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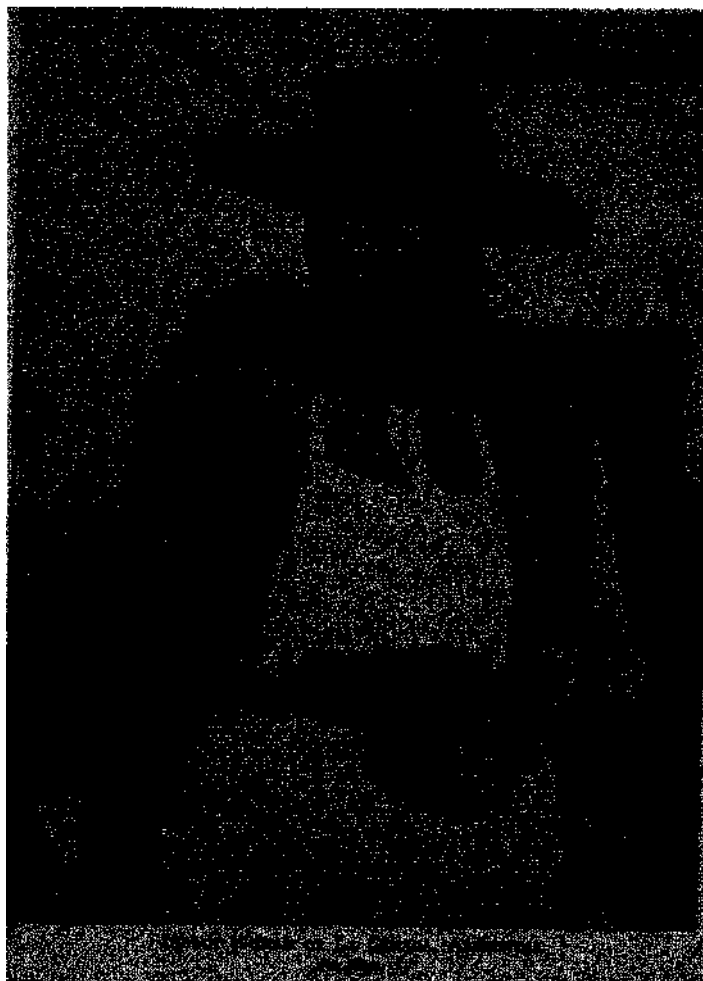
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SOUTH AMERICA



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SOUTH AMERICA

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The maps and diagrams have been specially drawn to assist in the interpretation of atlas maps. The data for the climatic graphs are taken from W. G. Kendrew's *Climates of the Continents*. Uniform scales are used to facilitate comparisons.

In the final preparation of the manuscript I had the advantage of much generous help and advice by Dr E. W. Shanahan, whose kindness I appreciate and acknowledge most gratefully.

It is hoped that this book will serve, as an introduction should, towards better acquaintance with, and a sympathetic understanding of, the potentialities of the continent and the problems of its people.

E. G. A.

November 1949

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CHAPTER I

INTRODUCTION

To only one mortal has it been granted to write his name across the globe almost from pole to pole. Yet Amerigo Vespucci, after whom the twin continents are named, was not their discoverer. The credit thus perpetuated goes to him for his boldness in insisting that the land found in 1492 and subsequently revisited by Columbus was not the desired Indies, but a barrier across the western sea-route to them.

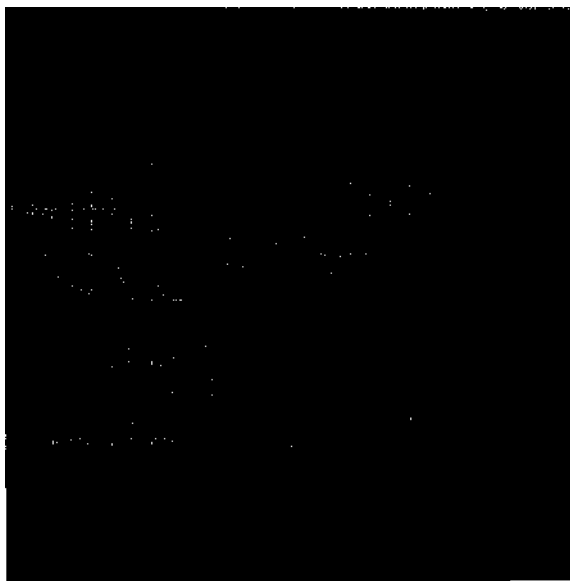
If, towards the end of the fifteenth century, there was suspicion or even more definite knowledge of land along the western flank of the newly found sea-route to the Indies it was kept secret for the security of that route. The Spanish mainland first visited by Columbus and then explored by Ojeda and Vespucci, was completely revealed by Bastidas in 1500. In this year Cabral was sent to investigate Portugal's interests under the partition of Tordesillas (1494), in view of Ojeda's discoveries and Da Gama's opening of the sea-route to India three years before. His report was followed by the coastal exploration undertaken in 1501 for the King of Portugal by Vespucci. Twenty years later the barrier continent was rounded by Magellan (1519-21), and for more than half a century Spain's monopoly in the South Sea was undisputed. It was challenged by Drake, who in 1578 followed Magellan northward along the Pacific shores, and del Cano in circumnavigating the globe.

Before his death in the Philippines in 1521 Magellan had inaugurated the Spanish trade-route across the Pacific. The need for a more direct water-route between the two oceans soon became urgent, and as early as 1529 proposals were made for cutting a canal across the isthmus of Panama. This narrow neck of land unites the two continents in no more than a physical sense. Its unhealthy and forested swamps have always proved a forbidding obstacle and will remain to be the last hindrance to the completion of the projected Pan-American Highway.

INTRODUCTION

character of the immigrant stream has undergone some modifications as regards both its origin and variety of composition.

In many respects the tendencies which characterized the peopling of the continent in the sixteenth century were reversed in the nineteenth. For three hundred years the Spanish and



PERNAMBUCO: HUTS IN THE NATIVE QUARTER

Fox Photos

Portuguese excluded from immigration all but their own nationals, and it was not until their political power in Europe weakened that their rivals—English, Dutch, and French—began to look towards South America as they had hitherto towards the northern continent. So in colonial times immigrants entered by way of the Caribbean and Brazilian ports, while the main gateway of the Plate estuary remained officially closed. Now, in republican times, very few immigrants enter by the north, but the great immigrant stream is directed towards the temperate grasslands of the Plate lowlands. It is no longer the mining of precious metals that is the attraction

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in the elevated tropical regions, but the more stable pursuits of the plains and valleys of the south.

The racial composition of the several republics varies in sympathy with these tendencies. Indians predominate in the Andean states—Ecuador, Peru, and Bolivia—and in Paraguay. Pure Indian populations still survive in the inaccessible interior of Brazil. In the Caribbean states, Colombia and Venezuela, the bulk of the population is mestizo—that is, of mixed European and Indian descent. The fusion of the races is most complete in Portuguese South America, and the Brazilian Government countenances no official distinction or discrimination on grounds of racial origin. In the southern republics—Argentina, Uruguay, and Chile—little remains of the coloured races, and the population is almost entirely of Mediterranean origin, whether immigrant or, if of colonial descent, criollo.

Immigration. With the opening of the Atlantic ports towards the close of the colonial era late in the eighteenth century European immigrants followed in the wake of traders from non-Mediterranean countries. Attempts at settlement, at first unsuccessful, were made soon after the establishment of the independent republics. The British colony in Buenos Aires dates from 1808, the Swiss settlement at Nova Friburgo in Brazil from 1818. An organized scheme to attract immigrants, the Immigration Commission of the United Provinces of the Rio de la Plata, collapsed in 1824. The settlers involved were English and German. A Scots settlement at Buenos Aires was more fortunate, and an Irish settlement was made in Araucanian territory in Chile. German agriculturists at about the same time (1824) founded Sao Leopoldo in Brazil.

The second half of the nineteenth century saw the beginnings of the present railway nets—the most highly developed on the continent—in Brazil and the Plate lowlands. Thus foreign capital was brought to the aid of the necessitous republics, and with the opening up of the hinterland of the 'pioneer fringe'⁵ European labour supplanted the inadequate native population. Other inventions contributed to the increasing prosperity of the pastoral pampas,¹ among them that of barbed wire in 1870 and the *frigorífico*² in 1882. While these were of great economic benefit their social influence was reactionary in that they hindered the establishment of a stratum of cultivators and

¹ Pampa = extensive plain.

² *Frigorífico* — freezing works.

