestern Europe, cereals (*i.e.*, "corn crops") have in Ireland been displaced by pasture and cattle. The population decline shows a trend roughly parallel to that of the land in grain. (*Courtesy of H. B. Smith.*)

The proximity of the great market in industrial Britain, particularly in South Wales and Lancashire, is of vital interest to Irish agriculture. Eight out of every ten of Ireland's cattle are shipped to the English market—and five out of those eight are shipped alive to be fattened on the Cheshire Plain (Fig. 155). The export of bacon, eggs, and dairy products especially butter, is largely to the industrial centers of England. In a recent year (1926), of the total foreign trade of the Irish Free State, 75 per cent of the imports were from, and 96 per cent of the exports were to, the United Kingdom. The foreign trade passes mainly through Dublin, the capital and chief port of the Free State. The lack of an extensive meat-eating population and of a local market for by-products of the slaughter house has thus far discouraged the establishment of local meat-packing plants.

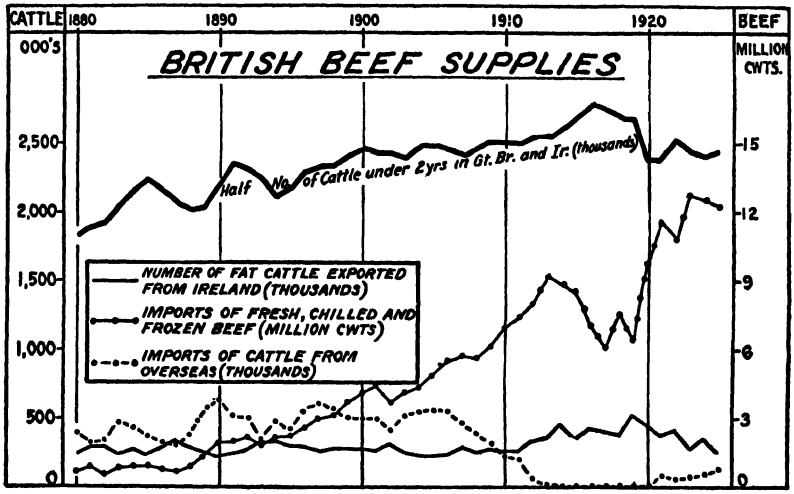


FIG. 155.—Imports of meats from distant lands have grown much more rapidly than have cattle from Ireland. (*U. S. Department of Commerce.*)

MINERAL RESOURCES

Britain's Coal. Key Resource.—Coal is the pivot around which the economic life of Great Britain moves. The mining of it alone furnishes work for about 2 per cent of the population and supports about a tenth of the whole population.[1] The annual prewar value of the product at the pit head approximated $680,000,000 and it paid wages, profits, and royalties totaling $465,000,000. From 1900 to 1913 Great Britain produced annually more coal than all of the rest of Europe together. Of much greater importance, however, is the fact that coal is the mainspring of British industry as well as of its commerce. There are ten factory workers to every farmer, and, as transformed by their labors,

[1] In Germany about 0.8 per cent are employed in coal mining and in Poland, the third largest European producer, about 0.4 per cent.

the original value of the fuel is multiplied many times over (Fig. 211). Abundant coal and highly skilled labor are the twin magnets which serve to attract foodstuffs and raw materials from all over the earth to feed British workers and British machines. About one-third of the total receipts of British railway traffic is for hauling coal. Not only is it the chief dependence of domestic industry but itself is an important factor in the foreign trade, where it plays a double rọle, serving as a reducer of ocean freight rates as well as a valuable commodity which can be exchanged for raw materials. Every Briton in whatever walk of life, is intimately affected by British coal (Fig. 71).

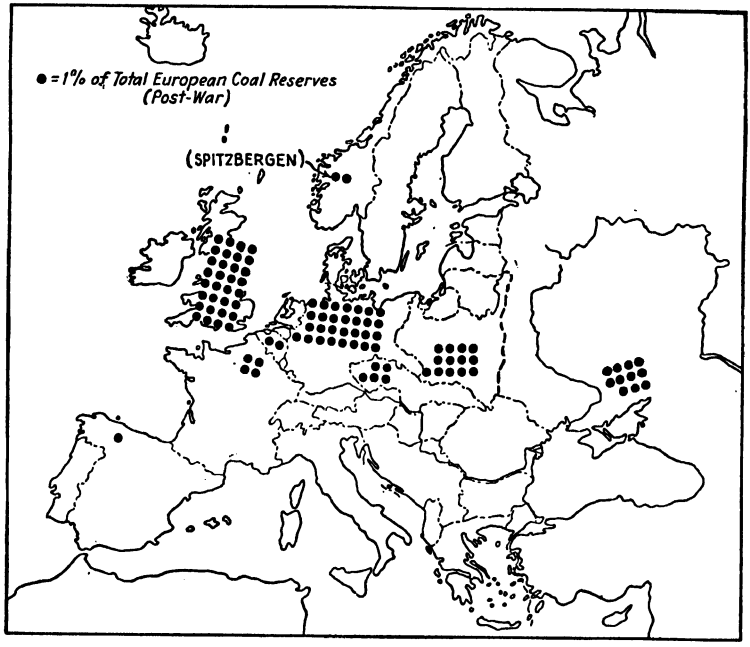


FIG. 156.—The boundary changes due to the World War have enabled Britain to pass Germany while the reserves of France were doubled. Germany, Austria, Hungary, and Russia lost important reserves. (*U. S. Department of Commerce.*)

Extent and Character.—The deposits are not only enormous in extent but also excellent in quality. Since the World War Great Britain has supplanted Germany in first place in reserves, possessing about a third of the total of all Europe (Fig. 156). So vast are these beds that at the present rate of consumption it is estimated that they will last for many centuries. The varieties available run the entire gamut, including anthracite, steam, gas, and coking coals, all of high grade. Individual beds are known with a maximum thickness of 30 feet and in one section there are 36 separate seams totaling 144 feet of coal. The beds occur at all angles from horizontal to vertical.

Short-haul Characteristic.—The deposits are admirably distributed both for domestic use and export. Some of them are close to iron ore, others are practically on tidewater. One of the great advantages of the English coal industry is the relatively short land haul either to local markets or to the seaboard. The average distance for all English coal from mine to port is estimated at 25 miles costing about 47 cents, as compared with 140 miles, Ruhr to Rotterdam, 70 cents, and 310 miles from the mines of West Virginia to Hampton Roads, costing about $1.25.

Of the coal fields of the British Isles practically all of any consequence are within Great Britain. Their combined area totals about 6,600 square miles, or one-tenth that of the Appalachian field of the United States. Of the total reserves of the United Kingdom, estimated at nearly 190,000,000,000 of tons, the fields of England alone account for about 61 per cent, Scotland, 12 per cent, and Wales, 21 per cent.

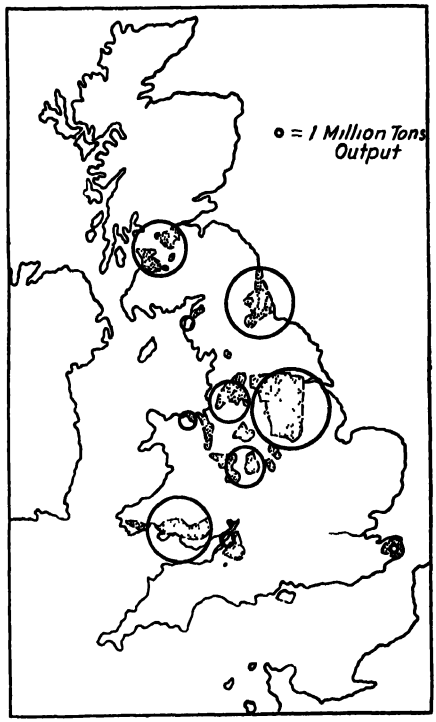


FIG. 157.—British coal fields and their production in 1928.

Major Coal Fields.—The important coal fields of Britain may be conveniently grouped into three major districts: (1) in the Scottish Lowland, (2) about the Pennines, and (3) in South Wales (Fig. 157).

The Pennine Group.—The Pennines were originally covered by coal formations that have been eroded from all except the lower flanks. On the east are the Durham-Northumberland and the York-Derby-Nottingham fields; on the west are the Cumberland and Lancashire fields. To the south of the Pennines is a group of small deposits comprising the Midlands district.

The Durham-Northumberland field possesses several advantages: it has much excellent coking coal, it lies close to tidewater and also to the Cleveland iron ores. As a result it is both a large exporter and a great industrial district, specializing in iron and steel goods, particularly shipbuilding. Newcastle-on-Tyne is one of its leading shipbuilding centers as well as an important coal exporter supplying much fuel to London and to Baltic Europe.

To the south lies the York-Derby-Nottingham coal field—the most important producer of all England. Its output is largely used locally in iron, steel, and textiles. This is the great wool manufacturing region centering at Leeds and Bradford.

The Cumberland field is small and principally of interest because of its association with the local iron ores and the iron and steel industry of Barrow.

South of it lies the Lancashire district whose coal is the major support of the world's greatest cotton-textile region. Access to the sea is afforded by the Mersey and the Manchester ship canal to which the near-by mines and factories are joined by means of a network of canals and railroads. "The potteries" form a southward extension—pottery clay being found in some of the coal mines, although dependence is now mainly on Cornwall clays. South of the Pennines the coal is used in the Birmingham district—"the Black Country"—where metal industries again predominate.

Welsh Fields.—South Wales, including the Monmouth field to the west (Fig. 157), is notable for its large export of high-grade steam coal, Cardiff as the world's leading exporter surpassing all other ports in coal shipments. Three-fourths of the output is normally shipped to all parts of the globe (Fig. 159). Local coal practically upon tidewater is also made use of in smelting much imported ore, especially at Swansea.

The Scottish Fields.—The Forth and Clyde coal fields occur in the graben valley forming the Scottish Lowland. Coal measures originally covered three times as much of southern Scotland as are comprised in this field, but erosion removed the bulk of them. The output of these fields approximates 35,000,000 tons annually, supporting an extensive industrial life including textile, machinery, shipbuilding, and chemical works. A considerable amount of coal is also exported to Ireland, the industries of Belfast deriving their coal supply from the Ayrshire fields to the west of Glasgow.

Growth of the Industry.—Although used for some 2,000 years it was not until the eighteenth century that coal really became vital to British industry and trade. The invention of coke making, the steam engine, the Bessemer process for making steel, and the varied and rapid changes characterized as the "industrial revolution" were directly or indirectly dependent upon coal (Fig. 158). It was used to smelt the ores, to make the machines, and then to run them; finally, it propelled the ships which marketed these wares and brought back more raw materials and food.

During the three-fourths of a century prior to 1914, the coal industry had made enormous strides. In 1860 Great Britain produced four-fifths of the world's supply and the output increased steadily up to the World War. At that time it represented a capital investment of $675,-

000,000 with 3,100 mines yielding coal valued at $680,000,000 (Figs. 157, 158).

Shipments of coal had likewise grown until by 1909 they were over four times those of all the rest of the world combined. In 1927 British exports including bunker coal, were 40 per cent of the world's total. About one-third of the coal output is used for bunkers or export (Fig. 175).

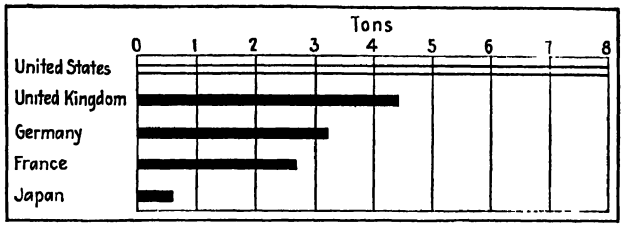


FIG. 158.—Per capita consumption of coal, oil, gas, and water power in terms of coal for leading industrial countries in 1927. (*U. S. Department of Commerce.*)

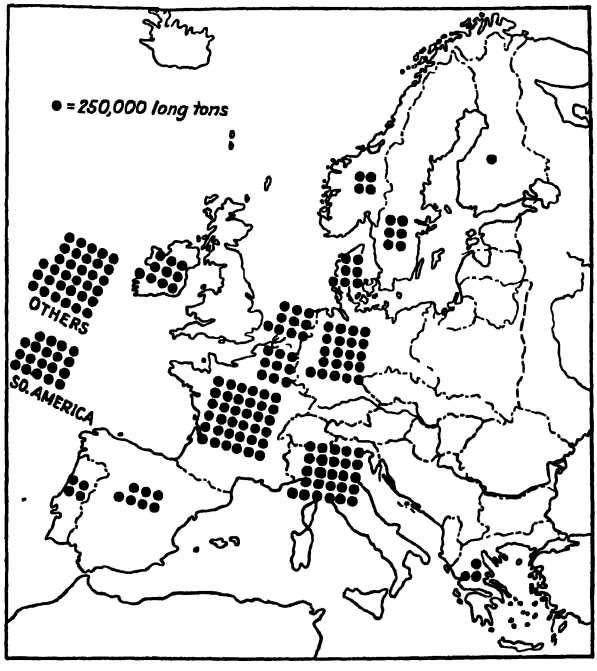


FIG. 159.—Distribution of British coal exports in 1928.

Its importance in the export trade is not merely as a convenient commodity for exchange, since the outgoing items are mainly manufactures high in value but small in bulk, coal serves as ballast to keep the ships loaded, thus reducing freights on imports. The chief exports are to European countries with two main currents: one to the Baltic countries making up 40 per cent of the total, the other to France and the Mediterranean-Black

Sea countries, which account for about 49 per cent (Fig. 159). It may be noted that Britain's chief coal markets are not the primary sources of her bulky imports. Even so the freight saving is large, for ships will drop their fuel cargoes, say, at Napoli, then complete the journey to Odessa for wheat.

Recent Difficulties in the Industry.—Some of the newly organized countries, *e.g.*, Poland and Czechoslovakia, have become competitors in coal exports. The rapid shift to the use of oil both as steamship fuel[1] and for industrial purposes, the increase of water power, of coal and lignite production by countries formerly large users of English coal, and the increased efficiency in the use of coal have cut sharply into England's former trade. Part of the difficulty is temporary, *e.g.*, German reparation payments and the world-wide depression in iron and steel, but many of the factors mentioned will be operative for a long time. As a result of these conditions involving a loss of markets together with mounting production costs, the output has dropped and the export trade was, in 1928, only 40 per cent of the world's total. The industry, in need of widespread readjustments, offers problems of the first order which will put severe tests upon the country's industrial and political leaders.

British coal mining has been in a chaotic condition since the World War. Even in the decades preceding 1914 there were indications of trouble ahead. The proportion of the world's coal furnished by the United Kingdom declined from 30.4 per cent in 1899 to 19.5 per cent in 1928. As long as the industry had almost a monopoly of world markets it closed its eyes to weaknesses. Antiquated machinery and methods were continued in use, large numbers of small and inefficient pits were operated, while wasteful methods in mining, distribution, and utilization characterized the industry. Even in 1924 only one ton in five was made to yield the valuable by-products which in Germany were made the foundation of vast industries. An indication of the lack of modernization is shown in the slowness to adopt electrification. The United States, Germany, and France have been active in establishing large central power stations resulting in a saving of much coal, a movement in which Britain is considerably in arrears. Furthermore most of Britain's mines are old and, with increasing depth, production costs mount.[2] The output per man employed has been declining since 1880,

[1] The tonnage of world shipping using oil increased from 3 per cent in 1913 to 40 per cent in 1930 (Fig. 76). About 60 per cent of British coal exports is finally used for bunking so that the significance of this change for Britain is obvious.

[2] Almost one-half of the coal output is now from seams over ½ mile deep; over one-fourth from a depth exceeding 1,500 feet. In the United States the average bituminous shaft is 260 feet, or less than one-third that in Great Britain. Again, only about one-third of Britain's coal comes from seams 4 feet or over in thickness. The average for bituminous coal in the United States is 5⅓ feet. The average

a trend found also in France and Germany, though less pronounced. The daily output per miner in Germany has now surpassed that of Britain. In prewar England for every 1,000 men digging coal, 1,100 were doing the other necessary work about the mine. In post-war years this latter figure has been raised to 1,500. The output in 1906 was about the same as in 1922, but in the latter year it required 225,000 more men to extract it. Moreover, each man in the latter year received about 45 per cent more wages than in 1906.

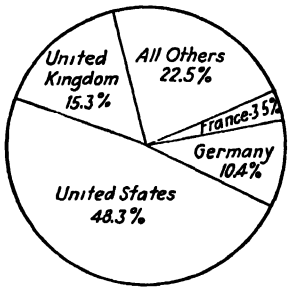


FIG. 160.—The "Big Four" of the power world. World power production from mineral fuels and water power in 1925 by principal countries. (*U. S. Department of Commerce.*)

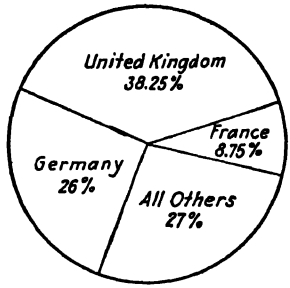


FIG. 161.—Almost three-fourths of the power production of Europe in 1925 from the domestic output of coal, water power, and petroleum, came from three countries. (*U. S. Department of Commerce.*)

Other Minerals.—Coal and iron ore make up about 90 per cent of the value of the mine products of Britain. There is a little tin, copper, lead, and zinc still produced, but the deposits have been almost worked out and the output is declining. There is, however, an important refining and smelting industry, in part an outgrowth of an earlier period when domestic ores were plentiful, which now uses local coal but imported ores and concentrates. Of the non-metal group there are important industries based upon the local deposits of limestone, china clay, chalk, and quarry rock.

MANUFACTURES

The Metallurgical Industries

Iron and Steel the Basis of English Industry.—Of all British manufactures that of iron and steel is most fundamental. In a country so highly industrialized and so dependent upon foreign commerce these basic materials are essential. Out of them are made the machines

distance from the face of the seam to the bottom of the shaft in British mines is now almost a mile. Only one-fifth of the coal is cut by machines, the fraction for American mines is two-thirds. Part of this latter difference is due to the physical conditions in the mines, part to conservatism. In 1925 seven men were needed to do the work in the British coal industry which had been done by six when the World War broke out.

used for manufacture as well as the carriers of her commerce on land and sea. Of the natural resources essential for industrial growth, only coal ranks ahead of iron ore, and of this former, as we have seen, Britain has abundant supplies.

Her position in iron-ore resources, however, is far less satisfactory (Fig. 201). In her vast reserve she possesses only a very limited amount of high-grade ore, but possibly twice as much which, although low in iron content, is so close to coal and to tidewater as to make its working practicable. Huge deposits—1,000,000,000 tons or more—are so poor as to be a doubtful asset.

Thus iron-ore resources which were ample for her needs at the time of the industrial revolution are now quite inadequate. Even as late as 1875 her mines accounted for one-half of the world's output of ore but in 1910 this was slightly more than one-tenth. Today she is dependent upon imported ore for the production of half of her pig iron. For the past 50 years her per capita production of this staple has remained practically unchanged; that of her industrial rivals has multiplied at a high rate, *e.g.*, that of the United States, increasing by one-half every decade, surpassed that of Britain in 1888 (Fig. 199).

Shiftings of the Metallurgical Industries.—The present distribution of the metallurgical industries of Britain is the result of a long series of readjustments. Until the middle of the eighteenth century smelting was dependent upon charcoal and so was located in the heavily wooded areas. The threatened destruction of the forests led to parliamentary restriction. This led in turn to the discovery of coke making and the shifting of the smelters to the coal fields, each of which fortunately had iron-ore deposits near by. Some of the latter were eventually exhausted. Furthermore the invention of the Bessemer process for steel making in 1856 called for ores low in phosphorus, a quality possessed by only part of the British ores. As a consequence the importation of ores, especially from Sweden and Spain as well as of considerable amounts of pig iron, was stimulated. Hence steel centers close to tidewater and to coal underwent rapid expansion, since they were not only able to secure ores but could easily market their surplus output abroad. Four of the six major iron and steel districts accounting for three-fourths of the steel capacity of the country are on the sea, but even those inland are only a short distance from deep water and have especially low rates for export.

The leading iron and steel district is that of Cleveland. Close to the Durham field with its excellent coking coals, to tidewater at Middlesborough, and yielding the largest output of domestic ore, this district accounts for one-third of the country's pig-iron production. Its equipment is the best in Britain, and while the local ore output shows a constantly declining grade, with greater difficulty in mining, the import of ores from abroad is easy.

Of the three other seaside steel districts, one centers about Glasgow and the Clyde. Its local ores were long ago exhausted and it now depends upon Cleveland and supplies from overseas. The shipbuilding and other industries which grew up there have enabled it to survive the disadvantage of long hauls for ore. The Cumberland district about Barrow in northwestern England is significant because of its high-grade ore—50 per cent iron. The amount of both ore and coal is, however, limited. For some time the local ore deposits of South Wales, like those of the Clyde, have been exhausted. Imported ores supply not only the steel plants but smelters for tin and other metals at Swansea. The Midlands and Sheffield districts are both inland but with excellent transportation to either seaboard. The former includes the "Black Country" about Birmingham. The Sheffield district south of the Cleveland area is one of the older steel centers. In addition to the Yorkshire supply, it has coal from Lincolnshire and the Midlands, excellent fluxes, crucible clays, and fine grinding stone. Little pig iron is made locally. It has specialized in lighter steel products, cutlery, and hardware for which it has a world-wide reputation, but manufactures considerable heavy steel as well.

The Textile Industries

Textiles the Most Valuable Export.—While second in importance to metals in the country's industries, textiles have long been the leading item in British foreign trade, cotton and wool manufactures accounting for about one-third of the value of all exports—with raw cotton the country's largest single import and cotton goods the chief item in Britain's textile manufacture. Britain possesses over a third of the world's cotton spindles, *i.e.*, more than all the rest of Europe, although the consumption of raw cotton is much less and the value of the output is somewhat smaller than that of the United States. But since British goods are finer on the average, they use less cotton per spindle than American mills with coarser products.

Cotton manufacturing was of minor importance until after the industrial revolution. The great inventions which marked that transformation and which substituted power-driven machines for hand labor were promptly used in cotton manufacture. These changes, combined with the invention of the cotton gin, resulted in a phenomenal growth of the industry. In the century following 1830 the value of the output of cotton textiles has multiplied by 120 as compared with 6 for linen and 3 for wool. The early modernization of the industry gave Great Britain precedence in the manufacture of cotton goods and until the close of the century the nation enjoyed almost a monopoly of the foreign markets. Since 1900 she has had to meet the growing competition, first of the United States, then of Germany, and France, and, more recently, of

Japan and India. Since four-fifths of the English cottons are destined for export, the growth of the industry within foreign markets is serious. Exports to the Far East have declined to less than half, for cheap labor and long hours there make British competition difficult.

Within Britain the industry shows a remarkable concentration; 90 per cent of the spindles and looms are west of the Pennines in Lancashire and adjacent parts of Cheshire and Yorkshire. This region was particularly favored by the moist climate which prevents the threads from roughening and breaking, by the development of Liverpool as a port of entry for the import of cotton from America, the chief source of supply, and by the fact that the soils of the region are not especially well adapted to agriculture.

Fortunately the changes introduced by the industrial revolution found in this same region their necessary prerequisites of water power, an abundance of clear soft water for bleaching and dyeing, coal, now the main power resource, and iron ore near by upon which an iron and steel industry was established and which could be relied upon to furnish the large amount of complicated textile machinery required.

While some of these factors have lost their former significance, Lancashire still maintains its position as the world's greatest cotton-textile district. The vast physical plants for spinning, weaving, bleaching, and dyeing, for the manufacture of the machines and the chemicals used, the dense population with its skilled workmen, the facilities and organizations which have grown up in Liverpool and Manchester for handling the raw cotton and marketing the manufactured products—all these would make removal of the industry difficult. Manchester is the chief center of the district being accessible to ocean-going steamers by the ship canal from Liverpool. The city itself has no cotton mills but is mainly a great warehouse center, the mills and factories being scattered about in the villages and cities of the district, the different sections having come to specialize in various processes or in different types of cotton goods.

Woolens.—Sheep raising and the spinning and weaving of wool are ancient industries in Britain. The climatic, topographic, and economic conditions by which wool growing early assumed significant proportions made of Britain, even in the Middle Ages, a great exporter of that commodity. Wool from the Pennine country was exported especially to Flanders for cloth making and even English cloth was sent there to be dyed and finished. With the subsequent immigration of Flemish weavers to eastern Britain, the manufacture of woolens flourished and until 1800 was the chief textile industry.

The gradual change to power-driven machinery served to concentrate the wool working in the Yorkshire coal field. The importance of this district for wool is mainly due to the early settlement there of the immi-

grant weavers, the large amount of wool from the Pennine range, and, later, to the local coal supplies. There is some overlap of the woolen and cotton areas, but in general the superior adaptability of the Lancashire region for cotton has served to give that fiber almost a monopoly there, while two-thirds of the wool spindles and 70 per cent of the looms are in the Yorkshire district with Bradford and Leeds as the chief centers.

Over the island in general, wool has been far outdistanced by cotton. The former employs only about one-half as many workers and the exports are only about one-third as valuable. On the other hand wool has been, perhaps, more of a characteristic product than cotton, since it is much older, has been largely based upon a native raw material, and a greater part of the product finds a local market in Britain. The United Kingdom, before the World War, was the foremost consumer of wool and enjoyed the reputation of producing the highest quality of woolen goods in the world. While this country is now second to the United States in wool consumption, woolens still constitute Britain's chief agricultural export.

Silk manufacture has never been important in the United Kingdom, but in the making of its substitute, rayon, a product of the chemical laboratory, so well adapted to that highly industrialized country, Great Britain in 1928 shared with Italy second rank among European producers of this material (Figs. 103 to 105). Favored by a large home market and a protective tariff, the industry has had a rapid growth.

Other Manufactures

The metal and textile industries of Great Britain each had a value added by manufacture of $1,000,000,000 or more (1924). Food and drink belong in this same class. In addition to these there is a great variety of manufacturing characteristic of a highly industrialized country; among which may be mentioned the printing, chemical, lumber, leather, and rubber groups. The total value added by manufacturing in 1924 was almost $5,750,000,000 employing almost 5,000,000 people. Northern Ireland's corresponding figures were $50,000,000 and 170,200 men.

Irish Industry of Minor Consequence.—The lack of important deposits of native coal and iron constitutes a serious handicap to any extensive industrialization. In eastern Ulster, however, Belfast and vicinity are close to British supplies of these materials which, with local cheap labor, support a considerable industry there. Belfast is one of the world's important shipbuilding ports and the manufacture of linen is closely associated with it.

Flax is the characteristic crop and linen the characteristic product of Ulster. As compared with both wool and cotton, its preparation for spinning involves much more handwork. Northern Ireland is well adapted to its culture, while the cheap abundant labor without other industries competing for it favors linen manufacture. About Belfast the industry

is parasitic, as the men work in the shipyards and allied heavy trades, while the women and older children may supplement the family income by working in the linen factories. Since local production has for many years proved inadequate to supply sufficient fiber, most of that used is now imported from the Baltic states, Russia, Belgium, and Holland (Figs. 103 to 105). In 1926 the export of linen from Northern Ireland was valued at over $50,000,000.

In the absence of coal, the development of hydroelectric power is of special interest. The harnessing of the lower Shannon is under way, the project utilizing a total fall of about 100 feet. Power will be distributed to most of the Free State and the government hopes within the next 5 years to double the per capita use of current. The total output at present is about 90,000 horsepower, but extensions will be made as the market justifies.

FORESTS AND FISHERIES

Forests Largely Lacking.—Originally covered with deciduous forest the British Isles now rank among the lowest of any European countries in the proportion of their area under tree cover. Clearing for pasture

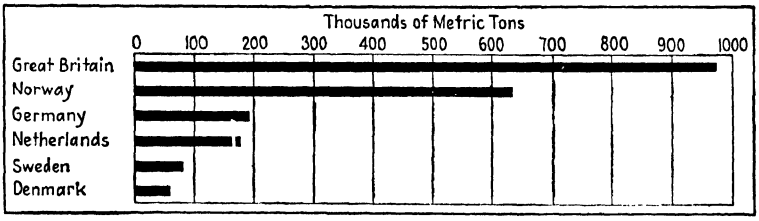


FIG. 162.—Average annual production of fish in European countries, 1920 to 1924.

and for cultivation, for charcoal and household fuel, as well as for construction timber, has gone on until now only 1 acre in 25 is forested. Many of the so-called "forests" are really today practically without tree cover. The area in forest and the total wood consumption of Great Britain is about the same as that of Illinois, one of our prairie states. There is, however, a striking difference between them in their attitude toward reforestation. In spite of a population almost four times as great, Great Britain has undertaken to replant at the rate of 20,000 acres per year, while Illinois has not yet set out 200 acres of public forest. It is claimed that much of Scotland which is now open heath and moor could be made to yield a forest growth as good as that of Scandinavia.

Most of Great Britain's wood requirements must be met by imports, chiefly from the Baltic countries. In addition to miscellaneous uses, the mining industry requires a huge quantity of pit props and the printing industry requires a large import of pulp and paper (Fig. 114).

Fisheries an Important Food Resource.—The continental seas off northwest Europe are the world's most productive fisheries. Variations in depth and in character of the bottom, as well as seasonal movements of various species furnish a wide variety of fish, while the dense industrial population close by affords an almost unlimited market.

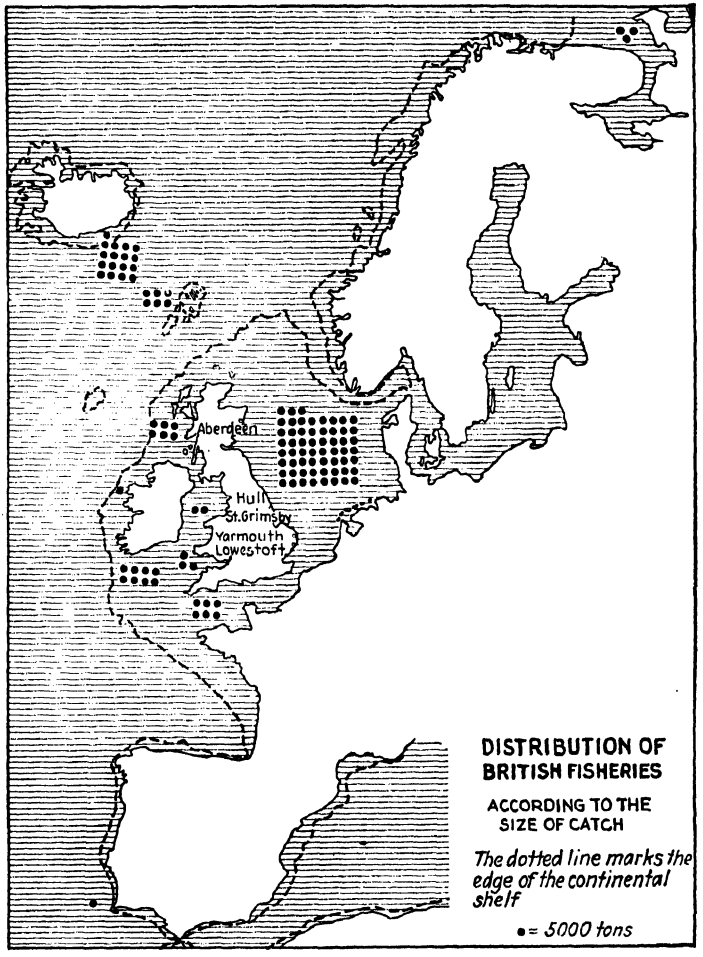


FIG. 163.—Only the landings at English and Welsh ports are shown. The dominance of the North Sea—especially the Dogger Banks, is apparent.

The British Isles, most advantageously located with respect to these waters, rank among the three leading countries in value and quantity of catch (Fig. 162). The prewar British fishing fleet in number of vessels and in equipment was about equal to that of all of the other countries of northwestern Europe combined, while of those working in the North Sea, about 70 per cent were British. Their prewar annual catch averaged over a million tons with a value ranging between $75,000,000 and $100,-

000,000, although the cost to the consumer was probably three or four times that amount. The domestic market took less than half the catch. Not only is the per capita consumption (about 65 pounds) very high, but fish also constitute the only domestic food product of which Britain has a large exportable surplus (Fig. 242). A fishing industry of such proportions is of manifest importance to a country otherwise so deficient in foodstuffs, as well as serving as a training school for British seamen.

The most productive areas are the North Sea and Iceland waters. These two together account for over two-thirds of the fish landed in recent years. The Dogger Bank, the most famous of the world's fisheries, is a submarine plateau of approximately 7,000 square miles submerged to a depth of about 120 feet. Located only some 60 miles east of Yorkshire, it is the chief factor in making all of the east coast ports of Great Britain important fishing centers, the operating bases for the fleets with exceptional facilities for handling and marketing the catch (Fig. 163). Each day at dawn, the world's most famous fish market—Billingsgate in London—is selling approximately 1,500,000 pounds of fish caught only a few hours before and rushed thither by special boats and trains.

With the increasing drain upon the North Sea fisheries, the catch has been declining and British fishermen are going farther and farther afield, the larger yield more than compensating for the greater distance. The British Government in the meantime is actively investigating the problem of maintaining the output.

TRANSPORTATION

Inland Transport Is Chiefly by Rail.—Since no part of the British Isles is far from deep water the importance of inland transportation is proportionately reduced. There is an excellent and comprehensive network of railways which has been supplemented by a rather extensive system of canals. These latter consist mainly of short links of varying dimensions, constructed chiefly to facilitate the movement of coal and iron. Unlike the canal system of Germany and France, that of Britain has been allowed to decay. Since the coming of the railways in the second quarter of the nineteenth century no new inland waterways have been constructed except that betweeen Manchester and Liverpool, which is really an ocean ship canal. Similarly improvements have been few and traffic has become negligible. The small size of the country with short hauls and the topographic difficulties which require an excessive number of locks have all operated to minimize the importance of inland water transport. On approximately 3,800 miles of canals and inland waterways, there were carried in 1913 about 33,500,000 tons, but this by 1921 had declined to 19,300,000 tons.

The Channel Tunnel.—The proposition to construct a tunnel underneath the Strait of Dover connecting the railway systems of England

and France is one of many years standing. Though always favored by France it has never been supported by a British Government, the chief opposition arising out of military considerations. From an engineering and geological standpoint the plan seems feasible. Freight movement across the strait is insignificant, but passenger travel is large. While a tunnel would probably increase the former, its chief use would be for rapid movement of passengers, mails, and high-class freight. The water crossing is often rough and the time from Paris to London could be thus reduced by 1.5 hours over that required by train and boat. There is a growing sentiment in favor of the tunnel, with a tendency to give economic considerations precedence over the military, and it is believed that the larger amount of travel back and forth should also lead to a better Anglo-French understanding.

POPULATION

A Nation of Cities.—One of the important consequences of the advanced stage of development in the United Kingdom is the high degree of urbanization of the population. The nation is predominantly one of city dwellers, four out of every five live in cities of 10,000 or over, a proportion far in excess of that in any other country (Fig. 92).

Previous to the industrial revolution the densest population was found in the great agricultural lowland of the south where soil, climate, topography, and accessibility combined to make the region the richest in Britain. Scattered market towns cared for the simple needs of the local farm folk. With the industrial revolution came the concentration of the population upon the coal fields where people and factories were crowded into large industrial centers about the mines. Each of the great coal basins gathered to itself a group of such cities, usually located at important nodal points upon the coal areas.

As a result of this shifting the manufacturing district of the north accounts for half of the total industrial and urban population of all England and Wales, one-fourth is in or near London, and the remaining one-fourth scattered. Such areas as London under the impetus of unsurpassed commercial and political advantages have continued to grow, but with these exceptions the great shifting from farm and pasture to the coal areas has been revolutionary.

Recent Changes.—There has been in recent years a noticeable trend toward the decentralization of industry. Excessive congestion with high costs in land and taxes together with the possibility of sending power long distances has tended to minimize, in part, the advantage of location immediately upon the coal. Commercial and other advantages in certain cases may outweigh that of fuel, and there are indications that industry and population are migrating away from it.

In view of what has been said, it is obvious that the population density of the different political units of the British Isles varies widely. Level topography, commercial accessibility, and, in particular, the presence of coal have all exerted a powerful influence on the distribution of people.

England with its propinquity to the continent and its preponderant share of both coal and fertile lowland has a population density of over one to the acre, a figure exceeded by no other country, and has in fact more people than all of the self-governing dominions of the Empire together. The majority of the Welsh and Scotch are concentrated in their lowlands which are also mineralized. Ireland, without coal and dominantly agricultural, has the most uniformly distributed population of all. The number of fairly large cities (50,000 or over each) in these units is a fair index of where the people live. Of the population of England and Wales, over half (56 per cent) live in such urban centers, in Wales the percentage is 41, in Northern Ireland 34, and in Ireland, as a whole only 14.

THE EMPIRE

The World's Greatest Empire.—In the short space of 150 years Great Britain has extended her control over about one-fourth of the land area and the same proportion of the population of the earth (Fig. 143). This is about 3½ times as large as the French possessions and almost 5 times the area of continental United States (Fig. 142). The population density varies from less than 2 to the square mile in Australia to 390 in the United Kingdom. India alone accounts for about three-fourths of the total population of the Empire. Fortunately, the greater part of her possessions fall within the temperate zone and therefore are suited for white settlement. It is one of the greatest areas ever assembled under a single flag.

British Possessions Widely Distributed.—Unlike the territories of Russia, those of Britain are widely scattered with possessions in every continent and in every sea (Fig. 164). Over three-fourths of the population of the empire is, by ordinary travel methods, more than a month distant from London. Wellington now requires six weeks, but by a relay system of airplanes it is planned to cover the distance in one week.

Although a web of cables, wireless stations, and even of airplanes may bind the scattered segments together, the actual transport of goods is far more important than communication facilities, and in this necessity lies one of Britain's chief problems. Acquired primarily as sources of food and raw materials for her workmen and factories, as well as for markets for her manufactures, a large merchant marine protected by a great navy became a necessity. Furthermore to insure the safety of those routes, she has acquired possession of a vast number of strategic points along the main world highways. Many of these are little more

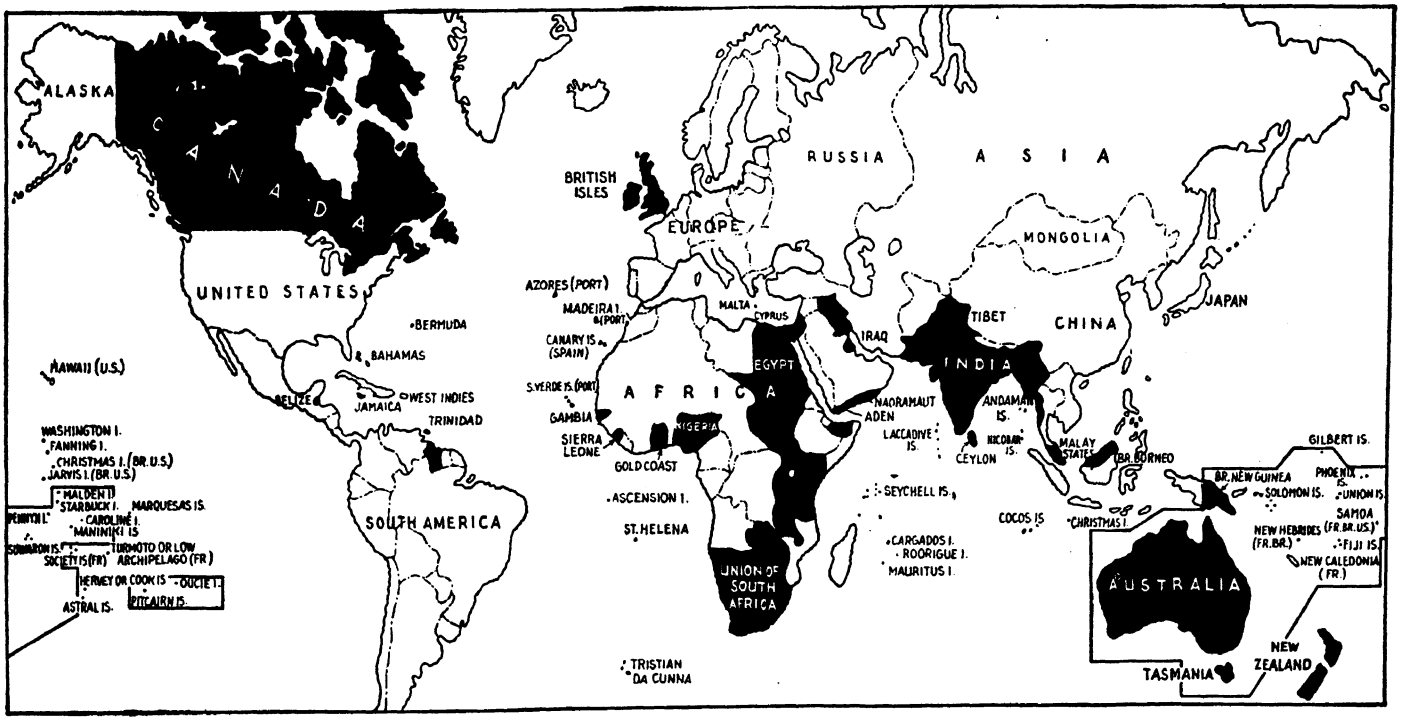


FIG. 164.—Britain's "far-flung empire." Note the large proportion in the temperate zone. (*Courtesy of Current History, published by the New York Times.*)

than fortified coaling stations, but in time of war they insure the operation of her fleets from a near-by base, no matter in what part of the world they may be located.

Economic Relation of Britain to the Colonies.—British plans to "make England the workshop and her dominions, the farm" have been encountering much difficulty, especially in post-war years. The growth of manufacturing within her possessions, the difficulties in the British coal industry and trade, and the development of keen competition by her industrial rivals are a few of the major obstacles. Thus the trade of Canada with the United States is much larger than that with Great Britain; the rapid increase in cotton textile manufacture in India is cutting into the British market there, at least for coarse cheap goods; and India, Canada, and Australia are demanding protection for their own manufacturers (Fig. 128). On the other hand imperial preference rests upon a differential[1] tariff as well as spiritual bonds, and the British merchant is noted for his dogged perseverance in a business wherein he has the advantage of long training. Past accomplishments give us confidence in England's ability to solve her difficulties without being reduced to a second-rate power.

COMMERCE

Foreign Trade Vital to British Prosperity.—As the most highly industrialized of the important nations, Britain to an unusual degree is dependent upon other countries for her food and raw materials, as well as markets for her manufactures (Figs. 119, 120). About one-third of the total output of goods of the United Kingdom is destined for foreign consumption. With the exception of part of the iron ore and wool, practically all of her raw materials are from abroad. Similarly the annual domestic food production is estimated as sufficient to last only six weeks out of the year, so that cheap and efficient transport is of vital importance. To better insure a steady exchange of goods she has become the world's chief shipbuilder, the owner of the largest merchant marine (Fig. 165), one of the leading nations in foreign trade, the possessor of the greatest naval fleet, and the center of the most extensive colonial empire (Fig. 217).

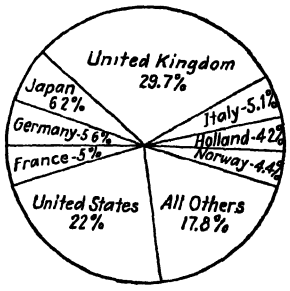


FIG. 165.—Merchant tonnage of eight principal countries, 1928.

[1] Preferential advalorem duties of colonial possessions given British goods averaged about 4 per cent before the war. In 1926 this advantage had been increased to 9 per cent. India and Newfoundland give none.

In 1928 of the total British foreign trade, that with the Empire accounted for 30 per cent of her total imports and 45 per cent of her exports.

Advantages for Commerce.—The British Isles enjoy their maritime supremacy because of

1. Their insular form with a much indented coast line giving a maximum contact with the sea. No part of the islands is over 70 miles from tidewater.

2. The large number of first-class harbors. Of those handling at least 1 per cent of British shipping there are 24, or 1 for every 5,000 square miles of territory. By way of contrast the United States has only 15 such, or 1 for every 200,000 square miles.

3. The attraction of the world's richest fishing banks off the coast which has encouraged a seafaring life.

4. Their location close to the center of the land hemisphere and at the doorway to the most highly developed part of Europe (Figs. 126, 127). The Strait of Dover is like the constriction in an hour glass, traffic in either direction focusing to skirt England's shores so that the island lies at the terminus of the two leading world ocean routes.

Of imports, foodstuffs, semimanufactured goods, and raw materials, of which raw cotton is most important, make up a little less than three-fourths of the total value; for exports a somewhat larger proportion consists of manufactures, though coal constitutes by far the greatest tonnage (Figs. 133, 134). Britain dominates the seaborne coal trade as Germany does that overland, and in 1913 at the peak of the coal industry, almost 100,000,000 tons were shipped either as bunkers or cargo (76,600,000 tons in 1929).

The United Kingdom's balance of trade is consistently adverse, the excess of imports over exports amounting in a normal year to over $1,000,000,000. This apparent deficit is, however, usually more than balanced by the so-called "invisible exports," some of whose more important items are (1) banking, insurance, and various entrêpot activities of London and other English trade centers; (2) earning's of the British merchant marine for carrying the world's goods; and (3) returns in dividends and interest upon British investments abroad[1] (Fig. 145).

Entrêpot Trade.—Besides the importation of goods for her own use England, particularly London, is engaged in an active entrepôt trade. Its advantageous position, and the fact that it has long been the world's greatest financial and commercial center, as well as the capital of an extensive and widely scattered empire, makes it a convenient collecting and distributing point for many materials. Most of these, though not all, are from British colonies. They are in general non-perishable goods of high value and small bulk, often brought to London to be graded, standardized, stored, and exported in the quantity and grade desired by various markets. Although only about one-sixth of the total foreign

[1] Returns from British foreign investments in 1926 were estimated at over $1,300,000,000.

trade of Britain, in 1913 this trade amounted to over $500,000,000. Much of our tea, tin, rubber, and diamonds are imported from London, just as in earlier days Venezia, Lisboa, or Bruges performed the same service for areas widely scattered. Although this method of handling goods usually requires a longer journey, the services performed ordinarily make it cheaper or more convenient for customers, especially those located in small isolated regions. With the rapid growth of other cities, however, the multiplication of trade routes, and the disturbances due to the World War, London's relative importance as an entrêpot center is declining.

LEADING CITIES

London.—This metropolis is located on the Thames, 65 miles from the sea at the first point where elevation on both sides of the stream marked the end of the tidal marshes that line the lower course of the river. Here, then is the first bridgeable point and here was constructed London Bridge, a converging point for traffic crossing the Thames. There are now 14 passenger bridges. Besides, the site is the head of navigation, and, in addition, the estuary faces two of the world's busiest rivers, the Rhine and Scheldt, which afford outlet to the most active part of the continent.

The tides of the Thames estuary have an exceptionally high range, the maximum being about 20 feet. While this movement helps to keep the river clear of silt, it necessitates building berths for the vessels that are enclosed by locks so that the water level within may be maintained constant. The very largest of the vessels must anchor at Tilbury, a sort of outpost for London, analagous to Bremerhafen and Cuxhaven, the down-river ports for Bremen and Hamburg.

Since the larger vessels must unload at Tilbury there has been a growing tendency for the large liners to stop at Southampton and forward their passengers and mails to London (80 miles) by rail from there. This port has the advantage of being on the direct route for steamers going up the channel; moreover its double entrance on either side of the Isle of Wight gives it a double tide, of particular value in these days of large ships.

Like New York, London is primarily a port, that is, commerce rather than manufacturing is its chief interest. At one time it was the principal shipbuilding port of Great Britain, but with the coming of steel ships, the industry shifted to the Clyde and Tyne where coal and iron are available, a movement analagous to that in our own country when New England was superseded by the Delaware.

Though lacking the advantages of coal, minerals, or other raw materials, London has remained the leading British port because of its great entrêpot trade, long experience, knowledge of all kinds of goods,

financial facilities, and great consuming population. About 16,000,000 people live within 100 miles of its center, and in the last prewar year the port accounted for 37 per cent of the imports and 15.7 per cent of the exports of the British Isles. The relative decline in importance of London as an entrêpot is to be seen, however, even within Britain itself, where the industrial centers are more and more establishing direct commercial relations with foreign ports.

Liverpool.—Though second to London in total trade, Liverpool is the Kingdom's largest export port and a great entrepôt for raw materials and foodstuffs for the industrial district of England. It has the most important harbor on the west coast of Great Britain and a hinterland

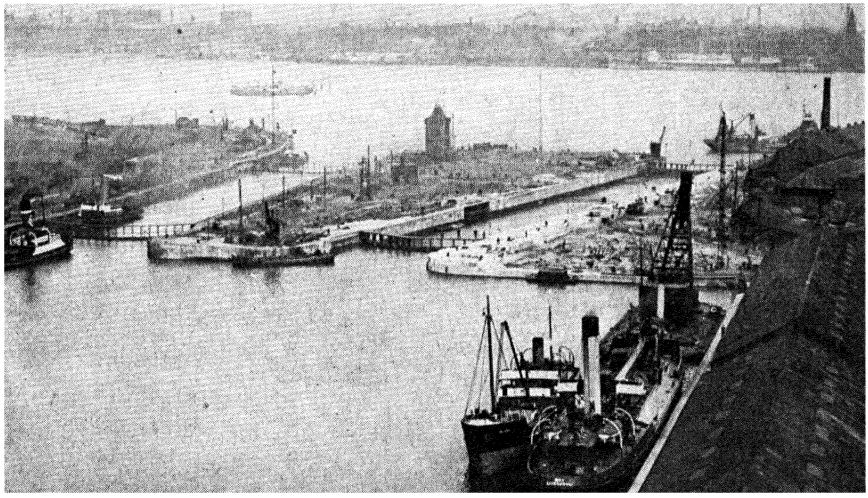


FIG. 166.—Port of Liverpool, Alfred Dock Entrance, Birkenhead. Note the lock chambers designed to surmount the difficulty associated with a wide tidal range. (*U. S. Department of Commerce.*)

which, though of limited size, is densely populated and highly industrialized.

Liverpool's growth has been intimately associated with that of the industrial development of the North of England and the Midlands. It is primarily a commercial rather than a manufacturing city, its chief interests being in the importation of raw cotton, wool, dairy products (from Ireland), and lumber, and the export of manufactures, especially cotton goods. It is the world's main cotton-trade center. Often termed the "liner port" because it has been the terminus of many important shipping lines, Liverpool's passenger traffic has been decreasing. The American restriction upon immigration and the advantage of Southampton and other channel ports for tourists because of their proximity to the

continent is resulting in the growth of the latter at the expense of Liverpool. Southampton is the leading passenger port, excluding cross-channel traffic, with 34 per cent of that trade of the British Isles in 1928, Liverpool having 28 per cent and London 18 per cent. In freight, however, Liverpool bids fair to remain second only to London. It normally receives about one-fourth of the imports and sends out one-third of the exports of the country. The enormous trade has demanded and warranted huge expenditures for harbor improvements (Fig. 166). The average annual expenditure for such work since 1909 has been $4,000,000 for Liverpool, and for Manchester, since 1882, $2,200,000 annually.

Manchester in the midst of the Lancashire-Cheshire cotton district has been, since the construction of the Manchester ship canal, a keen

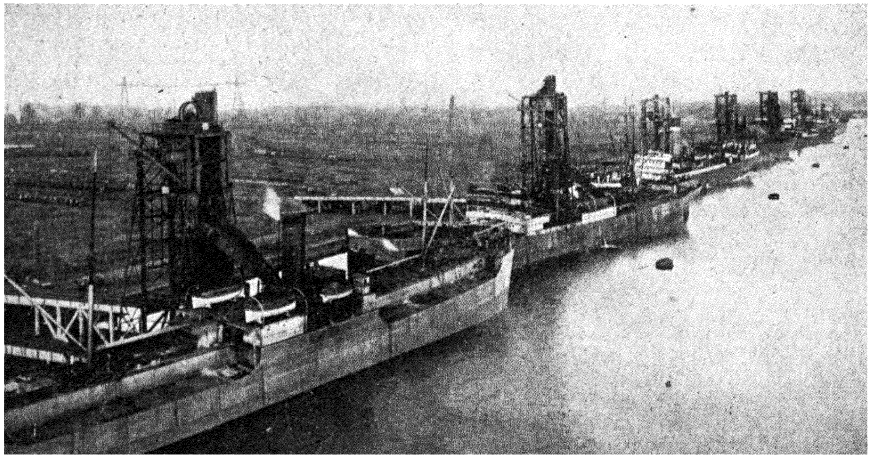


FIG. 167.—Coal hoists at South Dock, Newport Docks, South Wales coal field. (*Courtesy of Great Western Railway.*)

rival of Liverpool. The canal, built in 1894, is 35.5 miles in length and its minimum depth of 28 feet allows large ocean freighters to reach the heart of the cotton-textile area as well as a point close to the woolen district east of the Pennines. Hull, on the opposite coast, and Manchester, rank third and fourth, respectively, among the country's ports in value of foreign trade. Manchester has, however, never been able to wrest from Liverpool the premiership in the cotton trade.

Other Cities.—The ports of South Wales, the Tyne district, and those of the Clyde handle much coal, iron ore, and metallurgical materials. Cardiff is the world's leading coaling port; Glasgow ranks first in shipbuilding; Swansea is an important metallurgical city; while Hull is an outlet for the great wool-manufacturing region and, of late, also a rival of Marseille in vegetable-oil products.

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CHAPTER XII

FRANCE

France was among the first of the important countries of Europe to achieve national unity. During a large part of the ten centuries which closed with the battle of Waterloo in 1815, she enjoyed a position of preeminence among the nations of that continent. Napoleon's downfall marked Britain's succession to leadership to be followed later by the disastrous Franco-Prussian War of 1871, which allowed Germany to crowd France out of second place. For a century there has been a relative stagnation if not a decline in French power measured in terms of industry and commerce. Her prestige has been to some extent restored by the World War, but that she has been definitely outdistanced in material production by Britain, Germany, and the United States, is unquestioned. In her cultural and artistic accomplishments, however, France ranks second to none. Her goods have a world-wide reputation for their artistic merit and Paris is the fashion center of the world, while her contributions to literature, science, and invention are of the first order.

A Vast Colonial Empire.—France ranks next to Great Britain and Russia in extent of territory under one flag. In the seventeenth century she acquired vast possessions in America only to lose them in the hundred years following. With a revival of interest in a colonial empire in the nineteenth century, control was extended over great areas, especially in Africa, so that French territory is now found on all continents but one. Their combined population is considerably larger and their area is some eighteen times as great as France itself (Figs. 142, 143).

About nine-tenths of the area of the French colonial possessions are in Africa where they occupy about one-third of that continent. The real heart of the extensive holdings is in north Africa, *i.e.*, Algeria, Tunisie (Tunisia) and Maroc (Morocco). Likewise the least valuable of her extensive holdings is just south of these—the Sahara. The Sudan and equatorial Africa are at present of secondary importance. Madagascar, somewhat larger than France, and French Indo-China, about 50 per cent larger than the mother country, are the other extensive holdings.

Though superior to those of Belgium and Italy, French colonial territories are on the whole greatly inferior to those of Great Britain, since much of the land under French control is too dry or lies within the

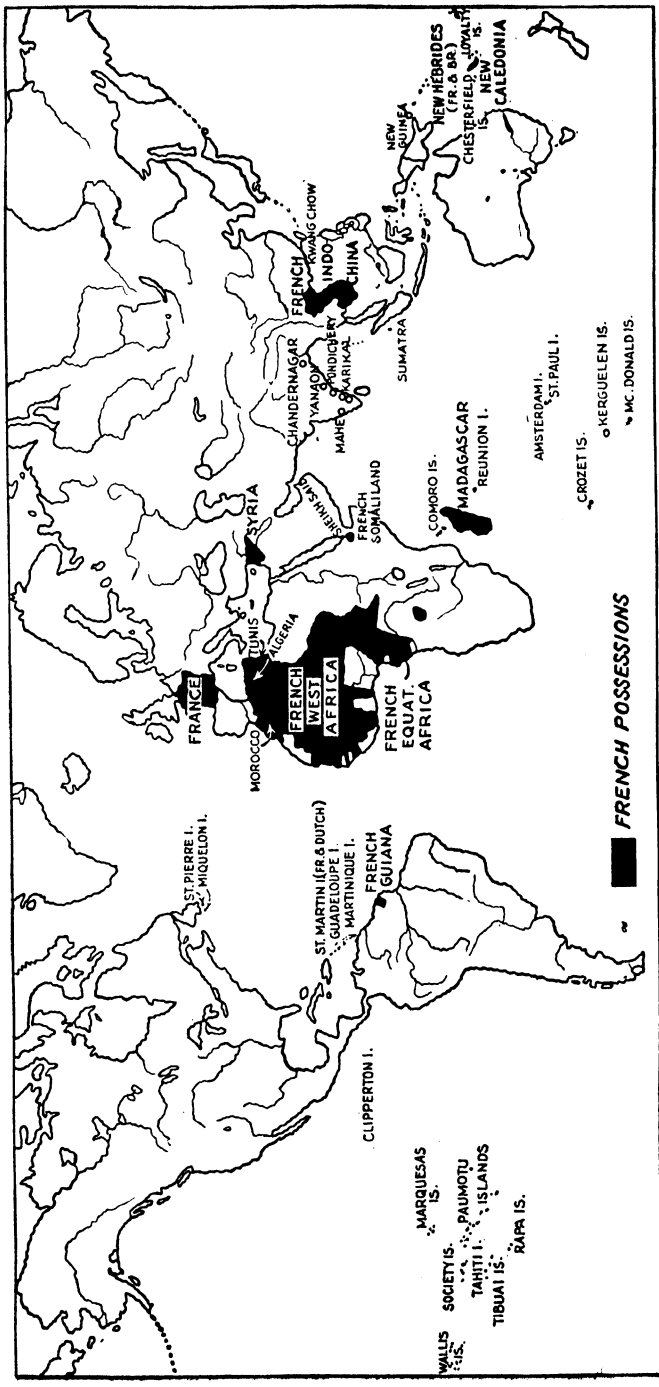


FIG. 168.—Compare these possessions and mandates with those of Britain (Fig. 164), in the tropic or temperate character of the lands.
(*Courtesy of Current History, published by the New York Times.*)

tropics, while practically all of it has a population largely made up of unprogressive native races (Fig. 168). North Africa, particularly Algeria, is the most promising. In general most of the French colonies are regions of potential rather than of actual value. Since the population of France is not increasing, they are looked to chiefly as contributors of raw materials and, in case of war, of man power.

PHYSIOGRAPHIC DIVISIONS

France is made up of several old massives about which are extensive alluvium-filled lowlands. The Paris and Aquitaine basins of the north and of the southwest, respectively, are the westward extensions of the Great Central Plain; on their seaward margin lies Brittany, a part of the Northwest Highland belt; to the east is a chain of massives—the central plateau, the Vosges, and the Ardennes, beyond which lies still another narrow lowland, the Rhone-Saône-Rhine corridor. In the extreme south and southeast the boundaries include part of the Pyrenees and the Alps-Jura mountain system.

With all this great variety of relief, the plains are fortunately the most extensive, over one-half of the country having an elevation of less than 640 feet. Second only in importance to this is the fact that the highlands are not continuous, but are interrupted by depressions which not only connect the basins with each other but also with the plains of adjoining countries and with the coast.

Upland Regions.—The upland areas are of moderate elevation. As compared with the lowlands, their soils are less fertile, the climate cooler and wetter, and the population more sparse. Pastoral and forest industries rather than cultivated crops represent their chief interests.

The Central Plateau.—Of the old massives, the central plateau in the southwest is the largest, occupying about one-sixth of the area of all France. The general plateau level averages about half a mile in height and slopes to the west. Along the eastern edge is a fault scarp, the Cevennes, which descends rather steeply to the valley of the Rhone. A northeastward extension of the plateau forms a divide between the Saône-Rhone and the Seine drainage, a water divide (the Côte d' Or) so low that it has been easily crossed by railways and even a canal.

The plateau differs greatly in character from place to place. In the east, three coal basins along the margin make that section economically important; the fertile rift valleys of the Allier and the Loire in the northeast are highly productive; while those of the Garonne tributaries in the southwest are among the poorest areas in France. These latter are in the karst section locally known as the "Causses," where the herds of sheep and goats provide milk for the famous Roquefort cheese. About Limoges are the kaolin deposits from which is made the famous Haviland

china, and in the central part of the plateau is a volcanic area abounding in extinct cones, crater lakes, and mineral springs.

Most of the Central Massive is of crystalline rock, although sedimentary deposits overlap on the northwest and southwest. The soil from the igneous rock is generally infertile, better suited to rye and buckwheat than to wheat. The crystalline formation is impermeable, too, so that the heavy rainfall frequently produces floods. The drainage reaches all four of the chief rivers of France, and supplies the major part of the water of the Loire and the Garonne.

Other Highlands.—The Pyrenees and Alps, young folded ranges, are of economic interest chiefly as summer pasture lands and for their water for irrigation and power. The former are less efficiently utilized, and are much more effective as a climatic and commercial barrier than are the Alps. Not till 1928 did a railway cross this mountain frontier into Spain, a task completed then only by the use of sixteen tunnels.

In the east and northeast of France are the forested massives, the Vosges and the Ardennes. The latter, an extension of the Slate Mountains, is largely within Belgian territory; the former was originally continuous with the Schwarzwald but is now separated from it by the Rhine graben.

Brittany, rough, bleak, and windswept, resembles the rest of the northwest highland of which it is an outlier. Its infertile soils and rocky terrain with heavy rains and mild winters combine to favor extensive pasturage and forest at the expense of cultivated crops. The people, therefore, depend largely upon the sea for a livelihood, and the majority live near the coast. The natives, descendants of ancient Britons, are of Celtic stock, refugees from the British Isles, who in their harsh environment and comparative isolation have remained unusually conservative and economically backward. It is significant, however, that from Brittany's ports sailed some of France's most intrepid seamen and explorers, and this section has always contributed a disproportionately large share of her naval recruits.

THE PLAINS

The Paris Basin is the largest as well as the most important region of France. It occupies the northern quarter of the country, but its significance is far greater than its size indicates. This lowland lies at the intersection of several of Europe's busiest thoroughfares. As part of the Great Central Plain, communication is easy, either northward across the Low Countries or to the southwest into Aquitaine. To the southeast leads the Saône-Rhone corridor, the least difficult of all routes between the Mediterranean and northwestern Europe. Eastward via the Seine and Marne, the Lorraine gateway communicates with the Rhine, while

on the western margin lies the world's busiest ocean highway. Thus the commercial location of the Paris Basin is such as to have inevitably led to its possessing a great world mart.

Geologically, the basin consists of a series of sedimentary strata arranged like a tier of saucers, each smaller than the one below. The edges of these layers form a series of concentric cuesta escarpments, their abrupt slopes facing away from the center, their back slopes dipping gently toward the middle. Where well developed, these are important commercially in their effect upon routes and strategically as natural lines of defense against approaching invaders.

The major streams draining the basin are the Seine and Loire. These were originally tributaries of master streams whose submerged valleys now form the English Channel. The drainage divides which mark the rim of the basin are low, so that transportation routes have focused naturally upon the French metropolis.

Not only is this the richest agricultural region of France, but its commercial and industrial activities are of the first rank. Along its northern and eastern margins lie the coal and iron deposits and the most important French industrial zone. The natural advantages for transportation have been utilized by a vast network of highways, railroads, rivers, and canals, particularly in the north or industrial section. In general, it is the economic center of gravity of France, and the natural focusing of routes upon Paris explains in part the highly centralized government of the nation.

Basin of Aquitaine.—Aquitaine is the triangular lowland between the Pyrenees, the central plateau and the Bay of Biscay. Drained chiefly by the Garonne, it finds its main outlet via Bordeaux, although it communicates with the Paris Basin and with the Mediterranean-Rhone region by the outlets of Poitou and Carcassonne, respectively. The region shows considerable variety of relief and consequently of economic development. Between the Garonne and the foothills of the Pyrenees is a large alluvial deposit—the Lannemezan Fan—whose deeply dissected surface makes transportation difficult except along the valleys. Since it is for the most part covered with glacial gravels, agriculture is seriously restricted.

In the southwest between the Garonne-Adour and the coast is a second region which was, at least originally, of still less promise. This area, the Landes, a century and a half ago was a sandy waste, unproductive, malarial, and scantily populated. The soil was not only infertile, but just below the surface was an impermeable layer of cemented sands. As a consequence rains turned the region into marsh; drought made it a desert. Furthermore the sand dunes bordering the coast moved continually inland destroying villages and forests. Through forestation of the dunes, thus fixing them in place, and by eventually draining and plant-

ing the rest of the Landes (Fig. 169), the region was reclaimed and turned into a vast pine forest (Fig. 170). Naval stores and timber constitute the major products and a fairly dense, modestly prosperous population of 1,500,000 is now living in what was formerly a desolate waste. On



FIG. 169.—The Landes, Mimizan Plaze; top of shore dune with protective wicker work and planted with Gourbet grass. (*Courtesy of U. S. Forestry Service.*)



FIG. 170.—The surfaced roads and well-kept trees of the Landes would do credit to many American city parks. (*Courtesy of U. S. Forestry Service.*)

the northern border of the Garonne basin lies the valley of the Charente, a highly productive region known for its cognac.

The Garonne basin itself is fertile, climatically well favored, very productive, and the most densely populated section of Aquitaine. The high temperatures and abundant moisture favor corn production, but

it is, above all, the region of the grape with vineyards clustering thickly on the terraced slopes of the many valley sides. Bordeaux, its chief ocean gateway, is one of the world's great wine ports, and likewise an exporter of naval stores, timber, and foodstuffs. The upper reaches of the Garonne are joined to the Mediterranean by the Canal du Midi, the oldest of French canals. The Biscay coast is regular, offering poor harbors, and Bordeaux is really a river port. All of Aquitaine, however, with its mild climate and productive soils lacks the stimulus to vigorous effort characteristic of more northerly latitudes. Life is easy, and agriculture, lacking careful labor, has returns correspondingly small.

Rhone Lowland.—The Rhone Lowland is the long narrow valley between the central plateau and the Alp-Jura ranges. It is occupied by the Saône and lower Rhone and communicates with the Rhine Graben and the Paris Basin by means of the Belfort Gate and Cote d' Or, respectively. At the south it passes through the Mediterranean coastal plain which reaches from the Alps to the Pyrenees.

North of Lyon the valley of the Saône was originally a large lake. The lacustrine deposits of clay and sand though impermeable are mostly rich, and the central portion is a prosperous agricultural country. During the Pleistocene period, the Rhone Glacier advanced to the vicinity of Lyon, leaving, just north of that city a region of moraines, infertile and until recently, marshy and unhealthful but now reclaimed and very productive.

A short distance below Lyon where the Alps and central plateau approach each other, the valley narrows. The lower Rhone Valley was originally an embayment of the Mediterranean, filled in as the delta of the river advanced. Likewise on either side the deposits of gravel by streams from the central plateau and the Alps have built up the plains of Languedoc on the west and Provence on the east. West of Marseille the coast is low, sandy, and margined by lagoons, while to the east the Alps crowd close to the sea. Here between the mountains and the water's edge is the Riviera, Europe's most famous winter resort, where are to be found also the flower gardens, serving as a basis for the perfume industry.[1]

The Rhone itself with its swift current and uncertain depth is better suited for power than for commerce. The delta is particularly difficult both for transport and as a site for a port. Marseille whose harbor has been so improved as to make it one of the best on the Mediterranean is about 30 miles from its mouth and is connected with the river above the delta by a canal, 4½ miles of which are subterranean.[2] Since the

[1] The production of perfume and cosmetics is valued at about $40,000,000 annually. Synthetic and artificial scents have not diminished the importance of the industry.

[2] The Marseille-Rhone Canal opened in 1916 has as a link one of the most remarkable tunnels in the world. It is 72 feet wide, 10 feet deep, and 4½ miles long.

current along the coast moves from east to west, Marseille is little troubled by silting.

Corse.—About 100 miles to the south of Genova lies Corse, politically French but geologically, racially, and linguistically Italian. Economically it is one of the most backward sections of France. Its soil is fertile, yet it imports foodstuffs; its rocks are mineralized, yet the deposits remain untouched. Transportation either by rail or water is entirely inadequate. Typical Mediterranean crops of wheat, wine, chestnuts, barley, oats, and olives are the main crops. About one-fifth of the island is forested and provides tanbark, briar root for pipes, lumber, and some cork.

A HIGHLY FAVORABLE CLIMATE

A country made up largely of plains and lying upon the lee side of the broad Atlantic, France has a climate predominantly marine. The oceanic influence is naturally less pronounced, however, than in Britain, which is only about one-half the size and insular rather than continental. While, then, France as a whole is mild and damp, these characteristics are modified with increasing distance from the Atlantic or with variations in relief.

The Atlantic coast, especially Brittany, has the most pronounced marine characteristics. Here both temperature and rainfall are remarkably equable so that there is little change from one season to another. Frost is unknown, but summers are cool and it rains on the average half the days of the year. This is the land of orchard and pasture rather than vineyard or wheat field.

Eastward in the Paris basin seasonal differences become more marked, although the rainfall is light. Here cereals, especially wheat, do well, as does also the vine in favored localities. Near the German frontier hot summers and severe winters are the rule, although the greater elevation causes a heavier precipitation in winter.

In the far south of France including the Rhone depression as well as the plain bordering the sea, the climate is typically Mediterranean. Almost enclosed by mountains on west, north, and east the influence of the Atlantic is negligible. Abundant sunshine and high temperatures prevail, but the outstanding characteristic of the climate is the long, dry, often entirely rainless summer. Winters are usually very mild, although occasionally a cold dry north wind, the mistral, sweeps down the Rhone Valley. In the extreme southeast the Maritime Alps crowd close to the sea. Here between these two protectors is the Côte d' Azur, the Riviera, a narrow fringe of coast whose delightful climate and magnificent scenery have made it one of the world's most famous winter resorts.

Mediterranean France as a land of summer drought favors only such vegetation as can withstand several months of scorching heat and aridity.

This is the region of stunted forests and dwarfed shrubs, of the evergreen with its thick leathery leaves, and of such crops as the olive with its shallow though extensive root system, the vine with its deep penetrating roots, and the mulberry. Irrigation is extensively practiced, extending

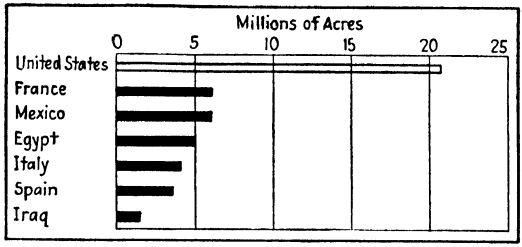


FIG. 171.—Irrigation in selected countries. (*U. S. Department of Commerce.*)

the range of crops as well as increasing the yield. As a whole the irrigated acreage of France is estimated at 6,000,000 acres, the highest of any country of Europe (Figs. 171, 172).

Climatically, the region of Aquitaine is intermediate in character between the Atlantic and the Mediterranean. It possesses the high

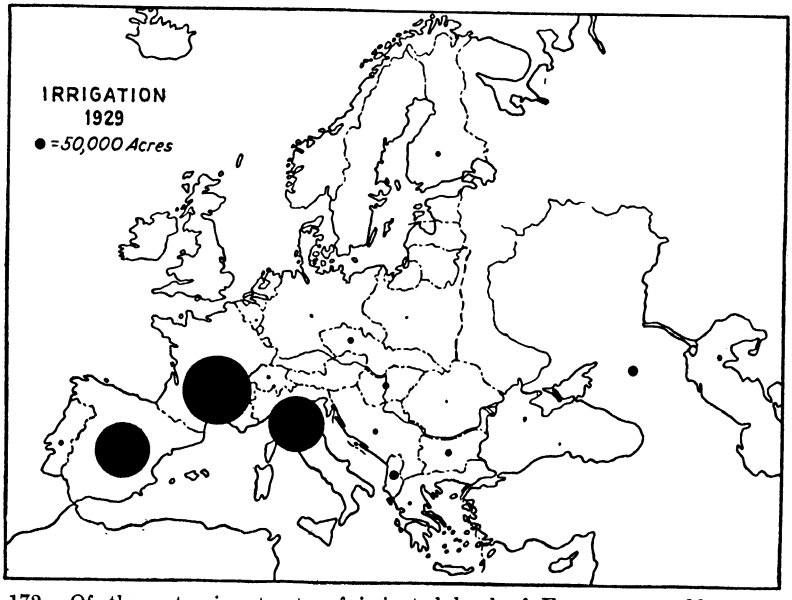


FIG. 172.—Of the extensive tracts of irrigated land of Europe, over 90 per cent is accounted for by France, Italy, and Spain. (*U. S. Department of Commerce.*)

temperatures of the latter, but the all important summer rainfall of the former. Thus favored, it is a land suited to forest and luxuriant native vegetation as well as crops. Unfortunately such a combination of heat and moisture is not so stimulating to human effort. Considering the

size of the country, however, the climate of France is, in general, exceptionally favorable to animal and plant growth as well as to a comparatively high degree of mental and physical activity.

Agriculture.—France provides a natural setting unusually favorable for agriculture. Of the total area, practically none is rendered unproductive by adverse climatic conditions and only little by roughness of topography or sterility of soil. Only one-fifth of the whole surface is unproductive and the soils average high in natural fertility—much higher than those of Germany in their original state. Not only are conditions favorable for a large agricultural output, but there is a sufficient variety to produce a great diversity of crops. The country extends from the belt of hardy cereals, root crops, and animal industries of north Europe well into the vine, corn, olive, and mulberry sections of the Mediterranean. All in all, the nation possesses the fundamental resources for a well-rounded system of agricultural economy.

It is not surprising then, that this activity has been of primary interest to the people, more so than to any of the other important countries of northwestern Europe. Over half of the population is rural, and of all the male population gainfully employed in prewar years, 40 per cent were engaged in farming. In contrast with this, note Germany with a proportion of 28 per cent or Britain with but 10 per cent, while even the Netherlands has only 26 per cent so occupied. By and large, the agricultural population is an element of great stability and the better balanced character of the nation's activities tends to insure against severe depression or widespread unemployment.

Land Ownership.—France for centuries has been a country of small farms operated by peasant proprietors. Only 30 per cent of the holdings are rented, an unusually small proportion for western Europe. Land ownership is held in high esteem, which, together with some unfortunate inheritance laws, has led to an excessive subdivision of the land; 85 per cent of the holdings are less than 25 acres in extent, each consisting of one or more parcels of land scattered about the villages in which most of the farmers live. Thus in 1882 approximately 5,000,000 property owners possessed an average of about 22 parcels of land each, and conditions have changed little since then. This relic of medievalism is a serious handicap to efficient cultivation of the soil and to the use of machinery, but it is an old institution difficult to change. In general, the French farm is not organized on a commercial basis but rather as a home for a family whose food wants it is expected to satisfy. The operating capital is small and the great majority have little net surplus for market. Cooperative societies have not yet progressed to the extent to be found in Germany, Switzerland, or Denmark.

Character of French Agriculture.—As compared with Germany, French farming is more intensive but less scientific, more hand labor is

used but less machinery and less fertilizer. Similarly, agricultural education in France has lagged. In 1910 Germany, with about the same area, had twenty-five times as many agricultural students, and little Belgium, although primarily industrial, had twice as many pupils in her agricultural schools as did all of France. The French peasant farmer remains individualistic and extremely reluctant to change. Farms are seldom sold but are passed on from generation to generation in the family, forming an unusually strong tie between the farmer and his plot.

Yields are, on the average, much higher than in the United States but lower than are usual in northwestern Europe. The productivity per cultivated acre is 35 per cent higher in Germany on the east and 80 per cent higher in Belgium on the north. Similarly, the output per farmer is about 30 per cent higher in each of these two neighboring countries. In addition to the factors considered above it should be noted that the pressure of the population upon the land is less in France than in most European countries.

For some time, changing trends have been noticeable in French agriculture, many of which were accelerated by the war.

1. One of these tendencies is that common to many countries, the shift of population from rural to urban communities. In France this is especially serious, since, with a total population largely static, it leaves agriculture to contend with a labor shortage. Immigration has helped to fill the gap, the movement in post-war years due to the serious loss of man power in the war being particularly large. Thus in the period 1901 to 1911 the foreign-born population of France numbered about 400,000; in 1921 to 1926 it was over 1,000,000. About one-third of the immigrants are engaged in agriculture.

2. Another trend is seen in the limiting of cereal production in favor of grass, root crops, and forage for animal industries, a change characteristic of northwestern Europe, and carried farthest, perhaps, in Denmark and for the same reason. Moreover, cheap cotton from abroad has lessened the interest in raising wool, as well as hemp and flax, while cheap meats from newer lands have forced the emphasis upon dairy rather than meat production. French agriculture has, however, responded to this movement much more slowly than has that of Germany. Thus in the 30 years prior to 1914, the latter increased her live stock five times as much as did France, without sacrificing her cereals, which in the same period almost doubled as compared with France's increase of only 4.7 per cent.

Animal Industries.—Like most of the other activities of the country, this consists of a large number of small undertakings, the great majority of the farmers maintaining a few head of stock as one phase of their diversified farming. Cattle are kept chiefly for draught or dairy purposes, sheep for wool, meat, and milk. The sale of the animals and their

products is to small operators who slaughter and retail the products. The huge packing plants familiar to the United States are unknown.

Of producing regions, the most important is that of the wet, cool, northwest coast from the Gironde to the Belgian frontier. The central plateau, ill adapted to cultivated crops, also has many cattle. Swine and horses show much the same distribution, while sheep are found principally on the chalk ridges of the Paris Basin, in the central plateau, and in the Pyrenees and Mediterranean districts. It was estimated at the opening of the war that 70 per cent of the cash income of the middle-sized farm was from animals and animal products, and 10 years later French herds had an estimated value of $1,500,000,000 their products, $840,000,000. In 1914 permanent grass and pasture together with forage crops occupied about 45 per cent of the productive land, its distribution naturally corresponding to the regions of animal production.

In general, prewar France was almost self-sufficing in foodstuffs, but present indications are that she will become less and less so. In view of what Germany has accomplished, France, with her more favorable soil and climate, could more than double her 1913 output of cereals and live stock. As it is, she has, on an area about one-fourteenth as large as that of the United States, grown almost food enough for a population about one-third as great.

Cereal Production.—France ranks high as a producer of wheat—next to Russia among European nations—and in no other country of the continent does this grain play so important a role in the nation's agriculture. Almost one-eighth of the entire territory is planted to wheat, which occupies as great an acreage as all the other cereals combined. The country is likewise one of the world's leading consumers, 50 per cent more per capita than in the United States, itself predominantly a nation of white-bread eaters. Though almost self-sufficing, a small import has been necessary to meet this large domestic demand.

Although wheat is raised throughout the country, the Paris Basin is the chief producing area, accounting for about one-half the total, with Aquitaine next in importance (Fig. 173). While oats and sugar beets compete with wheat for the rich loams of the plains, a high protective tariff to stimulate home production has extended wheat growing also onto lands of inferior fertility. Thus the average yields, while about 50 per cent higher than those of the United States, are low for western Europe. In the north where machinery, fertilizers, crop rotation, and, in short, modern methods are used, yields are higher, while those in the south are low. Acreage has, however, been declining for many years, and France is likely to depend more and more upon importation from newer lands.

Oats, second to wheat in importance, are found chiefly in the north, while corn is raised in the southwest where temperatures and moisture

are more favorable. Since the cultivation of the latter is indifferent, yields are low. Northward the corn finds the temperatures too cool,

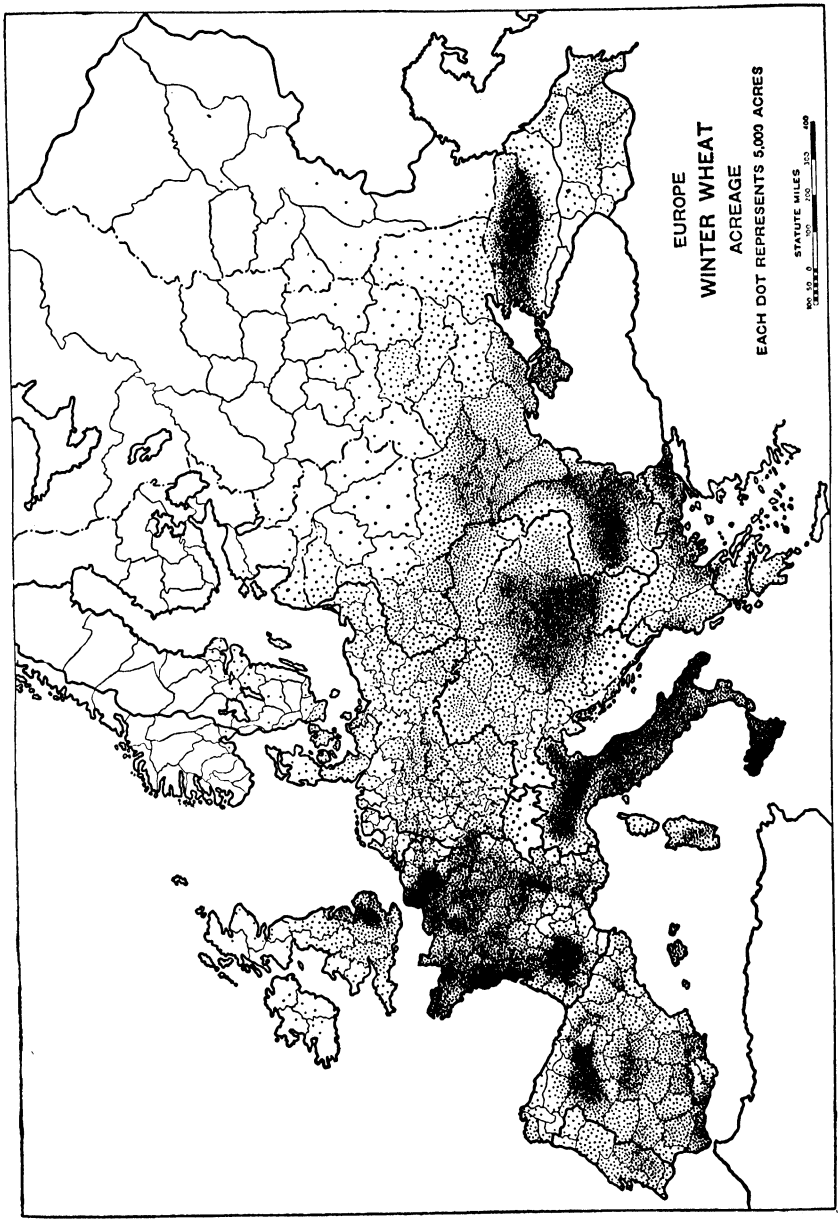


FIG. 173.—France ranks next to Russia among European countries as a producer of wheat. In normal years it has been almost self-sufficing, though becoming less so. (*U. S. Department of Agriculture.*)

while eastward it is too dry without irrigation, so that outside of this very limited section in the southwest, it is not an important crop.

The rye areas are, in general, complementary to those of wheat, confined mostly to the central plateau and Brittany, where poorer soils,

rougher topography, and a cooler moister climate are poorly adapted to wheat growing. Rye occupies a distinctly inferior place in the diet, the per capita consumption averaging only about one-eighth that of wheat.

The World's Chief Wine Maker.—France is the leading wine producer of the world; the grape ranks among her most valuable crops, and in prewar years wine was her chief export. While the area devoted to the vine is less than in Italy and is very small as compared with wheat, it is the characteristic agricultural product as silk is the characteristic textile. The quality of wine depends so much upon the way in which it is made that it seems peculiarly adapted to the Frenchman's love of skill and his taste for the artistic. Wine is the national drink, vying with bread in its importance in the diet. The per capita consumption is enormous—over a barrel a year. The wines are mostly light, *i.e.*, small in alcoholic content.

Successful vine growing is peculiarly dependent upon soils, climate, and exposure, so that slight variations in these natural conditions result in marked differences in the product. As a consequence the map of vine distribution shows a "spotty" appearance with production concentrated upon the most favored areas (Fig. 174). The long hot summers of the river valleys in central and southern France make it the agricultural speciality there, while contrary conditions exclude it from the north and the northwest. Culture is concentrated in four or five general districts, three of which are identified with the great river basins of the Loire, the Garonne-Gironde (Bordeaux) and the Saône (Burgundy); a fourth, occupying the western Mediterranean (Midi), produces over half of the total. Within all of these districts are subdivisions, each with its own characteristic product. The famous champagne is produced close to the northern limit of the vine on the chalk escarpments east of Paris where some 35,000 acres of south-facing slopes are covered with highly prized vineyards. In addition much wine is shipped into this section from other regions to be reworked in its famous cellars.

The peak of French wine production was reached in 1875 with an output of about 1,760,000,000 gallons, the yield of some 6,040,000 acres of vineyards. But by that time, the phylloxera which had appeared five years earlier had spread so that each successive crop was reduced until the output reached only about one-sixth that of the peak year. It was a national disaster, and poverty forced large numbers to emigrate. Relief was finally found by importing roots of native American grapes and grafting upon them the European varieties. Although production has again risen it has never fully recovered, the best recent years having about three-fourths that of the peak production of 1875. With the curtailment of foreign markets the industry seems likely to decline. Vineyards now occupy about 3,500,000 acres, a smaller area than is devoted to potatoes. The crop varies much from year to year, depending

upon the ravages of pests and the weather conditions. In addition to wine there is produced from French and north African wine casks some 10,000 tons of argols annually from which cream of tartar is made.

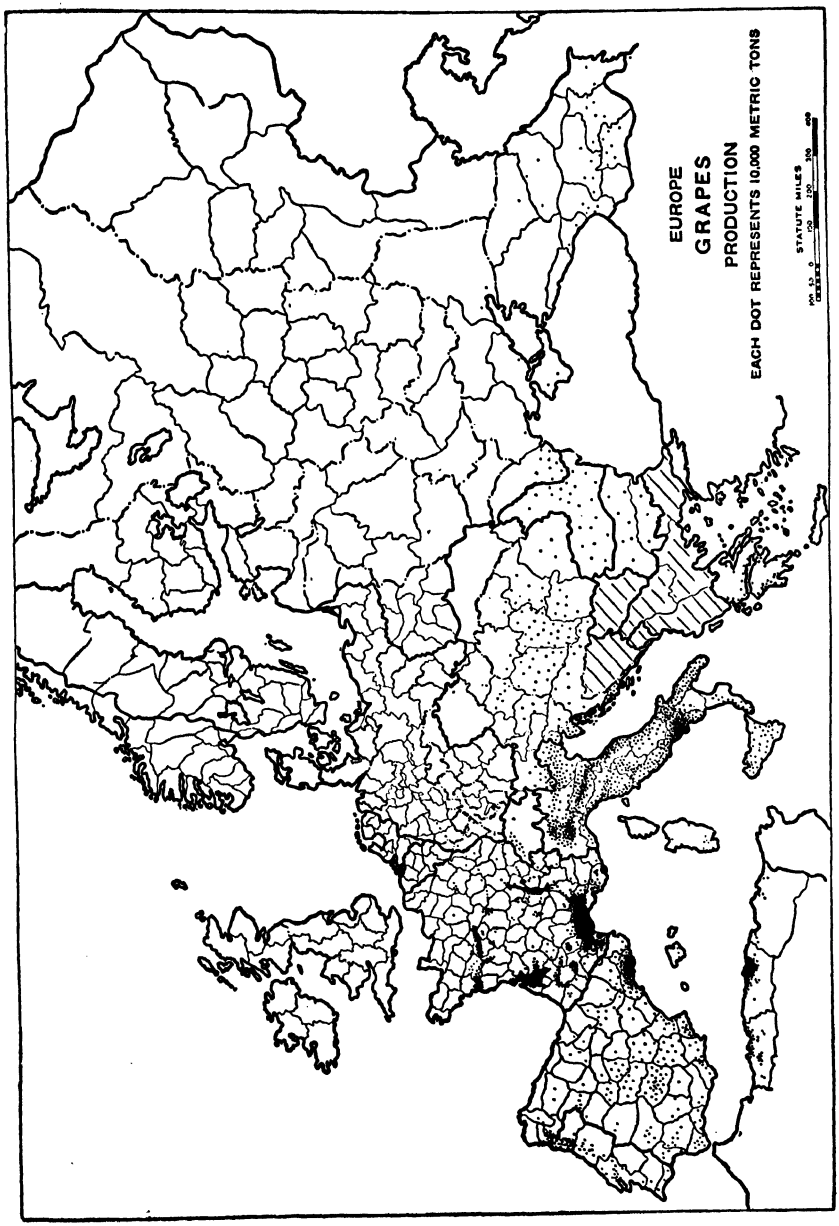


FIG. 174.—The world's principal wine producers. Italy produced about twice and France about three times as much as Spain from 1921 to 1925. (*U. S. Department of Agriculture.*)

Nut Crops.—Like the olive, nut crops are far less important than in Spain or Italy, but France is the leading world producer of English

walnuts. The average annual export of 50,000 tons passes chiefly through Bordeaux.

THE POWER SITUATION

In power resources France occupies an intermediate position among European states. Its output is considerably less than that of Great Britain or Germany, the two ranking countries, but with these two exceptions is far greater than that of any other country on the continent. Measured by her needs of fuel for the exploitation of her great iron-ore deposits, she is seriously deficient in coking coal. England had twenty times and Germany twenty-three times as much coal reserve as prewar France. The latter had less than 2 per cent of the total for the continent and was normally dependent upon imports for about one-third of her coal needs. During four years of war her chief coal-producing mines

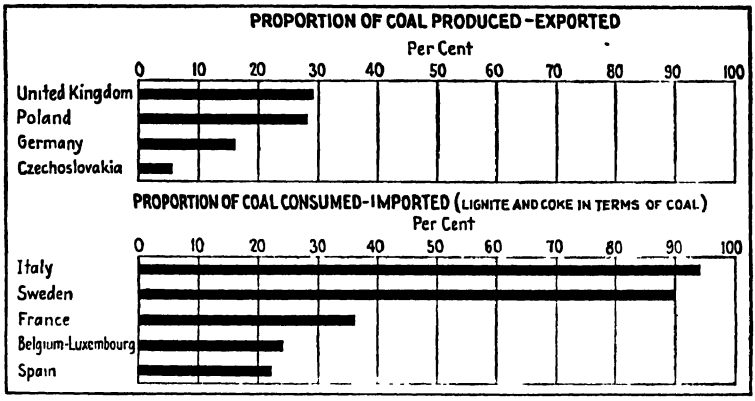


FIG. 175.—The balance sheet of coal in some of the leading European countries in 1925. (*U. S. Department of Commerce.*)

were in the hands of Germany, and, after their destruction upon the retreat of the invaders, did not, until 1925, regain the prewar normal output. As part compensation she has been assigned the Sarre basin, at least until 1935, as well as reparations coal and coke from Germany. A small deposit, an outlier of the Sarre, was also acquired with the return of Alsace-Lorraine, increasing the coal resources by about 20 per cent. If the Sarre remains hers, the total reserves will be approximately double those of 1914.

Chief Coal Deposit Is in the North.—Coal is found in some 50 separate sections of France, yet two-thirds of the total output is from one of these deposits. With respect to the three great producing areas of Europe, (1) the British, (2) those centering about the Ruhr, and (3) the Silesian, France occupies most of the space between the first and second (Fig. 65). On the north and east she shares to a modest degree the outlying

portions of the deposits which center at the Ruhr. As we have seen, the most important field is the one in the far north, which continues eastward along the flank of the Ardennes, across Belgium, and into Germany. The Belgian section constitutes the basis of that country's industrial development, but the German portion, called the Aachen field, is but little used (Fig. 200). The French share of this deposit supports the industrial zone across north France and supplies some coke for the Lorraine iron ores. While of fair coking grade, it is expensive to mine. The beds are deep, averaging 1,200 feet, steeply inclined, and the seams rather thin.[1] The output per person employed is considerably lower for France than for either Britain or Germany.

The other fields are widely scattered and of secondary importance. On and about the Central Massive are small deposits—the best near Lyon and Le Creusot. A small field, an outlier of the Sarre, is in Alsace-Lorraine. With the acquisition of the latter and the Sarre came a vast amount of industrial equipment as well as the great iron ore deposits, so that the added need for coal has been far greater than the fuel acquired, and it seems doubtful if the industrial demands of present-day France and the Sarre can be met by local production. Expansion in power output is more promising from hydroelectric sources than from coal. The Sarre basin, described in connection with the Ruhr-Lorraine industrial area, is a most welcome addition to the country's coal resources. Although its poor coking quality limits its metallurgical use, its proximity to the great ore deposits of Lorraine and the varied industries associated with that region make its possession a valuable asset.

With Alsace, France acquired the Pechelbronn petroleum deposit, located 18 miles north of Strasbourg with an annual output of some 70,000 tons of oil. This is only about 2 per cent of the annual French consumption and there seems little prospect of increasing it much beyond this figure.

Abundant Water Power.—Deficiency in coal and oil is in part compensated for by an unusual endowment of water power. Among European countries France ranks second only to Italy in the capacity of her hydroelectric plants—and only the Scandinavian countries and Russia have a larger potential supply of "white coal" (Fig. 176). France had more water power developed in 1926 than both her great industrial rivals, Great Britain and Germany, together. The World War proved a powerful stimulus to its development, since the bulk of the country's fuel supply as well as the chief industrial area lay in the northern frontier where it was most vulnerable. For four years most of the coal mines and much of the industrial section were in the hands of the Germans, so that water-power development was pushed to the limit to replace the lost

[1] The cost of this coal, the cheapest in France, was, in 1913, $4 per ton at the mine; German Ruhr coal was $2.80 and United States coal under $1.25 at the mine.

coal. At the same time many industries shifted from north to south to benefit by the new power supply as well as to be in a safer position. The developed capacity doubled between 1910 and 1918 and had trebled by 1928. In proportion to their water-power resources the French are actually using more "white coal" than are we in America.

It should be noted that the distribution of the water power and coal is complementary. One-half of the total potential hydroelectric power is in the French Alps, the rest in the Pyrenees and central plateau region, all scantily supplied with coal.

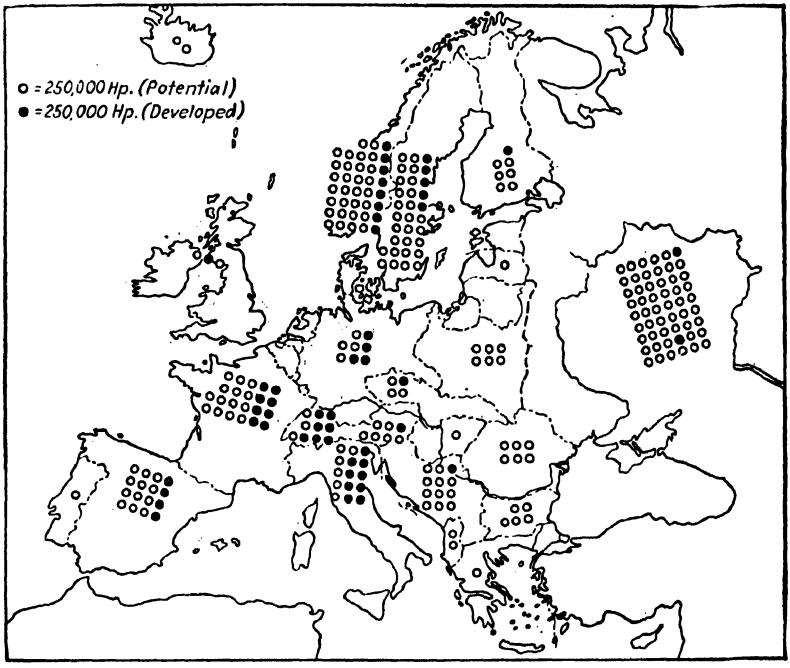


FIG. 176.—Compare with Fig. 156 and note that the leading countries in coal reserves are not the principal possessors of water power (Russian water power includes Asiatic territory). (*U. S. Department of Commerce.*)

The plans for hydroelectric development now being gradually carried out contemplate electrification of France, with the exception of Normandy and Brittany, the energy to be chiefly derived from "white coal." The post-war dearth of capital and labor and the large investment necessary for exploiting water-power sites have served to delay the execution of the original plans. By 1927 less than one-half of the communes of France were electrified. Rising living standards, however, a better appreciation of the benefits of electrification by a peasantry characteristically conservative, the advantage of electric over direct steam power in the ease with which it may be subdivided and so adapted to scattered,

small-scale production typical of French industry[1] have all served to stimulate development. The French Government hopes also by rural electrification to increase the attractiveness of country life so that the drift to the cities will be checked.

The chief use of electricity in France has been for power and for light. Electrochemical and electrometallurgical industries have had only a limited development, aluminum being the largest single product of the latter, although over one-half of the bauxite mined is still exported as ore. Railroads are being electrified, but much more slowly than in some other countries bordering the Alps.

Water Power Subordinate to Coal—All in all, water power still plays and in all likelihood will, for some time to come, continue to play a minor role in the production of power in France. The total hydroelectric energy output in 1926 was probably equivalent to not more than 10,000,000 tons of coal, and since a considerable part of the current is lost in transmission, it has a replacement value far below that. As with Italy and Spain, while its increased use has not served to diminish the consumption of coal, it has added convenient energy for power and light in regions previously without it. If French water power were all developed it would theoretically be more than equivalent to the coal imports. In 1923, 46 per cent of all the electricity produced in France was from "white coal," as compared with 35 per cent in the United States. The per capita use of current in the latter was about 2½ times as much as in the former.

INDUSTRY

Industry Secondary to Agriculture.—Though a very significant feature of French economic life, industry is still secondary in importance to agriculture. In post-war years 50 per cent more people have been engaged in farming and fishing than in manufacturing, and the urban population though increasing is still less than the rural.

Industrial Development Slow.—The industrial revolution which transferred much of the population of northwestern Europe from the farm to the factory has operated more slowly in France than in Britain, Belgium, or Germany. Thus while in 1927 only 28 per cent of the working population of France were employed in industry, the corresponding figures for England-Wales were 40 per cent, the same for Belgium, and for Germany in 1925, 38 per cent. Modern industry, with its large-scale production of standardized machine-made goods so common in the United States and developed to a considerable degree in England and Germany, is not typical of France. The per capita consumption of power and of

[1] *E.g.*, lace making in the Auvergne, wood carving in the Vosges, and glove making at Grenoble.

machinery is lower and the industrial units are markedly smaller than those of her rivals.

The country is, above all, one of small undertakings. In 1921 over 94 per cent of French manufacturing establishments employed only from 1 to 20 wage earners each. French manufactures are, nevertheless, world famous for their artistic qualities, products involving much skillful craftsmanship, good taste, and individuality but little mechanical processing—luxury products rather than staples. Wines and jewelry, perfumes and cosmetics, lingerie and laces, fashionable gowns and millinery are typical.

The retardation in industrial development is in part due to the scarcity of coal, the mainspring of modern manufacturing. In part it is also probably a matter of temperament. The Frenchman is highly individualistic; he prefers to work alone in his own little shop rather than to submerge himself in a large organization. The World War, however, speeded up the industrialization of France. For one thing, an acute labor shortage forced the larger use of machinery; again, the destruction of a large part of the principal industrial region led to post-war replacements with modern equipment, as well as to the extensive development of water power in the south; the urgent demand for many products formerly imported spurred French scientists and industrialists to action during the war; and, finally, the acquisition of Alsace-Lorraine brought with it iron ore, potash, and coal, as well as a large amount of industrial equipment. As a result of these various forces there has been in France a post-war industrial trend much more pronounced than that in Germany or England, and about on a par with the changes in the United States. But, it is rather a case of "catching up," at least to a degree, with her industrial rivals who have been advancing for decades, while French industry stagnated.

Industry Chiefly Concentrated in the North.—The geographical distribution of industrialized regions in France shows marked concentration in certain sections (Fig. 177). The areas of most intensive development make a broad belt along the Belgian-German frontier and three small districts in the southeast. Two other small sections about Bordeaux and Nantes have been developing rather rapidly since the war but have not yet equaled these others.

The major manufacturing section—the northern zone—is continuous with a similar band in Belgium and Germany. It is the region of coal, iron, and potash and is linked by a network of canals and railways with the coast on the west, with the abundant labor supply of Belgium on the north, and with the industrial section of the lower Rhine.

Other Raw Materials.—Aside from iron ore, potash, bauxite, and kaolin, raw materials are limited to those of an agricultural character: beets for sugar, barley for brewing, wheat and rye for milling, a little

local flax and wool for textiles. There is considerable coal and water power, although coking coal is imported from the Ruhr. Except for the minerals named, raw materials are either lacking or deficient, but these, as well as world markets, are made easily accessible by an efficient transportation system. The industrial areas of the southeast at the margin of the central plateau are close to the coal deposits as well as to water power. Marseille also receives considerable coal from England.

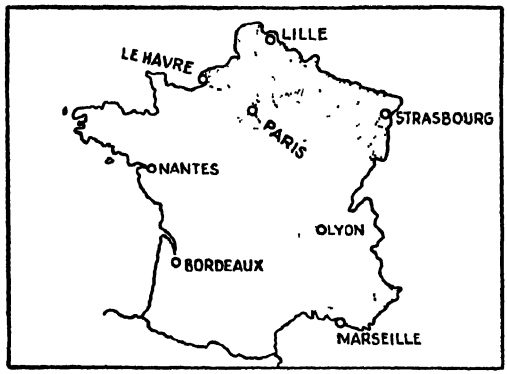


FIG. 177.—Distribution of agricultural and industrial areas in France. Shaded areas are those in which over half of the population are engaged in "extractive, transformative and shipping activities"; the unshaded, in which over 50 per cent are engaged in "agriculture, fishing, and forestry." (*Courtesy of Ogburn and Jaffe, and Columbia University Press.*)

TEXTILES

The Leading Industry.—Textiles and clothing constitute the chief items of French manufacture, employing, even as far back as 1906, about 2,500,000 people, three times the number of workers in metals, and using one-fifth of the total industrial power of the nation. The French textile industry is composed of relatively small individual units and is thus better adapted to producing a great variety of specialty goods than to quantity output. Textile fibers represented 40 per cent of the imports of all raw materials in 1928, and textile manufactures 43 per cent of the export of all manufactures. Although silk has been the most valuable of all export items, fine French cottons and woolens have a world-wide reputation. These latter two are centered chiefly in the northern industrial zone, the silk in the south with 70 per cent of the total about Lyon, the leading European silk-manufacturing city. Mediterranean France, including the lower Rhone, has long been a producer of raw silk, although only 4 per cent of the nation's needs are now supplied from domestic cocoons, the balance coming from Italy and the Far East. Similarly, foreign lands must be depended upon now for all of the cotton, about six-sevenths of the wool, and over two-thirds of

the flax and hemp. France, the original home of rayon manufacture is now outdistanced by both Italy and Britain. The industry is much more decentralized than the other textiles, being located wherever adequate labor is available.

As a result of the war about 30 per cent of the textile plants of France were destroyed or dismantled, necessitating much rebuilding. This new and modern equipment together with the addition of Alsace-Lorraine, which added upward of one-fourth to the cotton and woolen plants, has placed the country in a much better competitive position for world trade than before. Based upon spindle capacity, France now ranks first in silk and third in cotton and wool among European countries.

Metallurgical Industries

Iron and Steel Output Limited by Available Coal.—As the possessor of the great Lorraine iron ore field, France actually owns about 35 per

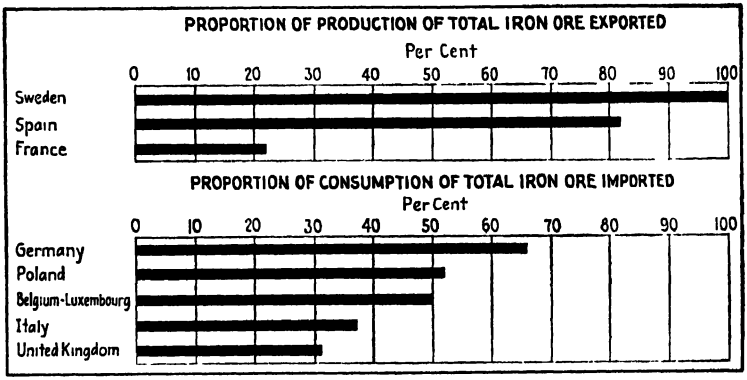


Fig. 178.—The balance sheet of iron ore in the leading European countries, 1925. (*U. S. Department of Commerce.*)

cent of the iron in the ore reserves of all Europe. Because of its restricted coal supply, the production of iron and steel goods, however, has not been in proportion to the country's ore resources (Fig. 178). It is when compared with the European leaders—Germany and Britain—that the slow progress of the French metal industry is particularly apparent. Among European countries as a whole, however, France ranks third, and, domestically, iron and steel are second in importance only to textiles among French industries. It should be noted that while coal is in general a limiting factor in French industry, its lack is especially acute in the mining and smelting of ore and the fabrication of machinery, where the fuel consumption is especially high. Furthermore the production of iron and steel goods, particularly of machinery, is hampered by the slow development of industrialization. Of all the coke used for the working of Lorraine ores in 1913 only 12 per cent came from French coal.

The post-war iron and steel industry, stimulated by the acquisition of coal, ore, and industrial equipment at a time when those of Britain and Germany have been depressed, has enabled France temporarily to outdistance the one and become a close competitor of the other. In fact the per capita consumption of iron and steel in France in 1924 and 1925 was actually higher than in either Germany or Britain.

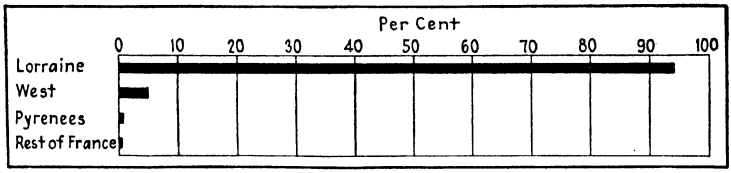


FIG. 179.—Distribution of iron-ore production in France by regions in 1926.

Chief Area in Northeast.—The bulk of this industry is naturally in the eastern portion of the northern industrial zone where iron ore and coal are available. This section accounted, in 1926, for about three-fourths of the French steel output, the section about the Valenciennes basin for about one-eighth, and the rest scattered (Fig. 179). The

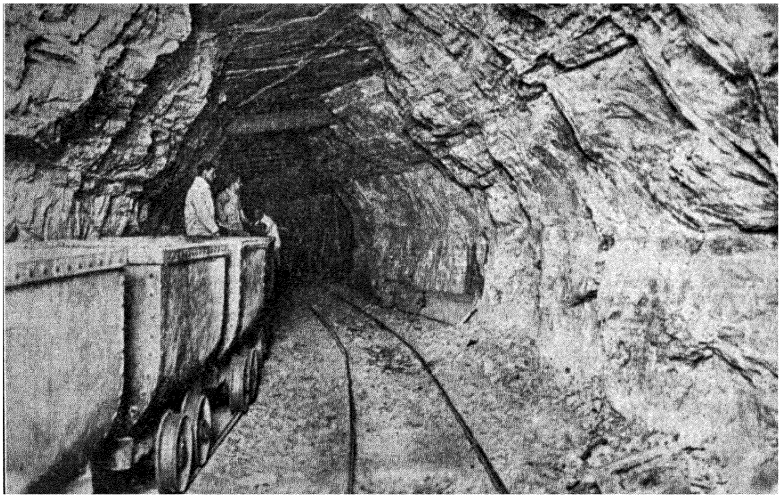


FIG. 180.—Interior of an Alsatian potash mine. (*Courtesy of Société Commerciale Des Potasses D'Alsace, Mulhouse, France.*)

Valenciennes region receives some ore from Lorraine, some from overseas. The scattered iron and steel areas, while less favorably located and less extensive, are important as an aid to national security, since the two principal regions of the north and east are close to the frontier and particularly vulnerable. There scattered small areas produce highly finished specialized products, such as tools and automobiles, while

primary products, such as rails and structural steel, are mainly confined to the east. In the metals, as in other industries, the French emphasize high-grade specialties rather than staples. Thus expensive automobiles are manufactured for export while cheap cars are imported.

Chemical Industry

France was at one time the world's chief producer of chemicals, and up to the middle of the nineteenth century shared with England the world's main production. Germany, though beginning late, soon took the lead, and, with her vast deposits of coal, lignite, and potash, left France far behind. To the latter, as well as to other countries, the war revealed the close relationship between the chemical industry and modern warfare. Partly as a military precaution, partly due to new technical developments, and partly because of the acquisition of coal, potash, and the energetic development of "white coal," the French post-war chemical industry has developed very rapidly. The French potash industry so long associated with that of Germany will be discussed with that country (Fig. 180).

FORESTS AND FISHING

Forests.—On the average about one acre in five in France is forested, a proportion somewhat less than in Germany. The actual distribution varies widely in different sections, from less than 4 per cent of the total area in the department of the Seine, to over 55 per cent in the Landes of the southwest. In general the highlands and the poorer soils of the plains have the larger stands. Conifers are estimated to occupy one-fifth of the total forested area, hardwoods the remainder. As is true of the agricultural lands, the great bulk of the forests are in small holdings privately owned.

Although careful conservation serves to make the cut balance the growth, the supply of wood is inadequate, and a considerable part of the domestic need must be supplied by imports, especially of construction timber, pulp, and pulpwood.

Besides the usual yield of wood, French forests provide small amounts of cork and charcoal, and they contribute an important share of the world's output of naval stores. The planted pine forests of the Landes covering some 1,500,000 acres yield annually about 80,000 tons of turpentine. This is about one-fifth the average output of the United States and gives France second rank in naval-stores production.

Fisheries.—Its long coast line, its nearness to the rich fisheries of the North Sea, and its predominantly Catholic population have combined to make fishing an important occupation, and the per capita fish consumption high. While both coasts have important fisheries, those of the Atlantic are especially valuable, and along certain sections, as in Brittany,

constitute a major resource. In addition to the yield from adjacent waters, there is a considerable catch from the Grand Banks off Newfoundland. The industry as a whole employs about 125,000 people and the annual catch is valued at approximately $50,000,000. Among European countries, France ranks high in the value of its fisheries.

TRANSPORTATION FACILITIES

Interior Communications Well Developed.—France has an extensive and well-located network of canals and rivers to supplement her railways. The actual length of the navigable interior waterways, both river and canal, is now about 7,000 miles, practically the same as in Germany, but the latter carry (1925) more than twice as much freight. In fact the tonnage that is moved over all the French waterways is only half that normally passing through the Soo Canal.

With the extension of the railways much of the country's waterway system, whose construction antedates them, had been allowed to decline. In 1860 inland navigation took care of 38 per cent of the traffic; within the next 20 years this declined to 16 per cent. With the rapid development of the iron and steel industry in the eighties, however, interest in providing cheap transport for bulky freight revived, and from 1880 to 1913 traffic on them increased threefold, a rate somewhat greater than that on the railways.

It will be noted that the navigable waterways are very unevenly distributed, the most important ones lying in the north and northeast, where the topography is more favorable and the need greater (Fig. 181). Here the large amount of coal, iron ore, and metallurgical products of an industrialized area have justified an extensive system of canals and improved rivers. About half of the tonnage brought into Paris comes by water and that city ranks as the first port of France.

While less important as carriers, perhaps the most interesting canals are those which join the great drainage systems of France with each other and with those of Germany, Belgium, and Holland. Thus the oldest French canal, the Canal du Midi, connects the upper Garonne with the Mediterranean at Cette, making use of the Carcassonne Gap. The Saône is joined with the Rhine by the Rhone-Rhine Canal passing through the Belfort Gate; with the Loire by the Canal du Centre; the Seine-Yonne by the Burgundy using the Côte d' Or; and the Marne-Rhine, using the Lorraine gateway. These canals surmount elevations varying from 625 feet in the Carcassonne Gap to 1,230 feet in the Belfort Pass and, consequently, require many locks (191 in the last-named passage). In the north the waterways are connected with the Belgian system.

Their chief use throughout the country is for local barge traffic for short hauls. The better channels, especially in the northeast, have a minimum depth of 6½ feet and will accommodate barges of several

hundred tons. Of all the interior waterway traffic over three-fourths consists of coal, coke, construction materials, ores, metallurgical products and machinery. Agricultural products make up less than 9 per cent, manufactured materials about 5 per cent of the total. The responsibility

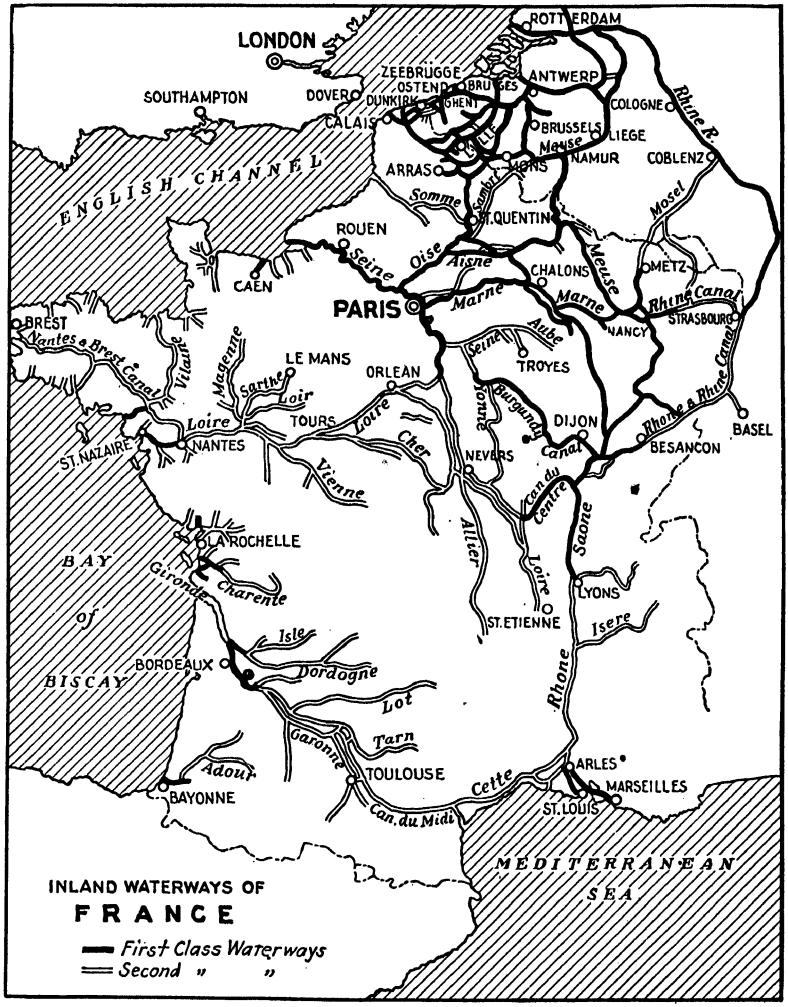


FIG. 181.—Note the concentration of the first-class waterways in the densely populated, highly industrialized northeast.

for the projects is shared by the national and local governments, the immensity of whose undertaking is shown by the huge expenditure involved. Thus, from 1814 to 1900 there was spent on construction and maintenance of French waterways some $461,000,000 an amount about equal to the cost of the Panama Canal.

France is well equipped with railways as well as with an excellent system of highways. The total mileage of railroad is less only than that of Germany and Russia among countries of Europe. Conforming to the general topographic arrangement, the principal lines radiate from Paris so that travel in any other direction is less easy. The railways and ports also do a considerable amount of business of a transit character for both Switzerland and Germany.

FOREIGN TRADE

Located in the most highly developed and commercially active part of Europe, with coasts bordering the North Sea, English Channel, the Atlantic, and the Mediterranean, and with excellent internal transport facilities, France is exceptionally well favored for trade. Yet her foreign commerce is only 40 per cent of that of Great Britain. It should be noted, however, that in contrast to the latter, most of the coast line of France is very regular, her territory is twice as large, and her activities much better balanced, so that she is far less dependent upon exchange with foreign countries. Moreover, retarded industrial development has forced France to meet long-established competitors in foreign markets. About one-third of her foreign trade is with her colonies.

Her chief surplus production is in manufactures which constitute about four-fifths of her exports, while coal, raw materials, and foodstuffs make up more than that proportion of her imports. Since she specializes in artistic manufactures, goods of high value but small bulk, the export tonnage is small, less in fact than one-half of the weight of the imports. There is always an excess of imports, but the immense tourist traffic,[1] the large investments of French capital abroad, and the earnings of her merchant marine more than make up the deficit.

Leading Ports.—Of her coasts, the Channel-North Sea section is commercially most important, the Atlantic coast ranking second, and the Mediterranean third. Furthermore, the foreign trade of the last is much more concentrated into a single outlet—Marseille. This has long been the leading French port in foreign trade as well as a close rival of Genova among all Mediterranean ports. The excellent harbor close to the end of the Rhone corridor assures a preeminent position among French ocean ports and an important gateway to western Europe from the Far East and the Mediterranean. The addition of north Africa to the French possessions and the opening of Suez were powerful stimuli to its growth. Its own immediate hinterland includes the leading French wine region and the Lyon manufacturing area. Since the industrial interests, especially in wine, vegetable oil, and silk, have outgrown local raw-

[1] American tourists alone are estimated to have spent $190,000,000 in France in 1927.

material supplies, these commodities play a large part in the trade of the port.

Bordeaux, situated on the Garonne about 60 miles from its mouth, is the fourth city in size in France, the chief port of the southwest, and one of the three finest harbors of that country. About one-fifth of the French vintage output is contributed by the hinterland of Bordeaux which is, above all, a wine port. Naval stores and lumber from the Landes also find an outlet here.

Calais is the leading passenger port while Rouen, Dunkirk, and le Havre lead in freight traffic. The last, at the mouth of the Scine, the most important of French rivers, has become one of the leading European coffee markets, but is handicapped by the shallow and unreliable character of the channel. Rouen, originally at the head of navigation and at the first bridgeable point on the Seine, has always been a thriving port for the rich Paris Basin.

POPULATION

Although five times as densely populated as the United States, France, in comparison with her north European neighbors, is much less closely settled. Thus the British Isles and Germany have twice the density, while in Belgium and the Netherlands it is three times as great.

The most noteworthy feature of the demography is its extremely slow increase. The population of Germany and France was about equal 75 years ago, but since then that of Germany has about doubled, while for France there has been an increase of only about 5 per cent. A low birth rate and small immigration have long been characteristic of France and are closely associated with her economic, social, and legal organization. The loss of about 2,000,000 in the World War was most serious, but the labor shortage was partially compensated for by a considerable and unusual immigration.

France is predominantly agricultural, though a well-marked movement of the population to urban centers is now in progress. As yet, however, less than half are city dwellers, as compared with about two-thirds in Germany and four-fifths in England and Wales. As in many other European countries, the great majority of farmers themselves live in villages rather than upon the parcels of land they cultivate.

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CHAPTER XIII

BELGIUM AND THE NETHERLANDS

Although these adjoining nations have been independent since 1830, and differ radically in important respects, they may to advantage be considered together, as they have many features in common. Furthermore the contrasts between them can perhaps best be pointed out and explained by comparing them (Fig. 182).

Small Densely Peopled Countries.—Belgium and the Netherlands are nearly equal in area and population (11,752 *vs.* 12,600 square miles, and 8,000,000 *vs.* 7,800,000 population). Belgium has 675 persons per square mile and Netherlands 627. As the average for Europe is about 128, Netherlands has over 4 times the average and Belgium 4½ times. They are surpassed in density of population by no other entire country, although parts of others such as England and the lowlands of China and India are more densely populated.

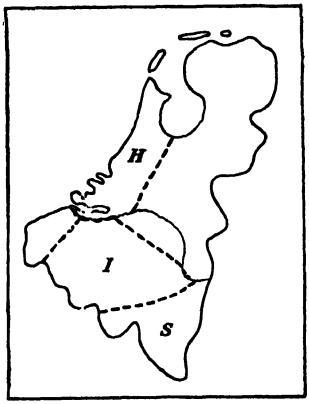


FIG. 182.—Regional contrasts in Belgium and Netherlands. *H*, Holland; *S*, southern Belgium, a rolling agricultural area; *I*, densely populated section of Belgium with industrial cities and intensive agriculture.

High Rank in Production and Trade.—Another respect in which these nations are much alike is in their advancement in agriculture, transportation, and commerce. They lead or nearly lead the nations of the world in respect to the production of various crops per acre and in the density of certain types of live stock per square mile (Figs. 183, 184). As might be expected in such densely peopled and active countries, transportation facilities and commerce are very well developed. Their imports for consumption and exports of domestic products now amount to about $212 per capita in contrast with $73 for the United States. Even if we omit the reexports, tiny Netherlands alone has almost as much foreign trade as Italy, Canada, or Japan, about half as much as France with 5 times the population, and one-third as much as Germany with 7½ times the population. The comparative rank of the various countries in per capita trade is shown in Fig. 217, and in total trade in Fig. 16.

Other Resemblances.—In respect to international prominence, both Belgium and the Netherlands are numbered among the leading dozen of the world's nations; they both have extensive colonies; in their cities

many international tribunals convene; and the deliberations of their statesmen and reports of their scientists are given respectful consideration by leaders in all other nations. Furthermore, the small region occupied by these nations has played an important role for centuries, and, on the basis of both population and area, has yielded far more than its quota of contributions to the advancement of civilization, discoveries, inventions, works of art, and ideals.

GEOGRAPHIC ADVANTAGES AND RESEMBLANCES

Favorable Location.—What are the geographic bases for the prominence of this tiny area? In the first place, it is exceptionally favorably located for the exchange of goods and ideas. Close at hand lie the most thronged portions of the ocean—the English Channel and the North Sea. The great importance of the ocean to these nations is suggested

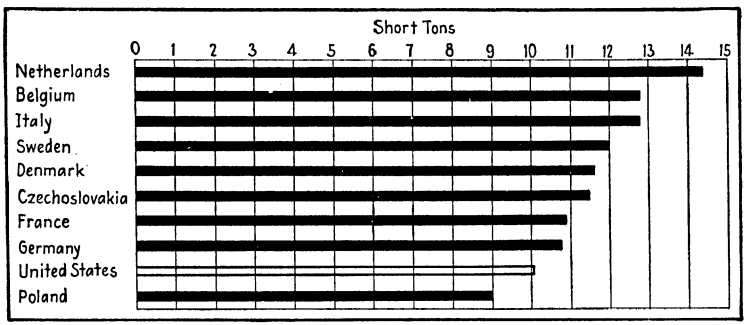


FIG. 183.—Production of sugar beets per acre average, 1921 to 1925.

by the fact that three of the world's eight greatest seaports are here—Antwerpen, Rotterdam, and Amsterdam (Fig. 189). Furthermore, for nearly a thousand years this area has contained at least one of the eight leading ports. It is crossed by the world's most used long river, the Rhine. It is itself a part of the North European Plain along which extend many railroads. The countries near Belgium and Netherlands include all but a few of the world's more progressive nations. Close at hand to the west lies England, to the south, the industrial portion of France, to the east Germany, and not far away to the north, Scandinavia. Because of its location, this area is crossed by a large share of the huge traffic between France and Germany and between central Europe and the Atlantic. The Rhine River has been especially advantageous to the Netherlands, but since a ship canal has been built along the Scheldt to Antwerpen, which has become one of the greatest ports on the continent, Belgium also receives part of the traffic between central Europe and the Atlantic.

Have Frequent Contact with Foreigners.—These little nations benefit from this active commerce not only financially but in other ways. The

numerous business contacts with foreigners which this extensive commerce implies have led to a broadening of their horizon and have stimulated the development of new ideas. Among the Dutch more than in almost any other nation, a large share of the people have had numerous dealings with foreigners. One result is that most educated Hollanders are acquainted not only with two or three foreign languages but appreciate to an exceptional degree other people's points of view. In these respects Belgium is not far behind. The fact that there is practically no adult illiteracy in Netherlands reflects the people's appreciation of the desirability of knowing more than they can pick up from their own experience and by word of mouth.

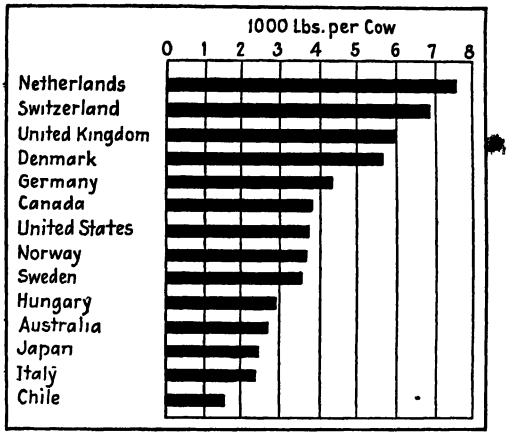


FIG. 184.—Average milk production per cow.

Advantages of Level Land.—A second great advantage possessed by these two countries is the almost level land which prevails everywhere but in southern Belgium, as the physiographic diagram reveals. Level land facilitates agriculture, road making, canal digging, transportation of all kinds, and the construction of factories as well. Netherlands leads the world in respect to the development of transportation. Belgium, however, leads in railroad mileage relative to area (530 miles of railroad to each 1,000 square miles of area). Her passenger and freight rates are the lowest in Europe. Netherlands, with more waterways and many small islands which are difficult to serve by railroads ranks fifth in this ratio, with 181 miles of railroad per 1,000 square miles of area. The railway service between Rotterdam and Amsterdam, however, is perhaps the best in the world. Splendid trains run every 15 minutes or so throughout the day, the fares are low and wrecks almost unknown.

Intensive Agriculture.—The level land facilitates agriculture in many ways. One is that the soil is little subject to erosion or to leaching, and is deep. Artificial fertilization has helped to make the better soils

of these countries remarkably productive. The Netherlands uses more fertilizer per acre of crop land than does any other nation (Figs. 185, 186). Belgium leads the world in the average yield per acre of several crops, and for a number Netherlands ranks second. Table VII gives the average yield per acre in recent years of six crops in Belgium, Netherlands, the United States, and Iowa, probably the best agricultural state in

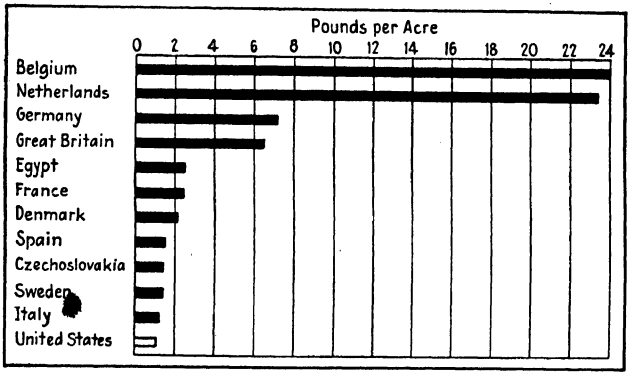


FIG. 185.—Use of nitrate fertilizer, pounds of nitrogen per acre of cultivated land, 1926.

America. It will be noticed that the American yield averages only about half that obtained in these little countries.

Although farming is carried on so intensively and is the major activity of the next to the largest group of people, the population engaged in manufacturing and commerce is so large that much food is imported

TABLE VII.—YIELD PER ACRE OF CHIEF CROPS

Crop	Belgium	Netherlands	United States	Iowa
Potatoes, bushels	280	276	102	82
Beet sugar, tons	2¼	2	1¼	1⅛
Wheat, bushels	38	41	14.7	18.7
Oats, bushels	66	56	30	36
Barley, bushels	51	50	25	28.9
Rye, bushels	36	31	18	17.2

and foodstuffs form a leading item in the imports. Both of these countries have large areas less favorable for tillage than for grazing. In Belgium the sandy coastal strip has been reclaimed by planting grass and is now used for raising many fine Flemish horses, cattle, and dairy products. Netherlands, too, has much sandy land and most of the two-fifths of the land which is at or below sea level is too wet to grow much except grass. Belgium also has a considerable proportion of its land

close to sea level, and some below sea level. This wet land grows luscious grass. With the great need for foodstuffs and the great energy of the people, it is not surprising that these countries rank high in live stock, as is shown by the following table which includes the two other nations ranking high in this respect. The term "animal unit" refers to a combination of all domestic live stock. A unit is 1 sheep, 5 hens, or ⅕ cow.

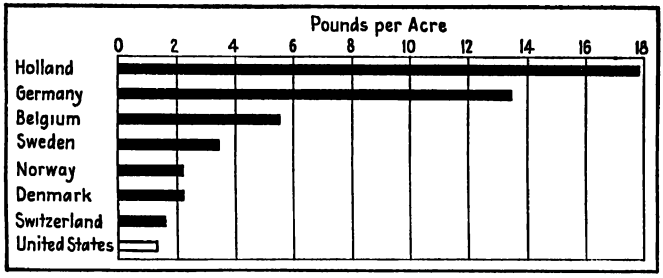


FIG. 186.—Use of potash fertilizer, pounds per acre of cultivated land.

TABLE VIII.—NUMBER OF LIVE STOCK PER SQUARE MILE, AND RELATIVE RANK AS COMPARED WITH OTHER COUNTRIES

Country	Horses		Cattle		Swine		Animal units	
	No.	Rank	No.	Rank	No.	Rank	No.	Rank
Netherlands	31	2	160	1	126	2	1,454	2
Belgium	22	3	150	4	100	3	1,202	4
Denmark	32	1	156	2	169	1	1,575	1
Irish Free State	11	..	156	3	43	..	1,225	3

Favorable Climate.—Another real asset is a favorable climate. Their climate is mild, moist, exceptionally dependable, and possesses a distinct seasonal range but not an extreme one. Minor changes of weather of a stimulating type are frequent. Just how significant the climatic advantages of this area are is impossible of determination at present, because so many other conditions affect the area. But unquestionably the favorable climate has helped to make this region an important one.

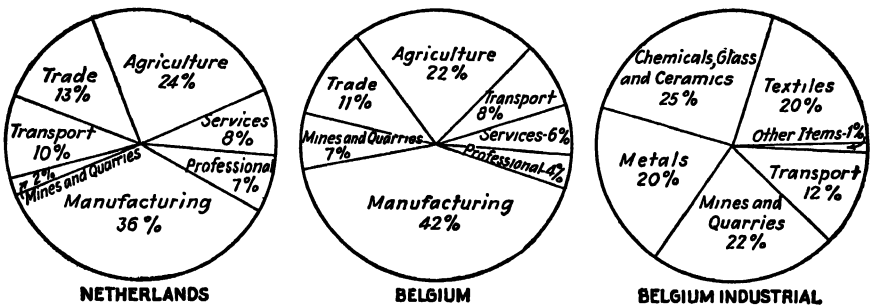
Advantages of Early Development.—A fourth asset possessed by both these countries has been their early development. Netherlands has been one of the important commercial nations of the world since the sixteenth century when the Dutch became distributors of oriental merchandize brought by the Portuguese to Lisboa (Lisbon). Soon they undertook trips around Africa in order to get the oriental products themselves. The development of this early commerce afforded the basis of Dutch commercial importance and helped them secure choice colonies

in various parts of the world, especially in the East Indies. Skillful management has enabled them to carry on a large amount of commerce with these colonies. Three-fourths of the total export from the colonies goes to the Netherlands. Only about one-fifteenth of Netherlands' total commerce, however, is with her colonies. This early start has also enabled the Dutch to build up a profitable business of carrying the commerce of other nations, and they have a large fleet of merchant ships carrying on commerce in all parts of the globe. They are surpassed in per capita tonnage only by Norway and Great Britain, the 1929 tonnage for Norway being 1.2, Great Britain 0.44, and the Netherlands 0.4 tons per person. Netherlands ranks seventh among the nations of the world in total gross tonnage (Fig. 75).

Belgium had a precocious development of a somewhat different sort. Before the English had much of a textile industry, Flemish weavers supplied a large share of the north European supplies of woolens and linens. Indeed Flemish weavers helped establish the textile industry in England. Likewise in navigation, drainage, deep mining, and certain aspects of government, the Low Countries have taught the world.

SOME CONTRASTS BETWEEN THE NATIONS

Occupational Contrasts.—After having noticed several respects in which Belgium and the Netherlands are similar and geographic conditions



FIGS. 187 and 188.—Gainfully employed in Netherlands and Belgium by occupational group. Belgium had 1,080,000 industrial workers in 1926.

which help to explain their similarity, we may now consider some of the differences and their causes. The most conspicuous difference has been that in addition to agriculture for home consumption, which occupies nearly one-fourth of the people of Netherlands and one-fifth of those of Belgium, the Netherlands has been especially interested in commerce, ocean transportation, and special phases of agriculture for export, while Belgium has been predominantly a manufacturing country. This difference in development in adjacent countries otherwise so similar is partly explained, however, by the difference in mineral resources.

Differences in Mineral Wealth.—Belgium has long been one of the richest areas in the world in mineral wealth. In addition to large amounts of coal it had valuable iron, lead, and zinc deposits. In contrast, Netherlands, because nearly all of the country is delta land, has until recently had almost no mineral output aside from potters clay. Consequently, Belgium was enabled to readily develop manufactures requiring much coal and the metals, while Netherlands could not compete in that line, and, instead, developed manufacturing industries which required little fuel but considerable skill, such as diamond cutting, fancy cotton goods, artistic pottery, and dependable cheese and butter.

Belgium has extracted her mineral wealth so actively, however, that the zinc mines have been practically exhausted, and the output of lead is small. Likewise her better iron ores are approaching exhaustion, but fortunately the bountiful French supplies are close at hand and are readily and extensively imported. The Belgian coal output has increased steadily from about 17,000,000 tons a year in the eighties to about 27,000,000 recently, and Belgium has stood third in the per capita consumption of coal. But the difficulty of getting coal is increasing and it is now mined 3,000 feet below the surface—the deepest anywhere—and seams only 18 inches thick are taken at a large labor cost. Great piles of culm form conspicuous features in the Belgian coal fields. During the World War when the Netherlands found it extremely difficult to import coal, a great effort was made to locate coal under the delta deposits close to Germany and Belgium. They were unexpectedly successful and now the annual output is about 11,000,000 tons, more than 40 per cent of that of Belgium, and is increasing rapidly. The reserve is officially estimated at 5,000,000,000 tons, or practically one-half as great as that of Belgium and nearly one-third that of present-day France.

Contrasts in Manufacturers.—Accompanying this recent development of coal mining in the Netherlands has been a great increase in manufacturing, but still of the more specialized sort, the type in which skill is a large element. The textiles are especially important, but an interesting item is 300,000 bicycles a year. Another important product is margarine, made from imported vegetable oils but mixed with butter. In a recent year about 400,000,000 pounds of margarine were manufactured in addition to 190,000,000 pounds of butter and 285,000,000 pounds of cheese.

In contrast, Belgium's average manufactures, from 1926 to 1929, amounted to about 4,000,000 metric tons of steel, 63,000,000 square yards of window glass, and 4,000,000 square yards of plate glass. Contrasts in the sizes of the occupational groups are shown in Figs. 187, 188. Of the textiles, linen comes next to cottons, and gives Belgium a high rank among the nations in the manufacture of linen.

Differences in Relation to the Sea.—On the other hand, the Netherlands has some 5,000 ships engaged in fishing. They catch about 500,000,000 pounds of fish a year, an occupation almost neglected in Belgium, which likewise has only a small merchant marine. The coast line helps explain this difference. It is short and practically all bordered by sand dunes in Belgium, but very long, relatively, in the Netherlands. Furthermore not only the mouths of the Rhine but of the Meuse (Maas) and Scheldt are in Netherlands, but there is no important river mouth in Belgium.

Military Differences.—Another difference between Belgium and the Netherlands is in liability to invasion. Belgium has been invaded

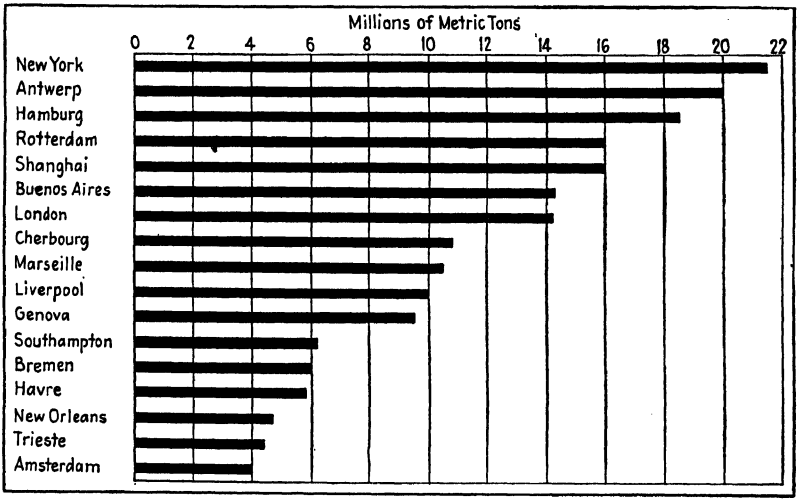


FIG. 189.—Leading ports, average of 1926 to 1928, ingoing and outgoing ocean traffic.

repeatedly and has been the scene of numerous great battles. During the World War a large part was conquered and held by Germany practically throughout the war. On the other hand, Netherlands has seldom been invaded. Invasion is difficult in so wet a land, partly because if the dikes are cut, as was done long ago when the king of Spain brought in an army, the invaders are put in a more perilous condition by the rise of the water than are those well acquainted with the land. Furthermore, there is less occasion to invade the Netherlands as it is not on the shortest and most convenient route between two powerful nations. Belgium has this situation, which is as unfortunate in time of war as it is fortunate in time of peace.

Population Contrasts.—Another difference between these nations is in the uniformity of population. While Netherlands is peopled by Dutch, Belgium has two racial stocks. About one-half are Flemish, blue eyed, closely allied to the Dutch, and speak a language similar

to the Dutch. The other, the southern half, are the Walloons, French-speaking brunets. The Belgians are nearly all Roman Catholics, whereas the Dutch are predominately Protestants. French is the official language of Belgium, but the Flemish names Antwerpen and Gent are now official, rather than the French forms Anvers and Gand. The capital is officially Bruxelles, rather than Brussel, the Flemish form.

GEOGRAPHIC SUBDIVISIONS

Belgium and the Netherlands each possess peripheral sections which are chiefly agricultural while the interior of each country is partly industrial-commercial (Fig. 182). The agricultural regions may be still further subdivided. The Netherlands has two main types. One is the densely populated highly productive polder or black lands, below or only a little above high tide, in the southwest. These lands grow almost no grain but much grass and root crops. Dairying is carried on there very intensively. Many tulips are grown in the narrow sandy belt between the coast and the black lands. The other chief type is the comparatively sparsely peopled higher land at the north and east. North of the Zuider Zee there is much sand. Belgium also has a sandy tract along the coast, and the southern part of the country is almost as sparsely settled as much of northeastern Netherlands, because it is rolling and less productive. The northeastern section is also largely devoted to agriculture and has only a moderate density of population.

The industrial section, that having most cities, is found in central and north central Belgium and in the section of Netherlands known as Holland. Commercial activities are largely centered in the industrial cities which have the best ports, Anvers (Antwerp), Rotterdam, and Amsterdam. These regions are shown, approximately, in the accompanying sketch map (Fig. 182).

BELGIUM

Cities.—The chief urban centers of Belgium with their populations according to 1929 estimates are as follows:

Bruxelle (Brussels)	826,000	Gand (Ghent)	210,000
Anvers (Antwerp)	425,000	Malines	60,000
Liege	252,000		

The net tonnage of shipping at Anvers (Antwerp) in 1926, 1927, and 1928 exceeded that of any other port in the world, although New York slightly excelled in the average of ingoing and outgoing marine tonnage. In 1924, however, it was exceeded by New York and London, and especially by Rotterdam which led the world that year. Gand had only one-thirteenth as much commerce as Anvers in 1928.

The total value of agricultural products in 1929 was estimated at $500,000,000 or about $61 per capita.

Trade.—The average value of exports for 1925 to 1929 was $750,000,000 and of imports $850,000,000. Significant facts as to the foreign trade are shown in Fig. 190. Of the exports to the United States, about half by value were precious stones, chiefly diamonds. Rabbit skins valued at about $4,000,000 came next, followed closely by plate glass. Of the imports from the United States, the chief items and their average values recently were wheat $22,000,000, cotton $17,000,000, automobiles $12,000,000.

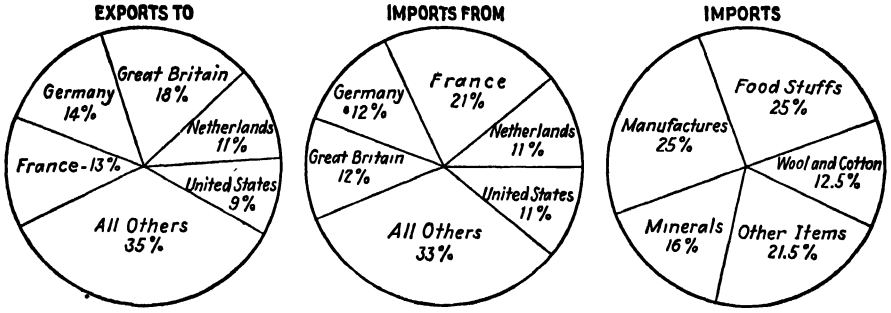


FIG. 190.—Belgium's foreign trade, 1925 to 1929, approximate average.

Growth in Population.—The population of Belgium is increasing fairly rapidly both naturally and by immigration. There are about 40,000 more births than deaths per year and the net immigration is about 10,000. These conditions suggest prosperity.

THE NETHERLANDS

Cities.—Most of the chief cities of Netherlands are on man-made land, and are, with their population according to a 1929 estimate,

Amsterdam	743,000	Utrecht	150,000
Rotterdam	580,000	Haarlem	115,000
s'Gravenhage (The Hague)	425,000	Groningen	103,000

Rotterdam handles about three-fourths of the sea-borne traffic of Netherlands. In 1924 it led the world in tonnage of ships entering but was fourth in 1928. The commerce of the Netherlands has recently had an average value of $1,010,000,000 for imports and $800,000,000 for exports. More than one-half is with its four nearest neighbors (Fig. 191). The United States, the other important nation in the foreign trade of the Netherlands, furnishes about 11 per cent of the imports but takes only 7 per cent of the exports, including about $25,000,000 worth of diamonds. Although the colonies of Netherlands are considered to be especially valuable, and export large amounts of valuable products, most of which are sent to Netherlands, and buy much from Netherlands, nevertheless the trade with the Netherlands East Indies comprises only about one-

fourteenth of the total export trade and one-eighteenth of the import trade.

The chief imports are textile fibers, cereals, iron, steel, wood, coal, and mineral oil. The chief exports are textiles, butter, cheese, milk, fresh meat, garden products, margarine, and paper (Fig. 191).

The excess of births over deaths is about 105,000 a year recently, and the emigration only about 3,000, so the population is increasing at a rapid rate (14 per 1,000), more rapidly than the United States or than any other European nation except Russia and Bulgaria, which have much higher birth rates. The Dutch birth rate, about 24 per 1,000, is only 2 to 6 higher than that of the other advanced nations, but the death rate is the lowest in Europe, less than 10 per 1,000 per year. The low death rate reflects the high standards of education, cleanliness, physical vigor,

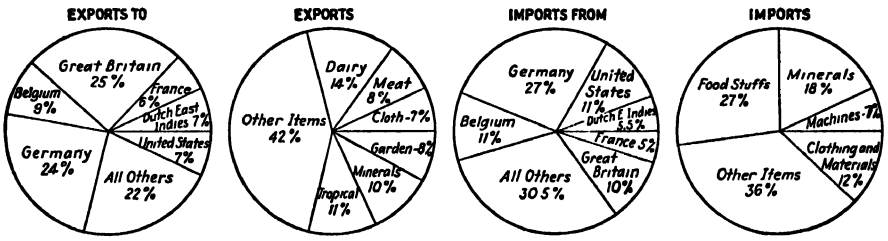


FIG. 191.—Netherlands' foreign trade 1927 to 1928, approximate average.

lack of poverty, and lack of excessively large families or numerous aged people. For two generations there have been few Dutch families with more than six children but many with four. Instead of the "ideal family" consisting of a son and a daughter, as in France and more recently elsewhere, the ideal in Netherlands is two sons and two daughters. With 53 per cent of the population rural and much intensive agriculture, children are more helpful than in many lands. The proverbial cleanliness of the Dutch is encouraged by the poor drainage conditions in the parts of the country where most people live. With the congestion of population in such an environment, filth is not only very conspicuous in summer but readily leads to much sickness.

The low death rate, rapid natural increase of population, very small emigration, high standard of living, extensive foreign investments, and rapid development within the country itself all suggest forcefully that the Netherlands is prosperous, and that to a majority of the citizens the future seems reasonably bright.

LUXEMBOURG

The little country of Luxembourg (area about 1,000 square miles, population about 300,000, chief city Luxembourg, population about 50,000), situated between Germany, France, and Belgium, was in the

German customs union before the World War but since 1922 is affiliated with Belgium. It is a land of tiny farms, one-third of which are less than 1½ acres in size and only one-eighth of which are over 12 acres. It also has relatively valuable iron mines. About 65 per cent of the working population are officially engaged in the mineral and metallurgical industries, which in 1928 produced about 7,000,000 metric tons of iron ore and about one-third that much steel (Fig. 201).

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CHAPTER XIV

GERMANY

The map of Germany at the outbreak of the World War presented a very complicated pattern. Of the 25 individual states or provinces widely varying in size, many were not composed of contiguous territory, but were scattered about in detached areas; 50 per cent of them were smaller than Rhode Island, while Prussia, on the other hand, possessed over one-half of the whole territory. Of the important nations in the European family Germany and Italy were the last to attain national unity. Up to 1870 both were geographical terms rather than names of political states, and within the boundaries of Germany there were included a multitude of states, large and small, each having its own coinage, postal system, and tariffs. Goods moving from the border to the center of the "country" crossed from 15 to 20 frontiers, paying as many tariffs.

Historic Background.—A Zollverein, or customs union, a precursor of the present republic, was formed in 1834 including about two-thirds of the states. But petty strife and jealousy retarded unity, which was only attained with the war of 1870 to 1871 when Bismarck succeeded in welding the various states into a coherent empire.

From then until 1918 Germany was really an enlarged Prussia, the largest and most powerful of the various states, whose militaristic and autocratic leaders dominated the political destinies of Germany until the end of the World War. Bismarck had transformed a weak and divided group of states into a strong, well-disciplined empire. The people had seen the easy victory won over France in 1870 to 1871 and had submitted, trusted, and worked with little criticism of the absolute rule of the Prussian militarists.

Defeat in the World War seemingly left Germany almost a material and spiritual wreck. In addition to the loss of important parts of her marginal territory to her neighbors, she was stripped of her colonies, her navy, and her merchant fleet; burdened with an enormous reparations account; and deprived of the respect and confidence of her former associates.

In the twelve years which have elapsed since the Treaty of Versailles, there has been a marked recovery. Especially has she been successful in winning back the confidence of the other powers, a prerequisite to the recovery of her place in international trade. The old political military

machine responsible for the debacle has been discarded and a republic established. The essential element in reconstruction, *i.e.*, the great mass of educated, thrifty, and energetic people, given renewed hope, will undoubtedly be able to restore the German nation to its former position among world powers.

SURFACE FEATURES

Germany is about equally divided between a dissected plateau region in the south and west and a broad belt of plains—the German lowlands—stretching across the north and east. The former is a part of the Baltic Plain which reaches from the North Sea to the Gulf of Finland; the latter is, in general, a region of moderate relief but made up of a great variety of topographic features of diverse geologic origin.

Western Highlands and the Rhine.—Two ancient massives lie along the western border of the plateau and are crossed by the Rhine. In the southwest is the Schwarzwald from whose counterpart, the French Vosges, it is separated by a graben now occupied by the Rhine. The river follows this depression from Basle to Bingen a distance of about 170 miles, leaving it at the latter place to swing northwest and cross the second massive, the Slate Mountains, in which it has carved the famous Rhine Gorge. The rift valley continues northeastward to the east of the Slate Mountains into central Germany where within the graben occur many volcanic hills. (See Physiographic Diagram.)

The Rhine graben is in marked contrast to the gorge. The former is a densely populated, flat, fertile, alluvium-filled valley about 20 miles wide, across which the Rhine meanders, and which is bounded on either side by precipitous fault scarps. The erosion valley through the Slate Mountains is a narrow V-shaped gorge. City sites are confined to junction points of the tributaries and main river. Part of the steep valley ridges are covered by terraced vineyards which here reach their northernmost limit in Europe.

The Slate Mountains of the lower Rhine region are of great interest because of the coal fields there. On the north the Ruhr-Belgian fields and on the south the Sarre, with their associated cities, constitute two of the most important industrial districts of Europe. Between this old massive and that of Bohemia there intervenes a varied collection of mountains and valleys constituting the highlands of central Germany. Here are the Harz, the Thüringerwald, and a number of minor features, while the western part of the highlands contain several hills of volcanic origin. Between the highlands of central Germany and the Alps lies the Bavarian Plateau whose southern portion has been covered with morainic deposits from Alpine glaciers.

Plains of North Germany.—The German lowland is a gently undulating plain whose main topographic features are due to the action of the

ice sheet. Several concentric morainic ridges parallel the Baltic Coast, the northernmost one, the Baltic Ridge, reaching, near Danzig, a height of 1,100 feet. Between these ridges are old glacial stream channels, some of whose east-west valleys today provide favorable sites for canals joining the main rivers of the plain. The soils are mostly low in fertility, and there are vast numbers of lakes and marshes. The areas of boulder clay are normally much more fertile than the sandy sections. Only through years of intensive drainage, fertilization, and cultivation has much of the region been transformed into productive farms.

The coasts, both on the North and Baltic seas are low, flat, and poor in natural harbors, characterized by a large number of spits and bars enclosing shallow lagoons. Four great rivers wind sluggishly across the plain to the north or northwest, their mouths choked with sand, except as they are kept open by dredging.

CLIMATE

In spite of its large size and its wide range of latitude, the climate of the country is exceptionally uniform. In general it is a modified continental type, the influence of the ocean being especially conspicuous in the northwest. There the winters are mild and the summers cool, with an extended growing season. Eastward the seasonal range of temperature increases; southward the difference in latitude is largely neutralized by increased altitude. The average July temperature for Berlin is 65°; for München, almost 300 miles farther south, 63°. The open coasts of the North and Baltic seldom freezes, but ice breakers are necessary for the harbors. All of the rivers are ice covered a part of the year, varying from 21 days in the case of the lower Rhine to 2 months for Stettin, while the Oder is closed for 80 days. In the plateau region some of the valleys, such as the Rhine graben, have comparatively mild winters and are suited for vine culture. The rainfall of the plains averages 20 to 30 inches annually and is fairly well distributed seasonally. There is a summer maximum but no dry season. In general the precipitation decreases from west to east and southeast, Silesia receiving the least.

AGRICULTURE

Agriculture Highly Efficient.—The remarkable development of industry in Germany in the 40 years preceding the World War was paralleled by an equally phenomenal expansion of its agricultural output. Unlike Britain, Germany's economic policy definitely provided for the largest possible production of food, so that in case of war she might be independent of the outside world. With a rapidly growing population but a restricted area, the growing demand for foodstuffs was met by increasing the yields. This was accomplished through more intensive cultivation, the larger use of commercial fertilizers and

the scientific selection and use of seeds, breeding stock, and foodstuffs, as well as by a comprehensive system of agricultural education. In 1914 Germany had 100,000 students of agriculture in her universities, training and evening schools. As a result of this policy prewar Germany was estimated to be about 70 per cent self-supporting as compared with 90 per cent for France, 64 per cent for Italy, and only 37 per cent for Belgium, while German laborers were about equally divided between agriculture and industry.

These accomplishments of German agriculture have been made in spite of a none too favorable environment. The German lowland has a climate characteristically cool and moist with little sunshine, while a large proportion of the soil is light and sandy. Although soils are better in the southwest, the rough topography is there a limiting factor. Thus much of the lowland is suited for rye and potatoes, both important

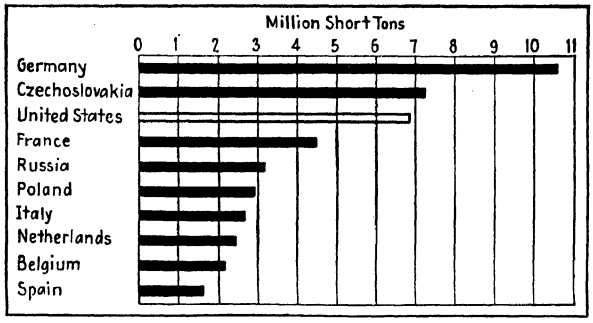


FIG. 192.—Average annual sugar-beet production from 1921 to 1925. By 1928 to 1929 Russia had gained upon Germany so that the latter produced only about 50 per cent more than the former.

staples in the daily diet. Wheat and the sugar beet are largely confined to the fertile clay soils. In the south, however, rye is better suited to the hills and slopes than is wheat, the latter being found chiefly in the plateau valleys (Fig. 195).

The World's Chief Beet Sugar Producer.—As indicated, beets and wheat occupy in general areas complementary to those devoted to rye and potatoes, for the former demand more fertile soils. Germany is the world's chief beet sugar producer (Fig. 192) and in 1928 and 1929 produced about one-fifth of the world's beet sugar output, an amount much larger than that of either Russia or Czechoslovakia. As shown on the map (Fig. 193), the region about Magdeburg on the Elbe is the main producing area and ranks second only to the French-Belgium section among European beet districts. Here, the cool climate, heavily fertilized soils, abundant labor, and excellent transportation facilities provide an ideal setting for this crop. Beets are ordinarily rotated with cereals, resulting in increased yields of the latter. By-products of

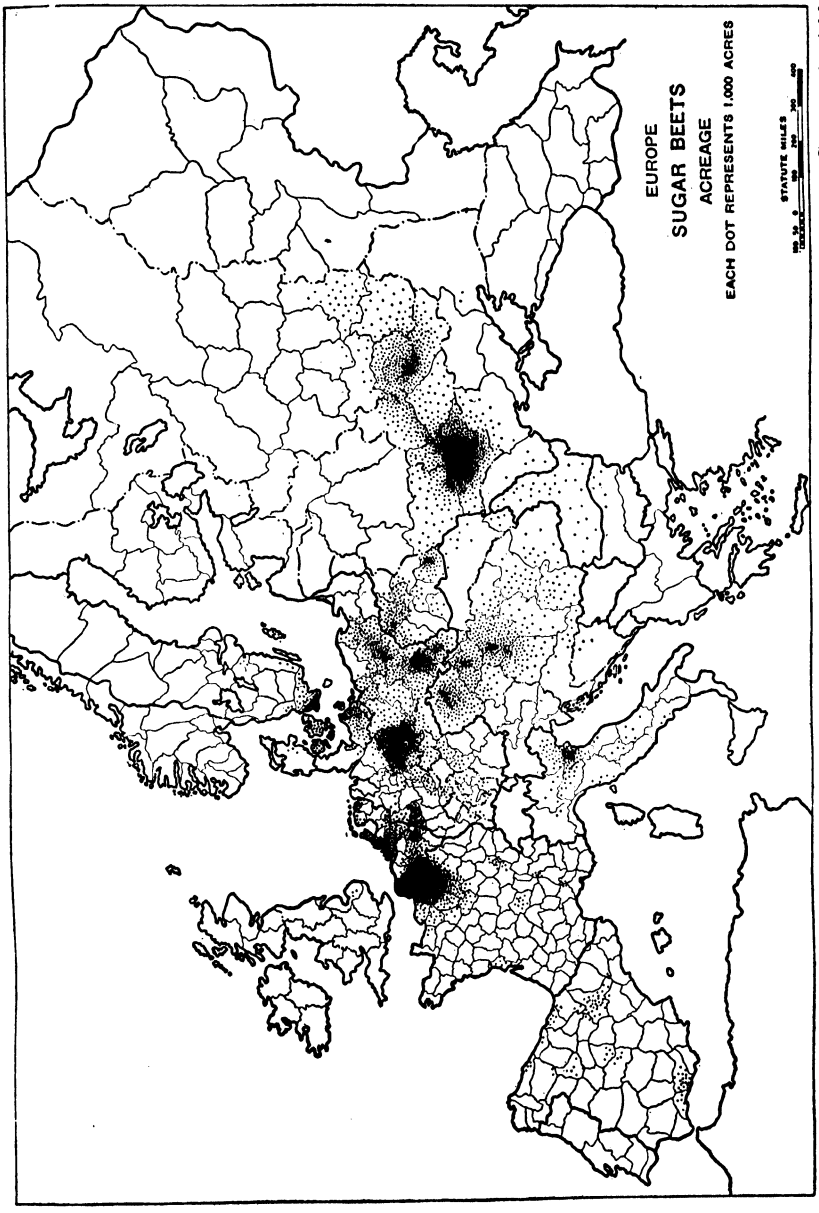


FIG. 193.—Compare with Fig. 192. This distribution of acreage is based upon prewar figures. In 1928 Germany's yield per acre was more than double that of the Russia, giving the former a large margin of leadership in production. (*U. S. Department of Agriculture.*)

beet culture in the form of tops and pulp refuse make excellent feed for live stock, their acre value being higher than that of the average American hay yield.

Rye and Potatoes.—The German lowland is ideally fitted for potato culture. Much of the plain is too sandy for other crops, the climate is cool, labor is abundant, and the product supplies an economic food as well as an important raw material for industry (Fig. 253). In no other country has its production and utilization reached such importance, the normal crop being about four times that of the United States and the 1921 to 1925 average acreage almost twice as large. With an acreage less than that of Russia, prewar Germany produced almost twice as large a crop of potatoes. By 1927 Russia had doubled her potato acreage,

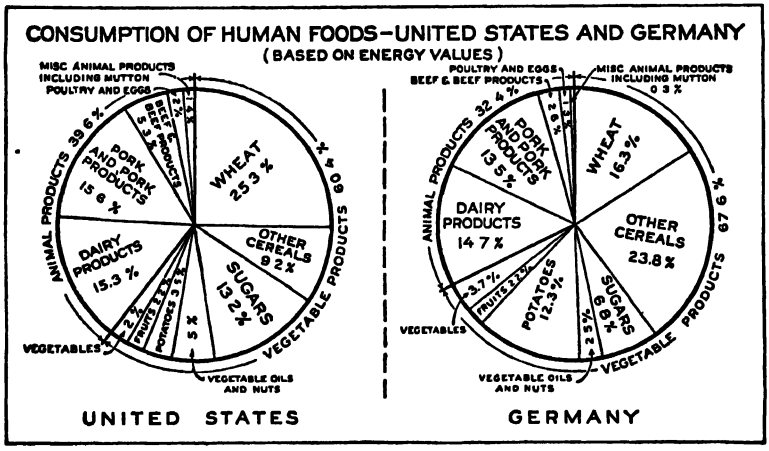


FIG. 194.—Consumption of human foods, United States and Germany. (*U. S. Department of Commerce.*)

so that Germany is now second in output to that country. In the quarter century preceding the war, while the acreage was expanded only by one-fourth, the yield increased 60 per cent. The chemists succeeded in increasing the starch content from 14 per cent in 1875 to 20 per cent in 1905. Less than one-third of the prewar potato crop was used directly as human food; alcohol, starch, potato flour, and stock forage absorbed the balance. Nevertheless, potatoes formed the chief item in the diet, the per capita consumption being about two pounds daily. It is the great starch food of Germany and, like corn in the United States, is closely associated with the swine industry. The kind usually used for stock food are mostly inedible, large, coarse grained, and rather flavorless. The wide and varied use of the potato has served to stablize the market so that there are not the great price fluctuations characteristic of the United States.

The copartner of the potato and the main competing crop on the light acid soils of the cool moist plains as well as on the rough slopes of the plateau of South Germany, is rye, the chief bread grain of the German peasant. The average prewar per capita consumption of rye in Germany was twice that of wheat, while in France that of wheat was seven times that of rye (Fig. 194).

Agricultural Trend.—By the close of the century all of the available tillable land had come under cultivation, with 95 per cent of the area of the country productive and 44 per cent arable. In spite of this the aggregate output constantly increased—in fact faster than did the population up to 1913, the peak year. The post-war depression, the currency difficulties, and the high price of machinery and labor, with the

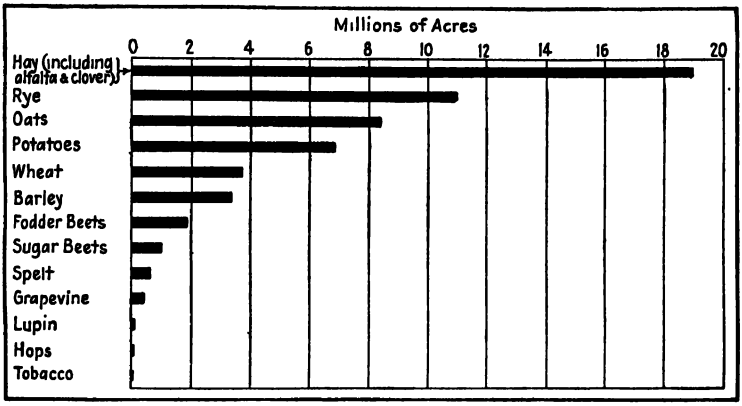


FIG. 195.—Area of principal crops in Germany, average of 1922 to 1926. (*U. S. Department of Commerce.*)

absence of tariff protection, resulted in large areas being turned back from cultivation to meadow and pasture.

In the pursuit of the agricultural program by which Germany was to increase her food output, cereal production by 1890 lost its leadership to root crops and swine, which represent more intensive crops yielding larger returns. There has also been a marked increase in the application of commercial fertilizers, particularly of nitrogen and potash, in both of which the country has become the world's chief producer. From 1910 to 1925 the consumption of the latter per acre was doubled, the former, trebled. Her chief source of domestic phosphate is Thomas slag—a by-product of the steel industry.

Yields High.—Partly as a result of this extensive use of fertilizers, crop yields increased until, under normal conditions, the fields rank among the most productive of the large countries, the yields from cultivated land being second only to Great Britain among the principal countries of Europe, and about one-fourth larger than those of France.

In 1914 Germany and France were approximately the same size. French agricultural resources were, however, greater, for her climate

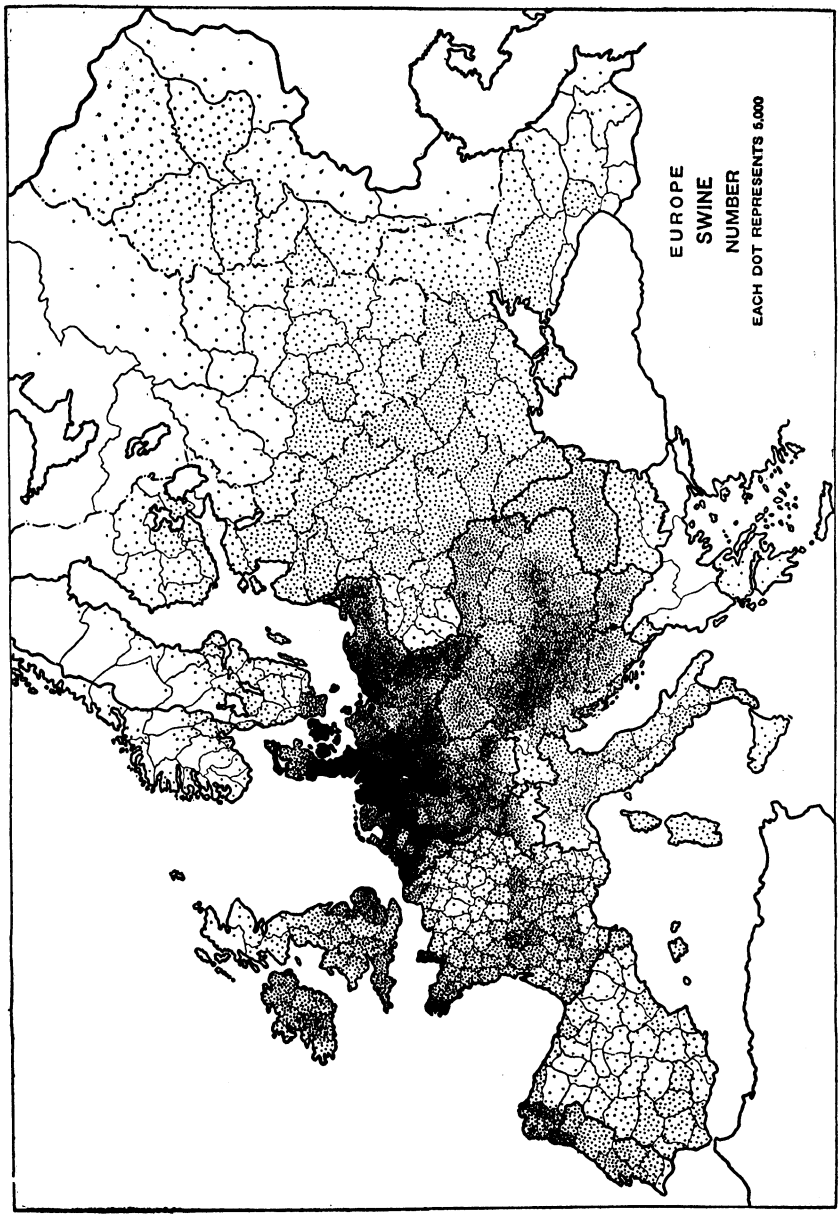


FIG. 196.—Swine distribution in 1913. Germany in 1927 accounted for almost one-fourth of all the swine of Europe. (*U. S. Department of Agriculture.*)

and soil were on the average far superior. But the more scientific methods used, together with the liberal application of fertilizers caused yields in Germany to be uniformly higher (Figs. 185, 186). Thus the

average production of several staples per acre in the two for the period 1909 to 1913 was as follows:

Crop	France	Germany
Rye, bushels	17	29
Potatoes, bushels	129.6	202.7
Wheat, bushels	29.7	32.6
Beets, tons	10.7	13.7

As to the cultivated land, that in Germany produced in prewar years over one-third more per acre than that in France. Similar results were obtained in the animal industry. In Germany the average annual yield of milk per cow was 4,375 pounds; in France 3,599 pounds.

Although cultivating on the average two acres less than the Frenchman, the production of the German farmer, both per acre and per worker, exceeds that of the former by at least a third. This marked difference, while probably involving somewhat larger costs for fertilizer, unquestionably leaves a considerable margin in living standards and income in favor of the German agriculturist. The intensification of agriculture also involved the large use of hand labor, frequently the employment of the whole family. For example, before the war, Great Britain employed 5.8 people per 100 acres, 1.2 being women; Germany 18.3, of whom 10 were women.

Live Stock Important Factor in the Agricultural Scheme.—The country is an important producer of live stock, ranking, in Europe, second only to Russia in production of swine (Fig. 196). This intensive form of animal industry is an important part of the program for increasing food production. In cattle Germany also holds second rank in Europe, the dairying industry being particularly well developed in the north and northwest. Of the oils and fats used in the country about one-third are of vegetable origin but of those derived from animals, about nine-tenths are produced domestically. In addition she provides herself with about 90 per cent of her meat needs, the main items being pork and lard. In the 30 years prior to 1913, the swine increased from 204 per 1,000 population to 383, or over 87 per cent.

MINERAL INDUSTRIES

World's Chief Source of Potash.—For almost three-quarters of a century the world has drawn the great bulk of its potash salts from Germany which up to 1914 had virtually a monopoly of the world's production. The main deposits lie between the middle courses of the Elbe and Weser rivers about Stassfurt (Fig. 197). Here, during an earlier geologic period, when the present north German plain was under

the sea, were deposited rock salt and potash, and it was while drilling for the former that the beds of the latter were discovered. The easy accessibility and vast extent of the deposits dwarf all other occurrences so far known. They cover an area of over 100 square miles and are estimated to contain some 20,000,000,000 metric tons of potash, which at the present rate of world consumption will last for about 2,000 years. As an essential ingredient of practically all commercial fertilizers, potash

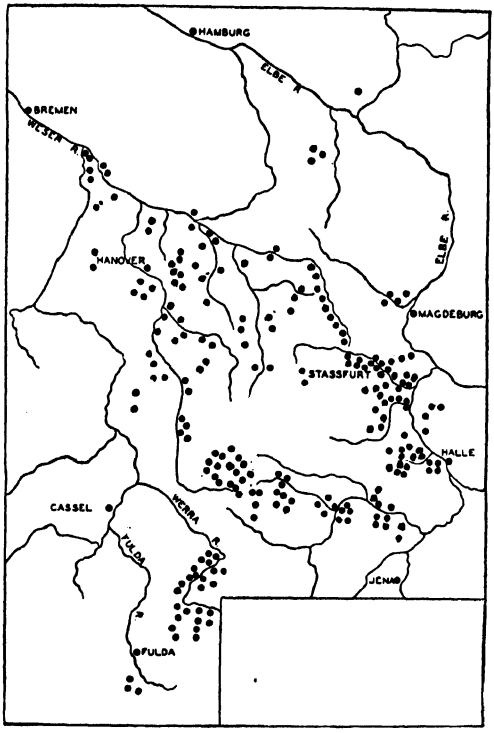


FIG. 197.—Shafts of the German potash field about Stassfurt, central Germany. (*U. S. Department of Commerce.*)

is indispensable to the agricultural world[1] and from no other source could it be obtained in such abundance and so cheaply. Germany was thus furnished with a powerful weapon in the exaction of favorable commercial treaties from a potash-hungry world—an opportunity she was not slow to grasp. Furthermore, the large bulk involved served to provide return cargoes for ships bringing in raw materials, performing much the same service as does coal in Britain's foreign trade.

[1] Both nitrates and potash are found in virgin soil, but whereas the former is restored by nature by letting the ground lie fallow or by planting of legumes, the replacement of the latter takes place so very slowly that the application of commercial fertilizers is necessary.

Importance in German Agriculture.—Of even greater importance has been the part the government has played in the nation's agricultural economy. Government control of production, exports, and prices has given Germany's own farmers cheap potash while foreign users were forced to pay at a higher rate and thus contribute the bulk of the profits. As a result, over 60 per cent of the total output went to enrich Germany's fields and has been of the greatest importance in accounting for the high yields on soils which were originally of low fertility. Only Netherlands uses more potash per acre than does Germany. About 90 per cent of the

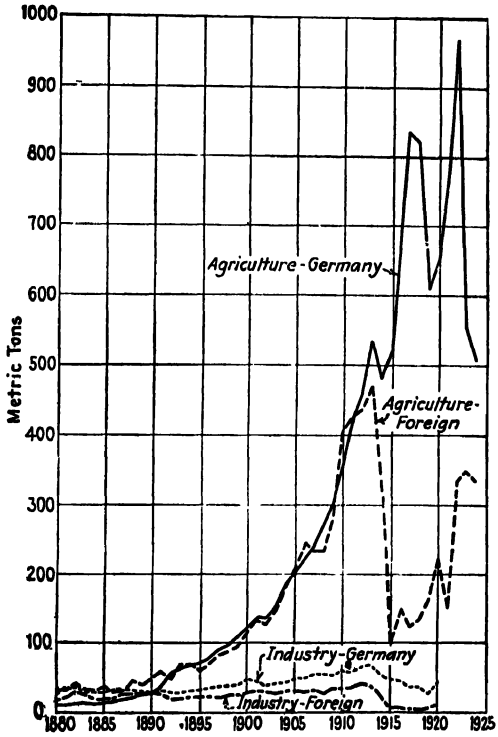


FIG. 198.—Disposition of pure potash in Germany and other countries.

world's production is consumed for fertilizer—its most essential use. Small amounts find a place in the industrial market, which absorbs about 10 per cent of the output, chiefly for the manufacture of soap, glass, matches, explosives, chemical reagents, and for dyeing and photography (Fig. 198).

Up to 1914 production showed a continuous and rapid increase, particularly notable after 1895. The war, cutting off most of the foreign markets from which the greater part of the profit was realized, was disastrous, while, at the same time, the necessity of greatly augmenting the food output in the years 1914 to 1918 materially increased the

domestic agricultural consumption. In addition to the other war losses the potash interests faced the cession of the Alsatian deposits to France, thus breaking their monopoly. Previous to 1918, they had been able to restrict the Alsatian output so as to prevent its competition with that of the Stassfurt mines. They had also been influential enough with the old Austria-Hungarian Government to restrict the development of the deposits now within the Polish border. While the latter hold little promise of being a factor in foreign trade in the near future, the Alsatian deposits are potentially serious competitors.

Alsatian Potash.—The Alsatian deposits were discovered in 1904 when prospectors were drilling for coal near Mulhouse. Though the beds are of smaller extent, they are of higher grade (22 per cent) than those of Stassfurt. It is estimated that the reserves underlie about 75 square miles and have a tonnage of some 300,000,000 metric tons of pure potash (K_2O). This would give them about one-sixth the volume of the German reserves, but enough to supply the world requirements, at the present rate of consumption, for about 275 years.

By 1911 the Alsatian output had grown so as to give serious concern to the Stassfurt interests. The German Potash Syndicate thereupon purchased a controlling share and restricted the output to 5 per cent of their own. In a recent pact between the rival interests, the world's markets have been apportioned, 70 per cent to the Stassfurt, 30 per cent to the Alsace production, so that though additional competition between the two is eliminated, the possibility of either one exercising complete control is also removed. Since the Alsatian deposits were taken over by the French the output has grown rapidly. In 1930 they contributed about 25 per cent of the world's supply as contrasted with about 5 per cent in prewar years. It is interesting to note the increase in the French domestic potash consumption since the acquisition of Alsace, the amount trebling from 1919 to 1925. Half of the 1928 sales were for domestic use. Among Germany's foreign customers the United States ranks first, taking on the average about one-fourth of the total. Approximately four-fifths of the export goes via Hamburg and Bremen, while Anvers is the chief exporting point for French potash.

Leadership Based upon Coal and Iron.—In the scant half century that elapsed between the signing of the Treaties of Frankfurt and Versailles, Germany, as we have seen, came to share with Great Britain the industrial leadership of Europe. In a large measure this remarkable development was made possible through the possession and efficient exploitation of her mineral resources, particularly of coal and iron. Prewar Germany was especially fortunate in the possession of vast reserves of these two essentials of modern industrialism. Within her borders were to be found 40 per cent of the coal and about one-third of the iron ore of the whole continent, the largest proportion of any

European country. In the production of coal, prewar Germany ranked second only to Great Britain; in pig iron and steel output she led her insular rival for over a quarter of a century (Fig. 199). Much of her iron ore and a considerable part of her coal were low grade, but she contrived through improved transportation facilities, the importation of high-grade ore for mixing, and the processing of her raw materials to compete successfully with her rivals and to outdistance most of them. By 1913 she was secure in her position among the three leading industrial countries of the world. Her losses of both coal and iron ore according to the Treaty of Versailles have been serious. Under the peace treaty Germany lost 10 per cent of her population, 12 per cent of her area, 26 per cent of her coal, 75 per cent of iron ore, 70 per cent of her zinc ore, 15 per cent of her wheat and rye land, and 16 per cent of her potato land. The restoration of Lorraine alone carried with it 69 per cent of

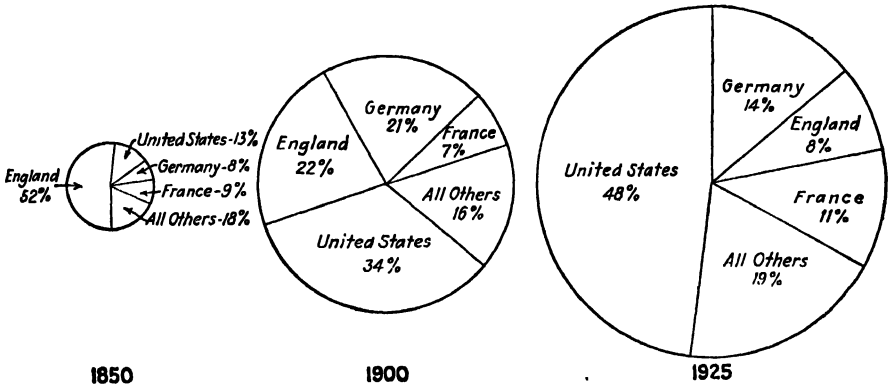


FIG. 199.—Changes in the production of pig iron by the world's leading countries.

Germany's iron ore reserve. The partition of Upper Silesia and the loss of Lorraine and the Sarre reduced the coal reserve 11.5 per cent, so that England has succeeded Germany in first place, while the iron ores still left her are woefully inadequate in amount, low in grade, and poorly located for exploitation. It is under these handicaps that the Germany of today must labor and compete with her industrial rivals.

Distribution of Coal Deposits.—Coal is located largely in three regions, all on the margins of the old massives. These are the (1) Silesian, (2) Sarre, and (3) Westphalian fields.

Silesia.—The Silesian region comprises the remnant of Upper Silesia left to Germany together with the Lower Silesian deposits. About 86 per cent of the production of the former went to Poland, and, since the German, Polish, and Czechoslovakian portions are all parts of one economic unit, the whole is discussed in connection with that country. Lower Silesia has a coal basin underlying an area about 38 by 20 miles, but mining is difficult and the coal is inferior to that of the Ruhr or Sarre.

Sarre.—The Sarre in French possession, at least until 1935, lies just east of the principal Lorraine iron-ore field. Coal underlies an area about 75 miles long with a maximum width of 25 miles. Portions extend into Alsace-Lorraine, but the depths increase in the southwest so that mining there is restricted. The coal is inferior to that of the Ruhr district for coking, and its use for this purpose requires the admixture of about one-fourth of the Ruhr coke. Its proximity to the Lorraine ore, however, is a tremendous advantage. In addition much of the prewar production went south to Switzerland and even to Italy.

The Westphalian Coal Basin.—Within the Ruhr-Lorraine district, together with near-by mineral deposits whose exploitation is related to it, is contained the world's greatest single industrial region. Although lying within five different countries it is an economic unit, and the various mineral deposits and the industries associated with them are so interdependent that they can best be considered together.

The two dominating features of the area are the Westphalian coal field and the Lorraine iron ores. In the same region are several other iron and coal deposits which, though dwarfed in size by the two mentioned, are of great importance to the countries in which they occur. Thus the coal field of north France extending into Belgium; the Campine chiefly in the latter country; and the Sarre, previously described, are essential to those nations (Fig. 200).

The Westphalian coal region owes much of its great industrial development to its advantageous location. Lying as it does in the lower Rhine valley between the Lorraine iron field and the sea, it has ready access to local ores as well as to foreign raw materials and markets. In addition to the Rhine which crosses it, there is a complete network of rivers, canals, and railroads connecting the various mining districts, industrial plants, and seaports.