INTRODUCTION

smallholders intermediate between the landed criollos and their landless labourers. This problem with its attendant political insecurity is still a major concern of the national Governments, and calls for the encouragement of a farming middle-class having an enduring interest in the land they work.

Portuguese immigrants naturally prefer Brazil. Of the Spanish-speaking republics, Argentina and Chile attract the majority of the Spanish immigrants. In both Argentina and Brazil, however, the proportion of Italian immigrants is rather greater than that of Spanish or Portuguese. In Chile Italians and Germans in equal proportions approximate together to the number of Spaniards. Italian characteristics, therefore, will tend to predominate in eastern or Atlantic South America, while the Pacific, Andean, and Caribbean republics will remain as Spanish as at present. In Brazil, however, the influx of Italian elements appears against the background of the 'cosmic race' evolved from the fusion of black, brown, and white peoples, whereas in Argentina the population, although cosmopolitan, is almost entirely of European stock. The Italians are the more welcome since they prefer to work on the farms, while the Spanish and Portuguese seek urban life and pursuits. In early colonial times first the Portuguese and then the Spaniards resorted to the importation of Negro slaves as a solution of the difficulty of labour supply on the sugar and other plantations. Argentina, however, has not attracted any considerable Negro population. The Italians are most numerous on the Brazilian *coffee fazendas*¹ and in the Argentine fruit-growing region.

Distribution of Population. The dominant characteristic of the distribution of population throughout South America is its concentration within a severely limited area in each of the republics. These concentrations are separated by great distances and inadequacy of transport. In every state except Uruguay the proportion of urban to rural population is abnormally high, and the disparity tends to increase rather than diminish. This is particularly the case in the 'ABC states' (Argentina, Brazil, Chile), where industrialization has been stimulated by two World Wars. One-third of the total population of Argentina is to be found in the single province of Buenos Aires, and an even higher proportion of that of Brazil in the two states of Sao Paulo and Minas Geraes. In Central Chile

¹ See p. 71.

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and in the highlands of Bolivia three-quarters of the population of each country is concentrated. Very few of these areas of closer settlement are expanding, the most notable exception being that of Central Chile, a highly urbanized region.

In the southern states of Brazil pastoral and agricultural settlement is advancing westward the frontier of this portion of the 'pioneer hinterland.' Here, and in the farming regions of Argentina, many of the immigrants hail from Italy, of whom a number are *golondrinos*—swallows returning to their native land after a short stay. Since 1818, however, there has been a thin but steady stream of immigrants from Germany into these regions. The extent of their penetration in southern Brazil and mesopotamian Argentina is marked approximately by the valley of the Parana. Geographical isolation has enabled these settlements to maintain their German character. Unlike the Atlantic shores of North America the coast of southern Brazil is not well endowed with harbours affording easy access to and from the European homelands of the immigrants. There has been, therefore, no successive impetus to result in a continued advance of the frontier, nor have the settlements become absorbed by diverse racial elements.

Political Consciousness. The present political partition of the continent perpetuates the decentralization reached during the three hundred years of colonial administration. The southern viceroyalty of the Spanish empire in the New World was originally administered from Lima. The successor viceroyalties became further subdivided, and the unit of administration at the time of the gaining of independence was the *audiencia*. Boundaries were ill defined. Geographical isolation and difficulties of communication accentuated consciousness of individuality, and in the north the movement towards independence began in revolts of the communes. The colonial tendency to decentralization bore fruit in the disintegration of the empire. Bolivar sought to create a federation of Spanish states and made Panama the venue of the first but unsuccessful Pan-American Congress in 1826. The infant republics had no cause to appreciate the benefits of interdependence, and it was not until the Second World War that a move was made in this direction in the proposal to form an economic *bloc* in the south of the continent. San Martin had hoped to establish some form of monarchy in the south: Bolivar was offered supreme

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authority and power in the north-west. Both liberators realized the urgent need for strong centralized Government in the aftermath of the Wars of Independence, but they failed to agree upon the means to attain this end. The need was met by the establishment of dictatorships in the earliest years of independence, which served further to promote the national consciousness of the several republics.

In the Andean republics, while the population is predominantly mestizo, political power is in the hands of a Creole oligarchy, although, particularly in Peru, the amelioration of the status of the 'forgotten man' is a recognized responsibility of the Government.

Economic Functions. The proposed Nazi repartition of the continent (*vide* Roosevelt's Address on Navy Day, October 27, 1941: "I have in my possession a secret map made in Germany. . . . This map makes clear the Nazi design not only against South America, but against the United States itself") by disregarding national frontiers and interests, and in defiance of national aspirations, threatened to destroy the political and economic status of the republics, and to reduce them to vassalage in a new world order. During the colonial period the entire continent remained economically tributary to the mother countries, Spain and Portugal. It was not until the latter half of the eighteenth century that legitimate trade was recognized with other European powers. For the first century of her independence the continent functioned mainly as a producer of primary commodities. During the present century two World Wars have speeded the development of her economy in two directions. In the first place, nationalist aspirations have appreciated the need for placing national economy on a broader basis by diversifying productivity. Secondly, the war-time restriction of oversea trade has stimulated national efforts towards industrialization. The post-war requirements of South American markets are, therefore, not identical with those of pre-war years. The need for capital equipment is insistent, while the demand for consumer goods is met, within the lower ranges, to an increasing extent from home or continental manufacture. In this connexion the proximity of the Andean republics of the north-west to the United States, and that of the 'ABC' countries to Europe, will contribute to the apportionment of South American trade with the northern hemisphere.

CHAPTER II

THE BUILD OF THE CONTINENT

LIKE North America, the continent of South America consists structurally of a massive mountain-system on the west, folded in Tertiary times against ancient and resistant crustal blocks to the east. In the north South America shares in the Antillean arc and also in the Central American folds. It is thus related structurally to its northern neighbour. A somewhat similar arc, the so-called Southern Antilles, relates it to western Antarctica.

Structural Relations. The geological correlation of the South American crustal blocks to their African counterparts affords some interesting parallels. Along the Atlantic shores of both continents the continental shelf is so narrow as to be taken as non-existent. The oceanward boundaries of these Gondwanaland remnants may, therefore, be regarded as lying along the continental slopes, roughly parallel to and at no great distance from the present coast lines. Thus it is not without significance that the east coast of South America, between the relevant latitudes, if rotated eastwards, fits with remarkable exactitude into the corresponding part of the western coast of Africa. The major features of this correspondence are indicated in Fig. i. Wegener first investigated this geological parallelism and found corroborative correspondence in the fields of palaeontology and biology.

When the two coasts are brought together in the manner suggested by Wegener, the Hercynian coastal range of the extreme south of Africa is seen to be continued across Argentina south of La Plata estuary into the Pre-Cordillera of the provinces of San Juan and Mendoza. The correspondence between the two continental plateaus is best observable in the direction of the strike of the folds traversing them, due allowance being made for the rotation postulated above. In South America the east-west strike north of Cape Sao Roque thus becomes continuous in direction with the diagonal north-east to south-west strike characteristic of the African plateau north of the Cameroons. The north-south strike parallel to the east coast

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of Brazil, as evidenced, for example, by the direction of the upper and middle courses of the Rio Sao Francisco, is paralleled by the north-south strike across the African plateau south of the Cameroons.

Ancient Crustal Blocks. Of the three South American plateaus two, separated by the basin of the Amazon, are Gondwanaland remnants. Their bases, however, extend westwards to the Andean folds, and also beneath the alluvial

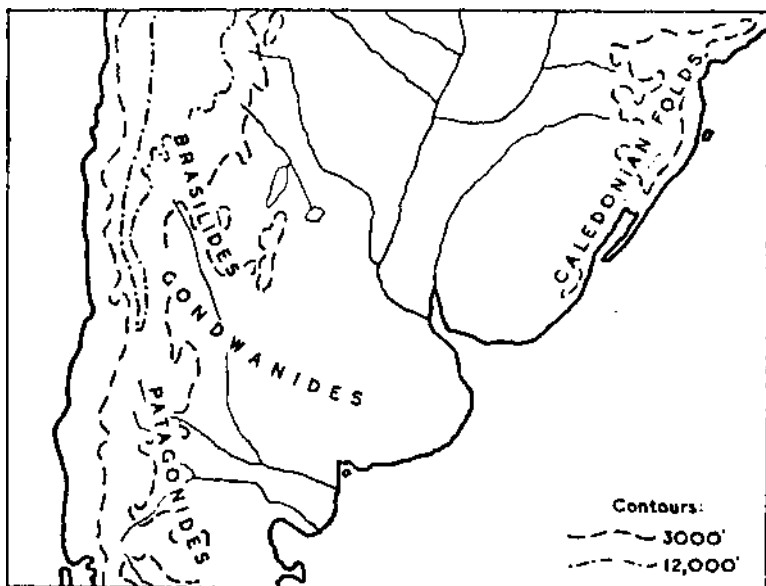


FIG. 2. SOUTHERN SOUTH AMERICA: RELIEF AND STRUCTURAL ELEMENTS

deposits of the intervening river basins. They thus constitute the proto-nucleus around which the present continent has been developed. This nucleus is associated on its southern and south-western limits with ancient folded remnants of the Caledonian period. Geological evidence indicates that since Devonian times these ancient block remains have remained stable, although overlaid to a great extent by later sediments. The third plateau region, that of Patagonia, bears affinity with the Antarctic continent rather than with the African component of Gondwanaland.