The Westphalian field is itself notable for its high-grade coal, for the cheapness with which it can be extracted, and for its great extent—90 per cent of Germany's total reserves and producing three-fourths of her output. It has an area of about 1,500 square miles, only about one-fourth of which is actually exploited. The majority of the mines are between the Ruhr and Lippe rivers where lie the best and most accessible seams. The size of the deposits is most remarkable, comprising almost one-half of the known coal reserve of all continental Europe and at the present rate of production sufficient for about 2,500 years. Measured by the needs of the Lorraine iron-ore deposits, Westphalia possessed twenty times as much coal as is required to smelt all those reserves. Though the beds are faulted, folding has not been great and more than half of the production is now mined by machines. The daily output per worker is considerably more than farther west where the greater depth handicaps mining operations. Of the total output a considerable pro-

portion finds markets in France, Belgium, and Netherlands, as well as the territory served by the Rhine, including Switzerland and even Italy.

Iron products are next to the largest item of Rhine transport. Ruhrort-Duisburg constitutes the main gateway of the Ruhr. Out of it pass coal, coke, and iron; into it raw materials of grain, wood, and ore, enabling Germany to dominate the trade in coal by land as England has that by sea.

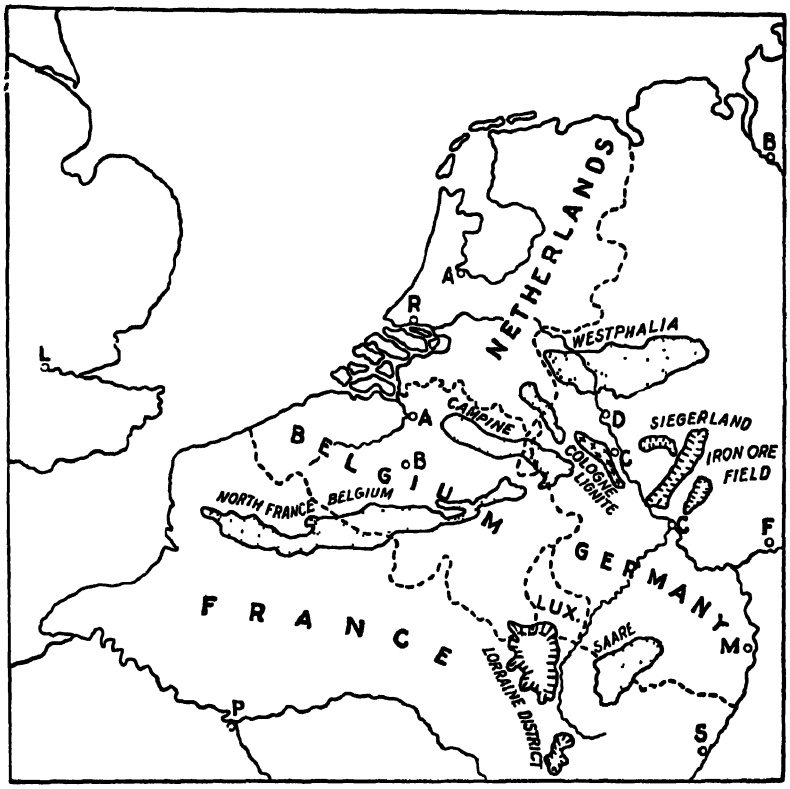


FIG. 200.—The Ruhr-Lorraine region of coal, lignite, and iron-ore fields. All of the deposits shown are within 150 miles of Namur. (*Adapted from Brooks and La Croix, U. S. Geol. Survey Bull.*, 703.)

Large Coal Exports.—Germany ranks next to Great Britain in the world's foreign coal trade, while, oddly enough, it is normally second only to France in the import of that commodity. The explanation for this anomalous situation lies in the greater accessibility of English coal to the coastal sections of Germany. Thus Westphalia, 140 miles by rail and barge from Rotterdam, pays about 60 cents per ton to reach tidewater. The average haul for Britain is, from pit to port, but 25 miles, costing about 36 cents. Consequently Hamburg and the Baltic

Coast are large importers of English coal. It is for this reason that Westphalia is asking for the Hansa Canal to join the Ruhr directly with the Hansa cities of Bremen, Hamburg, and Lübeck.

Coal Used as a Raw Material.—The presence of much low-grade coal coupled with the country's losses as a result of the war has forced a more complete and efficient utilization of other power resources as a solution of her fuel problem. Much progress has already been made and coal is today regarded as a *raw material* as well as a *fuel*. It is estimated that about one-third of all that mined in the country is fed to ovens from which there issues, in addition to coke, a great variety of products serving as raw materials for the chemical industry. Some of the recent developments in chemical and mechanical processing of coal are in (1) low-temperature distillation, (2) hydrogenation[1] or liquefaction, (3) long-distance gas transmission, (4) more extended use of powdered coal, and (5) the greatly increased use of lignite.

Lignite.—Of the estimated total lignite reserve of Europe—approximately 46,000,000,000 tons—Germany is credited with about 13,000,000,000 tons and Russia and Czechoslovakia, somewhat over 12,000,000,000 tons each. Four districts accounted for Germany's 1927 output: (1) Central Germany 41 per cent; (2) Köln 29 per cent; East Elbian 28 per cent; and (4) Bavarian 2 per cent.

The grade of the lignite varies much from place to place, as do also local needs and competing power resources. Thus the deposits of Central Germany are of special interest because of their bitumen content. They are admirably suited to the chemical industries with oil, tar, gas, and wax as by-products of carbonization. The sugar, potash, glass, porcelain, textile, and chemical industries of this region have largely substituted lignite for coal. In the Köln district, on the other hand, lignite is chiefly used for the production of electric power for the Westphalian industrial district. In general, over one-half of the whole German output is made into briquettes, thus reducing the moisture and doubling the calorific value. Much of it requires no binder for briquetting and in this form is extensively used for fuel for industrial and household use. Lignite has been playing an increasingly important role in German

[1] Mineral oils are hydrocarbons, *i.e.*, compounds of hydrogen and carbon. Coal is mainly carbon and the chemist's work is to provide cheap hydrogen and combine it with coal to make oil. The following quotation is from the U. S. Department of Commerce:

"Through its synthetic nitrate process, the Dye Trust produces unlimited quantities of hydrogen, which, having been so far a surplus by-product, is now used in hydrogenating 1,000 kilos of raw lignite coal into 490 kilos of coal oil, 210 kilos of gas, and 300 kilos of tar residue. Under this process the 490 kilos of coal oil will be separated into 350 kilos of heavy oil, 80 kilos of heating oil, and 60 kilos of grease oil. The 350 kilos of heavy oil can be further separated into 150 kilos of benzine and 200 kilos of Diesel oil."

industry. The tonnage output since 1922 has averaged higher than the production of bituminous coal, and the country as a whole accounts for over three-fourths of the world's annual lignite production.

The high water content, low heating value, and the tendency to crumble when dry, for some time retarded its exploitation, although it has been in use for more than three centuries. Like the water power of the adjacent mountains, extensive use of the brown coal had to await the perfection of long-distance electrical transmission. This, together with the earlier invention of the briquetting press (1858), enabled it to come into its own. Although German lignite is generally reckoned as having only two-ninths of the heat value of bituminous coal, four-fifths of the deposits can be worked from the surface, mostly by machines and unskilled laborers. The number of workers used in 1925 in exploiting the bituminous coal was five times that required to extract about the same amount of lignite, so that cheapness of production compensated in part for low quality. The present output is equivalent to about 33,500,000 tons of bituminous coal, and, since it is practically all used domestically, releases that much additional of the superior fuel for the export trade.

Lorraine Iron Ores.—About 150 miles south of the Ruhr lies the Lorraine iron-ore district whose deposits are located along the drainage lines of the Meuse and Moselle, two tributaries of the Rhine. About 95 per cent of the ores are now in France, the balance in Luxembourg (Fig. 201).

While these ores were one of the earliest deposits of Europe to be used for iron making, their modern exploitation on a large scale for steel is but a half century old. During the first three-quarters of the nineteenth century England dominated the steel industry. The acid Bessemer process, then in use, required ores lacking, or low, in phosphorus. Not until the invention of the basic process about 1880 were the Lorraine ores with their high phosphorus content utilized, and Germany with Ruhr coke and Lorraine ore became a great iron and steel maker, by 1900 surpassing Britain. The district in 1913 supplied one-third of all the metallic iron produced in Europe. The ores are of rather low grade, averaging about one-third metallic iron. However, the great extent of the deposits, their regularity and uniformity, their accessibility to coking coal and to the sea, and the cheapness with which they can be extracted have combined to give them a major role in the European iron and steel industry.

Relation to Tributary Coal Fields.—Furthermore the ores are exceptionally well placed with respect to coking coal. Some six fields containing about 86,000,000,000 tons of coal lie within a radius of 150 miles with excellent transportation facilities both by rail and water (Fig. 65). One of these is the Westphalian field upon which the chief dependence for coking coal is placed, over two-thirds of the total coming from that

source, the Meuse and Moselle valleys with the Rhine providing well-graded routes between the two. Here the bulk of the ore goes by rail, since the double handling necessitated by a water haul makes land transport for such a short distance more economical. Much coal and coke are brought back to Lorraine as a return load and used to smelt the lower grade ore there, so that large iron and steel industries have grown up in both districts.

Relation to Political Boundaries.—Prewar movements of coal, coke, and ore were directed by economic rather than political considerations,

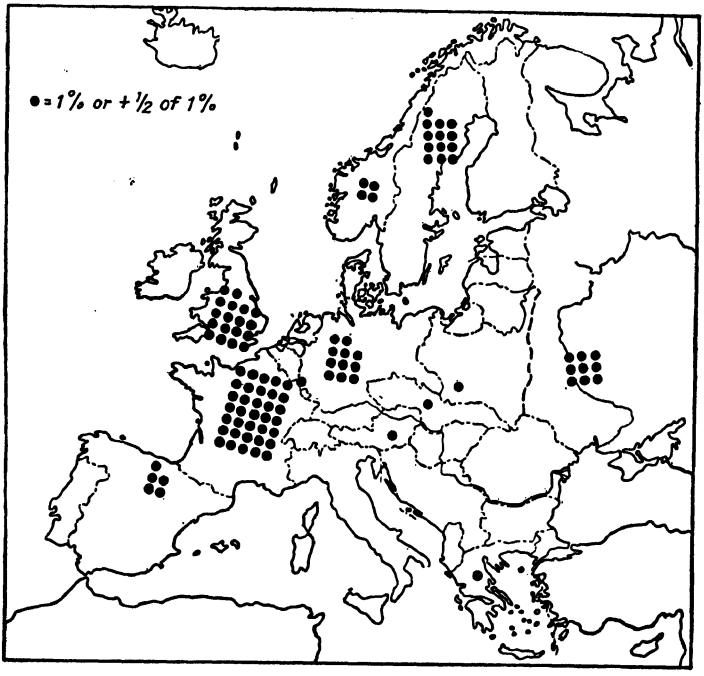


FIG. 201.—Distribution of iron-ore reserves based upon actual iron content as a percentage of total metal iron of Europe.

so that they had developed an efficient and profitable integration of the mining and manufacturing industries which the changes in boundaries and tariffs disrupted. The easy accessibility of the Ruhr to tidewater makes it possible for high-grade ores from Sweden, Spain, and north Africa to be brought in. Large amounts of Swedish ore were imported even before the war and the proportion was greatly increased during the abnormal post-war years. Recently over one-half of the total German imports of iron ore have been from Sweden.

While boundary changes, tariff walls, and nationalism have tended to disrupt the old interchange, it seems probable that eventually the old relations will be reestablished, since mutual cooperation is to the advan-

tage of all concerned. In the meantime Westphalia possesses one great advantage for she can import from other lands if Lorraine ores are not available. The loss of iron ores by Germany is serious only when and if nationalistic aims prevent the natural interchange of coal and iron. Her coal, her industrial plants, her labor supply and genius for work seem to insure her an important place in the European iron and steel industry. Indeed, the trend of production since the transfer of Lorraine has been upward even surpassing immediate prewar figures (Fig. 199).

Of her own iron ores those of Siegerland are most important. They are of high grade, contain considerable manganese, are close to the Ruhr, and, with the Weser deposits, provide the bulk of Germany's production.

MANUFACTURING

The Industrial Revolution in Germany.—In the 40 years prior to 1914 Germany was transformed from a predominantly agricultural country into one of the world's leading manufacturing nations. Britain's industrial revolution had preceded that of Germany by the larger part of a century, but the phenomenal speed of the latter's development compensated in part for her tardy beginning. By 1914 she had come to seriously dispute with Great Britain the industrial leadership of Europe.

Factors, Human and Geographic, Influencing Industrialization.—Of the various factors which have been responsible for this rapid change, the human is undoubtedly the most important. The population is large and the people have been schooled, by a none too kindly environment, to hard work and thrifty habits. Many of their leaders were far sighted and wise enough to realize the value of technical training and the necessity for a scientific exploitation of the country's resources. The government took an active interest in industrial and agricultural activities. Through its control of the railways and the fixing of rates, through its active participation in many of the larger corporations as a shareholder, through the giving of bounties and the adjustment of tariffs and export quotas, and through laws which compelled various operators to join a syndicate whose control it shared, it identified itself with the industrial, agricultural, and commercial activities to a degree unknown in the other large countries. Rich rewards were found in the application of science to industry, in the encouragement of scientific and economic research, in technical education, and in the aid given to state-owned railways and a subsidized merchant fleet.

Of the natural conditions which favored the transformation, large supplies of excellent fuel and a varied and fairly abundant supply of raw materials have been major factors. The country has been fortunate in possessing outstanding resources of coal, iron ore, potash, zinc, salt,

and pottery clays, together with moderate amounts of lead and copper. Meagerly endowed with forests and water power, it was upon her large coal and iron ore deposits, the scientific skill of her technicians, and the industry and thrift of her laboring class that Germany reared her industrial structure.

Germany as a Chemical Laboratory.—It is in the manufacture of chemicals that she has made her most distinctive reputation among industrial countries. The scientific attitude of her people, their emphasis on technical education, and the presence of certain basic raw materials have combined to make her the world's largest exporter and, with a single exception, the greatest producer of chemicals, with an output in recent years valued at more than $750,000,000. In 1928 these industries employed 400,000 workers and used 1,000,000 horsepower of energy.

Application of Chemistry in Other Fields.—The extensive development of tanning, brewing, and distilling; of the manufacture of drugs and medicines; of explosives, glass, fertilizers, soaps, artificial silk, steel alloys; and of the liquefaction of coal, reflects the widespread activities of the chemical laboratory. There is hardly a field in which the application of chemistry has not been of great advantage. German agriculture, through the use of commercial fertilizers, the improvement of the quality of its products, and the industrial utilization of its crops has been revolutionized by the chemist. The synthetic manufacture in the chemical laboratory of many of the world's raw materials promises to make the country independent to a considerable degree of producing areas. Among the most striking examples of such are synthetic nitrogen, camphor, rubber, gasoline from coal, and dyestuffs (Figs. 62–64, 98–100). In certain lines, such as coal-tar dyes and potash salts, prewar Germany had virtually a monopoly. Of the former she contributed three-fourths of the world's supply and furnished the intermediaries for the rest. She accounts today for the largest output of salt, and is the world's chief producer of nitrate (36 per cent of world's total, 1925). Because of greater competition in chemicals developed during the war, Germany's position is now relatively less important than in 1913, particularly in the case of dyes whose production had, by 1925, been reduced by one-half and the exports by two-thirds.

Recent Trends in Industrial Development.—The World War, resulting in serious losses in industrial resources, man power, and foreign trade, seriously checked industrial growth. There still remains, however, the potash, industrial equipment, competent workers, and, most essential of all, the coal. With these assets there should be little question of future industrial strength.

There has been in recent years a marked trend toward the increased use of machines and a corresponding reduction in hand labor. While Britain's per capita use of power still exceeds Germany's, the latter has

the greatest total consumption. The extensive use of lignite and water power, both of which require conversion on the immediate site, involves the extensive use of electrical transmission. In this field Germany has had a phenomenal expansion since the war, now producing more electrical power than any other country in Europe. Of the total current produced in 1924, over three-fourths was from coal and lignite and less than one-fourth from water. With the last, Germany is only moderately well endowed, but has developed somewhat over one-half of her potential hydroelectric energy. About 60 per cent of that exploited is in the southwest, in the sub-Alpine region where the dissected plateau furnishes many power sites and where good coal is scarce. Exploitation of this resource has been in many cases a by-product of the development of the German waterways system.

Distribution of Industries.—With widespread technical training emphasizing human skill rather than raw materials and fuel, industries have a tendency to scatter over the country as a whole. It will be seen however, that the great bulk of the establishments are in the southern two-thirds of the country (Fig. 202).[1] Furthermore, within this region there is marked concentration in three different areas:

Saxony.—The first, south central, district includes the territory between the Erzgebirge on the south and Hannover-Berlin to the north. Saxony, in the southern part of the district, has for centuries been famous for its industry, based in part upon the great wealth of minerals from the Erzgebirge, in addition to coal and water power. Near Dresden occurs the kaolin from which the famous Dresden china is made. Leipzig is one of the world's great fur centers as well as a famous publishing city. Although many of the ores are now exhausted, Saxony remains a prominent textile producer, and one of the most densely populated sections of Europe. It possesses 360 technical schools, 40,000 industrial plants, 13.7 per cent of all the factory workers of the republic, and over 30 per cent of the textile workers. Farther north are vast deposits of lignite, potash, and rock salt, while copper is mined at Mansfeld in the Harz. Agricultural crops, such as potatoes and beets, provide additional raw materials for industry.

Ruhr-Lorraine.—The second area of concentration, that of the Ruhr, is really a part of the Ruhr-Lorraine industrial region, where steel making predominates. It was considered more fully in connection with the coal and iron resources.

[1] It should be kept in mind that in addition to the output of the large industrial plants shown on the map, there is a considerable production from smaller plants and from household workers, especially in textiles, toys, jewelry, and similar articles which lend themselves to small-scale, often intermittent, household industry. In 1925 the average of all German factories had 20 workers as compared with 60 in the United States.

Bavaria.—The third section of industrial activity, less important than either of the others, is found on the upper Rhine and the Bavarian Plateau. There are no considerable deposits of coal or mineral raw materials, but since agricultural resources are very scant, industry seems, as in Switzerland, to be the best solution of the problem of making a living, utilizing the large supplies of water power and timber available. In view of the limitations imposed, the manufactures are characterized

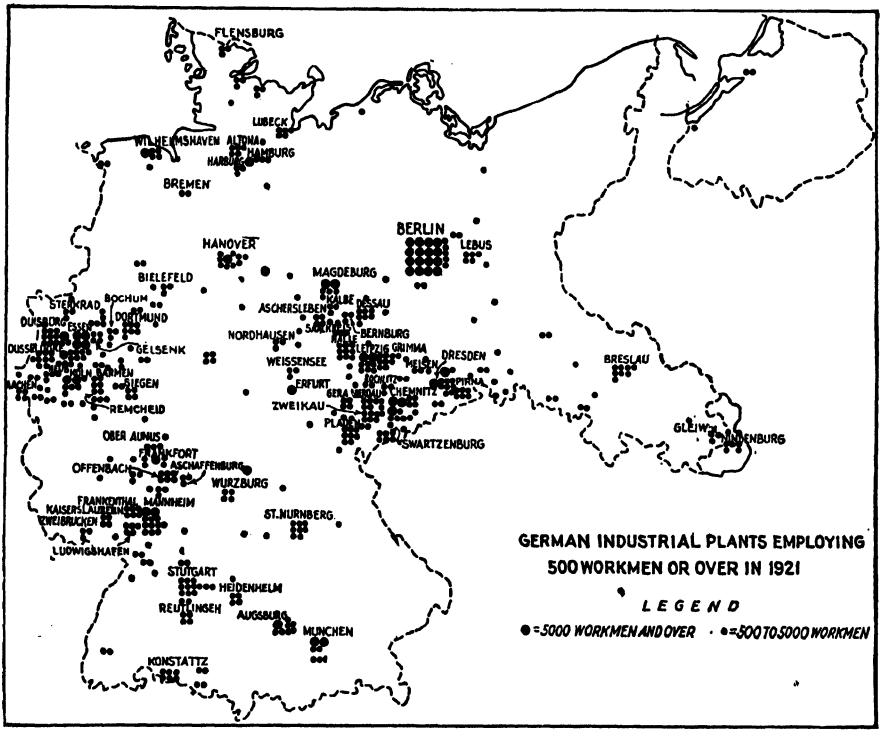


FIG. 202.—The major industrial centers occur mainly in three regions: (1) the lower Rhine, (2) Bavaria, and (3) Saxony.

by their high quality rather than cheapness, their value being based on the great amount of skilled labor involved and not on the quantity of fuel or raw materials needed. Thus Nürnberg is the world's toy center, Pforgheim specializes in jewelry, and München, supplementing water power with coal brought up the Rhine, uses the superior hops and barley grown locally for her world-famous breweries.

TEXTILES

An Important Textile Manufacturer.—The position of the textile industry in prewar Germany was similar to that in Great Britain. It ranked next to iron and steel in importance, employed one-eighth of the

entire industrial population, and its exports totaled almost a quarter of a billion dollars. In 1929 Germany was surpassed in cotton spindles only by Great Britain and the United States.

FORESTS

Forests Carefully Conserved.—Although resources are of moderate importance, Germany leads the world in scientific forestry. Threatened in the eighteenth century with disaster through the destruction of their forests, then their sole fuel supply, the Germans were forced to conserve their trees and provide a permanent wood supply for the future. These early measures consisted in dividing the wooded areas into 80 to 100 equal parts, only 1 of which could be cut each year. With the discovery of coal in 1850, the fear of a fuel famine was removed, but by that time the public attitude toward forests had become so well established that forest preservation was continued to provide timber resources.

About one-fourth of the country is better suited for tree growth than for cultivation, and these areas are largely devoted to such culture. Forests are treated as crops, the selection of trees, the density of the stand, the cutting of mature timber, and its replacement are regulated by law. Reckless cutting or waste is prevented and the harvest restricted to the annual growth. As a result of this care the nation has been able to supply about two-thirds of her timber needs from her own forests.

About one-fourth of the total forest is owned by the peasants as wood lots, one-half by states or municipalities, and the remaining one-fourth is on large estates, with the chief production from the last two. All forests, both public and private, are open to all the people at all times. Those owned by cities serve as great playgrounds and recreation centers made to yield an income rather than to be a drain on the public treasury. German forests are an object of national solicitude and popular opinion is practically unanimous in behalf of their maintenance. Their forestry methods have become a model for many other countries, where a rational system of land utilization is being developed.

TRANSPORTATION

Germany's rapid industrial and agricultural development has been closely linked with the growth of its transportation system. It ranks third in railway mileage among European countries and possesses a comprehensive system of waterways unrivaled anywhere (Fig. 203). Both are largely government owned or controlled and have been made to cooperate and supplement each other most effectively.

An Extensive Inland Waterway System.—The present inland waterway system comprises 6,252 miles of navigable rivers and 1,383 miles of canals; a total length about one-fifth that of the railways with traffic in about the same proportion. The inland fleet of approximat ly 25,000

vessels carried, in 1925, 85,700,000 tons, an amount over twice that on the French system. Some of the ports handling this trade are as busy as seaports. Thus Duisburg-Ruhrort handled almost 23,000,000 tons and Berlin, 10,000,000 in 1925.

The north German lowland, crossed from south to north by a series of long navigable rivers, provides an excellent natural setting for waterways development. The government has expended hundreds of millions of dollars in improving these rivers and joining them into a connected



FIG. 203.—The completion of canals now under construction will provide a remarkable system of inland waterways from east to west entirely across Germany. (*U. S. Department of Commerce.*)

system. Practically all the navigable waters of the country should be classed as "canals," since even the larger rivers have been much changed to meet the needs of modern transportation.

That the waterway system so built has been as economical a carrier as the railways, all costs considered, seems open to serious doubt.[1] Certain of them, such as the Dortmund-Ems and the Kiel canals, have been disappointments financially, but are distinct assets during wartime. Whatever motives may have actuated their construction, the canals

[1] The whole of the capital investment and 60 per cent of the maintenance and administrative costs were in prewar years paid by the public treasury.

and the railways have been used most effectively by the government to stimulate the industrial and agricultural growth of the country.

Main Rivers Internationalized.—The chief rivers of the lowland—the Rhine, Weser, Elbe, and Oder with their improvements—facilitate north-south traffic, while the Danube provides a backdoor exit to south-eastern Europe. All of these rivers, except the Weser, serve other countries as well as Germany and, with the Kiel Canal, have been internationalized. Their administration by an international committee prevents their monopoly by a single power and is especially important for inland countries such as Switzerland and the succession states.

Canal Links Provide East-west Facilities.—Transportation between the industrial west and agricultural east called for the linking of the main streams by canals. For these the east-west valleys carved by streams which ran along the front of the former ice sheet, while the latter blocked the natural outlet to the sea, have provided excellent routes. The canal connecting Berlin and Magdeburg, for example, occupies such a depression. With the completion of the Weser-Elbe Canal now under construction there will be provided a continuous waterway from the Rhine to the Oder and on to the Vistula.

Two other projects are under way: one for deepening the Neckar for some 71 miles to accommodate vessels of 1,200 tons; the second, the Mittelland Canal, is well advanced and will provide direct connections between the Rhine and the Berlin canal area. It is planned that thousand-ton boats will be able to reach the capital by 1931.

The Rhine.—The Rhine is one of the world's most important commercial rivers. Though not conspicuous for its length, its volume, or the size of its drainage basin, it has carried, in a normal year, over five times as much traffic as the Danube and half again as much as all the other rivers of Germany combined. It is of major importance to five countries.

The conditions which have favored its extended use are:

1. Its comparatively even flow and freedom from prolonged freezing.
2. Its location in a densely populated industrial region whose raw materials and coal require cheap transport.
3. Its use as a link in two of the most important routes across Europe.
4. The location of its mouth in the world's busiest water—the North Sea.
5. Extensive artificial improvements such as deepening, straightening, and the building of many terminals and artificial harbors. In addition canals have connected the Rhine system with the basins of the Rhone, Sarre, Scheldt, Meuse, and Danube.

Sections of the Rhine.—Within Switzerland the Rhine is of little commercial importance. It rises in a glacier on the flanks of St. Gothard only 12 miles from the source of the Rhone. After passing through the Boden Sea, where it leaves its sediment load, it runs westward to

Basle forming the boundary between Switzerland and Germany. This international section is full of rapids and falls suited for power but of little use for transport. Basle, just within the Swiss frontier, is usually

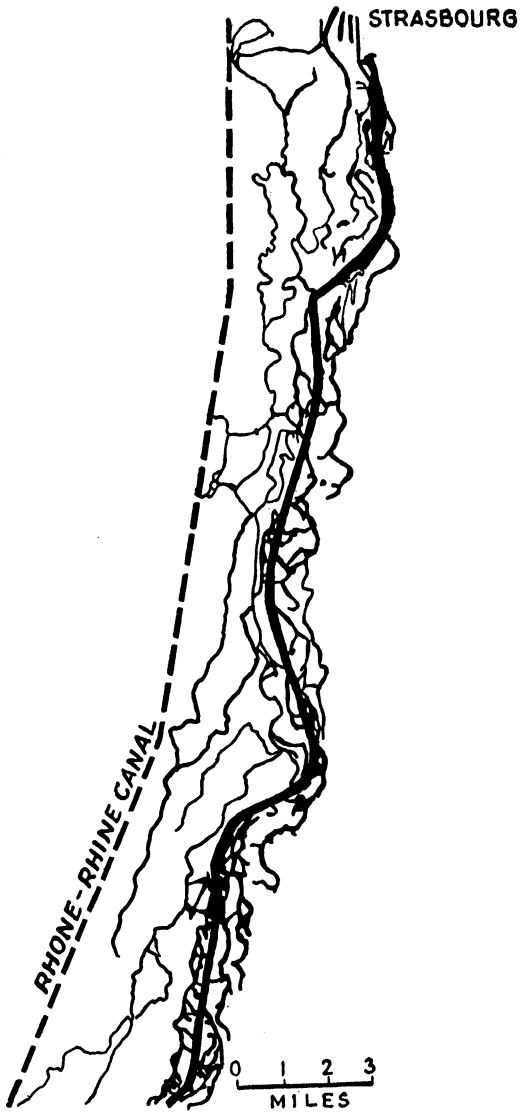


FIG. 204.—Rhine River south of Strasbourg showing straightened and deepened channel, also the Rhone-Rhine Canal. This is in the graben. Most of the traffic here uses the canal rather than the river.

considered the head of navigation, but, as a matter of fact, the water-borne traffic of that city port is very small. In 1924 it was only about 1 per cent of that using the railroads entering and leaving the city. The

valley from Basle to Mannheim is a naturally graded thoroughfare for railroads and of far greater importance commercially than the stream itself.

From Basle to Bingen where the river meanders over the flood plain of the graben valley, the course has been much altered by straightening the channel (Fig. 204). Above Strasbourg, the traffic uses the Rhone-Rhine Canal rather than the river itself. The depth of the channel varies from 6.5 feet at Mannheim to almost 10 feet below Köln. The gorge section from Bingen to Bonn is so narrow as to afford scant room for railways beside the channel, but below it the river again winds back and forth over the broad European lowland reaching the North Sea through Netherlands, which is largely delta built by the river. On one of its distributaries lies Rotterdam, while other commercial outlets are Anvers and Amsterdam—all three leading world ports.

A Link in International Water Routes.—In its upper course the Rhine is joined by canals with the Rhone and, by way of the Main, with the Danube. The Rhone-Rhine Canal parallels the Rhine through the upper part of the graben, crosses the Burgundy Gate where it reaches an elevation of 1,150 feet and joins with the Saône which connects with the Rhone at Lyons. The Rhone-Saône is also connected with the other French river systems by canals.

The Main and Danube were joined almost a century ago by the old Prince Ludwig Canal, but its small size, which limited it to vessels of 120 tons, and its steep gradient, which required 100 locks to surmount the high divide, made it an easy victim of competing railways, so that its chief interest for many years was historic rather than economic. There is at present under construction a new Main-Danube Canal which proposes to accommodate vessels of 1,500 tons, the new route differing considerably from that of the old canal. Fifty-two locks and dams will be needed, for the canal must rise almost 1,000 feet above the lower Main and 400 feet above the Danube at Passau. The completion of the project promises to mark an important step in trans-European traffic; while the water power developed (1,475,000,000 kilowatt-hours) will be an important factor in the industrial exploitation of a region of scant coal supplies.

In its lower reaches the Rhine is joined by means of the Rhine-Marne Canal with the Marne, by the Dortmund-Ems Canal with the North Sea at Emden, and by other canals with Anvers. The Dortmund-Ems waterway was intended to furnish an outlet entirely in Germany territory but has failed to divert much from the parent stream.

Traffic.—It is estimated that in normal prewar years there were over 10,000 vessels navigating the Rhine. Below Mannheim the river was a busy thoroughfare with trains of four or five barges towed by powerful tugs as the most common carriers, and coal, iron ore, stone,

cement, and lumber constituted the main tonnage. All told, traffic on the river and associated canals in 1925, 57,000,000 tons; upon the Elbe, 12,500,000.

FOREIGN TRADE

High Rank in Foreign Trade.—Germany's foreign trade, as a copartner of her industry, came late but, like it, rose rapidly. By 1914 she had become one of the three great commercial nations of the world, with a foreign trade of some $5,000,000,000 annually, one-eighth of the combined total of all countries.

Imports Normally Exceeded Exports.—In the matter of self-sufficiency in raw materials she occupied an intermediate position between Great Britain, twice as dependent, and the United States, far more nearly self-sufficient. Her foreign trade, however, was consistently unbalanced, imports exceeding exports by from $200,000,000 to $400,000,000 annually. But "invisible exports," among which were $100,000,000 income from the carrying trade, $25,000,000 earned by her railways on transit freight, almost $250,000,000 received as interest on foreign investments, and $60,000,000 in commissions earned by her banks and other financial institutions abroad, more than compensated for the difference and left a considerable amount for increasing her foreign investments.

Chief Trade via North Sea.—In spite of the country's long land frontier, as early as 1900, 70 per cent of her foreign trade went over the sea. In view of the importance of the maritime traffic, Germany's coast must be considered rather unsatisfactory. The land is low, much of it bordered by marsh and dune; spits and lagoons fringe the coast, while the absence of strong tides in the Baltic and the sediment-laden rivers favor the formation of deltas. Furthermore, both rivers and harbors east of Denmark are badly handicapped by ice, but the former, in spite of their disadvantages, offer the best harbor sites available. In 1912 almost one-half (46 per cent) of Germany's exports to Great Britain moved via foreign ports, chiefly Dutch and Belgian.

While the Rhine is the river most used for interior transport, the fact that its lower course lies in a foreign country is a marked disadvantage to Germany. In spite of this, however, there is a tremendous foreign trade carried on by way of that river, using the ports of Rotterdam and Anvers. The Elbe opening into the North Sea ranks second only to the Rhine in inland traffic and has in Hamburg the greatest German port.

Hamburg.—Not only is the tonnage through Hamburg greater than that of all other German ports combined, based upon volume and value, but it is much more diversified and widespread than that of any of its domestic rivals. In addition to a highly advantageous position, it has had the benefit of wise economic and political leadership. Cheap and efficient transport, both land and water, link it with the sea and with

the highly industrialized portion of middle Europe. It should be noted, however, that Hamburg's commercial relations with the great Westphalian industrial district are less close than are those of Anvers and Rotterdam. The Rhine is the great natural gateway for that region despite international frontiers. The Hansa Canal, mentioned elsewhere, represents an attempt to divert some of this traffic through the Elbe mouth. Hamburg in 1913 was the leading port of Europe, based upon the tonnage of vessels, and ranks among the leading half dozen such in the world.

As a consequence of their advantages, the North Sea ports of Germany handled four times as much tonnage in 1913 as did those of the Baltic. Hamburg accounted for half of the North Sea coast movement, followed by Bremen, Bremenhaven, and Emden. For the Baltic Coast, Stettin, Rostock, and Sassnitz led.

Merchant Marine and Aircraft.—The promotion of a large foreign trade was one of the principal planks in the German industrial expansion program, with shipbuilding as one of the country's major industries. At the outbreak of the war it possessed almost 5,000,000 gross tons registered. The World War affected commerce to a greater degree than any other of her activities. During the war the blockade practically stopped all overseas trade and the peace treaty required her to surrender most of her shipping to the Allies to replace that sunk by submarines. After these deliveries there were left, in 1920, only about 500,000 tons, which, by 1927, had been increased to almost 3,500,000. Germany in 1928 occupied sixth place among countries in merchant marine. Furthermore, as a newly built fleet, the ships are mostly modern oil burners. It is interesting to note that the building program calls for cargo carriers of smaller size than the average prewar boats, as the former are considered more economical.

Though restricted in the matter of military aircraft production, Germany is the leading European country in commercial aviation. Measured by government appropriations, by annual miles flown, or the passenger traffic, Germany has thus far outdistanced her nearest competitor, France (Fig. 85).

Through its well-organized consular service, its preferential railway rates on goods destined for export, its large foreign investments, and the close cooperation between its banks and industries, Germany has built up a post-war foreign trade second only to the United Kingdom in value.

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CHAPTER XV

SWITZERLAND

PHYSICAL FEATURES

Physiographically Switzerland consists of three well-defined regions: the Jura Mountains in the northwest occupying about one-sixth of the total area; the high Alps in the southeast, covering one-half of the surface; and between the two the plateau, which, though possessing only one-third the area, contains two-thirds of the population and is the heart of the nation.

The Juras.—An outlier of the western Alps, the Juras are a series of parallel ranges whose rain-soaked slopes, favoring the growth of forest and grass, afford a basis for an extensive dairy industry, including among its products the world-famous Neufchâtel cheese. The chief occupation, is, however, the working up of metal and wood into small but valuable articles easy of export, such as watches, toys, and jewelry.

The Plateau.—The plateau with an average elevation of about 1,400 feet, the home of most of the Swiss people, is a continuation of that of Bavaria. Its surface is covered with glacial drift, while moraine-dammed valleys contain many lakes. The two largest are Lac Leman (Geneva) and Boden See at either end. Nearness to the hydroelectric power plants of the Alps has favored industrial progress so that manufacturing, along with forestry and agriculture, here reach their highest development. The fairly level surface, its chief asset, naturally allows easier communication, and a network of railways serves the plateau. Proximity to Germany and the easy route via the Rhine valley make Basel, just north of the Juras, a great commercial focus, one of the chief railway centers of Europe. Foreign trade moves chiefly across Germany, using Rotterdam, Anvers, or other North Sea ports.

The Alps.—The Alps, shared with Austria, form the connecting link between the Apennines and the Carpathians (Fig. 205). Beginning at the Gulf of Genova, they curve west, north, then eastward, for about 750 miles, terminating where the Danube separates them from the Carpathian system to form the Austrian Gate. In the west they are narrow, but eastward they divide and subdivide until in Austria there are some five major ranges. The system consists of a central core of crystalline rock, originally flanked on both sides by limestone. On the south side, west of Lake Maggiore, this limestone is now gone, and the slopes from the Alps to the plains of the upper Po are consequently very abrupt.

Farther east in the Tyrol and along the whole northern side of the mountains the junction with the plains is marked by plateaus.

The main ridges are separated from each other by valleys with a general east-west trend. Thus the upper Rhone and Rhine occupy

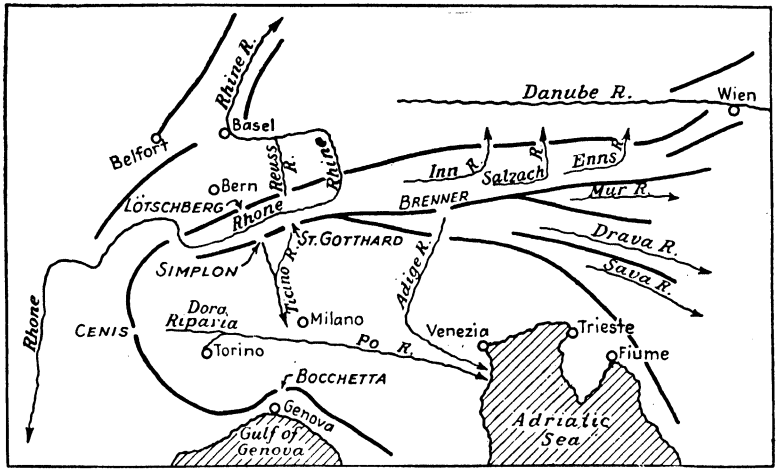


FIG. 205.—Diagrammatic sketch of the Alps showing main ranges and the breaks which provide passes and favorable tunnel sites.

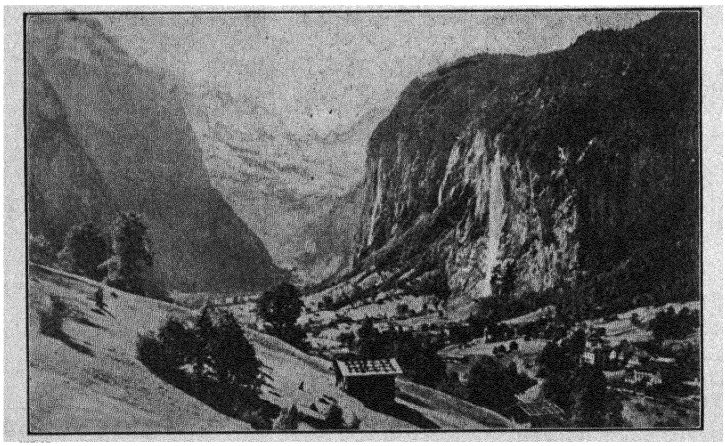


FIG. 206.—Lauterbrunnen, near Interlaken. An excellent example of a U-shaped Alpine valley with tributary hanging valleys marked by waterfalls.

the depression marking approximately the division between the crystalline core and the northern limestone ranges. The corresponding valley at the south is occupied by the Drava.

Fortunately there are many transverse valleys cutting across these ranges, depressions of great significance in providing routes for transportation across the Alps. The St. Gotthard, Simplon, Brenner and others have been famous thoroughfares for centuries, although today tunnels

underneath most of them care for the bulk of the traffic. While the Alps serve as a commercial barrier between the north and the south, they possess, on the other hand, valuable assets in their scenic attraction, the entertainment of tourists providing one of the chief sources of income, as well as in their water power, the keystone of the Swiss industrial structure.

The river valleys are U shaped in cross section, a result of ice erosion. Many tributary valleys, less actively eroded, are left at much higher levels so that branch streams must drop over steep cliffs from these "hanging valleys" to the main channel often several hundred feet below. These falls (Fig. 206), provide an unusual head of water as well as an

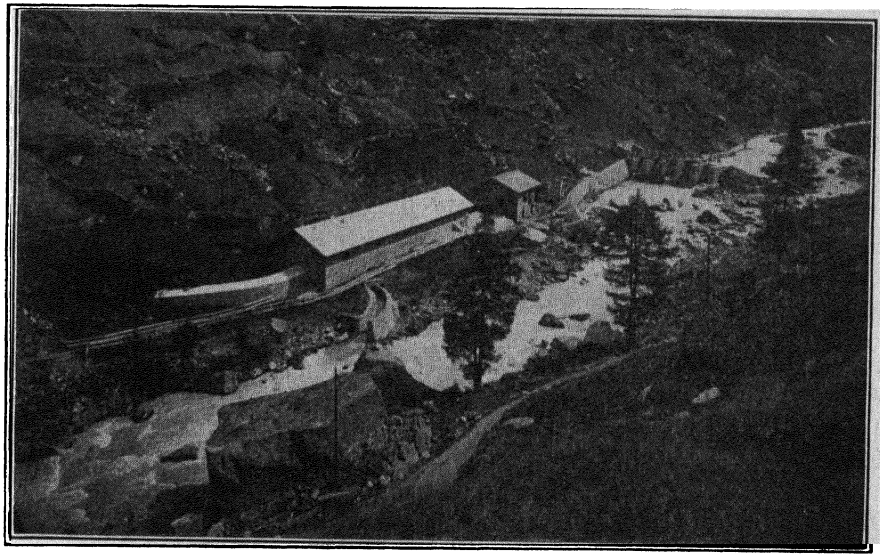


FIG. 207.—Power station on the Lonza. Intake and sand-separating plant at Balen (Wallis) on the Viege River of Saas. (*From Guide to Swiss Hydraulic Developments.*)

attraction for the tourist, while the lakes not only add to the scenic setting but also regulate the stream flow and serve in a small way as transportation routes.

Water Power.—Aside from the scenery, water power is the one outstanding natural resource of Switzerland—the natural pivot about which the whole system of national economy revolves. It is the motivating factor in Swiss industrial life, the power which moves the bulk of their transport, and in addition, is becoming an export commodity of considerable significance. In perhaps no other country, with the possible exception of Norway, is the future of the economic life of a nation so bound up with the utilization of water power.

Climate, topography, and economic conditions have combined to form a natural setting for this form of energy development scarcely

duplicated in any other country. The great height of the Alps results in (1) an unusually heavy precipitation, (2) low temperatures, (3) extensive glaciers and snow fields, and (4) steep gradients in whose descent the streams may be harnessed (Fig. 207). About one-tenth of Switzerland's surface is occupied by lakes, ice, and snow fields. Even where such natural lakes are lacking, the narrow gorgelike valleys,

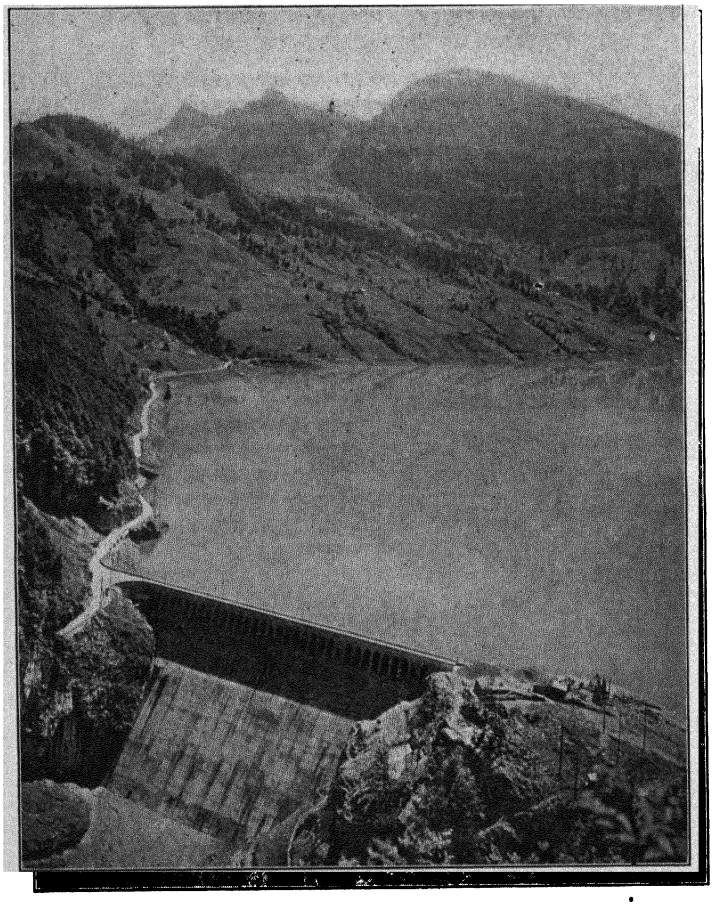


FIG. 208.—Power station near Zurich. Note the admirable site requiring a minimum of dam construction. (*Courtesy of Nordosschweiz. Kraft-werke A. G.*)

admitting of easy damming, afford favorable conditions (Fig. 208). These power sites are located close to the Swiss Plateau where the industrial life is centered, so that transmission losses are small. Realizing the fundamental importance of this resource to the nation as a whole, the Swiss have developed a wise policy of conservation and control whereby water power has become a national asset yielding a maximum return to the whole population.

These exceptionally favorable natural conditions and their energetic and wise exploitation have not only made water power an element of prime importance among Swiss assets, but have given the country a high rank among nations in development (Fig. 302). In spite of its small size, Switzerland ranks sixth among world countries in total developed water power, while she ranks first in the amount per square mile of area both developed and potential. In per capita electricity output the country is third, only the sparsely settled Canada and Norway exceeding it.

The rate at which the country is utilizing its "white coal" has shown a remarkable increase. The solution of the problem of long-distance electrical transmission in the nineties of the last century opened the way for exploitation of sites in relatively remote locations. By 1925, 96 per cent of all Swiss hydraulic power was transformed into electricity and nearly all was used at some distance from the site.

In the use of current in 1923, light, power, and heat consumed 55.5 per cent; the railways 9.0 per cent; electrochemistry and electrometallurgy 18.7 per cent, while export accounted for 16.9 per cent. By 1926, 90 per cent of all Swiss houses were electrically lighted, and 3 years later it was estimated that 95 to 98 per cent of all machines and two-thirds of the railway trains were driven by hydroelectric energy. Electrification is so complete in some cantons that practically every house and most of the barns are supplied with current. The per capita consumption of electricity in Switzerland more than doubled from 1913 to 1925 and is now the third highest of any country of the world.

While the peak of power production is reached in the summer and that of consumption in the winter, the problem of adjusting the one to the other is not so serious as in Italy. This is being accomplished by linking the various sections of the country, increasing the storage, reducing rates during seasons of greatest stream flow, and also by exporting current, especially during the period when Switzerland can not use it all to advantage.

MANUFACTURING

A Highly Industrialized Country.—In spite of its inland position and its dearth of raw materials and fuel, Switzerland is a highly industrialized country, 44 per cent of the nation's workers being engaged in manufacturing, the highest proportion of any country in the world (Fig. 209). Only about one-fourth of the people employed are agriculturists—slightly less than in the United States (Fig. 316). The proportion of the Swiss population producing raw materials has declined in the last 60 years from 46 to 28 per cent, while those engaged in manufacturing and commerce have increased from 49 to 63 per cent. This emphasis upon industrial development reflects a wise adaptation to their environment.

in silk gauze weaving from 6,077 to 2,908. These changes are also causing significant readjustments in the distribution of population and in the character of Swiss goods.

Industrial Specialties.—Dearth of coal and raw materials has encouraged the people to concentrate on the manufacture of articles in whose making the labor element plays a large part. Thus watches, clocks, jewelry, textiles, chemicals, printing, and fine machines have become specialties. The character of Swiss wares is reflected in a comparison of the tonnage value of their exports, the average value per ton of those from Switzerland in prewar days being over ten times that from Germany.

Textiles are the most important of the manufactured goods. The country is the leading producer of embroidery, and ranks high also in silk and cotton fabrics, indicative of the degree to which the moist climate, abundance of water power, and difficult transportation to world markets have combined to lay the emphasis upon human labor and products of high quality.

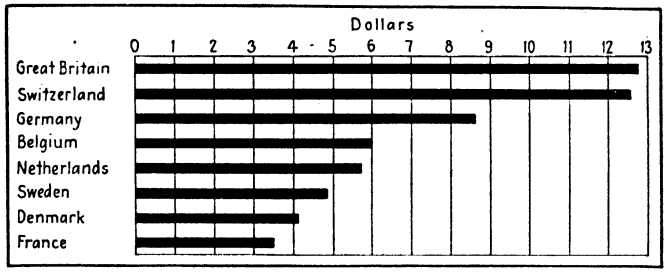


FIG. 211.—Per capita consumption of machinery in leading countries in 1924 or 1925.

Watchmaking is the traditional industry, originally household but now transferred to the factory, a change which has greatly increased the output, standardized the product, and facilitated interchange and repair. Especially in the Juras, where poor soil, severe climate, and isolation rigidly restrict choice of occupation, have watch, clock, and jewelry making offered an important means of livelihood. Practically the entire output is for foreign markets and Switzerland ranks as the leading country in export of watches and clocks. There are almost 1,000 small factories in the country, but there is a decided trend toward centralization of the industry. The average annual export is over 20,000,000 watches and parts, with a value exceeding $50,000,000. The government maintains technical training schools and also a testing laboratory where the better grades are inspected.

In contrast, Swiss chocolate, condensed milk, and cheese have the added advantage of local raw materials, at least in part. The first of these industries is interesting but not comparable in importance with the others mentioned. The average yearly export of chocolate is valued

at about $6,000,000; of milk and cream, about $10,000,000; and of cheese, about $18,000,000.

An interesting and growing industry is that of the manufacturing of machinery centered mainly at Zürich, and initiated largely in response to the needs of the domestic market for textile, water-power, and transportation equipment.

The general trend of occupation seems to be toward a greater and greater industrialization with a consequent increased dependence upon foreign supplies and markets. Water-power development is eliminating the need for part of the coal imports, and electrical distribution allows of decentralization of plants carrying lower capitalization and maintenance costs, similar to the situation in the Po basin.

International Aspects of Swiss Industry.—The great dependence upon neighboring countries for raw materials, markets, tourists, and all communication with the outside world causes political, financial, and economic disturbances in any of those nations to react upon Swiss prosperity. The extraordinary growth of nationalist feeling with high protective tariffs characteristic of post-war Europe has made the situation particularly difficult for Swiss industry—conditions which are not, however, necessarily permanent. That they have made a success of their industrial life is amply evidenced by the fact that they support a comparatively dense population, pay high wages, and maintain high living standards.

AGRICULTURE

Agriculture Limited.—Occupying the heart of the Alps, Switzerland is rich in scenery but poor in cultivable land. Almost one-half of the entire country is covered with forest and meadow, which thrive on the cool, wet slopes (Fig. 212). Peasant proprietorship is the rule and the farms generally small, the holdings, about 244,000 in number, averaging less than 15 acres each. The strip system is common, the average Swiss farm consisting of over 14 separate strips (Fig. 213). Though limited in extent, tillage is intensive and yields per acre comparatively large (Fig. 27). Next to dairy products, cereals and potatoes are the most important. Swiss agriculture is nevertheless insufficient to supply the domestic needs of a population mainly industrial so that a large annual import of foodstuffs is required.

Dairying.—Rural economy centers about the dairy industry and by careful breeding and rigorous elimination of the less productive, the individual cow's average milk output is, with the exception of Denmark and Netherlands, the highest of any country in the world (Fig. 184). The average milk production per cow is about a ton per year greater than that for our leading dairy states of Wisconsin and New York.[1]

[1] It is, however, considerably less than for American dairies where the cows are well-bred Holsteins or Jerseys.

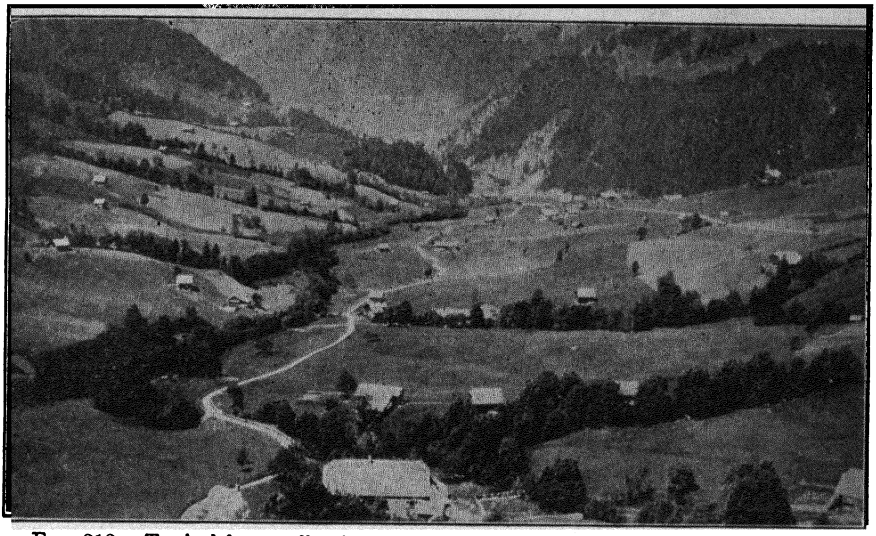


FIG. 212.—Typical farm valley in Switzerland. Valleys like this explain the devotion of the Swiss peasant to his farm home and its mountainous environment. (*U. S. Department of Agriculture.*)

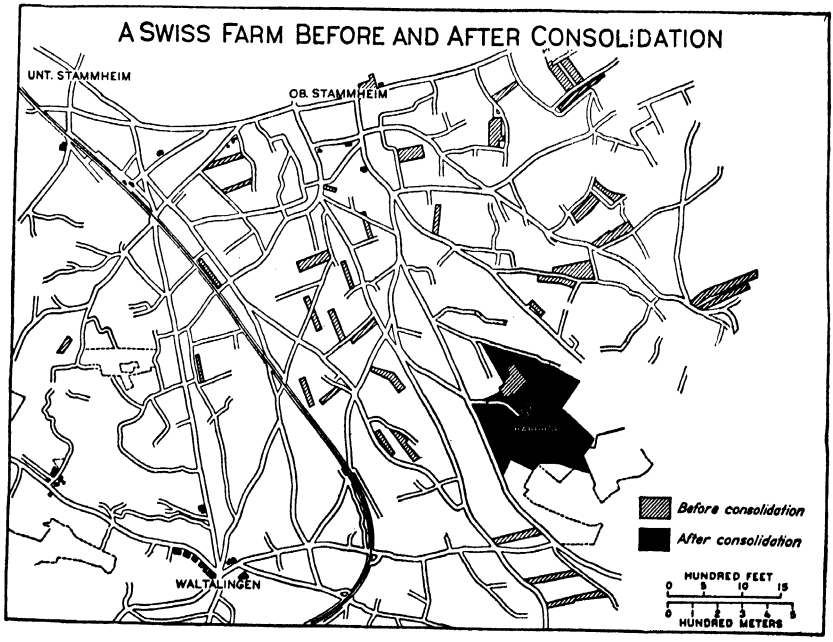


FIG. 213.—The average Swiss farm has a total area of 21 acres in 14 separate strips. (*U. S. Department of Agriculture.*)

As in other mountainous countries the higher meadows or "alps" are utilized during the summer months. These upland pastures are dotted with simple shelters in which the herder lives during the summer caring for the cattle and making cheese and butter which is sent down at regular intervals. Though this "transhumance" is a regularly established custom and serves as a valuable supplement to the valley pastures, it is estimated by Jefferson to contribute only about 6 per cent of the total animal foodstuffs.

The striking feature of the dairying is the large export of cheese, which has an almost world-wide reputation for quality. The isolation of many of the valleys and mountain pastures makes cheese the logical form in which the perishable milk may be marketed. In 1926 besides constituting an important part of the diet—26 pounds per capita—the highest in the world, cheese made up over one-half of the country's dairy exports. Condensed milk and milk chocolate are other important outlets, but until recently little attention has been paid to butter.

TRANSPORTATION

Topography Imposes Formidable Handicaps.—The mountainous topography of two-thirds of Switzerland naturally makes transportation relatively difficult and the construction and maintenance of roads and railroads expensive. The dependence upon foreign countries for raw materials, fuel, and markets, however, as well as the accommodation of the tourist traffic, puts a high premium on an efficient transportation system. Hence the nation has attacked this problem vigorously and has developed a marvelous network of roads and railroads (Fig. 214). Switzerland has today the greatest mileage of railway in proportion to her size of any European country, except Belgium and Great Britain. The 3,400 miles of railway represent an estimated outlay of about $750,000,000 or over $200,000 per mile, while the average expenditure for automobile roads is about $125,000 per mile.

The fact that the Swiss plateau, where the most of the people live, is a continuation of that of Bavaria makes communication with Germany comparatively easy. This part of the country also finds two natural avenues of approach through the Rhine and Rhone valleys. The latter leaves the plateau between the Juras and Alps at the western end of Lac Leman. It is navigable only from Lyon to the mouth, however, so that while the valley is convenient for rail traffic the water route is of little present importance.

The Rhine, on the other hand, is navigable up to Basle, although most of the freight between that city and Mannheim, or Strasbourg, goes by rail, the rapid current in this upper portion of the river making navigation difficult. The maximum river tonnage to date was reached in 1924 when 286,000 tons passed into and out of the Swiss port. The

chief interest in the Rhine lies in the use of the valley as a rail thoroughfare. The river and its valley provide the most direct route to the iron and coal of the lower Rhine and via Rotterdam and Anvers to overseas markets. In spite of the fact that the North Sea is twice as far away as the Mediterranean, the bulk of the foreign trade goes via the north, and the Rhine Valley is Switzerland's main outlet.

Railways.—Access to the south has been difficult owing to the Alpine barrier, yet it is highly desirable that the rich Po Valley be joined with the trans-Alpine region. Although the major relief trends east to west, there are a number of transverse valleys where these streams or their

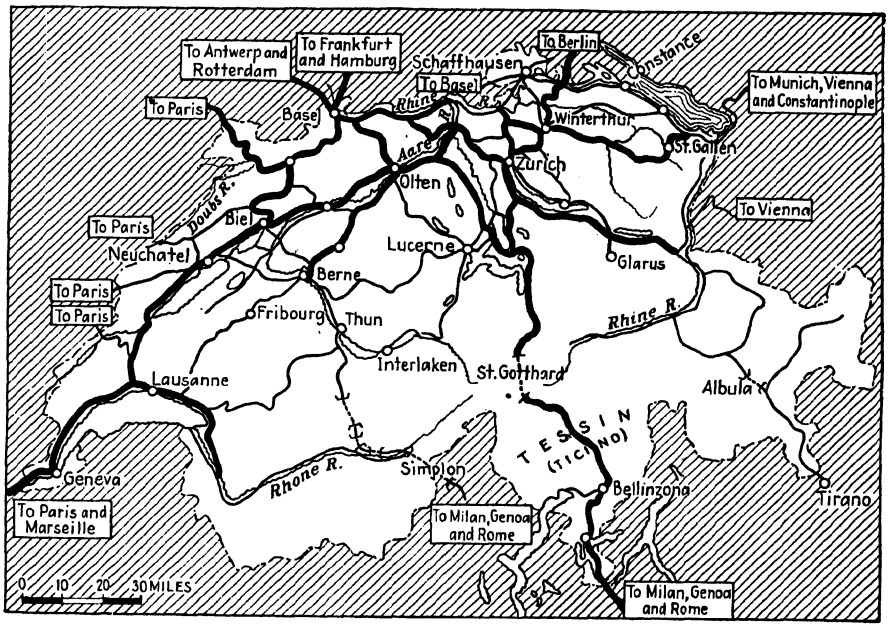


FIG. 214.—Chief routes across Switzerland. Note the predominance of the main railroads, *i.e.*, those with over 10 trains daily, on the plateau. (*Swiss Department of the Interior.*)

tributaries have cut across the main ridges. These passes have been much utilized and in recent years many have been supplanted by tunnels beneath them. Some of these, *e.g.*, the Simplon and St. Gotthard, are world-famous engineering feats and have shortened the time for freight traffic between the North Sea ports and Mediterranean coast to less than three days, and, for passengers, to two days. As a consequence of this intensive development of routes, the Swiss section of the Alpine system is much more densely populated than the Austrian portion.

A solution for the problem of motive power for the railways seemed to lie in the substitution of hydroelectric energy for coal, large amounts of which were formerly required. Speeded by the wartime coal shortage,

this change was actively pushed and, as a result, by 1929 two-thirds of the total mileage had been electrified and over 85 per cent of Swiss railway tonnage was moved by electrical power at an estimated saving of over 600,000 tons of coal. Electric traction is better able to negotiate the heavy grades and is obviously much superior for use in the long tunnels. The initial expenditure has put an enormous financial burden upon the roads but it will probably pay in the long run.

THE SWISS PEOPLE AND THEIR PROBLEMS

A Wise Adjustment to Environment.—Switzerland has a population about equal to that of Massachusetts, but an area twice as large. In view of its limited resources, the maintenance of 4,000,000 people with high living standards is a remarkable tribute to their resourcefulness, energy, and intelligence.

The central position, the lack of natural boundaries, and the existence of powerful neighbors have made themselves felt in many ways. There is no common language nor dominant religion, yet there is a strong national feeling. About 71 per cent of the population speak German, 21 per cent French, and 6 per cent Italian. A buffer state, they have not only avoided entangling international alliances which might sacrifice or impair their independence, but, with the aid of their natural defense, they have kept their own territory free from invasions when neighbors were at war. Tolerance and hospitality have marked their foreign policy and the country has long been a refuge for exiles and the home of many international organizations. The high repute in which she is held is a well-earned tribute to the human factor keenly appreciative of the possibilities of rather meager resources intelligently used.

Within the country the distribution of the population shows the same lack of uniformity which characterizes the relief, soils, climate, and accessibility. Genève canton, for example, has a density of 900 per square mile; some of the Alpine provinces, as low as 35; four cities count 100,000 or over, with a total of almost one-sixth of the Swiss population.

Tourist Traffic.—Swiss scenery, world famous for its beauty, has become one of the country's most valuable assets. About 500,000 foreign visitors sojourn there every year, and before the war over 35,000 tourist hotels with 43,000 employees provided for them. In addition, there were hundreds of clinics, sanitaria, boarding schools, and other institutions catering largely to foreign guests. Switzerland's capital investment in hotels is at present over $750,000,000, or nearly $200 per capita. Although the hotels are the largest single beneficiaries of the tourist traffic, transportation lines, communication facilities, and shops all benefit. It is estimated that this stream of visitors left, in 1925, not less than $80,000,000 in the country, a sum almost sufficient to cover

the excess of imports over exports. In view of the small size and population of Switzerland these figures assume large proportions.

The Swiss have done much to develop their scenic resource. Comfortable hotels and elaborate transportation facilities make the beauty spots easily accessible, and extensive advertising has helped make Switzerland "the playground of Europe." Obviously the tourist industry has certain inherent disadvantages: the traffic is highly seasonal, and since travel is a luxury, it depends much upon the prosperity and friendly attitude of other countries.

FOREIGN TRADE

Large Foreign Trade.—Switzerland has a foreign commerce far out of proportion to its size, population, or resources. In 1928 its value was about $920,000,000 or about $225 per capita, one of the highest in the world. Although Spain has about five, and Russia thirty-five times the population, their total purchases of foreign goods are about the same as those of Switzerland.

As we have seen, the imports are primarily raw materials, fuel, and foodstuffs, the exports, high-grade manufactures. With growing industrialization this trend is being emphasized more and more.

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CHAPTER XVI

AUSTRIA AND CZECHOSLOVAKIA

THE SUCCESSION STATES

Political Background.—Austria-Hungary was established as a political entity about four centuries ago (1526) when Bohemia and Hungary elected the Austrian king as their ruler. At first each of the three states retained much of its independence, but the authority came to be gradually centralized at Wien with Austria the dominant power. In 1867 the monarchy was divided into two states, each retaining control over its domestic affairs but with a common king and a common administration of affairs. Galicia had been added to Austria at the partition of Poland and in 1908 Bosnia and Herzogovina were annexed.

Austria-Hungary was never a unified state because geography, history, and race operated to produce distinct groups having little in common: (1) across the north is a Slavic zone made up of Czechoslovaks in the west, Poles and Russians in the east; (2) across the center, a belt consists of Germans in the west, Magyars in the middle, and Rumanians in the east; and (3) in the south is another Slavic zone. The division of the state into two parts, Austria and Hungary, in 1867 was a political maneuver designed to split the Slavic influence and enable the German minority in Austria and the Magyar minority in Hungary to dominate. The move failed and the conglomeration of diverse elements held together only by arbitrary means threatened constantly to disintegrate into separate political units. The World War furnished the opportunity for the liberation of the various nationalities, and in addition to three new "succession states" carved entirely out of the old empire, large sections were annexed to Rumania, Serbia, and Poland, and a small section to Italy.

AUSTRIA

An Alpine State.—The Alps continue eastward to occupy the greater part of the Austrian Republic and make the country even more mountainous than is Switzerland. Only in the extreme north is there a small extension of the Swiss-Bavarian Plateau, while the extreme eastern and northeastern parts of the republic lie on the western margin of the Danube lowlands. Over two-thirds of the country averages about 3,300 feet in elevation and its mountainous surface has exerted a pro-

found influence upon the commercial and agricultural development of the republic (Fig. 41).

The general trend of the topography is from east to west. The great Rhone-Rhine trench between the crystalline and limestone ranges on the north continues with some interruptions from Switzerland into Austria where it is occupied by the Inn, Salzach, and Enns, finally widening into the Wien basin. As a consequence of this disposition of relief features, communication is easy in an east-west direction but difficult north and south. Except in the extreme western section, the drainage is eastward to the Danube, while Vorarlberg province, adjoining Switzerland, lies within the Rhine watershed.

The narrow strip of plateau and plains in the north and east, though of limited extent, plays a dominant role in the economic life of the country. Not only is this a rich agricultural land but cutting across it is the Danube in whose channel and valley lies one of Europe's most important transcontinental trade routes.

Richer Portions Lost.—Present-day Austria is but a poor remnant of the old empire, including about one-fourth of the area of the latter and almost the same proportion of the population. About one-third of its inhabitants are included within Wien, to whom the break-up of the old monarchy and the severance of industrial and commercial ties brought tragic consequences. The condition of economic chaos which followed the war is still felt and activities are so abnormal that a record of present-day activities and accomplishments furnishes little of value. It seems best to examine the more or less permanent assets and then to judge of the possibilities of progress by comparison with a neighboring republic whose natural endowment much resembles that of Austria.

Agriculture

Crop Production Limited.—Austria includes a considerable part of the poorest and most mountainous section of the old monarchy. Over one-third is forested, one-tenth unproductive, and less than one-half at all fit for agriculture. Of all the succession states, she makes the poorest showing agriculturally both in the proportion of employed population engaged in farming and in the proportion of arable land.

Post-war Problems.—With the main interests industrial rather than agricultural, what is now the Austrian Republic depended formerly upon the more fertile and productive farming sections of Hungary, Czechoslovakia, Yugoslavia, and Poland for foodstuffs, and, since there were no frontiers, the movement was unhampered, with the result that little effort was made to develop her own agricultural resources.

Other factors, political and economic, have served to restrict development along these lines. One of these is the strip system commonly

found in central and eastern Europe, as already described. The government recognizes the tremendous handicap which such a ridiculous practice imposes and has been active in encouraging consolidation. The rural element of the population is, however, very conservative, and the movement is progressing slowly. In general Austria does not have the problem of large landed estates which is troubling so many of the neighboring countries, 94 per cent of the agricultural land of the republic being in holdings of less than 247 acres each.

The effects of the war and post-war adjustments have been to seriously reduce agricultural activities. The requisition of crops and live stock for the army, the lack of fertilizers, currency inflation, high wages for labor, and the fixing of maximum prices for foodstuffs all discouraged the production of any crops beyond the farmer's own individual needs. Furthermore, there has been considerable bad feeling between Wien and the outlying provinces of Austria which prevented whole-hearted cooperation.

The trend in land utilization in Austria since 1910 has been toward a reduction of tilled acreage and an increase in the proportion devoted to pasture. Much of the country is better adapted to live-stock raising than to cultivated crops, and Alpine Austria had begun, even before the war, to specialize in high-grade cattle, though Wien depended upon Hungary for 73 per cent of its meat supply. With its present population Austria can hardly be self-sufficing in food production, yet there is room for much improvement, and under the stimulus of necessity the situation is changing

Power

Limited Power Resources.—The availability of coal from Moravia and of petroleum from Galicia in the days of the old monarchy retarded the development of water power. As a result the total developed hydraulic energy within the boundaries when the republic of Austria was formed in 1918 was only 170,000 horsepower. The loss of most of its coal and all of the petroleum has stimulated the exploitation of this resource, the amount developed by the end of 1928 being practically twice that in use in 1918 (Fig. 215). Necessary dependence upon foreign capital has been a serious handicap, but a start has been made in electrifying the railways, beginning in the west, farthest from the coal, and in some sections there is now sufficient current for some exports to Bavaria and Hungary in addition to supplying local needs (Fig. 216). As shown in the European power map (Fig. 301), Austria's output of energy is small, little more than in such non-industrial countries as Yugoslavia and Hungary. In 1925, of the total output of energy in Austria, that from domestic coal was about one-half as much as from water power.

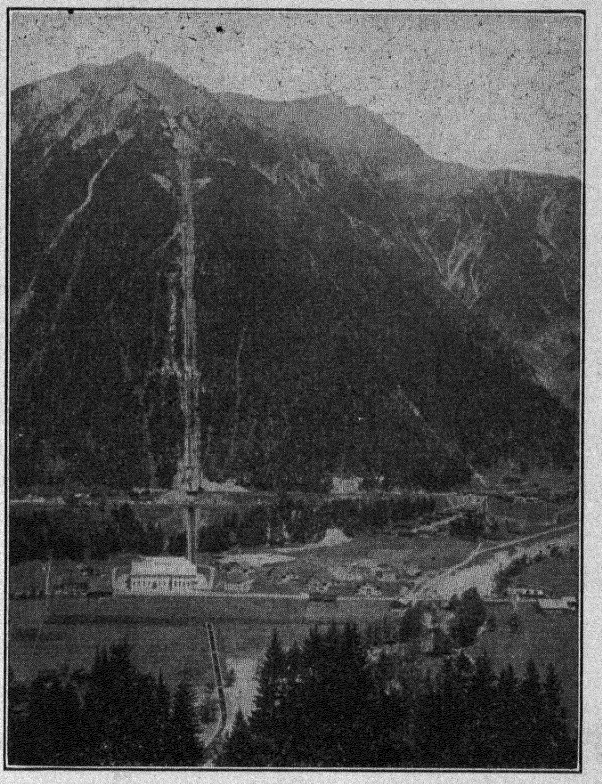


FIG. 215.—Power plant in the Austrian Alps. (*Courtesy of F. X. Schaffer, Wien.*)



FIG. 216.—Electric train in the Austrian Alps. (*Courtesy Osterreichische Verkehrswerdbung, Wien.*)

Industry

Industrial Resources and Equipment Reduced.—The decade preceding the World War witnessed a marked industrial trend in Austria-Hungary in response to the rapid growth in population whose increase neither emigration nor agriculture was able to accommodate. This expansion in manufacturing was greatly facilitated by the large variety of raw materials, fuel, and foodstuffs available within the boundaries of the empire. Thus in prewar Austria alone, there were large coal fields in Bohemia, Moravia, and Silesia, iron ores in Styria, timber in the Tyrol, oil in Galicia, and agricultural lands in Bohemia, Moravia, and Silesia. Unhampered by tariff barriers these raw materials could be assembled according to the location of coal, labor, and markets. Under these conditions there had grown up two great industrial areas, one, by far the more important, in the Bohemia-Moravia-Silesia region; a second in the vicinity of Wien and the Styrian coal fields. It is estimated that of the national income of prewar Austria, two-thirds was from industry and trade and one-third from agriculture. Hungary, on the other hand, realized about 60 per cent from agricultural activities. Wien, through its advantages as the capital and the focus of great transportation routes, became the great financial and commercial center from which Austria's industries were directed.

The break-up of the old empire left the Austrian Republic with only a remnant of the old industrial equipment and resources. Czechoslovakia possessed the main industrial region, the major part of the coal, and much of the better soil. Austria retained considerable timber and excellent iron ores, but very little fuel and no coking coal. With nine-tenths of her former markets gone, the industrial capacity of present Austria is far in excess of her domestic requirements unless she manufactures for export and can rely on imports of fuel, raw material, and foodstuffs. This would appear the logical solution. In some cases the various branches of large industrial enterprises were widely scattered, the various steps in manufacturing being completed in different regions. Thus the textile industry had much of its spinning done in Austria, the weaving in Bohemia, the finishing in Austria, and important markets in Poland and Hungary. Dismemberment places these various units in different countries whose intense nationalistic efforts and hostility toward the old domination of Wien have made their integration and cooperation extremely difficult. Further maladjustment resulted from the wartime expansion of Austria's industries, leaving them with a total capacity one-fifth larger but an output one-fifth less than in prewar days and a large unemployment as a result. Austria has the facilities for producing a surplus of manufactures of wood, electricity, paper, and steel.

Metallurgical Industries Limited by Lack of Coal.—Of the industries the metallurgical occupy first place, based largely upon the manufacture of excellent steel from the high-grade iron ore which, though only moderately rich in iron (40 per cent), is practically free of sulfur and phosphorus. The chief handicap is, as indicated above, the lack of domestic coking coal so that most of the fuel must be imported. Of some 10,000,000 tons required, only 3,000,000 are produced at home, and of this latter amount five-sixths are lignite. Imports are mainly from the upper Silesia and Teschen regions and the high cost of such fuel naturally retards progress in industry, especially iron and steel. A move full of significance for the reestablishment of integrated industries in the succession states is to be seen in the purchase by the chief Austrian steel company of an interest in Silesian coal mines.

Textiles ranked next to the metal industries in importance and like them suffered much by the political changes resulting from the war. Much of the spinning required imported raw materials, hence the mills tended to locate along the great transportation routes found in lower Austria (40 per cent) and Vorarlberg (30 per cent); the weaving, on the other hand, sought cheap labor and fuel and found both in present Czechoslovakia. Finishing plants centered again in the Wien district close to the most important local market. Thus present-day Austria inherited 30 per cent of the looms of the old monarchy while similar conditions characterized the worsted and silk industries. As a result there was twice as much spinning as the weavers could use. It would seem logical to export yarn to Czechoslovakia, return it for finishing, dyeing, printing, etc., then export it to Galicia and Hungary, but high tariffs interfere.

Transportation

Routes.—Austria, as we have seen, lies directly in the path of some of the great routes running from the North Sea countries to the Mediterranean, two of them crossing near its eastern and western extremities. The Brenner route, joining Germany and the Adriatic, crosses western Austria where the Adige cuts through the southern ridge, the Inn the northern, their headwaters being separated by a low pass, the Brenner, across the central range. This saddle is low enough—4,500 feet—to be traversable even in winter and requires no tunnels. It is not only the lowest gateway across the Alps but one of the few places where but a single range need be traversed. The Brenner is one of the most famous passes of history and the route over which the Romans brought produce to exchange for goods from northern Europe. As the easiest route from Italy to Germany it helped to cement the political and commercial ties of these two countries.

The Danube with its connecting routes is of such general importance to the countries of all southeastern Europe that they have come to be

known as the "Danube states," and, as one of the great waterways, deserves the extended description given elsewhere (pp. 81–83).

It should be noted that the extreme western part of Austria is in the Rhine drainage basin, and, until the construction of the Arlberg Tunnel (6.37 miles long and at an elevation of 4,300 feet), the western province of Vorarlberg was much more accessible to Switzerland than to Wien.

Forests

Wood Industries.—The country is rich in timber, 37 per cent of its area being forested. In Europe it is exceeded only by two others, Finland and Sweden, and equaled by one, Russia, in the proportion of forest covered land. Woodworking is also of interest, since, of all Austrian industries, it furnishes the largest net export.

About three-fourths of the forests are evergreens, mostly pine. As a result of this predominance of softwoods the manufacture of structural timber, wood pulp, and paper is important, while there is an actual import of hardwoods. As in Switzerland considerable areas are in sections either difficult of access or else in regions which require "protective forests." Almost one-half of the timbered area of the country is in large estates, *i.e.*, over 1,250 acres each. In general both government and private interests have been active in conserving the forests with the idea of not only insuring future wood supply but at the same time of protecting water resources and reducing soil erosion. Approximately two-thirds of the pulp-producing capacity of the old empire passed to Austria. These mills use mainly hydraulic or hydroelectric power; the paper industry, however, is still dependent upon coal for 85 per cent of its energy.

Wien

Geographic Advantages.—Geography and politics combined to make Wien one of Europe's leading centers of art and culture, of commerce and finance. Its position at the crossing of great trade routes is its chief asset, all the more important because it is situated in a part of the continent where topography has rigidly restricted movement to well-defined paths. The city lies in a small plain, the smallest of the three Danube basins, at the place where that great waterway separated the Alps from the Little Carpathians. Here converge routes leading (1) up the Danube to Bavaria, thence by canal to the Main and Rhine or by the Inn over the Brenner to the plains of north Italy; (2) down the Danube to the Black and Aegean seas; (3) up the March to the Oder and via the Moravian Gate to the north German plain and the Baltic; and (4) to the southwest over the Semmering Pass to Trieste. This superb focal position made it the natural center from which the commerce, banking, and

industry of much of southeast and central Europe was directed. With the great iron-ore deposits near by and fuel and raw materials available within the old monarchy, the Wien district became an important industrial section, second only to Bohemia in the old empire.

In addition to these natural advantages Wien was the capital of an empire of 30,000,000 people, embracing 116,000 square miles. As such it became the home of thousands of soldiers, government officials, and tradesmen as well as the seat of a great array of institutions.

The break-up of the old monarchy suddenly reduced the area of the nation to less than one-third of its former size and from a population of 30,000,000 to 6,500,000. A mere remnant, mostly mountainous, was left with a great city having the administrative and business machinery designed for the direction of the political and economic life of a large empire, and readjustments have brought tragic consequences. Its importance as a political and cultural center must necessarily be reduced. Nevertheless, its natural advantages remain, and, with a return of better feeling and a spirit of cooperation among the succession states, perhaps much of the old commercial and financial prestige may eventually be restored. None of the other capitals possesses its advantages, and distinct benefit may be derived from having a single commercial center for this much divided part of the continent.

Commerce

Foreign Trade.—As a consequence of the abnormal conditions prevailing since the World War, the imports have greatly exceeded the exports in value, indicating, in this case, an increase of indebtedness. From 1920 to 1926 her exports paid for only 60 per cent of her imports. This, in effect, is a smaller proportion than that in countries with similar lack of balance but having large invisible export items, such as Great Britain with 66 per cent. Since stabilization, her income from foreign investments and various services has covered only 60 per cent of the deficit, and the balance has had to be made up by the export of capital and by borrowing. This condition must of course be temporary.

Increased agricultural output, the substitution of water power for imported coal, the restoration of the banking and other commercial activities of Wien, and trade agreements with neighboring states will facilitate exchange and aid her industries. These with the fostering of the tourist traffic are all looked to as aids in the solution of the grave economic problems.

Although Trieste is only about one-third as far from Wien as is the Baltic, and access to ports formerly within the empire has been guaranteed Austria, her main trade routes lead to the north rather than to the Adriatic.

Austria, a Political Entity

Can Austria Maintain a Separate Existence?—This is a question which has been often asked and by many answered in the negative. The career of Switzerland, whose natural endowment is so strikingly similar to that of Austria, is very suggestive.

Likeness to Switzerland.—Both republics are mountain-girt lands lying astride the Alps, liberally endowed with scenic resources but meagerly with cultivable land. Raw materials and coal supplies are scant or lacking, but there is much water power and an abundant labor

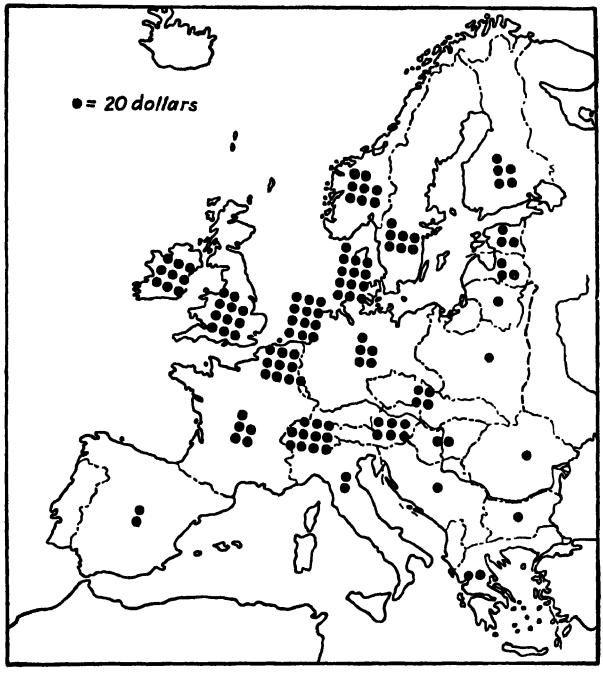


Fig. 217.—Per capita foreign trade in 1928.

supply. Both are inland countries lacking the stimulus of cheap ocean shipping or fish resources, yet they lie athwart great transcontinental thoroughfares and hence have exceptionally efficient rail service.

Swiss Accomplishments.—With this natural setting Switzerland has turned her attention to industry rather than to agriculture and ranks first among all countries in the proportion of her population engaged in manufacturing. She has specialized in highly finished goods requiring much skill and handwork and but little raw material. Her goods bear the stamp of merit and have won a world-wide reputation. General agriculture, on the other hand, is necessarily restricted in extent but highly remunerative in the fertile valleys, the country ranking second among all nations in the productivity of its cultivated land, while the

mountainous terrain has emphasized dairying in which Switzerland occupies high rank.

A second supplementary source of income lies in the tourist industry and the Swiss have with their customary thoroughness and efficiency made the entertainment of the visitor at once a fine art and a lucrative business.

Austrian Resources Compare Favorably with Those of Switzerland.—The potential natural resources of Austria are possibly better than those of Switzerland. While the latter has considerably more potential

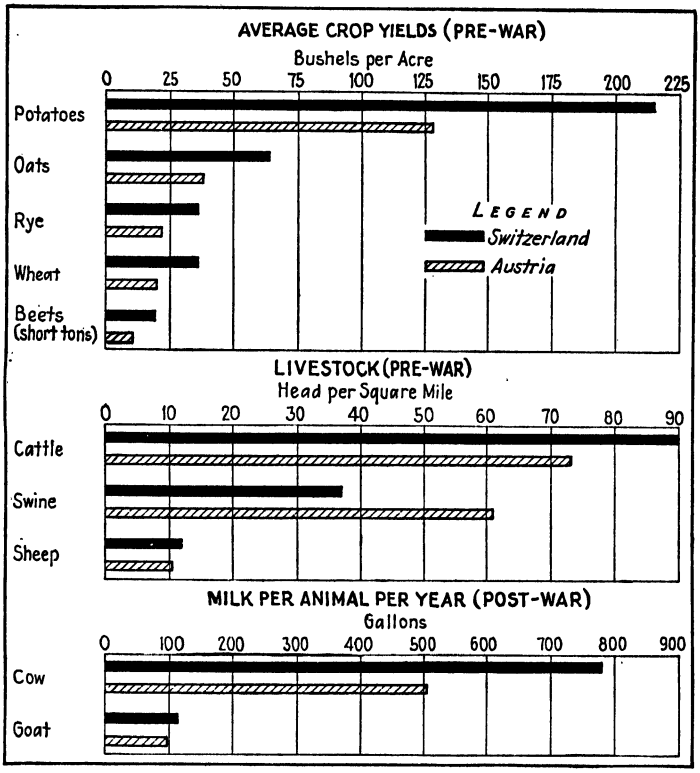


FIG. 218.—Contrasts in accomplishment between two Alpine countries possessing much the same resources.

water power, the former has some coal and considerable lignite. Austria has also a somewhat larger proportion of arable land, considerably more forest in proportion to the total area, and a large deposit of excellent iron ore. Although the scenic attraction of the Swiss Alps is probably greater than that of the Austrian portion of those mountains, Wien has no duplicate in Switzerland.

Comparative Retardation of Austria.—However the greatest contrast appears in the progress made in the two countries in exploiting their resources (Fig. 218). Thus in water power Switzerland has developed

75 per cent of her total supply, Austria, less than 20 per cent. The former's yields of staple crops (prewar) ran from 40 per cent to 90 per cent higher than those of the latter. In the animal industries, so well adapted to mountainous regions, Switzerland had many more cattle, about the same number of sheep, but not nearly so many swine. More significant than numbers is the grade of animals raised. Swiss cows average over a ton of milk a year more per head than do cows in Austria. Switzerland in 1925 sold abroad dairy products to a value of $4,500,000. Her neighbor is far from supplying even her own needs for meat and dairy goods, supplying only 46 per cent of her meat, one-third of her butter and one-half of her egg consumption. It is not without significance that Voralberg, on the Swiss border, has come to be the country's most advanced and progressive dairy province. The Austrian Government estimates that there is fodder and forage within the country to supply an increase of 65 per cent in cattle and 40 per cent in swine.

Little has been done so far to develop the tourist industry, and the splendid mountain scenery remains mostly unknown and inaccessible to the foreigner.

If Switzerland by long years of experiment and study has made the necessary adjustments and in spite of rather meager resources, is supporting a dense population with a high standard of living, Austria with resources averaging as good if not better should be able at least to do as well with a population whose density is only about four-fifths as great. In the sudden change from being the focus of a great empire to a small republic, there must be much loss and suffering, but given time there would seem to be no reason why Austria should not become fairly prosperous.

CZECHOSLOVAKIA

A Promising State.—Of the various states which emerged from the wreckage of the old Austro-Hungarian Empire, Czechoslovakia is by far the most promising. Its resources are varied and abundant, the agricultural and industrial development exceptionally well balanced, and the Czechs, who constitute the dominant political group, are an able and intelligent people. The character of the population and their homeland holds the promise of making their country one of the strong states of central Europe.

Minorities.—Czechoslovakia is a Slavic wedge projected far into middle Europe, with Germans on both the north and south. The main part of the population is made up of two closely related Slavic groups, the Czechs and the Slovaks. There is a considerable alien minority making up more than one-third of the total population—in fact it is estimated that for 90 per cent of its length the boundaries of Czechoslovakia run through non-Slavic populations. The most important

minority group is that of the Germans who form a fringe near the border of Bohemia. They and the Hungarians were in political control until the World War, and now constitute a powerful and aggressive element opposed to the newly established regime. The question of minorities has been one of the country's major problems.

The Country

Location and Extent.—On the map of Europe Czechoslovakia is conspicuous because of its peculiarly elongated shape and central position (Fig. 219). The country lies near the center of the continent, about equidistant from the Baltic and Adriatic, the North and Black seas. From east to west it stretches about 600 miles, while its north-south width varies from 50 to 125 miles. This inland position and the extraordinary length of its boundary implies a large number of border states.



FIG. 219.—Provinces and chief cities of Czechoslovakia. (*Courtesy of Current History, published by the New York Times.*)

The necessity for crossing foreign territory in order to reach the sea and the great length of international frontiers provide a fertile field for misunderstandings and make Czechoslovakia's foreign relations difficult.

The broad western part of the country has as its dominant physical feature the old Bohemian Massive. The narrower eastern portion includes the southern slopes of the Carpathians. Separating the two is a depression occupied by the Morava (March), a tributary of the eastward flowing Danube, and by the northward flowing Oder.

Bohemian Plateau.—Bohemia is a plateau almost completely rimmed by forest-clad mountains. On the southwest is the Böhmerwald, the largest timbered section; on the northwest, the Erz Gebirge long famous for their minerals; on the northeast, the Sudetes; and to the southeast the Moravian Heights. The plateau is tilted northward and its drainage, gathered by the Elbe and its tributaries, escapes via the Elbe Gate between the Erz Gebirge and Sudetes, across the German plain to the North Sea. Bohemia is underlain with old crystalline rock, except

the central and northeastern sections where there are sedimentaries. The valleys of the lower Moldau, the Elbe, and the Eger lie in this limestone and are covered with alluvium providing the most fertile portion of the plateau. The eastern part of this massive is drained southeastward by the Morava and its tributaries to the Danube.

Moravia.—In general the lowlands of Moravia are fertile and highly productive. There are in addition some coal deposits, though the richest coal fields are in Silesia to the northeast. Here is the Ostrava-Karvinna district, the southwestern part of the Moravian-Silesian-Polish basin, of which Czechoslovakia's share is about one-sixth. This coal, with the lignite in northwestern Bohemia, furnishes the chief basis for the industrial growth of the country.

The narrow gap between the Sudetes and the Carpathians through which the Oder flows is known as the Moravian Gate, one of the most important passes of Europe. Not only is there a break in the mountain wall, but three important rivers rise close to the opening; the Oder, whose channel lies in the gap, leads to the Baltic Sea; the Vistula leads northeast to the Baltic; and at the south entrance of the gateway is the upper Morâva, leading to the Danube. So low is the divide between the Oder and Morava that the two channels have been joined by a canal. The value of this gateway at the junction of three important routes is further enhanced by the presence of the great mineral deposits of Upper Silesia just to the northeast of the opening.

Slovakia and Ruthenia.—In the east, Slovakia and Ruthenia, much more mountainous, occupy the southern slope of the Carpathians and include the margin of the great Hungarian Plain. The drainage is to the Danube which for about 100 miles forms the frontier. In Slovakia the south-flowing rivers have cut the country into a series of parallel ridges with more or less isolated valleys. In Ruthenia there is an extension of the Hungarian Plain. In eastern Czechoslovakia the plain areas are fewer, the soils less fertile, and the mineral deposits of far less importance than in the west. Its forests and pastures occupy much of the rough slopes, while the lower valleys provide agricultural lands of only moderate fertility.

Climate

The climate of Czechoslovakia is rather continental in type with cold winters. The Elbe is closed by ice for about 11 weeks each year and the snow of the Carpathians is regularly used in logging operations. The rainfall is moderate in the mountains—30 to 35 inches—but rather light—15 to 20 inches—on the plains. Fortunately about two-thirds of the precipitation occurs in the summer when most needed; moreover, because of the altitude, that season is not very hot.

AGRICULTURE

Agriculture and Industry Well Balanced.—In spite of a marked industrialization, agriculture still employs a somewhat larger proportion of the population than does manufacturing. As a whole, the country is almost self-sufficing in foodstuffs, a condition which facilitates its economic stability. In spite of its rough topography the arable proportion is high (42 per cent), the part unproductive is extremely small, while forests and pasture occupy about one-half the total surface.

Czechoslovakia is a part of the great temperate belt of grain and root crops, which extends across north and central Europe. Sixty per cent of the arable land is in grain and the predominance of rye, oats, and barley is indicative of the large areas of poor or only moderately fertile soil—especially in Slovakia and Ruthenia, with wheat and sugar beets monopolizing the richer land, corn being restricted to southern Slovakia.

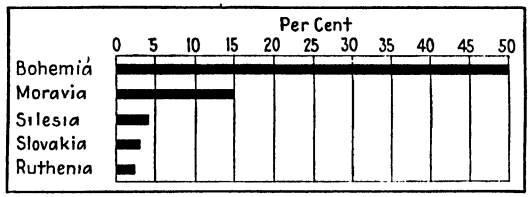


FIG. 220.—Sectional contrasts in illiteracy in Czechoslovakia, 1927. Note the consistent increase from west to east.

The best agricultural region is, as already indicated, in northern Bohemia, in the lower valleys of the Moldau, Elbe, and Eger, where, as in southern Slovakia, there has been a rapid increase in sugar-beet production. The republic has, in certain years, ranked first among exporters of beet sugar and is second only to Germany in production. About 70 per cent of the output is for export, amounting in recent years to over 1,000,000 tons annually.

Progressive in West, Backward in East.—The relative importance of agriculture, the special phase which is emphasized, and the methods used in western Czechoslovakia are in marked contrast with those of the east. In the latter, *i.e.*, in Slovakia and Ruthenia, over two-thirds are peasant farmers; in the west, over one-half live by industry and commerce. Here, too, agriculture is more intensive and methods scientific and modern, while, in the east, greater emphasis is laid on the pastoral phase and procedure is governed by tradition and chance (Fig. 220). General illiteracy and backwardness characteristic of the population formerly dominated by the Magyars is reflected in their agricultural practice.

Land Reform.—Until 1920, land tenure in Czechoslovakia smacked strongly of feudalism. In no other country of central Europe was there such an unequal distribution of land ownership. At one time it is said

that one-sixth of all the territory of Bohemia was in the possession of 33 men, while less than 1 per cent was owned by 373,000 peasants. Seven-eighths of the population of Bohemia owned no land at all until 1920.

Many of these enormous estates were lands confiscated as a result of the religious and political wars. With the independence of Czechoslovakia and the end of control by the German and Magyar elements, a comprehensive scheme of agrarian reform was planned. In 1920 the expropriation of all estates of over 475 acres, if cultivated, and of 350 acres, if uncultivated, was ordered. The former owners were to be paid by the new possessors. Some 3,250,000 acres of cultivated land and twice that amount of forest were taken over, so that Czechoslovakia is now a country of moderate-sized and small farms. In general the reform has been carried out very satisfactorily, with an increased interest in farming and with yields which are actually larger in spite of the difficulties which inevitably accompany such a readjustment.

Forests

An Important Resource.—One-third of the country is forested, mostly by conifers, and timber constitutes an important part of the national wealth. Much of that privately owned prior to 1918 was in large estates whose expropriation is expected to increase the state-owned areas. In addition to supporting extensive wood-consuming industries, there is a large export of timber and wood products. Although the east has the greater proportion of tree cover, the bulk of the wood manufactures is in the industrial west. Paper and pulp mills which prefer the softwoods, are densest about the mountainous rim of Bohemia, above the deciduous forest level. Almost one-half of the wood cut is for fuel.

Resources Varied.—In general Czechoslovakia has the varied resources and activities which make it almost economically independent. Its chief concern in this regard is in retaining adequate markets for its industrial exports. The major domestic problems consist in welding together the diverse racial and social groups into a unified state, while its foreign policy is centered upon the problem of securing the goodwill of its neighbors through commercial and defensive alliances.

Industrial Development

Coal and Lignite.—Czechoslovakia's coal and lignite resources are of fundamental importance to the country's economic progress. The coal of the Ostrava-Karvinna district is of coking grade and for that reason is in great demand both for domestic use and for the adjacent industrial districts of Poland and Germany, more particularly since the other Upper Silesian deposits are not suitable for this purpose (Fig. 253).

It supplies three-fourths of the country's output and about one-half of the product is exported. Supplementing the coal production is lignite, chiefly from the northwestern frontier of Bohemia, the annual output being about 50 per cent larger in tonnage than is that of coal.

Water Power.—Thus far water-power development has received little attention, largely because of the abundance and accessibility of coal, and, in prewar days, of petroleum also. Of the total water-power resources, estimated in 1929 at about 1,000,000 horsepower, scarcely 15 per cent have been developed, 80 per cent of the total thus far exploited being in the western part. Some 13,000 industrial plants use water power, mostly woodworking and textile mills. The average size of these plants is small. Although coal furnishes now about 96 per cent and water only 4 per cent of the power used, there is an active campaign for an increased exploitation of the latter and for the electrification of the railways.

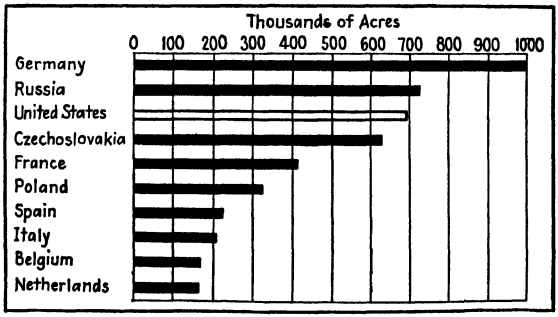


FIG. 221.—Sugar-beet acreage in certain European countries, 1921 to 1925 average. Compare with Fig. 192. (*U. S. Department of Commerce.*)

A Sound Basis for Industrial Development.—Czechoslovakia possesses the basic raw materials and power resources for an extensive industrial development. There is, as indicated above, an abundance of coal and lignite, as well as a great variety of raw materials for all of the food, brewing, glass, porcelain, and wood industries, part of the iron, chemical, and leather plants, but practically none for the textile and fertilizer plants. The most serious deficiency is in iron ore whose low-grade requires that the major supplies be imported from Austria and Sweden.

The western part of the country, including Bohemia, Moravia, and Silesia, is, as we have seen, the industrial section, the contrast with the east being even more marked than in agricultural development. The west possesses coal, the larger part of the raw material supplies, and the stimulus of near-by industrial Germany.

As a result of its natural advantages this was the chief industrial district of old Austria-Hungary. Bohemia inherited four-fifths of the manufacturing equipment of the old empire but only one-fourth of the

population, so that about one-half of her manufactured wares must now cross the frontier. The lack of protected markets and the deficiency in domestic iron ore have forced the country's industries to specialize in high-grade wares in which there is less competition.

Manufactured Specialities.—Of the characteristic industries several have developed a very wide reputation, especially glass, of which Jablong ware of northern Bohemia is best known. Over 200 glass factories employ some 60,000 people. Bohemian hops are highly prized and with local barley serve as a basis for brewing, one of the country's major industries, centered mainly at Plzěn and Budejovice (Budweiss). Steel production, chiefly in the coking-coal district, is comparable in output with that of the Saar basin or of Italy. The metal industries specialize in agricultural machinery and in the equipment for sugar factories and breweries, while the forests support important paper, pulp, furniture, and toy manufactures.

Considering the small proportion of the land which is unproductive, it is felt that the problem of the increase in population can best be solved by industrial rather than agricultural expansion. About 40 per cent of the national income is estimated to be derived from manufacturing as compared with 34 per cent from agriculture.

Transportation

Factors Influencing Transportation.—Transportation facilities of Czechoslovakia have been greatly influenced by (1) the mountain-plateau character of the topography, (2) the position far inland on the continental divide, and (3) the long east-west extent athwart some of the great transcontinental routes.

In the west, Bohemia, although almost hemmed in by mountains, has an important break where the Elbe leaves via the Saxon Gate (Fig. 222). Likewise the absence of any continuous barrier in the southeast gives access in that direction, so that there is an important route across the plateau through the Saxon Gate via Praha and thence to the Danube.

The second break at the eastern edge of the plateau, the Moravian Gate, joins the German-Polish plain with the Morava Valley and by this to the plain of the middle Danube. At the north entrance of this gap is the densely populated and highly industrialized Upper Silesia region from which the Oder and Vistula lead to the Baltic. Southward this route joins the one crossing Bohemia to focus upon Bratislava, the country's chief Danubian port.

Since eastern Czechoslovakia is on the southward-facing slopes of the Carpathians, it faces Hungary with whose capital it has physical and commercial ties. Bohemia, although part of Austria, had a natural focus of routes at Praha. One of the main problems of the new state

has been to reorient and unify the railways so as to integrate eastern and western Czechoslovakia commercially as well as politically.

The great bulk of the foreign trade is by railways in spite of the fact that navigable waters lead both to the north and to the south. For water traffic the Elbe is by far the most important. In 1925 freight destined to or from the country used the Danube to the amount of 833,882 tons; the Oder and Elbe, 2,709,365 tons. As a matter of fact, the navigability of the Elbe, Moldau, Oder, and Morava is limited. Plans are under way for joining the Elbe with the Danube, but if accomplished it will require some 10 years at least. The Versailles Treaty internationalized the

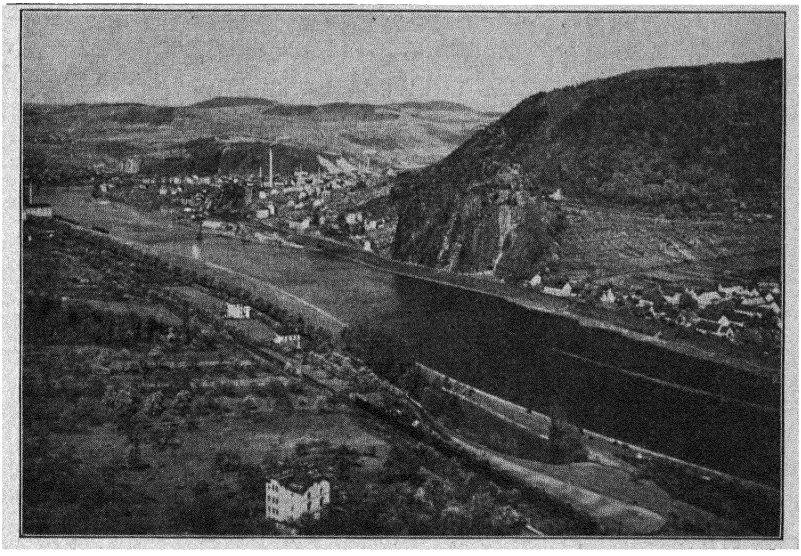


FIG. 222.—The Elbe in Bohemia near the Saxony boundary. (*Courtesy of Czechoslovak Legation, Washington, D. C.*)

Oder, Vistula, Elbe, and Danube, as well as guaranteed to Czechoslovakia port facilities at Hamburg, Stettin, Danzig, and Trieste.

The main part of the oversea traffic goes through Hamburg, Trieste ranking second, and rivalry between the two has been keen. Before the World War the German port handled about three times as much of the country's trade as did the latter. Foreign commerce is primarily with northwestern Europe rather than with the Balkans, the latter accounting for only about one-third of the total.

Industrial exchange is, as already indicated, all important in the commercial life of the state, since Czechoslovakia is primarily an exporter of manufactured goods and an importer of raw materials.

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CHAPTER XVII

SCANDINAVIA AND DENMARK

A Large Peninsula of the Far North.—Scandinavia is the most northerly as well as the largest of Europe's many peninsulas. In latitude, Norway and Sweden correspond to Alaska, with the climate of whose coast they have much in common. Over 1,000 miles in length, the peninsula would, if swung around upon its southern tip as a pivot, reach almost to Sicilia or beyond the Pyrenees. Its width averages about 250 miles, but in the south widens to twice that.

The location as well as the great length of Scandinavia from north to south entails important consequences, both climatic and commercial. About one-third of the whole is north of the Arctic Circle and, in spite of the modifying influence of the ocean, possesses serious handicaps characteristic of high latitudes. Just as truly as Egypt is the child of the Nile, is Scandinavia redeemed by the North Atlantic: the one rescues a land from scorching drought, the other redeems from perpetual frost.

It should be noted that Scandinavia lies between two seas, both of which commercially are "blind alleys." Unlike the through traffic of the Mediterranean-Suez route, which gives unimportant ports the advantage of frequent service, only such shipping as is attracted by the northern part of the peninsula either in the Arctic or the Baltic will go thither.

SURFACE FEATURES

The Physical Framework.—Though physiographically a peninsula, Scandinavia is essentially an island, for Lapland, the land junction, is a commercial barrier and intercourse with the continent is preferably by way of the sea. An old block, it is so tilted that the western slope is short and steep, the eastern, more gentle. The drainage divide is not a sharp ridge, however, but rather a long, barren, dissected plateau about 100 miles in width and over a ½ mile in height. On the west the steep slope drops precipitously to the sea which penetrates it through numberless fjords—some of them reaching 100 miles or more into the interior. On the east the descent to sea level is much more gradual and accomplished by a series of broad terraces. The depressions here which correspond to the Norwegian fjords are the lakes,[1] which, as in most recently glaciated countries, are present in large numbers; in fact the proportion

[1] Note the similarity in origin to the lakes of north Italy (see Chap. XXIV).

of the total surface occupied by inland waters is, with the single exception of Finland, the largest in Europe.

The Mountains an Effective Barrier.—The northern two-thirds of the boundary between Sweden and Norway is located on this plateau, so barren and uninhabited as to provide a most effectual barrier. Southward from Trondheim, however, the boundary, instead of continuing southwest on the highland, turns south so that the whole of the southern part of the plateau is within Norway, giving that country the productive plain about Oslo (Fig. 223).

The general trend of the relief makes Norway face the Atlantic and Britain; Sweden, the Baltic and Germany. Communication is much easier between either of the peninsular countries and Denmark than

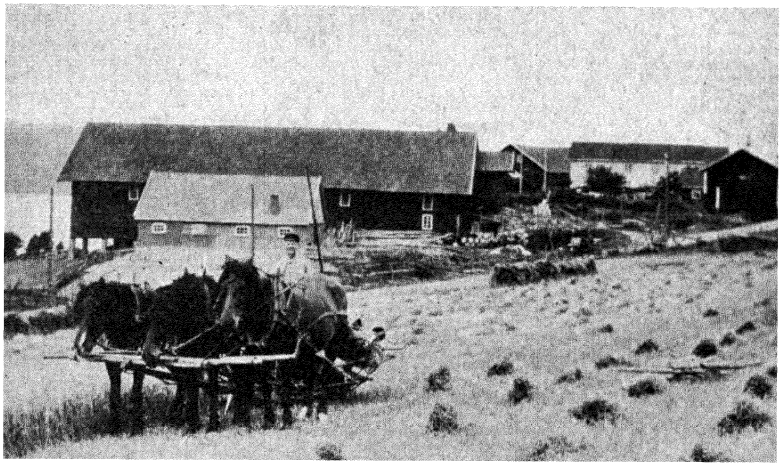


FIG. 223.—Typical farm in southeastern Norway on the Oslo plain. Note the access to water in the background. (*Courtesy Norwegian Government Railways.*)

between the two themselves, and for some time in their history it was Denmark that bound the two northern nations into a political partnership.

A Sinuous Coast Line.—Scandinavia has, especially along its western edge, one of the most irregular coast lines to be found anywhere in the world, the innumerable indentations and fringing maze of islands forming a pattern most intricate (Fig. 224). The total length of the peninsula's margin, not counting the minor irregularities, is about 6,000 miles—long enough to span the North Atlantic twice over. Norway alone has a *detailed* coast measuring a total length equal to half the circumference of the earth.

The Fjords.—The fjorded coast of which western Norway affords a classic example owes its form to the action of several agents. Originally the steep west-facing slope of the highland was dissected by rivers which

carved deep valleys. During the great Ice Age glaciers moving seaward through these valleys, greatly deepened them, and also changed their cross section from a V to a U shape. With the melting of the ice, and probably also a sinking of the coast, the ocean waters penetrated the seaward openings of the valleys, forming fjords. Their walls are often perpendicular or nearly so, and may extend for a half mile or even a mile above the sea level. The water is very deep, occasionally two

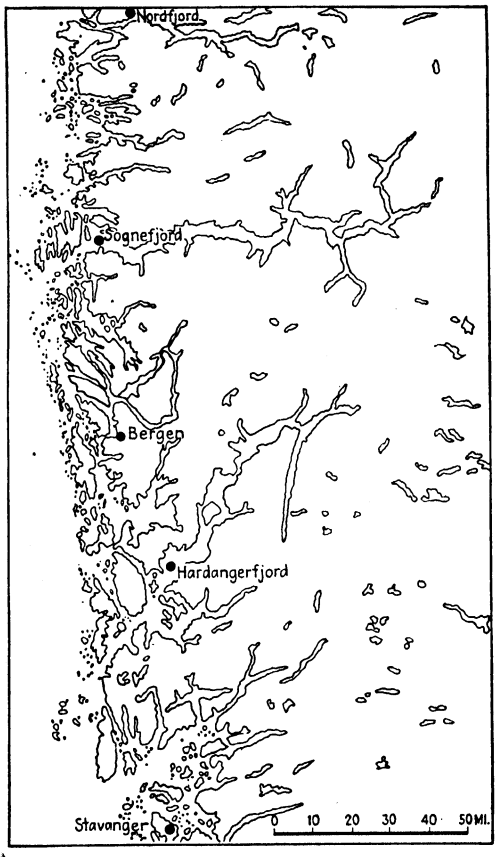


FIG. 224.—A section of the southwestern coast of Norway.

thousand feet, though a sill at the ocean entrance marking the former limit of the ice tongue makes the water somewhat shallower there. At the landward end there is often a delta where the stream, whose lower course constitutes the fjord, enters the sea. Often the only approach from the land is via this narrow stream valley upon whose delta there may be room enough for a port, and whose only means of communication with its neighbors may be by way of the sea. Frequently the heads of neighboring fjords meet, forming islands, of which it is esti-

mated that there are some 150,000 off Norway, forming almost a continuous chain or "skerry guard" between which and the mainland is the quiet protected water of so much importance to fishermen and sailors. The largest island group—the Lofoten—separated from the mainland by the Vest Fjord, is one of the world's most famous codfishing regions.

Some of the more notable of the Norwegian fjords are Sogne, 136 miles long with a maximum depth of over 4,000 feet, and Hardanger, 119 miles long and over 2,100 feet in depth, while Stavanger, Nord, and Vest fjords are almost ½ mile deep. Those at the extreme north as well as Oslo Fjord in the south are more baylike in form, *i.e.*, open and light rather than dark gloomy clefts in the mountain wall. Ofotenfjord at one point reaches within 6 miles of the Norway-Sweden boundary.

The Swedish coast is in marked contrast to that of Norway, being relatively smooth and unbroken while the wide river mouths provide good harbors.

CLIMATE

Tremendous Importance of the Sea.—In spite of its northerly location—in the latitude of Greenland and Labrador—Scandinavia is the home of two of the world's most progressive nations. The explanation of the contrast in these two regions on either side of the North Atlantic lies in their position relative to that ocean. The climate of Scandinavia, on the leeward side of the waters warmed by the North Atlantic Drift, is greatly modified, especially on the western slopes. As a consequence of this oceanic influence the coast, even at the far north, is ice free throughout the year and has the same January temperature average as central Bulgaria, 2,000 miles to the south. In fact on the coast the Norwegian winter is so open that in places grazing is possible throughout the year. The winter temperature in the vicinity of the Lofoten Islands is more than 40° F. higher than the average for that latitude and represents the maximum divergence from the normal of any place on earth.

Temperature.—Within Scandinavia the distribution of temperature depends more upon elevation and distance from the sea than upon latitude. Especially is this true of western Norway. One may go the entire length of the country from North Cape to Khristiansand, a distance of 1,000 miles through 14 degrees of latitude and experience no greater change in the average January temperature than may be found by going inland 25 miles from the west coast.

The long high plateau running through Scandinavia cuts off most of Sweden from this marked oceanic influence. As a result the harbors on the Baltic are frozen in winter; the lakes and rivers used for navigation and power are closed by ice for part of the year; the summers get hotter and the winters colder than in corresponding sections on the western side of the divide, accompanied naturally by a shorter growing season

and by deeper snow in winter. Upon the plateau the winters are very severe and even in summer the evenings and nights are cool. The combination of adverse climate, scant soil, and steep slopes makes this section of little economic value. The largest glaciers of Europe are found on this pleateau northwest of Oslo, one covering an area of 580 square miles.

Precipitation.—The precipitation is heaviest in western Norway, increasing with elevation until on some of the plateaus above the western coast it has been estimated that over 200 inches fall annually. The leeward side of the peninsula receives considerably less, with the northern part of Sweden and adjacent Norway getting but a scanty fall (20 inches or under). Because of the limited evaporation, there is no part of the peninsula rendered non-agricultural on account of lack of moisture. The low temperatures and light precipitation over much of central and northern Sweden, however, reduce the stream flow and affect their usefulness for floating timber and for the development of power.

Variation in Length of Day and Night.—The high latitude carries with it a commensurate variation in the length of day and night. This of course increases as one goes northward until at North Cape there is a continuous night of 2½ months in midwinter and a correspondingly long day in midsummer. Trondheim shortest day is from 10 a.m. to 2:30 p.m., while Bergen and Oslo have 5½ to 6 hours of light. Mathematically the actual total length of light and darkness will in the course of the year average about the same as farther south but the extreme periodic variations call for profound seasonal readjustments in life and work which greatly increase the difficulties. The inconvenience of long winter nights is in part alleviated by the long twilight and the white snow cover with consequent increased effectiveness of moonlight and of the aurora borealis.

The length of the summer days, too, compensates in part for the short season, so that hardy grains may be matured even in 70° latitude. Barley will actually ripen in 2 months in northern Sweden, while it requires 3 or 3½ months in the southern part.

Sunshine Deficient.—A disagreeable feature of the Scandinavian climate is the prevalence of cloudy and foggy weather. Practically all of the peninsula has less than one-third of the total possible sunshine. Fortunately the growing season has a minimum of cloudiness, June in Sweden having sunshine 50 per cent of the possible total time, but only 25 per cent in December.

AGRICULTURE

Agriculture Seriously Handicapped.—In spite of the great difficulties of mountainous topography, cold climate, and scanty soil, about one-half of the population of Scandinavia are farmers, at least during the

farming season. Many, during the winter, supplement their income by work in the fishing fleet, the lumber camps or the iron mines. Of the total area of the peninsula, about 50 per cent is unproductive waste land, one-tenth in crops or pasture, and 40 per cent in forest.

There is a belt of waste land on the high plateau running the entire length of the peninsula, a distance of about 1,160 miles, which in the north is a continuation of the tundra of Arctic Russia. Southwestward the elevation increases, thus counteracting the more favorable latitude. Much of this plateau is above the tree line, the latter varying from 1,600 feet in the north to 3,000 feet in the south; ice and snow cover large areas, desolate in aspect. The vegetation covering, mainly of mosses and

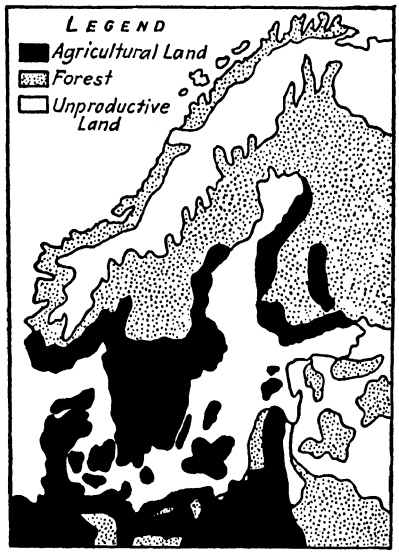


FIG. 225.—Land utilization in Scandinavia. (*Courtesy Macmunn and Coster, Europe—A Regional Geography, Oxford Press.*)

lichens, in the north, provides sustenance for the reindeer of some scattered bands of Lapps. The chief value of this belt lies in its regulatory effect upon the flow of the streams (Fig. 225).

Mountains Limit Cultivable Land.—The principal difficulty in crop production in Scandinavia is the mountainous surface (Fig. 226). Little Denmark, a level plain only one-seventeenth as large, has over half as much arable land as the whole rock-bound peninsula of Scandinavia. Sweden, occupying the gentler slope, has proportionately four times as much land under the plow as has Norway. All told the total cultivated area of the latter country is only about 1,700,000 acres or about the same as that in the state of Maine. Norway with three-fourths and Sweden with one-third of her land absolutely unproductive, rank lowest

of all the countries of Europe, in this regard—lower even than Switzerland on her Alpine perch.

The fact that the larger part of the peninsula is made up of old resistant rock which weathers very slowly permits of the removal, over much of the area, of the distintegrated rock materials as fast as they are formed. Only on lower levels are deposits left intact and in a mountainous country like Scandinavia these will be in small patches or narrow strips, in valley bottoms, at fjord heads or in the limited plains of the south (Fig. 37). Southern Sweden has the best soil, the most favorable climate and the most extensive plain of Scandinavia. Here are to be found

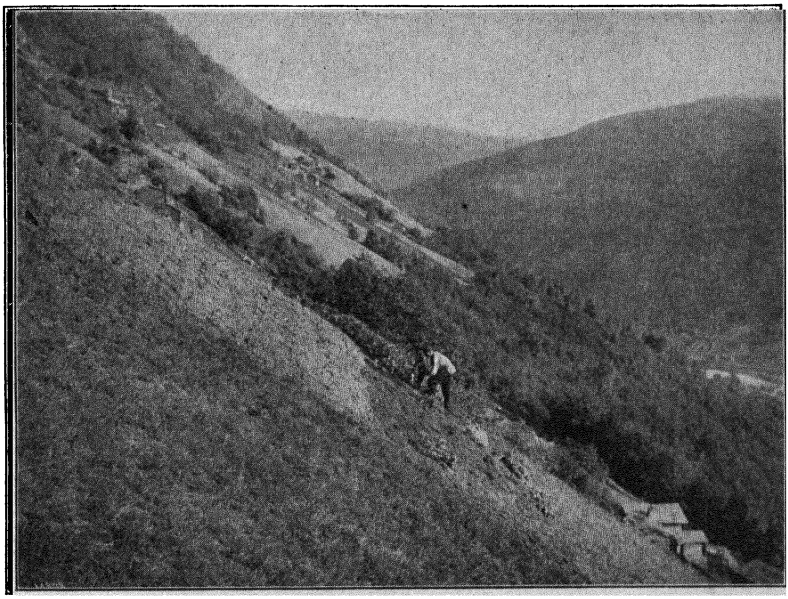


FIG. 226.—Farming under difficulties in Norway. View from Gudbrarrdodalew, Norway. (*Courtesy World Agriculture, June*, 1923.)

the most densely populated rural areas and the chief agricultural region. The "granary of Sweden"—Scania—averages about 50 per cent of the land under cultivation, almost as much as in the American spring wheat belt.

Emphasis upon Hay and Pasture.—The short summers restrict the variety of agricultural products within narrow limits. Both climate and topography favor hay and pasture rather than other crops. Over two-thirds of the arable land of Norway and about two-fifths of that of Sweden are used for this purpose (Fig. 227). Only Switzerland among European countries has a larger proportion of its productive land so employed. As in the Alps, transhumance or the seasonal migration of live stock to different altitudes for pasture is common agricultural

practice. In Norway grass is saved very carefully. That too inaccessible for the animals to reach is often cut by hand, sometimes being sent down to the valley by cables and cured by being ricked on a fence so that it will dry even in the damp climate (Fig. 228). Hay is the major

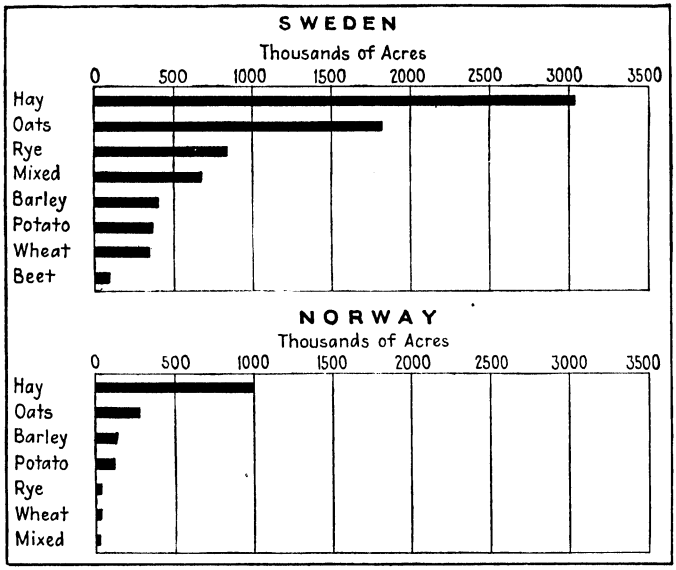


FIG. 227.—Relative importance of crops in countries of the Scandinavian Peninsula. (*U. S. Department of Commerce.*)



FIG. 228.—Drying hay near Nidaros, Norway. (*Courtesy Norwegian Government Railways.*)

agricultural crop of both Sweden and Norway, being more valuable in the latter than all the cereal and root crops together. In the north it is essentially the only crop; in the center and south it shares the productive acreage with oats, barley, and rye, which latter, in Norway as in Germany,

is the chief bread grain; and in the extreme south, with wheat and the root crops, especially potatoes and sugar beets. Crop yields per acre are intermediate between those of the North Sea countries and the output of the southern and eastern countries. Nevertheless the average production per cropped acre for Norway is 20 per cent and for Sweden 25 per cent higher than in the United States.

Live-stock Raising.—The importance of hay and forage crops naturally leads to emphasis upon the animal industries. The large proportion of rocky, forested, or snow-covered land, however, makes the animal density small. Finland, Norway, and Sweden are the lowest countries of Europe in animal units per square mile. Sheep, in rock-ribbed Norway, make up almost one-half of the animal population; in less mountainous Sweden, about one-fourth. Swine, on the other hand, constitute only 7 per cent of Norway's animals and 17 per cent of those of Sweden. In the latter they are valuable by-products of the dairy industry of the south. Practically all the cattle are for dairy purposes, their products providing the only considerable item of agricultural export from the peninsula. Southern Sweden, where small farms, cooperative dairies, and a considerable export of butter and condensed milk are characteristic, is an extension of the Danish dairy section. Goats, which would seem to be fitted for such conditions as prevail over large sections, have declined in number, their destructiveness of young forest growth discrediting them in countries which value their timber highly. It has been estimated that in 1915 two-thirds of the Swedish agricultural output was unsuited for human consumption, and that four-fifths of this was used for animal fodder. In other words, the great bulk of the agricultural output is grown for animal use.

Food Production Insufficient for Needs.—With the exception of a small dairy export, the farm products are, therefore, solely supply crops, neither Norway nor Sweden being self-sufficing in agricultural foodstuffs. The latter with its more favorable agricultural possibilities produces about three-fourths of its food requirements. Norway imports over one-half of her grain, one-third of her fats, and all of her sugar. In both countries there has been a marked industrial trend, but, while the proportion of the population engaged in agriculture has declined, the area cultivated has increased, as has also the total output of both grain and live stock. The possibility of extending the area of cultivable land is not particularly promising. While it is estimated that Norway may slightly increase the tilled acreage, it can only be done with government aid, and in some cases by subjecting the land to an unduly heavy capital charge.[1] The soils of Norway in general are hard to work, often glacial or avalanche deposits so full of stones or so steep as to make

[1] The cost of clearing, removing boulders, and draining often runs from $140 to $1,000 per acre.

difficult not only the cultivation but the mere holding of the soil in place. In Westland some farms can be reached only by the aid of ladders laid up the sides of the mountains.

As a rule the farms are small and operated by owners (Fig. 228). Over one-half of those in Norway are mere gardens—less than three cultivated acres each.[1] Most of these farms, however, possess also more or less forest, grassland, and pasture which contribute a considerable portion of the total income. The mountain pasture, or *saeter*, is usually located at an elevation of 600 to 1,800 feet, many being on the lower slopes of the plateau.

FORESTS

A Major Resource.—One-third of the Scandinavian Peninsula, stretching entirely across the great coniferous forest belt of northern Europe, is timbered, chiefly with pine and spruce; and wood and wood products play a major role in the national economy of both countries.

Distribution of Forests.—The distribution of forest cover over the peninsula is, however, very irregular. The high plateau is practically barren and over much of western Norway tree growth is lacking. Although precipitation there is heavy and winter temperatures mild, there is a considerable proportion of the surface upon which soil is absent, the slope too steep or the exposure to heavy winds too great to permit a good stand of timber (Fig. 229).

Forests of Norway.—Of the total woodland surface of Norway, about one-half of the merchantable stand is on the southeastern slope draining to the Skagerrak. The most important forest area of western Norway is in the region of Nidaros. In addition to an unfavorable environment there has, in the past, been little restriction upon cutting, so that the forested area has been reduced by about one-third and now covers only 21 per cent of the total surface. The ready accessibility of the original forests to the deep well-protected fjords open all of the year and the presence of many streams for floating and for power for the mills together with the attractive English market near by, have led to a serious depletion of Norway's timber.

As a national resource forests share second place with fish, and, since the population is small, per capita timber acreage and wood consumption are high, next in fact, to Finland and Sweden, among European countries. Not only is there a large domestic consumption for fuel and construction purposes, but exports of lumber have been a considerable item in the foreign trade. There has been in recent years a marked decline in the production of lumber and a corresponding increase in the manufacture

[1] Only 26 individual farms have over 250 acres of cultivated land each and 92.5 per cent have less than 25 acres of such land. In Norway 81 per cent of the farms are worked by owners.

of wood pulp and paper. With this increase in the industrial use of the timber has come a more complete utilization of the forests and increased employment in a land of limited opportunities. As a national asset the forest resources are important, but Norway is not an important factor in the world timber supplies.

Sweden's Vast Forests.—Sweden ranks high among forested countries, Finland alone on the continent having a larger proportion of its area in timber. Northern Sweden reaches into the Arctic tundra, the southern



FIG. 229.—Much of Norway's surface is better suited for forest than for crops. Note the splendid conifers on this rocky area. (*Courtesy Norwegian Government.*)

section is in the hardwood zone, but the great bulk of its forests are coniferous. Although the largest acreage of timber is in the north, the slower growth and the greater inaccessibility there make the central and southern sections the chief producing areas. In contrast to Norway, Sweden encounters the difficulty of the ice-closed rivers and harbors for several months of the year. On the other hand, there is a greater area well suited for timber, a larger number of streams of considerable volume less impeded by falls, and a heavier snow for land hauling. Practically all the standing timber is within 3 or 4 miles of a stream,

so that exploitation has been accomplished at little cost, and the utilization has been correspondingly efficient. Perhaps even more important than these natural advantages has been the attitude of the government and lumber companies, both cooperating to conserve the forests. There is practically no waste, cutting is strictly regulated, and reforestation widely practiced. As a result, although exploited for centuries, and

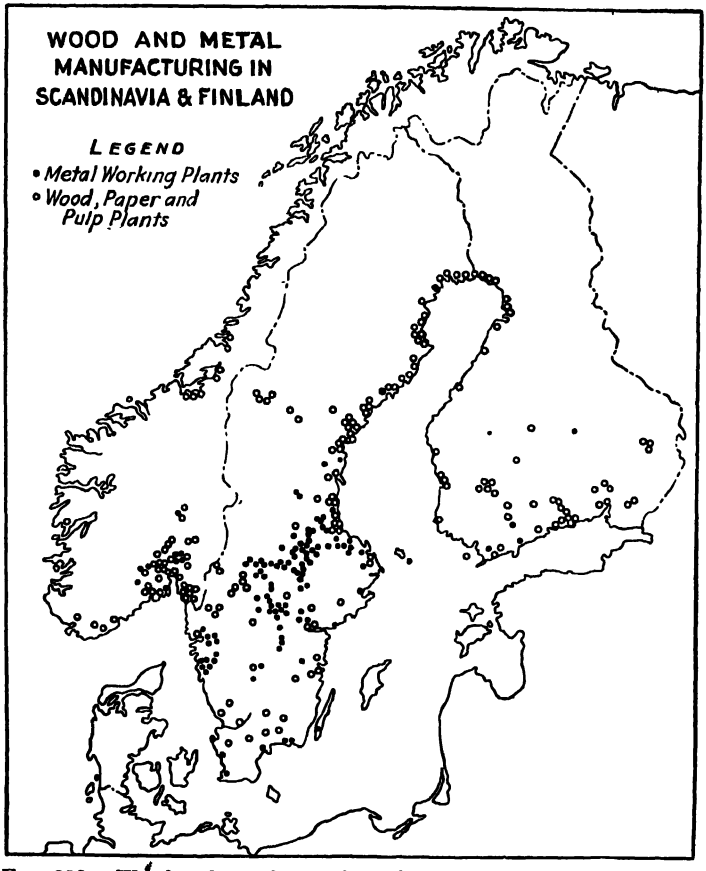


FIG. 230.—Wood and metal manufacturing in Scandinavia and Finland.

with a slightly larger cut than growth, it is probable that at present Swedish forests are actually increasing in area.

There is the same trend toward the production of pulp and paper which characterizes her neighbors, though Sweden, using one-half of her pulp for this purpose, is still behind Finland which converts as much as four-fifths before exporting. Lumber and pulp rank first and second, respectively, among Swedish exports. With favorable natural conditions and business-like management her forests are not only a national but an international factor in lumber, pulp, and paper production (Fig. 230).

WATER POWER

Wealth of Water Power Available for Manufacturing.—Although climatic and topographic factors have operated to seriously curtail agricultural production, they have, on the other hand, furnished Scandinavia with an extraordinary abundance of water power. The peninsula possesses almost one-third of the total potential and one-fourth of that developed on the whole continent. In view of the entire absence of petroleum and the scant coal resources, the enormous hydroelectric power available is of fundamental importance in shaping the economic

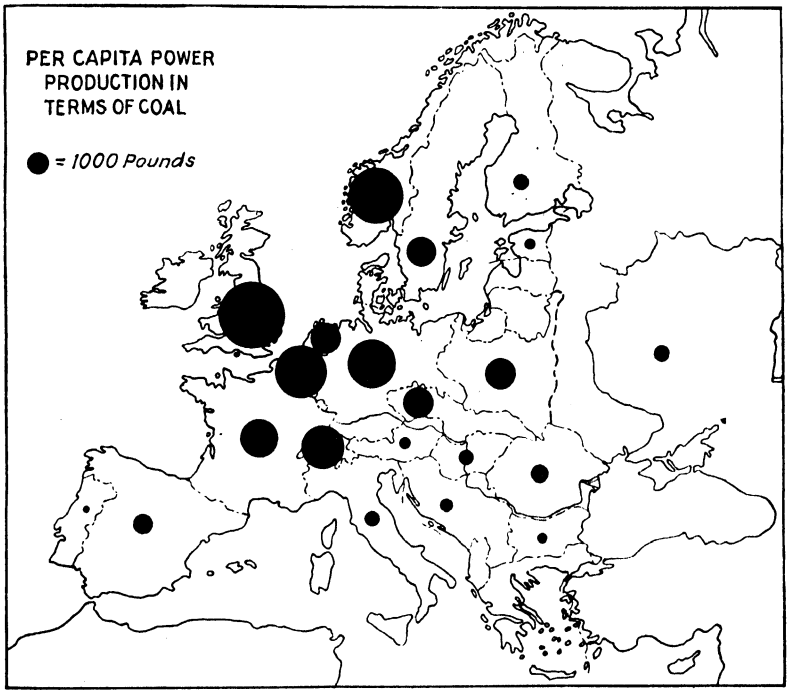


FIG. 231.—The coal-producing countries dominate the power production, three countries alone accounting for 75 per cent of the total power output.

development of the two countries. Any considerable growth of the population of either country must depend upon industrial development, which, in turn, hinges upon water-power exploitation (Fig. 231).

Norway Especially Favored for Water-power Development.—Conditions in Norway are, on the whole, more favorable for extensive hydroelectric development than they are in Sweden. Possessing the west-facing slope of the peninsula she receives considerably more rainfall, has steeper gradients for streams, possesses countless fjords which bring ocean transport into close proximity to the power sites, and is much freer from ice troubles. In fact, Norway probably has the most favorable combination

of natural conditions for the development of water power to be found anywhere in the world. In per capita development she has no equal, and among European countries ranks first in potential energy and third in exploitation. The chief handicap is the comparative scarcity of local markets and raw materials, wood being about the only raw material available. As a result of these naturally favorable factors Norwegian water power has been developed in large quantities at very little expense. Cities on the west coast in places may purchase power at the extremely low rate of $4.80 to $7.60 per horsepower year. (Compare with $50, an ordinary rate in New York City.) Several falls developed prior to 1915 cost only from $25 to $40 per horsepower of installed capacity, and, since distances are short, transmission charges are low. Water-power exploitation in Sweden, including the cost of falls and distributing system, is estimated to average about $80 per installed horsepower and the capital invested in hydroelectric works in 1924 was estimated at over $250,000,000. Post-war installation is of course done at greater expense.

Conditions Affecting Power Development in Sweden.—Swedish rivers, on the other hand, have larger drainage basins but smaller precipitation. The gentler slope results in many falls of small head rather than a concentration of the drop at few points with high heads as in Norway. One of the most serious handicaps in much of Sweden is the freezing in winter, which reduces the flow and necessitates auxiliary steam power or temporary closing of the plant. Sweden possesses, however, in its mines, forests, and farms much more in the way of domestic raw materials available for manufacturing to utilize its available power.[1] Both countries possess the advantage of rock foundations for dam construction and lakes and glaciers in addition to forests as stream regulators. Of great significance is the availability of electric power to the rural population, Sweden leading the world in its agricultural utilization. Over 3,600,000 acres of farm land, or 30 per cent of the cultivated area, is electrified, the current distribution being usually handled through cooperative societies. The total agricultural use in Norway is, however, negligible, being only 7 per cent of that in Sweden.

Distribution of Water Power.—The distribution of developed water power in Scandinavia shows the major part to be in the south where population and industries provide a market (Fig. 232). In northern Norway the chief use of current is for lighting and heating in the fishing ports. In Sweden the great excess of power is in the northern interior in the thinly populated and undeveloped Norrland. Some of it is used there for the electric railway from Luleå to Narvik and for power in the sawmills (Fig. 73). To a limited extent it may be transmitted southward

[1] Its proximity to Denmark which has no water power results in an export of current via submarine cable to that country. Sweden also sends some to the near-by Oslo region.

where deficiency in the supply will first develop, but much of Norrland's power must necessarily wait long for exploitation.

Other Power Resources.—Of supplementary power resources Scandinavia has few. Less than 750,000 tons of coal are produced in Scania and Spitzbergen. Much wood is used, especially for domestic heating. There is also considerable use of wood (charcoal) for smelting, while the waste from lumber is used for steam raising in the sawmills. All told, wood consumption is probably equivalent to several million tons

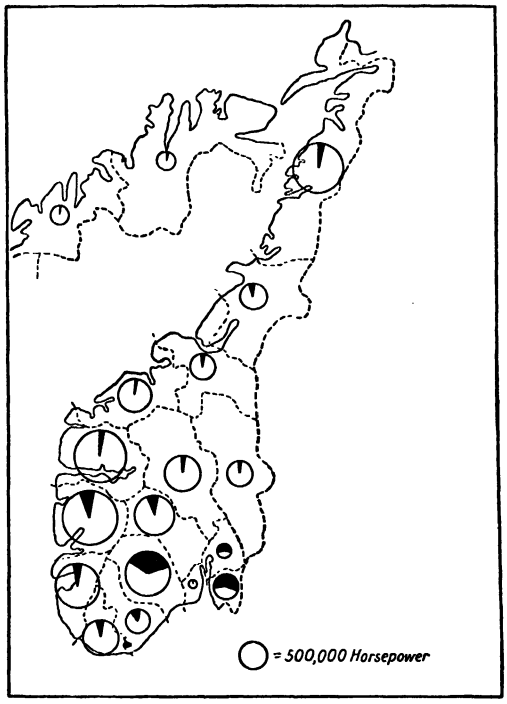


FIG. 232.—Potential and developed water power of Norway by provinces, 1922. (*Data from Utbygget Vannkraft I Norge, Oslo*, 1923.)

of coal whose actual consumption, considering the population and industrial development, is not only small but is decreasing, a tendency for which the increasing use of water power and of fuel oil is in large part responsible. The chief source of Swedish coal, formerly Great Britain, is now Poland.

INDUSTRY

The Industrial Trend.—The industrial use of water power in Norway began in 1845 with the manufacture of textiles. Within the next 30 years it had become the sole source of power for the making of pulp. Those establishments using water power rank next to agriculture and

forestry in the number of people employed. Local conditions have favored the development of manufactures demanding raw materials of small bulk but requiring much power for their fabrication. Norway was the first country to produce nitrogen compounds on a commercial scale, admirably supplemented by the rapid growth of the electrochemical and electrometallurgical industries giving her high rank in the manufacture of calcium nitrate, cyanamide, aluminum, cement, and wood products. The country ranks with Switzerland and France in aluminum output and is surpassed only by the United States and Germany.

In spite of the deficiency in coal, Sweden has turned more and more away from agriculture to industry and commerce. A half century ago industrial activities supported only 15 per cent of the population; today the proportion is 35 per cent and the value of the industrial products is fifty times that produced in the seventies. This rapid development has been paralleled by a corresponding growth in the foreign trade both in volume and in variety of items.

Swedish Resources Favor Industry.—In contrast to the narrow limitations upon agriculture which leave the country deficient in foodstuffs, Sweden has in her forests, iron ores, water power, and favorable commercial position the basis of a substantial industrial development. The Swedish people have responded to the stimulus of abundant raw materials by a marked display of inventiveness and skill especially in the manufacture of machinery. Swedish labor is well paid and efficient; the output per worker is considerably above the European average; and living standards are high.

Character of Products.—The products of her industries (known for their quality rather than for cheapness) are coming to be more and more of the highly finished type, only 14 per cent of the exports now being raw materials. This trend has been noted especially in connection with the industries associated with forests and mines. The former are no longer looked upon merely as a supplier of charcoal, and even the export of lumber has shown a strong tendency to barely hold its own or to decline. Swedish forest products have risen in value in 30 years from $25,000,000 to $170,000,000, while at the same time pulp, paper, and artificial silk manufacture have grown rapidly, accompanied by a corresponding change in the metal industries, second only to wood in export values.

Sweden is to a considerable extent a three-commodity country, bnt her rapid exploitation of the mines, forests, and water power has not been allowed to endanger the future supplies. The government and private capital have cooperated to insure the future as well as to protect present industry by proper conservation.

Distribution of Manufacturing.—The distribution of industrial plants shows a broad band across the southern part of the country between

Stockholm and Göteburg. Here, water power, iron ores suited for charcoal reduction, transportation, and the better agricultural resources are to be found. Many sawmills are scattered along the Baltic coast at the mouths of the rivers (Figs. 233, 234). With the increasingly complete utilization of the available power and forests in south Sweden,

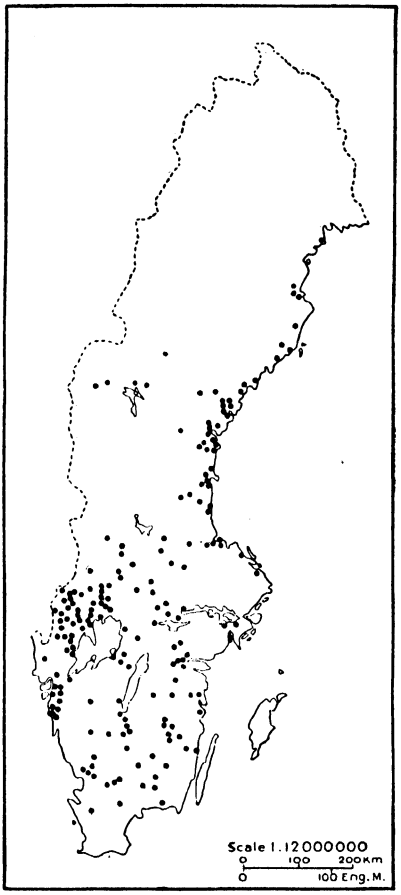


FIG. 233.—• Wood-pulp mills and paper mills.

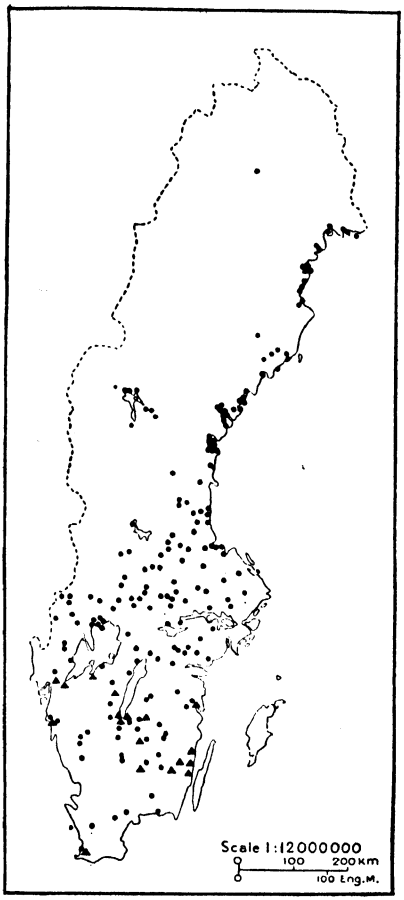


FIG. 234.—• Sawmills. ▲ Match factories.

it will be necessary to depend more and more upon the vast waterfalls and timber of Norrland.

THE FISHING INDUSTRY

A Resource of Great Significance to Norway.—Scandinavia's meagerness of land resources is compensated for in part by the wealth to be found in the adjacent seas. The North Sea—most productive of the world's waters—and the coastal waters, especially those of Norway,

yield enormous supplies. With the single exception of Britain, the three Scandinavian countries rank first in Europe among those important in per capita fish consumption, 45 pounds a year—about twice that of the United States.

Norway, among all modern nations, is most dependent for sustenance upon fishing. Next to the soil, forests and the sea rank about equal as major resources. Fish not only furnish an important part of the domestic food supply but they and their by-products constitute about one-third of the value of all exports. Great Britain, among European countries, is the only one whose catch exceeds that of Norway. In 1926 the export of fish and their by-products was valued at $38,000,000 or about $14 per capita.

Conditions Favorable for Fishing.—The coast of Norway is unusually favored for fishing. Its innumerable fjords and islands give protection



FIG. 235.—Codfishing. (*Courtesy Norwegian Railways Travel Bureau.*)

to the boats, and provide, as well, excellent spawning grounds. In addition the northerly position with the low temperatures, while poorly suited to agriculture, favors an excellent quality of fish and facilitates their preservation. The freedom from ice allows the fleets to follow the migrations of the fish at all seasons. Of course the open waters are frequently visited by storms and the havoc and destruction wrought among thousands of open boats is sometimes appalling. The modernization of the industry bringing larger vessels, steam and motor, in place of the small sailboats, together with the systematic use of patrols and wireless have, however, greatly reduced this hazard and loss.

The most famous fishing grounds off the west coast are those for cod south of Lofoten. Every winter some 11,000 to 12,000 boats visit these waters, and the population of the islands increases about 60 per cent during the height of the season. The cod ranks first in importance in Norwegian fisheries, the herring, caught farther south, being second

(Fig. 235). There where agriculture increases in importance the coast dweller may be both fisherman and farmer, depending upon the season. It was estimated in 1923 that of the 109,000 Norwegian fishermen, almost 25 per cent were farmers primarily, using the sea only as a minor source of income.

Whale Fisheries.—Whaling has, in recent years, become an important branch of Norwegian fishing—in fact in 1927 the value of the catch was equal to that of all the other fisheries in the country (Fig. 236). Norway has almost a monopoly of this phase, its oil output accounting for over one-half that of the world's total. With the depletion of the supply in the Arctic the industry has scattered to the four corners of the earth, although the principal catches are now in the Antarctic. Modern whaling

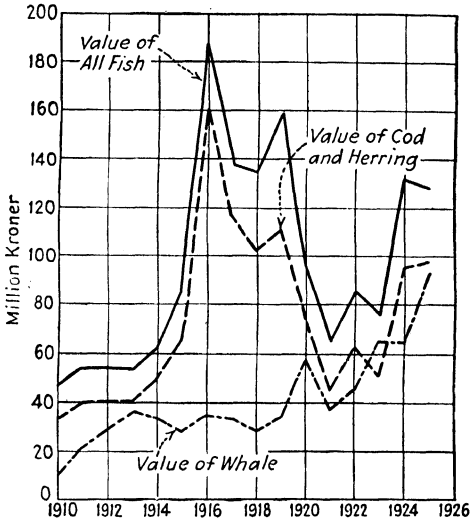


FIG. 236.—Norwegian fisheries classified as to types of fish. (*Courtesy R. Linder.*)

operations are carried on by huge floating factory ships each attended by some three or more "chasers." The latter capture the animals and turn them over to the great "cookery" vessel which extracts and refines the oil. A single vessel may carry 40,000 barrels of oil, much of which is used by soap factories or made into edible products.

Baltic of Minor Importance.—The Baltic Sea is of far less importance for fishing. Indeed, the abundance of fish decreases with distance from the North Sea, the Gulf of Bothnia being of least importance. Some fish are taken along the coast of Sweden and the inland lakes and rivers contribute appreciably to the large quantity consumed. During the Middle Ages the herring fisheries off Scania were important, but are now of little consequence. The best Swedish fisheries are off the west coast in the Straits of Kattegat.

POPULATION

A Sparsely Settled Land.—Scandinavia contains two of the most sparsely populated countries of Europe, a natural consequence of comparative poverty of resources, a subarctic climate and a mountainous topography. Relief has been sought in emigration and industrial development which still constitute important outlets for surplus population of both countries, although the numbers seeking a livelihood elsewhere have varied with changes in economic conditions. As a whole the number of emigrants in proportion to the total population has been large but has decreased with the shift from agriculture to industry, a change characteristic of all the Scandinavian countries.

Population Distribution Very Irregular.—The distribution of the population over the peninsula, in view of the great variations in the environmental conditions, naturally is not uniform, in general the density decreasing northward and inland. Three-fourths of the population of Sweden live south of the sixtieth parallel, *i.e.*, south of the latitude of Uppsala, while an extension of this favorable plain section into Norway accounts for one-half of that country's population in the region about Oslo. Topography, climate, soil, and transportation facilities account for this distribution, and all these conditions are favorable only in very limited areas. A fringe of population along the coasts, groups of fishermen about the heads of some of the Norwegian fjords, timber workers in the mills at the mouths of the Swedish rivers, and an occasional band of nomadic Lapps are the widely scattered outposts of humanity in the north. No large cities are found in the interior. The industrial trend has tended to minimize the influence of soil and topography, but, since agriculture still concerns about one-half the population, these changes are as yet of small importance. Of the total, the proportion engaged in industry in Sweden is 45 per cent, in Norway 28 per cent.

Population Increase Depends upon Industrialization.—For the future, any considerable increase in numbers rests upon additional industrialization. For Norway, agricultural production has approximated its limit; in Sweden, while added transportation facilities will open up new lands in the interior and in the north, the total addition to the food supplies will of necessity be small. Water power represents the largest single asset, as yet only partly utilized, and its further exploitation rests in part upon the price of imported coal. Before the industrial revolution, founded upon this fuel, Norway and Sweden were much more important members of the European industrial family than today. The substitution of water power is, however, serving to restore some of their lost prestige.

The Lapps.—In northern Scandinavia and to a smaller extent in the central portion of the peninsula are some 25,000 to 30,000 Lapps (Fig.

237). Although numerically a minor element in the population they are an alien group, and the retention of their primitive habits, speech, and mode of life has given rise to a number of problems both domestic

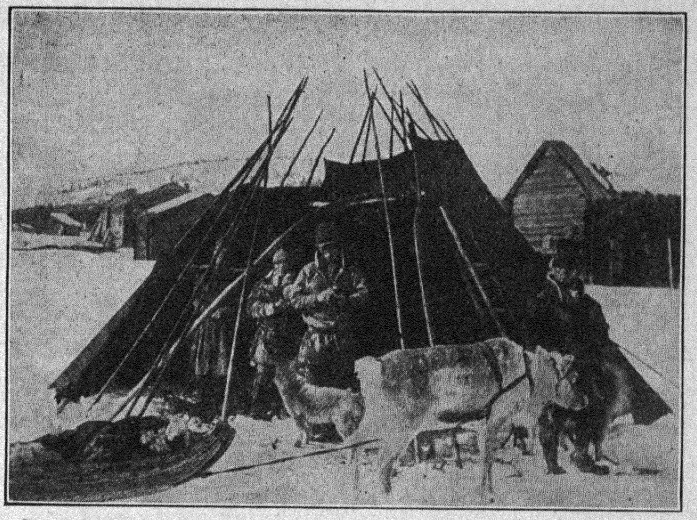


FIG. 237.—Scene in Swedish Lapland showing Lapp dwelling and transportation methods. (*Courtesy Geographical Review published by the American Geographical Society of New York.*)

and international. A considerable proportion of them are nomadic, depending for a livelihood almost entirely upon their herds of reindeer

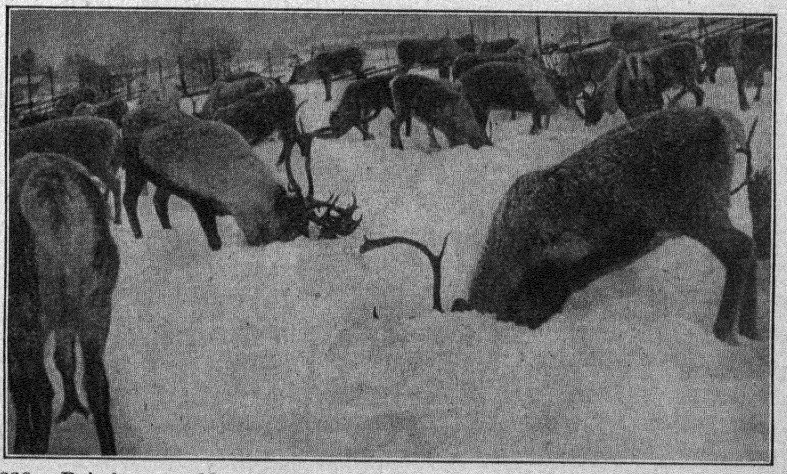


FIG. 238.—Reindeer are able to feed on lichens and moss buried under several feet of snow. (*Courtesy K. B. Wiklund, Uppsala.*)

(Fig. 238). In their wanderings for fresh pasture they have not only come into conflict with the sedentary farmers but have crossed the national boundaries and necessitated international arrangements for the

regulation of their movements. They are, on the other hand, to a certain extent an asset since they provide hides and meat and utilize what would otherwise be vast tracts of unproductive land.

MINERAL RESOURCES

Mineral Industries Chiefly Based upon Iron Ores.—Though one of its oldest industries, mining is not of primary importance in Scandinavia. Norway is especially deficient[1] in minerals and the only one of consequence in Sweden is iron ore. Unfortunately the coal is limited in amount and poor in grade thus placing a serious handicap upon mining and smelting. Less than 10 per cent of Sweden's coal needs are met by the domestic output which comes from Scania, and the limited supply of good coal there makes the exploitation practicable only where coal and excellent clay occur in conjunction, so that both can share the cost of mining.

Large Iron-ore Resources in Sweden.—Sweden possesses about 12 per cent of the iron-ore reserve of Europe but more significant still is the fact that she possesses 90 per cent of the *very high grade* ores of the continent, Russia claiming the remainder. This circumstance is especially fortunate in view of the absence of coal and the necessity of exporting the ore whose quality enables it to stand a high transportation charge.

The Ore Field of Central Sweden.—The iron-ore deposits occur in two fields rather widely separated. In central Sweden are found excellent iron ores, low in phosphorus and sulfur; abundant forests for charcoal; and a population which for many generations has been skilled in iron and steel making. As a result Sweden became, during the eighteenth century, the world's leading iron producer and their product had a reputation for excellence unmatched anywhere. Upon it Sheffield's high-grade cutlery was based. But with the invention of coke as a substitute for charcoal and improvements by which a good quality of iron and steel could be produced from low-grade ore, steel production grew rapidly in the countries possessing coal. Furthermore, the price of Swedish wood for charcoal continued to rise, especially since the pulp and paper industry has developed to such large proportions, so that Sweden has become a relatively small steel producer. She still keeps her reputation for high grades, however, and retains certain markets needing special qualities. The use of the electric furnace, based upon energy from her abundant water power, is being tried out, a method which reduces the charcoal consumption about one-half. Electric smelting is used in the production of one-fifth of the total Swedish pig iron output, the rest being by charcoal alone. The general trend of the industry

[1] Mining and quarrying in Norway employ about 1.5 per cent of the working population (1920) and the value of the mineral output (1926) is about $5,000,000. The principal items are pyrites and iron ore.

in recent years has been toward the manufacture and export of the finished steel products rather than pig iron. Exports of the latter from 1913 to 1925 have been reduced by three-fourths, while that of machinery and apparatus has multiplied about three times in the same period. The high per capita consumption of steel and the fact that metal products now rank first in value among Swedish manufactures are evidences of this trend.

The Lapland Deposits.—Though known in the seventeenth century, the Lapland ore deposits awaited the completion of the Luleå-Narvik

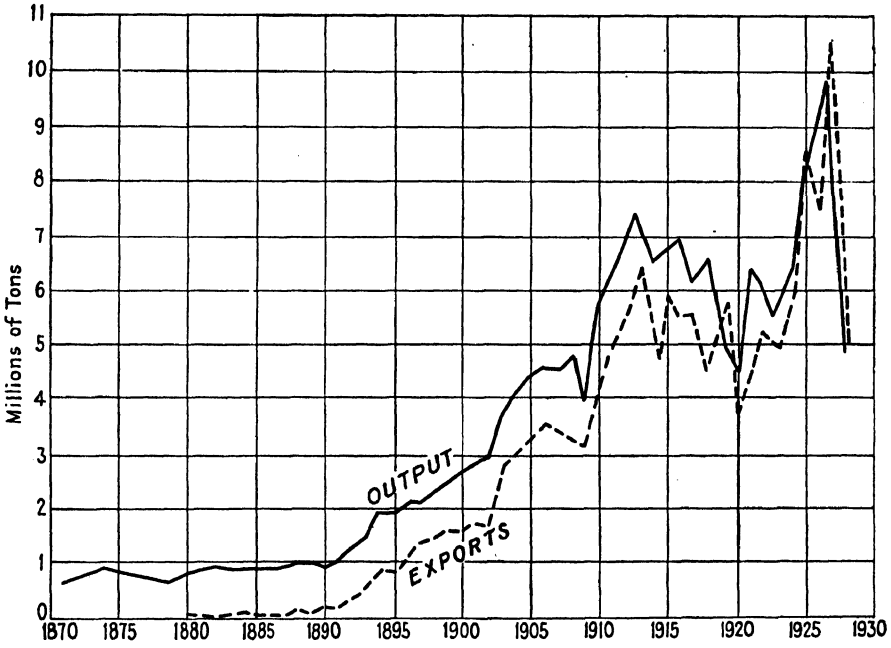


FIG. 239.—The export of Swedish iron ore is closely related to that of output.

electric railway in 1903 before extensive exploitation could be undertaken. In a bleak barren country, without coal and far removed from the iron-steel plants of central Sweden, the Lapland ores are almost wholly for export. The deposits rank as one of the world's largest reserves of high-grade ore, being about four times the extent of those of central Sweden. They are easily mined, much of them by open pit work, averaging about 62 per cent metal, with the major part rather high in phosphorus. Luleå, the nearest Baltic port, is closed by ice for 6 months, but Narvik on the west coast of Norway is ice free and accounts for the bulk of the shipments. About two-thirds of the annual export of 9,000,000 tons goes normally to German furnaces via Rotterdam, a journey comparable with that from Duluth to Pittsburgh, British plants and methods being

mostly adapted to low phosphorus ores imported chiefly from Spain and north Africa. The export from Lapland is strictly regulated by law and the government intends that the Swedish steel industry as well as the nation at large shall benefit from this valuable but limited resource (Fig. 239).

TRANSPORTATION AND TRADE

Interior Transportation Difficult.—Over much of the peninsula the construction and maintenance of roads and railroads is extremely difficult. Especially is this true of Norway where they must be hewn from mountain sides, carried through tunnels, or laboriously run over

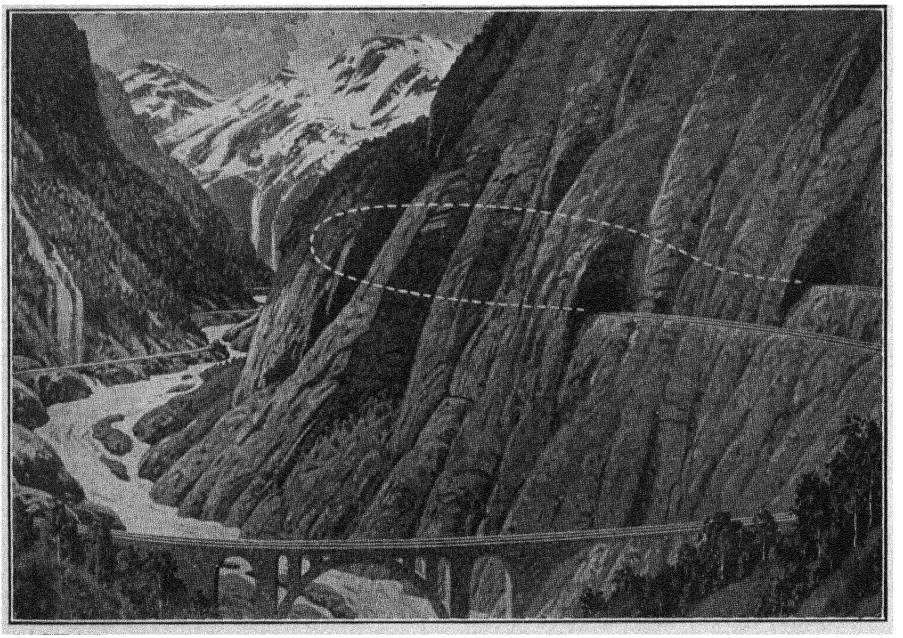


FIG. 240.—The remarkable triple tier track and the "turnabout" tunnel (nearly a mile long) at Verma on the Romsdale Railway east of Nidoros. (*Courtesy Norwegian Government Railways.*)

the mountains by zigzag windings (Fig. 240). In addition to topographic obstacles, winter snow and ice make the maintenance of roads, railroads, and electric transmission lines expensive.

The high plateau forming the backbone of the peninsula with its precipitous slopes to the fjord heads on the west coast constitutes a commercial barrier of the first order. Only five railroads cross it, and these were built only with the greatest difficulty. Bergen, the second city of Norway, has but a single railroad connecting it with the interior—a line to Oslo. This road cost over $11,000,000 dollars, and, although less than 500 miles in length, it has 178 tunnels and climbs

to a height of 4,264 feet (Fig. 241). No automobile or even wagon road supplements it. Only in southern Sweden, where one finds also the only inland water route, is there adequate interior transport.

The Göta Canal, built a century ago, joins Göteborg with Stockholm by means of one of the world's most picturesque though little used waterways. Of the 347 miles, over 200 are natural waterways, including lakes Vättern and Vänern, the Göta River and the Baltic Sea. Seventy locks with a total lift of 300 feet are used, the minimum depth being 9 feet. The

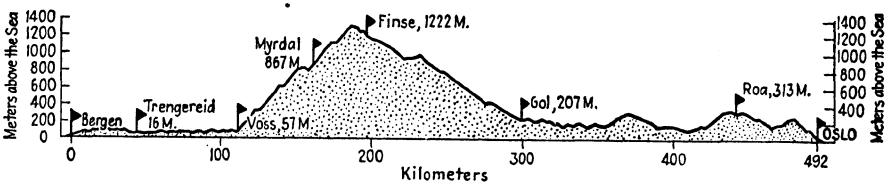


FIG. 241.—Profile of the Oslo-Bergen Railway showing altitudes of stations. Permanent snow is found at the altitude of Myrdal, and at Finse the railway passes between two glaciers.

water power available along this route has attracted many industrial plants to the vicinity.

Though large areas are untouched by railways or highways, the mileage of railroad in proportion to the population is large; in Sweden, the largest in Europe. The wide use of telephone, telegraph, and electric light has been a great boon to rural Scandinavia in her isolated mountain valleys with her long dark winter evenings.

Transportation Largely Dependent upon the Sea.—The difficulties of interior transport have forced Scandinavia to trade via the sea. This is true for both domestic and foreign commerce, particularly in Norway. The protected coastal waters, ice free, the abundant food supplies furnished by the sea, with the meagerness of agricultural resources have made the Norwegians a nation of sailors. Shipping there gives employment to one-fifth of the adult male population, and the country has long held first rank in per capita tonnage of merchant marine. It is said that Norway could put her whole population aboard her own fleet, an interesting contrast to the United States where all of the people could be put into their automobiles. It should be noted also that the natural limitations on the variety of products in Scandinavia with the exportable surplus confined to a very few staples makes dependence upon foreign trade a necessity. The great merchant fleet of Norway is of course not needed entirely for her own commerce, but serves as a carrier for other countries. Norway's losses of shipping in the war were enormous—almost one-half of her total fleet—but by 1927 she had a larger and a much more modern one than in 1913. The earnings of the merchant marine with that of the whale fisheries and tourist traffic are important

factors in correcting the unfavorable trade balance of $75,000,000 to $80,000,000.

Character of the Foreign Trade.—The chief exports of Norway (1925) are fish (about 30 per cent) and forest products (about 39 per cent), while the output of her manufactories, dependent upon water power, account for 16 per cent. Pulp and paper figure largely in export tonnage. The United Kingdom, Germany, and United States receive more than one-half of the exports. Oslo, the capital and only city of

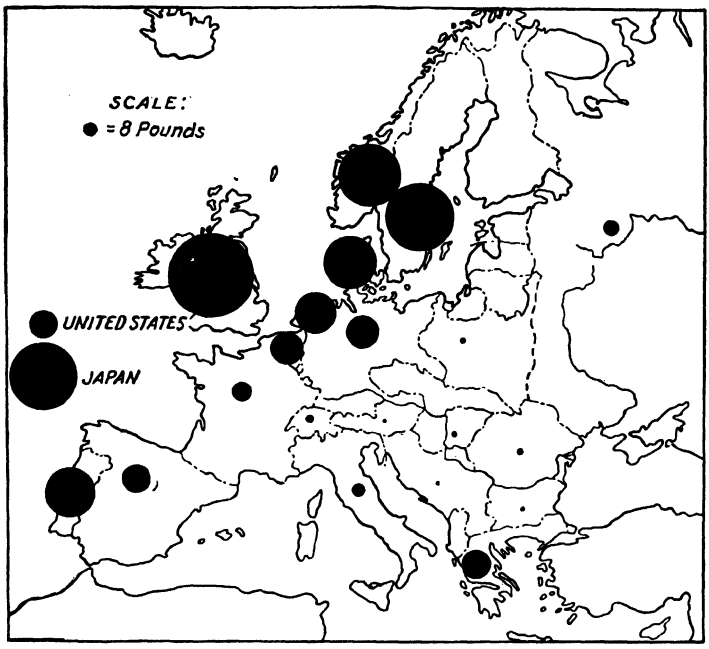


FIG. 242.—European fish consumption per capita. Note the contrast of the North Sea and Mediterranean countries. (*Courtesy H. B. Smith.*)

over 100,000, is the chief port; Bergen, the second city, is principally concerned with the fish trade.

DENMARK

Comparison with Finland.—In size Denmark ranks among the half dozen smallest countries of Europe, but its population density is high, especially for an agricultural country. Finland, at the opposite end of the Baltic, has only a few more inhabitants but is eight times as large as Denmark, a fact of great significance in comparing the relative value of their natural endowments. Denmark in its peninsular form and more especially in its more southerly position has marked advantages, both commercial and climatic over its northern neighbor. Furthermore,

while the surface features of both are the result of the activity of the same ice sheet, Denmark was fortunate in being chiefly a region of deposition, while Finland was one of erosion. As a consequence, the former, in spite of its limited area, has one-fourth more arable land.

The Kingdom and Its Possessions.—Denmark proper comprises the peninsula of Jutland, which contains 70 per cent of the whole surface, and about 325 islands, only 100 of which are inhabited. Of the outlying possessions, Greenland with an area, exclusive of that covered by glaciers, approximately twice that of Denmark, has a population of about 15,000. Its chief value lies in the fisheries off the coast. The Faroe Islands, an isolated volcanic group about midway between the Shetlands and Iceland, are regarded as a part of Denmark. The majority of the 23,000 inhabitants subsist chiefly by sheep raising and fishing. Iceland, formerly a Danish possession, is essentially independent, though acknowledging the same king.

Physical Features.—Physically Denmark is but a northward extension of the great European plain, with the same dune strewn west coast extremely irregular on the east and with the same low morainic hills, bog, swamp, clays, and sands which may be found anywhere bordering the southern shores of the North and Baltic seas. Its peninsular form, and its position bridging Scandinavia and the mainland as well as dividing the waters of the Baltic from the North Sea have furnished the physical basic for individuality—an independent political state rather than merely one of the numerous blocks which were joined to form the German realm. Again, the extended coast line and relatively level topography greatly facilitate transportation—an important factor in view of the semiperishable nature of the chief exports, and an advantage also reflected in the development of a merchant marine and in the exploitation of the fisheries.

Denmark commands the three natural routes between the North and Baltic seas, the main passage, the Sound, being only three miles wide at the narrowest place. The Great Belt and Little Belt have dangerous currents, many small islands, and shoals.

Climate.—The climate is marine, characteristic of northwestern Europe, the rainfall averaging about 25 inches with much damp cloudy weather and raw chilly winds. Köbenhavn on the average receives only about one-fourth of the sunshine possible, conditions which, in general, are much better suited to pasture than to cereals. Of these, oats, rye, and barley are better favored than wheat.

Population.—The population of Denmark (3,475,000) is still mainly rural (57 per cent), although with the increased use of machinery and the growth of industrialism the urban element is showing a relative increase. Emigration varies with the economic conditions but in recent years has averaged about 6,000 annually.

Köbenhavn ("merchant's haven") the only city of consequence, and possessing one-fifth of the total Danish population, occupies one of the most strategic positions in Europe. Built upon a narrow strait between Zealand and Amager Island, it has an excellent harbor. Its importance as an entrêpot was greatly increased by the establishment there of a free port in 1894, but the construction of the Kiel Canal[1] was a great blow to the city.

Resources Limited.—In view of the limited variety of resources and the proximity to the world's most famous fishing grounds, it is surprising to note the relatively small importance of this industry in Denmark. In 1928 the total catch was estimated at about 210,000,000 pounds with a value of almost $10,000,000. This is a per capita value of only about $3 as compared with over four times as much from fish and whale in Norway. Formerly the Baltic was frequented by great schools of herring and the protection of the fishermen in these waters from the pirates was used as an excuse for the "Sound Dues" collected by Denmark on all shipping through it, but this was discontinued in 1857.

Although at one time covered with forests the country now has but 1 acre in 12 in timber or a total of about 700 square miles, and ranks with such forest-poor countries as Britain, Netherlands, and Greece. The forested area has, however, increased 3½ fold in the past 60 years.

The country's only mineral resources of consequence are the raw materials for brick, cement, pottery, and porcelain works. The materials for the last are furnished by the island of Bornholm which, geologically unlike the others, is an outlier of the Scandinavian block and possesses excellent clay.

Though native fuel or power resources are practically lacking, it must be noted that Newcastle coal is ordinarily about as cheap in Köbenhavn as in London, while a small amount of electricity from Sweden's surplus hydroelectric energy is transferred by submarine cable across the Sound. Under present conditions, however, this lack of resources prevents Denmark's becoming an industrial nation in the modern sense, and such manufacturing as is carried on is chiefly concerned with the preparation of her agricultural products destined for export, or with the satisfaction of the home market.

AGRICULTURE

Agriculture the Dominant Occupation.—To an extraordinary degree Denmark is a country of a single resource—the soil—and much of this was, originally, not naturally fertile. Eastern Jutland and the islands possess moderately productive land, but the rest contains large areas of light, sandy, infertile soils.

[1] Sixty-one miles in length it saves 237 miles, 1 day for a steamer.

Up to 1850 grain growing, without fertilization or crop rotation, characterized Danish agriculture. The production of animals was of minor importance, although badly needed by a soil naturally low in fertility. Under these conditions the land gradually became impoverished, yields declined, and, together with low prices for grain, a serious depression developed. The crisis became acute when, in the seventies, there came a flood of cheap grain from the virgin lands of the New World.

Reasons for Change from Grain to Dairying.—With the recognition of the permanence of this condition, and of the futility of attempting to compete with the new countries in grain growing there began in Den-

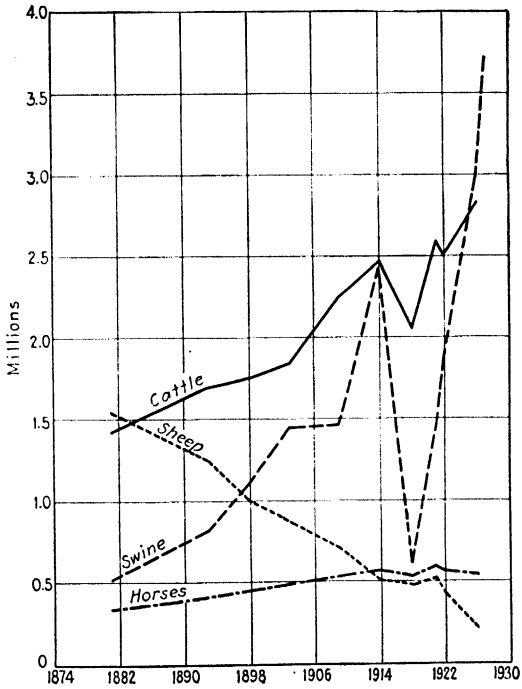


FIG. 243.—Live-stock trends in Denmark. Note the rapid increase of swine and cattle (mainly dairy) as compared with sheep and horses.

mark a great agricultural transformation, furthered by the considerations that (1) the prices of animal products had not fallen as had those of the grains; (2) climatic and soil conditions were actually more favorable for animal than for cereal production; (3) large industrial populations were near by to provide markets which could be reached by perishable animal products; and (4) the animal manures would restore the fertility of their worn-out soils. Several farseeing leaders recognized in this phase the future of Danish agriculture. The revolution was effected gradually, animal husbandry replacing grain growing and small holdings replacing large estates (Fig. 243).

The shift from a comparatively simple type of land utilization to a highly specialized complex type, from grain growing to the production not only of animals but of highly finished animal products, has been intimately associated with that of several other movements fostered by the government, by individual scientific leaders, and by the farmers acting through their cooperative societies. The establishment of a far-reaching system of agricultural education in which a knowledge of scientific agriculture could be made a part of the equipment of every farmer was fundamental to the success of the new regime.

The World's Leader in Agricultural Cooperation.—One of the most distinctive features of Danish agricultural organization is the large number of small farms and their intensive cultivation by their owners. Of the total number of holdings (about 250,000) 71 per cent are under 40 acres, over one-half have less than 13½ acres, and over one-fourth (27 per cent) less than 1½ acres. The most important contribution of Denmark to the agrarian world is the successful application upon a large scale of the principle of agricultural cooperation. Nowhere else have such efforts been so widely applied or so uniformly successful. There are approximately 5,000 (1920) cooperative societies enrolling almost 90 per cent of the farmers of the nation. Their activities cover a wide range chiefly in the production, marketing, and purchasing fields.

Cooperation has in turn made small land holdings practicable, has produced standardized high-quality products, distributed them efficiently through the most direct marketing channels at small cost, and has been able to make continual readjustments in farm production to better meet the consumers' demands. It has thus made available to the small farmer the advantages of large-scale production, distribution, and purchasing. It is significant that the majority of those farmers not members of the cooperative societies possess large farms.

In all these activities the government has taken an energetic part. The success of the movement has been primarily dependent upon the unique system of education which has made a knowledge of scientific agriculture and a high regard for rural life the possession of practically every inhabitant. Loan funds have been instituted for facilitating the purchase of land by the workers; information disseminated on stock breeding; laws respecting sanitation, standards and grades established and rigidly enforced. The aim has been to insure the maximum use of the land and to foster every financial, educational, and scientific organization or institution designed to increase the national agricultural efficiency. The cooperation of government with private effort has been conspicuously intelligent and effective.

Reclamation and Fertilization Practiced.—Reclamation of waste land and the increased productiveness of that already under cultivation have gone hand in hand with the change in agricultural methods. Thus

1,500,000 acres of waste land have been converted either into forests or farms—and Denmark now has the largest proportion of its area classed as arable of any country of Europe. Meantime permanent pasture has declined in the past half century from 41.4 per cent of the area to 17 per cent. The increased use of animal manures, together with imported commercial fertilizers, has raised the productiveness of the soil until yields are among the highest in the world.

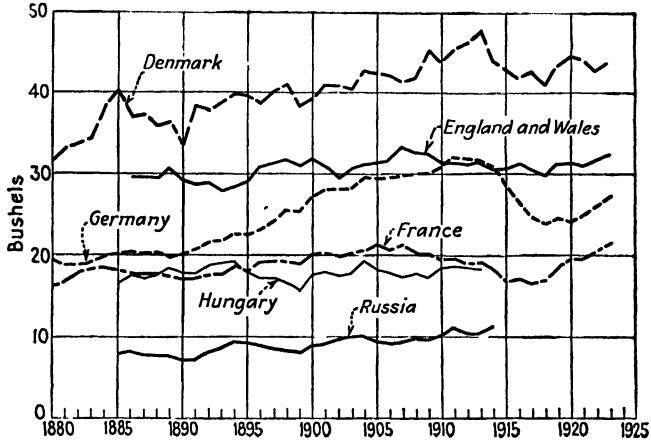


FIG. 244.—Wheat yield per acre, trends in various European countries, 1880 to 1923. (*U. S. Department of Agriculture.*)

Agricultural Methods.—The small size and the comparative uniformity of climatic and topographic conditions have made agricultural practices fairly uniform. On practically all farms the aim is to grow mainly fodder crops, to keep dairy cows, raise bacon hogs to utilize the skim milk and whey, and to raise chickens. With the rapid growth of animal population much of their food must necessarily be procured elsewhere. In 1928 over 1,500,000 tons of oil cake, bran, maize, and other feeds were brought in. Up to the World War about 60 per cent of the grain consumption was of domestic origin. The effect of the stoppage of that movement during the war was to necessitate the slaughter of much of the live stock.

The animal population has grown until Denmark in proportion both to area and number of inhabitants ranks among the three or four leading countries of Europe in the number of cattle and swine. With this growth in numbers there has been a corresponding improvement in the animals and their products. In the half century from 1864 to 1914 the yield of butter fat per cow trebled, only three countries of Europe having in the latter year a larger average yield of milk per cow. Tuberculosis has been entirely eliminated. The observance of the utmost care and cleanliness together with the most modern methods and rigid inspec-

tion of export products have made Danish butter, bacon, and eggs the world's standard for high quality.

Foreign Trade.—Limited area and lack of variety in the resources naturally favor a large per capita foreign trade ($259), more than three times that of the United States. In addition to manufactures, huge quantities of animal feed—80 per cent of the total used—must be imported. Manufactured foodstuffs make up about 80 per cent of the exports. High-grade butter is Denmark's speciality, and she is the world's largest shipper of that commodity. It is her main export "money crop," over 300,000,000 pounds being shipped in a single year. Such has been the phenomenal development of the variable product

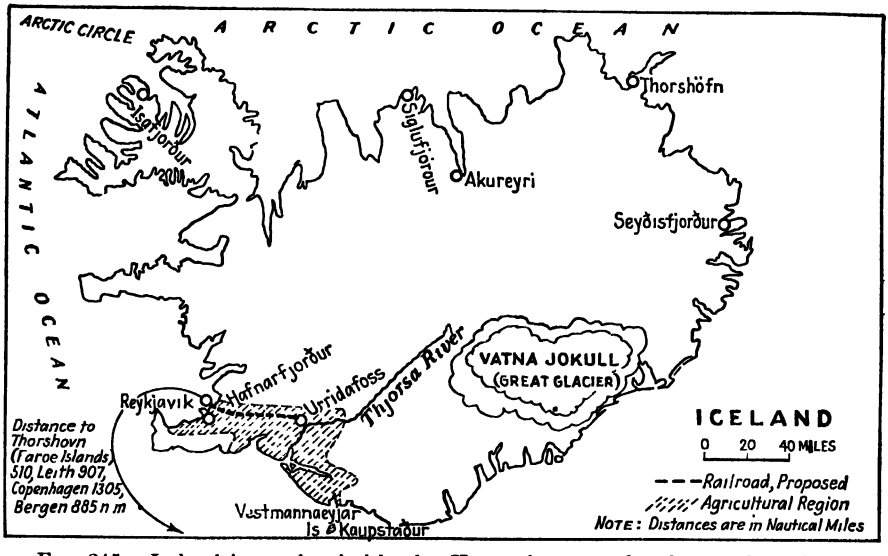


FIG. 245.—Iceland is a volcanic island. Hot springs are abundant and earthquakes and volcanic eruptions are relatively frequent. The mountainous surface leaves only about one-fifth of its 38,000 square miles cultivable. (*U. S. Department of Commerce.*)

of the primitive kitchen hand churn into the standardized high quality product of more than 1,000 modern sanitary factories which is hurried across the North Sea to the English breakfast table. Similarly, bacon prepared to suit the Englishman's taste is today turned out from 55 cooperative bacon factories, Denmark, in 1926, accounting for 30 per cent of the world's total exports of bacon. A recent attempt to increase the variety of commodities for export is seen in the larger amounts of cheese and condensed milk. As a matter of thrift, the Dane will sell his high-priced butter and in turn import cheaper fats and oils for his own table, and the country is an important manufacturer of margarine. Practically the whole output is for domestic use, and their per capita consumption of 45½ pounds is probably the highest of any people.

Iceland.—Though on the margin of the north frigid zone, Iceland, like Norway, escapes some of the severest penalties of its northerly position, thanks to the moderating influence of the warm waters of the North Atlantic. Thus, Reykjavik is an ice-free port, although so far north as to be off the main commercial routes.

The island is about one-fifth larger than Ireland yet has a population only one-fourth that of the city of Dublin, in fact the density, 2.5 per square mile, mostly on the southwest margin of the island, is by far the smallest of any European land. The explanation for its scant population lies in the fact that three-fourths of the area is waste land, lava, or ice covered (Fig. 245). In spite of these handicaps, Iceland has a civilization of a high type. The gradual emancipation from restrictive trade regulations has resulted, since 1900, in a greater quickening of the industrial and commercial life than in the previous five centuries.

Of the total population about two-fifths are farmers, and, since the island lies north of the limit of cereal production, their interests, like those of Scandinavia, are chiefly in producing hay, forage, and animals, of which sheep are the most numerous, although dairying is of growing importance.

Another one-fifth of the people are fishermen and their catch supplies the chief export. Most of the fish, salted and dried, go to Spain, the dairy products, to England, the latter furnishing, in turn, the chief imports of clothing and machinery.

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B. EASTERN EUROPE

CHAPTER XVIII

THE BALTIC STATES AND FINLAND

FINLAND

Political Relations.—Finland for some six centuries was a part of Sweden and owes much of its progress and culture to the influence of the Swedish people, who still constitute a small but important group in the country. In 1809 Russia acquired control and for almost a century Finland was a semi-autonomous part of that empire. About the close of the nineteenth century strong efforts to Russianize the territory aroused much national spirit, and the Russian revolution of 1917 provided an opportune occasion for a declaration of independence. After a period of internal strife, in the settling of which German aid played a part, the Bolshevik element was defeated and the republic established.