The plateau surfaces of the Guiana-Brazil block remains

THE BUILD OF THE CONTINENT

reach their greatest elevation in scarps facing respectively south and south-east. In the Brazilian plateau a water-parting may be traced along the Serra dos Divisoos, the Serra des Pyreneos, and the Serra do Piahy. Between this and the Caledonian uplift along the Atlantic coast is a trough drained to the south-west by the Parana and to the north-east by the Rio Sao Francisco. The general parallelism of these river courses on both sides of this water-parting, as well as that of the main divide itself, should be noted as testifying to the characteristic grain of this crustal block developed along the diagonal strike. This direction contrasts with the east-west strike of the Guiana-Venezuela plateau. Here the main scarp, the Serra Acarai and the Serra Tumuc-Humac, follows this general direction, as do the upper courses of the Venezuelan rivers.

Ancient Fold Remains. To the north of the Bolivian plateau the Andes are drained by rivers of the great Amazonian system. Deep deposits of alluvium have here rendered the relation of the Cordillera to the crustal blocks difficult to decipher. To the south, however, folded ranges east of the main system anticipate in a geomorphological sense the younger and more massive Cordilleran complex. The most ancient of these are the Brasilides (so named by Keidel) of Caledonian age. They are closely related to the folds of the eastern margin of the Brazilian massif now represented by the Serra do Mar and the Serra da Mantiqueira. The principal element of the Brasilides is the Sierra de Cordoba, and these folds may be traced back to the Andean system in a north-by-west direction. They thus share with the Gondwanides and the Patagonides a slight divergence from that of the Tertiary Cordillera.

The Gondwanides are represented in the Pre-Cordillera lying across the thirtieth parallel. They too diverge from the Andean chains, and are continued south of the Rio de la Plata as the low Sierras of the Pampas—for example the Sierra de Tandil. Between the Pre-Cordillera and the Cordillera de los Andes is the high Puna de Atacama.

The Patagonides, which are Cretaceous in age, are hardly distinguishable on a small-scale map from the Andes, which in these temperate latitudes are of diminishing vigour of altitude and extent. They function rather as a foreland uniting the Cordillera and the Patagonian plateau surface dipping eastwards to the Atlantic. Denudation by glacial erosion and river

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action, as well as subsidence, have here resulted in the reduction and dissection of the southern Andes.

The Cordillera of the Andes. Against these resistant crustal blocks were pushed up in Tertiary times the great folds of the Andes. These form part of the Pacific Cordillera enclosing the great basin of that ocean. In South America the system is broadest in the region of the Bolivian plateau, where it attains a breadth of some four hundred miles. Here also meet the watersheds separating the Amazon and Parana drainage basins, and both of these from the Pacific drainage. Southward the Cordillera extend in a direct line to the Strait of Magellan.

From the Knot of Pasto, just within the Colombian border, the system bifurcates. One limb, the Cordillera Oriental, swings round parallel to the northern Gondwanaland remnant and eventually assumes an easterly direction. In Venezuela it is known as the Sierra de Merida, and continues along the coast to the Paria peninsula. It terminates in the islands of Trinidad, Tobago, and Barbados. A branch, the Sierra Nevada de Santa Marta, extends northward west of the Lake of Maracaibo, and then from the Goajira peninsula can be traced eastward parallel to the former through the Paraguana peninsula and the Netherlands West Indies. This line ultimately becomes the Windward and Leeward Islands of the great Antillean arc. The second and third limbs, the Cordillera Central and the Cordillera Occidental, form the western watersheds of the Magdalena and Cauca rivers respectively.

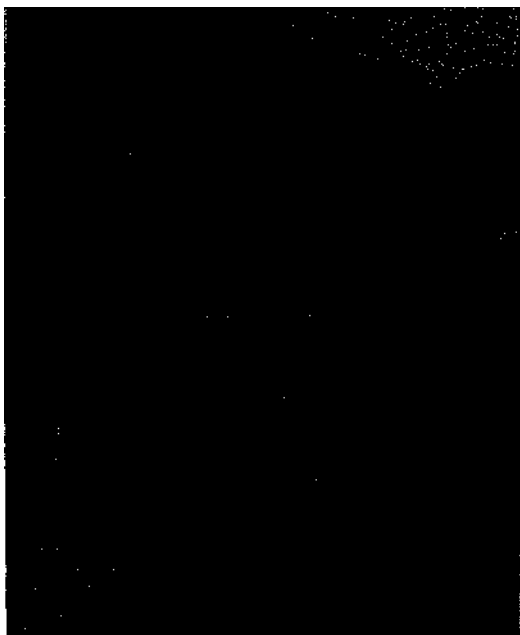
Between the Atrato river and the Pacific is a small range, a continuation of the Central American Sierra del Darien. This range, forming the western watershed of the Atrato river and the southward-flowing San Juan river, represents South America's structural link with the Central American Cordillera. It is not, therefore, part of the Andean system.

The central section of the Andes from latitude 1° N. to latitude 28° S. differs considerably from the northern system of diverging ranges and the southern fading-out of a single range. The Central Andean system consists of two very high mountain walls enclosing a series of high plateaus. Of the two boundary walls the Western or Maritime Cordillera reaches the greater heights. The most southerly of the intermontane plateaus is the Puna de Atacama, which lies for the most part in Argentina. Across the frontier the Puna is continued in the still higher



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altiplano of the Bolivian plateau. The Yungas is the eastern slope of the Cordillera Oriental drained by the headstreams of the Madeira. Between Vilcanota, a peak in latitude 14° S., and the Cerro de Pasco in latitude 11° S., the altiplano is narrower. From both points ranges bifurcate in a general northerly



SOUTHERN ANDES: LIMAY RIVER

Fox Photos

direction, enclosing the deep valleys of the tributaries of the Marañon. The eastward slopes are here known as the Montana of Peru. In Ecuador, between Loja and the Knot of Pasto, the double arc of the Cordillera encloses a narrow but deep valley lying lower than the altiplano, but surrounded by some of the highest peaks and active volcanoes of the Andes. The other great volcanic groups of the Andes are in the Maritime

THE BUILD OF THE CONTINENT

Cordillera of Peru and Bolivia, in the Eastern Cordillera of Bolivia, and in Central Chile.

In the south the Cordillera of the Andes terminates at the Strait of Magellan. There is, however, along the entire length of the Chilean coast a Coastal Range enclosing the great Longitudinal Valley. In Peru this range is fragmentary. It attains its greatest height in northern and Central Chile. It then falls away, but on a small-scale map can be traced where, in the wetter region south of Valparaíso, it is intersected by westward-flowing rivers. In southern Chile the Coastal Range continues as a series of archipelagos, and the Longitudinal Valley is here submerged. Eventually the line of this uplift bends to the eastward round the end of the Andean Cordillera into Tierra del Fuego and Staten Island. It thus, in longitude 65° W., points to the South Antillean arc, as the northern virgations of the Andes do in almost the same longitude, 60° W., to the Antillean arc of the Caribbean Sea. The Falkland Islands are of plateau formation.

The Longitudinal Valley. The great Longitudinal Valley extends from Peru throughout the entire length of Chile. In the north it suffers encroachment by the westward-projecting spurs of the Andes, and to some extent by the formation of detrital cones by the intermittent mountain streams. In Central Chile the Valley becomes wider and is crossed by a number of rivers which reach the ocean through gaps in the Coastal Range. This points to the elevation of the Coastal Range being subsequent to that of the Andean Cordillera. Where in more southerly latitudes the Andes themselves diminish in height and breadth and the Coastal Range, owing to subsidence, is represented by islands, the Valley south of the Gulf of Ancud is submerged. This submergence is interrupted by the Taitao peninsula. To the north are the large island of Chiloe and the Chonos Archipelago, and to the south the Madre de Dios Archipelago separated from Tierra del Fuego and Staten Island by the Pacific outlet of the Strait of Magellan and the Cockburn Channel. The most southerly point is Cape Horn, on a small island to the south-east of the Beagle Channel. The inlets from the submerged southern portion of the Longitudinal Valley are often referred to as fiords. They have some of the characteristics of the Norwegian fiords in that, for example, they are narrow and deep and enclosed by steep, high mountain sides. The

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islets fringing the coast, however, are remnants of spurs not to be confused with the Norwegian skerry-guard. Nor is the mode of formation of these inlets that which characterizes true fiords.