Politically and culturally Finland, like the countries immediately to the south, marks the transition between east and west Europe, a buffer between Slav and Teuton. It should be noted, however, that while racially it is composed of neither of these groups, the country itself belongs to the west; is the frontier of the *western* rather than of the *eastern* social and political systems. The change occurs at the Russian boundary and is most striking. Though for centuries a battle ground between Russia and Sweden, it has been the latter, not the former, which has dominated social, intellectual, and political affairs, and in spite of harsh climatic and topographic conditions, civilization and culture compare favorably with those of Western Europe.

Latitude and Its Consequences.—The country occupies the most northerly position of any of the nations. The Arctic Circle crosses not far from the center and all of the country lies north of the sixtieth parallel, *i.e.*, in the latitude of peninsular Alaska and of Greenland.

As a consequence of its position, Finland's climate is intermediate in type, being neither strictly continental nor marine. The Scandinavian Highland minimizes the influence of the North Atlantic and its warm currents, while marked extremes of temperature are characteristic of the great Russian plain on the southeast. Finland is low, however, and the prevailing winds are from off the Baltic, so that the average temperature is about 10° F. higher than the normal for that latitude. Even so, the winters are very severe, the summers short and hot, and

sudden temperature changes with accompanying frosts not infrequently destroy crops.

During the winter the ports on the southwest coast can be kept open by the aid of ice breakers. Because of the influence of a branch of the North Atlantic Drift, Finland's short strip of Arctic coast with the port of Pechènga is ice free, yet this "back door" is commercially an uninhabited waste. The average annual precipitation of 21 inches, about one-third of which is in the form of snow, is lighter than for most countries of northwestern Europe. The freezing of the inland waters and the snow cover are important factors in winter transportation, particularly for logging operations.

Surface Features

A Low Glaciated Plateau.—Finland is a low plateau, the stump of a former mountain system long since eroded away. Its present surface features are largely the consequence of most vigorous glaciation. Like its counterpart, the Laurentian Highland of North America, it has been stripped by the ice of most of its original soil, leaving a moraine cover of boulders, gravel, and sand. The country has been appropriately named *Finland* (fen land) since lakes, marshes, and bogs comprise about one-third of the entire area. Lakes, to the number of 35,500, occupy a larger proportion (11.2 per cent) of the total area than in any other country. Most of them are small, and the great majority are located in the southern half where they cover about one-fourth of the surface.

National Resources and Their Development

Large Water-power Resources.—Over most of its rocky, ice-scoured, lake-strewn surface, forests and water power constitute the chief resources. Although the country is neither high nor subject to heavy precipitation, yet the small amount lost by evaporation or absorption leaves a relatively large run-off. The many lakes and marshes serve as reservoirs, although the ice renders them useless for about 150 days of the year. Of the total potential power available, estimated at 1,800,000 horsepower, about 343,000 were to have been developed by the end of 1930. The absence of coal, however, and the demands of industry are stimulating systematic exploitation (Fig. 246). The completion of the government projects under construction planned for 1930 will electrify all south Finland, a section with 50 per cent of the population, half the cultivated land, and 70 per cent of the industries of the country. The pulp and paper industries use almost two-thirds of the electric power provided.

A Land of Extensive Forests.—The land lies in the great north European conifer forest belt, and timber, of which it is the largest European producer and exporter, constitutes a most important factor in

national economy (Fig. 247). The proportion of land in forest as well as the per capita timbered area is the highest in Europe; and, with Russia, Finland possesses the only extensive virgin forests on that continent (Figs. 248, 249). The wooded portion—over three-fifths of the whole—is

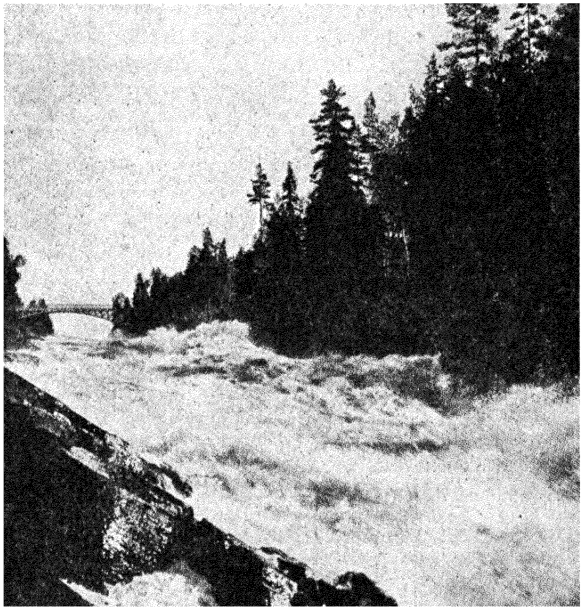


FIG. 246.—The famous rapids of Imatra, Finland. One of the many potential power sites in this northern land. (*Courtesy Finnish Government.*)

larger than New England or the state of Illinois, and timber, pulp, and paper constitute a large part of the total exports. About 20,000 logs and 2 500,000,000 board feet of lumber are cut and over 300,000 tons of pulp and almost 500,000,000 cubic feet of wood are exported

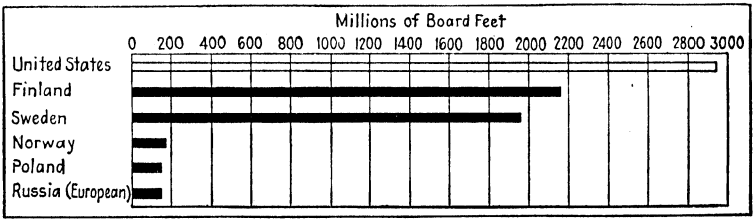


FIG. 247.—Exports of lumber, 1928, from the leading exporting nations.

annually. Woodworking industries employ almost one-half the workers and timber products account for about 85 per cent of the value of all exports. About 40 per cent of the forests, chiefly in the north and east, belong to the State, and, since the establishment of independence, conservation measures have been adopted to preserve this valuable resource.

Agricultural Development Limited.—Next to Norway, Finland is probably the poorest country of Europe in agricultural resources, but in spite of an adverse climate and a scanty and infertile soil, it is the chief dependence of the country's economic life,[1] two-thirds of the population being engaged either in farming or forestry. The most favorable conditions, both as to climate and soils, exist in the southwest (Fig. 250). Cultivable land is in general found only along the coast, river valleys, or lake shores. The initial investment for clearing the land of timber and

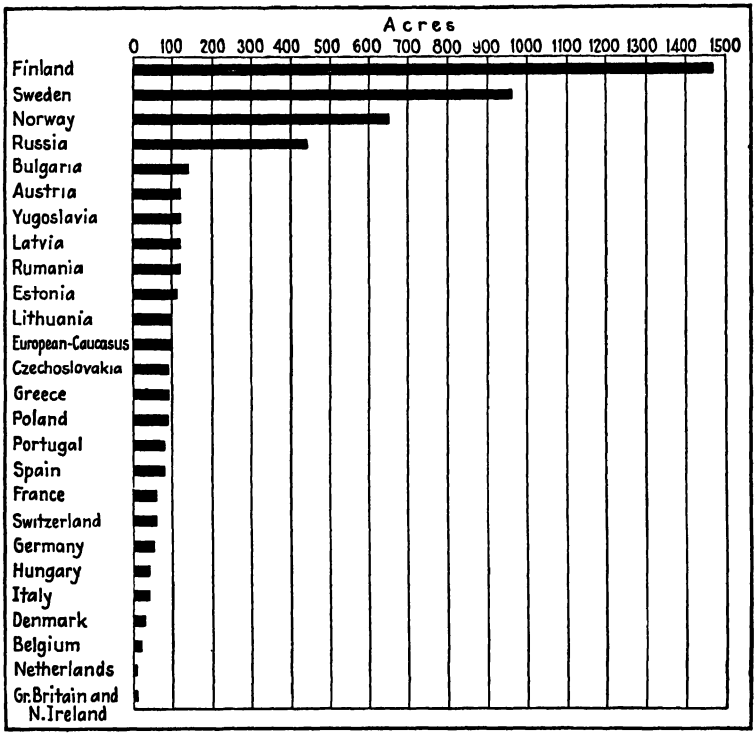


FIG. 248.—Number of acres of forests per 100 inhabitants for the countries of Europe. (*Data from Zon and Sparhawk's Forest Resources of the World, McGraw-Hill Book Company, Inc.*)

boulders and of draining and fertilizing is very high, and there is much land in central and north Finland better suited to forest than to crops. In view of the small proportion of the land cultivated (6.2 per cent), and in pasture and meadow (3.4 per cent), it is surprising to find the population so dependent upon farming and stock raising.

As in Scandinavia, rye, oats, potatoes, barley, and hay are the standard farm crops. Because they are hardier, oats are gradually

[1] Capital invested in agriculture in 1923 was estimated at $491,000,000, in forests between $500,000,000 and $600,000,000. However, agriculture employs and furnishes a livelihood to a far larger number of people.

displacing rye and now occupy twice as much acreage, although the latter is the chief human food and matures, in favorable years, even on the Arctic Circle. Because of the long summer days in the north, barley, which in the Åland Islands requires 116 days to ripen, will mature in 63 days in higher latitudes. Potatoes rank next to rye in the diet. The value of the harvest is increasing, yet agricultural production is insufficient for the population and food products constitute the bulk of the imports.

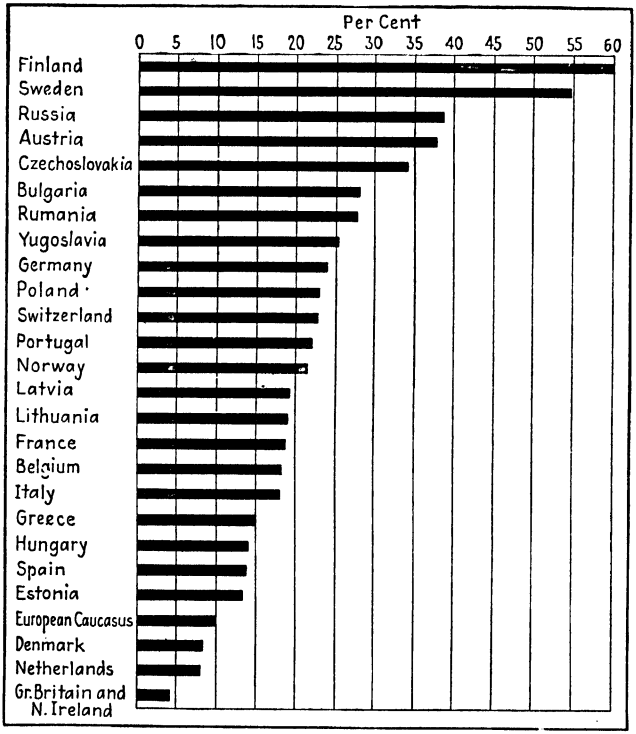


FIG. 249.—Ratio of forest area to total land area in countries of Europe. (*Zon and Sparhawk's Forest Resources of the World, McGraw-Hill Book Company, Inc.*)

Dairying has been growing rapidly in importance, and there are large and increasing shipments of butter, the principal foodstuff exported, with Britain the chief market. The returns from live stock and dairying in 1926 were about 50 per cent higher than from harvested crops, while the acreage of hay (1927) was greater than that of all the other crops combined. The growth of cooperative enterprises in the republic has been rapid, with over 3,000 large cooperatives numbering some 250,000 members in 1919.

Industry Based upon "White Coal" and Forests.—Lacking coal or iron but with extensive forests and many waterfalls, manufacturing has been

chiefly limited to woodworking and the making of pulp and paper. These account for almost half of the industrial wage earners while the rest are scattered among a number of activities, *e.g.*, textiles, chiefly for the domestic market. The total annual value added by manufactur-

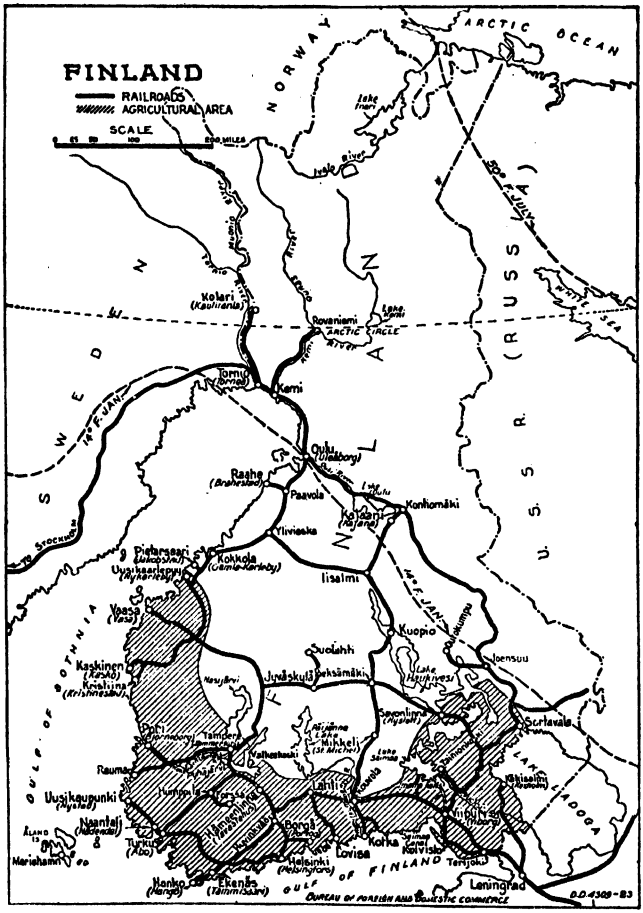


FIG. 250.—The agricultural land of Finland is confined to the south where temperatures, transportation, and soil conditions are more favorable. Finland's Arctic coast is of little practical use.

ng in the whole country is about the same as that for a moderate sized American city, such as Indianapolis, although the latter uses only about one-fourth as many workers to produce this increment.

TRANSPORTATION

Difficulties of Transportation.—A sparse population, a difficult terrain, and a rigorous winter climate have combined to render the

problem of interior transport difficult. Inland waterways have a total length of about 47,000 miles chiefly of use for floating timber in summer and hauling it in the winter. About 2,500 miles are navigable for river craft and accommodate over 50,000 vessels, which move about 3,500,000 tons, mainly wood, each year. Both highway and railway construction under such discouraging conditions of climate and topography have been slow, especially in the north. Foreign trade is almost entirely carried on by sea, and port facilities are of major importance. Helsinki is the chief importing point, but exports move through a large number of outlets. Hanko (Hango) and Turku (Åbo) have been especially developed as winter ports, and ice breakers attempt to keep them as well as Helsinki open all through the year.

Sparse Population.—The population of 3,250,000 is less than that of Chicago, yet the country's area is twice that of Illinois, and its population density of 25 to the square mile makes it one of the most sparsely inhabited countries of Europe. The density varies, however, from 93 per square mile in the southwest to less than 1 in the extreme north (Fig. 87). Ten per cent of the population are Swedes, while in the north are about 1,300 Lapps. As might be expected, Finland's population is predominantly rural. "Bred in the school of adversity," the Finns are a hardy, progressive, energetic race with a very low percentage of illiteracy, and Finnish emigrants to northern United States constitute one of our best elements. The chief cities are on the coast with Helsinki the capital leading with a population of about 200,000. Hanko on the southernmost point of Finland, even when the other ports are blocked, is usually kept ice free and serves as the most convenient butter port.

While the natural resources are so limited as to preclude a dense population or the development of a powerful nation in the ordinary sense, yet a commendable policy has been shown in attacking its agricultural and forestry problems. The area cultivated has increased 8 per cent from 1910 to 1920, and the number of farms operated by owners increased from 110,000 in 1901 to 182,000 in 1920, largely because of beneficial legislation. Approximately one-half of the cereal consumption is supplied by imports. The chief difficulty seems to be the low return for the farmer badly handicapped by his small capital. Hand labor still absorbs 65 per cent of the cost of agricultural production, but the introduction of modern methods, machinery, and drainage projects are being fostered by state loans of capital upon easy terms. With agricultural education and cooperative activities there should be continued improvement.

THE BALTIC STATES

Political Problems Growing Out of Their Position.—The three small nations of Lithuania, Latvia and Estonia, frequently referred to as the

"Baltic Republics," were, until recently, parts of the old Russian Empire. They lie in that north-south zone stretching from the Baltic to the Mediterranean, between the Slavs to the east and the Germans on the west, part of a belt of numerous states whose peoples, through the defeat of the Central Powers and the collapse of Russia, were enabled to organize independent governments.

The Baltic states are economically weak and their precarious geographical position renders their continued independence uncertain. The largest of them has but little more territory than West Virginia; all lack even a moderate variety of resources, while their neighbors are powerful and agressive. Founded upon ethnological grounds, their land frontiers are mainly arbitrary lines without natural protective features. Their secession has reduced Russia's "window on the Baltic" to a mere "porthole," a condition not likely to be tolerated long by a great nation. Consequently, the foreign policy of these three republics is mainly the problem of preventing their reabsorption into the Russian State.

A Plains Region.—As a part of the Great Central Plain the surface features are much like those of lowland Germany or Poland on the one side and of Finland on the other. The characteristic evidences of recent glaciation—lakes, marshes, and morainic ridges—are present. The Baltic Sea projects far inland to form the gulfs of Riga and Finland, but the coast is mainly of the lagoon type, low and sandy. The rivers have cut rather deeply into the plain. They are regularly navigable only at their lower ends and their chief use is for timber floating.

A Continental Climate.—Though somewhat modified by the Baltic, the climate is essentially continental with winters long and rather severe. The rainfall is everywhere over 20 inches, ordinarily sufficient for general agricultural purposes. The rivers and the harbors, except those on exposed western coasts like Liepaja (Libau), Ventspils (Windau) and Tallinn (Reval), are frozen from 3 to 4 months of the year

Agriculture Is the Chief Dependence.—The soil is the chief resource and agriculture the dominant occupation. The great majority of the people are peasant farmers. Until independence was secured, the lands were mostly held in large estates by German barons and the major domestic problem of the new governments has been the withdrawal of the land from these landlords and its redistribution to the peasants.

The soils and the severe winters all but eliminate wheat, except in the south. The hardy cereals—rye, oats, barley—thrive, while flax, potatoes, and sugar beets are of considerable importance. The same trends noted in southern Sweden, in the same latitude, are observable in these republics. Pasture is increasing at the expense of cultivated land, with live stock, particularly dairy cattle, replacing the grain crops. Realization of the fundamental importance of agriculture to their national

welfare is stimulating the government to foster zealously any movement to improve it, especially cooperation.

The flax industry deserves special mention, for while the acreage is not so extensive as for several of the cereal crops, this section is one of the leading flax producers. Lithuania ranks next to Russia and Poland in world flax production. Flax is raised both for fiber and for seed, more particularly the former, and is especially important as an export item as well as a raw material for local linen factories.



FIG. 251.—Freighter entering harbor of Riga after channel has been made by the ice breaker whose stern is seen in the foreground. Though not able always to keep the channel open all winter, the closed season is much shortened by this means. (*Courtesy J. F. Simons.*)

Forests, a Major Resource.—Next in importance to the soil and its exploitation are the materials and industries associated with the forests. All three states lie within the great coniferous belt of north Europe and timber covers over one-fifth of their surface. Lumbering, woodworking, pulp, and paper manufacturing are important industries and forest products constitute a large export item. The major part of the timber is state owned and cutting is carefully regulated.

Other Resources.—Minerals are of small importance. Rich oil shales underlie probably 2,000 square miles of Estonia and form the basis of a local petroleum industry making it the leading country in oil-shale exploitation. Clays and sands serve for construction material

and some amber is dug and worked. There is no coal and but limited water power. Peat and wood are used for domestic fuel.

Manufacturing and Commerce.—As part of Baltic Russia the coastal ports formerly had a large commerce and some industries of local importance. The erection of tariff barriers along the new frontiers closed the vast Russian markets and the subsequent decline in both the trade and industry of the cities has corresponded to the greatly restricted hinterland. Most of the manufacturing consists in working up the agricultural and forest products. Riga on the gulf of the same name and also on the river Dvina is the largest port, and Tallinn, Liepaja, Ventspils and Klaipeda are others of consequence (Fig. 251). All, but especially the first two, carry on considerable transit trade, but Russia's nationalistic policy is diverting much of her traffic through Leningrad.

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CHAPTER XIX

POLAND

Poland, *i.e.*, the "polder" land or lowland, lies between Russia and Germany, a low featureless plain between two powerful and aggressive nations. This is the most important geographical fact underlying its varied fortunes in the past and the problems concerning its future.

Historic Background.—In the absence of natural boundaries, conflicts with both Prussia and Russia have, for centuries, been of frequent occurrence and the domain has expanded or contracted according to the fortunes of war. For several centuries Poland ranked as a first-class power, in the latter part of the seventeenth century extending from the Baltic almost to the Black Sea and from the Oder to the Dnepr. Internal dissensions, however, with which Poland has always been more or less afflicted, together with the growing power of its neighbors, resulted in reverses which culminated, a century and a quarter after its maximum expansion, in the famous partitions of Poland (1772 to 1795). Prussia, Russia, and Austria divided the country and added it to their own domains so that for the following century and a quarter Poland, as an independent country, did not exist. In spite of vigorous attempts to Russianize, Prussianize, and Austrianize them, the Poles clung to their language, religion, and national ideals. With the collapse of the three nations which had robbed it of its territory, Poland was, in 1918, reconstituted. The absence of definite limits, either physiographic or ethnic, made the determination of the new boundaries extremely difficult. In several places plebiscites were held to determine the wishes of the inhabitants. Access to the sea was felt to be necessary, although giving it has separated Germany, its most powerful neighbor, into two parts and provided a fertile field for future trouble.

SURFACE, CLIMATE AND VEGETATION

A Low Featureless Plain.—As a part of the north European lowland, the physical features as well as the soils of Poland are, in the main, the contribution of the great ice sheet. Throughout almost its entire extent it is a vast plain of low relief, monotonous and featureless, four-fifths of the whole area having an elevation under 670 feet. In the extreme south are the Carpathians, whose central portion, the Tatry, raise their granite peaks to a height of over 8,000 feet, while the north is bordered by morainic ridges known as the Baltic Heights.

The low elevation and lack of relief result in very imperfect drainage, as evidenced by some 4,000 lakes and extensive marsh lands. The Vistula, flowing across the middle of the country, dominates the drainage. Winding through marshy lowlands, now partly drained, it has built at its mouth an extensive delta covering approximately 600 square miles. Formerly a swamp, the delta has been reclaimed by dykes. The river volume in flood may rise to twenty times that at low water, and the waters are frozen on the average for 2½ months. Where it crosses the old frontier it varies in depth from 3 to 5½ feet. It is connected with the waterways of north Germany by the Bromberg-Oder Canal.

Climate.—The climate of the country is, in general, of the continental type, the marine influence decreasing from west to east. The rainfall ranges from 20 to 24 inches, and, since two-thirds of it comes in the summer, droughts are of rare occurrence.

Vegetation Cover.—In north Poland forest and marsh occupy the uncultivated lands, in the south it is steppe, always an attraction for the pastoral and nomadic invader. The lower slopes of the Carpathians have much fertile soil, especially in the west, but cultivation seldom goes higher than 2,000 feet where the forests begin.

Forests constitutes a valuable resource, about 23 per cent of the country being covered with tree growth. Two-thirds of the wood is pine, which is the chief lumber export, but about three-fourths of the forest products are used at home.

AGRICULTURE

Dominance of Agriculture.—Poland is essentially agricultural, almost two-thirds of the population being made up of farmers and forest workers, four times as many as are supported by mining and manufacturing (1921). Considerably over one-third of the whole area is arable land, and another third of the country is in forest and meadow land. In general, the proportion of arable land decreases and that of forest increases from west to east. The Carpathians on the south and the extensive marsh lands on the east reduce the amount of cultivable land in those sections.

Variation in Crops and Yields.—The rolling glaciated plains vary greatly in productivity from place to place. Both soil and climate, like those of north Germany and Russia, are only moderately favorable, being best suited to rye, oats, and potatoes, with wheat, flax, and beets occupying the richer clay loams. Seventy per cent of the cropped land is devoted to the first three mentioned, Poland ranking third among European countries as a potato grower.

The most important factor, however, in accounting for the marked differences in yields in various parts of Poland is to be found in the past political ties. Western Poland, formerly a part of Germany, shared in the intensive, efficient, and scientific agricultural regime which has

characterized the use of the land in that country. Here are to be found progressive farmers, securing high yields through crop rotation, scientific

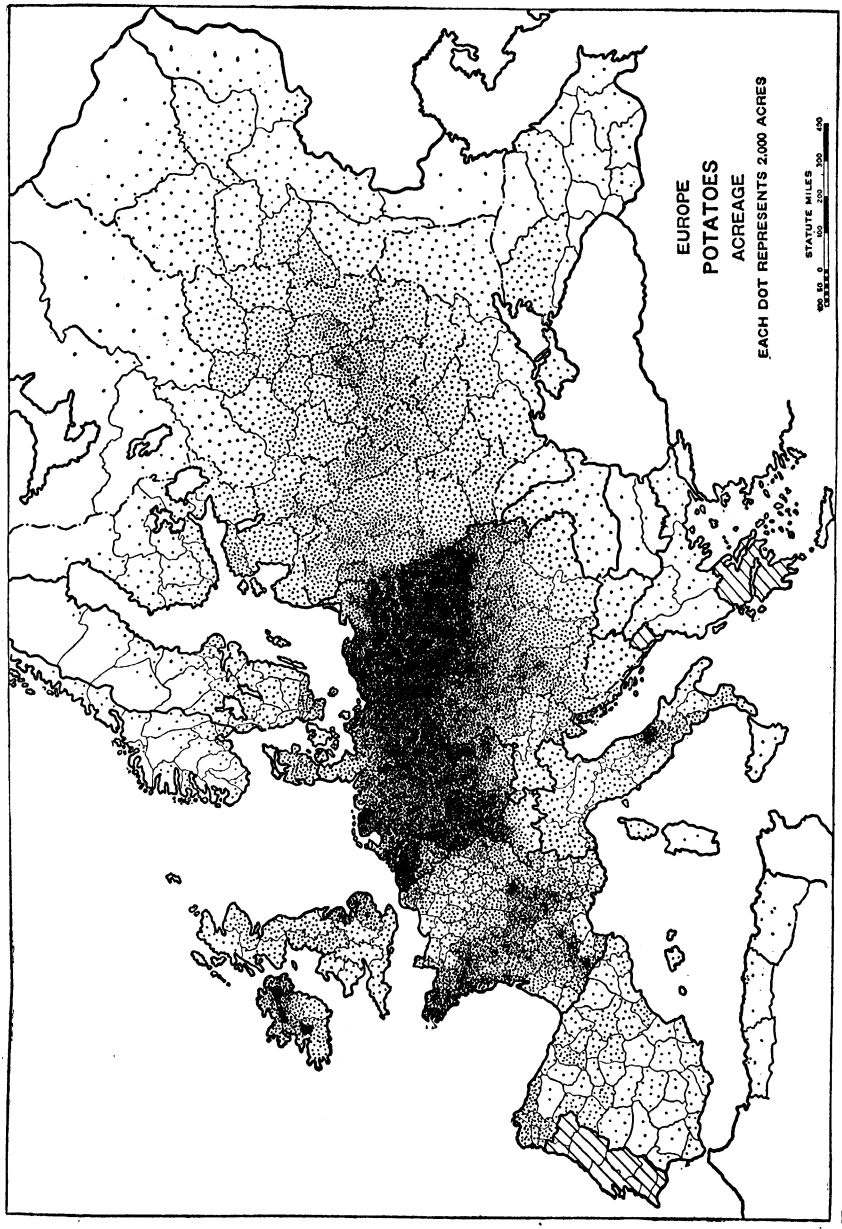


FIG. 252.—The middle portion of the Great Central Plain is the world's great "potato belt." Too cool for corn, it is well suited to the potato which in many ways serves as a substitute for corn. (*U. S. Department of Agriculture.*)

fertilization, and animal husbandry. In eastern Poland, on the other hand, the backwardness characteristic of most of Russian farming is found. Yields are low and material as well as cultural progress lags.

The contrast may be shown by a comparison of wheat yields. The average annual production per acre in Posen (German) was for 1908 to 1912, more than three times that in Vilna (Russian) while that in Lwów (Austrian) was more than twice as great. The records of other crops show about the same difference, those for Poznań averaging from 2½ to 4 times those for Vilna and Grodno. Even where the eastern provinces have the advantage of better soils, as in Wolhynia, the yields are inferior to those of the northwest. Obviously, while climate and soils are to be reckoned with, the chief responsibility lies with the economic and historic rather than the purely physical factors.

For the country as a whole, Poland is a land of poor peasant farmers. The population density is large, for an agricultural country, being five or six times that of the United States. As a consequence, the cultivation is rather intensive and the returns per worker small, with the result that capital is scarce and poverty is general. Normally the country is self-sufficing in foodstuffs, but there should be a large exportable surplus when its agriculture becomes modernized.

Poor Land System.—In common with the other countries of eastern Europe, Poland's agrarian system was cursed with great landed estates and a large landless peasantry. Before the post-war reform began to break up the large holdings, it is said that 18,000 landlords held title to 40 per cent of the whole of the territory. On the other hand, in some of the congested portions of Galicia over 18,000 people owned less than 18,000 hectares (44,500 acres) of land, or less than 2½ acres each.[1] Under the law providing for the division of the large estates, some 500,000 acres are to be reapportioned annually. At this rate readjustment should be completed by 1934 or 1935. Holdings are limited in extent, the size depending upon the location. It is estimated that the land affected by the reform involves about 8,836 square miles of arable soil, or an amount larger than the state of Massachusetts.

MINERAL RESOURCES

Southwestern Poland Highly Mineralized.—In southwestern Poland and extending into adjacent Germany and Czechoslovakia is one of the

[1] E. Dana Durand gives a striking comparison of land holding in crowded parts of Poland with those in Iowa:

"Lwów, the most densely populated province, has a *farm* population of over 200 per square mile, Iowa has less than 25; 97 per cent of the Lwów farms are less than 25 acres each; in Iowa 76 per cent are between 50 and 260 acres each. Less than one-half of 1 per cent of the farms of Lwów have over 500 acres each, but these together own about 43 per cent of all the land in farms. In Iowa less than 5 per cent are of this size. The middle-sized farm dominates in America. It is a negligible factor in most parts of Poland; in Lwów only 4 per cent of the land is in farms of between 50 and 250 acres, the prevailing size in Iowa."

great mining and industrial districts of Europe, the famous Silesia-Moravia-Krakow coal basin (Fig. 253). In addition important deposits of zinc, lead, and some iron ore occur, while near by in Galicia are found both petroleum and salt. Thus there exist the fundamental resources to support an extensive industrial population employed in the exploitation of the mineral deposits and the various manufactures dependent upon them.

The Division of Upper Silesia.—The great mineral and industrial wealth of the area has long made it a bone of contention among the neighboring countries. Its assignment at the close of the World War was one of the most bitterly contested of the various territorial problems, particularly since the population of the Upper Silesia section is mixed

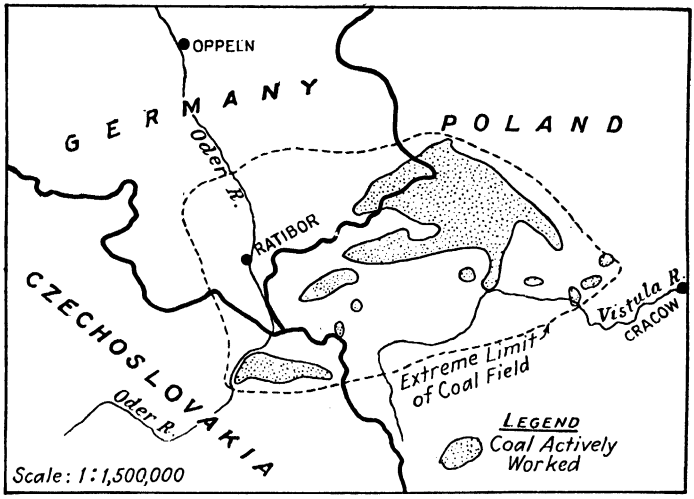


FIG. 253.—Silesia-Moravia-Cracow coal basin showing political ownership.

Polish and German. As finally settled, Czechoslovakia and Poland divided the Teschen field, the former receiving from Germany the larger western portion as well as a small section of Upper Silesia. The Teschen area given to Czechoslovakia is of particular interest because it is an important source of coking coal, a grade in which this region as a whole is deficient. The division of 4,100 square miles in the major Upper Silesia region between Poland and Germany resulted, after a plebiscite, in the larger part of the territory going to the latter, while Poland received the larger share of the minerals. Of the coal output, she acquired 80 per cent; of the zinc and lead, 70 per cent; of the coal reserves about 90 per cent; and practically all of the iron ore, while the industrial plants using these products were assigned in about the same proportion as the mines.

The separation of such a highly industrialized unit as Upper Silesia was bound to work hardship. Many integrated industries involving the

close cooperation of mines, smelters, and manufacturing plants would be unavoidably separated by the drawing of an ethnic boundary. An elaborate set of agreements to insure reciprocal rights of trade and transport was provided (1922) to be effective for 15 years, or during the period of readjustment.

Coal.—With the Upper Silesia award Poland now has some 1,969 square miles underlain with coal of which almost one-half are in Upper Silesia, nearly as much as in the Krakow, and a remaining 300 square miles in the Dombrova districts. Within the so-called "industrial triangle" the major part of which went to Poland, the production of coal per unit area is one of the greatest in the world. At one place six veins have a combined thickness aggregating 60 feet of coal. Mining is easy and the quality of the coal is good, although most of it is, unfortunately, non-coking. The country's total reserves are estimated at almost 70,000,000,000 metric tons and its output of about 40,000,000 tons gives the country high rank in this valuable resource. Over one-fourth of the output is exported.

Other Minerals.—Of the other minerals lead is important, Poland ranking fourth in Europe in its production (1926) as well as second in zinc. The iron ore production, about 500,000 tons annually, is small and seems destined to grow smaller with the gradual exhaustion of the deposits. In oil output Poland ranks third in Europe, after Russia and Rumania. The petroleum district, where oil was found at about the same time it was discovered in Pennsylvania, is on the northern slope of the Carpathians in southeastern Galicia, extending over a distance of about 240 miles from the western frontier to the Rumanian border. The yield is declining, the peak having been reached in 1909, and the present output of over 5,500,000 barrels represents only 0.4 per cent of the world's production. About one-half of the output is exported. Foreign capital, especially French, is chiefly responsible for the development. It is probable that production will rise when the deeper sands are more extensively tapped, most of the present wells being shallow, for deeper productive sands are known to exist.

Potash.—Deposits of potash of considerable extent have long been known. Two areas have been proved, one in the west, including large parts of the provinces of Poznań and Lodz, the other, in the southeast, near the Carpathians in old Galicia. The exact extent of these salt deposits is not known, their active exploitation being a post-war development. Under prewar conditions the German potash interests, which were located between the Elbe and the Weser, were influential enough not only to restrict exploitation of other fields within German territory, as in Poznań and Alsace, but to exert pressure at Wien so that the policy of the Austrian Government was to discourage development in Galicia.

The exploitation of potash resources in independent Poland has also been slow, due to lack of capital and a disorganized market. The output is growing, however, although not yet able to supply the entire domestic needs. The prewar use totaled 400,000 metric tons, while the 1925 production was only 150,000 metric tons. The consumption in 1925 was about 215,000 metric tons, most of which was in former German Poland where agriculture is more scientific.

MANUFACTURING

Industry Secondary to Agriculture.—Although predominantly agricultural, Poland has a considerable industrial development. In her exports, for example, manufactures are twice as important as are raw materials.

Naturally the industrial section is in the south where both mineral raw materials and fuels are found. Polish Silesia is thus the most highly industrialized, one-half of its population being engaged in factory and mine as compared with an average of 15 per cent for Poland as a whole.

Chief Industrial Items.—Textiles are the most important item among the manufactures, followed by food products and iron and steel goods. Lodz, the chief textile center, though not on, is close to the coal field. The concentration here has been due largely to artificial stimulation by the Russian Government during the period when this was Russian territory. The government encouraged the immigration of skilled workers and by a high protective tariff made all Russia a protected market.

The fabrication of food products has become important, especially in the northwest. Sugar factories, breweries, potato establishments, as well as the flour mills depend upon local agricultural crops for their raw materials.

The iron and steel industry of the Upper Silesia district was originally based upon local ores, but the output of the latter has been decreasing owing to exhaustion of the deposits. The production of about 500,000 tons of ore is entirely inadequate, and imports from Sweden, Austria, and other countries are needed. The output of zinc for Upper Silesia was prior to 1914 about one-sixth that of the world. The largest of the zinc corporations has recently been taken over by American interests.

Polish industrial equipment is much larger than is needed to supply domestic needs. With territorial adjustments the large protected markets of Germany, Russia, and Austria were lost, so that not only manufactured goods but mine products, such as coal, petroleum, zinc, and lead have had to seek foreign outlets.

TRANSPORTATION AND TRADE

Topography Level but Rivers Shallow.—The vast level plains which dominate the topography, the Vistula which traverses the entire length of the country, together with an intermediary position provide a natural setting most favorable for the establishment of a network of interior transportation routes.

Though the Vistula is the main waterway of Poland and the river best suited for navigation on the plain east of the Elbe, it has been much neglected and used but little above Warszawa. It is joined by canal with the system of interior waterways to the west, but the connecting channels are too shallow for efficient transport, while the river itself requires extensive and constant dredging to make it an important carrier. In 1914 the trade of Danzig with the interior was five times as large by rail as by river.

Danzig.—Danzig though predominantly German is the natural outlet for Poland, and with its intermediate hinterland was internationalized.[1] Poland was granted a "corridor" to reach it but has preferred to build a port (Gdynia) a few miles north of Danzig, entirely within her own territory.

Foreign Trade Small.—The foreign trade of Poland is small in proportion to the population, one of the smallest in Europe, only the Balkan States and Russia being lower. There is considerable export of coal and timber via Danzig, Polish coal being at present the main dependence of Scandinavia. The location of the coal basin and the industrial area so far inland places the export of coal and steel and the import of iron ore under the serious handicap of a long rail haul to or from the coast. Total exports in 1927 paid for about 87 per cent of the imports.

PROBLEMS

Domestic and Foreign Problems Serious.—Of the problems which confront the reconstructed Poland, several are of prime importance, the major one, already mentioned, being that of the lack of strategic or even definite ethnic limits on the east or west. This is especially serious since powerful neighbors on these borders are likely to dispute the boundaries. There has been friction on all sides and the existence of a corridor separating East Prussia from the rest of Germany provides an especially vexatious situation. Added to the political question is that of religious differences. About two-thirds of the population are Poles, the great majority of whom are Roman Catholic but there is a large

[1] The free city of Danzig includes 750 square miles or about ten times the size of the District of Columbia and has a population of about 350,000. It has been established as an independent state under the League of Nations but foreign affairs and transport facilities are shared and administered by Poland to whom in return it furnishes a free port.

Jewish minority. Germany, the most powerful and hostile of the neighbors, is Protestant, while Russia is Greek Orthodox or Agnostic.

With the possible exception of Serbia, Poland suffered more than any country of eastern Europe from the devastation of war activities. Poor to begin with, the country was unable to cope with the problems of relief, distress, and want, of repairing the damage to transportation and industries. Local capital is scarce, and, in view of the past history of the country, foreign investments have been slow to enter, and German management and capital have been for the most part withdrawn so that the economic recovery of the country has been slow. The Polish people seem unwilling as yet to lay aside partisanship and petty rivalries and jealousies for the sake of working for the nation as a whole. The lack of internal unity and teamwork has always been one of the country's great weaknesses. It has the fundamental requisites for a fairly well-balanced economic life, and with peace could gradually rise to the cultural level of western Europe.

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CHAPTER XX

THE HUNGARIAN PLAIN

PHYSICAL FEATURES

A Great Inland Basin.—Eastward from Austria the ranges of the Alpine system separate; the southern limestone belt branches southeastward along the Adriatic west of the Rhodope Massive and the Balkans, while the northern ranges, continuing as the Carpathians, swing eastward in a great arc to meet at the Iron Gate, completing an almost closed mountainous rim. The great basin thus encircled has been a region of subsidence and, within recent geologic times, has been covered by an inland sea. Wastes from the encircling mountains have filled in the depression to a depth, in places, of several hundred feet, even burying the old crystalline Alpine core, though the latter reappears in places. Remains of the former inland sea are to be found in the marshes, salt deposits, and lakes, of which Balaton is the largest.

In the northwestern part of the Hungarian Plain are two smaller basins. The Danube cuts through the barriers and unites these basins. Important cities are located at the narrows, Budapest between the Little Alföld and Great Alföld, and Bratislava at the lower entrance to the Wien basin.

The Danube.—Across this wide, flat, featureless plain winds the great Danube and its major tributaries the Tisza, Sava, and Drava. The absence of any considerable fall, together with the marked seasonal variation of the rainfall, subjects large sections to flood danger. Cities, roads, and railways for the most part avoid the immediate vicinity of the rivers, except where the ridges, approaching close to the channels, form narrows.

One of Europe's Large Fertile Areas.—The soils are in general highly productive. The lacustrine sands and clays over large areas have been covered with loess, to which humus has been added. The plain constitutes a westward outlier of the "black earth" of Russia and Rumania. In places, as between the Tisza and Danube, there are sand dune areas which have had to be "fixed" by planting trees. As a rule the flood plains are more fertile and the drainage divides less productive. Where the impervious clays are close to or at the surface, however, there are brackish ponds or marshes.

CLIMATE

Climate Marked by Extremes.—The climate is typically continental. Although the Carpathians afford considerable protection from the north winds, the winters are cold and dry, the summers hot. The average rainfall is between 20 and 30 inches with a maximum in spring and early summer. Unfortunately the actual precipitation varies much from year to year, and droughts alternating with floods are not uncommon. The climate is better suited to grass than to forest, so that the major part of the plain is a natural steppe land, which varies in different sections from scanty to luxuriant pasture.

AGRICULTURE

A Region of Surplus Food Production.—Favorable conditions of climate, soil, and topography have combined to make this a great agricultural region—second only to Russia as the chief granary of Europe. In yields per acre it is intermediate between those of northwestern Europe and the lands to the south and east. It is much less intensively tilled than such favored spots as the north Italian plain, but, as compared with the Mediterranean countries, it has the great advantages of levelness and a summer rainfall while its temperatures at that season are much higher than those of northwestern Europe—thus bringing it within the climatic range of corn production.

Cereals in West. Pasture in East.—Although there is but little waste land the western portion is in general more fertile, more rolling, and has a slightly heavier rainfall (24 to 40 inches) so that it is the more important region in the production of an agricultural surplus of small grains, especially wheat. Rye is grown on the lighter soils just east of the Danube ("Pest rye"), while sugar beets and tobacco are produced on the richer soils. Maize is the chief cereal in the central and southern portions, while in the east the lighter precipitation (20 to 28 inches) produces conditions more favorable to pastoral industries.

The basin of the Little Alföld is about one-sixth the size of that of the Great Alföld, possesses no sandy waste, has considerable tree cover, and a better rainfall regime. Its position nearer Germany and Bohemia and beyond the reach of the Turk during his long occupation of the plain have all combined to make this section much more advanced than the Great Alföld.

HUNGARY

Hungary occupies the heart of the middle Danubian plain. Settled over 1,000 years ago by the Magyars, nomadic horsemen from the Asiatic steppes, the earliest use of the land was as pasture for great herds

of cattle, horses, and sheep (Fig. 254). In the course of time the better sections were cultivated, and to the pastoral interests were left only those parts of the plain too dry or too rough for cropping, conditions found particularly about the mountainous margins.

Agriculture

Dominance of Agriculture.—Present Hungary is almost wholly agricultural, practically the entire land surface being productive. Three-fifths of the total area is arable, next to Denmark, the largest proportion of any country of Europe. Cereals occupy over one-half the cultivated land, wheat being considerably more important than corn.



Fig. 254.—Herding horses on the Hungarian Plain. The Hungarians were originally nomads and horse breeding has always been an important occupation. (*Courtesy Hungarian Legation, Washington, D. C.*)

Large Land Holdings.—One of the major post-war problems which confronts Hungary is the matter of land tenure. More than one-third of the whole territory is owned in 1,500 estates while five hundred times that many proprietors must share an approximately equal area. Attempts to divide the estates are resisted by the owners and little has been accomplished thus far.

Actual and Potential Production.—Agricultural methods constitute another problem. Production per acre is only about the same as that in Austria, which has much poorer land. In wheat and potatoes the yield is about the same as in Illinois, but the corn yield is only one half as great. The density of her swine and horse population, too, is about the same as in Illinois. The last few years have witnessed much more activity

on the part of the government's agricultural department. Greater use of machinery is badly needed, but financial conditions discourage such purchases at present. The flatness of the terrain makes drainage and flood control imperative for the use of some of the richest lands. Wells built for watering, trees planted for timber and for fixing the movable sands, levees constructed for restraining flood waters are lines of improvement, but the reclamation problem has hardly been well started. The immensity of the task may be seen from the fact that almost 10,000,000 acres have been reclaimed in the valleys of the Danube and Tisza whose channels are restrained by over 3,800 miles of dykes, more than enough to reach from New York to Berlin. It is estimated that there are over 5,000,000 acres of barren lands until recently considered unfit for agriculture because of underlying hardpan, but which experiments indicate may be reclaimed.

Transportation

Routes to the Sea.—Although the Hungarian Plain is practically enclosed by a mountain rim, there are several openings which provide egress for transport routes. The commercial importance of the Danube has been dealt with elsewhere. In addition, the Moravian Gate gives access to Upper Silesia and to eastern Germany. The Hungarian Government had spent much money in developing its port of Fiume on the Adriatic, as Austria had that of Trieste. Although Hungary's natural trade relations were toward the northwest, the former government by large expenditures had diverted considerable traffic through this port. In 1913 the sea-borne trade of Fiume was 2,250,000 tons, making it a formidable rival of Trieste.

In spite of the fact that Fiume is to the southwest and that her chief markets lie to the northwest, Hungary is still looking to the Adriatic for an outlet (Fig. 310). Semihostile countries on all sides make her negotiations difficult, for in order to reach the sea she must cross the territory of some one of her neighbors. Hamburg offers accommodations, but Czechoslovakia or Austria must be crossed, and the distance is long, although the German railways are offering low rates; out by way of the Danube means crossing unfriendly Rumania, and increased competition of Russian wheat; Fiume is only about 269 miles from Budapest, but Yugoslavia must be crossed, and the latter prefers that Hungary use the new port of Split now being built. This is one day's sail nearer the Mediterranean and rail rates on Yugoslavian railways have been made as low as to Fiume.

Population

Cities.—Budapest, Hungary's capital, like Bratislava and Wien is situated where the Danube narrows, making bridging easy. Buda,

the administrative section, is built on the hills on the right bank, while the commercial Pest across the river spreads over the plain. Budapest profited through the political, commercial, and industrial favors showered upon it by the Magyar Government. The railroads were built to radiate from the capital, and a zoning system of rates provided cheap transportation thither from the most distant parts of the country. The city became a great flour-milling center, ranking next to Minneapolis in that industry. Most of Hungary's cities are agglomerations of villages covering much territory. Thus Debreczin with less than 100,000 population covers about 350 square miles, about one-half that occupied by Greater London with more than seventy times as many people. Scattered farm houses are rare, village life having been the natural arrangement for protection during the long struggle with the Turks.

Post-war Conditions and Problems

Industry Handicapped.—After the World War Hungary faced a disrupted industrial organization which has not yet been readjusted. Of her former territory and population she lost somewhat over two-thirds. From the standpoint of industry she still produces three-fourths of her former output of coal, sufficient for her non-industrial needs, but only one-fifth of her former output of iron ore, and that of poor grade, while five-sixths of her timber industries, including woodworking and paper making, have been lost. Even before 1914 vigorous efforts had been made to attain a greater degree of industrial independence, and that desire is still strong, but except in textiles, which are heavily subsidized, little progress has been possible. Though her industrial equipment inherited from the prewar kingdom—including population employed in manufacturing—is larger than the supply of raw materials left to her, it seems inevitable that her future development lies in the intensification and improvement of her agriculture and stock breeding. Such industries as brewing, milling, sugar making, and others associated with the preparation of her agricultural products are logical, but her chief dependence must be on her soil.

Racial Animosities a Major Problem.—Present problems have their origin mainly in the country's history—particularly in the past relations of the races. Old Hungary contained non-Magyar peoples, subject races whose economic, social, and political conditions were made all but intolerable by Magyar oppression. With the defeat of the Central Powers, of which group Hungary was a member, that country's border lands, largely inhabitated by non-Magyars, were detached and added to her neighbors on three sides. Considerable numbers of Magyars inhabited the lands to the east; in fact, in order to give strategic advantages to Czechoslovakia, Rumania, and Yugoslavia, there were included within those regions some border zones predominantly Magyar. Such

boundaries, largely arbitrary, worked havoc with transportation lines and the cooperation of industrial, mining, and agricultural sections, so that economic disorganization approached a state of chaos. To the tragic consequences of the World War was added a brief but disastrous communistic regime, an invasion by Rumania, and a short civil war. As with Austria, the aid of the League of Nations was finally invoked, a loan made, and, after brief wardship under one of the League's representatives, the country began a reconstruction program. Of all the defeated nations, the Hungarians feel the most bitter, openly declaring that when an opportunity comes they will force a revision of the peace terms. This hostile feeling, in view of the unbalanced condition of present resources and the necessity of foreign trade makes commercial intercourse and economic recovery slow. Agricultural Hungary, however, did not suffer so much as industrial Austria, particularly Wien, for, as a nation of farmers, she was at least independent in foodstuffs. She is also less distracted than most of her neighbors by sectional controversies and racial conflicts.

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CHAPTER XXI

RUMANIA

Ethnic Background.—Much of what is now Rumania became, in the second century of the Christian era, a Roman province. In spite of the fact that Roman rule was maintained for only 150 years and was followed by successive invasions of Goths, Slavs, and Turks for over 1,000 years, the Latin influence is still discernible, especially in their speech. Although the population is mixed, with Slav blood predominating, the Rumanians take great pride in their early Latin associations, considering themselves on a distinctly higher cultural plane than the more purely Slavic peoples about them.

As an independent nation Rumania has had but a brief existence—little more than a half century in fact. Her greatest expansion came, when, as one of the Allies in the World War, she demanded and received at the peace conference additional territory inhabited in part by Rumanians so that her prewar area and population were more than doubled. The annexation of Bessarabia, the country between the Pruth and the Dnestr, has sown seeds which promise to be especially troublesome. Russia, which has never acquiesced in the transfer, is by far the stronger nation and will undoubtedly try to regain this very desirable territory. Along with the newly acquired territory, she has inherited alien minorities which have complicated both foreign and domestic relations. In view of the government's traditionally hostile attitude toward the Jews, the treatment of the new racial minorities will be watched with interest. In size, the country is about as large as Italy but far more dominantly agricultural. The population density is less than one-half that of the latter but about three or four times as great as in our own agricultural states of Iowa and Nebraska.

MAJOR PHYSIOGRAPHIC DIVISIONS

Rumania's boundaries are for the most part ethnic rather than strategic, and include parts of three major physiographic regions. On the west the country occupies a part of the great Hungarian Plain; on the east and south, an extension of the Russian black earth region; while across the middle, from north to south, run the broad Carpathians, a part of the great Alpine system. The absence of easily defended boundaries, especially along parts of the Hungarian, Russian, and Bulgarian

frontiers, constitutes a national weakness, since Rumania's expansion has been at the expense of these three powers and their present relations are far from friendly.

Carpathians.—The outstanding physical feature of Rumania is the Carpathian Range. Entering at the north these mountains run southeast, then bend sharply westward to cross the Danube at the Iron Gate. Extensive plateaus and foothills flank the main ranges, particularly on the west. The great Carpathian arc is completed on that side by the Bihar Massive, within whose mountainous rim lies the Transylvanian basin, a low rugged plateau.

The mountains and bordering foothills are forested, conifers on the high Carpathians, beech and oak on the lower hills. Many basins, fertile and agriculturally productive, are found in the plateau region, and grazing is an important adjunct to cultivated cereal crops. In the northeastern part of the country, the plateau receives less rainfall, the hills are barer, and the valleys wider. The Dobrudja, Rumania's only territory across the Danube, is a semiarid steppe region, except in the north where the Danube delta widens into great marshes.

Plains.—Either side of the great mountain-plateau region is flanked by the plains of Rumania. One, the smallest, lies to the west of Transylvania and is part of the Hungarian Plain. It is a narrow but fertile, well-tilled, and highly productive agricultural zone extending from the Banat to the Czechoslovakian border.

Eastward and southward from this mountainous backbone stretches the main lowland, the heart of the country, and one of the world's leading cereal-producing areas. It is a westward extension of the Russian black earth, the same level steppe region of loessial soils, with a climate well suited to cereal production. Agriculture, the chief industry of Rumania, is here found at its best, and its products not only furnish a large part of the domestic food supply but also play a major role in the export trade.

CLIMATE

A Continental Climate.—The climate is continental with temperatures ranging from 100° F. in summer to 30° below zero F. in winter. The rivers are ice bound on the average for about 3 months of each year. The rainfall maximum occurs in the summer, but the total annual precipitation is rather light—about 25 inches—and somewhat irregular. In general, rainfall is the main critical factor in Rumanian agriculture, and climatic vagaries are reflected in marked fluctuations of output (Fig. 255).

AGRICULTURE

A Great Agricultural Nation.—A large proportion of arable land—about 41.6 per cent of the total area—a level surface, a temperate climate, and water transportation combine to make Rumania, in proportion to her size, one of the world's great granaries. Of the cultivated land 85 per cent is in grain, with corn and wheat leading (Fig. 256). The former has a slightly larger acreage, but, since it is a staple food crop domestically, there is a larger export of wheat. Oats, rye, and barley are likewise important crops.

Animal production is, for the country as a whole, distinctly subordinate to cultivated crops. Transylvania, with its rough topography, leads in live stock in proportion to area and population. Many oxen

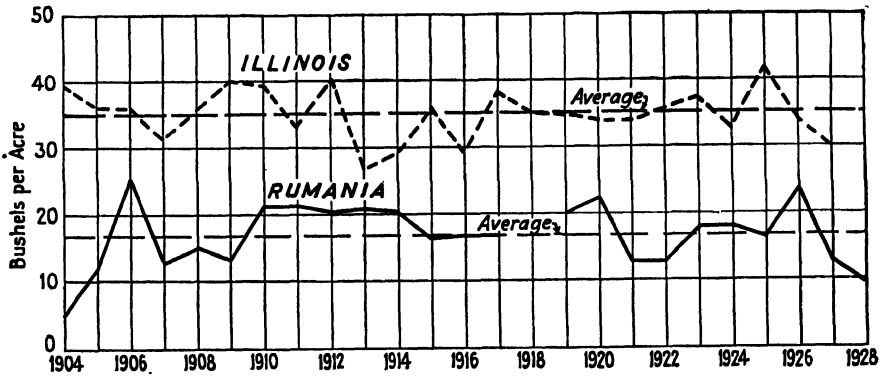


FIG. 255.—Corn production per acre in Illinois averages about double that of Rumania. Furthermore, the fluctuations in the latter are larger, more numerous, and, because of the low average, much more serious than in Illinois. Rainfall differences are largely responsible for the contrasts shown.

are raised for draft purposes, but the number of sheep per 1,000 population is three times that of cattle.

Climate, the Critical Factor.—While most of old Rumania and Bessarabia possess exceptionally fertile soil, the climatic fluctuations make agriculture more or less of a precarious occupation. Extremes of temperature and rainfall are frequent; droughts alternate with floods, hot weather with cold; so that successful agriculture in this region demands an unusually intelligent and industrious farmer. Moisture conservation methods are particularly necessary, and, while practiced to a considerable degree on the large estates, are difficult to carry out among a peasantry mostly illiterate, indolent, and poor.

Poor Economic and Social Conditions of Farmers.—About four out of every five of the people of Rumania depend upon the soil for a living, yet the great mass of peasants are poverty stricken and illiterate in the extreme, agricultural methods are primitive, and the crop yields among

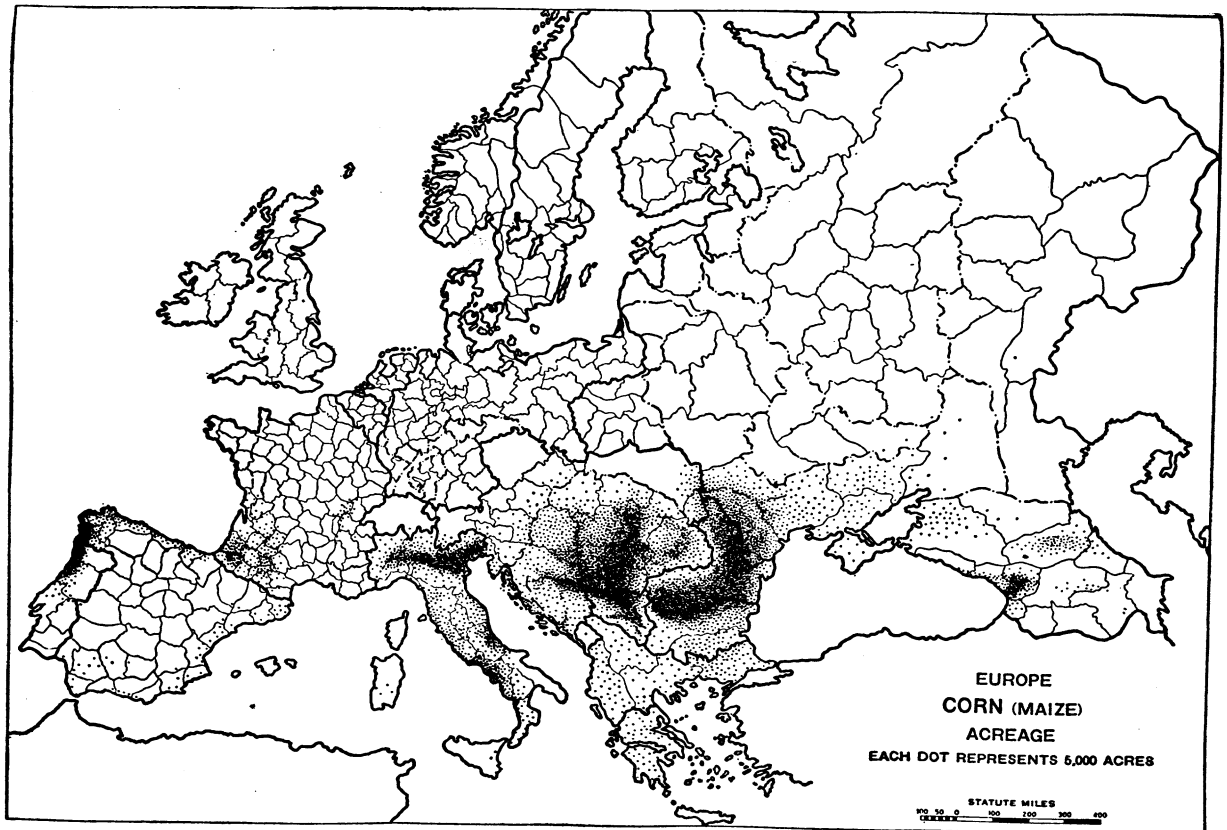


FIG. 256.—Europe produces about 12 per cent of the world's corn crop. The area suited for corn is limited, the total acreage being less than the area of the state of Illinois. (*U. S. Department of Agriculture.*)

the lowest in Europe, a condition arising rather from economic and political than from geographical causes.[1] Their tools are crude and machinery almost entirely lacking; grain is sown broadcast by hand, harvested with a sickle, threshed by the treading of oxen, and the grain is winnowed by tossing it up to let the wind blow out the chaff.

Land Ownership.—Agrarian reform has been a national problem of long standing. Although serfdom was abolished in 1864, the liberated peasants remained landless and wretchedly poor (Fig. 257). During the succeeding 50 years outbreaks occurred repeatedly, each followed



FIG. 257.—A Rumanian village. (*U. S. Department of Commerce.*)

by half-hearted measures on the part of the government looking toward the redistribution of the monastery estates, the crown lands, and large private holdings, but their failure to provide adequate relief is evidenced by the fact that up to 1918 less than one-half of 1 per cent of the agriculturists owned almost one-half the farm land of the country while the remaining 99.5 per cent were, for the most part, without any land or had holdings too small to properly provide for their needs.

[1] "The Rumanian peasant is not industrially or commercially inclined. Serban says, 'The gypsy works only under stress of hunger; the Rumanian only from need; the Hungarian for a peaceful life; the Slovak and German for profit.' There are 108 days when the peasant of Rumania feels obliged to do no work, and there are a series of holidays at critical times in the agricultural year. Weather conditions enforce further idleness so that in Rumania, as in Serbia, there are probably only 75 to 80 days of actual field labor. The remainder of the time is spent in meditation and pottering around." U. S. Dept. Agr., *Tech. Bull.* 126.

The war and the political changes which followed furnished an opportunity to remedy the old evils. The expropriation of the large estates is now under way, the reform being applied to all of Greater Rumania. In lands acquired from Hungary this measure operates to oust many of the Magyar landlords, dividing their land among Rumanian peasants, thus giving rise to much racial antagonism. In addition to 1,000,000 acres still remaining in large estates, there is estimated to be about 2,500,000 acres of wet land which can be easily reclaimed.

Under the direction of a more progressive government it is hoped that agriculture may be modernized and intensified. The immediate effect of expropriation has been to reduce yields, but the war and the subsequent disorganization of the entire country make present figures of little importance, especially since readjustment is not yet complete. After all, a land problem still remains, for it is estimated that more than one-half of the rural population is still landless, and those who are not, have, on the average, decidedly inadequate holdings. Lack of capital and the inability of most of the peasants to read make improvement necessarily slow. Crop rotation, maintenance of soil fertility, seed selection, and the use of modern labor-saving devices are still essentially lacking. In spite of a comparatively dense population, the output has been only about a third of what it should be. Industrialization on a larger scale, for which the country possesses both fuel and raw materials, would be a partial solution for the problem of the large number of unemployed.

OTHER RESOURCES

Mineral and Power Resources.—Rumania ranks next to Russia among European countries in the output of petroleum, although the production is small in comparison with that of the world's chief contributors (Fig. 72). This, however, is no index of the possibilities. The former policy of limiting the use of foreign capital in exploitation of resources and industries has greatly retarded development; a recent change in this respect should stimulate this phase of national life.

Salt ranks next to petroleum among the nation's mineral resources. Natural gas production is considerable and provides more power than all the coal mined in the country. The output of the latter (chiefly lignite) is small. It has been estimated that the streams could furnish more than 1,500,000 horsepower, but, so far, less than 2 per cent of this has been developed.

Forests.—About 28 per cent of Rumania is forested, with Transylvania and the Carpathians the main source, and timber, while not exploited to the full, ranks next to agricultural products and petroleum in the country's exports. Lying near to many countries deficient in supplies of wood, there is an excellent market, and with improved

transportation facilities the exploitation of her forests could play a considerable rôle in the national economy.

TRANSPORTATION

Handicap of Transport.—Transportation facilities are, however, so deficient as to constitute a major handicap to the country's development. There is a pipe line from the oil field to Constanţa, and another to the Danube, built by the Germans during the war, but both these and the rail facilities are entirely inadequate to meet the country's needs. In general the railroad mileage is comparable with that of the Balkan states, or the less developed parts of old Austria-Hungary. Only one bridge crosses the Danube. Part of the railways in territory formerly Russian were of different gage and must be rebuilt to coordinate with the other roads. Wartime destruction, insufficient capital with which to repair roadbed and rolling stock, and reorientation of railways in the newly acquired territories are problems with which the inadequate finances of the country have had to cope.

Waterways.—Rumania has considerable navigable waterways including the Danube, the Dnestr and the Black Sea. The actual utilization of these facilities is, however, restricted. Ice, the Iron Gate, the delta mouth, fluctuating depths, and low marshy banks handicap the use of the Danube. Through the Wallachian Plain the river varies from 6 to 16 miles in width and has a navigable depth of 7 or 8 feet as far as the Iron Gate. Braila and Galati are the chief upriver Rumanian ports on the Danube; Sulina is the delta port on the only mouth kept free for commerce. Grain is the chief freight. Constanţa handles the main petroleum exports, as well as the winter grain movement. It is a Black Sea port able to accommodate large ocean-going vessels with the added advantage of freedom from ice throughout the year. In general, the waterways are of use only in foreign commerce.

Of the exports, foodstuffs, timber, and petroleum are the chief items, while textiles and metals constitute the main imports. The bulk of the foreign trade is with the countries of central Europe.

SUMMARY

Rumania in general is a land rich in resources but exhibiting ..... development, social, political, and economic conditions all bespeaking backwardness. Part of the economic difficulties are traceable to the war, yet the actual destruction was less acute than in a country of factories and large cities, and the recovery correspondingly earlier. The most fundamental ills are those of long standing: illiteracy, an unjust division of the land, the exploitation of the peasantry by a small group of landed aristocracy—features which have characterized her entire

history. With large agricultural, forest, and petroleum resources, and a surplus agricultural population, Rumania possesses a sound basis for the development of a well-balanced economic life.

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CHAPTER XXII

EUROPEAN RUSSIA. UNION OF SOCIALIST SOVIET REPUBLICS

RELATIONS TO THE REST OF EUROPE

Soviet Russia includes nearly one-half of Europe's area and one-fourth of its population (Fig. 260). Not only is it the largest European country in area and population, but its population is growing especially rapidly, and numerous other developments are taking place. Many people consider present-day Russia the most rapidly progressing country in Europe. Certain it is that the social and economic changes since the revolution of 1917 have been profound, and social experiments which are both radical and numerous are being tried, the outcome of which is being watched with deep interest by thoughtful people the world over.

Distinctiveness.—In many ways Russia is the most distinctive country of Europe. The Russian language differs radically from the languages of Western Europe; religiously, Russia is neither Protestant, Roman Catholic, nor Jewish; economically, she has been most self-sufficient, having by far the lowest per capita trade; culturally, even the architecture appears bizarre to the westerner. Furthermore the great majority of the people have very little interest or sympathy with Western Europe, and their ideals on many topics are distinctly different. The leaders, too, only partly resemble those of Western Europe, and many have such opposed ideals as to appear strikingly peculiar or original to westerners. Politically also, prewar Russia was perhaps the most bureaucratic of the European nations, and, since Bolshevism has dominated, Russia is unique politically.

Some of the distinctiveness of Russia is suggested by the oft-quoted phrases, "Asia begins with Russia," and "Scratch a Russian and you will find a Tartar." The latter phrase suggests, of course, that western civilization has penetrated only skin deep.

Some Reasons for the Distinctiveness.—The contrasts between Russia and the rest of Europe are partly due to rather obvious influences. Although Russia now touches the sea for long distances, nearly all the coast is closed by ice for long periods, and most of the coastal zone is sparsely settled. Historically, also, the Russians spread out from near the center of western Russia, not reaching the coast to any extent for centuries. Hence the Russians are essentially a people of the continental interior. They have remained an almost self-sufficient, chiefly agricultural people, seldom exchanging goods or ideas with the people of

the rest of the world, and having, in fact, only a small domestic commerce. This latter is partly because geographic and economic conditions are



FIG. 260.—Generalized ethnographic map of Russia in relation to the boundaries of the larger natural regions. Smaller ethnographic elements, like the Lapps in the north and the Kirghiz about the eastern and northern Caspian, are not shown. "Caucasian" refers to locality, not race. The Cossacks of the Don, Kirghiz east of them, and the Tatars about Baku constitute a broad belt of non-Russian population, with separatist tendencies, encircling the Caspian. (*Ethnography after Debes and natural regions after map by Hanelik in Rudnyckyj, Der Ostliche Kriegesschauplatz*, 1915. *From Bowman, The New World.*)

so similar in most of the well-settled region that near-by localities usually produce almost the same commodities. Furthermore, perhaps in part

because of this local self-sufficiency, the transportation facilities have been far less effective, or intensively used, than in western Europe.

Little Contact with the West.—As is being increasingly realized, civilization is a delicate flower, nurtured by frequent friendly personal contacts between individuals having different ideas, experiences, and training. These personal contacts include, of course, those obtained by reading. Because of their location and environment, the Russians have been handicapped in having contact with any others aside from peasants quite similar to themselves. The inability of most of them to read has greatly restricted the other great means of contact by which culture is spread.

Partly because of the greater distances involved, the severe language handicap, and the poverty of most of the people, relatively few Russians have visited other lands. The millions of Jews who have emigrated from Russia (including the former Russian Poland), and the tens of thousands of Russian Mennonite emigrants, have not gone back to Russia to any extent, and have had little influence in enlightening most of the regular Russians. The Mennonites, by the way, are not Russians but Germans who emigrated to Russia a few generations ago to escape compulsory military service. In respect to the small contact with outsiders, the Russians resemble the Americans of the Mississippi basin a century ago.

The Russians also differ racially from most western Europeans, although a large majority are allied to the round-headed, brown- or gray-eyed people of central Europe. These several conditions, geographic, cultural, and lingual, discourage foreigners from visiting Russia, as has also the fact that nearer countries could be visited at less expense and with much greater ease, comfort, and enlightenment, as well as greater enjoyment from scenery and climate. Most of Russia has little or no natural scenery of the sort that tourists seek, and the climate for most of the year is not inviting.

Conditions Favoring Vastness.—The large size of Russia reflects the lack of natural barriers on the great plain which had, before the Russians occupied it, only a scattered nomadic population. Over most of this plain the Muscovites found it relatively easy to spread, except toward the west. The large population is in response to the large amount of arable land of this plain, which is more than that of the rest of Europe combined. The fact that the population of Russia is still increasing very rapidly (Fig. 94), when most of the other European nations have experienced a sharp decline in birth rates in recent years, reflects the fact that about four-fifths of the people are agriculturists, by whom children are far more readily and advantageously reared than by urban dwellers. Furthermore, most Russians are peasants, more than one-half of whom are illiterate and nearly all poor. The world over, such people still have relatively high birth rates.

Some Causes of Radicalism.—The radical social experiments being tried in Soviet Russia reflect the fact that there is no large substantial middle class to act as a social balance wheel. Furthermore, since the urban descendants of peasants have obtained the reins of government, most of the former educated aristocracy has been driven out, killed, or impoverished. With the government now in charge of a class of people which was in virtual slavery until 1861 and badly subjugated until about 1900, and hence little bound by precedent or property, experimentation is to be expected.

Causes of Poverty.—The great mass of the Russian people are exceptionally poor, partly because of the erratic rainfall on much of the land. During favorable years crop yields are bounteous, because of the great fertility of much of the soil. The vast areas of nearly level land ready for the plow have invited exploitation. Hence a spread and rapid increase of population has been natural. But frequent droughts have repeatedly reduced enormous numbers to the verge of starvation and rendered poverty widespread. The drought of 1921 is reported to have caused the death of millions of people. Yet, there has been little else than agriculture to which they could turn, as most of Russia is relatively remote from the sea and from foreign markets, and the lack of local varied resources has discouraged diversification. Furthermore, the peasants have been exploited by the aristocracy more than in most lands. This has been possible partly because such a large proportion of them have been agriculturists, everywhere a hard group to unite to fight oppression. Likewise, with almost Asiatic severity, potential leaders of the oppressed peoples were seized and exiled or executed by the bureaucratic government.

EXPANSION OF RUSSIA

The discussion of the growth of Russia given in Chap. X needs only be summarized here. (1) Russia commenced in the western part of a great plain, and has expanded to include most of it. (2) The spread was facilitated by several rivers which radiated from near the original kingdom. (3) Except toward the west, the spreading Russians found the lands they entered sparsely populated by less advanced and weaker peoples, who caused no great difficulty. (4) To the west, however, not only was the land well occupied, but the people were not weaker, and hence there was little expansion westward. (5) The fact that Russia is essentially an interior land, with little contact with western Europe until recently, has also been significant in retarding the development of resources and in otherwise interfering with the economic and cultural progress of the people.

This summary of the conditions discussed in the chapter on Political Geography may advantageously be extended here to include additional influences and further details.

Desire for an Ice-free Port.—The Muscovites spread out in all directions from their home area near Moskva (Moscow), following down the rivers which radiate from the low Valdai Hills, the western Dvina to the Baltic Sea, the Dnepr (Dnieper) and Don to the Black Sea, and the Volga to the Caspian Sea. The spread was gradual, commencing 1,000 years ago and continuing until the World War. During the last 250 years the desire of the rulers, who had been most influenced by western ideals, for a seaport which is not closed by ice has had an important influence on the extension of territory. Leningrad was closed by ice for 5 months of the year until strong ice breakers were invented, despite which it is closed 3 months, or more, on the average. In the effort to obtain a port at lower latitudes on the Baltic, the Russians were repulsed by a more geographically favored people, the Germans. Their repeated efforts to obtain Constantinople, which controls the outlet of the Black Sea, were rendered fruitless by Britain and Germany. Britain likewise has blocked desired expansion southward across Persia to the ice-free Persian Gulf, and Japan drove Russia from the desirable open Port Arthur on the Pacific Ocean, which was, however, too remote from most of the Russian people to be very valuable to them or to be effectively defended from attack.

During 1917 to 1921 large parts of the czars' domains became independent, but subsequently most of them have been brought back under the central government. The chief exception is the zone extending along the west from the Arctic to the Black Sea, divided among Finland, Estonia, Latvia, Lithuania, eastern Poland, and eastern Rumania (Bessarabia).

MAIN GEOGRAPHIC FEATURES

The Russian Plain.—Most of Russia is an almost featureless plain, with an average altitude of about 600 feet above sea level and a maximum altitude of 1,150 feet. The center is about latitude 57 degrees. It is nearly all farther north than Montreal. The winters are long, cold, and dark and the summers short and rather hot. Most of the plain is so flat that it is poorly drained, and, although the rainfall averages only about 16 inches, there is much marshy land. Furthermore, in spring much of even the better land is very muddy. As firm rock is generally lacking, the building of roads which are good during wet weather is very costly, and there are few such. During the long winter, however, the snow and frozen soil make firm roads nearly everywhere, for even southern Russia is continually snow covered for two or three months. The flatness of much of the plain is a result of one or more of three conditions: (1) its recent elevation from the sea; (2) the deposition of silt and loess in front of the ancient ice sheet; (3) the exposure by the melting away of the continental glacier, from an area of slight relief. The White, Caspian and

Black seas were united in recent geological times. But the uplift was very gentle, and the rock formations are practically horizontal, with, however, a slight western dip in the southern half of the country, as is well shown in the cross section at the bottom of the physiographic diagram. The only features of the relief are very broad and gentle swells and the narrow river valleys. The main water parting extends northeast to southwest and has an average elevation of about 800 feet above sea level. In the central and northern parts of the plain, the recently glaciated section, large rivers have cut relatively deep channels. Their tributaries, however, have not yet extended far enough to have roughened much of the adjacent land. Hence, the presence of even a major river is often not discernible until it is closely approached over the almost level plain. This sort of topography is characteristic of the geologically early or youthful stages of the erosian cycle on a plain and is represented in many parts of the world, but nowhere on a more extensive scale than in the North Eurasian Plain.

Its Northern Location.—In latitude Russia extends from 47° N. (with minor extensions south of this) to beyond the Arctic Circle. Most of the people are found in latitudes 47 to 60 degrees. This well-inhabited area corresponds in latitude to the region from central Montana and Duluth northward almost to Great Slave Lake. Climatically these regions are similar also. But the North American area has probably less than one-third as much land at all suitable for agriculture and less than one twenty-fifth the population at present. The Canadian population, however, has many times the per capita wealth and purchasing power of the Russian, and the standard of living is very much higher, although the agricultural possibilities of the region are not nearly so completely utilized. The Russians could be equally well off if similar methods were used, and the population were reduced sufficiently.

Climatic Conditions.—Although the chief climatic characteristics of Russia have been presented in Chap. II (Climate and Climatic Regions) climatic conditions are such a prominent aspect of the Russian environment that a more detailed account is desirable.

A Continental Climate.—The prevailing winds are from the west, bearing from the Atlantic Ocean moisture and some equalizing influence on temperature. Most of the moisture is precipitated, however, before Russia is penetrated far, and the winds soon lose most of the tempering influence of the ocean. Hence central and, especially, eastern Russia have a strongly continental type of climate in contrast to that prevailing in the rest of Europe.

Temperature Conditions.—Moskva (Moscow) in the same latitude as Glasgow is 36° F. colder on the average in January but 7° warmer in July. East of Moskva the seasonal extremes are greater because of increased distance from the ocean. At Orenburg, near the south end

of the Ural Mountains in the latitude of London, the average temperature for the entire month of July is 63° higher than the average for January, and one recent July *averaged* 91° warmer than one January (78° and −13°). For London the average range between January and July is 24° and extreme range is 37° F. both of which are only two-fifths as great as at Orenburg.

In general the temperature decreases from south to north, and the seasonal extremes increase from west to east. The only port of Russia, however, which is not closed by ice for two months or longer is at the extreme northwest, Murmansk, on the Arctic Ocean, open because the ocean is there kept relatively warm by the Atlantic Drift from the southwest. In general the seasonal range of temperature increases most rapidly toward the southeast, with increased distance from the Atlantic Ocean. The northern quarter and more of Russia contains very few farmers, because the temperature is too low for most crops. A wide belt of northern Russia, the tundra, is characterized by the presence of ice in the soil the year round. In winter, temperatures far below zero are common, and the soil has been frozen to great depths. In summer only a few feet at the top are freed of the frost. The average annual temperature of Arkhangelsk on the White Sea is only 32° F., of Moskva 38°, and of Odessa, on the Black Sea, only 50°. Hence for the whole of Russia the average is distinctly low. Furthermore, the annual range is very great—for most places there is a difference of 130 to 140° F. between the lowest and highest temperatures recorded during an average year. Temperatures of 100° in summer are widespread as are temperatures of 30 or 40° below zero in winter. Moskva has had a range of 79° F. between the average temperatures of the entire months of January and Ju'y

Precipitation.—Precipitation decreases not only eastward but also southward and northward from the part of west central Russia nearest the southern Baltic Sea, where the annual average is about 24 inches. The decrease northward and northeastward is unimportant, as there the low temperatures largely prevent the growth of crops, and furthermore the lesser evaporation compensates for the decreased precipitation. Indeed, northern Russia is largely swampy, despite a precipitation of less than 10 inches a year. The decrease in precipitation southward is much more significant. The main agricultural region of Russia receives an average of less than 20 inches of rainfall and has frequent droughts which sharply reduce crop yields. The decreased rainfall toward the southeast, accompanied as it is with higher summer temperatures, is sufficient to render the area bordering the Caspian Sea practically a desert. The precipitation there is less than 10 inches a year. Bordering this area is a broad zone of semiarid land. Thus one-fifth of European Russia is so dry that few crops are grown and the population is scanty.

Furthermore, there are pronounced fluctuations of rainfall from year to year, and hence an area may be in the humid zone one year and in the semiarid the next.

Storms.—Cyclonic disturbances are most frequent in summer but produce most storms in spring and fall, when they often are severe enough to resemble the blizzards of corresponding areas in North America.

Summary.—The main climatic characteristics of Russia are sharp seasonal contrasts of temperature, low average temperature, moderate but erratic summer rainfall, little precipitation in winter, nearly all of which is snow, and much cloudless weather.

RACIAL STOCKS

Since its separation from Poland, Finland, and the Baltic states of Latvia, Estonia, and Lithuania, soon after the revolution of 1917, European Russia is rather homogeneous racially. Two great Slavic stocks comprise nearly three-fourths of the people (Muscovites 53 per cent, Ukranians 21 per cent). Jews and Germans, however, form important elements, the Jews being about 8 per cent. In addition there are numerous minor constituents. Of the Muscovites there are three chief subdivisions, the Great Russians, Little Russians, and White Russians. Most of the Little Russians live near the Dnepr, and the White Russians near the western Dvina. The Great Russians are most numerous near the Volga, but they have spread more widely than any other group (Fig. 260).

NATURAL REGIONS

Because of European Russia's extent of about 1,500 miles from north to south, and nearly as much from west to east, a number of natural regions may be recognized. These are characterized by considerable contrasts in climate, as we have just seen, and by differences in native vegetation, crops, soil, population density, occupation, accessibility, and advancement. Because of the levelness of the topography and the decided fluctuations of rainfall and temperature, the regions are bordered by wide transition belts. Indeed gradual transition is the rule. Hence the following accounts of the more conspicuous regions apply primarily to their more characteristic parts, which may be only a small share of the area assigned to the type in Fig. 260 or in the text.

The seven great belts of Russia in Europe have already been discussed somewhat in Chap. IV (Soil, Vegetation, and Agriculture) but require a fuller treatment here.

The Tundra.—From the Arctic Ocean southward to about latitude 65 or 66 extends the tundra, characterized by small shrubs, herbs, scattered grasses, and especially by reindeer lichen. This zone is very sparsely peopled. Most of the inhabitants are nomadic Lapps and

Samoyeds who number less than three per square mile. Because of the climatic conditions, discussed in Chap. II (Climate and Climatic Regions), this zone exports very little and holds forth little promise of future development. Arkhangelsk, at the mouth of the northern Dvina River, on Beloe More (the White Sea) is of importance, though a small city. The port of Murmansk on the Arctic Ocean is not closed by ice, but it is of little importance because too remote from the settled and more active parts of Russia.

The Coniferous Forest.—The northern forest or coniferous zone extends from the tundra south to about the latitude of Leningrad (60° N.). Little land is cleared in this zone, and the population is small. Lumbering is being carried on increasingly in it, however, except toward the north near the treeless tundra, where the trees are too small. Much timber is rafted down the northern Dvina to Arkhangelsk, where it is sawed up or made into paper pulp and exported to Britain and other western markets. Many furs are likewise exported from this forest zone. Considerable oats and flax, for fiber, are grown on fields which are commonly abandoned to forest growth after a few years, because the crop yields decline rapidly.

As is true of forest soils in general, the soil is deficient in humus, but, because this section was recently glaciated, it usually contains abundant soluble minerals. The rocks are horizontal sedimentaries but are deeply buried by glacial drift, as in most of the northern two-thirds of the country. No sort of firm rock is exposed to view in most of Russia, even along the rivers. This is in sharp contrast to adjacent Finland, where granite outcrops are widespread. As elsewhere in the recently glaciated northern one-third of Russia, there are many lakes and marshes. The southern forest region and the northern part of the black earth region as far south as latitude 50 degrees were covered by an earlier advance of the ice but contain no lakes now. Because this region is nearly everywhere covered with glacial drift, the underlying deposits are known very imperfectly. As yet no minerals of any special value have been found. Furthermore the low level of the land, the long closure of the streams by ice, and the scanty precipitation make it unlikely that much water power will ever be obtained.

The chief feature of the landscape is the coniferous forest, a resource of present and future value, belonging to the state. In east central Russia there are said to be 400,000,000 acres of forest. Forest products are the major output of the eastern part of the forest belt, but the region is relatively remote and inaccessible from the chief Russian markets and especially from the great markets of western Europe. The areas near the rivers flowing to the more densely populated regions farther south or west in Russia were long ago cleared, and the facilities for getting out additional timber are poor. The outlet northward, down the Northern Dvina, is far better and is much used. In recent years timber, lumber,

and wood pulp have provided about one-ninth of the value of Russia's exports.

Experts have estimated that about 88 per cent of Russia's trees are conifers and 12 per cent are hardwoods, and that the annual growth is 12,000,000,000 cubic feet, or three times the estimate for the United States. The annual cut of about 7,000,000,000 cubic feet, of which saw timber makes up 4,000,000,000 and firewood 3,000,000,000 is, however, only about one-third that of the United States.

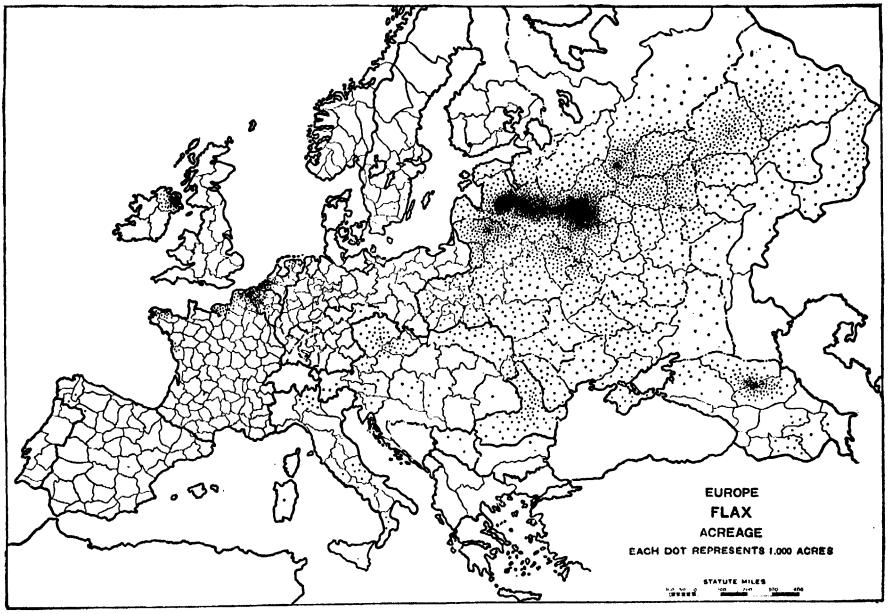


FIG. 261.—Flax acreage. (*From Finch and Baker, U. S. Department of Agriculture.*)

In the northern forest the population is rather sparse, and most of the buildings are made of logs. There are numerous villages but no large cities.

Climate.—Climatically this region is near the border of the agricultural area, with long, cold, dark winters, and with summers which are too short for any but the more hardy crops. It suffers from cold rather than drought, however.

The Southern Woodland Zone.—Deciduous, broad-leaved trees, beech, oak, linden, etc., dominate the southern woodland zone, although pines are interspersed toward the north. This belt extends from about latitude 60 south to about 54 degrees. Trees have been largely cleared away in the southern and especially in the western part of this zone, which is very important agriculturally, being the great rye- and flax-growing region (Fig. 261). It also contains much of the industrial

activity of Russia, especially in and near Moskva, near the center of the western part. Because of the relatively large industrial population, this region does not produce enough food for its population, and much is shipped in from the adjacent region just south. From this belt, however, flax, butter, and eggs, as well as furs are exported. The population has been Muscovite since before the ninth century.

The climatic conditions of Moskva and Leningrad have received considerable attention in the climatic section earlier in this chapter and that discussion can suffice.

The agricultural activities are discussed with those of the next region, the chief agricultural region, but here transportation facilities may be discussed, as the more important rivers all have their source in this region, and most of the railroads radiate from it.

Transportation Facilities.—About 16,000 miles of European Russia's rivers are navigated by steamboats, and there are some 1,400 miles of canals connecting the various rivers. Certain aspects of the rivers are favorable for their extensive use. The streams have gentle gradients and are relatively deep. Several of them flow out radially from so low and flat a divide that their headwaters have easily been connected by canals. From the almost indiscernible Valdai Hills, the western Dvina flows to the Baltic, the Volga to the Caspian, the Dnepr to the Black Sea. The Volga, the Don, and other rivers have been readily connected in their lower courses. It is said that it is possible to go to nearly all large sections of European Russia by boat. There are, however, several unfavorable features of the inland waterways. (*a*) They are all closed for 2 months or more by ice. Even Astrakhan, near the mouth of the Volga, is closed over 3 months, while Arkhangelsk, at the mouth of the northern Dvina, is free from considerable ice less than half the year. (*b*) The largest river, the Volga, which with its tributaries affords more than 7,000 miles of inland transportation, leads to the landlocked Caspian Sea. (*c*) The canal connecting it with the Don has been only a barge canal, but a ship canal is under construction. (*d*) The Dnepr, the principal waterway to the Black Sea, has, for 23 miles, a series of rapids, in the central part of the great eastern bend, caused by the outcrop of Russia's one great ridge of granite, which, however, is hidden elsewhere. The artificial channels intended to surmount these rapids have been quite inadequate. (*e*) The rivers are crooked. For example, the distance from Tver, at the head of steamboat navigation on the Volga, to the mouth of the river is 1,650 miles by the river but only 900 by direct line. (*f*) Low water in summer also interferes greatly with navigation, especially in southern Russia.

Although the waterways have long been the chief commercial highways, the tonnage of traffic shipped on them is small, some 3,500,000 metric tons in recent years. This means less than 70 pounds per capita

per year. Much of this is lumber, for about three-fifths of Russia's lumber is transported on rivers.

The importance of the rivers is illustrated by the fact that nearly all the cities are located on them. For example, 8 of the 14 cities having a population of from 100,000 to about 200,000 lie on the Volga. From the head of navigation downward they are Tver, Yaroslavl, Nizhnii-Novgorod, Kazan, Samara, Saratov, Stalingrad, and, on the delta, Astrakhan. Most of the river towns are on the right bank. On the Volga below Kazan there are said to be only 4 towns on the left bank as against more than 30 on the right. On the Dnepr and Don rivers a similar distribution of towns obtains. This is partly a result of the fact that the rock strata dip gently toward the west in southeastern Russia. This, and the deflective effect of the earth's rotation, cause the rivers to hug their right banks more than their left. Hence the right bank is higher and less subject to flood and has deeper water than has the left.