Coasts. The structural and physical characteristics of the Pacific and Atlantic coasts are typical of those of the ocean they confront. The geologically recent elevation of the Pacific Cordillera presents a steep face westward to the ocean. This rapid descent continues beyond the shore line, and hence both coastal plain and continental shelf are virtually absent. Moreover, the elevation of the Andes and Coastal Range has been accompanied by marked trough-faulting, which has served to accentuate these characteristics. Although in the southern temperate latitudes, glacial erosion and denudation by rivers have been vigorous, the steepness of the descent and the subsidence of the land-mass have prevented sedimentation. In the north, particularly along the Peruvian coast, these conditions are reversed, with, however, a similar absence of constructional results. The few rapid streams have, in these two regions, a typical desert *regime*, and the later continued upthrust of the mountain-system here has therefore not revealed any extent of coastal plain.

In common with other Atlantic coast-lands, the east coast of South America is a series of plateau edges with ancient folds, having their maximum elevation nearest the ocean. Again, therefore, there is a marked absence of continental shelf. The coastal plain south of Cape Sao Roque is extremely narrow until Quaternary deposits are reached in the neighbourhood of the Rio de la Plata. Subsidence, evident from the occurrence of rock harbours along a coast lacking in estuaries between the mouths of the Amazon and the Rio de la Plata, has precluded the formation of a Brazilian coastal plain. Still farther south, although the Patagonian plateau is covered with recent deposits, the coasts are steep, and penetration to the interior is possible only up the deeply trenched river valleys. The north coast from the Gulf of Uraba to Cape Sao Roque has coastal plains of deposits overlying the northward dip of the Gondwanaland massifs. The Andean limbs radiating from the Knot of Pasto, however, are interspersed with broad river valleys leading inland.

Continental shelves are more characteristic of the North Atlantic than of any other ocean. In the South Atlantic the

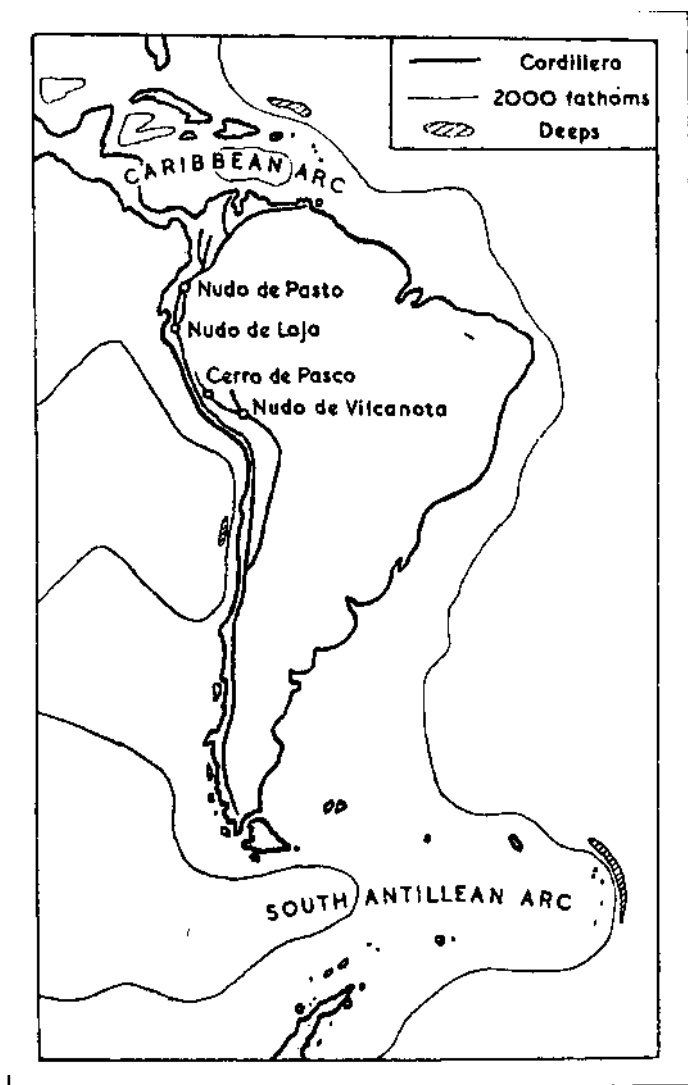


FIG. 3. THE CORDILLERA AND ANTILLEAN ARCS
For the Caribbean see *North America*, second edition, Fig. 39.

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Falkland Islands have already been noted as belonging structurally to the Patagonian plateau. They may, therefore, be considered to stand upon a continental shelf formed primarily by subsidence. Off the mouths of the Amazon a continental shelf of deposition is to be expected, but the westward movement

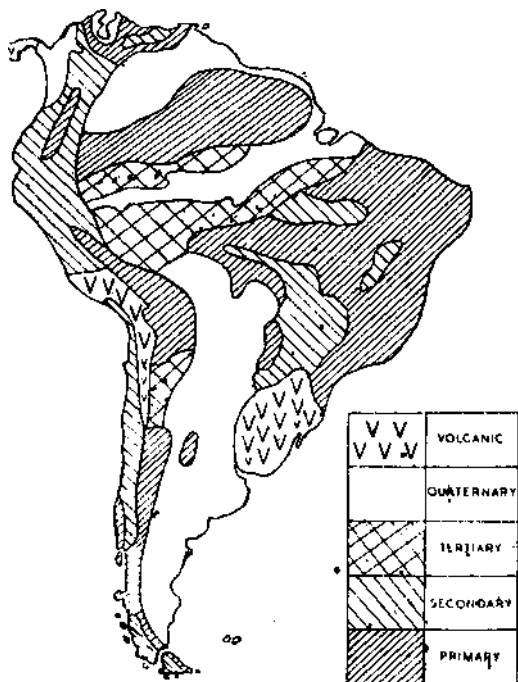


FIG. 4. GENERALIZED GEOLOGICAL DISTRIBUTIONS

of the South Equatorial Current along this shore distributes the tremendous quantity of sediment which is carried by the river even as far as three hundred miles out to sea.

Geological Distributions. The basins and troughs lying between the Cordilleran system of the west and the three distinct plateau massifs are filled by sedimentary deposits of varying ages. Quaternary and Tertiary deposits are found concentrically arranged in the valley of the Amazon, the former fringing the river and continuing along the coasts of the

THE BUILD OF THE CONTINENT

Guianas and into the basin of the Orinoco. The lowlands of the Parana-Paraguay basin have likewise been filled with Quaternary sediments. In the north-west deposits of similar age are found in the lower valleys of the Atrato and Magdalena rivers and in the Maracaibo lowlands.

Sedimentary rocks of Secondary age are exposed in the Cordillera and on the western half of the Brazilian massif. The central portion of the Archaean plateau is, therefore, fringed by the Cretaceous series on the south-west in the Matto Grosso plateau region, on the north and on the east in the basin of the Rio Sao Francisco. To the north-east, in the provinces of Goyaz and Piahy, the older Carboniferous and Devonian strata are exposed. Similar considerable exposures of the Upper Palaeozoic are characteristic of the Cordilleran folds about their broadest extension in Bolivia.

Drainage Pattern. The major watersheds of the South American continent are the crest of the Andes and the scarps of the two Gondwanaland remnants. Since all these lie near coasts, the initial direction imposed upon natural drainage is inward towards the interior of the continent. This drainage, therefore, resolves itself into three great systems, each having its main stream and outlet in the sedimented synclines separating these three major structural elements from one another. The Orinoco valley occupies the depression between the Cordillera and the Venezuela-Guiana massif. Between the two eastern plateaus is the valley of the Amazon. The Parand-Paraguay system drains the broad trough separating the Andes from the Brazilian uplands.