Railways.—European Russia has some 39,000 miles of railways, of which Ukraine has 7,041 miles, or twice its proportionate share, based on area. The distribution is shown conspicuously on Fig. 79 which reveals five chief features: (1) a large share of Russia is more than 10 miles from a railway; (2) lines radiate from Moskva, Leningrad, and the Donets coal field; (3) northern and eastern Russia have few railroads except for two almost straight lines to the White Sea port of Arkhangelsk and the Arctic port of Murmansk, and a line east from Leningrad to the Urals; (4) the region about the Caspian has no railroads except the two to Baku, one on either side of the Caucasus, and the one to Astrakhan at the mouth of the Volga; (5) there are fewer railroads near the Polish boundary than somewhat eastward, because of the Pinsk marshes and other sparsely settled tracts.

Airplanes.—Aviation has commenced in Russia, somewhat more than 1,000,000 miles having been flown commercially in 1928, and 8,700 passengers carried. The larger cities are now all connected by airplane routes.

Russia reported only about 24,000 automobiles in 1930, a very low ratio to population (Fig. 84).

Distribution of Population.—About one-third of European Russia's approximately 120,000,000 people are found in the southern woodland zone. Leningrad, with about 1,666,000 people was long the chief city. It is located near the northern margin of the mixed forest, on the Neva River, the outlet of Lake Ladoga. This lake is the largest in Europe, and is near the Gulf of Finland. Leningrad (before 1917 called Petrograd or St. Petersburg after its founder) lost 500,000 people after the transfer of the capital to Moskva and the breakdown in railroad transportation following the revolution. But it is again Russia's chief port, especially for imports, and is larger than ever before.

Moskva, the capital of Russia before 1701, and also since the revolution, now has about 2,250,000 people. It lies on the Oka, a small tributary of the Volga, but railroads from a dozen radial directions afford most of the transportation. Four cities each with populations of 100,000 to about 200,000, lie on the Volga fairly near Moskva. Tver stands at the head of steamboat navigation northwest of Moskva, Yaroslavl lies northeast of Moskva, and Nizhnii-Novgorod and Kazan due east. Two other modern industrial centers of similar size, Tula and Ivano-Voznesensk, are situated on railroads not far south and northeast of the capital city. The manufacture of textiles is especially important in the Moskva district, the cotton mills being unusually large, but woolen, linen, and silk mills are also important. The manufacture of machinery is of some significance.

The Prairie or Black Earth Region.—The fourth great belt of Russia is the famous Black Earth Belt, a grassy plain of great natural fertility. This black soil region covers about one-fifth of the country, but a considerable portion is in the steppe region, discussed below.

The black earth soil derived its color from the decay of the roots of its native grasses. Its fertility is partly due to this humus but largely to the fact that the fresh soil materials were blown from the area left bare by the melting of the continental glacier and the soluble minerals have not yet been leached out. Indeed, because of the rather scanty rainfall, they will long remain in the soil (see Soils in Chap. IV). The black earth soil corresponds to the loess of western Iowa and eastern Nebraska, and is fine, porous, and deep.

The natural fertility of the black earth belt is so great that when rainfall is sufficient, plant growth is rank. For example, hemp occasionally attains a height of 20 feet. Crop growing is the major activity of this belt, although because it contains the chief coal field and considerable water power, it has recently acquired a sizable industrial population. Most of Russia's large prewar export of grains and flour came from this region, nine-tenths being from Ukraine.

Climate.—Climatically this is the best large region of Russia, as there is sufficient warmth and moisture for extensive agriculture, and yet the summer heat is seldom intense enough to be enervating, as it often is in the southeastern part of the country. The winter cold is, likewise, less severe than in any other Russian region, except the tiny Mediterranean one. It is, however, prolonged and benumbing, field work being stopped by it for three months, on the average. In respect to rainfall, this region is less fortunate than the southern woodland, because of the lower average amount and especially because of its greater fluctuation. Moreover, as a result of higher temperatures, more moisture is required than in the woodland zone, not less. In the main part of the prairie region, however, the rainfall is sufficient so that there is almost never a

complete crop failure, although often the yields are reduced pitifully by drought.

Precise figures for the January and July temperature and precipitation and the annual averages are given for Odessa, at the south, in the appendix, and for Saratov at the east in Table I of Chap. II. The discussion of climatic conditions at Moskva, not far from the northern border of the region, as well as the more general statements concerning the climate in the earlier part of this chapter and in Chaps. II and IV should make the main features rather clear.

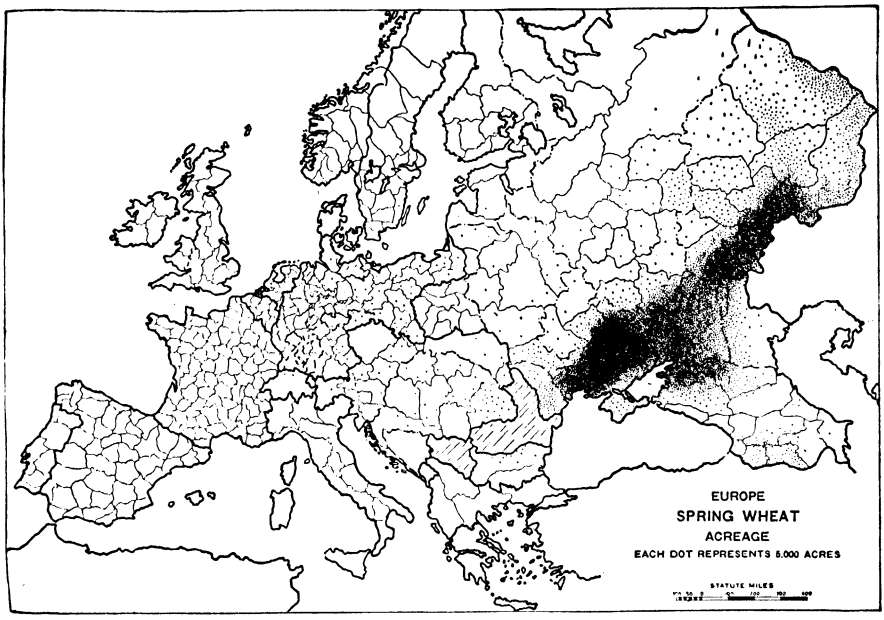


FIG. 262.—Spring wheat acreage, prewar. (*From Finch and Baker, Geography of World Agriculture, U. S. Department of Agriculture.*)

Agriculture.—Most of the Russian people are farmers, indeed about 80 per cent are agricultural peasants. The area devoted to crops is greater than the combined total area of France, Germany, Britain, and Italy. Because of the vast acreage and despite the low average yield per acre, Russia in recent years (1926 to 1929) has produced about one-third of Europe's wheat, corn, oats, and barley, and more than one-half of the rye. Of the estimated total output of the entire world, excluding China, for which there are no adequate estimates, European Russia now produces about three-fifths of the flax fiber, one-half of the rye, one-fifth of the wheat and oats, one-sixth of the flaxseed, one-eighth of the barley and one-tenth of the tobacco. This is despite the fact that European Russia has only about one-thirteenth of the world's population (China

excepted), has a rather unfavorable climate for agriculture, and uses, for the most part, poor agricultural methods.

The dominant agricultural region of Russia is the triangular area with Leningrad just beyond the northern corner, Odessa at the southern, and Samara on the middle Volga near the eastern corner. According to Russian authorities this area is so densely occupied as to be overpopulated and therefore any large net export of food from it is no longer to be expected. Hence the chief efforts of the Soviet Central Government to obtain grain for export are being made in the more sparsely populated region to the southeast.

The acreage of the chief crops, their production, and their yield per acre averaged approximately as follows from 1925 to 1928, inclusive:

Crop	Millions of acres	Millions of bushels	Bushels per acre	Crop	Millions of acres	Millions of tons or pounds
Wheat	70	800	11.5	Sugar beets	2	8 tons
Rye	68	900	12	Flax	4.3	
Barley	17	240	15	Hemp	2.3	1,000 lb.
Oats	41	1,000	25	Millet	12	8,000 lb.
Corn	8	140	16	Sunflowers	7	4,000 lb.
Potatoes	14	1,800	128			

Localization of Crops.—The sections of Russia in which the several chief crops are most extensively grown are shown in Figs. 261 to 263; they are, briefly as follows: rye, the most northern section extensively farmed, especially east of Moskva; flax, northwest and west of Moskva (Fig. 261); barley, just north of the Black Sea (Fig. 263); spring wheat, just north of the Black Sea from west central Ukraine to the Don and also just west of the southern Urals (Fig. 262); winter wheat (much less widespread), chiefly east of the Sea of Azov (Fig. 173); corn, near the Black Sea and just north and south of the Caucasus Mountains (Fig. 256); sunflowers, near the drier margin of the tilled area in southeast Russia; potatoes, in west and northwest central Russia (Fig. 252); sugar beets, strongly localized in central Ukraine (Fig. 193); tobacco, localized near Kiev.

The chief farm animals with their approximate average number during 1926 to 1928, were sheep, 120,000,000, cattle 60,000,000, horses 30,000,000, swine 20,000,000, and goats 10,000,000. Of the world's horses, European Russia has about one-sixth and of the cattle and swine about one-tenth.

Cattle are distributed evenly over the southern half of European Russia, but decrease gradually northward until they are lacking in the tundra. Sheep and goats are most numerous in the southeast, in

the drier section (Fig. 314). Swine decrease gradually in all directions from west central Russia, and are lacking in the north and almost so in the southeast and east (Fig. 196).

Mineral Resources.—In addition to being the best agricultural section, the prairie or black earth region is richest in mineral wealth, the chief item of which is coal. The Donets field, near the lower course of the Don River in eastern Ukraine, has an area of some 16,000 square miles. In some places as many as 40 seams are considered workable. In recent years more than 80 per cent of Russia's coal has come from this field, which also yields the only coking coal. The Tula or Moskva

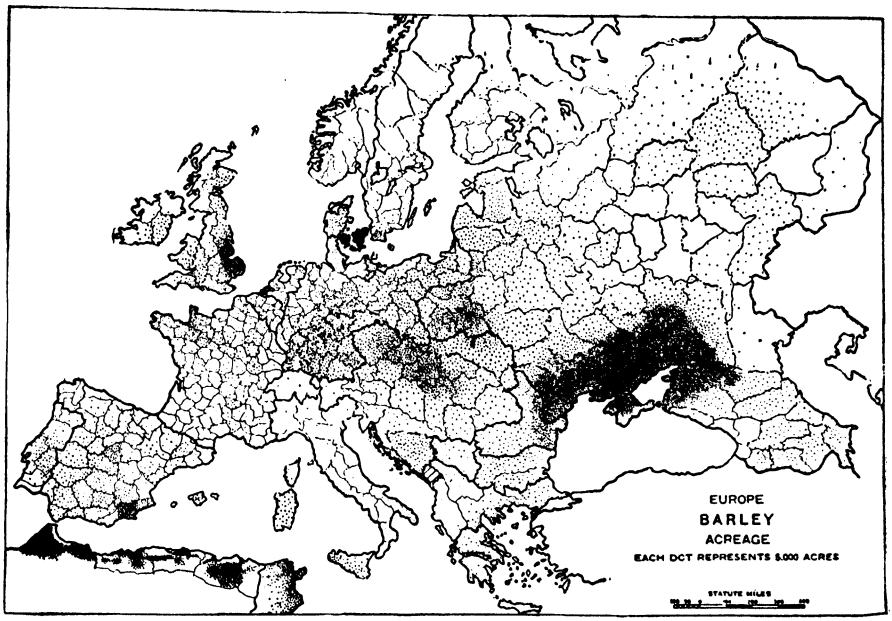


FIG. 263.—Barley acreage. (*From Finch and Baker, U. S. Department of Agriculture.*)

field and small fields in the Caucasus contain low-grade coal of little present importance. Despite the urgent need for domestic fuel in winter, little coal has been mined in Russia. Less than 1,000,000 tons were mined in 1885 and only about 16,000,000 tons in 1925, but the production rose to 35,000,000 tons in 1927–1928. Iron ores of low quality are found in several places and some high grade ore in Krovirog. About 70 per cent of the output comes from Ukraine, but the total is small. In 1928 it made up only 3 per cent of the world's total. In that year 3,400,000 tons of pig iron were made, and, as a by-product, about 2 per cent of the world's phosphate fertilizer. Considerable manganese is obtained from Ukraine.

Industrial Activity.—In recent years the industries of eastern Ukraine have increased conspicuously. This has occurred chiefly near the Donets

coal field and in the adjacent area served by the hydroelectric development of Dnepropetrovsk at the rapids of the Dnepr, where the ultimate capacity will be about 455,000 horsepower. Ukraine with about one-eleventh of the area and one-fourth of the population of Russia has recently produced four-fifths of the coal, 70 per cent of the pig iron, 85 per cent of the sugar, 70 per cent of the agricultural machinery, and a large share of the flour. The value of the output of all Russian factories in 1927 equaled that of 1913, and in 1929 it exceeded the 1913 figure by about one-fourth. In that year the output had a value of about $500,000,000 dollars, or about the output of the individual city of Minneapolis or Akron, or one-fourth that of Philadelphia.

Urban Centers.—Prairie or black earth Russia is densely populated, the west central part having, as we saw in Chap. VII (The Distribution of Population), more than 250 persons per square mile. Ukraine averages 172. This region contains most of the large cities of Russia aside from the seven mentioned in the southern woodland region and a few in the steppe region. The chief are Kiev, Odessa, and Kharkov, with populations of from 400,000 to 500,000, Rostov with about 300,000, Dnepropetrovsk with about 250,000, and three with from 100,000 to 200,000, Stalin (Yuzovka), Voronezh and Nikolaev. Rostov is near the mouth of the Don and the coastal port of Taganrog is near by, while Voronezh is higher up the river. Kharkov lies on the Donets, a tributary of the Don, and Stalin is on a smaller river near by. Kiev, one of the capitals of Ukraine, and for centuries a leading city of the black earth belt, is situated on the Dnepr, as are Dnepropetrovsk and Kherson. The latter is an important port at the mouth of the river. Near by on the coast of the Black Sea are Odessa, long the chief port of southern Russia, and Nikolaev, which recently has surpassed Odessa. It is now one of the capitals of Ukraine and also manufactures considerable steel.

The Steppe.—Southeast of prairie Russia the rainfall becomes progressively less abundant and more erratic, with the result that tall prairie grasses give place to short grasses or to scattered bunch grasses. Likewise in the drier sections the black soil is replaced by lighter colored soils, as the amount of humus decreases. This dry steppe belt is largely given over to stock raising, and contains more sheep and cattle than any other large section. Farmers, however, have been venturing eastward decade by decade, with the result that more and more are subject to the highly erratic rainfall characteristic of semiarid regions. Very low average crop yields result, despite the fertility of the soil. Of the small area in crops, barley and sunflowers occupy most, except on the government farms where winter wheat is chiefly grown. Indeed the chief winter wheat area is the southern part of this region. The main expansion of agriculture which the Soviet Central Government has been strenuously attempting since 1924, with the help of numerous tractors and other

labor-saving machinery, has taken place in this region, where increased aridity has kept the population down to less than 20 per square mile, but where the soil is relatively fertile and large areas are physically adapted to tillage by extensive methods. Indeed such large-scale methods employed by large organizations, which cannot be bankrupted by the frequent crop failures, are entirely logical in such a climate. Thus any expansion of agriculture which the Soviet Government is able to make in that region is largely a net gain. Most of the region was not, and could not be, farmed by the small-scale methods prevalent in most of the country.

Urban Centers.—Despite the generally sparse population of this region it has two cities with populations of from 100,000 to 200,000, Saratov and Stalingrad (Tsaritsyn), both on the Volga.

Mediterranean Russia.—A narrow fringe of forest of the Mediterranean type is found on the south side of the coastal mountain range on the Krim (Crimean) Peninsula, and in the Caucasus Mountains. This zone was settled by Mediterranean peoples during the age of ancient Greece, and they have not all been displaced. Winter wheat and corn are important crops. The chief city is Akhiar (Sevastopol). Southern Krim is rather important as a Russian health resort, especially in winter.

Desert Russia.—The seventh great vegetal type of European Russia is the desert bordering the northern part of the Caspian Sea, particularly in the considerable area below sea level. Because of receiving less than 10 inches of precipitation on the average and often much less than that, and having hot summers, it is practically a desert. Hence it is characterized by saline and drought-resistant shrubs, scattered salty herbs, and either coarse or else very ephemeral grasses. The only significant city in this region is Astrakan, on the delta of the Volga, population about 150,000. It is maintained partly by the commerce on the Volga and partly by the fisheries in the vicinity of which fishing for caviar (sturgeon's eggs) is of especial interest, because of the comparatively large export of this delicacy.

Mountainous Russia.—The eastern and extreme southern sides of European Russia are bordered by the Ural and Caucasus mountains, the physiographic characteristics of which are well suggested on the physiographic diagram in the pocket. The Urals are a low range with summits generally not over 3,000 feet high. They are not rugged and are densely forested, sparsely populated, and of little present importance, except toward the south where gold and platinum are mined. The Caucasus Range, however, is quite rugged and is loftier than the Alps. It still contains glaciers but affords little mineral wealth. The Dariel Pass across the middle of the range leads to Tiflis (population about 300,000), the capital of the Transcaucasian Soviet Republic.

Mineral Resources.—The Urals have produced some gold, and before the World War produced over nine-tenths of the world's platinum, largely from their eastern, Asiatic side. They now produce less than one-half. The Apsheronskii, or Baku Peninsula, which projects eastward into the Caspian Sea, produced enough petroleum from 1860 to 1917 to give Russia second place among the nations in oil production. Since 1917 Russia has ranked third. The output for 1927 to 1929 averaged 13,000,000 tons (86,000,000 barrels in 1928), two-thirds from Baku and one-third from near-by Grosnyi. In 1930 petroleum was discovered in considerable quantities, apparently, just west of the southern Urals also. Before the war about one-half of the world's manganese was

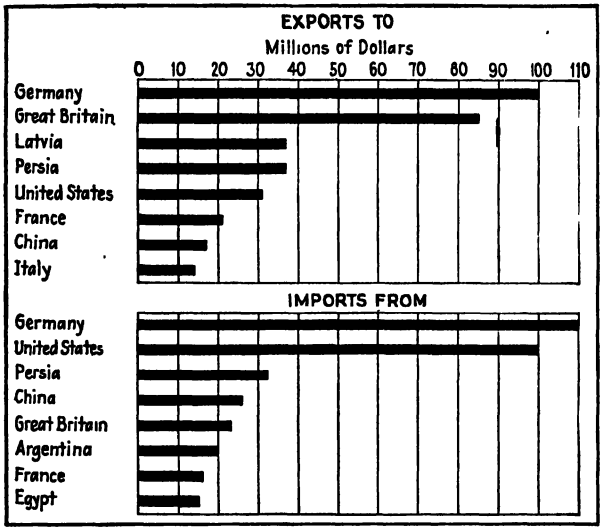


FIG. 264.—Russia's foreign trade, average 1927 to 1929, by countries and values to each.

produced near Kutais, in the southern foothills of the Caucasus. Baku (population about 450,000) is connected with the port of Batum, at the east end of the Black Sea, by two oil pipe lines some 500 miles long and a railroad. Krasnodar (Ekaterinodar), population about 120,000, is on the Kuban River near the Black Sea, just north of the Caucasus.

RUSSIAN COMMERCE

The per capita foreign trade of Russia, as in most very large countries, is relatively smaller than that of lesser countries. This is because most of the necessities of life can be obtained within the borders of the country. The poverty of most Russians likewise reduces imports, as do the high tariffs (Fig. 135) and other governmental restrictions, and the relative remoteness of most of the people from convenient sources of imports. Exports are small chiefly because the remoteness of most of Russia from

foreign markets, and the unsatisfactory transportation facilities thence absorb most of the profits which would normally be obtained from exports. Furthermore, Russian methods of production have been less efficient than those in many other areas.

Agricultural products formerly comprised more than 60 per cent of Russia's exports by value, but from 1927 to 1929 they comprised less than 25 per cent. The chief items in recent years and their average approximate value were eggs $20,000,000, butter $19,000,000, grains $16,000,000, flax and tow $14,000,000, and meat $12,000,000. Although in recent years the powerful central government has endeavored strenu-

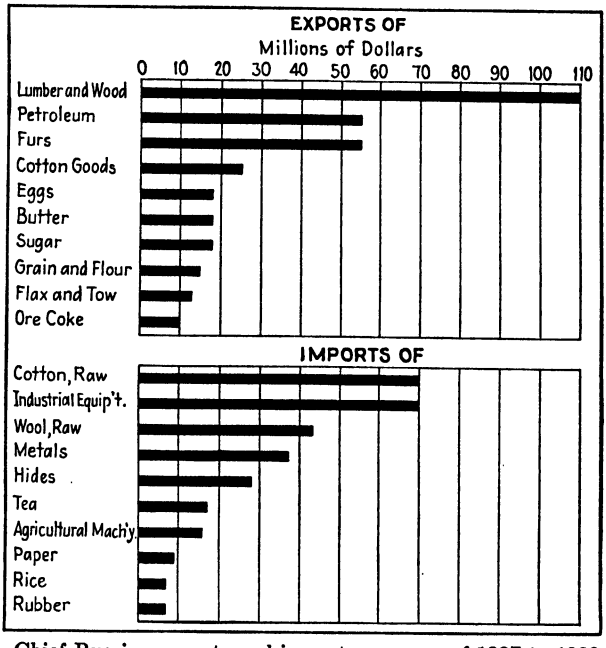


FIG. 265.—Chief Russian exports and imports, average of 1927 to 1929, by items.

ously to increase exports, they have had little success except in respect to products such as furs, lumber, platinum, and petroleum in which the world's demands can not readily be supplied by more favored and advanced nations.

For 1926 to 1929 the exports had an average value of about $400,000,000 and the imports of about $450,000,000. Thus the per capita trade was only $7 or about one-tenth of that of the United States. The bulk of the imports was composed of raw materials and semimanufactured products, about 54 per cent, while manufactures formed 35 per cent and foodstuffs 9 per cent. The principal imports with their average value are shown in Fig. 265. Russia's imports are mostly from a few countries, about one-fourth coming from Germany and nearly one-fourth from

the United States. The values from the leading countries are shown in Figs. 270, 273.

The exports for 1927 to 1929 were chiefly raw and semifinished materials, about 60 per cent, and foodstuffs 30 per cent. Because of the great decline in foodstuffs exported, the total value of exports recently has been only about one-half as great as in 1913. The chief exports and their approximate average values are shown in Figs. 265, 266–269.

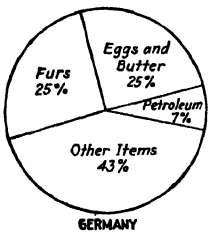


FIG. 266.

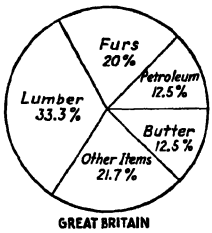


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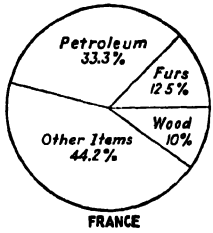


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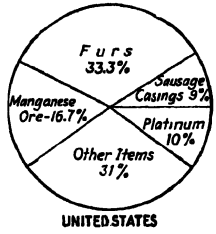


FIG. 269.

FIGS. 266 to 269.—Chief Russian exports to leading countries, average of 1927 to 1929

Of Russia's exports, England and Germany each take about one-fourth. The leading countries and the values are shown in Fig. 264. Doubtless a considerable share of those received by Latvia were reexported via Riga.

The chief items exported to and imported from each of these chief importing nations, with the approximate portion which they comprise of the total sent to or received from that country, are shown in Figs. 266, 269.

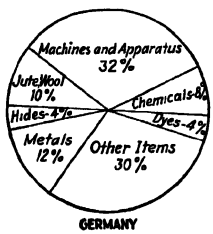


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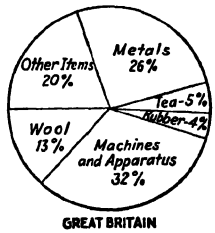


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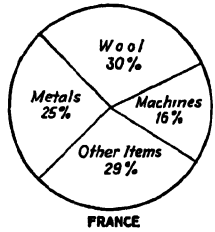


FIG. 272.

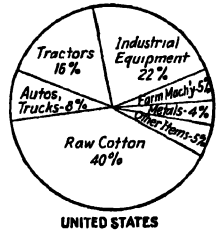


FIG. 273.

FIGS. 270 to 273.—Chief Russian imports from leading countries, average of 1927 to 1929.

Russia in Europe received an average of 1.1 per cent of the exports of the United States in 1910 to 1914 and 1.4 per cent in 1927 to 1929. Russia furnished 1.1 per cent of America's imports in 1910 to 1914 but only 0.3 per cent in 1927 to 1929.

SUMMARY

The chief characteristics of European Russia are (1) the vastness, (2) the levelness, and (3) the continuity of the area, (4) the lack of distinct

natural boundaries, (5) the high latitude, (6) severe climate of most of the land, (7) the greater suitability of the land for agriculture than for anything else, (8) the relative isolation of all but a small fraction of the people, (9) the comparative monotony of conditions, and (10) their cultural distinctiveness, of which the present socialistic government is an example. The fact that about four-fifths of the people are classed as rural and live in farm villages is one of the striking characteristics. Most of these villages are rather small, with a population of 200 to 500, but some reach a few thousand. There are, moreover, only 22 cities of over 100,000 in European Russia compared with 93 in the United States, which has approximately the same total population. Russia has only 2 cities of over 500,000, in contrast with 20 in the United States.

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C. SOUTHERN EUROPE

CHAPTER XXIII

SPAIN AND PORTUGAL

Changes in the Geography.—Spain and Portugal (Fig. 274) have been so prominent in the past but are of such little concern to most of Europe now, that it is worth while to examine the geographic conditions to see to what extent they may help to explain the radical changes which have occurred.

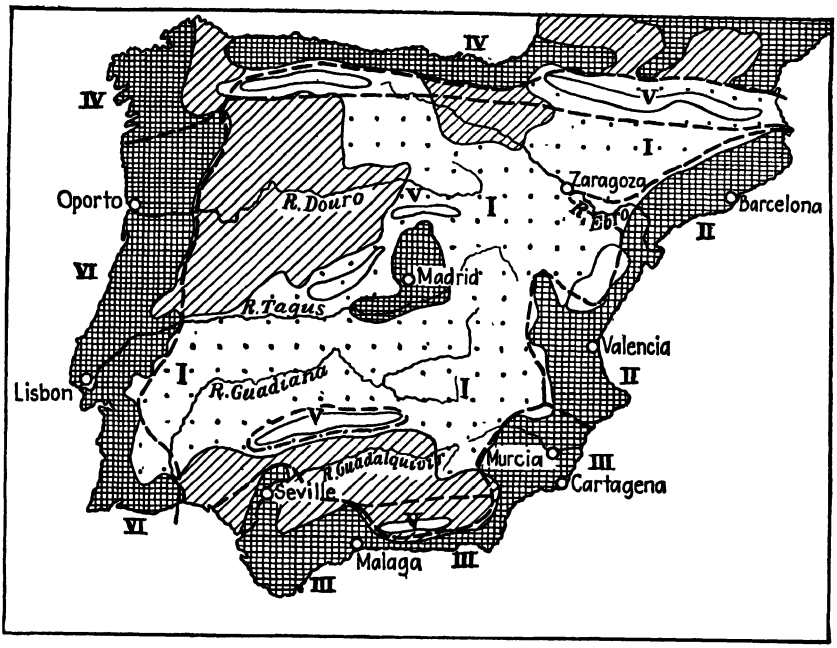


FIG. 274.—Iberia; density of population and natural regions; crossed: dense, over 125 per square mile; stippled, less than 60. Regions, I Plateau, II Catalonia, III Granada, IV Humid Iberia, V Mountains, VI Portuguese Iberia.

The Iberian Peninsula was an important source of metals for the Phoenicians, several hundred years B. C., a leading outpost of Rome, and for several centuries, when controlled by the Moslem Moors, it attained to a splendor of civilization not then possessed by the rest of Europe. Following the expulsion of the Moslems came the era of exploration largely inaugurated by Columbus' discovery of the New

World. For nearly two centuries thereafter the Iberian Peninsula contained the most prominent nations of the world, with the largest areas under their control that any countries had. During the last century, however, Iberia has sunk to almost insignificance from the world point of view. Why?

It is often assumed that the geography of an area remains the same. How false this assumption may be is illustrated by Iberia, in respect to which there have been several very significant changes.

Harbor Deterioration.—The harbors of Iberia have deteriorated greatly. There were many good harbors and the larger rivers could be ascended some distance a century and a half ago, when ships were small. But now Iberia has almost no good harbors, except Barcelona, which is almost entirely artificial, and Lisboa (Lisbon), and is decidedly worse off than formerly, as compared with many other countries. This change is partly due to the fact that several formerly important harbors are shallower than they were, because of having been silted up by rivers or blocked by wave-built bars. Of much greater significance is the general increase in the size of boats which has accompanied the use of steel and the great growth in the volume of commerce. When spices, precious metals, gems, and silks formed the chief items of commerce, small ships sufficed, but now that vast quantities of bulky commodities are carried, large ships are needed.

Declining Value of Minerals.—Although Iberia was an important source of minerals and was considered especially rich in mineral wealth until recently, it is now almost insignificant as a source, present or prospective. This is partly because of the exhaustion of certain mines, but more largely because of changes elsewhere. The world demand for minerals has grown to be so great that only of mercury and pyrite does Iberia now supply an appreciable fraction. Copper is a good illustration. Spain long supplied a large share of the world's output and was considered to be perhaps the most fortunate part of the world so far as copper was concerned. But the development elsewhere of improved methods of recovery and the opening of new mines in other lands where the cheaper methods can be used to better advantage has resulted in Spain no longer having any real significance as a source of copper. Of iron ore Spain exported from 6,000,000 to 10,000,000 tons of high-grade Bessemer ore for the years 1910 to 1917, and produced 6 per cent of the world output of iron ore in 1913, but the supply of this rich ore is approaching exhaustion and Spain presumably will soon decline almost to insignificance in respect to iron ore production also. In 1929 less than 1,000,000 tons were exported.

In coal, likewise, Spain's position has changed sharply. Until recently it was credited with having considerable quantities, and therefore having potentialities from an industrial standpoint. Iberia is now

considered to have only a very small amount of coal as compared with the more favored nations. Spain is placed in the fourth class on the basis of the data in the authentic "Coal Resources of the World" while Portugal, Italy, Scandinavia, and most of Africa and South America are placed in the fifth or last class. The United States, Canada, and China make up the first class, Britain and Germany the second class, while most of the European countries fall into the third class. Thus Spain is put in the next to the lowest class and Portugal in the lowest. The current output of 6,000,000 or 7,000,000 tons certainly is almost a negligible fraction of the world's total. Thus the explanation that Iberia (and the Mediterranean countries in general) have declined relatively because of the rise of nations with better coal deposits can no longer be said to be disproved by Spain, which was formerly given as an example of a country which had much good coal which was unused. It therefore appears that the decline Iberia has experienced during the last

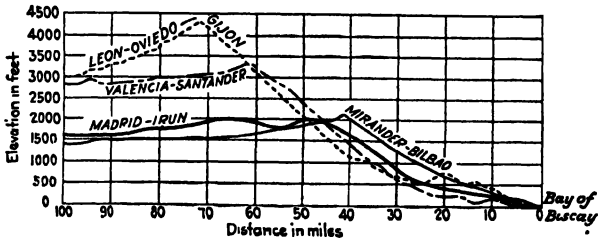


FIG. 275.—Profiles of railroads from the north coast of Spain to the interior, showing the steep grades.

century and a half is partly due to changes in the value of its mineral resources.

Relief an Increasing Handicap.—Of probably greater significance in explaining the increased isolation of Iberia and its lessened world influence are the changes which have taken place in the influence of its topography. When land transportation was everywhere by pack animals, steep slopes were relatively unimportant, for all travel was slow and laborious. Then Spain and Portugal were not much worse off than other countries. Indeed the firmness of most of the roadbeds, in part due to the general scarcity of rainfall and in part to the abundance of rock for road making, made travel about Spain by the methods then in use easier than in wetter lands, especially in muddy plains which lacked stone for road metal. With the coming of railroads, however, Iberia was at once greatly handicapped, relatively, by the fact that at only a few points can a railroad readily ascend onto the plateau from the coast, because the slopes are so steep that the drive wheels of the locomotives spin. Even where they can ascend, the grades are steep (Fig. 275). Nor can railroads readily unite coastal communities because the mountains reach the sea, as is clearly shown in the physographic diagram in the pocket. In

contrast with Iberia, railroad building and operation is easy in the North European Plain, and in many other parts of the world. The geography of Iberia has changed, therefore, in another important particular, with the result that it has been harder for the people to keep up with the advance of better favored lands.

Trade Routes Less Favorable.—Another great change has occurred in Iberia's location in respect to the great trade routes. It formerly was very favorably situated for trade and was a leading commercial region. This was when much of the trade of the world was by small boats between the Mediterranean lands and northern Europe, between Europe and the Orient around Africa, or between Europe and America with the westward-going ships sailing with the trade winds. But now that a considerable share of the commerce between northern and southern Europe is carried by rail, and most of the rest by ships too large to be interested in stopping in Spain, and since most of the traffic across the Atlantic follows the northern route, Iberia's situation is far less favorable, relatively.

Agriculture Unable to Meet Severe Competition.—In respect to several agricultural products, also, Iberia has suffered a geographic change of an unfortunate type. For centuries it was one of the best places in the world for the production of high-grade wool from its famous merino sheep. But since the extensive building of railroads in other parts of the world, such vast areas suitable for wool production have yielded wool for export that Iberian wool is no longer important to other countries. Similarly, Spain formerly exported grain, but no longer can compete with more favored areas. In oranges it has been less handicapped, but the development of California has broken the monopoly Spain formerly had in the European market, although it still supplies about 64 per cent of the worlds' export.

Thus in several respects Iberia has experienced changes of a geographic sort which have contributed to her being surpassed by regions which have greater geographic advantages.

Human Factors.—In addition to the foregoing changes in environmental conditions, for which little blame need be laid on the people of Iberia and which have clearly contributed to their decreased importance in the world of affairs, various other conditions have helped bring about the decline. It has often been stated that the Spanish Inquisition was a major cause of the decline, for by it many of the more progressive people were killed or driven out. The loss of "the flower of Spain" on the Spanish Armada also contributed to a racial deterioration, but of much greater significance than the last was the emigration to the colonies, generation after generation, of ambitious young men who never came back. Another unfortunate result of the colonies was accentuated by a wrong fiscal policy. The large inflow of gold and silver were held so far

as possible in Iberia, with the result that prices were inflated there and exportation of commodities to other countries rendered so difficult as to seriously check trade.

Another explanation of the decline which has been offered is that with the growth in power of the Roman Catholic Church more and more of the rich lands became church property and no longer paid taxes or supported a strong middle class. At the same time an increasing share of the educational program came under the control of the church, which has been characteristically conservative. Furthermore, a considerable number of the more capable people became childless priests or nuns.

It is obviously impossible to correctly evaluate the relative importance, in explaining the lessened influence of Iberia, of the deterioration in environmental conditions sketched above and of the unwise legislation and social conditions just mentioned, but with these geographic and social changes in mind we are in a position to consider modern Iberia with a more sympathetic attitude.

GENERAL CHARACTERISTICS

Spain and Portugal commonly are grouped with the Mediterranean countries, although Portugal lacks 150 miles of touching the Mediterranean. This is done because in several conspicuous respects Iberia resembles other Mediterranean lands. Its languages are Romance and its religion is Roman Catholic; most of its peoples belong to the Mediterranean subrace and live similarly in villages, not on farmsteads. Most of Iberia carries on the type of agriculture widespread on the Mediterranean, the growth of winter cereals, of fruits, especially the vine and olive (Fig. 279), and grazing, particularly sheep, goats, and asses. The type of agriculture is in response to the dry hot summers and the relatively rainy winters, which prevail except along the north coast. The winters, however, are much colder on the plateau than in the Mediterranean lands generally, which interferes with winter cereals and especially with the characteristic Mediterranean flora. Indeed the latter is found in less than one-third of the area, for it is lacking also on the north coast where the rainfall is abundant enough the year round to permit the growth of the type of vegetation approaching that found in northern France and southern Britain.

Climate.—Although the sea forms seven-eighths of the periphery of the Iberian Peninsula, and the land area is small (125,000 square miles) the climate is distinctly continental in type, in response to an average altitude of about 2,200 feet and a latitude of 37 to 43 degrees. Its latitude insures considerable differences in the height of sun and the length of day in summer and winter. Its latitude is also such, in connection with its relation to Africa, that in summer it is crossed by the high-pressure calm belt, between the belts of the trade winds and westerlies. The nor-

mal dryness of this calm belt is favorable to high temperatures. As a result of these conditions and the fact that the sea is practically everywhere bordered by steep slopes of lofty mountains, or by the abrupt margin of the plateau, moisture and the tempering influence of the ocean are seldom carried far inland by the winds. Madrid, near the exact center of the peninsula, has a January mean temperature of only 40° F. but a July mean of 77°, and frequently has temperatures above 100° F. in summer and below 20° in winter. In contrast, Lisboa (Lisbon), on the coast, has averages of 50 and 70°. Madrid receives an average of only 16 inches of precipitation, of which less than 1 inch falls in July and August together. Lisboa receives 29 inches but only ½ inch in July and August.



FIG. 276.—A representative Iberian village.

The fact that Madrid receives slightly more rainfall than Lisboa in summer reflects its continentality, also, as one of the characteristics of continental climates is that they receive more precipitation in summer than do coastal areas in similar latitudes.

Geographic Separation.—The Iberian Peninsula is the most distinct part of the continent. It is almost completely separated from the rest by the lofty and rugged Pyrenees which are the harder to cross because of their compact longitudinal folds, and which closely approach the sea at both ends. Until 1928 no railroad crossed the Pyrenees, and the traffic across them remains small because the grades are steep. Traffic on the railroads which hug the coasts at their ends is also small. Hence most of the trade with other countries is by boat. The effectiveness of the Pyrenees barrier is sufficient to have given rise to the French saying that

"Africa begins at the Pyrenees." Certainly it is true that the Pyrenees have been a more difficult barrier than has the Strait of Gibraltar which is only 9 miles wide.

Harbors.—Despite the relatively long coast line, Iberia has very few good harbors and fewer good ports, as connection between the interior and the coast is difficult nearly everywhere. Because of the prevailingly scanty precipitation in the interior and the rapid evaporation most of the year, relatively few rivers extend from the interior to the coast. Only the largest of these have cut valleys with gentle enough gradients to make them feasible routes for railroads. Because of their steep gradients, all the rivers carry so much sediment when they do flow that deposition at and near their mouths clogs their channels. This renders them unsuitable for the entry of large ships, and as consequence none of the ports is at mouths of rivers, although Lisboa and Porto are on estuaries.



FIG. 277.—Looking across San Pedro de Premia, Spain, showing fields and olive trees.

Natural Regions.—Iberia possesses six major regions (Fig. 274).

1. *The Plateau.*—Five-sixths of Spain is a plateau known as the *meseta*, averaging about 2,600 feet in height, nearly surrounded by mountains along the coast (see the physiographic diagram) but largely made up of wide interior basins which lie between scores of almost barren mountain ranges. Few localities are not within sight of one or more rugged ranges. Most of the mountains, however, have long gentle slopes which extend for miles from their base. These gentle slopes lead to stream valleys or to lake beds called *playas*. Upon the long slopes stretch fields or pastures, which, during all the year except springtime, look too dry to yield even a small crop of wheat or grass. Here and there orchards of dwarfed gnarled olive trees only slightly reduce the impression of almost hopeless aridity. Every few miles there is a drab village of adobe brick. Towering above the low, commonly flat-roofed houses of all

but the smallest villages is the cathedral, which is usually quite picturesque from a distance (Figs. 276, 277). Between the villages there are almost no houses nor roads nor even fences. The average density of population on the plateau is slight for Europe, as most of the people of Iberia live on the periphery of the peninsula. If Madrid, which owes its size to being the capital and the commercial center of Spain, be excluded, the rest of the plateau has an average density of population of less than 50 per square mile.

The great interior of Spain with its scant rainfall of from 8 to 18 inches per year, almost all of which falls in the cool winter season, is in general quite similar except for the contrast between mountain, plain, and the little strips of irrigated land along the flood plains of the few

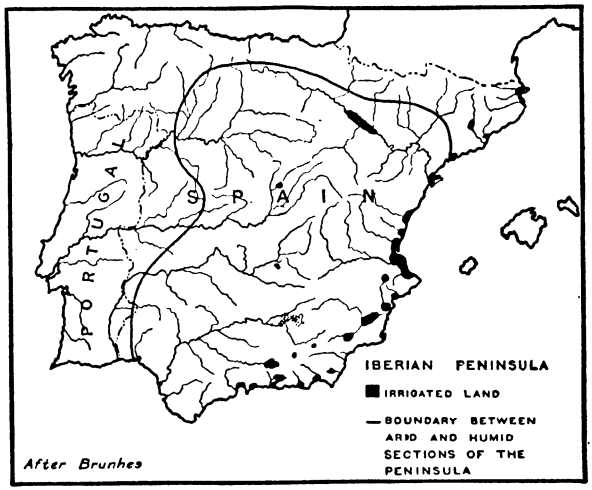


FIG. 278.—Chief tracts of irrigated land. The water is mostly diverted from rivers fed by mountain streams.

rivers (Fig. 278). It has, however, an average elevation of 2,700 feet in its northern half in contrast with 2,600 feet in its southern, and the southern part is hotter because of its lower latitude also, and hence distinctly more arid. Some sections of it are almost without population.

2. *The narrow eastern coastal strip* along the Mediterranean with irrigated deltas and flood plains contains many more people than the plateau, although it is much smaller. The flood plain of one of Spain's two large rivers, the Ebro, extends this province inland as a narrow strip 100 miles to Zaragoza and affords perhaps the best route to ascend onto the steep-sided plateau. This region has long been rather distinct from the plateau, and Catalonian is spoken commonly instead of the Castilian of the plateau. Barcelona and Valencia are the chief ports of this region. This region is extensively irrigated, especially toward the south, and

5. *Mountainous Iberia.*—A fifth geographic type is made up of the numerous mountain ranges. Most of them are rugged and almost barren and comprise much of the more than one-third of Iberia which is practically unproductive (Fig. 82). The mountains yield minerals, however, and supply water for irrigation and water power. Obviously they act as barriers to travel from place to place. The only ranges which are extensively forested are those along the north coast and part of the Pyrenees. The Sierra Nevada, at the extreme south, and the Pyrenees are both lofty enough to be partly snow capped, with peaks reaching somewhat over 11,000 feet. Most of the ranges extend roughly east and west and tend powerfully to break up the country into separate units.

6. *Portuguese Iberia.*—Most of Portugal, although not radically different from adjacent parts of Spain, may be considered a separate region, for it has more rainfall than most of Spain (30 inches on the average in contrast with 15 inches for most of Spain). Portugal, also, has somewhat less marked seasonal contrasts of temperature. It also slopes mostly in one direction, toward the west, while Spain slopes partly west, partly south, partly east, and partly north. Furthermore, the cork oak and the olive are found in almost all parts of Portugal but only locally in Spain. The mountainous extreme northern part of Portugal, however, resembles northwestern Spain more than it does the southern or lowland part of Portugal and is part of humid Iberia.

AGRICULTURE

Importance and Distribution.—The 26,000,000 people of Iberia are mostly engaged in crop growing and in grazing. Upon the plateau or *meseta* little water is available for irrigation and hence most of the crops are grown by dry-farming methods. Many of the fields (about 40 per cent of the tilled acreage) lie fallow every other year to permit a sufficient supply of moisture to accumulate to yield a small crop of wheat, barley, or chick peas the following year. In respect to wheat, all of which is of the winter variety, Spain ranks about fifth among the European nations in acreage (10,000,000), in total yield (125,000,000 bushels), and in yield per acre (13.6 bushels). Nevertheless, about one-fifth as much wheat as is grown is imported, chiefly from Russia to Barcelona. Portugal now devotes about 1,000,000 acres to wheat, but receives a yield of only about 11 bushels per acre and normally imports considerable. Barley is relatively important also, about 4,400,000 acres or one-eighth of the cropped land being sown to it. Only European Russia and Austria have a larger proportion (Fig. 262). The yield per acre is small, however, 15 to 21 bushels on the average in contrast with 35 bushels in Germany. Enough rye is grown in northwestern Spain (1,600,000 acres) to give Spain fourth place among the nations of the world. For Iberia as a whole about one-third of the land is devoted to cereals. The northwestern

portion likewise produces most of the relatively few potatoes. The extremely dry summers of most of the land are highly unfavorable to potatoes, and doubtless help explain the fact that Spain produces fewer in proportion to area than any other part of Europe except the Balkan Peninsula and the subpolar section. Apples are another crop largely confined to the northern and western slopes of the Cantabrian Mountains. The production in this favored strip is rather heavy, and there cider is a chief beverage. Peaches, on the other hand, are most abundantly grown in the Mediterranean section, though some are produced upon the upland by irrigation. Sugar beets likewise are grown by irrigation, and almost none is reported from the more humid section of Iberia. Spain formerly depended upon Cuba and other possessions in America for sugar, but, at the close of the Spanish American War, began to grow sugar beets, and now enough sugar is obtained from beets to make importation unnecessary. Another crop which is largely grown by irrigation and is not common in the humid section is oats. As in the United States large quantities of oats are grown in the corn belt, it is

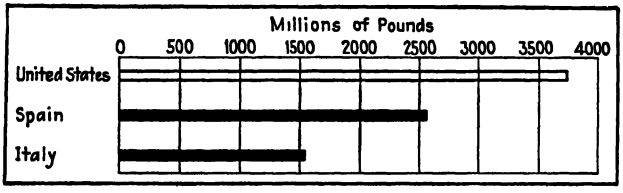


FIG. 280.—Citrus fruit production, average of 1926 to 1927.

interesting to note that in Iberia little is grown with corn. Spain devotes nearly 2,000,000 and Portugal 500,000 acres to oats, with an average yield per acre of 22 and 11 bushels, respectively.

Special Crops.—The four crops for which Iberia is especially noted are grapes, olives, oranges, and cork. None of these is grown extensively in the humid northern portion. The heaviest production of grapes is near Barcelona, of citrus fruits near Valencia, and of olives in the broad valleys near Seville, with a lesser important area near Barcelona, especially along the Ebro (Fig. 281).

Grapes.—Iberia has approximately as many acres of vineyards as has France or Italy. In percentage of cropped land planted to vines, Portugal and Spain have about 8 per cent, which is greater than any other nation except Italy, which has about 14 per cent. As the yield of grapes per acre averages about 2,300 pounds compared with 5,000 in France, Iberia produces somewhat less than half as much as France (Figs. 174, 298). Grapes are grown extensively in all but the coolest northern coastal section and in the more barren mountains and saline flats. Many grow upon terraced hillsides, with only such natural irrigation as

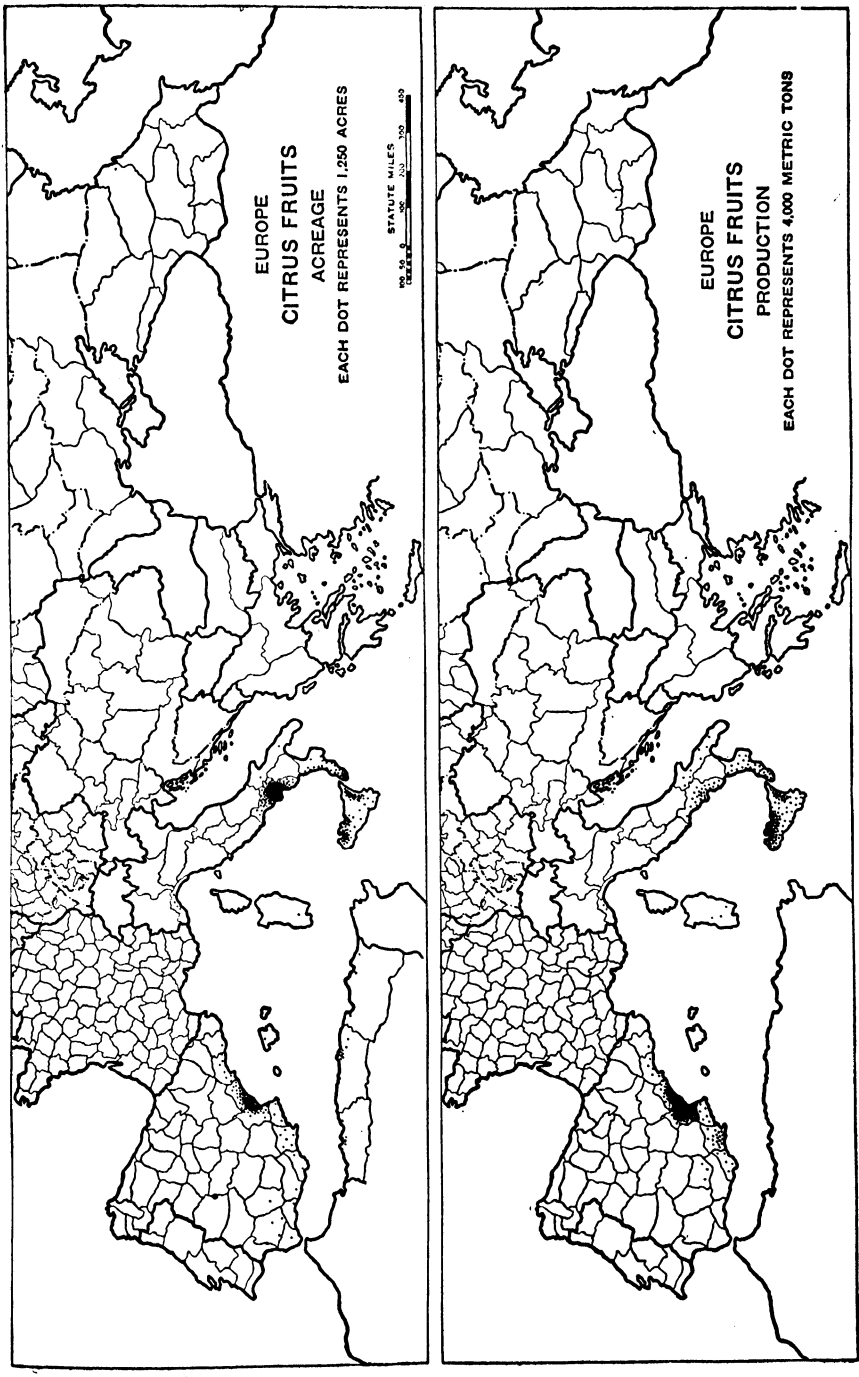


FIG. 281.—Production of oranges and lemons. (*From Finch and Baker, U. S. Department of Agriculture.*)

the run-off from the higher slopes afford (Fig. 42). Spain devotes about 3,500,000 and Portugal about 1,000,000 acres to grapes (Fig. 78).

Olives.—In respect to olives, also, Spain with 4,000,000 acres ranks next to Italy in acreage. In this case, however, it has a higher yield, and ranks first in production. It produced about 3,500,000 metric tons of olives and made about 125,000,000 gallons of olive oil, or an average of 31 gallons per acre, for 1922 to 1929 (Fig. 54). Olives are grown quite extensively in the southern half of Spain, but only two small areas have notably heavy production, those near Seville and Barcelona, already mentioned. Many of the trees are several decades old and some are several centuries old and are very decrepit. In recent years, however, there has been much grafting of select varieties upon the ancient trunks, and the small vigorous young shoots growing from short trunks three or more feet in diameter give many orchards a strange appearance.

Citrus Fruit.—In respect to oranges, as with olives, Spain contains the area of most intense European production. Near Valencia something like 40,000 acres are planted to oranges, with a smaller area in lemons (Figs. 53, 54). For the whole of Spain there were in 1928 about 22,000,000 orange trees and 1,000,000 lemon trees. The citrus trees are all irrigated, but most of the olives receive only the run-off from the adjacent slopes.

Cork Oak.—Another crop requiring special mention is cork. Portugal produces nearly one-half of the world's supply and Spain over one-fourth. Southern Portugal and the southwestern and the northeastern parts of Spain yield most. The cork is grown without irrigation in most places, and few of the trees were planted. The Portuguese cork production was 220,000,000 pounds in 1928 and formed a leading export, one-ninth by value of all Portuguese exports on the average, and one-twelfth of Spain's (Fig. 290).

Sheep.—Many sheep are raised, about 20,000,000 in Spain, and 3,500,000 in Portugal. Spain has more sheep in proportion to the population than any other European country except Bulgaria, though in proportion to area it ranks below Britain and Italy, as well as below the Balkan states, which have four times as many (Fig. 314). Spain has long been famous for its merino wool. The cold nights, characteristic of the dry plateau and of the drier portion of the lowland as well, have encouraged the production of a heavy fleece on the sheep and the use of woolen clothing and blankets by the people. Blankets are often worn over the shoulders by the farmers going between the villages and the distant fields in the early morning and late evenings, as well as by the shepherds.

Other Animals.—Next to sheep, the ass and mule are the most important domestic animals. Iberia has over 3,000,000 of these beasts of burden, 1 to each 8 people, or about 14 per square mile. The Balkan

Peninsula is the only region with more asses (Fig. 313). Some fine strains are reared in Iberia and some are exported to the United States and elsewhere for breeding purposes. The distribution of asses and mules is fairly uniform over the peninsula, for the drier regions, where little else can be grown, still can raise these hardy beasts. There are few horses in Iberia, and, although there are about 4,400,000 cattle, they are relatively scarce except in the humid portion of Spain and Portugal. Two-thirds of the area of Iberia has only about 1,000,000 cattle, or about 7 per square mile. By contrast, Great Britain averages 100 per square mile and the Netherlands, Belgium, and Denmark each about 165 per square mile, or nearly twenty-five times as many as are found in most of Iberia. Swine, likewise, are mostly confined to Portugal and western-most Spain, the more humid portion where corn is grown. About



FIG. 282.—Fighting bulls grazing in the rainier northern part of Spain.

three-fourths of the peninsula has only about 7 swine per square mile, while Germany has 160 and several of Germany's neighbors each about 125. The total number in Iberia is about 6,000,000.

MINERALS

Mercury.—The famous Almaden mine of south central Spain has yielded a large share of the world's output of mercury for centuries. In 1913 it yielded about 35 per cent, in 1926, 38 per cent, and in 1928, over 40 per cent. Furthermore, there are large reserves of the ore. Although Spain was surpassed by Italy in the years 1923 to 1926 in the output of mercury, this was possible only because Italy annexed the important mercury mines of Idria, formerly in Austria, nearly doubling her output. Since 1926, however, the Italian output has declined and Spain has regained supremacy.

Other Minerals.—Spain, in 1928 produced 7.1 per cent of the world's lead, 3.2 per cent of the iron ore, 3 per cent of the copper, 2.8 per cent of the zinc, 1.3 per cent of the potash, and 7.4 per cent of the superphosphate. The lead comes chiefly from the southeastern province of Jaen between the Sierra Nevada and Sierra Morena. The copper comes almost exclusively from the extreme southwestern part of the country near Huelva, and the zinc from near the south coast of Murcia and from near the north coast of Santander. The iron ore comes chiefly from the north coast near Bilbao (Fig. 70), with a lesser amount from near the south coast (Fig. 283).

Foreign Control.—As the chief mines of Spain are owned and managed by British or French interests who make most of the profit from them, their activity varies sharply with the demand for their products, and

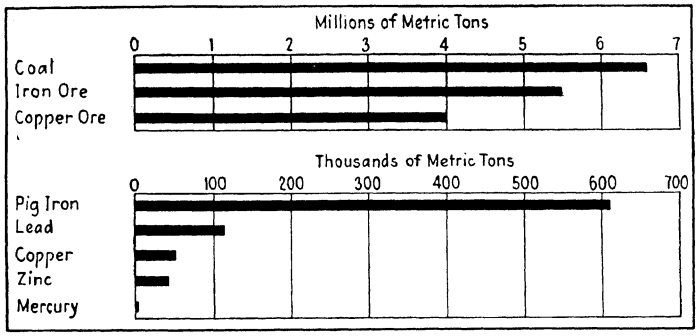


FIG. 283.—Spanish coal and metal output in 1928.

consequently their output varies radically. For example, more than half again as much iron ore was produced in 1928 as in 1926, but in 1929 the output was less than half that of 1926, and in 1930 it was less than a third. The output for 1928 of various mineral products is shown in Fig. 283.

MANUFACTURING

Although a high protective tariff prevails in Spain (see the tariff walls, Fig. 135) relatively little manufacturing is done, except of cotton goods, for domestic consumption, at Lisboa, and especially at Barcelona. There were some 115,000 workers in Spanish cotton mills recently, some 27,000 in woolen mills, and some 3,000 in silk mills. Some 20,000,000 pounds of raw silk were produced recently, chiefly in the southeastern province of Murcia. Bilbao, in addition to manufacturing approximately 500,000 tons of pig iron produces some steel and does some shipbuilding. Considerable salt is obtained by the solar evaporation of sea water near Cadiz and also in southern Portugal. Olive oil is extensively rendered at Seville. The chief industrial city by far is Barcelona where in addition

to the textile mills and the manufacture of numerous miscellaneous items, some electrical machinery is made. Barcelona receives much power from hydroelectric plants in the Pyrenees. The existing hydroelectric plants of Spain had a capacity of 1,000,000 horsepower in 1929, about one-fourth of the estimated total water power of Spain. Esparto grass plaiting is carried on locally on the southern part of the plateau. Esparto grass, a native of the drier areas, formerly was gathered extensively for paper manufacture.

FISHERIES

With so large a population living near the coast as is present in Iberia, and with a large demand for fish encouraged by the Catholic proscription against the use of other meat on numerous days, a considerable development of the fishing industry is to be expected. In Spain some 130,000 men are employed in fishing and in Portugal the fisheries are next to agriculture in importance and yield about one-fifth of the exports by value. The most important sections are near the northwest and southwest corners of the peninsula, and the chief fish caught are the sardines and tunny.

CITIES

The cities of Iberia having more than 100,000 people with their approximate 1929 populations, are:

City	Population	City	Population
Madrid	820,000	Malaga	160,000
Barcelona	770,000	Zaragoza	155,000
Lisboa	530,000	Murcia	155,000
Valencia	370,000	Bilbao	150,000
Porto (Oporto)	225,000	Granada	110,000
Sevilla	216,000	Cartagena	100,000

Of these 12 cities 9 are seaports; Murcia is only a short distance from the sea, on a river which is navigable that far for small boats; and Zaragoza is on the Ebro River at the junction of the railroad across the central Pyrenees and the main line from Barcelona to centrally located Madrid.

Of the 20 cities of Iberia having populations of 40,000 or more, only Madrid, Granada, and Valladolid are at an altitude greater than about 500 feet. Madrid is at 2,100 feet and the others at 2,200 and 2,300, respectively.

COMMERCE

Spain imported commodities valued at about $500,000,000 for the average year from 1923 to 1929. The chief items and the approximate

percentage they formed of the whole and the chief nations sending them are shown in Figs. 284, 285.

Spain exported commodities valued at $350,000,000 for the average for 1923 to 1929. The chief items and approximate percentages they formed of the whole and the chief countries receiving them are shown in Figs. 288, 289. The chief items of the Spanish trade with the United States in recent years are shown in Figs. 286, 287.

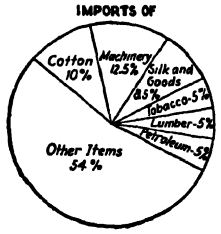


FIG. 284.

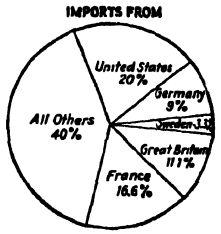


FIG. 285.

FIGS. 284 and 285.—Chief Spanish imports 1923 to 1929 average and the countries sending them.

Portugal's exports and imports had average values of about $40,000,000 and $105,000,000, respectively, for 1925 to 1928. The chief imports were cotton, wheat, sugar, and automobiles. Additional significant facts as to the foreign trade are shown in Figs. 291, 293.

CONCLUSIONS

Handicaps. *Climatic.*—Iberia's handicaps include the great uncertainty of rainfall in most of the area, with consequent sharp fluctuations

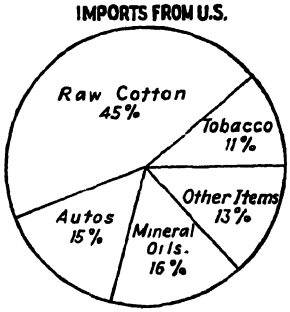


FIG. 286.

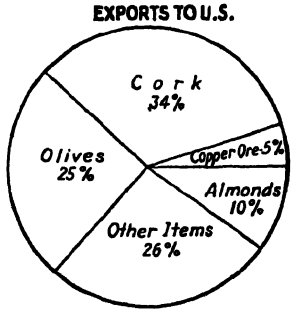


FIG. 287.

FIGS. 286 and 287.—Spanish trade with the United States, approximate averages for 1925 to 1929.

in the yields of crops (Fig. 33); the extreme dryness of the air during the hot days; the large amount of dust toward the close of the long rainless summer; the cold nights.

Topography.—Another handicap is the difficulty of railroad construction from the coast up onto the steep-sided plateau or across the numerous

mountain ranges. Spain has only about 9,800 miles of railroads and ranks about twenty-seventh among the nations in ratio between railroads and population and eighteenth in proportion to area.

Most of the hauling, even of such bulky commodities as unthreshed grain, is done still on the backs of donkeys (Fig. 82). Roads are very scarce and communication is inadequate.

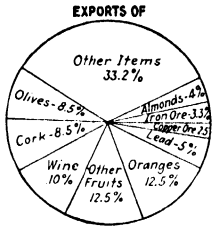


FIG. 288.

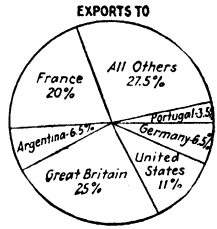


FIG. 289.

FIGS. 288 and 289.—Chief Spanish exports and the countries receiving them, average 1923 to 1929.

Conservatism.—An additional handicap is the conservatism of the people, more than half of whom do not read or write, do not know what is going on elsewhere and care little, and therefore do not take full advantage of inventions and discoveries made elsewhere. The per capita mail of Spain is only one-fifth of that of France and one-eighth that of Great Britain.

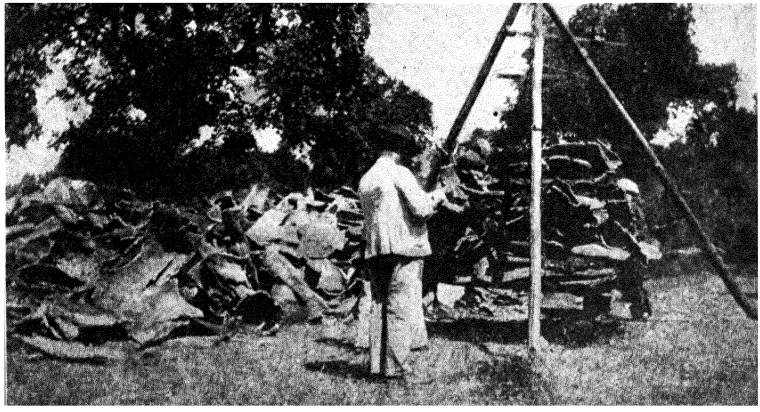


FIG. 290.—Weighing Portuguese cork.

Another example is that although dry farming has been practiced for centuries in Spain, the light tractor, so helpful in the extensive type of farming most successful in a climate as uncertain as that of Spain, has scarcely been introduced.

Large Estates.—There are many large estates. For example, one-third of the state of Cordoba belongs to 176 proprietors who have an average of 2,246 hectares (5,547 acres) each. Much of the better land of the country is held in large tracts, many of which belong to the Catholic Church and pay no taxes.

Disdain of Labor.—There is, moreover, a hearty disdain of manual labor and only those who are compelled by dire necessity do physical work. Commercial activities are also in popular disrepute, as well as scientific research and other scholarly pursuits.

Bull Fights.—Another unfortunate condition is the relatively large amount of the better land devoted to the rearing of fighting bulls, and the considerable fraction of the energy and income of the people that is expended unwholesomely in attending bull fights and participating in lotteries.



FIG. 291. FIG. 292. FIG. 293.

FIGS. 291 to 293.—Portugal's foreign trade, approximate average 1925 to 1928.

Water Shortage.—Geological conditions are favorable for deep wells in many regions and in many places flows might be obtained, but very few wells have been drilled. An abundance of deep wells would make possible scattered farm homes instead of compact villages such as now prevail. Much time is wasted in going between village home and distant field, and the fields are not cared for as well as they would be if the people lived on the farm. Likewise, in such villages as those in Spain, life is probably less wholesome than is life on farms (Fig. 277). If a dependable supply of water were obtainable from wells it would also not be so necessary as now to drive all the sheep to the mountains in summer. The area irrigated could be much increased by impounded waters. At present there is almost no storage of water in reservoirs, although there are many sites where small reservoirs could advantageously be built.

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CHAPTER XXIV

ITALY

Rebirth of an Old Nation.—Italy is often referred to as old historically. Yet the nation as we know it today is very youthful. The Romans, it is true, unified the country twenty centuries ago and from it as a base they conquered the lands about the Mediterranean and even beyond. Yet, after the fall of Rome, petty quarrels finally divided the country into many small states, easy prey to more powerful neighbors. Some of these Italian city-states, however, such as Venezia, Genova, and Firenze became famous in the Middle Ages not only as commercial and political centers but also for their art and culture.

With the abandonment of the Mediterranean route to the East following the discovery of the route around Africa and with the industrial revolution, the economic center of gravity shifted to northwestern Europe. Italy, formerly near the center of the Western World, was now left on its margin. Neither the opening of the Suez Canal, the tunneling of the Alps, nor national unification restored her former power. A late comer among the modern nations she fared even worse than Germany in the matter of colonial territories, and though she was one of the victors in the World War her material gains were of almost negligible importance. Recently, however, the country has attempted to lift herself out of the class of Spain, Portugal, and Turkey by a more aggressive foreign policy and industrial expansion.

PHYSICAL DIVISIONS

The Northern Plains. *The Economic Center of Gravity.*—Fertile, accessible, favored with a temperate climate and so situated as to be easily irrigated, the plains of north Italy form one of the garden spots of Europe. In addition, the recent development of long-distance electrical transmission has placed within reach the abundant water power developed in the Alpine zone, with the result that recently manufacturing has also assumed an important role. Because of these favorable conditions this northern section, though occupying only 15 per cent of the area of Italy, provides homes and a livelihood for almost 40 per cent of the population.

North vs. South Italy.—Italy consists of two regions contrasting sharply not only in their physical setting but also in the economic and social conditions to which this has in each case given rise. In the north

are the plains of the Po, whose surface features, climate, and human activities approach those of northwestern Europe. To the south are peninsular and insular Italy, dominated by mountains, the Apennines on the peninsula and lesser ranges in Sicilia and Sardegna, with a climate typically Mediterranean and a population mostly illiterate and poor.

Origin of the Northern Plains.—The plains of the Po are a northwestward extension of the Adriatic basin and were, in recent geologic times, an arm of that sea. Streams from both Alps and Apennines carrying down enormous quantities of sediment filled up the trough, forming a great piedmont plain. This extension of the lowland at the expense of the Adriatic is still in progress[1]—indeed, at an increasing rate—but, with confinement of the lower stream channels by dykes, aggradation is largely restricted to the stream bottoms and to the delta rather than, as formerly, distributed over a broad flood plain. The upper Po is an eroding stream, its waters swift and suited for use in irrigation and power, while the lower portion is aggrading its bed to such a degree that for hundreds of miles both it and its tributaries are restrained by dykes. Seepage and floods have produced extensive swamps in this section, so that drainage becomes a serious problem.

The Po.—While the Po and its tributaries are useless for navigation purposes and are rather difficult to cross, they have been of inestimable value in opening routes through the Alps. Because of the steep gradient of these slopes, crossing them to northern Europe is practically impossible except where river valleys lead to passes. From west to east are several famous passes, Mount Cenis reached via the the Riparia, St. Bernard via Dora Baltea, Simplon via Toce, St. Gotthard via the Ticino, and the Brenner via the Adige. All but the last named are tributaries of the Po.

The Italian Lakes.—The beautiful lakes which mark the southern border of Alpine Italy were formerly fjords along the margin of the great inland sea which covered the plains. During the Ice Age valley glaciers descended the southern Alpine slopes and deposited great crescent-shaped terminal moraines across the open ends of the fjords. Subsequently they were transformed into lakes (Fig. 294). As might be expected from the way in which they originated, the lake basins are long, narrow, and deep, varying in depth from 900 to 1,800 feet. Their shores are precipitous, their waters a deep blue, and the marvelous beauty of the lakes and their surroundings attract yearly thousands of visitors. Their use in the regulation of the flow of the rivers is of great importance in connection with flood control, water-power develop-

[1] Marinelli Olinto estimates the average annual increase from 1823 to 1893 in the Po delta as from 173 to 175 acres or a total for the period of 20 square miles. A. Geikie estimates that the total Po basin is being lowered on an average 1 foot in 729 years. High parts are lowered; low parts, extended and raised.

ment, and irrigation. The Alpine slopes, now within the Italian frontier, are of especial interest to the people of the plains, and the abruptness of their gradient is of strategic importance, as Italy has many times found to her cost. The descent of the invader, attracted by the fruitful plain, was easy, defense against him, difficult. Consequently the lowlands were for centuries in the possession of peoples from beyond the Alps, so that not the lowlands but the Apennines marked the frontier. Since the World War the boundary has approximately followed the Alpine divide and Italy has a natural line of defense along her Austrian border.

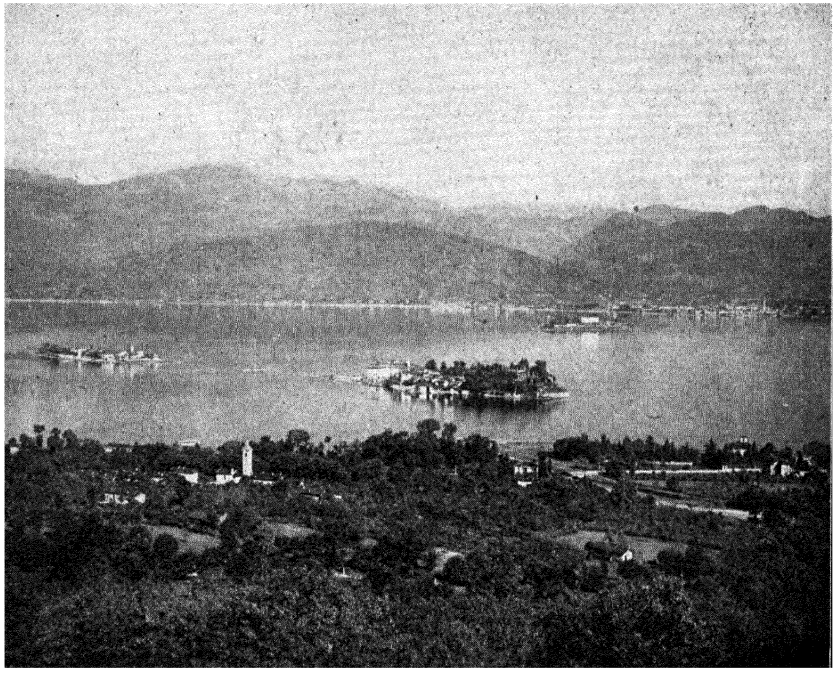


FIG. 294.—Lake Maggiore. (*Courtesy Italian Tourist Association.*)

Climate of the Plains.—Almost completely enclosed by its mountain rim, the northern plain has a climate much more continental than that of the peninsula which is exposed to sea influences. In marked contrast to sunny Tuscany, or even the south-facing Alpine slopes, the north flanks of the Apennines suffer much from winter cold. In general the plains have heavy snows, with soil frozen from mid-November to the end of March. Milano has about 2 months of frost. Summers are hot with moderate precipitation. Torino receives 34.5 inches; Padua, 33.9 inches.

Cities of the Northern Plain.—The main cities of the plain are located primarily with reference to the routes through or over the surrounding mountains. The rivers do not offer attractive sites and no important

city is to be found on the middle or lower course of the Po. The original location of the larger centers was primarily for trade, and those so placed as to command the traffic between the plains and the regions beyond the mountain barrier enjoyed the greatest prosperity. Thus Torino commands the approaches to Mount Cenis; Milano the Simplon and St. Gotthard; Verona the Brenner, and Bologna the Poretta.

Venezia is one of the world's most famous cities. Its unique site,[1] its historic buildings, and its art treasurers serve to attract some 800,000 tourists annually; in fact, the city derives its chief income as host to this throng of visitors. Originally settled by a group of refugees fleeing before the Hun invaders, the inhabitants turned to the sea for their livelihood. The site of the city was well suited for trade. It not only commanded the chief gateway of the mountain-girt plain of the Po, but it lay just opposite the lowest pass over the Alps. For centuries it was the middleman for the rich products from the East which here broke bulk to go via Verona, the valley of the Adige, over the Brenner Pass to Augsburg, Nürnberg and Regensburg (Ratisbon), which cities in turn passed them on to northwestern Europe. Incidentally, her contact with the artistic goods and luxuries of the Orient stimulated the manufacture of similar articles within her own shops, goods for which her visitors provide a ready market.

The interruption of this profitable trade and the diversion of the traffic around Africa spelled ruin for Venezia. Even the opening of the Suez Canal and the building of the Alpine tunnels failed to restore her trade, for it is far cheaper for ships to complete the journey via Gibraltar than to send their cargoes over the Alps. Furthermore, the harbor, because of its shifting coast line and shallows, is unsuited to modern shipping. As a port its present importance is purely local, although a strong effort to revive its shipping is being made by the construction of a harbor and a port on the mainland opposite. In spite of its location to the north of the Po mouth, whose silts are carried south by the currents, the fate of Venezia may be read in that of Ravenna, Speria, Adria, and Aquileia, former ports, now far inland, which have passed through the same cycle of change. Human effort may temporarily delay the inevitable, but her maritime supremacy is a thing of the past.

Milano and Torino are great industrial centers. Both not only occupy strategic commercial positions but in addition are near cheap hydroelectric power. The former is the greatest manufacturing city of Italy, specializing in machinery and textiles, and rivaling Lyon as the premier silk center of Europe. Torino, on the upper Po, has become a sort of "Italian Detroit."

[1] The city occupies 122 islands joined by 350 bridges and intersected by some 176 canals over which an additional 410 bridges have been built. A railway bridge about 2 miles in length joins the city to the mainland, while communication about the city was formerly mainly by canal but now is chiefly by narrow streets and bridges.

THE PENINSULA

The Apennines.—The Apennine "backbone" with its adjacent foothills occupies the greater part of peninsular Italy. The axis of the range forms in the center of the peninsula a great bend skirting the Adriatic with the ends reaching the western coast at the "hip" and "toe," respectively. Made up of parallel limestone ranges of considerable height it not only seriously limits the area of cultivable land but constitutes an important commercial barrier between the two coasts.

At the north the mountains rim the Gulf of Genova as a true coastal range. Though barring access to the interior, they shield the coast from the north winds, giving both climate and vegetation a semitropical aspect. The Italian Riviera here is an extension of that of France, and like it, an attractive winter resort. Although farther north than Portland, Maine, its genial climate allows the growth of such fruits as the olive, orange, and the lemon.

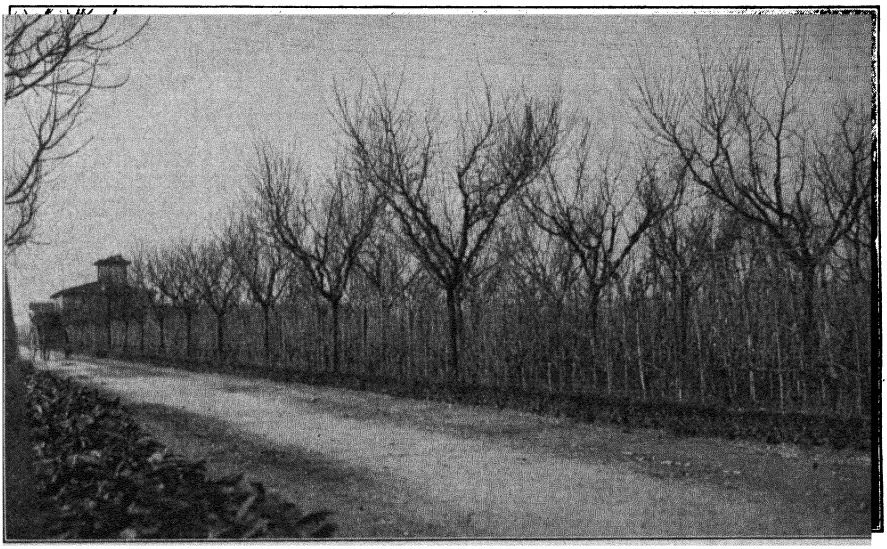
Genova, a Great Mediterranean Port.—Genova possesses the best harbor of the coast and fortunately lies opposite the convenient Bocchetta Pass (2,560 feet) leading to the Po Valley. This route, since replaced by railway tunnels, made the port the most accessible outlet for the rich and productive basin of the upper Po in the environs of Milano. The Simplon, St. Bernard, and St. Gotthard expanded the hinterland of Genova into Switzerland as well as into adjacent Germany. The bulky raw materials and fuel needed by these regions comes via the sea route to Genova; but, since their manufactures go overland, the tonnage movement in and out of Genova is very unequal, the imports being four to six times as large as the exports. In spite of this unfortunate lack of balance and the troublesome topographic restrictions the city has grown rapidly and has in recent years (1924 to 1925) ranked first among Mediterranean ports. In contrast to its old rival, Venezia, it is modern and progressive although far less picturesque.

The Plain of West Italy.—Within the great bend of the Apennines, *i.e.*, west-central Italy, lies a section which in importance ranks second only to the northern plains. It is of varied relief, but mostly hills and mountains, projecting spurs from the Apennines. Within its borders are, however, three small plains areas of extraordinary activity, each supporting an important city.

The Arno Valley.—At the north is the valley of the Arno with Firenze in its midst. Here is to be found agriculture almost as intensive and progressive as in Holland, with vineyards, vegetables, and olives all competing for the same ground (Fig. 295). The manufacture of wine, olive oil, and art goods also plays an important role in the local economy, while the long-stemmed wheat serves as a basis for the famous Leghorn straw braid.

Firenze is one of the world's most illustrious art centers and its world-famed galleries, containing many originals by great artists, are visited by thousands of tourists every year. The city is on the best route leading from the lower Po basin, over the Apennines to south Italy.

The Campagna.—The second plain lies in the central part of the western slope. Though productive and well populated in ancient times, the Campagna has for centuries been largely a pasture land deserted even by shepherds in summer, when malaria is especially bad. Recent efforts of the government are, however, rehabilitating the region.



FIGS. 295.—Three crops from the same soil near Firenze, Italy. (1) pluma, (2) grapes, (3) vegetables. Soil is valuable, hence the three crops. This particular soil is river bottom type and very rich. (*Courtesy W. V. Cruess.*)

The Tiber, with Roma spread over its seven hills, occupies the center with the city dominating the region. In ancient times the hills gave protection not only against invaders but river floods as well. In later years they have also made of the city an island of refuge in the malarial plain surrounding it. Its central position in the peninsula, at the cross-roads of routes leading in all directions and at what was originally the head of navigation on the river, has contributed greatly toward making the city a center of art, civilization, and power.

Neapolitan Plain.—A third focus of activity is in the south around the Bay of Napoli. Soils from weathered lava, famous for their fertility, have made the region about Vesuvius a garden. Napoli, on the beautiful bay of the same name, long was the largest city of Italy and, by its recent capitalization of cheap labor and hydroelectric power, bids fair

to remain an important industrial center. Like Firenze and Roma it is a nodal point for routes leading not only north and south along the coast but also across the central mountain chain to Brindisi.

Eastern Plain Handicapped.—The westward swing of the Apennines into the "toe of the boot" leaves the "heel" with considerable plains area. On the leeward side of the mountains it unfortunately suffers much from drought. Wheat, olives, and the vine are raised, the high gluten content of the grain making it especially suitable for macaroni.

THE ISLANDS

Sicilia, the largest of the Mediterranean islands, is a link in the Apennine-Atlas mountain chain which, within comparatively recent geologic times, formed a continuous land connection between Europe and Africa. Crustal movement is, indeed, still active in this region and earthquakes and volcanic eruptions are frequent. In 1908 one of the most destructive earthquakes of recent times rocked Sicilia and adjacent Italy, killing approximately 100,000 people and leveling the city of Messina. Mount Etna, the highest volcano of Europe, is the southernmost of the active cones in the chain which reaches from Elba to Messina. Stromboli, in the Lipari group north of Sicilia, has long been known as "the lighthouse of the Mediterranean" because the clouds above it are almost always illuminated at night by the light from the lava in the crater below.

In spite of its mountainous surface, the constant menace of volcanoes and earthquakes, ravages of malaria and the frequent droughts, Sicilia has a fertile soil, a sunny climate, and a highly strategic location. Its central position in the Mediterranean has long made the island a meeting ground between forces from north and south, from east and west, and its history is a chronicle of centuries of strife—of a succession of invasions, conquests, revolts, and oppressions interspersed with periods in which there developed a high stage of culture and civilization. Its present population of over 4,000,000 makes it one of the most densely inhabited agricultural areas of Europe (over 450 per square mile).

The economic and social conditions prevailing on the island leave much to be desired; stagnation and inertia have characterized the agricultural situation. Although drought is the most serious handicap, until recently little progress had been made in irrigation. Though climate and soil favor highly specialized fruit and vegetable growing, careless and unscientific methods and lack of cooperation resulted in failure to cope with insect pests and diseases. Added to this was a transportation system woefully inadequate and poor. Latifundia, absentee landlordism at its worst, and a poorly paid peasantry, for the most part landless and illiterate, always on the verge of starvation have been outstanding features of their agrarian economy. It was such condi-

tions that each year forced out thousands as emigrants and provided a fertile field for organized lawlessness and crime for which the isolated sections of Sicilia and southern Italy were long notorious.

Sardegna, although about the same size as Sicilia, has only one-fifth as many people. It is probably the most sparsely populated and backward of any part of Italy. Nine-tenths of the island is mountainous, and, although the plains are fertile, malaria is rife and drought is the rule. Agriculture is primitive; the forests and fisheries, as well as the lead and zinc deposits, are practically unexploited. The recent completion of the Tirso power and irrigation project which will water about 50,000 acres and supply cheap energy for mining is the most hopeful sign in a rather discouraging situation.

AGRICULTURE

Agriculture Progressive in North Italy.—The plains of the Po are often referred to as "the garden of Europe" and in their productiveness fully justify that title. In comparison with peninsular Italy they are richly endowed, but even here the great fertility is largely the result of arduous labor of many generations who have leveled, irrigated, and fertilized, or, in the lower basin, drained and reclaimed the marshes. "It has been estimated that in south Lombardy the irrigation system, which is the basis of the rich agricultural output there, represents an outlay of at least $200,000,000 on an area of about 2,225,000 acres, or an average of about $81 per acre."[1] Lombardy and Piedmont, of which one-half and one-third, respectively, in 1911 were under irrigation, together had 72 per cent of all the irrigated land in Italy (Fig. 296).

While the soils are generally fertile, the methods, crops, and value of the output vary much from one section to another. Thus in the west the farmer is largely dependent upon irrigation while to the east drainage is more important. North of the Po agricultural development is much farther advanced than to the south, the rivers are more regular, the greater distance from the mountains gives a gentler gradient, and the exposure is toward rather than away from the sun. As a consequence there is a marked contrast between the north slope with its prosperous looking homes, its broad fields of wheat, corn, or rice marked off by mulberry hedges, all well cultivated and irrigated, and the region to the south of the Po where the same crops may be found but are generally less prosperous, the soil less fertile, irrigation rarer, and the homes poorer and less well kept.

Agricultural methods as practiced in the northern plains approach those of northwestern Europe. Irrigation and drainage, intensive cultivation with a wide diversification of crops, dairying and forestry, all indicate a highly developed agricultural region for which a favorable

[1] HOBSON, A., "Agricultural Survey of Europe: Italy."

climate, particularly a well-distributed rainfall, fertile soil, level topography, abundant water for both irrigation and power, together with a large local market in the industrial population have provided a favorable setting. In spite of a dense population and necessarily small-scale operations its per capita production of the staples, *e.g.*, cereals, potatoes, and legumes, is greater than in central or southern Italy, this, as well as production per acre, declining generally as one goes southward.

Wheat.—Italy is a nation of wheat eaters both as bread and macaroni, its per capita annual consumption of about 7.5 bushels being almost as much as in France. For this reason and also because of its ability to withstand drought, wheat is an important crop throughout the country.

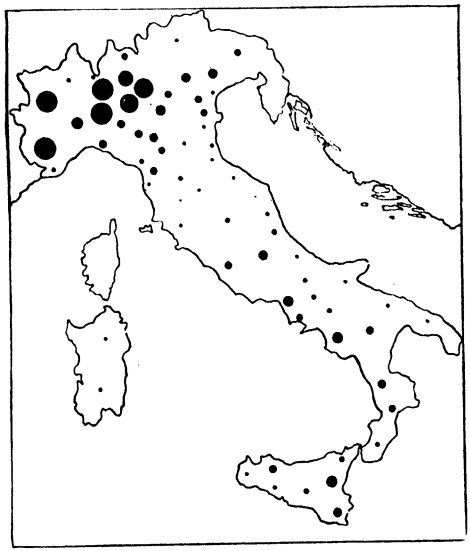


FIG. 296.—Distribution of irrigation in Italy. (*Data from U. S. Department of Commerce.*)

Italy, in fact, devotes a larger proportion of its cropped land to wheat than does any other European country, even growing considerable quantities upon the slopes of the Apennines.

Though found in every province, the map shows the bulk of the crop to be produced in the north and northeast, the northern plains alone accounting for 40 per cent of the total, where its greater relative importance is due mainly to better yields (Fig. 173). Thus while Sicilia shows a greater acreage, extensive methods and less favorable climatic conditions make its total contribution to the national breadstuffs much less. Although widely grown in the north as an intertilled crop between rows of vine or mulberry, the acre yield averaging 21.7 bushels is about 75 per cent larger than in southern Italy where methods resemble those of Spain.

Although ranking third among European countries as a wheat producer, the dense population requires imports equal to from one-fourth to one-third the domestic output. In spite of increasing population the wheat acreage and production, have been declining, especially in southern Italy, and the government has conducted a vigorous campaign to increase the output. It is believed, however, that any augmented production must come from increased yields per acre rather than from any extension of the area planted, unless the nation is willing to go beyond economic limits in order to attain self-sufficiency. Improved methods including fertilization and irrigation, would do something for southern Italy in improving the yield but weather conditions are responsible for widely fluctuating returns. For example the wheat *acreage* for Italy in 1922 and 1923 was practically the same but the *output* in the latter year was 40 per cent greater.

Corn.—Corn ranks next to wheat among Italian cereals with an acreage about one-third as large. The moisture requirements naturally restrict it, except where irrigation is possible, to the northern plains almost three-fourths of the total production being from that region. The entire crop of the country is about the same as that of prewar Rumania or almost twice that of Russia. Corn in Italy is not only used as stock food but also for human consumption, especially among the poorer farming population.

Hay and Forage.—Of all the agricultural land about one-third is devoted to forage crops, and of the latter some three-fourths is in natural pasture. This latter, approximately 16,000,000 acres or one-fifth of the whole land area, is an indication of the extent to which mountains and aridity have rendered the land unsuited for tillage, since practically no acreage capable of cultivation is left in grass. With the rise in the agricultural wage scale, considerable marginal land of questionable value for cultivated crops will undoubtedly revert to pasture. As a whole, the total gross value of all the forage crops is actually greater (1921 to 1923) than that of the cereals or the vine.

While areas of secondary importance are found in Tuscany and near Napoli, the northern plains, with their more favorable rainfall regime, are the important forage region. Here considerable areas including the upper portions of the alluvial fans, the lower Alpine slopes, and the undrained or poorly drained flood and delta lands are better suited for such use than for grain or root crops. In the Alpine valleys and also in the basin proper there is much permanent meadow. Considerable forage is raised in rotation with other crops, in part under irrigation, and yielding upward of four crops annually. These "water meadows" serve as the basis of an important animal industry.

Other Crops.—Hemp and sugar beets are raised on a small scale, chiefly in the lower Po basin. Italy ranks next to Russia, though a

poor second, as a hemp producer and this is one of the few textile raw materials exported. Ferrara and Bologna districts account for the bulk of the hemp crop.