The main elements of the drainage of the continent not included in one or other of these three systems are the northward-flowing streams of Colombia and the Guianas, the eastward-flowing streams of the Patagonian plateau, and the two regions of inland drainage. The Bolivian plateau, which extends from western Bolivia into southern Peru, is a highly elevated basin region, whose east and west rims include some of the highest peaks of the Andes. The drainage, supplied by the meeting of the snow- and ice-fields of the rivers, flows, therefore, inward into the basin, the main stream flowing from north to south through Lake Titicaca, whose surface is 12,644 feet above sea-level, to the salt Lake Poop6. The mean annual rainfall received by this region is about twenty inches,

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three-quarters of which falls in the southern summer between November and March. The second region of inland drainage is in the western part of Argentina, between Tucuman and C6rdoaba. Here an even greater proportion of the annual rainfall comes in the summer months, and, owing to excessive

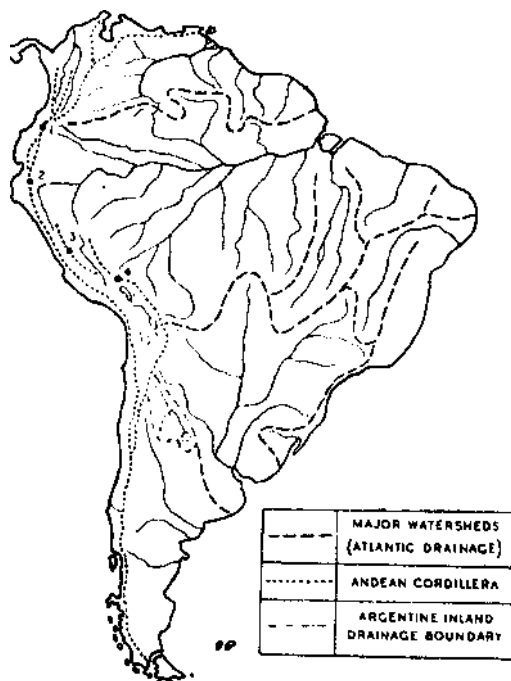


FIG. 5. DRAINAGE BASINS

loss by evaporation, the water of the Rio Dulce fails to reach the sea. The Rio Dulce empties itself south-eastward into the salt Lake Chiquita, having received some intermittent water from the great salt swamp of Salinas Grandes.

The basin-like disposition of the relief of the broader part of the continent, with the consequent effect of throwing the natural drainage towards the interior and concentrating it into only three major systems, results also in constricting the outlets of each of these systems into bottlenecks at the coast, as well as rendering large areas liable to flood or swamp. Two of the

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major drainage systems have, therefore, failed to develop a first-class port, although the Amazon is navigable for 2000 miles from its mouth to Iquitos, in Peru. Navigation on the Orinoco is restricted to small craft, and is impeded on Venezuelan territory at the Boca del Infierno, and again at the Raudales de Atures and the Maipures rapids on the upper international portion of the river. The third great river system, that of the Parana-Paraguay, has on its estuary some of the biggest and most important ports of the continent. The outlet of the drainage basin has a bottleneck, but the watershed enclosing it on the south is of no great elevation and no obstacle to communication with the Patagonian pampa lying outside the basin. The rock basin harbours, due to recent subsidence of the Atlantic coast, have only very restricted hinterlands. Harbours on the Pacific coast suffer a similar disadvantage.

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presence of high pressure over the oceans to the north. Depressions are a marked characteristic of this zone. Winds from the Pacific continue across the low Patagonian plateau as dry winds, whose aridity is accentuated by increasing temperature consequent upon compression while descending eastward.

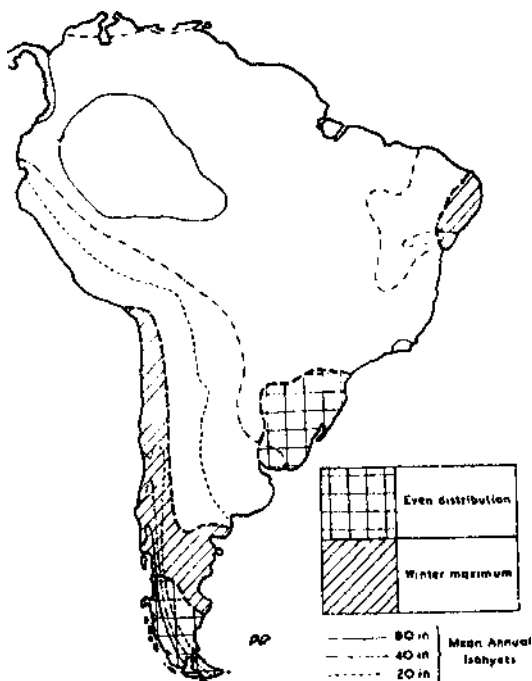


FIG. 6. RAINFALL DISTRIBUTION
After Franzc.

The circulation of the ocean waters along the shores of the continent is also closely associated with the atmospheric circulation. The westward movement of the Equatorial Current along the northern shores has no great effect upon air temperatures. Cold currents from the Westerly Wind Drift flow northward along the shores of Chile and Patagonia, the Humboldt and Falkland Currents respectively. South of Cape SSo Roque the warm Brazil Current represents the normal oceanic circulation in these latitudes.

CHAPTER III

CLIMATE

General Conditions

THE shape, position, and relief of South America combine to place the greater part of the continent under climatic influences from the Atlantic rather than the Pacific Ocean. The land-mass is broadest in those latitudes where the easterly trade-winds prevail, and it is here that the climatic barrier of the Andes is most effective, being placed well to the west of the continent. Thus over the greater part of South America the midday sun is overhead or nearly so during a considerable part of the year, and beyond these tropical latitudes oceanic influences prevail. The seasonal range of temperature is nowhere of continental dimensions. The greatest mean annual range of temperature is experienced at Chaco Mission station, where the Parana crosses the Tropic. Here the hottest month is January, with a temperature of 84⁰ F., and the coolest is June-July, with 64⁰ F.

Over almost the entire continent the atmospheric circulation is controlled by low-pressure systems over the Amazon basin and by high-pressure systems over the oceans in the middle latitudes. The area of lowest pressure follows the seasonal migration of the overhead sun. In the southern summer it lies over the south-east of the basin, and in July it is in the north-west of the continent.

The discontinuity of the high-pressure zone of the middle latitudes is most marked in summer. The penetration of oceanic influences towards the tropical interior of the continent is therefore greatest at this season. Except in the temperate latitudes of the south of the continent, the Andes form an effective climatic barrier, preventing the flow of air from the Atlantic to the Pacific. Only in summer does westward-moving air penetrate far enough to give rain to and beyond the upper valleys of the Eastern Cordillera.

The prevailing circulation of the atmosphere in temperate latitudes is from west to east. This movement is assisted by the

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presence of high pressure over the oceans to the north. Depressions are a marked characteristic of this zone. Winds from the Pacific continue across the low Patagonian plateau as dry winds, whose aridity is accentuated by increasing temperature consequent upon compression while descending eastward.

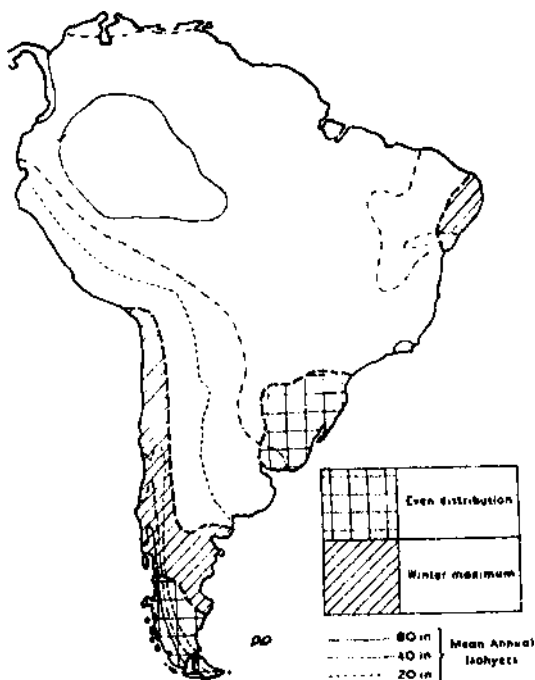


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A broad zone of marked deficiency of rainfall crosses the continent diagonally from the Patagonian coast to that of Peru. This dry zone separates a temperate region, having a winter maximum of rainfall, from the rest of the continent over which a summer maximum is the general rule. In the former region summer rainfall increases from drought in Central Chile until in the south an even distribution is attained. The latter region may be subdivided according* to the intensity of the summer rainfall maximum and also the increasing range of temperature away from the Equator.