Italy is the only European country producing rice in large quantities and it is the only cereal of which she is a regular exporter. The chief producing area is near Milano. The acreage (about 351,000 in 1927)

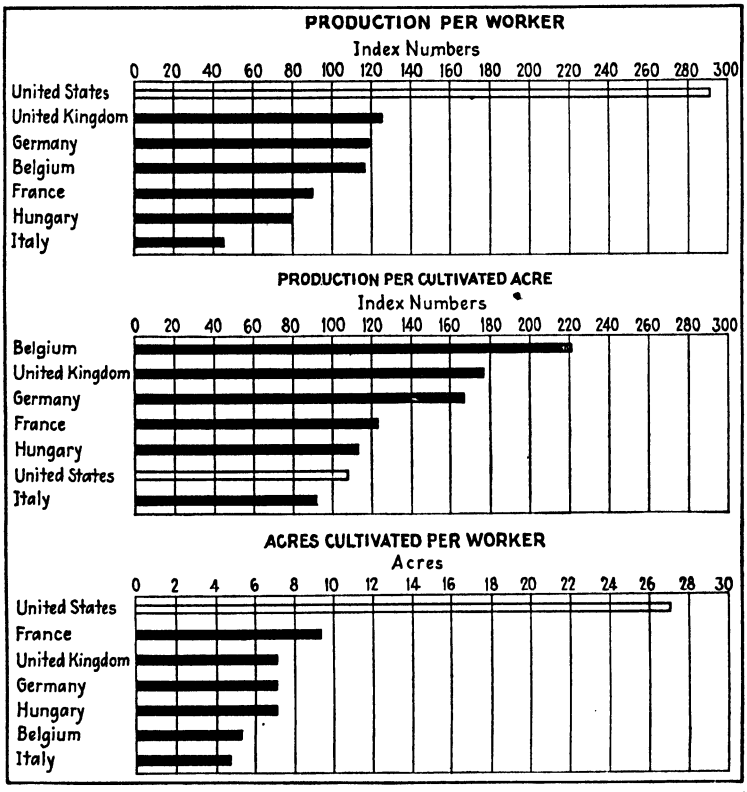


FIG. 297.—Three significant graphs whose comparison brings out interesting relations. The large production per acre for European countries as compared with the United States is due chiefly to a large use of fertilizer and labor. Note the comparatively poor showing of Italy, a land of dense population, limited agricultural land, but of small production per acre. Drought, mountains, and poverty combine to produce yields actually lower than those of the United States with its extensive methods. (*U. S. Department of Agriculture.*)

has been declining for the past half century, though improvements in yield have kept the total output about the same.

Animal Industries.—The importance of hay and forage crops in the north is naturally accompanied by a corresponding emphasis on cattle raising. The most intensive dairy district lies in the upper Po Valley. Since in Italy olive oil is regularly used in place of butter, cheese is the chief dairy speciality. Certain brands, *e.g.*, Gorgonzola and Parmesan are widely famous. In general meat is little used, though its

average consumption is growing, its place being taken by the more economical cheese, olive oil, legumes, and fish. The practice, in peninsular Italy, of living in villages often at a considerable distance from the farm creates a general demand for animal transport, so that cattle not only serve for food but are also extensively used as draft animals; indeed in that part of the country, this is their chief use. With the limited summer pasture in South Italy, the goat and sheep replace the cow for milk, and for the same reason the mule and ass largely replace the horse. Few swine are raised, those which are found being kept to dispose of household wastes, findings in field and forest, or skimmed milk from the cheese factories.

The large expenditure of human labor and the limited use of animals characteristic of Europe in general is, in Italy, shown in its extreme form. Each agricultural worker in Italy averages 4.7 acres of cultivated land, an amount even less than highly industrialized Belgium (5.3), and only one-half that of France (9.3) (Fig. 297).

Backward Agriculture in the South.—The change in agriculture from north to south Italy is almost kaleidoscopic, methods in the south greatly resembling those in Spain and Portugal. In the foot of the boot and in the islands there is a semifeudal land system, large estates extensively operated, using primitive tools and a one-crop system. Here, so it is said, a wooden plow and a yoke of oxen constitute the main agricultural equipment of thousands, and farming methods remain essentially unchanged from the time of the Caesars.

This condition is in large part a consequence of the more difficult topographic and climatic conditions in the south. There the forest destruction is greater and the stream flow less favorable, rainfall distribution more irregular, and temperatures higher, resulting in more intense droughts which, in parts, last for seven months. During the summer the pastures of South Italy are brown and the roads are ribbons of white dust. Lack of pasture, limiting cattle production, has meant scanty animal fertilizers, which condition has led to soil impoverishment. Of course where irrigation is practiced the higher temperatures bring bountiful returns—even greater than in the north—but the area so treated is pitifully small and chief reliance is placed upon drought-resistant crops, especially the vine and olive.

The Vine.—In no other country is dependence upon the grape greater than in Italy (Fig. 298). It is estimated to contribute almost one-fourth of the total income of Italian agriculture and in value ranks second only to the forage crops. Approximately 5,000,000 people, or about one-third of the rural population, depend upon it for a living.

Less sensitive to cold than the olive, it is important, even in the Po basin, but for south Italy it is the crop par excellence. Vineyards cover both slopes of the Apennines and in Sicilia are planted up to an altitude

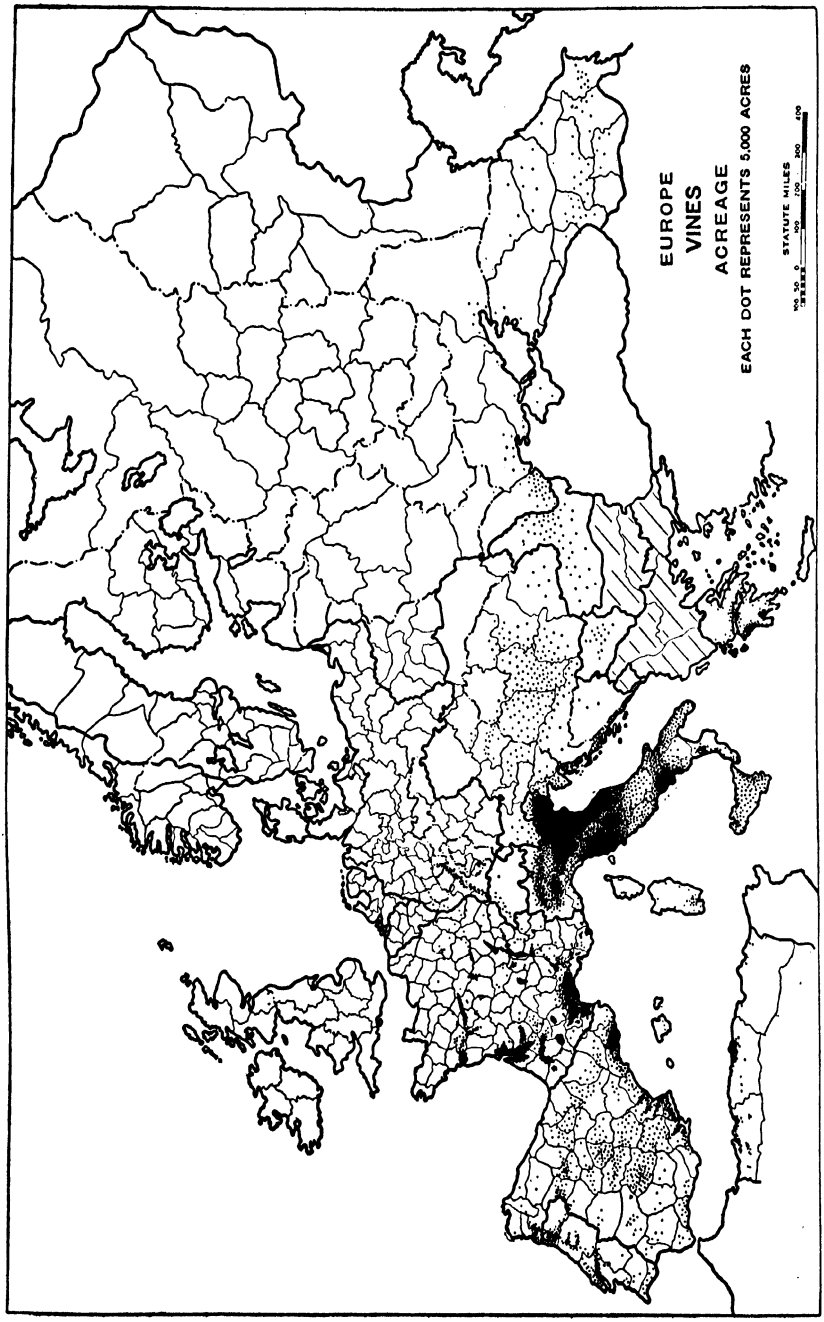


FIG. 298.—Italy of all countries is most dependent upon the vine. Although its acreage is larger, most of its vineyards have intertilled crops, so that the wine production is less than in France. Compare with Fig. 172. (*U. S. Department of Agriculture.*)

of 3,000 feet. Four-fifths of the Italian vine acreage represents mixed crops, the grapes being alternated with fruit trees which serve as their support, with grain frequently planted between the vine rows. The yield per acre of any one of these crops is correspondingly small. Thus though Italy has a larger area in vines, the actual yield of France is about 50 per cent greater.

A warm climate, poor water supplies, the need of something to render the common vegetable diet of bread, beans, salad, and oil more palatable, together with the abundance of grapes and the ease with which they may be converted into wine, have operated to make the per capita wine consumption in the Mediterranean countries high. Though found on even the poorest peasant's table it should be remembered that most of the Mediterranean wines are light, *i.e.*, of a small alcoholic content. The average per capita consumption of wine in the three leading producing nations of France, Italy, and Spain is estimated to approximate 48, 28, and 21 gallons, respectively. From the Italian yield there is an exportable surplus of only 5 or 6 per cent, chiefly to European countries.

Keen competition demands much improvement in quality and standardization of production before Italian wines may hope to hold profitable foreign markets. The area of viniferous grapes might well be reduced and replaced with table and raisin grapes, both of which are now insufficient for even the domestic market.

The Olive.—As is true of the vine, the olive is grown on a larger acreage in Italy than in any other country of the world. The custom of planting mixed crops upon the same fields, common in much of the country, reduces the yield, however, so that on the average the Italian crop is only about two-thirds that of Spain, the world-leading producer (Fig. 279). Of the total olive acreage of Italy only one-fourth is devoted exclusively to that crop, yet this one-fourth accounts for about one-half the total output.

The olive, most typical of Mediterranean crops, finds its most congenial home in south Italy and the islands, this section accounting for three-fourths of the country's production. Apulia, Calabria, and Sicilia are the important olive provinces, the first named possessing over one-half of the specialized olive acreage of Italy. In sections of Apulia, the heel of Italy, it is the staple crop around which the whole farm economy centers, in Bari occupying as much as 40 per cent of the productive land. In central Italy it is still a commercial crop of considerable importance—about one-fifth of the whole—while the north accounts for only about 4½ per cent of the annual output. Tuscany, particularly the Lucca section is famous for the high quality of its oil, while in Liguria a few olives are grown along the protected Riviera.

Unlike Spain, the cultivation of the olive in Italy is gradually declining. There has been a decrease in the area of specialized culture,

an increase in mixed cultivation. In general the insect pests and diseases and the careless methods characteristic of agriculture in southern Italy together with the crude practice of domestic extraction of the oil have operated to depress the industry. In recent years there has been a strong tendency toward concentration of the oil manufacture in a few large modern plants, with a product much more uniform and of higher grade. The price of Italian oil ranks next to that of France and above that of Iberia. Much is imported from the latter and from north Africa for further refining and blending. There is an opportunity for great improvement in the Italian olive industry, both in the cultivation of the tree and in the manufacture of oil, with little doubt that the production could be doubled without increasing the area. Suited to lands of little use for other crops and providing an ideal substitute for the dairy cow which finds the summer drought a serious obstacle, the olive will undoubtedly continue to be a significant factor in Italian agriculture,[1] an important item in the diet and in the foreign commerce of the country.

Citrus Fruit.—Sicilia with the adjacent mainland is one of the world's three principal citrus fruit regions (Fig. 54). The orchards are distributed in a crescent about the Tyrrhenean Sea, the more sensitive lemons predominating on the island, the oranges and mandarins on the mainland. The mountainous character of the region has led to the planting on steep slopes where bare rock is often terraced at enormous expense. Lemons as a whole constitute 60 per cent of the total output of Italy's citrus fruit, making that country the leading world producer. Over half of the lemon crop is marketed as extracts, concentrates, or some form other than fresh fruit.

FORESTS

Forests Deficient.—Reckless cutting of trees in the past coupled with a climate in which forest growth is naturally slow has left Italy, particularly in the south, with a serious deficiency in forest cover. Only one-sixth of the total area is wooded, a low average for a country 37 per cent of whose surface is mountains. In parts of the south *e.g.*, Apulia and the islands of Sicilia and Sardegna, the proportion forested is less than 5 per cent, while south Italy as a whole has less than one-half as much as the north. It was necessary to import one-half of her prewar wood needs to satisfy an unusually small per capita consumption. This lack of a wise forestry program with its consequent depletion of tree cover is particularly unfortunate in a country without coal or oil and dominantly agricultural, where topography and climate increase the difficulty of

[1] The average annual per capita consumption of oil for Iberia, France, and Italy is estimated at about 8 quarts. Italy had in 1914 a per capita butter consumption of only 2⅛ pounds, less than one-seventh of that of the United States.

soil conservation and where malaria control and water-power development are vital (Figs. 299, 300).

Ninety per cent of Italy's forest is made up of broad-leaf hardwoods—beech, oak, and chestnut leading—only the upper Alpine slopes and the highest Apennines possessing stands of conifers. Chestnut in central Italy and cork oaks, especially in Sardegna, are valued for nuts and bark, respectively, while beech and oak are favorites with the charcoal burners.

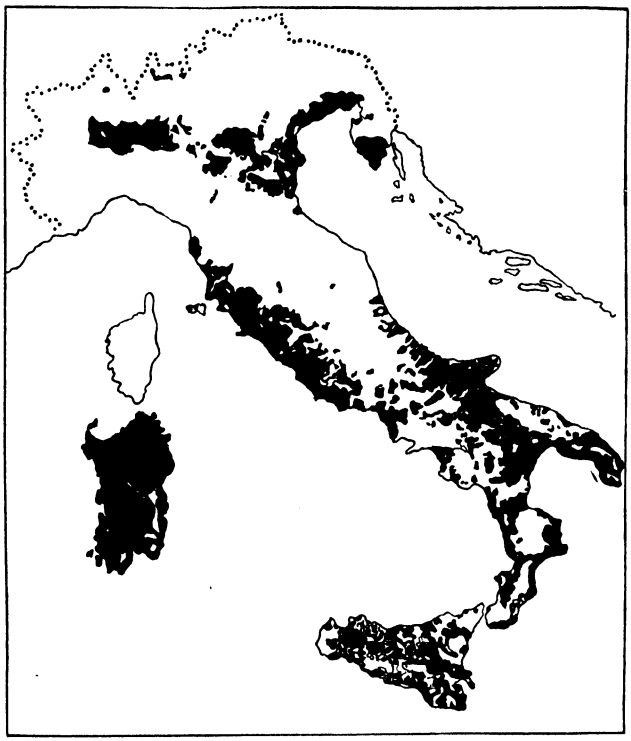


FIG. 299.—Malarial zones of Italy. Approximate boundaries in 1922. Note the close resemblance of malarial districts with those of plains. (*After Dr. Lucien Reynaud.*)

INDUSTRY

Industry Subordinate to Agriculture.—Although Italy was until recent years a nation of farmers, and even today has over one-half of the population directly dependent for its livelihood upon the exploitation of the soil, the past third of a century has witnessed a remarkable industrial development. The World War, with its restriction upon imports and at the same time with its enormous demands for manufactures, greatly accelerated a movement which is making of northern Italy an industrial region of no insignificant proportions.

Industrialization to Care for Population Increase.—For the explanation of this rapid growth one need not seek far. Considering its resources,

Italy is one of the most densely populated countries of Europe. Ribbed with youthful mountains and having considerable areas deficient in rainfall, to support its population of over 40,000,000 by agriculture alone is out of the question. Furthermore, population is increasing rapidly with an annual excess of some 400,000 births over deaths. Two solutions for the disposition of the surplus man power present themselves: emigration and industrialization. The former in the past served as the major safety valve of overpopulation. In the absence of an extensive colonial empire there has been a huge annual exodus to the countries

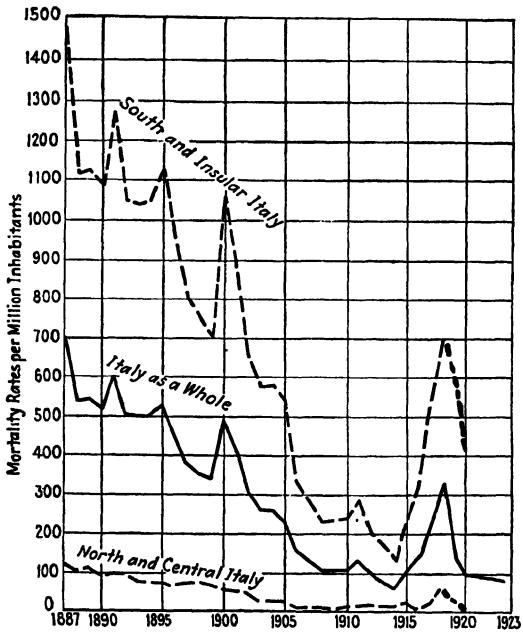


FIG. 300.—Italian death rate curves for malaria only. Note the rapid decline which has been accomplished by reclamation of poorly drained land and the increased use of quinine. In the south, higher temperatures, more irregular rainfall, and more backward social and economic conditions result in a higher mortality rate.

of the New World and to adjacent countries in the Old World. This situation goes far in helping to explain Italy's efforts in recent years to enlarge her colonial empire, to intensify her agriculture, and to expand her industrial activities.

Obstacles to Industrialization.—The unique character of Italian industrialism lies in the formidable nature of the obstacles with which it is confronted. Italy with scant supplies of the basic raw materials and still less of the fuels—two requirements the possession of at least one of which has usually been considered fundamental—is the least self-contained of all the great industrial nations of the world. Her industrial structure is supported instead upon the two pillars of an abun-

dant supply of comparatively cheap but efficient labor and an unusually rich endowment of water power.

Italy's reserves of coal, lignite, and peat are estimated to total only 340,000,000 tons, of which almost 90 per cent is lignite. Practically all of the coal mined comes from Istria in the territory newly acquired from Austria, a section whose reserves are estimated at only 13,000,000 tons. Unfortunately it is high in sulfur content and unsuited for many special purposes, including the making of metallurgical coke. The lignite is likewise of poor quality, having a heating value only one-fifth to one-third that of bituminous coal. The location of the deposits is also unfavorable, most of them being in the non-industrial central provinces.

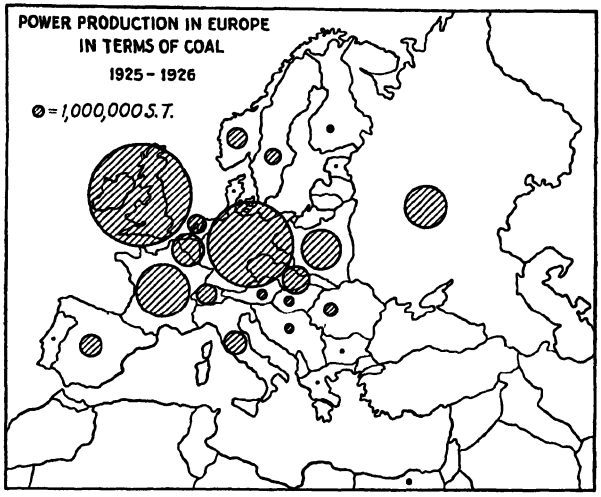


FIG. 301.—Note the importance of the coal-producing countries. Three countries accounted for about 75 per cent of the total power of Europe.

In the case of oil the outlook is even less promising, the production of 5,000 metric tons annually being about one-half of 1 per cent of the nation's consumption.

Water-power Development.—The "silver lining" in the Italian power situation consists in the country's possession of magnificient water-power resources, and her record of hydroelectric exploitation, especially since the war, has been notable (Fig. 302). In the decade following 1914 the capacity of the installed plants was doubled and by the end of 1925 had reached 2,380,000 kilowatts, the actual power produced, meantime, having trebled.

The phenomenal development of water power has failed, however, to diminish the coal consumption. It appears that its increased exploitation has but kept pace with the industrial expansion, and the coal import requirement of some 11,000,000 or 12,000,000 tons must be expected to continue if not actually to increase.

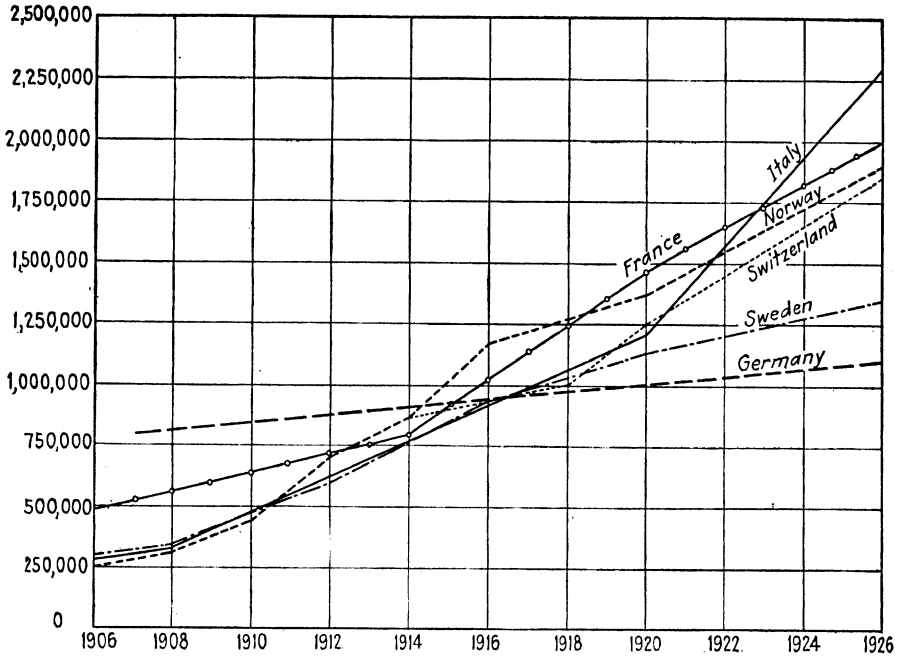


FIG. 302.—The trend in hydroelectric development in selected European countries. Figures are in horsepower of installed plants. (*U. S. Department of Commerce.*)

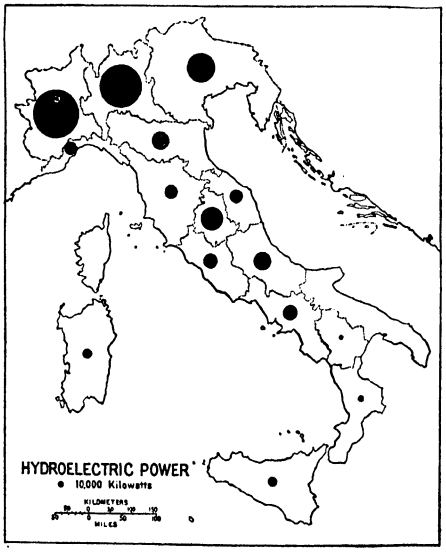


FIG. 303.—Italian hydroelectric power development by provinces including all plants of 300 kilowatts or over each, in 1925.

Northern Italy.—Italy's water turbines are about as unequally distributed as are her agricultural activities (Fig. 303). The major share of both is possessed by the north, for here both are related to the Alps. The great fertile plains of the Po are built of alluvium contributed in the main by the Alpine slopes which thus reclaimed what was formerly an arm of the Adriatic. The same streams which changed a waste of

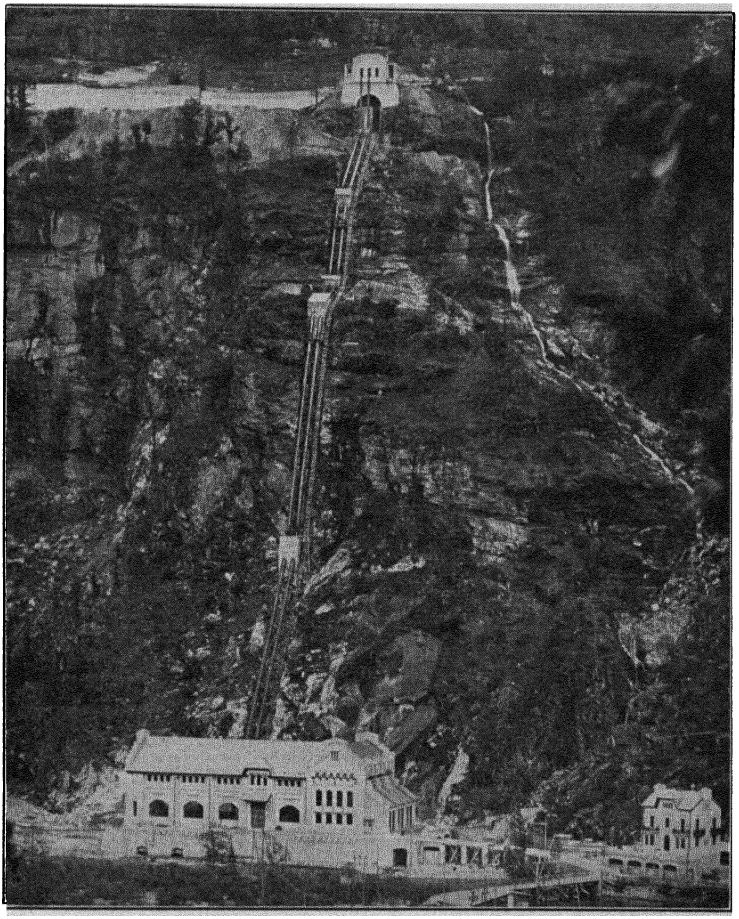


FIG. 304.—Grego power plant in the Italian Alps showing gatehouse, flumes, spillway, and power house. (*Courtesy F. X. Schaffer, Wien.*)

waters into one of Europe's garden spots are today being harnessed to the wheels of industry located on these same plains (Fig. 304).

Obviously the physical setting of northern Italy is peculiarly well suited to the development of hydroelectric power. The height of the Alps is responsible for a heavy precipitation and for sufficiently low temperatures to maintain extensive snow fields and glaciers and at the same time to furnish a high head for the streams. Many moraine-

dammed valleys constitute huge natural reservoirs which serve to equalize the stream flow.

Central Italy.—The northern and central Apennines are less favorable for water-power exploitation than even the poorest of the Alpine provinces. The mountains are lower, there is less snow, and there is a total absence of large lakes or glaciers. Furthermore, the climatic conditions are unfavorable—increasingly so toward the south. Rainfall is scantier, evaporation about twice as great, and the seasonable distribution of precipitation less favorable. Even in the northern Apennines the summer drought is marked. Liguria has the heaviest rainfall and perhaps the largest per capita consumption of electric current of the Italian provinces, yet precipitation is most disconcerting in its lack of regularity. Because river discharge is even less uniform than rainfall, streams are for the most part torrential and short, many becoming dry beds in midsummer. At Genova, for instance, the total rainfall for 1921 was 1,763 mm.; the following year, 522 mm.; in 1925, 759 mm.; the following year, 2,017 mm. As a consequence the hydroelectric plants are smaller than in the Alpine region where large streams and fairly even volume justify installations of tens of thousands of horsepower each.

Southern Italy and the Islands.—This region has remained largely oblivious to the industrial development of the north. It is essentially agricultural with but few industries requiring power. The small annual precipitation and its more pronounced seasonal distribution provide few streams of value for development. Thus an unfortunate combination of conditions both physical and cultural has served to retard industrial development as it has the modernization of their agriculture.

There are, however, indications of a change, for in the Sila Mountains in the toe of Italy there is being constructed a huge hydroelectric project where will be developed a head of over 3,000 feet with a capacity of 120,000 kilowatts. Much of this power is expected to be used for irrigation projects, and some will be transported across the Straits of Messina to help water thirsty Sicilia. The Tirso project of Sardegna, now completed, is expected to do as much for that backward island.

Ironing Out the Energy Curve.—Of the various handicaps to hydroelectric development, lack of uniformity in the flow of the rivers is one of the most serious. This difficulty is, as we have seen, greatest in the south. Three methods of ironing out the inequalities in the discharge curves are commonly used: (1) artificial reservoirs, (2) auxiliary steam plants, and (3) the linking by transmission lines of the regions with different energy regimes. The high cost of coal makes operation of thermal auxiliary plants expensive. They are, however, used to some extent, especially in central and southern Italy, where they make up as much as one-fourth of the total, while in northern Italy they contribute

less than 3 per cent. The use of reservoirs has always been an important feature of Italian hydroelectric development and will naturally become more so as the less desirable projects are exploited.

The variations in the stream discharge curves in different parts of Italy immediately suggest the obvious advantage of connecting the different regions. Thus the power deficiency in the north during the Alpine

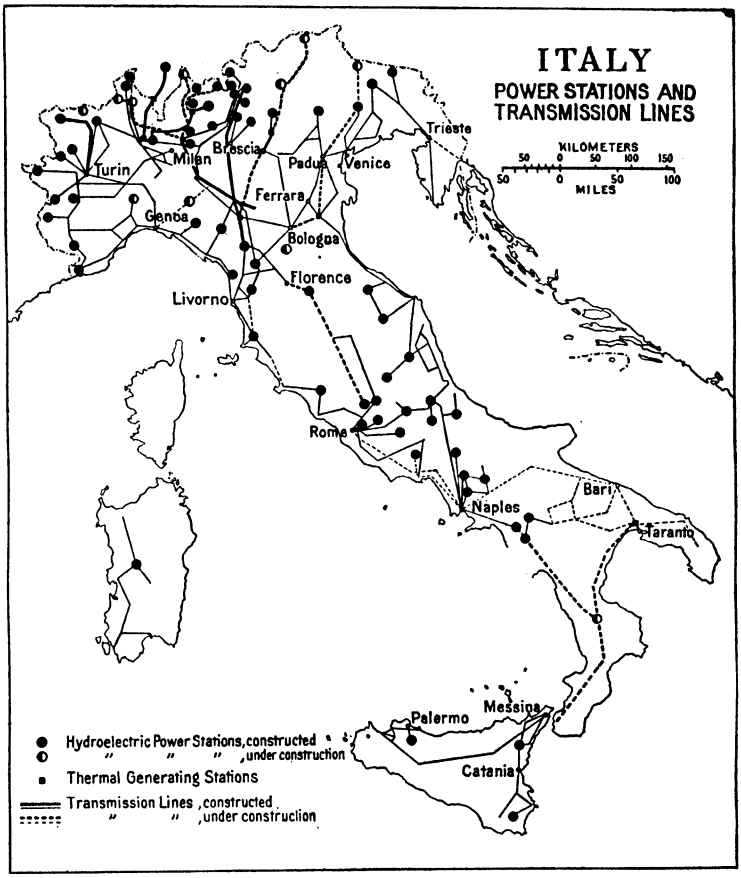


FIG. 305.—The network of transmission lines covering Italy helps to smooth out the energy curve. (*U. S. Department of Commerce.*)

winter is being partly compensated for by drawing current from the northern Apennines, which has a maximum precipitation at that time. In the summer the reverse is true, and today Italy may be said to be practically covered by a network of wires reaching from the Alps to Sicilia (Fig. 305).

Use of Electric Current.—The greater part of the current produced is used in the mills and factories. In the north emphasis is upon industrial uses; in the south agricultural benefits are sought with land reclama-

tion and control of malaria by drainage as important features of the plan. Electrification of agriculture, other than energy for irrigation pumps and the like, is slow for it must contend with ignorance, conservatism, and cheap labor.

Of the Italian industries, textiles use most electricity. Their use of power in proportion to value of output is not so large as in the metallurgical works, but the small bulk and high value of the finished product makes transportation costs a small item. The growth of metallurgy has been in spite of geographical and economic handicaps, the government subsidizing it as a form of military preparedness.

Trends in Water-power Development.—By the end of 1929 there were 588 hydraulic plants operating in Italy with an installed capacity of 2,300,000 horsepower, the largest of any European country. It is estimated that about two-thirds of her theoretically available power is now harnessed. Installation costs have risen greatly—100 per cent from 1918 to 1925—and it seems inevitable that the development curve must shortly begin to flatten. This change will be hastened as the countries more richly endowed with coal and raw materials recover and competition in world markets grows keener, compelling the country to specialize more and more in highly finished types of goods for her export trade.

The Textiles

The Silk Industry.—Italy is the leading European country in silk production, accounting for about 90 per cent of the total for the continent. Among world producers her rank is third, with only Japan and China leading, though her actual output is small compared with these two countries. Of the world's annual total of 75,000 to 100,000 metric tons of raw silk, Italy supplies but 4,000 to 5,000 metric tons, or about 5 per cent.

Unlike the other textile industries, silk manufacturing in Italy depends almost wholly upon domestic raw materials. Over 90 per cent of the cocoons are of local origin. As in France raw silk production has been placed upon a scientific basis; 1 ounce of eggs normally yields 12 pounds of raw silk or eight times as much as the average in China. The work involved may be judged from the fact that the raising of the worms from an ounce of eggs represents the consumption of almost a ton of mulberry leaves.

The dense population in north Italy is the chief reason for the concentration of raw-silk production there, the Po basin contributing about 90 per cent of the national output. The cocoons are reared in the homes of the peasants and marketed in Milano, Como, Torino and other cities in whose near-by mills the reeling, throwing, and spinning are done.

In spite of the improvements in the industry, silk production in Italy, as in western Europe in general, is on the decline, principally because of the cheaper labor in the Far East but also because a milder climate places the industry on an almost year-round basis.

Raw silk has for some time been the leading export of Italy, the domestic market absorbing only about one-third of the output. In view of her abundant labor supply it would be more profitable to manufacture the textiles before exportation, but her chief markets have a high tariff on manufactured silk.

Rayon.—The outlook for the rayon industry appears to be much more promising. Beginning in 1909, its development, especially since 1922, has been remarkable. In that year it surpassed silk in tonnage; by 1928 its output was over 4½ times as large as the product of the silk worm, and second only to the production of Germany in all Europe. In 1928 50,000,000 pounds were produced, 13.2 per cent of the world's total (Fig. 105).

Unlike the raw silk industry, the manufacture of rayon is entirely a factory occupation and in Italy appears to be on a sound basis. Like the former, it is chiefly confined to the north, where it is favored by cheap water power and abundant labor. Domestic supplies of the important chemicals, *e.g.*, soda and sulfuric acid are available, but unfortunately the attempts to use native poplar have been unsuccessful and dependence must be placed upon imports from Scandinavia and central European countries.

Other Textiles.—The manufacture of cotton fabrics actually uses four or five times as many spindles and employs more workers than does that of silk. The latter, however, plays a much larger role in the foreign trade. The 1928 export of silk and rayon together was over 50 per cent larger than that of cotton. The difference in net returns to the country is even greater, inasmuch as practically all of the raw cotton is imported.

There is a considerable woolen industry, using in part domestic raw materials; a hemp industry, entirely supplied by the local crop; and some jute, the latter depending entirely upon imports for its material.

Apennines Not Highly Mineralized.—Unfortunately the Apennines are almost barren of ore minerals. The quarries of the country employed in 1928 almost as many workers and had an output almost as valuable as all of the mines together. The combined value of Italy's products from quarries and mines is about $60,000,000, an amount less than the mineral output of New Jersey. At the north Carrara is the center of the famous marble quarries, the purity of whose products makes them highly prized by sculptors the world over. To the south, near Firenze, are Italy's lignite deposits, while at Mount Amiata, about midway between Firenze and Roma, are important mines of mercury yielding about 1,000 metric tons annually. Together with the production

from Idria, in the territory recently acquired from Austria, these place Italy second only to Spain as a mercury producer.

Italy has long been one of the world's chief sources of sulfur; indeed, until the deposits of Louisiana were made available, it was the world's leading producer. Of Italy's output 90 per cent is from Sicilia whose reserves are estimated at from 40,000,000 to 60,000,000 tons of ore averaging about 23 per cent sulfur. This is insignificant compared with the deposits of the United States, and the latter has far outdistanced the Mediterranean island (Fig. 306). The Sicilian deposits have been exploited by primitive methods, have been subjected to enormous royalty burdens, and have been unable to compete with the cheap American product. Modernization of the industry, reduction of royalties, trade agreements with American producers, and government control have all been invoked, but the industry is not flourishing.

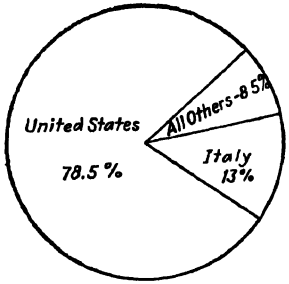


FIG. 306.—World sulfur production, 1928. Italy and the United States are the only important producers. Of the total Italian output, about 75,000 tons (25 per cent) came from the mainland the rest from Sicily.

THE FISHING INDUSTRY

The limitations upon agriculture and manufacturing in Italy are not compensated for, as in Scandinavia, by plentiful fish in the neighboring seas. The lack of a wide continental shelf, of modern technical facilities for catching and marketing the fish, together with the absence of restrictions upon destructive fishing methods have made the catch wholly inadequate even for domestic needs. Italy, of all European countries, in spite of its long coast line, has about the lowest per capita fish consumption—9 pounds as compared with 65 pounds in England—and even then Italy must import large quantities from north European countries as well as from Spain and Portugal.

POPULATION

Emigration.—With a dense population, a fairly high birth rate, and scant agricultural and industrial resources, Italy has resorted during the past half century to wholesale emigration (Fig. 307). From the time of the unification in 1870 this exodus had grown until for the single year of 1913, it reached the enormous number of 872,000. The World War, restrictive legislation, and industrial development within Italy have reduced this flood to less than half that figure. From 50 to 65 per cent of the numbers leaving Italy are temporary emigrants. In some cases they leave to work in the harvest, *e.g.*, in Argentina, or in adjacent European countries; in other cases they remain away only long enough to accumulate a modest competence. The New World, particularly the United States and Argentina, attracted the major part of the emi-

grants before the war, but a considerable part of the movement during post-war years has been diverted to France. In 1927 of about 10,000,000 Italians residing abroad, over 8,000,000 were in the two Americas and 1,000,000 in France. Up to 1900 the bulk of the emigrants went from northern Italy; since then they have gone chiefly from the south and the islands. This latter region represents, as indicated elsewhere, the poorest and most backward as well as the most overpopulated part. The majority of them were agriculturists and unskilled day laborers, very poor and illiterate.

In addition to the direct benefit of relieving the pressure upon the nation's food supply, a large number of emigrants sent their savings

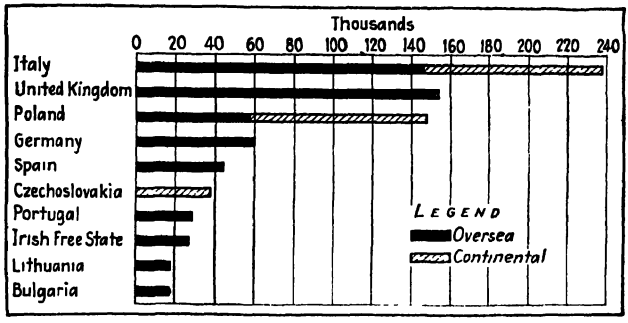


FIG. 307.—Leading countries of Europe in emigration in 1928.

back, while those who returned usually brought their accumulated earnings along. Besides, the large Italian populations abroad constituted profitable markets for exporters familiar with the habits and needs of their countrymen. All in all, the economic gain was large. On the other hand, the movement naturally took the young, strong, and physically fit, leaving the old or less vigorous for carrying on the work at home. Constantly increasing restriction on the part of foreign governments is making the problem of food supply a difficult one. Some relief may be expected from improvement of the agriculture, industrialization based upon cheap labor and water power, exploitation of Italian colonies, and by a decline in the birth rate,[1] but the problem is still an acute one.

FOREIGN TRADE

Manufactures dominate the outgoing goods, raw materials the incoming goods. Thus in 1928 fuels, foodstuffs, and raw materials made up 12 per cent and manufactures 42 per cent of the exports; while for imports the corresponding figures were 35 and 17 per cent, respectively. Textiles accounted for 43.6 per cent of the total exports.

[1] The birth rate dropped from 31.7 per 1,000 in 1913 to 25.1 in 1929.

Imports come largely by sea; exports go chiefly by land. Several reasons help to account for this condition. The export commodities are high in value and small in bulk. They are produced in north Italy and find their chief markets in north Europe. Imports, on the other hand, are bulky and relatively cheap. Thus coal, grain, cotton, and lumber are brought to Genova and other ports, but the raw silk, textiles, and the like move over the Alpine railways. As a consequence there is a marked discrepancy between export and import cargo at most Italian ports, as mentioned above in connection with Genova.

Imports normally exceed exports in value by a large amount, a condition made possible because of the large expenditures by tourists and the remittances by emigrants.

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CHAPTER XXV

THE BALKAN PENINSULA

GENERAL ASPECTS

The Balkan Bridge.—The term "Balkan" has come to serve almost as a synonym for political instability and sectional strife. But though weak politically, these countries occupy a position of unusual commercial and strategic importance, and to this fact is due much of the friction which has retarded their growth socially, politically, and economically.

The Balkan Peninsula differs from the other two great Mediterranean peninsulas in several important respects. Unlike these, it has within it a section of one of the world's great thoroughfares. Both Iberia and Italy are cut off at the north by mountain chains and are terminated on the south just beyond the Mediterranean by desert wastes. The Balkans, on the other hand, are traversed by the great European route extending from the North Sea along natural depressions—the Rhine, Danube, Morava-Vardar, Maritza valleys and continuing eastward over the plateau bridge of Anatolia and Syria to the Mesopotamian Valley, or southward across the Mediterranean to the Nile or Red Sea and thence to Asia. Likewise, the water route from south Russia to the Mediterranean is in reality a Balkan route, *i.e.*, controlled by the power which dominates the Bosporus-Dardanelles outlet. This thoroughfare is of vital interest to Russia since its great export crops find their natural outlet here as the only available route ice free throughout almost the entire year. Thus as the intersection of the land route to the southeast and the water route to the southwest, the Balkans have become a serious bone of contention among European powers. These latter in turn have viewed them, not so much from the standpoint of the economic development of the countries themselves, as thoroughfares to further their own ambitions. The water interruption to Asia offers an easy passageway. The actual separation is in one place less than that spanned by the Brooklyn bridge; where the gap is wider it is sprinkled with innumerable islands which serve as convenient stepping stones; many excellent harbors line either shore; while the almost tideless sea and clear weather combine to make the "bridge" a real connecting link.

Relief and Routes.—Though all three Mediterranean peninsulas are mountainous, the relief of the Balkans is much more complex than that of the others. Like Iberia it has a core of old crystalline rock, the Rhodope Massive, but this covers only a small part of the whole peninsula

and the folded ranges with their intervening valleys flank the central core in all directions. As a consequence of this jumble of mountains the peninsula is extremely irregular—surface, coast line, and drainage showing the greatest variety of features.

The Balkans may be broadly divided into three major regions: (1) Along the west, and running from north to south, are the Dinaric-Pindus ranges, a continuation of the limestone mountains which flank the south side of the Alps of Switzerland and Austria. (2) To the east of these lies the Rhodope Massive, a triangular plateau whose corners lie approximately at Beograd, Istanbul, and Thessalonike. (3) Between the central massive and the Danube lie the Balkan Mountains, running east-west parallel with the Danube and really an extension of the Carpathian system.

Each of these major physical features is interrupted where the crustal sinking gave rise to the Aegean-Marmara-Black Sea depression, but is again continued beyond these waters. Thus the limestone ranges of the western Balkans find extension in those at the southern border of Anatolia; the Rhodope continues as the plateau of Asia Minor, and the Balkans, as the Caucasus.

Each of these major relief features is flanked on either side by routes which run from the middle Danube to the coast. Thus on the west there are the passes over the Dinaric Range to the Adriatic; between the Dinaric-Pindus mountains and the Rhodope lies the Morava-Vardar; while between the Rhodope and the Balkans is the Maritza; and to the north of the Balkans the lower Danube. Although the coast line of the peninsula is unusually long, the mountainous interior neutralizes this advantage, making access to the sea from many points difficult. It is significant that the Greek railroads were not united with the continental lines until 1911.

Racial Heterogeneity.—The Balkan bridge to Asia consists of a series of defiles separated by mountain barriers. Through these narrow pathways have swarmed, since antiquity, hordes of emigrants from the steppe lands of western Asia. From time to time some of these wanderers, eddies from the parent stream, drifted from the main routes and settled in the various valley pockets. Thus successive human invasions, each overrunning the preceding, have given the region a racial composition as varied as its relief. Greeks, Romans, Goths, Huns, Bulgars, Slavs, Magyars, and Turks have all left their impress.

Because of this great variety of relief and of racial composition, and the fierce enmities fostered by centuries of strife accentuated by the rivalries of the great European powers, the development of the Balkan peoples has been most seriously handicapped. Five independent nations occupy the peninsula as compared with one in Italy and two in Iberia (Fig. 308). Furthermore, within each of these five are elements of dis-

sension so serious that prolonged or close cooperation is practically impossible, at times even within the boundaries of one state. The First Balkan War of 1912 was the only occasion upon which the countries, exclusive of Turkey, had united forces to achieve a common end; but it should be noted that the alliance was short lived and was soon followed by quarrels over the spoils of war.



FIG. 308.—Map of the Balkans. (*Current History.*)

Limited Resources.—The Balkans are only moderately endowed with natural resources. Mineral deposits are of little significance, forests limited, and the bordering waters not to be compared with those of north Europe in their supply of fish. In spite of the tangle of mountains, agriculture, with emphasis on the pastoral phase, is by all odds the chief interest.

In view of its meager resources the peninsula is greatly overpopulated. The average density is almost as great as in Illinois, a state with a large area of level, highly productive soil, a moderately humid climate,

vast coal supplies, and a highly industrialized area. Needless to say the standard of living is very low, on the average, in the Balkan Peninsula, and will remain low until there is a better balance between utilized resources and population.

YUGOSLAVIA

The South Slav Kingdom.—The kingdom of the Serbs, Croats, and Slovenes is one of the new states organized after the World War. It represents an attempt to reunite the South Slavs who first entered the Balkan Peninsula from beyond the Carpathians in the sixth and seventh centuries. Although originally identically the same people, they drifted into valleys separated by mountain walls, where isolation served, during the many centuries that followed, to develop pronounced differences. Without a strong central government they were an easy prey to various foreign powers. For 1,200 years they have been divided and dominated by various peoples; most of them, at different times and for varying periods, subject to the blighting oppression of Moslem rule. The Turkish yoke was thrown off in the Balkan wars of 1912 to 1913, and with the defeat of the Central Powers in 1918 an opportunity came for union. Serbia as one of the most militant of the Slavic groups and the one with the most intensely nationalistic spirit assumed the dominant position in the new state.

Yugoslavia is the principal state of the Balkans, occupying approximately one-half of the area and possessing about half the population. Although the actual boundaries are largely arbitrary, nearly all of the country lies south of the Drava-Danube rivers and between the Rhodope Massive and the Adriatic.

Larger Divisions of the Country

The country is about three-fourths mountainous and is divided into four geographical regions: (1) The Dalmatian or Adriatic Coast, (2) The Dinaric mountain-plateau region, (3) The Pannonian plain and (4) The Morava-Vardar depression.

The Adriatic Coastal Region.—The Adriatic belt is a narrow, much indented coast wedged in between the Dinaric Alps and the sea. Subsidence of this mountainous coast admitted the sea into the lower valleys, leaving the mountain tops as peninsulas and islands (Fig. 309). The latter, long and narrow, lie parallel to the mainland, providing protection for the interior channels. Cultivable land is very limited and is mostly devoted to the vine, olive, and fig. The cold dry wind called locally the "bora" is a disagreeable feature of the winter climate.

Inland the coastal belt is backed by the precipitous escarpment of the Dinaric Alps beyond which lies the inhospitable karst. Naturally the towns have turned to the sea for a livelihood. Fishing ranks next

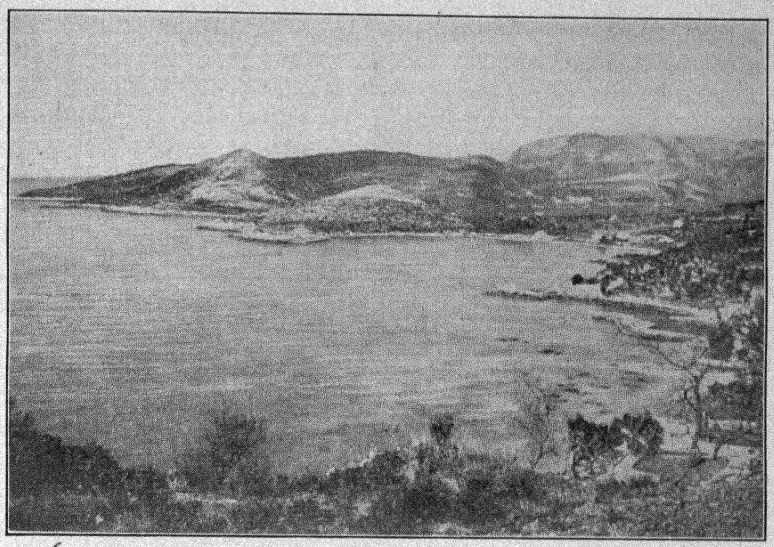


FIG. 309.—A typical view on the Dalmatian coast. (*Courtesy Geog. Rev., published by the American Geographical Society of New York.*)



FIG. 310.—Note the main railway network lies in the north and east. Access to the Adriatic is limited. (*U. S. Department of Commerce.*)

to the vine in Dalmatia, the catch in 1927 amounting to over 5,000 tons valued at about $750,000.

In spite of the difficulty of communication with the interior, the Adriatic is Yugoslavia's only coast and is regarded as one of her major gateways for foreign trade (Fig. 310). Until recently the only railways crossing the Dinaric barrier to this stretch of shore line were the standard gage lines from Zagreb to (1) Susăk, (2) Trieste, and (3) Split and a difficult narrow gage from Brod to Zelenika on the Bay of Kotor (Cattaro) or to Gruz (Gravosa) on the Sara River. Though Fiume, the natural outlet of the north and a port well equipped to care for all the reasonable needs, was lost to Italy, Susăk, a suburb with Port Baros, was retained by Yugoslavia, as well as a long-term lease of the Thaon di Reval harbor. Like Poland, however, Yugoslavia dislikes dependence upon foreign ports and has energetically set herself the task of developing a port of her own at Split, now the leading port of the country, and another at Kotor. Susăk will probably remain important for lumber exports; Split, to which the railroad has been completed, will handle general cargo, while Kotor in addition to its splendid naval harbor, will, when joined by rail with the interior, become another commercial outlet. Meanwhile Fiume, with better natural advantages than any of the others, seems destined to decline, because of the frontiers shutting out the natural hinterland. Italy is less concerned with that fate, however, than she was with what the port might do to Trieste if in foreign hands.

The Dinaric Region.—The dominant topographic feature of Yugoslavia is the great belt of mountains and plateaus—the Dinaric Alps—which occupy the western half of the country. Lying between the much indented Adriatic coast, with its innumerable well-protected harbors, and the rich agricultural basin of the middle Danube, this highland is a most formidable commercial barrier.

The main ridges trend northwest-southeast, parallel to the Adriatic coast, and, while not very high, there is a singular lack of transverse valleys to join the interior lowlands to the sea. Furthermore, the western edge is an escarpment which drops abruptly to the Adriatic. The western portion of this highland zone is a region of karst topography best developed in the north, but to be found in a modified form throughout the entire length of the Dinarics, making connection with the interior extremely difficult.

Although the precipitation is moderate, in places reaching 60 inches, the drainage, typical of karst regions, is largely underground, so that much of the surface is bare dry limestone. In the north the region is pockmarked with sinks; toward the south, where there is less limestone, the depressions are larger with their bottoms often covered with fertile soil (Fig. 311). These are agricultural oases, though wet at least part of the year they are likely to suffer from drought. They are steep walled,

hard to enter or to leave, and the people who use them usually live on the outer rim, free from danger of flood. Their chief use is for hay and pasture. Inland from the karst country, the highland is much more productive with fertile valleys and excellent forests. Pastoral industries predominate, although cereals, especially corn, are raised.

In general the Dinaric highland is the least productive and the most sparsely populated section of Yugoslavia, while its mountain barriers constitute the most serious geographical handicap of the country. It is narrowest and lowest in the north, making possible the joining of Fiume with Beograd. Southward the highland broadens, the rivers

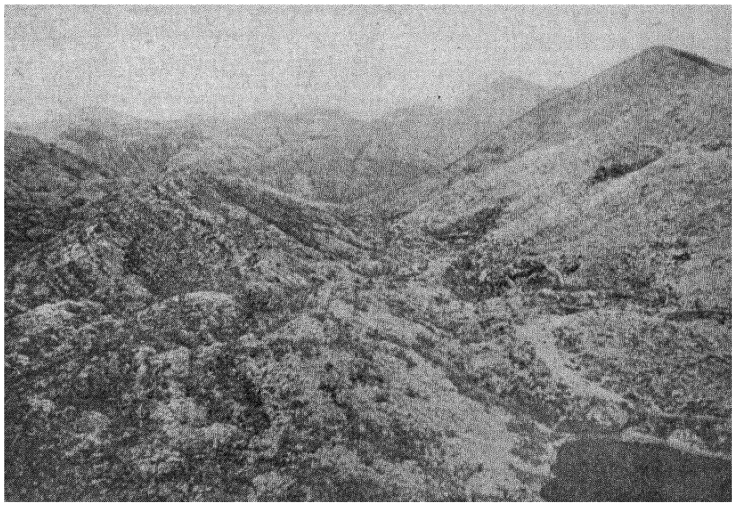


FIG. 311.—Typical karst topography in Yugoslavia. (*Courtesy Geog. Rev., published by the American Geographical Society of New York.*)

flow through tortuous gorges, and isolation and poverty have made the mountaineers backward and primitive.

The Pannonian Basin.—On the north Yugoslavia includes a portion of the great Hungarian Plain. Here in the valleys of the Sava, Drava, Danube, and Tisza—a region embracing about one-fourth of the entire kingdom—is the most productive and the most densely populated section. Yugoslavia is almost exclusively an agricultural nation and here is its chief farming area. Not only is it the region of the greatest plains and the richest soil, but the level topography and the large rivers make transportation by land or inland water comparatively easy.

The chief crops are similar to those of adjacent Hungary, except that corn is of greater importance than wheat and is a staple article of diet for both men and animals. Cereals occupy 80 per cent of the cultivated land, rye and barley being sown where the soils are too poor

for wheat and corn. Prunes for export, as well as for jam and brandy, are raised in large quantities. Live stock, especially the rearing of pigs on the wooded hills, ranks second to crop raising, and for the nation as a whole, animal products supply one-third of the country's exports.

In proportion to its area Yugoslavia's agricultural output is not large. It has the largest proportion (23.7 per cent) of unproductive land of any of the Danubian states; likewise, with the exception of Austria, the lowest proportion of cultivated land. In spite of this, agriculture supports over three-fourths of the population.

Agrarian reform has had two problems with which to contend: (1) the tenure of the larger states, chiefly in those sections formerly belonging to Austria-Hungary, and (2) the abolition of feudal practices which still existed in some parts of the country. The equalization of holdings accomplished thus far has actually increased production, though yields per acre for the country as a whole leave much room for improvement. Intensification of agriculture, the shift from cereal production to horticulture and live stock, and the extension of industries for working up the agricultural raw materials into more finished forms are avowed policies of the government in its program of reconstruction.

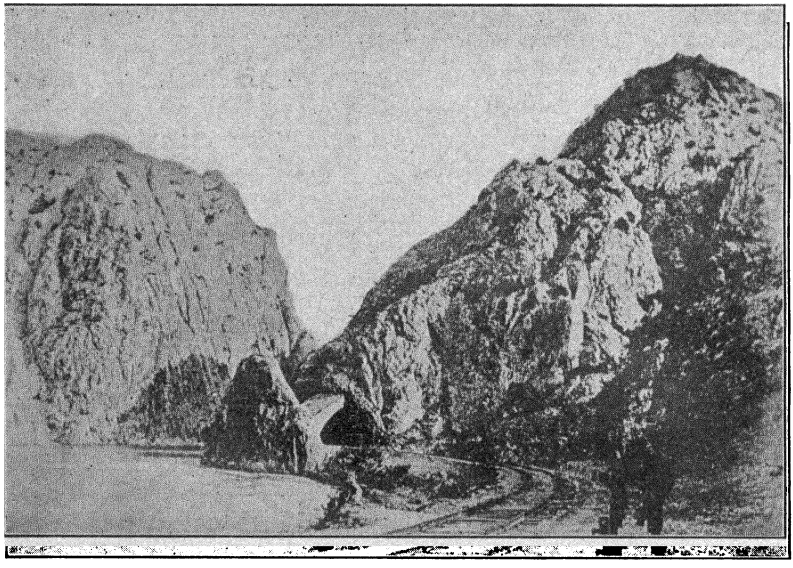


FIG. 312.—The Varder Gorge through which passes the branch of the Oriental Express which runs south from Nis to the Aegean at Thessalonike. (*Courtesy Geog. Rev., published by the American Geographical Society of New York.*)

The Morava-Vardar Depression.—All of the great land routes from western Europe to the Near East cross Yugoslavia, so that there is considerable transit trade as well as that destined to or from the country. Of these great routes, the one leading from the Danube at Beograd

southward through the Morava-Vardar trench is second in importance only to the Beograd-Nish-Istanbul route. The former lies between the Rhodope Massive and the Dinaric-Pindus ranges. Its commercial value to the country is emphasized by the difficulty of access to the Adriatic over the Dinaric-Pindus highlands on the west and the great length of the route down the Danube to Istanbul or to inland seas.

Unfortunately for Yugoslavia, the lower portion of this depression, together with the Aegean port of Thessalonike, is in Greece. The latter has granted a free port on the harbor, however, as well as joint control over the railway from the frontier to tidewater, so that Yugoslavia's outlet to the Aegean seems reasonably secure.

In addition to its value as a great thoroughfare, the Morava-Vardar Valley is an important agricultural section. The lower Morava is an extension of the cereal and fruit region of the Hungarian Plain. Pastures on the lower slopes, and oak and beech forests on the upper, provide feed for swine. Along the upper Morava there are a series of basins originally lakes and exceedingly fertile, such as Nis and Skoplje (Uskub). The divide between the Morava and the Vardar is very low and southward toward the Thessalonike Plain a Mediterranean climate is more and more in evidence with tobacco, mulberry, vine, and even rice as staple crops. The mountains serve as summer pasture for the herds of the plain. In general the Vardar section is little developed agriculturally though potentially rich. Political disturbances have been the chief obstacle to its better utilization.

Minerals and Power

Minerals and Water Power Little Exploited.—Yugoslavia is known to possess deposits of a great variety of minerals, yet the total output, except that of coal, is insignificant, and the industry ranks fourth in importance after agriculture. The South Slav is a farmer, and mining is left to foreign enterprise. As in the case of the forest industries, poor transportation facilities effectually restricted the exploitation of mineral deposits. About 4,500,000 tons of coal, mostly of low grade, are produced from mines scattered throughout the kingdom, the richest ones being in the north. The output is insufficient for local needs even though the country is distinctly non-industrial. Some ores of iron and copper are exported, but the amount is negligible.

Yugoslavia has estimated hydraulic resources of 3,000,000 horsepower—that is, one-fifth larger than is possessed by industrial Switzerland—yet the latter has developed over ten times as much as the Balkan state. Most of the 180,000 horsepower now developed is used for sawmills. The possibilities for further utilization are large but they must await foreign capital and better transportation facilities.

Forests

Forests, a Valuable Resource.—One-fourth of the area is forested, mostly with deciduous trees, and the timber industries represent about a third of the country's capital invested in manufacturing. Much wood is used for fuel, and structural timber and lumber are exported to the extent of about one-half of the total output. Lack of transportation seriously restricts trade in such a cheap bulky commodity and greatly hampers the development of the industry.

Economic and Political Difficulties

Problems.—The union of the various branches of the South Slavs brought with it a series of political and economic questions which have proved exceedingly difficult of solution. With 85 per cent of the inhabitants Serbs, Croats, or Slovenes there is not the serious problem of a large alien population. Cooperation among the various component groups, however, has been distinctly lacking. Fourteen hundred years during which the various groups have been associated with different states, with political, social, and economic progress unequal and along different lines, have developed varying stages of culture and greatly retarded unification. Differences in local political systems, in methods of taxation, in systems of land tenure, in literacy, are only a few aspects of the problem of coordination of political machinery. In addition much of the country has been overrun and devastated so that there is the added burden of economic rehabilitation.

Besides internal dissension, the country has had serious international controversies with Italy over the possession of Fiume, with Bulgaria over Macedonia, and with Greece over the free Yugoslavian port at Thessalonike. Unquestionably the pathway of the new nation has been a rough one.

Among the economic problems which bulk large in the future, transportation is of primary importance. Until 1918 the territory now comprised in the kingdom was under six different governments, and such railways as had been constructed were made to focus at as many different points. In spite of the country's advantageous position with respect to transcontinental routes and its possession of considerable coast line and frontage on navigable rivers, its railway system is one of the most poorly developed of any country of Europe. Although Beograd, the capital, possesses a highly favored position upon which water and land routes down the Sava, Drava, Danube, and Tisza converge, until very recently to go by rail from Beograd to Pancvevo on the opposite side of the Danube, only 9 miles distant, required a journey of 360 miles.

Foreign Trade.—Yugoslavia is primarily an exporter of foodstuffs and an importer of manufactures. Furthermore, its exports are raw, not prepared; its imports, highly finished. In 1926 agricultural and pastoral products made up over one-half of the export value, corn being the largest single item, while the most of the balance of export commodities consisted of forest and mineral products; textiles and machinery furnished the bulk of the imports. Most of the foreign trade is with Italy, Austria, and Czechoslovakia, countries with a considerable industrial output.

ALBANIA

A Backward Country.—The northern part of the Pindus Mountains is occupied by Albania, a country about the size of Switzerland, but with a population hardly one-fourth as large. Extremely rugged, it is one of the least accessible and one of the least known regions of Europe. The coast, a rising one, in contrast with that of Dalmatia, is characterized by lowlands, marshy and malarial. The harbors are little more than roadsteads, Valona being the best. The Drin Valley in the north separates the Dinaric and Pindus Mountains, forming one of the few gaps leading inland from the Adriatic.

Turkish misrule added to topographic conditions has served to keep Albania one of the most backward states of Europe; indeed Albania is more of a territory than a nation. The people are for the most part illiterate, still maintain a tribal culture in the north and east, and have successfully resisted assimilation by the various states which have in turn sought control of their country. Possessed of a high degree of pugnacity, each individual Albanian is said to be a "walking arsenal," a law unto himself. They are an agricultural and pastoral folk, self-sufficing to a high degree and with a negligible foreign trade. Indeed, until the World War, the country did not have a railroad or even a good highway, trails and pack animals serving for the small amount of transport carried on.

As an independent country, Albania has had but a brief and precarious existence. It was created a sovereign state in 1913 by the powers at the instance of Austria, who wished thus to block Serbia's attempt to acquire frontage on the Adriatic. Her independence was again recognized in 1920 by admission to the League of Nations, yet the state is too weak to assert itself and as a buffer between the three rivals, Yugoslavia, Greece, and Italy, seems likely to be absorbed by one or more of them. Indeed, Italy has already through loans, concessions, and commercial treaties secured what practically amounts to a protectorate over the country, as well as possession of the island of Saseno at the entrance to the harbor of Valona. Her efforts to control Albania are a part of her general policy of attempting to make the Adriatic an Italian lake.

GREECE

A Land of Islands and Peninsulas.—Unlike the other Balkan states Greece is not a compact territory nor one so largely dominated by agricultural interests. Her lands are insular and peninsular to an extraordinary degree, so that maritime activities, while subordinate to the agricultural, play a considerable role in her national economy. Though possessing an area of 50,000 square miles with a population of some 6,000,000, no part is more than 85 miles from salt water and the large cities and the great bulk of the population are disposed about the margins within easy reach of the sea.

Belonging to Greece are the Ionian Islands on the west and approximately 300 islands in the Aegean. Most of these, being peaks and ridges of partly submerged mountain chains, are very rocky. The Dodecanese and Rhodes are occupied by Italy, but Kriti (Crete) a Greek possession, occupies a strategic position across the open end of the Aegean Sea. Although the third largest island of the Mediterranean, Kriti's agricultural resources are restricted. A limestone mountain range traverses its entire length and two-thirds of the area is barren stony waste.

Recent Political Readjustments.—Modern Greece is but a century old, dating from independence won in 1829, after some four centuries of economic and political servitude to the Turk. This century of freedom, while one of considerable progress, has also been one of turbulence. Its present territorial extent is largely the result of the two Balkan wars of 1912 to 1913 and the World War of 1914 to 1918. A brief but disastrous conflict with the Turks in 1922 was terminated by exclusion of the Greeks from Asia Minor and by an agreement with Turkey and Bulgaria to interchange their nationals on a comprehensive scale. This was carried out in 1922 to 1924, when 1,400,000 Greeks, mainly from Asia Minor but also from Bulgarian Macedonia, were returned to Greece, while 480,000 Turks and 200,000 Bulgarians from Greece migrated to their respective countries. The exchange has been, especially for Greece, a costly project and one bound to work great hardships. It has, however, given the country a more homogenous character while the energy and skill of the refugees have greatly stimulated agriculture and industry.

Relief.—Physically the country includes (1) the southern extension of the folded limestone ranges bordering the eastern Adriatic, (2) the lower Vardar depression (southern Macedonia) and (3) the southern portion of the Rhodope Massive.

Western Greece is dominated by the Pindus Mountains whose folds trend northwest to southeast. Crustal sinking has submerged the lower valleys, leaving the intervening ridges as peninsulas and islands. One such depression, the Gulf of Corinth, almost severs the southern from the northern portion of the country.

Likewise in the east, Greece now extends to the Maritza and includes in western Thrace the southern part of the Rhodope Massive. Here again, the adjacent Aegean waters now stand above a part of the old block which foundered, portions of which not yet submerged form scores of islands.

Between the Pindus and Rhodope lies the lower Vardar depression. This plain and that of Thessaly are the two most extensive level tracts in Greece. Many valleys, widely scattered and of small size, are to be found. They are generally isolated by enclosing mountains, providing ideal conditions for the development of the city-states of old Greece. Coastal plains are uniformly narrow or even often absent.

Agriculture.—Without important mineral or forest resources, Greece must depend upon the soil and the sea. In spite of a mountainous surface and a maritime position, the country is preeminently agricultural, three-fifths of the population depending upon crops and herds for support. Yet conditions both physical and economic have served to make the annual harvest a meager one.

Only one-fifth of the total area is cultivable while fully three times that much is occupied by mountains, almost barren. Centuries of deforestation without replanting have, as in Italy, been accompanied by the usual consequences of wood shortage and soil erosion, while malarial swamps occupy the lower courses of streams that have become choked with sediment. Not only were the mountains denuded for the sake of the timber, but sheep and goat herders burned large tracts to improve the pasturage (Figs. 313, 314). Overgrazing, summer drought, and the lack of any conservation program have given Greece, of all the Balkan states, the lowest percentage of forest in proportion either to total area or to population.

Even within the lowlands much land potentially cultivable has lain waste or been used only for grazing. Several factors share the responsibility for this condition. The Greek is by nature a sailor and a trader rather than a farmer, and almost one-half of the population is urban. For centuries, wars, both civil and foreign, coupled with the oppression of foreign domination, have discouraged the growing of crops. The valleys have been the highways for marching armies and the rural dweller has had to take refuge in the mountains with his flocks and herds. Macedonia, potentially one of the richest of Greek regions, has been so long a battle ground that much that should be thriving fields is now but barren waste.

Yields have been exceptionally low even though the soil in places is particularly adapted to specialized crops. The returns per acre of wheat, the chief cereal, are only two-thirds those of Bulgaria and are the smallest of any of the Balkan states. Agricultural methods are primitive, little fertilizer is used, and irrigation is neglected. Most of the produce is for

domestic consumption, and, before the influx of refugees, about one-half of the cereals for local needs had to be imported. In general the rough

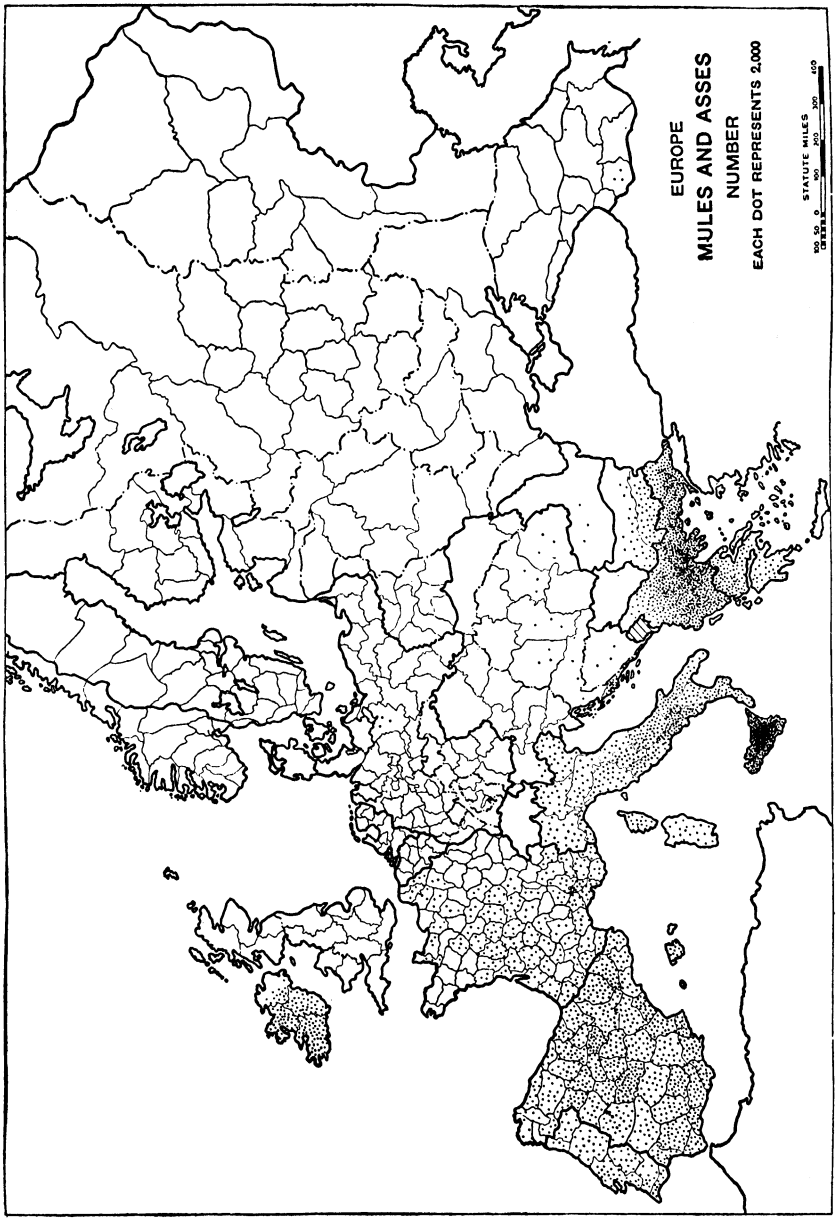


FIG. 313.—The Mediterranean border lands of summer drought and scanty pasture are better suited to the hardy mule, ass, and ox, than to horses. (*U. S. Department of Agriculture.*)

topography and the Mediterranean type of climate which prevails over most of the country, favor tree and vine crops and Greece ranks next to Spain and Italy in olive-oil production. Agricultural exports are

confined to tobacco, currants, olive oil, and wine—semiluxury commodities which in recent years have had difficulty in finding foreign

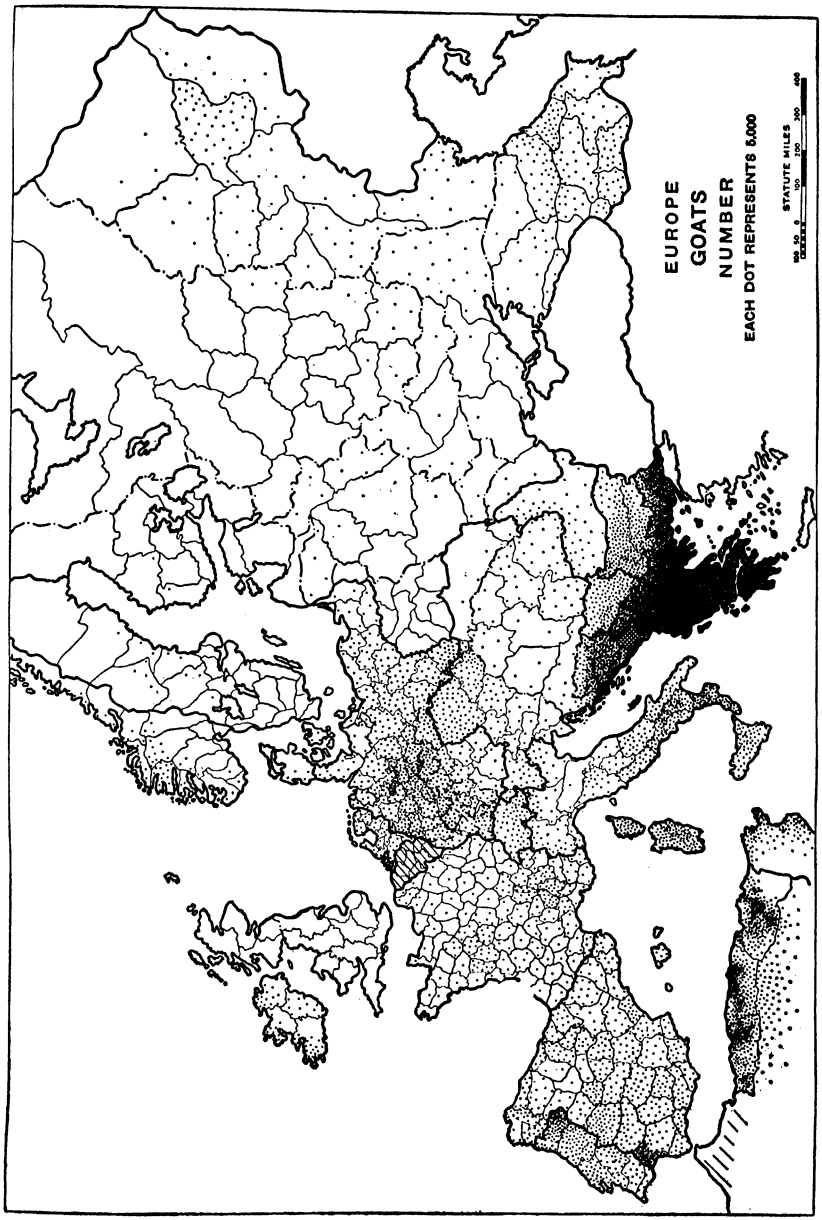


FIG. 314.—The goat thrives where less hardy animals would starve. The scant pasturage and mountainous surface of the Mediterranean lands, especially the Balkans, account for the densest goat population of Europe. (*U. S. Department of Agriculture.*)

markets. Tobacco is the leading export with a value two or three times that of currants. Of the production of the latter Greece up to 1914 enjoyed practically a world monopoly. The principal areas of culture

lie along the western and northern coasts of Peloponnesus and on the Ionian Islands with Patras as the chief port. The increase in output and the growing competition of other countries have made legal restriction of output and export necessary.

Pastoral interests, especially goat raising, are important in this rocky land of scant rainfall. Greece ranks lowest among Balkan states in the per capita ownership of sheep, cattle, and pigs, but has the densest goat population of any country in the world, with as many as the other three states together, and three times this proportion of mules though but few horses.

Given peace and political stability agriculture will undoubtedly modernize. The establishment of a vast number of refugees in Macedonia and western Thrace is necessitating the cultivation of much waste land with extensive reclamation work. One such project underway involves the restoration of about 800 square miles of the Thessalonike Plain, *i.e.*, the lower Vardar basin. Not only is this expected to provide fertile farms for some 25,000 refugee families, but it will aid in eliminating malaria, with which many Greek lowlands are afflicted. By giving a more decidedly Greek character to the population it may, also, help solve some of the political problems of the territory and thus pave the way for more rapid development.

Industry.—Of manufacturing, other than the preparation of her agricultural products for marketing, Greece has practically none. Without important raw materials or power resources and with restricted transportation facilities, industries have necessarily remained of the simplest type. The manufacture of tobacco, wine, olive oil, raw silk, and currants will continue, and even in these there is much room for improvement. Greek olive oil and wine are handicapped in competition in the world markets by reason of the "rough and ready" preparation methods.

Transport.—Greece shares with the other Balkan states that lack of internal transportation and communication which has so restricted their development. But, unlike some of these countries, she has had the sea, and since the populous centers are on coasts and headlands, the intervening water has served as a substitute for roads and railroads. Partly as a consequence of this condition the country has the smallest mileage of railway per 1,000 population in Europe but ranks among the leading countries of the world in per capita merchant marine.

Within her territorial limits is included the lower portion of the Vardar-Maritza Valley, a route of great international interest. The Oriental Express connecting western Europe with Istanbul has a branch from Nish to Thessalonike, finding the Morava-Vardar most convenient for this important short cut to deep waters (Fig. 312). This trench between the Rhodope Massive and the Dinaric-Pindus ranges, besides being of strategic interest for western and central Europe, is of special

concern as an outlet for Hungary, Albania, Yugoslavia and western Bulgaria. Thessalonike as the terminus of the Morava-Vardar line, is inevitably one of the great ports of southeastern Europe. Its importance as an outlet for Yugoslavia has led to a special arrangement whereby that country has been given certain privileges mentioned elsewhere. In addition to the Yugoslavian port concession, Greece had also established a free port there, a feature of particular interest to western Bulgaria.

A somewhat similar situation prevails in the east where the Maritza Valley affords a natural outlet for eastern Bulgaria to the Aegean. Negotiations are still in progress between Greece and Bulgaria providing

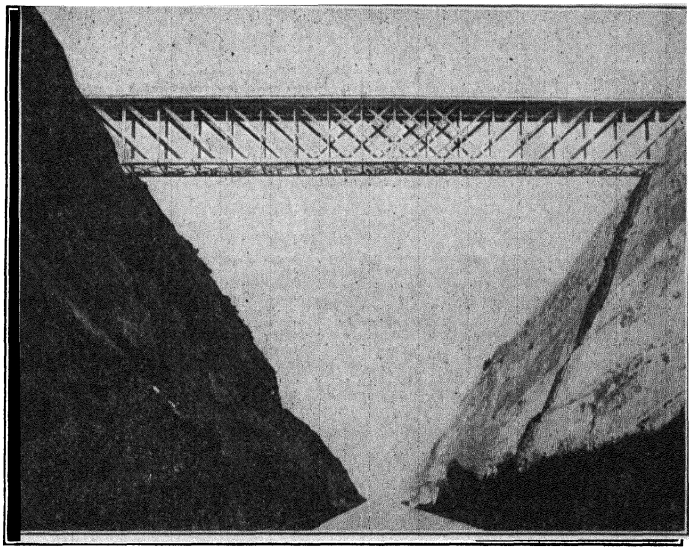


FIG. 315.—Bridge over Corinth Canal. The narrowness of the canal and the rapid currents which pass through it limit its commercial use. (*U. S. Department of Commerce.*)

for such an outlet. Neither Dede Agach at the rail terminal near the mouth of the Maritza, nor Kavola farther west has a good natural harbor, yet the former is the main port, since Enos at the mouth is subject to shifting sand bars.

The Gulf of Corinth reaches within 4 miles of the Aegean and in the olden days ships were carried across on a tramway. Repeated attempts to cut a canal across the isthmus were finally successful in 1893. Its narrowness (only 52 feet) together with the swift current makes it available only for small vessels. Although in 1920, about the same number passed through it as transited Panama, their size averaged far below the latter and until widened it will not constitute an important factor in Mediterranean trade (Fig. 315).

Tourist Attractions.—Greece possesses in her ancient ruins a historic and artistic interest which is an asset of no mean importance. Though

as yet less accessible and less patronized than those of Italy, the country nevertheless benefits by a considerable tourist traffic. Athenai, the capital with its Acropolis as the center about which much of Greek history has focused, is the point of greatest interest. It is a city of about 500,000 situated at the edge of higher ground some 6 miles from the swampy coast. Piraeus, its port, is the largest one in Greece, while Thessalonike, the outlet of the Morava-Vardar route, and Patras, the chief currant exporting point, are other ports of importance.

Trade.—Geographical position and the maritime and trading instinct of the Greek people, together with the mountainous character of their homeland, have turned them to trade and commerce. Shipping ranks next to agriculture in importance and Greek ships and sailors are found in every port. The earnings from this source add an important item to the correction of a normally unfavorable trade balance. Difficult economic conditions have induced a large exodus to other countries, especially to the United States, and Greek emigrant remittances constitute no small addition to the country's assets, sometimes reaching $40,000,000 in a single year.

BULGARIA

A Smaller Bulgaria.—At the opening of the World War, Bulgaria was the leading Balkan nation. In contrast to land-locked Serbia she had twice the area of that country and half again the population, as well as valuable commercial outlets on the Aegean and Black seas; today, as a result of unwise leadership and an exaggerated chauvinism, Bulgaria is, with the exception of Albania, the poorest of the Balkans in area, population, and prestige. Not only is the country left with diminished natural resources and opportunities, but her heritage of international illwill makes amicable relations with her neighbors difficult. The contraction of her boundaries has been accompanied by a large immigration of Bulgarian refugees from the lost territory. This floating population of malcontents has greatly increased the difficulties of her situation both domestically and internationally.

Climate.—The climate of the northern half of the country is rather continental, marked by cold winters and hot summers. The Maritza Valley, however, protected from the cold north winds, has a modified Mediterranean type of climate. For the country as a whole the rainfall is rather light, ranging from 20 to 30 inches.

Natural Regions.—Physiographically the country includes three different types of regions: (1) the Rhodope Massive in the south, (2) the valley of the Maritza between this, and (3) the Balkan Mountains and the foreland running from their crest to the Danube. The general trend of physical features is east to west, and in this direction, therefore, run the major transportation routes.

1. *The Rhodope Massive* is the least important of the regions, the most obscure and backward. It is dissected by gorgelike valleys cut by torrential streams. Originally forested with beech and oak, unrestricted cutting has destroyed much of the timber and thus further impoverished a region already poor. Nevertheless, Bulgaria still ranks among the leading half dozen European countries in the area of forest in proportion to population.

Agriculture is the chief occupation, cereals being raised in the valleys and live stock on the uplands. Ignorance, isolation, and poverty have kept this region the least progressive of an agriculturally backward nation. The population is sparse with no cities and only a few scattered villages. The inhabitants are of the hardy mountaineer peasant type, largely self-sufficing and having but few contacts with the outside world.

2. *The upper Maritza Valley* is, in many respects, the section of Bulgaria best developed agriculturally. Here are to be found a fertile soil, the most valuable products, the best transportation facilities, and, in consequence, the largest cities of the country. A small ridge—the Anti-Balkans—runs parallel to the Balkans dividing the valley into two parts. The northern is often referred to as the Inter-Balkan Valley, or the Vale of Kazanlik, the southern, as the Plain of Plovdiv. Topographically and climatically this region offers a marked contrast to the upland sections of Bulgaria. The Vale of Kazanlik is especially well favored climatically and has become famous as "the rose garden of Europe." Here is produced the well-known attar of roses, the distillation of an ounce of which requires from 3,000 to 5,000 times its weight of rose petals. Wheat, corn, tobacco, wine, and raw silk are also staple products.

3. *The Balkan Foreland,* the home of the greater part of the population, is a low plateau covered with steppe vegetation, sloping gently northward to the Danube. The rivers have cut such deep gorges in its surface that they are not only of little use for irrigation or transportation routes, but in fact serve to obstruct the east-west movement. The soil is fertile but lies on a porous limestone so that it dries out quickly, resulting in frequent droughts.

A portion of the great cereal belt of the lower Danube Valley, it is the region of grain surplus, especially wheat and corn. In general the latter is grown in the moist valleys, the wheat on the higher land and sheep and cattle on the uplands. Toward the Black Sea the climate is more moderate, favoring the growth of tobacco and the vine, the former constituting the country's chief item of export.

Transportation Facilities. *Outlets to the Black Sea.*—The natural outlet for the surplus grain is the Danube, which is navigable for boats of 7 feet draft, but which is blocked by ice for 3 months out of each year. Ruschuk is the chief Danubian shipping point, the grain being

transferred at Galatz onto Black Sea vessels, while Varna and Burgas on the Black Sea are of secondary importance.

Except for the Danube on the northern boundary, the rivers of Bulgaria as a whole are of little commercial importance. Their courses, originally directed to the Black Sea, have been changed, by the uplifting of the coast, either to the north or the south, minimizing their value as commercial routes. Thus the Danube has been deflected northward, the Maritza and Tunja southward. With the loss of both Thrace and the

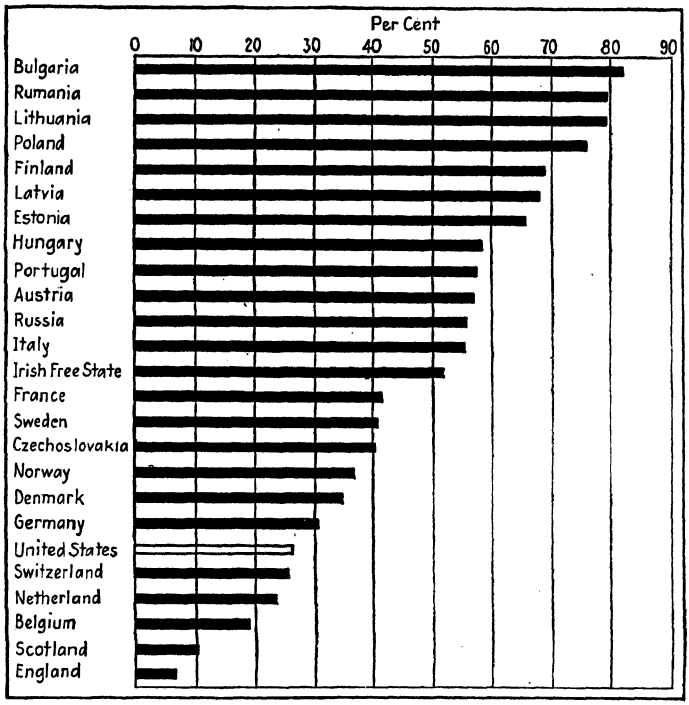


FIG. 316.—Percentage of population of various countries engaged in agriculture and fishing. Note the change as one goes from southeastern to northwestern Europe. (*Data chiefly from International Statistical Yearbook*, 1928.)

Dobrudja, the mouths of Bulgaria's chief rivers have been placed outside her boundaries.

Aegean Outlets.—Although the country lost her frontage on the Aegean, she was guaranteed an economic outlet through Greek territory. Free transit privileges with port facilities at Dede Agach are hers if she wishes to avail herself of them, and Thessalonike has a free port giving access to the sea to both Yugoslavia and Bulgaria. The full utilization of these facilities will, however, be realized only when the ill feeling between these countries gives way to friendly cooperation.

Agriculture.—Agriculture is decidedly the mainstay of Bulgaria, to even a greater extent than in the other Balkan states. Eighty-four per

cent of the population are dependent upon the soil—the highest percentage of any European country (Fig. 316). About one-third the area is cultivable, and 28 per cent in forest. The Bulgar is a hard-working, patient, but ignorant and conservative farmer, using primitive methods and securing yields which are unnecessarily low. Irrigation, crop rotation, and fertilization all offer possibilities for greatly increasing the production. The question of land tenure, so vexing in neighboring states, is here of little consequence, since few large estates exist, the holdings rarely exceeding 15 or 20 acres, and these already in the hands of the peasants themselves.

Sofia, the capital of Bulgaria, lies in a small basin close to the western frontier, marking the intersection of several important trade routes. It is on the main transcontinental line from Beograd and Nish to Plovdiv and Istanbul. In addition, it communicates via the Isker northward to the Danube Valley and southward to Skoplje, but the latter has no railway beyond the frontier. Plovdiv is the second city of the country in size and an important agricultural center.

With but scanty resources in minerals and water power, Bulgaria is among the least industrialized countries of Europe; even the old household handicrafts are disappearing before the importation of cheap factory-made goods. A little lignite and some copper are mined, but their value is almost negligible.

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CHAPTER XXVI

MEDITERRANEAN ASIA AND AFRICA

TURKEY

Historical Background.—The Turks were the last of the Asiatics to invade Europe. During the sixteenth and seventeenth centuries the empire was extended to its maximum limits and included most of the Balkans, Rumania, southern Russia, and Hungary, as well as southwestern Asia and northern Africa. Their defeat before Wien in 1683 marked the beginning of their decline, the break-up proceeding rapidly during the nineteenth century. Turkish rule has been long recognized as a blight upon the lands under its control and would have long since been banished from Europe except for the jealousy of the powers, no one of which wanted to see a strong rival in possession of that strategically located region.

Present-day Turkey is practically synonymous with Asia Minor (Anatolia). Though still retaining control of both sides of the straits, her actual holdings in Europe comprise only about 3 per cent of her total area. The demilitarization of the straits, the removal of the Turkish political capital to Ankara (Angora), and the abolition of the caliphate leave her possessions in Europe but a mere outpost of the real Turkey, which is now practically an Asiatic country.

Turkey in Europe

A Steppe Land.—European Turkey lies between the Maritza and the Black Sea, and includes an area slightly larger than that of Massachusetts. It is an undulating plains region with low mountains along the coast. The low precipitation with a marked winter maximum makes of it a dry steppe district given over mainly to grazing. Thus Istanbul receives 3.1 inches in the warmest 3 months and 10.9 inches in the coldest 3 months.

Significance of Position.—Devoid of mineral, forest, or even agricultural wealth of importance, the chief interest of European Turkey lies in its commercial and strategic importance. It is situated where the great overland bridge route between Europe and Asia crosses the water gateway of the Black Sea basin.