The Dry Zone

Desert conditions extend farther into low latitudes along the west coast of South America than in any other continent. Aridity persists beyond the Gulf of Guayaquil almost to the Equator. Air temperatures along the coast, however, from this northern limit to as far south as the thirtieth parallel, are much lower than might be expected for these latitudes. The cooling of the air is due to the Humboldt Current, and also to the upwelling of cold water inshore brought about by the prevalent off-shore breezes. From these causes fogs arise, to which the name of Peruvian dew, or *garua*, is given, and this form of precipitation mitigates to some degree the extreme aridity of the shore lands. The cooling effect of the Humboldt Current is minimized in summer when a southward-flowing current, El Nino, penetrates the inshore waters of the northern Peruvian coast. Even so, the warmest month, March, at Callao has an average temperature of barely 71 ° F.

A tendency for some precipitation to occur on the seaward slopes of the Western Cordillera may be noted. Lima, at a height of 520 feet, receives less than two inches of rainfall in the year, and Arequipa, at 8041 feet, over four inches. The arid Pacific shorelands, therefore, are backed by the highly elevated region of the Cordillera, throughout which temperatures are always low, and where slight precipitation may occur at all seasons.

In the remaining, or Argentine, portion of the great arid zone climatic influences from both oceans are felt. The warming effect of the prevailing winds as they descend eastward is minimized by the chilling of the Falkland Current.

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Eastward-moving depressions are a general characteristic of this westerly wind zone, and these disturbances are frequent along the northern margins of the zone in summer. They then give rise to strong cold winds in their rear known as Pamperos. Warm air descending from the north-west across the Andean foothills

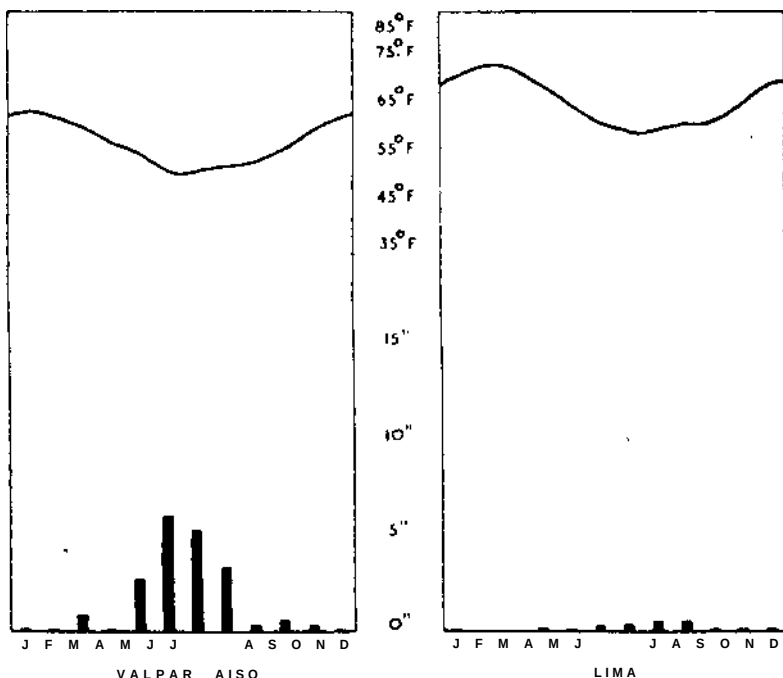


FIG. 7. PACIFIC TYPES

Desert and Mediterranean types contrasted. See also Evangelist's Island (Fig. 8).

produces a *fohn* effect in north-west Argentina known as *Zondas*. The little rain that falls occurs almost entirely in summer.

Winter Rain Regions

The northward migration of the middle latitude high-pressure belt over the Pacific brings onshore winds to the coast of Central Chile in winter. The depressions associated with this circulation then give rain to a region which suffers

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extreme drought in summer. In contrast with other regions under the winter rainfall, or Mediterranean type of climate, Central Chile is distinctly cool in summer. It comes under climatic influences similar to those experienced in the desert region to the north, to which it virtually belongs at this season.

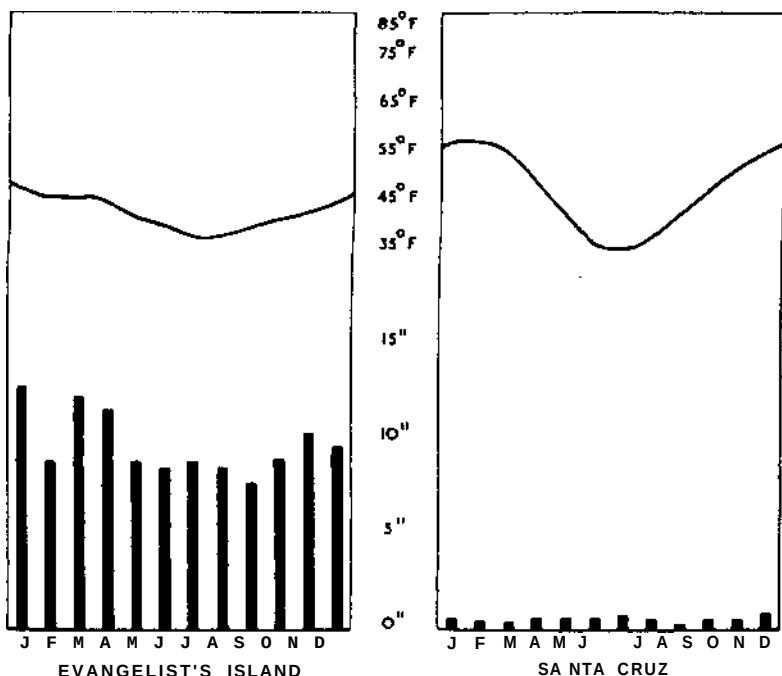


FIG. 8. COOL TEMPERATE TYPES

The Pacific and Atlantic coasts contrasted for both range of temperature and distribution of rainfall.

The warmest month at Valparaiso is only a little warmer than in London, the mean annual range of less than twelve degrees being somewhat lower.

In the zone of permanent westerly winds there is no dry season, and in the west the total rainfall is very great. As elsewhere on the Pacific coast south of the Equator, temperatures are lower, particularly in summer, than might be expected for the latitude. Maritime influences, however, induce mild winters, and at Evangelist's Island the annual range of

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temperature is from 37 to 47 degrees. Climatic conditions on the coasts of the two oceans are strongly contrasted. Santa Cruz, in almost the same latitude as Evangelist's Island, is clearly within the arid zone, and has a distinctly greater range of temperature from 35 to 59 degrees.

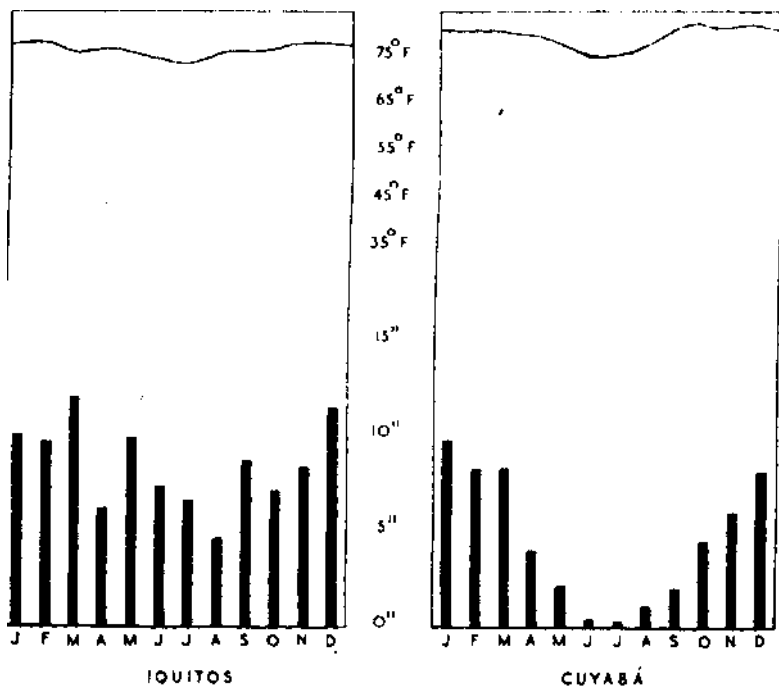


FIG. 9. EQUATORIAL TYPES

Double peak at Iquitos (328', 3° 58' S.) and single peak at Cuyabá (738', 15° 30' S.).

Summer Rain Regions

The differentiation of climatic regions within the vast area of the continent that receives most of its rain in summer rather than in winter is mainly a matter of range of temperature and emphasis of the summer maximum. Over the northern half of this area the annual range of temperature does not exceed 5° F., and a range of more than 26° F. is experienced only south of the Tropic. Over much of this latter area rainfall

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is distributed fairly evenly throughout the year. Where a more equable range of temperature prevails the wettest month is closely related to the latitude of the overhead sun and the thermal equator. There are, however, some notable exceptions to this general rule, as, for example, the extreme east of

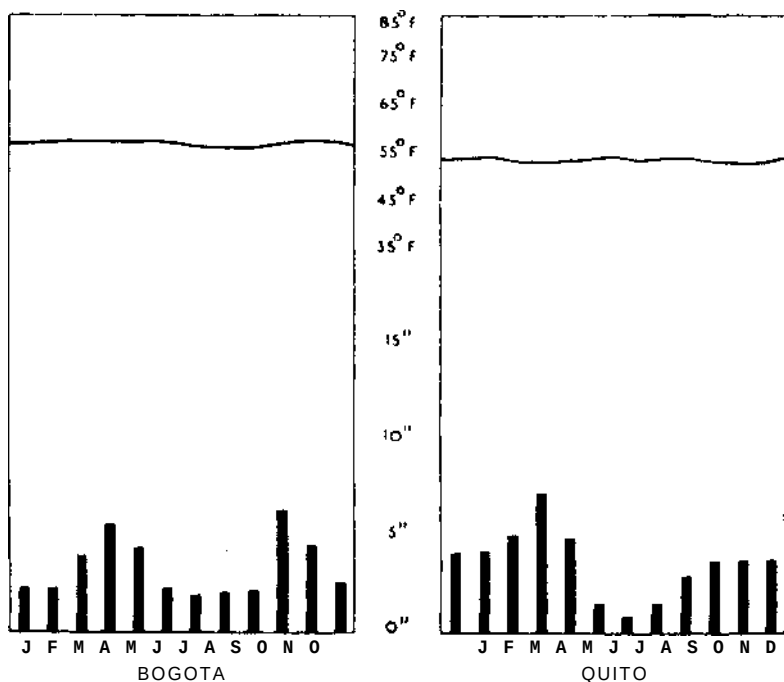


FIG. 10. TROPICAL PLATEAU TYPES

Note the extremely small range of temperature and the double rainfall peaks.
See also Sucre (Fig. 14).

the continent, where the wettest months are the coolest, and other regions where the double maximum and minimum characteristic of an equatorial *regime* are in evidence.

Double Rainfall Maximum. True equatorial climate is exemplified at Iquitos. Here temperatures are uniformly high throughout the year, and relative humidity is over 80 per cent. In this region the seasons are indistinguishable. There is no month without heavy rainfall. The two maxima occur in March and December, being related to the position of the

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thermal equator rather than the geographical. At a height of nearly 9000 feet Bogota experiences a variant of this type of climate, its two rainfall maxima coinciding with its temperature peaks, although the annual range is only $1-6^{\circ}$ F.

No Dry Season. The narrow coastal strip between the deltas of the Orinoco and the Amazon is also a region of very small annual temperature-range having no marked dry season. The indrawing of warm, moist air from the Atlantic is strongest during the southern summer, when the north-east trades blow on to this coast. The incidence of rainfall is intimately associated with configuration, and very wide local variations are to be noted. For example, Cayenne, rivalling Evangelist's Island as the wettest place on the continent, and Georgetown, with as much as three-quarters of their annual total, incline to equinoctial maxima of rainfall. At both places the driest month is October, which at Para is a month of real drought.

Perennial rainfall is experienced also along the narrow Bahia coast of Brazil, where the south-east trades blow onshore through the year and are confronted by the steeply rising escarpment of the Brazilian plateau.

On the Pacific coast of Colombia the extension of the equatorial low-pressure area during the northern summer is responsible for a monsoonal indrawing of air, with consequently heavy rainfall at this season. There is no seasonal drought along this coast.

Summer Rainfall Maximum. Elsewhere east of the Andes and north of the Tropic the monthly distribution of rainfall shows a single maximum, usually in summer. This is characteristic of the lower Amazon basin, of much of Venezuela to the north, and of the Brazilian plateau lands to the south.

In the lower Amazon basin Manaos, Santarem, and Para are typical of this seasonal distribution of rainfall. About 70 per cent, of the annual total at Santarem falls during the six 'summer' months, and at Manaos about 60 per cent. Para receives almost 90 per cent, of its annual total during the six months January to June. The trade winds of both hemispheres are drawn into the Amazon valley in accordance with the seasonal migrations of the wind belt.

The northern region of seasonal rainfall is influenced by the trade-winds, which in summer are drawn well inland by the prevailing low pressure in the interior. On the coasts these

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winds yield very little rainfall, La Guaira, typical of the Venezuelan coast, receiving an average of only eleven inches per annum. Caracas, at a height of over 3000 feet, close behind the port, has almost three times as much. At both places summer is distinctly the wetter season, the winter

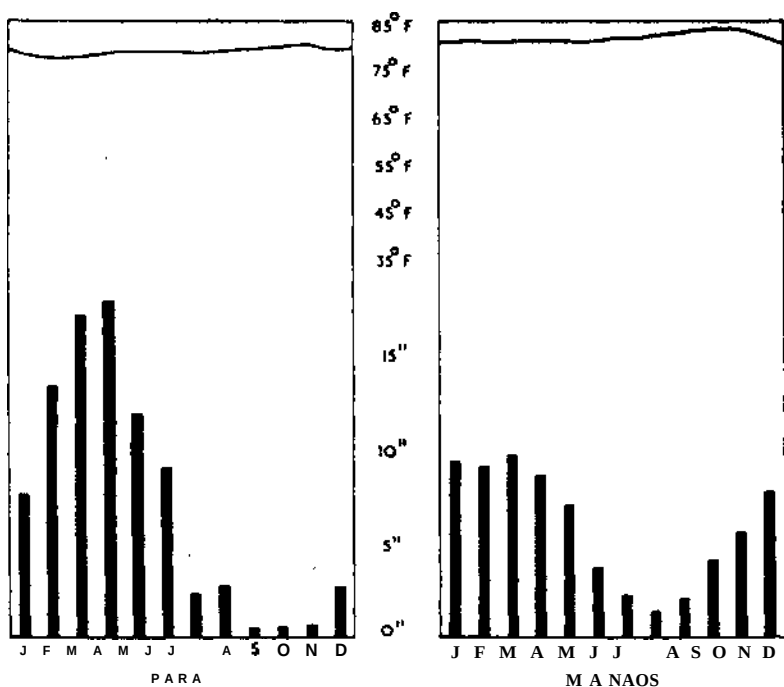


FIG. 11. EQUATORIAL LOWLAND TYPES
Contrasted with Plateau types (Fig. 10).

conditions approximating to drought. Still further inland Ciudad Bolivar parallels the monthly rainfall distribution of Caracas.

The Brazilian plateau region south of the Amazon is one of high temperatures throughout the year. Even as far inland as Cuyabá the mean annual range is only 6-6° F., while nearer to the Atlantic it is smaller still. The heavy summer rainfall in the interior is associated with the furthest south position of the equatorial low-pressure system. More than 80 per cent, of the annual total at Cuyabá falls during the six summer months.

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In the extreme east, however, the inter-relation of winds and relief is more evident. Both Para and Ceara receive 90 per cent, of their total rainfall during the six months from January to June, and in each case the wettest month is April. At this season the north-east trades blow directly towards this coast.

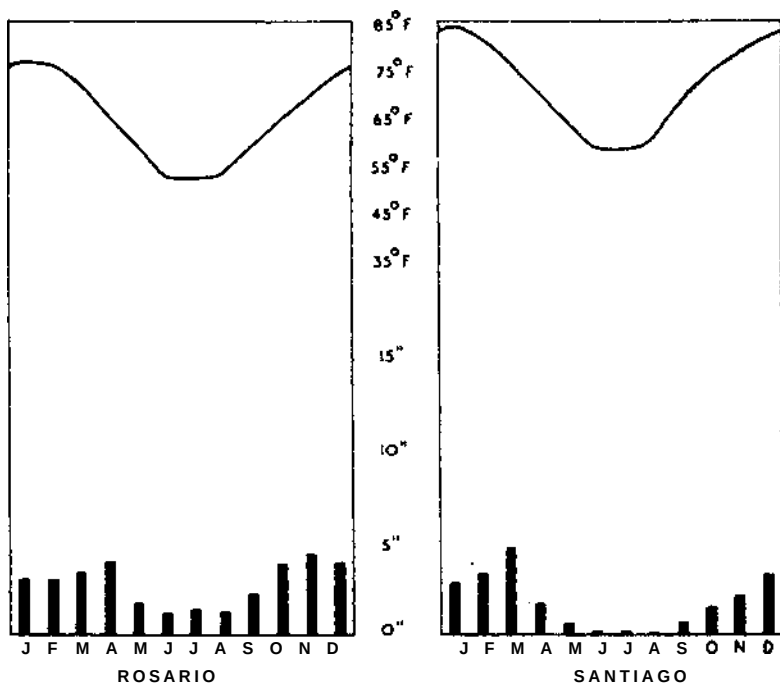


FIG. 12. SUB-TROPICAL INTERIOR TYPES

Note the increasing continentality. See also San Juan (Argentina) (Fig. 14).