The Maritza along the western boundary is sluggish and shallow, entirely unsuited for commerce, but its valley provides a convenient railway outlet to the Aegean, especially for Bulgaria.

The overland intercontinental route from Paris and Berlin passes via Istanbul across Asia Minor and down the Mesopotamian Valley to the Persian Gulf. The value to Turkey of the European section of this road has been thus far primarily strategic. The water route to the North Sea countries, though longer, is cheaper and only through traffic which can ignore the high transport costs will move by railway.

Istanbul.—Istanbul occupies a unique site at the intersection of these two great world routes. The Bosporus, upon which the city is located, the Sea of Marmara, and the Dardanelles (Hellespont) constitute a narrow cleft between the Rhodope and the Anatolian massives—old blocks formerly continuous (Fig. 317). It is the passage through

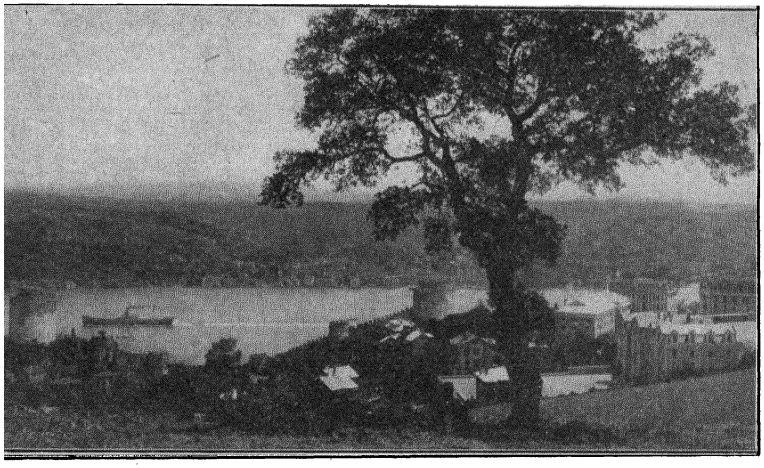


FIG. 317.—Istanbul and the straits. The towers on the Bosporus and Robert College. (*U. S. Department of Commerce.*)

which much of the foreign trade of southern Russia and other Black Sea countries passes. As might be expected, much of the trade of the port of Istanbul is transit and entrepôt in character. Thus of some 5,000 vessels entering its spacious harbor, the Golden Horn, only about one-sixth used that as their terminal port. One-third of Turkey's prewar imports entered via Istanbul, but the exports went chiefly via Smyrna.

The natural defenses of the straits, like their commercial advantages, are unexcelled; the only outlet of the Black Sea, the waters are deep and narrow, with a surface current flowing in the middle of the straits toward the Mediterranean[1] and with both sides lined with hills admirably adapted for defense. The city is almost impregnable and is the key to the Black Sea as fully as Kobenhavn is the key to the Baltic.

[1] Used during the World War to float mines into the attacking fleet outside the Dardanelles.

Turkey in Asia

A Plateau Peninsula.—Anatolia is a peninsula in outline and a mountain plateau in relief. The elevation, however, is considerable, 3,000 to 4,000 feet, increasing eastward to the highlands of Armenia. Folded mountains run along the Black Sea margin and the Mediterranean coast, making entrance to the interior easiest from the Aegean or western side. Plains areas are few—only along the river valleys and the district about the lakes, such as Van, are there low level regions. The Cilician plain near the northeastern corner of the Mediterranean, though small (5,000 square miles), is one of the richest agricultural areas of Turkey.

Except on the Aegean side, Asia Minor is shielded from the moderating ocean winds so that most of the peninsula has hot summers and rather cold winters. The most critical element of the environment, however, is the rainfall, which varies from 22 to 33 inches along the coast to 8 to 14 inches in the interior, with a marked winter maximum. As a consequence most of the plateau is semiarid, the rainfall decreasing eastward.

Agriculture the Chief Dependence.—Agriculture, with special emphasis upon the pastoral phase, is the chief dependence of the Turkish Republic, and the bulk of the population derive their support from the soil, the country's exports being dominated by the returns from the crops and herds. In spite of the important role played by agriculture, only 18 per cent of the land is cultivated, and the yields per acre are among the lowest of any country. Two natural factors, mountainous topography and scanty precipitation, limit agricultural activities, yet the variation in topography, soil, and climate have resulted in a marked diversity rather than a large volume of products.

Retardation Due Chiefly to Human Factor.—Although climatic and topographic conditions are not highly favorable, the chief explanation of the unpromising conditions in Turkish agriculture lies in the human factor. Large areas are susceptible of irrigation, yet artificial watering is seldom used; commercial fertilizers are practically unknown and animal manures used but little. Large-scale production and the use of modern methods and machines are rarely found. Most of the plowing is done with a wooden stick, tipped with metal and drawn by oxen. Grain is still cut with a crude sickle, bound by hand, threshed by spreading it out on the hard earth and dragging over it a sledge, into the bottom of which there have been fastened pieces of flint (Fig. 318). The straw is separated by winnowing. Flour is made by hand, using stones for grinding. Highways are often almost impassable and railways are few. Taxation was destructively burdensome, particularly under the old system of "farming out" to individuals for a certain sum the revenue to be raised. All sorts of abuses characterized the collection of these tithes. The larger the harvest produced the greater the temptation to the tax

gatherer, so that any production beyond bare necessity was discouraged. Frequent wars have drained the country of a large proportion of its able-bodied men, leaving agriculture but poorly manned, and ruined the extensive irrigation system of an earlier day. Land ownership by the peasant developed into a sort of feudal system of share tenancy, for sooner or later poverty and oppression drove him into debt under such conditions as to make it practically impossible for him to free himself.

The new Turkish Republic has inaugurated many reforms which should improve the lot of the peasant, but centuries of neglect and suffering will require much time for remedy, especially since illiteracy is so



FIG. 318.—Ancient type of threshing board in general use throughout Turkey and the Near East. Stones are fastened into the bottom of the board which is dragged over the grain. (*Courtesy Near East Relief.*)

general as to make the improvements in agricultural methods difficult by any other than expensive demonstrations.

Agricultural Specialties.—Among cultivated crops cereals play the major role, wheat and barley being the most important. The broad fertile plains of Hungary, Rumania, and Russia, however, are much better suited for cheap grain production, so that in the foreign markets Turkish efforts are centered more upon specialized types of produce for which she has unusual facilities. Thus there is a considerable export of dried fruits, tobacco, cotton, opium, and high-grade hides. Tobacco ranks next to grain in importance and is first in value among the exports. Sections tributary to Samsun on the Black Sea produce a superior tobacco much prized for cigarettes. Figs reached a prewar export value of about $3,000,000. Olives, chiefly in western Anatolia, occupied

in 1913 about 500,000 acres, but the destruction during the war has greatly reduced the present output. Licorice root and attar of roses are exported in small amounts.

Emphasis on Pastoral Phase in East.—Eastward from the Aegean the rainfall decreases, temperature extremes increase, the elevation becomes greater, the vegetation sparser, so that, except in a few favored spots, cultivated crops give way to pastoral pursuits.

Sheep are almost as numerous as cattle and goats together, and there are about twice as many mules and asses as horses. Northeast of the capital city of Ankara there are several million Angora goats supplying mohair for export. Reduced during the war, the output in 1924 was about one-half that of 1913. Originally a native of this region, the Angora goat has been transplanted to South Africa which now supplies twice as much mohair as does Turkey.

Forests.—The mountainous borders along the northern and southern margins of the peninsula receive more rainfall and are forested, particularly along the Black Sea coast, where some three-fourths of the wooded areas are to be found. Lack of transport handicaps exploitation and the timber cut is insufficient for even domestic needs, though there is considerable export of valonia for tannin. Forest conservation has never been practiced and the more accessible timber has long been cut. The extensive pasturing of goats has also made forest renewal difficult.

Mining is an ancient industry in Turkey, but while a considerable variety of minerals is found the actual output is small and the potential resources unknown. Coal, silver, copper, and lead are mined regularly, while the country ranks high as a producer of chromium, boracite, emery, and meerschaum. Again, absence of means of communication, scarcity of man power, and political red tape, which makes the obtaining of mining concessions difficult, have been obstacles to the development of the industry.

Inadequate Transport.—In spite of its peninsular form with a long coast line and despite the intermediate position between East and West with its possibilities of transit trade, transportation facilities in Anatolia are woefully inadequate. No country of Europe, not even in the backward Balkans, has so few miles of railway in proportion to population. As a consequence, the productive areas of Anatolia which, because of topography and climate, are in scattered patches remain isolated and unable to dispose of their surplus. Freight rates (June 14, 1924) on wheat from New York to Istanbul were only 57 per cent of those from Ankara to Istanbul—a distance of 270 miles. The roads—so called—are mainly remnants of ancient caravan trails, dusty and stony in summer, extremely muddy and practically impassable in winter. Road-building material is abundant everywhere, yet even where sporadic efforts at the construction of metaled roads were attempted, the works were promptly allowed

to fall into disrepair. Except for a portion of one line all the railways constructed previous to the World War were by foreign capital and enterprise.

The Berlin-Baghdad railway which passes via Adrianople and Istanbul is continued through Anatolia via Konia, transverses the Tarsus ranges by way of the Cilician Gates to Adana, thence eastward to Nisibin, leaving an unfinished gap of about 100 miles between the latter point and Kala-Shergat in Syria and Iraq.

The new government realizes the necessity for improving transport facilities, as fundamental to the success of its other reforms, and is attacking the problem energetically.

Chief Cities Are Ports.—The cities of Anatolia are chiefly coastal terminals of transportation routes. Smyrna on a well-protected bay and with fair transportation to the interior is the chief port. Formerly largely Greek in make-up it was assigned to Greece in 1920 but was regained by Turkey after a short war with that country. The expulsion of Greeks and the burning of a large part of the city will make conditions of trade and industry abnormal for some time. Tobacco, skins, raisins, and rugs are characteristic exports.

Trabzon (Trebizond) on the Black Sea has for centuries been the northern terminus of caravan routes. Both it and Samsun, a famous tobacco port, have open roadsteads rather than harbors. Mersin (Mersina) on the Mediterranean ranks next to Smyrna in importance among Turkish ports. It is the outlet of the rich Cilician Plain, the cotton region of Turkey.

SYRIA AND PALESTINE

Political Regions.—The eastern Mediterranean region formerly referred to in general as Syria is now divided politically into Syria and Palestine, the former a mandate of France and the latter of Britain. Syria, the northernmost and by far the larger of the two, is roughly triangular in shape, with the base along the Mediterranean coast, the apex extending inland to the Tigris River. Palestine, to the south, is only about one-sixth as large as Syria and is confined to the narrow strip between the Mediterranean and the Jordan rift valley (Fig. 319). On the south it reaches to the Gulf of Aqaba of the Red Sea so that it spans the entire width of the land connection between Africa and Asia.

TOPOGRAPHY

Plateau with Regular Coast.—The barrier character of the Mediterranean border of Anatolia is continued along the eastern coast of that sea. Here, however, it is a plateau rather than mountains, the elevation varying from 2,000 to 4,000 feet. The coast line is markedly regular. From

the Gulf of Alexandretta to Egypt there is no harbor worthy the name. Between the plateau and the sea a coastal plain has been built up from the sediment contributed by the Nile and carried along by currents. North of the Mount Carmel promontory this plain is very narrow but to the south it widens to 15 to 20 miles.

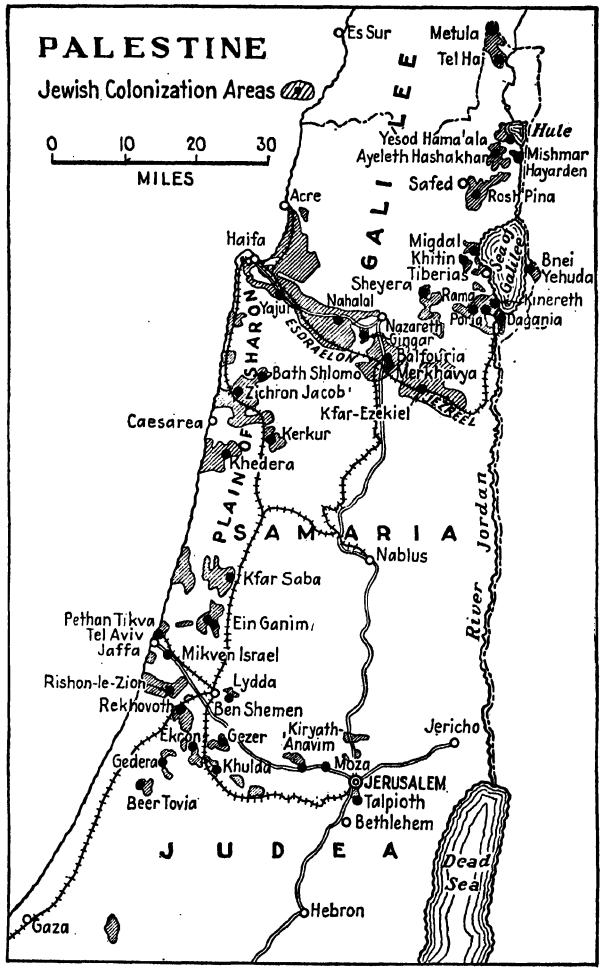


FIG. 319.—Palestine. (*Courtesy Geog. Rev., published by the American Geographical Society of New York.*)

The Two Great Depressions.—The southern part of the plateau is interrupted by two depressions. One is a great rift valley, a deep narrow trench running from north to south and forming the eastern boundary of Palestine. Within this trench are included the waters of Merom, Galilee, Jordan River, and Dead Sea. The shores of the latter are 1,293 feet below sea level, the lowest land surface on the globe. The second

depression forms the plain of Esdraelon which joins the rift valley to the Mediterranean just north of Mount Carmel promontory.

TRANSPORTATION

Desert and Mountain Barriers.—The major topographic features—coastal plain, plateau, rift valley, and desert plateau—all run north and south. Fortunately, however, there are several gaps by which movement between Mesopotamia and the Mediterranean is facilitated. These gateways have for centuries been of the greatest importance as routes both for war and commerce. The aim has been to find a way around the Arabian Desert—a most effective barrier (Fig. 320).

The Three Great Natural Routes.—On the north the Tigris-Euphrates headwaters approach rather closely to the Mediterranean and here also

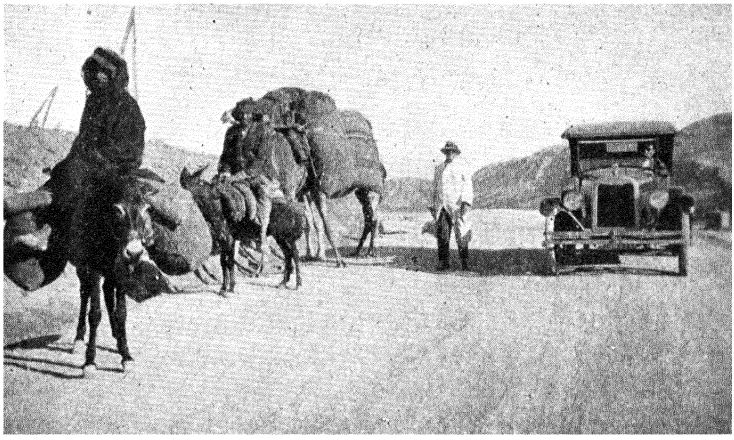


FIG. 320.—Yesterday and today near Jerusalem. (*Courtesy Near East Relief.*)

the plateau is low and easily crossed by means of the valley of the lower Orontes which enters the sea north of the Lebanon Mountains forming the historically important "Syrian saddle."

Communication via land between the Mesopotamian and Nile valleys was usually along the narrow coastal plain of Palestine to Mount Carmel, thence inland using the plain of Esdraelon and across to Damascus. From here it was about 150 miles over the desert to the Euphrates Valley (Fig. 321).

At the southeastern corner of the Mediterranean the plateau barrier again sinks at Suez. This route, which before 1869 made use of the Red Sea, then overland by caravan across the isthmus, was in bad repute because of the difficulties of sailing in the northern part of that water. To avoid this, much traffic moved via the lower Nile to Thebes, thence overland to the Red Sea. With the cutting of the canal and the intro-

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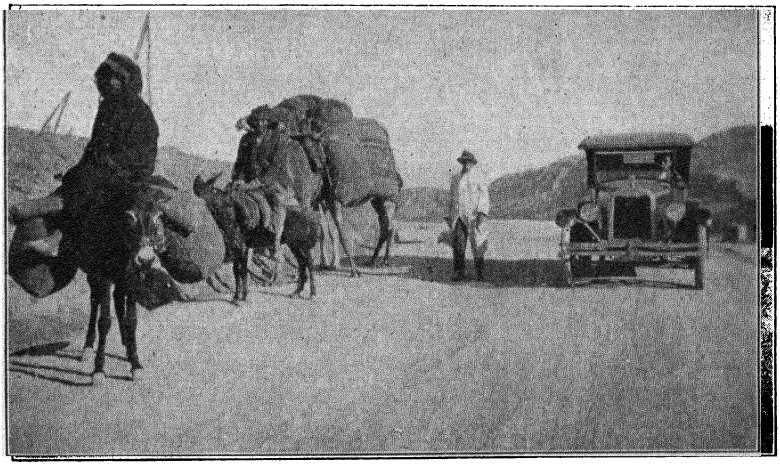


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the plateau is low and easily crossed by means of the valley of the lower Orontes which enters the sea north of the Lebanon Mountains forming the historically important "Syrian saddle."

Communication via land between the Mesopotamian and Nile valleys was usually along the narrow coastal plain of Palestine to Mount Carmel, thence inland using the plain of Esdraelon and across to Damascus. From here it was about 150 miles over the desert to the Euphrates Valley (Fig. 321).

At the southeastern corner of the Mediterranean the plateau barrier again sinks at Suez. This route, which before 1869 made use of the Red Sea, then overland by caravan across the isthmus, was in bad repute because of the difficulties of sailing in the northern part of that water. To avoid this, much traffic moved via the lower Nile to Thebes, thence overland to the Red Sea. With the cutting of the canal and the intro-

duction of steam navigation, traffic via Suez has assumed great importance and constitutes the main connection between Mesopotamia and the Nile basin.

The Pilgrim Railway.—But one railway, the Pilgrim Railway runs the entire length of the eastern Mediterranean region. From Alep (Aleppo) in the north it passes through Homs and Damas (Damascus) east of the Jordan Valley to the Mohammedan holy city of Medina. Built by contributions from the faithful from all over the world it was primarily intended for pilgrims visiting the holy city. It is joined with the coastal ports at Alexandretta (by the Berlin-Baghdad Railway) at Tripoli, (Beyrouth,) and Haifa (via the Esdraelon Plain). From Haifa a railway follows the coastal plain around to Port Said and Alexandria.

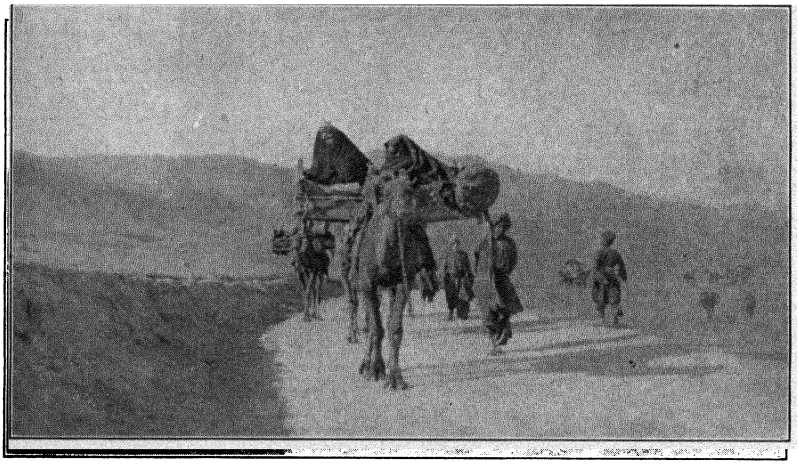


FIG. 321.—Camel train in Syria. (*Courtesy Near East Relief.*)

For the most part, since the population is close to the coast, the chief need for railways is to connect the interior with the nearest seaport.

Beyrouth is the chief port of Syria; Damas in a large and productive oasis is the main commercial center as well as the capital, and Alep is a nodal point at the crossing of routes in north Syria.

CLIMATE

Climatic Limitation.—The climate of the Levant is of an extreme Mediterranean type. The rainfall is generally light but varies with elevation and exposure. The maximum precipitation (about 40 inches) is on the western slopes of the Lebanon Mountains in southern Syria; part of ancient Phoenicia; while northern Syria's lower elevation furnishes access for the sea to the interior, it is arid. Southward from the Lebanon ranges, the rainfall along the coastal plain of Palestine is, on the average, barely sufficient. The plateau between the coastal plain and the rift

valley receives in normal years enough for drought-resistant crops. Not only is the precipitation over much of the entire region light but uncertain as well, and droughts with attendant crop failures are not infrequent. The plateau of Judea receives 26 inches on the average,

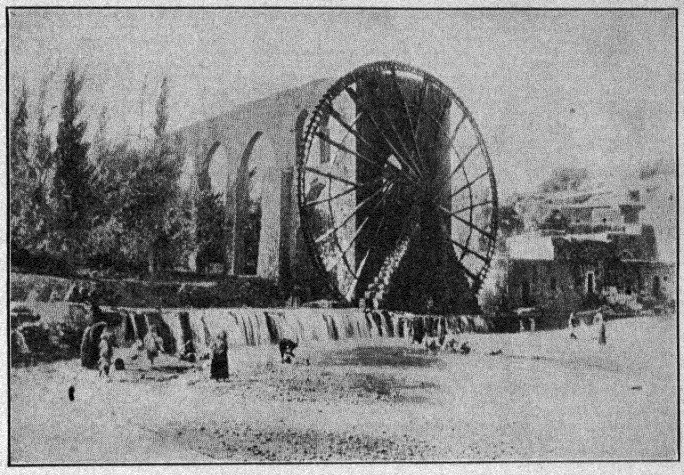


FIG. 322.—Wooden water wheel, Hama, Syria. The water is lifted in pots attached to the rim. The wheel is driven by float boards on the rim which dip into the stream. (*Courtesy Science and Art Museum, London.*)

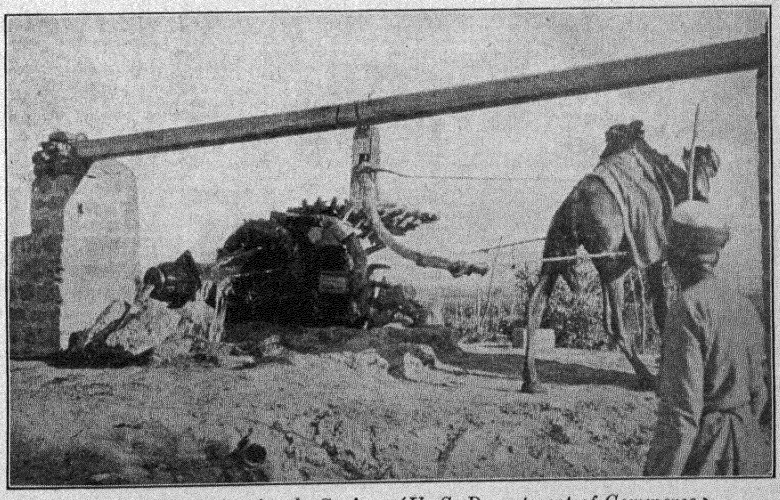


FIG. 323.—Irrigation in Syria. (*U. S. Department of Commerce.*)

but for one year in every five the precipitation is considerably below that and crops are seriously reduced. The rainfall of Jerusalem varies from 12.5 to 42 inches.

Water for irrigation is limited. The Jordan Valley is too deep for plateau irrigation and its own flood plain too hot and unhealthful to be

the home of an energetic people. There is estimated to be some 425,000 acres under irrigation in Syria and Palestine (Fig. 322). While this area will undoubtedly be increased somewhat, the possibilities are not great and the chief reliance must be placed upon drought-resistant crops and dry-farming methods (Fig. 323).

Agriculture

General Conditions Affecting Agricultural Development.—The chief crops are the cereals, principally wheat and barley, with cotton, tobacco, fruit, and vegetables playing a minor role. In neither Syria nor Palestine is there sufficient production of staples, such as cereals, to supply domestic needs. The only agricultural surplus for export is in specialized lines, such as cotton, fruit, vegetables, and tobacco.

Climatic limitations have emphasized the pastoral industries. Syria has about the same area and population as Wisconsin, yet three-fourths of its inhabitants are nomadic. Only about 5 per cent of its surface is cultivated and the response to steppe conditions is seen in dependence upon grazing. Syria has five times as many goats and ten times as many sheep as it has cattle, and wool is a leading export item.

Political, economic, and social conditions must share with climate the responsibility for backward agriculture. The whole region has, until very recently, felt the retarding influences of Turkish rule. These transit lands, like the Balkans, have been fought over from the earliest times, and the medley of races and religions found there is still subject to frequent warfare. Syria has been the scene of almost continual disturbance since the French took charge in 1920.

Primitive methods, crude tools, and a neglect of even ordinary means of conserving soil fertility characterize native farming in Palestine. Nine bushels of wheat and 5 bushels of barley per acre are common yields in Palestine but have been changed to 20 and 40 bushels, respectively, on farms of German colonists.

The Jewish State

Problems of Its Establishment.—In view of the poverty of resources of the country it will be interesting to note the movement to reestablish in Palestine a Jewish State (Fig. 319). Since Britain assumed the mandate the population of Jews has doubled, the immigrants coming largely from central and eastern Europe. The major settlements thus far have been on the better lands—the coastal plains, the Esdraelon depression about Galilee, and in the central part of the Judean Plateau. Outside of Palestine the Jews have been chiefly a non-agricultural people. Transplanted to a country whose sole opportunity lies in the development of its soil resources will of necessity call for a marked change in their

mode of life. The whole scheme is still in the experimental stage and the real test of its success must await the withdrawal of artificial support and the end of the period of abnormal building and rehabilitation activities which at present employ many of the new settlers. One of the chief problems is to make Jew and Arab live peacefully as neighbors, and the proposal has been made that the Jewish element be cultural rather than the main economic or political influence.

CYPRUS

Cyprus, a British island in the northeastern course of the Mediterranean basin, is of minor importance. Much of the island is so mountainous that, with the scanty rainfall, a large proportion of it is almost barren. Considerable grazing is carried on and some olives and vines are raised. Irrigation works are being planned. The chief value of the island is as a strategic base for Britain.

MEDITERRANEAN AFRICA

European Africa.—The African margin of the Mediterranean is a narrow fringe, green in winter, between the desert proper and the sea. The width of this productive strip varies with the amount of water available either as rainfall or from wells and streams. In only one place —Egypt—is there a fertile band running southward entirely across the desert. Westward from the Nile, Libia, Tunisie, Algeria, and Maroc consist of a productive coastal zone which rapidly merges southward into the Sahara. These countries, while physically a part of the African continent, are economically European—political outliers of Italy, France, and Spain.

EGYPT

The Real Egypt an Oasis.—Within present-day Egypt is the world's largest oasis and the seat of one of its oldest civilizations. Possessed of a marvelously fertile flood plain, protected by vast deserts, it has in the great river Nile not only the life-giving waters but the all important stimulus of an alternately productive and unproductive season occasioned by that river's periodic rise and fall. Well favored by nature it supported a vast empire with an advanced civilization while Europe was still an unbroken wilderness.

Superficially Egypt is a vast territory, half again as large as Texas, yet the real Egypt—the habitable productive region—is less than 4 per cent of that area. The country is a section of the old World Desert, which, under various names, occupies the northern one-third of Africa and crosses central Asia. Except for the oasis of the Nile and a few small watered areas, Egypt is a barren desolate expanse of sand, rock,

and gravel (Fig. 324). Practically all of the 14,000,000 inhabitants live almost within sight of the river. The rainfall is negligible and temperatures average high, so that the whole economic life centers about irrigation. Only in India and China is there greater dependence of a large population upon artificial watering.

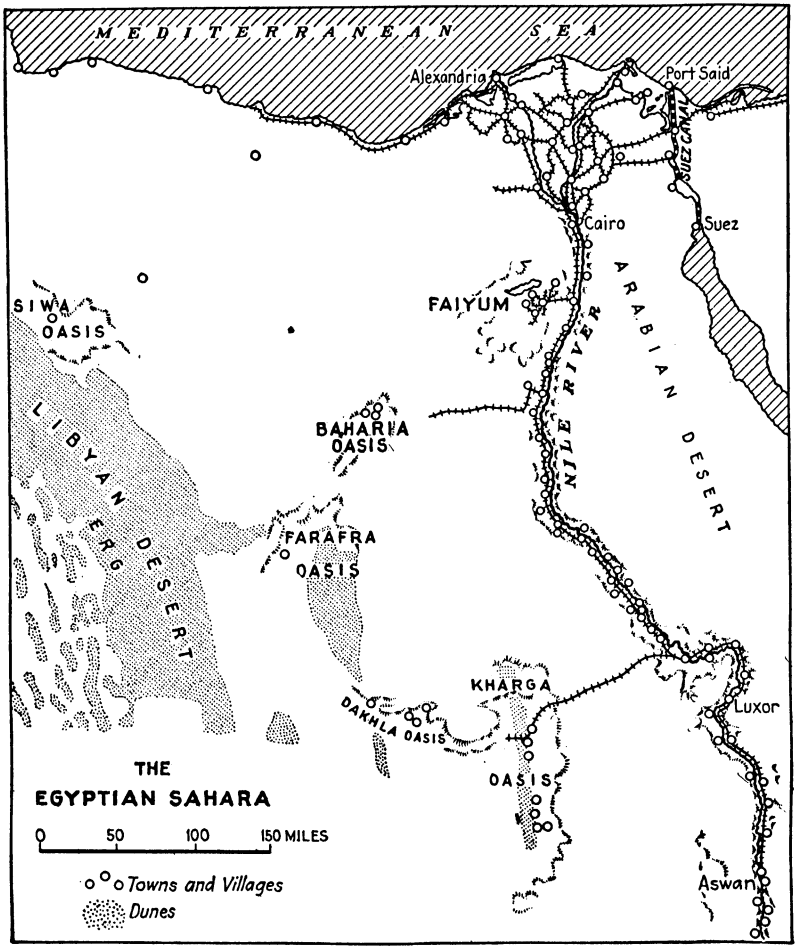


FIG. 324.—Life in Egypt, as indicated by the villages and railways, is confined to the immediate vicinity of the Nile and Suez. (*Courtesy Geog. Rev., published by the American Geographical Society of New York.*)

THE NILE

Physical Character of the Streams.—The Nile and its flood plain constitute the real Egypt. Among the world rivers the stream ranks high, both in its physical proportions and in its economic importance

Only the combined Mississippi-Missouri is longer, and few, if any, of the world's rivers are so necessary to the support of such a large population.

Rising in Victoria Nyanza in equatorial Africa it flows northward 3,670 miles to the Mediterranean. Throughout almost the entire lower half of its course, while crossing the desert, no tributaries are received and the volume of the river is considerably reduced by seepage, evaporation, and the withdrawal of water for irrigation. It is estimated that only 3 per cent of the precipitation which falls on its drainage basin is actually delivered at its mouth, as compared with six times that proportion by the Mississippi or Amazon. The valley in Egypt varies from 2 to 15 miles in width and ends in a large delta. For navigation the river is only of local importance, being interrupted by six cataracts between Khartoum and Assuan.

Significance of the Periodic Floods.—The periodic fluctuation in its volume is of the utmost significance. At Khartoum, on the southern edge of the desert, the Blue Nile from Abyssinia joins the main stream, the White Nile. The summer monsoon together with the melting of mountain snows of Abyssinia causes the Blue Nile to be in flood in late summer. The White Nile is much more regular, since its source is in a region having two rainy seasons annually, while in addition the flow is regulated by the lakes in its upper basin. High Nile lasts from September to January, the rise at Cairo averaging about 25 feet.

Under the old system of irrigation the rising flood waters were let into the fields enclosed by dykes which retained the waters for 5 to 10 weeks, thoroughly soaking the land and leaving a thin film of fertile mud. After the water was drained off quick-growing crops were planted and harvested, and then the land lay baked until the next annual rise.

The modern system, made possible by an elaborate series of dams and storage reservoirs, is designed to furnish perennial irrigation. It allows the cultivation of a larger area, the growing of several crops a year, or of crops requiring a longer maturing season, also those requiring the higher temperatures of summer. Furthermore, the water is much better controlled and crop production is correspondingly more certain.

Agriculture

Importance of Cotton.—As a result of the improvement in irrigation, there has been a great increase in agricultural output and a corresponding growth in population, making possible the large production of the famous Egyptian cotton grown particularly in the delta region (Fig. 325). Egypt ranks fourth among cotton-producing countries, its average yield per acre being more than twice as high as that of the United States (Fig. 326). The superior fitness of this cotton for certain uses led to its rapid increase, until it has become the chief export and the barometer

of Egypt's commercial prosperity. It constitutes about four-fifths of the value of all exports. Recent low prices have moved the government to limit its area to one-third the total cultivated land. In addition to cotton, corn, wheat, barley, rice, and sugar cane are raised, chiefly for domestic use.

Agriculture Primitive.—The vast majority of the population are peasant farmers, illiterate and miserably poor. The holdings are almost

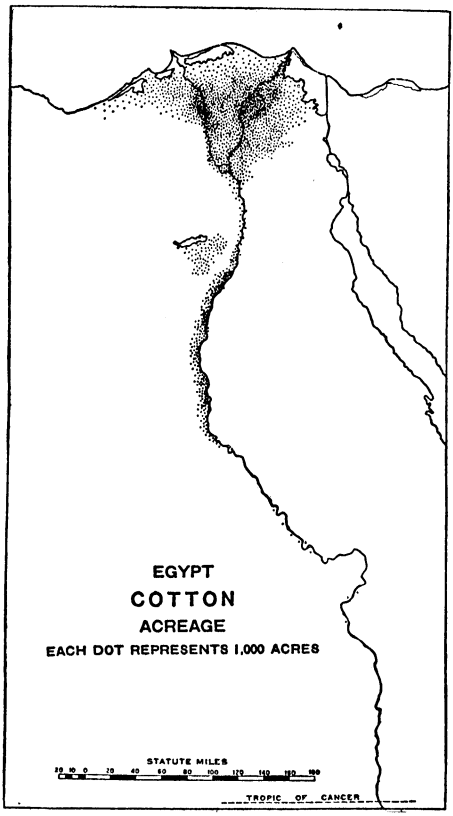


FIG. 325.—The bulk of Egypt's cotton is grown on the delta. (*U. S. Department of Agriculture.*)

unbelievably small, some being less than a meter in width. Houses are of adobe, furnished with only a few copper and earthenware utensils, and in some cases are even without roofs. The climate allows and poverty compels the fellah to spend nearly all but his sleeping hours toiling on his little plot. Agricultural methods are extremely primitive, tools crude and inefficient, but labor is cheap and *farming* is *gardening*. The yields per acre, although declining in recent years, have been high and are very regular. The population, restricted to the irrigable portion

of the Nile, rises in the delta to over 1,100 per square mile, possibly the densest of any agricultural region of the world, except parts of China and India.

International Importance

British Interest in Egypt.—Egypt's position, like that of the other states of the Near East, makes the country of peculiar international interest. Her position astride the Nile whose valley is the natural link in the Cape to Cairo route, and her possession of the land bridge between the Mediterranean and Red seas on the important Suez link

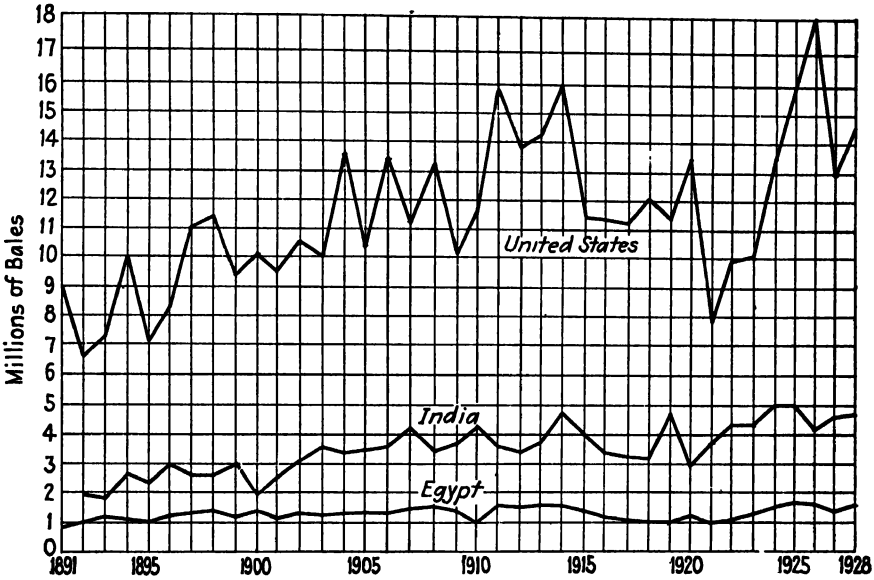


Fig. 326.—The Egyptian cotton crop, though small, has the highest yield per acre and is comparatively free from the fluctuations characteristic of the crops of the United States and India.

in the route to India places her in strategic command of these two routes. The control of these communications, or at least their protection from possible interruption of service by an enemy country, is obviously of deep concern to Britain. As a consequence, it seems improbable that a protectorate over Egypt will ever be surrendered by Britain without adequate safeguards being provided for these routes.

Another problem of international importance concerns the use of the Nile. Britain owns the Egyptian Sudan, and the development of that country involves the use of Nile waters for irrigation, while the extension of agricultural land in Egypt calls for their further use. Obviously the equitable division of the irrigation supplies from that river as demands increase will necessitate continual cooperative effort on the part of both countries.

On the northeast Egypt is joined to Asia by the Isthmus of Suez and the Sinai Peninsula, both politically a part of Egypt. The Suez Canal is approximately 104 miles in length, without locks, and will admit vessels of 30 feet draught. Built in 1869 by the Frenchman, De Lesseps, it is owned and operated by the Suez Canal Company, the British Government being a majority share owner. It is financially very profitable, over 6,000 vessels passing through it annually (Fig. 327). Improvements now being made will increase the depth to 40 feet.

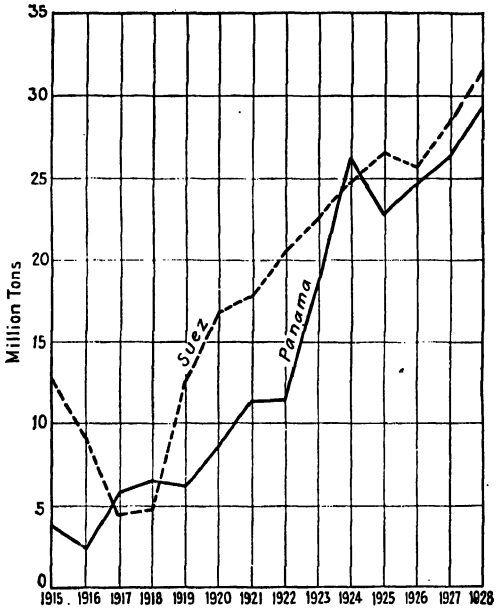


FIG. 327.—Net tonnage of ships passing through the Panama and Suez canals from 1915 to 1928. (*U. S. Department of Commerce.*)

WEST OF EGYPT

A Wide Expanse of Territory of Limited Value.—The total area of the African countries bordering the Mediterranean west of Egypt is about 1,500,000 square miles. As in Egypt, however, these figures are misleading, for much of the territory nominally included within the political boundaries, which often are nothing more than military picket lines, is neither Mediterranean nor European but desert and included merely for administrative and strategic purposes (Fig. 328). It is significant of the economic importance of this vast area that it has a population and an irrigated area only equal to the population and the watered area along the Nile.

Nowhere is there a counterpart of that river and its flood plain. Only where elevations are sufficiently high to cause local precipitation is there

production. Where this is lacking, as in much of Libia, the cultivated area is reduced to almost negligible proportions. Being on the southern margin of the belt of prevailing westerlies in winter when they are farthest south, the rainfall is not only light but uncertain, and crop failure two

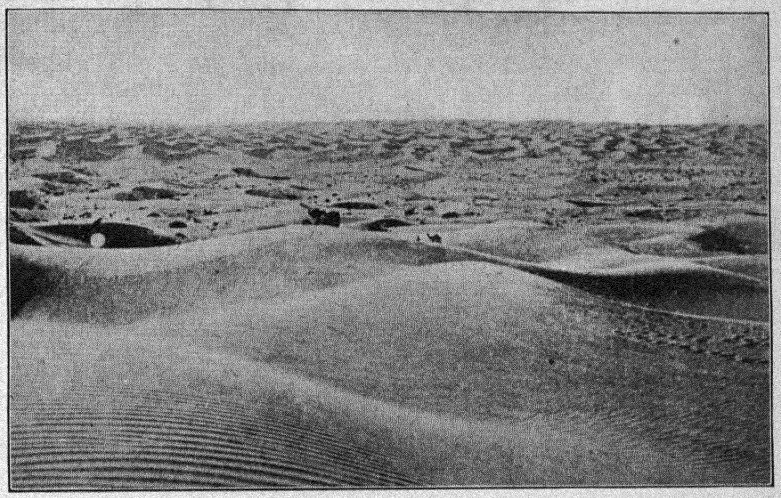


FIG. 328.—Dunes in the Algerian Sahara. (*Courtesy Geog. Rev., published by the American Geographical Society of New York.*)

years out of three is a fair average even for Algeria. The maximum rainfall occurs in winter as is characteristic of the Mediterranean in general.

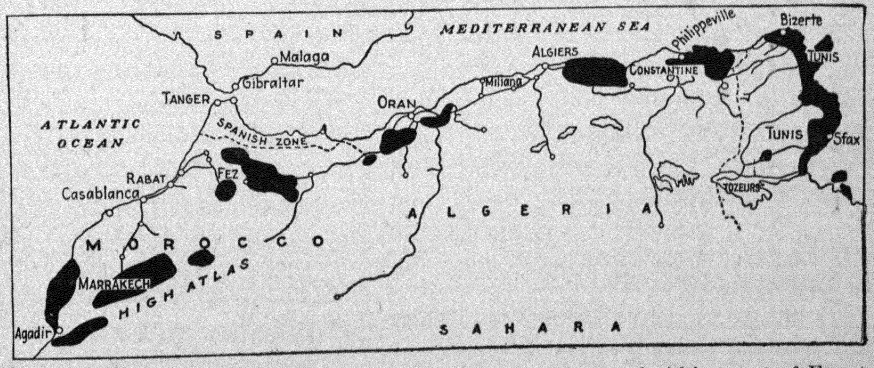


FIG. 329.—Railways and principal olive-producing areas of north Africa west of Egypt.

LIBIA

A. Land of Little Promise.—Acquired by Italy from Turkey in 1912, Libia is more than three times the size of the mother country, but counts less than 1,000,000 people. The population density of less than 2 per

square mile is indicative of its unpromising assets, and Italy is finding that the country offers slight relief for her own overcrowded acres. Less than 25,000 Italians live there, and the chief port, Tripoli, has but 60,000 people. Only a narrow belt along the coast and a few scattered oases are agriculturally productive, and the vast desert areas hold no promise of development. To the problem of dearth of natural resources is added that of keeping order among the native wild tribes, among which the Senussi have been particularly troublesome. The administration of the colony is estimated to cost Italy several times the total revenue received from it, as much as one-half of the latter being used for policing the country. Libia is the most unpromising strip of the north African

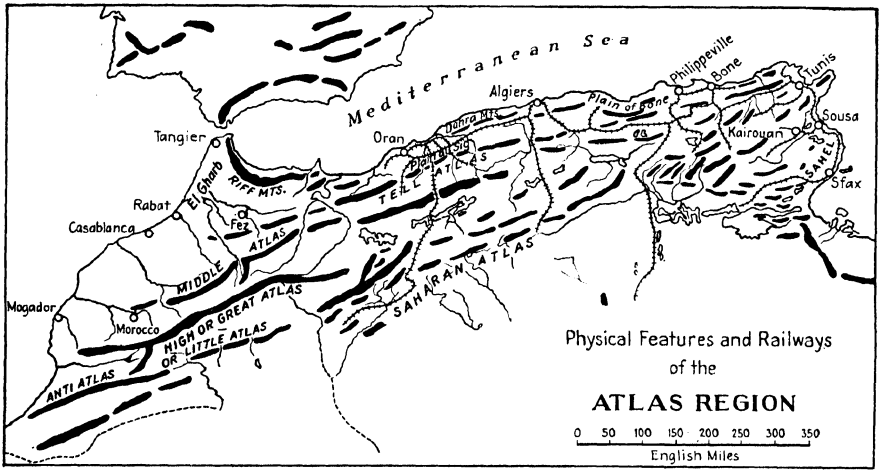


FIG. 330.—Physical features and railways of the Atlas Region. (*Courtesy MacMunn and Coster, Regional Geography of Europe, Oxford Press.*)

littoral, the least desirable remnant, left to the country which was last among European countries to secure African colonies, and so far must be considered a liability rather than an asset.

FRENCH NORTH AFRICA

The Atlas Country.—West of Italian Libia is French North Africa, made up of Tunisie, Algeria, and Maroc. Algeria is administered as a province of France, the other two as French protectorates. On the Straits of Gibraltar is Tangier, which, with a hinterland of about 140 square miles, is under international control, while a zone of 8,740 square miles, extending along the Mediterranean from the Atlantic 207 miles eastward, is Spanish (Fig. 329).

Political Background.—France has been active in north Africa for a century. Her initial interference was for the purpose of punishing the

pirates of Barbary and of safeguarding shipping. From this beginning she has gradually extended her influence, although her colonial policy has vacillated between indifference and enthusiasm. Her possessions, including mandates along the Mediterranean littoral, cover almost 1,000,000 square miles and have a population of over 12,000,000 of which about 1,000,000 are European. Her task of pacifying the native nomadic tribes has been slow and costly, involving up to 1927 an estimated expenditure in money alone of between $2,400,000,000 and $2,800,000,000.

France's aim in recent years in north Africa has been to insure foodstuffs and raw materials for her industries and soldiers for her armies. Since her own population is actually decreasing, if one excepts the territorial acquisitions, there is no need of new homes for her population. Her latest addition, Maroc, has been hers for less than two decades, and this accounts in large part for the primitive conditions still to be found there. Algeria and Tunisie are profitable possessions. Spain's control of a narrow zone in Maroc has been even more costly considering the size of the territory. It is extremely doubtful whether her north African possession will ever repay the money and blood spent to pacify it.

Physical Character and Economic Responses

Atlas Mountains.—The dominant physical feature of French North Africa is the Atlas Mountains—geologically a continuation of the Sierra Nevadas of Spain. The ranges of the Atlas run parallel to the coast, except at their ends. In eastern Tunisie and western Maroc the ranges terminate at the seacoast which here runs at right angles to the mountain axis. Thus at these two extremities access to the plateau region is easier and the coastal plain wider than along the north coast.

Between the Atlas and the sea is a coastal region of moderate relief. Except in Tunisie, where part of this plain lies in the lea of the Atlas, this region is highly productive and through its ports passes the country's foreign trade.

Use of the Land.—Wines, olives, early vegetables, and grain are produced in various sections of the coastal zone. Many of the Atlas spurs are forested, the cork oak being particularly valuable. The more highly developed specialties of this general region, such as wine and olive oil, are almost entirely absent from the export list of Maroc, since this country is much more primitive in its stage of development than the others. Barley, skins, wheat, and almonds provide ordinary necessities. In Tunisie, cereals are raised on the coastal margin, with olives just south, this province holding fourth rank among world olive oil producers (Fig. 331).

Mineral Resources

Phosphate.—Back of this immediate coastal strip the limited variety of resources includes the large phosphate deposits as an important asset. Although the average grade of north African phosphate is lower than the best Florida pebble, the close proximity of the former to the major world market (Europe) and its location close to the sea have stimulated its exploitation to a remarkable degree. In 1927 north Africa accounted for about five-sixths of the total European imports. Tunisie, whose product ranges from 58 to 68 per cent pure phosphate, has been the chief exporter, but the higher grade (70 to 78 per cent) of the Maroc product

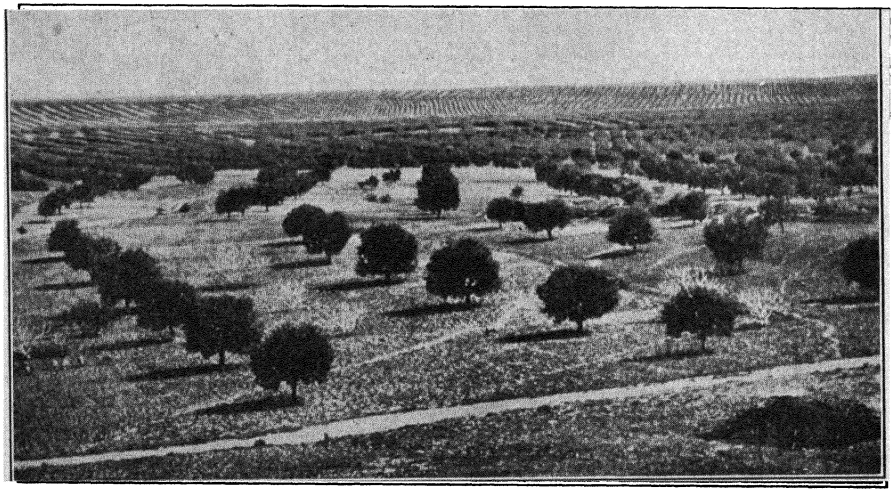


Fig. 331.—Dry land olive culture in northern Africa. (*Courtesy T. H. Kearney, U. S. Plant Industry Bureau.*)

is enabling that country to gain on Tunisie. The output of Algeria and Tunisie is now about the same.

In addition to the phosphate deposits the Atlas Mountains possess considerable reserves of iron ore. Their relatively high grade (50 per cent), low phosphorus content, easy availability to the coast, and occurrence in a non-industrial country make them of particular interest to the manufacturing countries of northwestern Europe. The production of about 2,000,000 tons of ore is about half that of Great Britain but a considerably larger proportion if based upon the iron content. Algeria accounts for about three-fourths and Tunisie one-fourth of the output. Like the Spanish ores, those of north Africa go largely to Britain. The output is limited at present, not by the reserves of ore, which are estimated to amount to between 100,000,000 and 150,000,000 tons, but by the inadequate transportation facilities.

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APPENDIX

STATISTICAL DATA[1]

TABLE I.—AREA AND POPULATION: PRINCIPAL COUNTRIES

Country	Area, square miles	Last census		Official estimates		Density per square mile	Largest city	Estimated population, thousands
		Year	Population, thousands	Year	Population, thousands			
Austria	32,372	1923	6,535	1929	6,694	206 8	*Vienna (Wien)	1,866
Czechoslovakia	54,196	1921	13,613	1929	14,611	269.6	*Praha (Prague)	774
Hungary	35,875	1920	7,980	1929	8,662	241.4	*Budapest	928
Germany	180,989	1925	62,411	1929	64,036	353 8	*Berlin	4,346
Switzerland	15,944	1920	3,880	1928	4,018	252 0	Zürich	223
Estonia	18,358	1922	1.107	1929	1,115	60 7	*Tallinn (Reval)	130
Finland	132,597[1]	1920	3,365	1928	3,612	27.2	*Helsinki (Helsingfors)	227
Latvia	25,402	1930	1,899	....	.....	74.8	*Riga	377
Lithuania	21,490	1923	2,029	1929	2,340	108 9	*Kaunas (Kovno)	97
Poland	149,957	1921	27.177	1929	30,733	204.9	*Warsaw (Warszawa)	1,086
U. S. S. R. (Russia)	8,244,228	1926	147,014	1929	153,800	18.7	*Moscow (Moskva)	2,142
Italy	119,744	1921	38,711	1929	41,508	346 6	Naples (Napoli)	976
Portugal (including islands)	35,796	1920	6,033	1929	6,440	179 9	*Lisbon (Lisboa)	530
Spain	195,040	1920	21,959	1928	22,603	115.9	*Madrid	817
Bulgaria	39,825	1926	5,479	1929	5,825	146.3	*Sofia	213
Greece	50,270	1928	6,205	.. .	.... ..	123.4	*Athens (Athenae)	453
Rumania	113,887	1912	7,235	1929	18,172	159.6	*Bucharest (Bucuresti)	875
Yugoslavia	96,737	1921	12,017	1929	13,500	139.6	Belgrade (Beograd)	260
Sweden	158,510[1]	1920	5,904	1929	6,120	38 6	*Stockholm	487
Norway[2]	119,653[1]	1920	2,650	1929	2,821	23.6	*Oslo	250
Denmark[2]	16,574	1925	3,435	1929	3,518	212.3	*Copenhagen (Kφbenhavn)	761
United Kingdom	94,278	1921	44,176	1929	45,741	485.2	*London (Greater)[3]	7,834
Irish Free State	26,601	1926	2,972	1929	2,951	110.9	*Dublin	419
Belgium	11,754	1920	7,466	1929	8,060	685.7	*Brussels (Bruxelles)	833
Luxembourg	999	.. .	.....	1927	286	286.3	*Luxembourg	52
France	212,736	1926	40,744	1929	41,130	193.3	*Paris	2,871
Netherlands	13,213	1920	6,865	1929	7,833	592.8	Amsterdam	749

[1] Land area. *Capital.

[2] Not including outlying possessions.

[3] The area of Greater London is 693 square miles. The area of registration London is 117 square miles and the population, 4,605,400. Neither population figure is closely comparable with New York.

[1] From the "Commerce Yearbook, 1930," vol. II, Foreign Countries, U. S. Department of Commerce, Jan. 25, 1931.

TABLE II.—CLIMATIC CONDITIONS: IMPORTANT CITIES

Country	City	Latitude and longitude, degrees	Elevation, feet	Mean temperature			Mean precipitation		
				January, ° F	July, ° F.	Annual, ° F	January, inches	July, inches	Annual, inches
Austria	Vienna (Wien)	48 N. 16 E.	666	29	67	49	1 4	2.8	24.6
Belgium	Brussels (Bruxelles)	51 N. 4 E.	131	34	63	48	2.2	3.1	29.6
Bulgaria	Sofia	43 N. 23 E.	1,804	27	69	49	1.5	2.7	25.5
Czechoslovakia	Prague (Praha)	50 N. 14 E.	656	29	66	48	1.1	2.6	19.5
Denmark	Copenhagen (Kobenhavn)	56 N. 13 E.	43	32	62	46	1.3	2.6	21.5
Finland	Helsingfors (Helsinki)	60 N. 25 E.	38	22	62	40	2.1	2.5	26.1
France	Bordeaux	45 N. 1 W.	243	41	68	54	2.8	2.0	33.4
	Marseille	43 N. 5 E.	246	43	72	57	1 8	.6	21.5
	Paris	49 N. 2 E.	253	37	66	51	1 4	2 0	20.8
Germany	Berlin	53 N 13 E.	125	31	65	47	1.5	2.7	23 0
	Munich (München)	48 N. 12 E.	1,726	27	63	45	1.5	4 8	35.2
Greece	Athens	38 N. 24 E.	351	48	81	64	2 0	3	15 4
Hungary	Budapest	48 N. 19 E.	369	28	70	50	1.5	2 1	25.3
Irish Free State	Dublin	53 N. 6 W	163	42	61	50	2 1	3 0	28.0
Italy	Florence (Firenze)	44 N. 11 E.	240	41	76	58	2 7	1.4	34.8
	Milan (Milano)	45 N. 9 E.	482	32	75	55	2 4	2.8	39 8
	Naples (Napoli)	41 N. 14 E.	480	47	76	60	4 0	1.0	33 0
	Rome (Roma)	42 N. 12 E.	170	44	77	60	3 1	1.0	32 0
Latvia	Riga	57 N. 24 E.	50	23	64	43	1.3	3 0	21.3
Lithuania	Kaunas (Kovno)	55 N. 24 E.	118	24	65	44	1.5	3 5	24.3
Netherlands	Amsterdam	52 N. 5 E.	45	36	65	50	2 1	3 1	29.1
Norway	Oslo	60 N. 11 E.	82	24	63	42	1 1	3.0	23.2
Poland	Warsaw (Warszawa)	52 N. 21 E.	392	26	66	45	1 2	3.0	22.3
Portugal	Lisbon	49 N. 9 W	312	49	70	60	4.0	.2	28.7
Rumania	Bucharest (Bucuresti)	44 N. 26 E.	269	26	73	51	1.2	3.0	23.1
U. S. S. R. (Russia)	Leningrad	60 N. 30 E.	16	15	64	39	1.0	3.0	19.0
	Moscow (Moskva)	56 N. 38 E.	512	12	66	39	1.1	3.0	21.0
	Odessa	46 N. 31 E.	213	25	73	49	1.0	2.1	16.1
Spain	Barcelona	41 N. 2 E.	138	46	74	59	1.3	1.0	21.1
	Madrid	40 N. 4 W.	2,149	40	76	56	1.3	1.0	17.0
Sweden	Stockholm	59 N. 18 W.	144	27	62	42	1.0	2.4	19.0
Switzerland	Geneva (Genève)	46 N. 7 E.	1,329	32	67	49	2.0	3 1	34.0
Turkey	Istanbul (Constantinople)	41 N. 29 E.	246	41	74	58	3.4	1.1	29.0
United Kingdom	Glasgow	56 N. 4 W.	180	39	58	47	3.3	3.1	37.2
	London	51 N. 0	76	39	63	50	1.8	2.6	25.1
Yugoslavia	Belgrade (Beograd)	45 N. 20 E.	453	29	72	52	1.1	2.8	24.3

TABLE III.—WHEAT: ACREAGE AND PRODUCTION

Country	Acreage, millions of acres					Production, millions of bushels of 60 pounds				
	1909–1913 average	1921–1925 average	1927	1928	1929	1909–1913 average	1921–1925 average	1927	1928	1929
World total[1]	278.4	268 9	316 9	312.9	320.7	3,800	3,726	4,413	4,733	4,169
Europe	147.0	108 8	148 2	139.2	146.7	2,107	1,613	2,020	2,192	2,164
England and Wales	1 8	1.7	1.6	1.4	1.3	56	58	53	47	47
France	16 5	13 5	13 1	13 0	12.7	326	291	276	281	320
Spain	9.5	10 5	10.8	10.5	10.5	130	142	145	120	149
Italy	11.8	11 5	12.3	12 3	11.8	184	198	196	229	261
Germany	4.0	3 6	4 3	4 3	4.0	131	99	121	142	123
Yugoslavia	4 0	4.0	4.5	4.7	5 3	62	59	57	103	95
Hungary	3 7	3 3	4 0	4.1	3.9	71	60	77	99	75
Rumania	9 5	7.1	7.7	7 9	6 8	159	90	97	116	100
Poland	3 4	3 0	3 4	3.2	3.4	64	49	61	59	66
U. S. S. R. (Russia) (including Asiatic)	71 2	42 8	77 2	68 2	75 7	759	419	752	783	739
All other Europe	8 6	7.8	9 3	9 6	11.3	165	148	185	213	189

[1] Estimated, excluding China

TABLE IV.—RYE: ACREAGE AND PRODUCTION

Country	Acreage, millions of acres					Production, millions of bushels of 56 pounds				
	1909–1913 average	1921–1925 average	1927	1928	1929	1909–1913 average	1921–1925 average	1927	1928	1929
World total[1]	109 4	105.9	117.1	110 6	....	1,761	1,557	1,848	1,731	1,799
United States	2 2	4.9	3.6	3 5	3.2	36	68	58	43	41
Percentages of world total	2.0	4.6	3.1	3.2	....	2.0	4.4	3.1	2.5	2.3
Canada	.1	1.4	.7	.8	1.0	2	20	15	15	13
Europe:										
Sweden	1.0	.8	.7	.7	.6	24	22	15	17	16
Belgium	.7	.6	.6	.6	.6	24	21	22	23	20
France	3.1	2.2	1.9	1.9	1.9	53	41	34	34	39
Spain	2 0	1 8	1.8	1.4	1.6	28	28	27	14	23
Germany	12.7	10 7	11.6	11.5	11.7	368	250	269	335	321
Austria	1 1	.9	.9	.9	.9	24	16	20	20	19
Czechoslovakia	2.6	2 1	2.0	2.5	2.7	64	52	49	70	64
Hungary	1 6	1.6	1.6	1.6	1.6	31	27	22	33	33
Poland	12.1	12.9	14.2	13.2	14.7	219	207	232	241	276
Lithuania	1.7	1.4	1.2	1.2	1.1	24	23	21	19	22
U. S. S. R. (Russia, including Asiatic)	61.1	59.4	69.1	63.6	....	736	676	945	756	
All other	7.4	5.2	7.2	7.2	....	128	120	119	111	

[1] Estimated, excluding China.

TABLE V.—POTATOES: ACREAGE AND PRODUCTION

Country	Acreage, thousands of acres				Production, thousands of bushels of 60 pounds			
	1909–1913 average	1921–1925 average	1928	1929	1909–1913 average	1921–1925 average	1928	1929
World total[1]	38,025	40,144	47,171	.....	5,463,728	5,776,635	6,735,000	
United States	3,677	3,697	3,837	3,370	357,699	395,242	465,350	357,451
Percentage of world total	9.7	9.2	8 1	.....	6.5	6 8	6.9	
Canada	483	606	599	544	77,843	90,838	83,658	74,447
Europe.								
United Kingdom	1,166	814	789	815	254,444	190,685	212,768	219,037
Irish Free State		398	364	363		67,666	83,863	112,249
Norway	102	121	125	125	24,780	27,796	34,933	34,615
Sweden	377	387	345	348	57,581	64,966	67,468	61,450
Netherlands	411	430	443	446	104,051	118,990	142,010	121,252
Belgium	404	406	411	421	110,830	107,736	133,531	112,710
France	4,066	3,607	3,639	3,657	526,793	451,353	413,875	610,601
Spain	642[2]	784[2]	831	....	112,997[2]	96,860[2]	139,892	
Italy	759	840	875	891	67,514	66,079	54,742	73,896
Germany	6,775	6,753	7,040	7,006	1,373,609	1,304,447	1,516,373	1,472,563
Austria	436	390	468	465	53,373	54,183	91,428	79,758
Czechoslovakia	1,849	1,580	1,800	1,880	245,210	247,176	315,719	392,993
Hungary	619	639	655	684	71,118	56,036	54,031	86,587
Yugoslavia	458	537	580	581	46,288	36,528	31,312	
Rumania	399[2]	568	656	514	43,086[2]	57,489	75,404	83,380
Poland	5,693	5,443	6,189	6,514	889,531	807,919	1,016,339	1,166,585
Lithuania	403	374	300	326	40,864	60,654	35,263	72,053
Finland	181	167	172	175	18,443	21,809	25,312	30,375
U. S. S. R. (Russia, including Asiatic)	7,225	8,944	13,971	....	740,728	1,154,635	1,466,217	
All other	1,900	2,659	3,082	...	246,946	296,648	275.512	

[1] Estimated, excluding China.

[2] Period covers less than 5 years.

TABLE VI.—SUGAR BEETS: ACREAGE AND PRODUCTION

Country	Acreage, thousands of acres					Production, thousands of short tons of 2,000 pounds				
	1909–1913 average[1]	1921–1925 average	1927	1928	1929	1909–1913 average[1]	1921–1925 average	1927	1928	1929
World total[2]	5,818	5,144	7,045	7,296	7,297	61,578	49,736	67,713	66,960	
United States[3]	485	693	721	644	717	4,860	6,965	7,753	7,101	7,672
Percentage of world total	8.3	13.5	10.2	8.8	9.8	7.9	14.0	11.4	10.6	
Canada	17	30	44	51	43	160	293	391	433	364
Europe[4]	5,315	4,418	6,277	6,599	6,535	56,551	42,453	59,540	59,090	56,352
Sweden	78	94	101	106	62	1,036	1,160	1,095	1,208	726
Denmark	80	83	105	113	74	871	966	1,207	1,414	904
Netherlands	144	167	173	162	133	1,977	2,402	2,013	2,523	1,808
Belgium	146	170	175	158	141	1,793	2,173	2,186	2,015	1,639
France	612	412	590	621	607	6,544	4,472	6,616	5,521	5,910
Spain	114[5]	224	154	146	153	949	1,606	1,675	1,584	1,763
Italy	130	207	219	285	283	1,983	2,646	2,222	3,154	3,155
Germany	1,075[6]	982	1,073	1,123	1,125	14,679[6]	10,595	11,964	12,137	12,226
Czechoslovakia	716	629	712	635	609	8,238	7,229	8,773	6,863	6,844
Hungary	131	133	159	165	185	1,513	1,085	1,604	1,585	1,591
Poland	431	326	499	579	591	4,611	2,926	3,990	5,404	5,563
U. S. S. R (Russia)	1,484	725	1,644	1,901	1,928	10,636	3,171	11,130	10,690	9,259
All other Europe	174	266	674	605	645	1,721	2,022	5,064	4,992	5,259
Australia	1[5]	2	2	2	2	7[5]	25	28	17	

[1] Figures for European countries are for present boundaries.

[2] Estimated and excludes minor producing countries but includes several not listed

[3] Principal producing states.

[4] Represents only the totals for countries for which data for all periods shown were available to the Department of Agriculture.

[5] Less than 5 years.

[6] 1912 only.

Source: Bureau of Agricultural Economics, Department of Agriculture.

TABLE VII.—TOBACCO: WORLD TRADE

(Thousands of pounds)

Country	1909–1913 average		1927		1928		1929	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
Principal exporting countries:								
United States	52,768	381,128	102,754	511,868	74,797	583,846	68,066	565,072
Brasil	596	58,669	3,988	65,274	3,772	58,064	.....	68,060
Greece	18	18,011	.....	116,231	.....	107,812	.....	123,695
Turkey	1,954	65,132	269	64,664	336	87,764		
Netherlands East Indies	3,124	161,265	14,413	169,814	11,376	154,127	16,982	160,855
Principal importing countries:								
United Kingdom	127,499	4,617	212,538	8,166	206,996	5,021	230,501	12,498
Belgium	22,094	33	44,872	140	45,717	84	47,438	102
France	63,914	164	87,000	141	67,756	510	85,568	120
Netherlands	57,218	3,786	68,159	3,473	71,297	3,082	72,439	2,469
Czechoslovakia	.....	.....	37,626	.....	24,919	7	45,287	1
Germany	165,097	1,062	210,141	522	243,291	582	226,664	749
Poland	.....	.....	33,663	506	22,568	335	36,341	257
Italy	47,732	3,008	12,372	5,379	13,334	7,601	14,553[1]	8,651[1]
Argentina	14,988	41	23,390	588	26,695	412		
China	15,113	25,270	84,400	30,249	142,646	19,615	62,540	

[1] January to November.

TABLE VIII.—LUMBER: FOREIGN TRADE OF SPECIFIED COUNTRIES

(1,000 board feet)

Data in general represent combined total lumber and sawn timbers, excluding logs, ties, poles, laths, shingles, etc. In some minor aspects the figures for different countries lack comparability. Box shooks and mill ends are excluded where separated in the trade returns.

Calendar year	United States		Canada, exports	Sweden, exports	Finland, exports	Norway, exports[1]
	Exports	Imports				
1920	1,722,136	1,350,799	1,967,630	1,879,468	1,368,657	234,260
1921	1,340,271	839,288	1,079,330	1,038,502	1,356,341	102,276
1922	1,881,836	1,563,524	2,048,691	1,991,261	1,600,150	254,934
1923	2,368,185	1,971,032	2,515,481	1,774,472	1,690,563	190,936
1924	2,630,400	1,742,562	2,179,698	1,755,773	1,942,363	180,867
1925	2,502,328	1,846,398	2,273,842	1,889,418	2,001,035	222,175
1926	2,693,888	1,899,220	2,249,067	1,728,580	2,130,756	224,968
1927	2,950,535	1,744,627	2,192,501	1,914,233	2,658,888	166,385
1928	3,115,856	1,468,404	1,901,596	1,956,233	2,164,791	176,341
1929	3,079,153	1,524,686	1,952,977	2,200,653	2,286,901	192,949

[1] Sawn wood only.

TABLE IX.—COTTON SPINDLES: NUMBER IN PRINCIPAL COUNTRIES

Data for 1900 and 1914 are for active spindles; for 1928 and 1929 for both active and idle; all years ended July 31; all figures in thousands. No adjustment of prewar figures to post-war boundaries has been made.

Country	1900	1914	1928	1929	Country	1900	1914	1928	1929
Total	105,681	146,397	165,352	164,363	Italy	1,940	4,620	5,189	5,210
					Czechoslovakia	([2])	([2])	3,663	3,673
United States	19,472	32,107	33,540	34,820	Spain	2,615	2,210	1,897	1,875
Percentage of total	18 4	21.9	20 3	21.2	Belgium	920	1,530	2,070	2,156
Canada	550	965	1,319	1,240	Switzerland	1,550	1,380	1,525	1,504
Mexico	([1])	([1])	840	836	Poland	([3])	([3])	1,544	1,557
Brazil	450	1,250	2,610	2,750	Austria-Hungary	3,300	4,970	1,014[4]	955[4]
United Kingdom	45,500	56,300	57,136	55,917	Other Europe	1,095	1,895	3,795	3,891
Percentage of total	43.0	38.5	34 6	34.0	India	4,945	6,500	8,703	8,704
France	5,500	7,410	9,776	9,880	Japan	1,274	2,750	6,272	6,530
Germany	8,000	11,550	11,153	11,250	China	550	1,000	3,528	3,620
U. S. S. R. (Russia)	7,500	9,160	7,311	7,465	All other	520	800	473	530

[1] Not available.

[2] Included in Austria-Hungary.

[3] Included in U. S. S. R.

[4] Austria only.

TABLE X.—LIVE STOCK: NUMBER OF CATTLE, HOGS, AND SHEEP IN PRINCIPAL COUNTRIES

(In thousands)

The averages for 1909 to 1913 and 1921 to 1925 are for the 5-year period if available, otherwise for any year or years within the period except as stated. Data for 1929 are for that year or the latest year available after 1925. In countries having changed boundaries the prewar figures are estimated for 1 year only, for the territory within the present boundaries.

Country	Cattle			Hogs			Sheep		
	1909–1913 average	1921–1925 average	1929 or latest available year	1909–1913 average	1921–1925 average	1929 or latest available year	1909–1913 average	1921–1925 average	1929 or latest available year
Total, estimated...	558,400	642,200	.....	260,700	258,700	.....	673,700	617,800	
North America:									
United States.....	56,750	65,421	56,467	53,300	61,827	56,880	43,235	37,215	47,509
Europe:									
United Kingdom.....	11,893	7,748	7,890	3,801	2,959	2,701	29,161	21,668	24,315
Irish Free State.....	.....	4,259	4,137	.....	943	945	.....	2,804	3,375
Norway, rural only...	1,134	1,128	1,221	334	216	283	1,398	1,380	1,654
Sweden.....	3,069	2,418	2,898	1,023	1,056	1,369	1,205	1,384	806
Denmark.....	2,717	2,613	3,031	2,715	2,314	3,616	533	380	191
Netherlands.....	2,062	2,063	.....	1,305	1,519	.....	842	668	
Belgium.....	1,925	1,550	1,751	1,533	1,081	1,139	189	126	122
France.....	15,338	13,582	15,005	7,529	5,302	6,017	16,176	9,777	10,415
Spain.....	2,587	3,457	3,685	2,544	4,500	5,032	15,778	19,229	20,529
Portugal.....	703	754	.....	1,111	1,019	.....	3,073	3,684	4,900
Italy.....	6,590	6,812	7,400	2,685	2,630	2,850	11,615	12,014	12,500
Switzerland.....	1,443	1,425	1,587	570	640	637	161	245	170
Germany.....	18,474	16,786	18,008	22,533	15,776	19,920	4,988	5,889	3,475
Austria.....	2,356	2,241	2,330	1,932	1,399	.....	301	526	500
Czechoslovakia.....	4,596	4,469	4,691	2,516	2,201	2,539	1,322	986	861
Hungary.....	2,150	1,866	1,819	3,322	2,424	2,582	2,406	1 661	1,573
Yugoslavia.....	5,155	4,122	3,686	3,956	2,875	2,663	10,496	7,728	7,800
Bulgaria.....	2,048	1,928	1,817	546	832	1,002	8,551	8,186	7,986
Rumania.....	5,648	5,570	4,505	3,262	2,976	2,406	11,128	11,660	12,406
Poland.....	8,664	8,063	9,057	5,487	5,287	4,829	4,473	2,193	2,523
Lithuania.....	918	1,149	944	1,358	1,521	944	1,152	1,314	1,125
Latvia.....	912	867	975	557	465	388	996	1,240	900
Estonia.....	528	508	605	252	299	279	486	654	475
Finland.....	1,005	1,847	1,917	422	378	435	1,330	1,526	1,314
U. S. S. R. (Russia)..	60,280	57,278	66,693	20,336	16,592	21,102	111,051	92,501	123,810

TABLE XI.—IRON ORE: PRODUCTION

(Thousands of metric tons of 2,204.6 pounds)

Changes in boundaries of certain European countries affect comparison between prewar and post-war data, no adjustments of the former to conform to present boundaries having been made. Austria has lost part of its production to Czechoslovakia and Poland; Hungary, part of its production to Rumania and Yugoslavia; Germany, part of its production to France; U. S. S. R., part of its production to Poland.

Country	1913	1922	1927	1928
America:				
United States	62,972	47,885	62,732	63,195
Cuba[1]	1,608	452	422	401
Newfoundland	1,457[1]	1,014[1]	1,357[2]	1,573[2]
Chile (Tofo mine)	14	223	1,516	1,515
Europe:				
Austria	3,039	1,112	1,599	1,928
Czechoslovakia	.....	313	1,591	1,779
France	21,918	21,106	45,671	49,328
Germany[3]	28,608	5,795	6,005	
Great Britain[4]	16,254	6,946	11,386	11,443
Hungary	2,059	46	194	200
Italy	603	311	503	625
Luxembourg	7,333	4,489	7,266	7,027
Norway	545	269	479	
Poland	.....	353	541	699
Rumania	.....	95	97	84
U. S. S. R. (Russia)	9,514	221[5]	4,792[5]	
Spain	9,862	2,772	4,960	5,771
Sweden	7,476	6,201	9,661	4,673
Yugoslavia	220	36	336	439

[1] Shipments.
[2] Shipments from Wabana mines.
[3] Exclusive of iron ore carrying 12 to 30 per cent of manganese.
[4] Exclusive of bog ore, which is used mainly for the purification of gas.
[5] Year ended Sept. 30.

TABLE XII.—PIG IRON: PRODUCTION

(Thousands of long tons of 2,240 pounds)

1913 figures for Germany are for prewar territory; for Austria, they include the major portion of Czechoslovakia and Hungary. Japan's figures include Manchuria and Chosen for all years.

Country	1913	1920	1921	1924	1925	1926	1927	1928	1929
World total	77,714	61,846	37,401	66,801	75,670	77,573	85,590	86,981	96,880
North America:									
United States	30,653	36,401	16,506	31,077	36,370	39,101	36,289	37,832	42,400
Percentage of world total	39.4	58.9	44.1	46.5	48.1	50.5	42.4	43 5	43.8
Canada	1,015	999	616	619	596	795	760	1,083	1,170
Europe:									
Germany	19,000	6,931	7,719	7,687	10,014	9,490	12,893	11,615	13,300
France	5,126	3,380	3,308	7,570	8,358	9,281	9,125	9,821	10,290
Great Britain	10,260	8,035	2,616	7,307	6,262	2,458	7,204	6,611	7,565
Belgium	2,445	1,099	858	2,798	2,501	3,345	3,602	3,843	4,035
U. S. S. R. (Russia)	4,563	113	112	746	1,521	2,395	3,290	3,322	4,000
Luxembourg	.....	682	955	2,123	2,325	2,472	2,688	2,726	2,850
Saar Territory	.....	956	1,131	1,367	1,427	1,599	1,743	1,905	2,075
Czechoslovakia	.....	725	568	967	1,147	1,071	1,241	1,515	1,600
Poland	.....	42	437	331	310	322	607	673	710
Spain	418	247	341	489	520	479	603	570	720
Italy	420	87	60	299	474	505	487	500	675
Austria	2,344	98	220	263	374	328	428	451	470
Sweden	730	477	314	526	455	493	448	431	500
Hungary	.....	.....	70	114	92	185	294	281	360
Asia:									
Japan	236	718	646	820	917	1,160	1,263	1,500	1,500
India, British	204	312	371	877	888	902	1,145	1,052	1,350
China	239	125	126	200	380	400	300	300	300
Oceania: Australia	47	344	352	416	439	442	550	410	450
All other	100	75	75	250	300	350	450	540	560

Source: *Iron Trade Review.*

TABLE XIII.—ELECTRIC POWER: OUTPUT AND NUMBER OF CONSUMERS IN PRINCIPAL COUNTRIES

Country	Output of electric current[1]			Number of consumers,[2] thousands, 1925
	Total, million kilowatt-hours		Per capita kilowatt-hours, 1929	
	1925	1929		
World total, estimate	160,000	300,000	153	45,000
North America:				
United States	73,791	125,000	1,019	19,721[3]
Canada	10,480	18,014	1,839	1,454[3]
Europe:				
Belgium	3,214	4,486	557	492
Czechoslovakia	.....	1,900	130	1,000
Denmark	223	458	130	694[4]
France	9,700	11,875	289	2,000
Germany	11,521	29,000	453	3,000
Italy	7,600	12,700	306	1,500
Netherlands	896	1,606	205	400
Norway	4,200	8,500	3,013	300
Poland	1,300	.....	.....	400
Spain	.....	3,000	133	1,000
Sweden	3,500	5,000	817	500
Switzerland	4,190	5,300	1,319	400
United Kingdom	8,320	16,200	354	3,000[3]

[1] In most cases figures cover central stations only, not isolated plants.

[2] Data are for 1925 unless otherwise noted and are for domestic lighting only. In 1929 there were 4,537,000 consumers of power and commercial lighting in the United States and 45,000 in Canada.

[3] 1929.

[4] 1927.

Source: British Electrical and Allied Manufacturers Association and Bureau of Foreign and Domestic Commerce.

TABLE XIV.—RAILWAYS: OPERATING STATISTICS

The world's total mileage of line at the end of 1927 has been estimated at 776,800 by Aueswald, in "Railways of the World." The total mileage in countries specified in 1928 was as follows, by continents: North America, 314,074; South America, 58,940; Europe, 253,832; Asia, 81,025; Oceania, 29,738; and Africa, 21,799. Figures of ton-mileage are based on metric tons of 2,204.6 pounds. Except as indicated, prewar figures are based on the boundaries as then existing.

Country	Length of line 1928			Freight, thousands of metric tons		Passengers, thousands		Freight, million ton-miles 1928	Gross receipts, $1,000,-000, 1928
	Total	Per 10,000 inhabitants	Per 1,000 square miles	1913	1928	1913	1928		
Total countries specified	759,408	4 1	19.4	3,109,068	3,734,345	7,566,386	10,332,909	679,882	14,028.5
Total countries for which freight ton-miles are available	683,503	4 2	21 1		3,526,823	. . .	9,666,856	. . . .	13,278.2
North America:									
United States	249,309	20 3	83 8	1,072,796	1,244,083	1,043,603	798,476	395,614	6,212 5
Mexico	14,600	8 9	19 2	5,931[1]	7,501[1]	8,666[1]	10,942[1]	1,914[1]	54 2[1]
Europe:									
Sweden	10,378	17 0	65 5	41,000	34,072	67,188	66,686	1,947	85.3
Norway	2,383	8 4	19 9	7,218	9,878	17,835	18,123	402	21 9
Denmark	3,262	9 3	196 8	8,812	9,672	32,520	40,754	402	36 9
Great Britain	20,389	4 5	216 3	370,277[4]	311,045	1,549,791	1,666,255	18,081	944 1
Irish Free State	3,028	10 3	113 8		4,011	28,205	22,633	248	28.4
Belgium	6 014	7 5	511 7	66,542	81,401	202,541	235,075	4,852	85 7
France	39,638	9 6	186 3	217,329	350,898	547,886	767,342	25,429	600 0
Netherlands	2,277	2 9	172 3	20,183	22,032	54,072	57,578	....	69.8
Austria	4,156	6 2	128 4	158,818	29,119	301,915	110,839	2,634	88 1
Czechoslovakia	8,315	5 7	153 4	.	81,766		269,342	6,639	146 8
Hungary	5,399	6 2	150 2	87,175	26,691	166,007	90,061	1,667	53.5
Germany[5]	35,770	5 6	197 6	399,000	432,300	1,577,000	2,005,000	41,222	1,229 7
Switzerland	3,391	8 4	212 7	18,778	24,940	128,779	168,087	1,380	97.4
Estonia	1,167	10 5	63 6		2,642		6,475	159	4 3
Finland	3,178	8 8	24 0	4,033	11,478	18,310	23,152	1,142	22 5
Latvia	1,722	9 1	67 8	.	3,562		11,584	301	8 6
Lithuania	1,053	4 5	49 0	.	1,673	.	5,264	185	4 7
Poland	12,114	3 9	80 8	.	80,724		175,205	13,624	167.3
U. S. S. R. (Russia	47,869	3 1	5 8	158,200	176,500	244,000	343,189	66,330	1,042 9
Italy	13,541	3 3	113 1	37,427[4]	56,566[4]	93,792	111,369	7,277	253.6
Portugal	2,103	3 3	58 7	5,609	7,022	18,939	33,114	.....	14.4
Spain	10,139	4 5	52 0	31,526	45,650[2]	57,511	114,615[3]	.....	154 6[2]
Bulgaria	1,807	3 1	45 4	788[6]	3,419[6]	1,885[6]	9,036[6]	460[6]	8 5[6]
Greece	1,555	2.5	30 9		1,018	..	3,765	65	4 4
Rumania	6,913	3 8	60 7	8,778	17,039	12,054	39,518	2,665	69.5
Yugoslavia	6,280	4 7	64 9	1,632	17,445	1,779	46,158	1,984[2]	42.1
Asia:									
Turkey (including European	3,291	2 4	11 2	.....	1,819[2]	.... .	11,580[2]	186[3]	12 2[3]
Syria	492	1 7	6 4						
Palestine	757	8 4	85 2	. . .	484	.....	830	.... ..	3 2
Iraq	940	2 8	6 6	.. ...	447[2]	..... .	506[2]	.... ..	3.4
Oceania:									
Australia	26,335	41.1	8 9	27,413	35,109	249,856	372,007	3,164	237.7
Africa:									
Algeria	2,940	4 7	13 2	5,079	6,181	6,273	8,984	..	11.8
Tunisia	1,258	5 8	26 0	4,246	5,700	2,919	3,700	...	6.2[2]
Morocco, French	1,305	2 6	8 0	...	3,272		2,956	. .	5 4
Egypt	2,858	2 0	7.4	4,492	5,311	28,574	27,927	909	35.2

[1] National Railways of Mexico.
[2] 1927.
[3] 1926.
[4] Not including live stock.
[5] 1913 figures are for present boundaries.
[6] Standard gage only.
[7] Principal lines only.

Source: Bureau of Foreign and Domestic Commerce, compiled from official statistical publications of the individual countries.

TABLE XV.—TELEGRAPHS AND TELEPHONES: OPERATING STATISTICS

NOTE.—Figures for 1913 are adjusted to present boundaries of countries except those marked*. World totals include countries not listed.

Country	Telegraphs				Telephones			
	Wire mileage		Messages, thousands		Wire mileage		Instruments	
	1913	1928	1913	1928	1913	1928	1913	1928
World total	5,548,100	6,900,000	.....	.....	37,337,908	115,500,000	14,888,550	32,700,000
United States	1,849,196	2,260,000	114,000	225,000	22,137,479	69,130,000	9,542,017	19,341,295
Percentage of world total	33 3	32.9	.....	.....	59.3	59.9	64.1	59.1
Europe:								
Sweden	39,468	49,168	2,787	3,982	405,736	1,064,302	159,252	472,205
Norway	13,992	25,576	3,001	3,447	177,849	509,736	82,550	181,962
Denmark	8,081	8,487	1,734	2,112	303,404	885,193	116,172	331,048
United Kingdom	267,588	370,000	83,780	54,848	1,714,388	7,900,000	730,763	1,754,641
Irish Free State	.....	21,838	.....	2,583	.....	82,839	.....	28,135
Belgium	26,505	29,046	6,131	8,572	202,456	979,793	66,457	225,845
France	387,918	515,000	67,120	42,426	1,060,052	2,986,417	293,195	965,519
Netherlands	23,762	20,207	4,600	5,135	225,025	600,000	86,490	255,489
Austria	150,840*	48,901	13,908*	3,486	357,693*	480,818	179,084*	212,929
Czechoslovakia	.....	44,176	.....	5,602	.....	369,580	.....	126,551
Hungary	99,802*	51,030	13,979*	3,739	281,299*	309,998	84,040*	93,159
Germany	459,811*	327,000	51,858*	43,500	3,708,211*	11,482,634	1,387,300*	2,950,430
Switzerland	16,672	21,936	3,145	2,912	249,492	706,903	96,528	240,186
Estonia	.....	6,312	.....	251	.....	52,462	.....	12,692
Finland	10,461	6,647	446	942	76,000	229,770	40,000	113,793
Latvia	.....	22,183	.....	1,370	.....	168,409	.....	33,390
Lithuania	.....	3,727	.....	244	.....	30,422	.....	11,851
Poland	.....	50,955	.....	6,782	.....	583,126	.....	162,079
U. S. S. R. (Russia)	500,491*	420,000	37,734	27,621	668,277	1,400,000	336,462*	300,000
Italy	132,557	216,946	20,019	29,508	195,000	700,000	91,720	292,867
Portugal	14,500	19,709	6,000	2,638	27,500	87,500	8,850	29,516
Spain	60,538	84,185	7,378	19,483	68,000	451,000	34,000	146,333
Bulgaria	9,687	7,377	2,265	3,213	8,731	46,771	2,972	13,020
Greece	10,481	30,957	1,970	4,159	5,368	14,126	3,097	11,795
Rumania	15,716	45,884	2,631	7,331	70,077	180,000	21,283	58,398
Yugoslavia	.....	57,000	.....	5,097	.....	100,000	.....	35,000

TABLE XVI.—MERCHANT MARINE BY CLASSES IN 1929

Vessels of 100 tons and over. Wooden vessels on the Great Lakes, vessels on the Caspian Sea, and most sailing vessels belonging to Greece, Turkey, and southern Russia are excluded. Figures for Philippine Islands included with United States.

Class	World total	United States	United Kingdom	Japan	France	Germany	Italy	Netherlands	Norway	Sweden	British Dominions	All other
	Number of vessels											
All classes	32,482	4,383	8,172	2,059	1,662	2,127	1,380	1,339	1,807	1,385	2,507	5,661
Steam and motor, total	29,612	3,635	7,783	2,059	1,478	2,105	1,105	1,320	1,792	1,259	2,077	4,999
Steel and iron	27,191	3,105	7,631	1,587	1,433	2,079	1,032	1,310	1,609	1,076	1,706	4,623
Oil burners[1]	3,406	1,638	929[2]	98	86	71	89	180	102	16	([2])	197
Oil engines[1]	1,118	118	330[2]	41	13	98	79	63	186	.....	([2])	190
Tankers[1]	1,315	396	492[2]	18	27	29	54	78	109	10	([2])	102
Sailing, total	2,870	748	389	.....	184	22	.....	.....	15	126	430	956
	Thousands of gross tons											
All classes	68,074	14,482	20,166	4,187	3,379	4,093	3,285	2,939	3,224	1,510	2,950	7,859
Steam and motor, total	66,407	13,592	20,046	4,187	3,303	4,058	3,215	2,932	3,218	1,480	2,795	7,581
Steel and iron	65,654	13,291	20,025	4,068	3,295	4,048	3,198	2,930	3,174	1,447	2,701	7,477
Oil burners[1]	18,813	8,581	5,811[2]	590	557	562	580	851	546	67	([3])	662
Oil engines[1]	5,604	447	2,067[2]	181	57	512	427	306	916	....	([3])	691
Tankers[1]	6,978	2,321	2,564[2]	87	153	122	232	284	704	67	([3])	444
Sailing total	1,667	890	120	...	76	35	.....	....	7	30	154	355

[1] 500 gross tons and over.

[2] British Dominions included with United Kingdom.

Source: Lloyd's Register and Bureau of Navigation, United States Department of Commerce.

TABLE XVII.—MERCHANT MARINE OF MINOR COUNTRIES

(Thousands of tons)

Country	1895	1900	1905	1910	1915	1920	1922	1924	1926	1928	1929
Belgium	131	163	159	300	276	415	579	561	507	493	529
Dansig	...	...	...	...	.....	...	107	99	140	128	132
Denmark	357	519	627	737	855	803	1,038	1,036	1,081	1,068	1,055
Estonia	...	...	...	...	.....	...	45	46	49	53	60
Finland	...	...	...	...	.....	167	214	208	233	281	298
Greece	347	245	398	528	909	530	668	761	925	1,188	1,267
Latvia	...	...	...	...	.....	...	40	46	68	117	150
Portugal	104	111	101	110	123	276	286	301	280	246	246
Rumania	2	18	23	32	55	75	72	71	68	72	69
U. S. S. R. (Russia)	488	721	863	887	1,055	535	.....	339	323	377	441
Spain	554	695	732	765	899	997	1,283	1,240	1,163	1,164	1,162

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