Pernambuco receives most rain when the south-east trades similarly blow onshore, and least when, from October to December, the southward migration of the high-pressure system of the South Atlantic brings the general circulation of the air parallel to the coast.

The Dry North-east. Inland in this north-east 'shoulder' of Brazil rainfall diminishes very rapidly. At both Quixeramobim (05°16'S., 39°15'W.) and Santa Anna do Sobradinho (Joazeiro) more than four-fifths of the total annual rainfall is received during the southern 'summer,' and at both places

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March is the wettest month. Drought is, however, more prolonged at the latter town. This monthly distribution closely resembles that at Para and Ceara, and is related to the extreme southward position of the continental low-pressure system and the inward flow of air from the North Atlantic. The high ranges

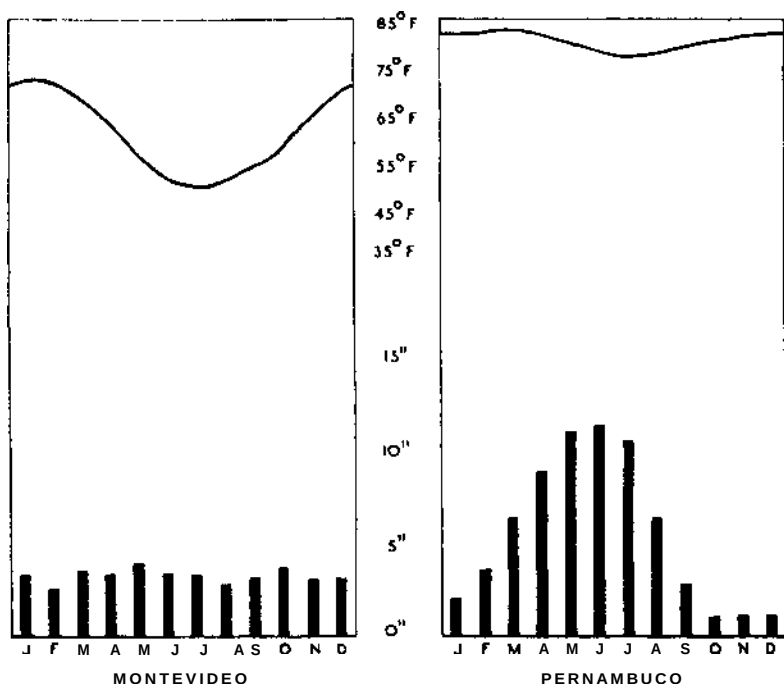


FIG. 13. ATLANTIC COAST TYPES

The even distribution of rainfall in Uruguay and the anomalous winter rainfall of Pernambuco. See also Santa Cruz (Fig. 8).

of the plateau parallel to the shores of the South Atlantic exclude from the interior the rain derived from that ocean.

Warm Temperate Regions. Climatic conditions improve towards the south in this Brazilian hinterland. The total annual rainfall increases and the seasonal distribution becomes more even. The driest season is autumn, during which, however, as much as 12 per cent, of the annual rainfall is received at places on the coast—for example, Santos and Rio de Janeiro. On the plateau this proportion is considerably lower, and the

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summer maximum, with the stronger indraught of air from the South Atlantic, is more pronounced. The range of temperature in this region is from five to twenty degrees, being about ten degrees at the coast.

The summer maximum of rainfall persists southward into the

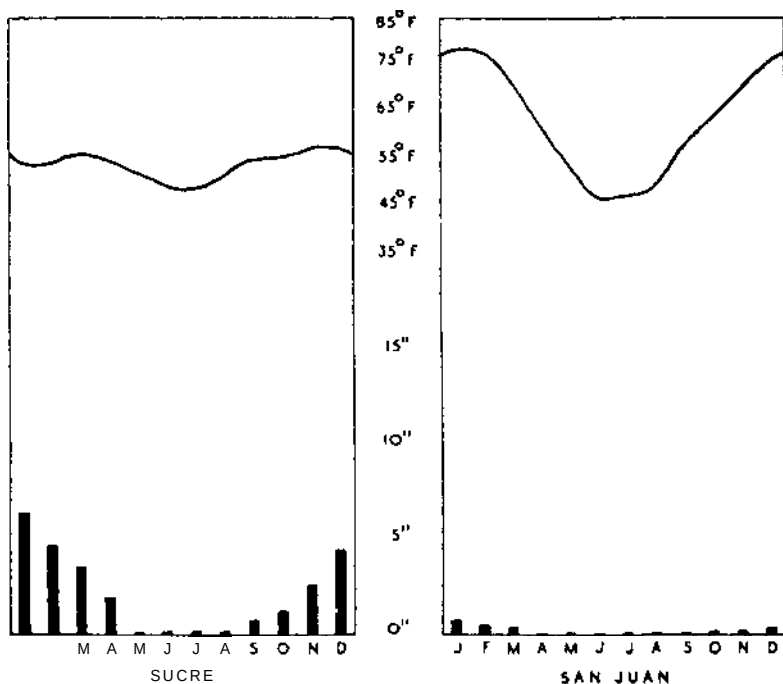


FIG. 14. SUB-ANDEAN TY'KS
Dry belt and Plateau characteristics contrasted.

region of greatest range of temperature. Periodicity of rainfall is least marked along the Atlantic coast, where such places as Buenos Aires, Montevideo, and Rio Grande have a fairly even monthly distribution. Continentality becomes more marked in the Parana-Paraguay valley and westward to the Andean foothills. For example, the percentage of the annual total falling during the three winter months at Rosario, Corrientes, and Asunción is about twelve. At Santa Fe it is 8.5. At Córdoba and Santiago this proportion has fallen to 4 and 2.5 respectively. In the Andean zone, of which Saka, La Rioja,

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and San Luis are typical, not only is the annual total low but the winter is a time of drought.

Andean Region. Mention has already been made of the seasonal distribution of rainfall in the high Andean plateaus north of the Equator, where Bogota, in latitude $04^{\circ} 38'$, reflects the double maximum and minimum of the adjacent equatorial lowlands. The range of temperature in this plateau region is everywhere very small. Farther south in the region of the tropical Eastern Cordillera the wettest month varies from April near the Equator—as, for example, at Quito—to January at La Paz and Sucre. The total annual rainfall also diminishes, until at the latter town it is only a little more than half what it is at Quito. The driest month throughout the region is July. The heaviest rain occurs at Bogota in the months following the equinoxes. In the south of the region summer conditions of temperature and pressure permit the penetration of Atlantic influences into the valleys of the Eastern Cordillera.

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of the continent into natural regions may, therefore, have primarily a physical basis, with regard to differences in relief and climate, and will also take account of the varying character of the natural vegetation.

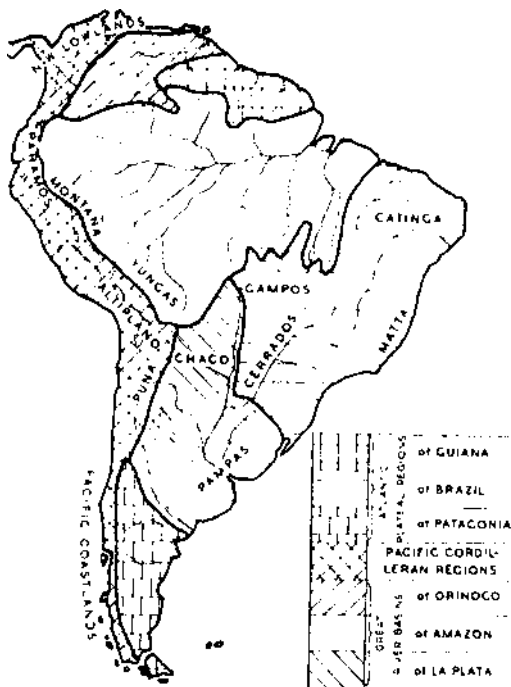


FIG. 1(>. NATURAL REGIONS

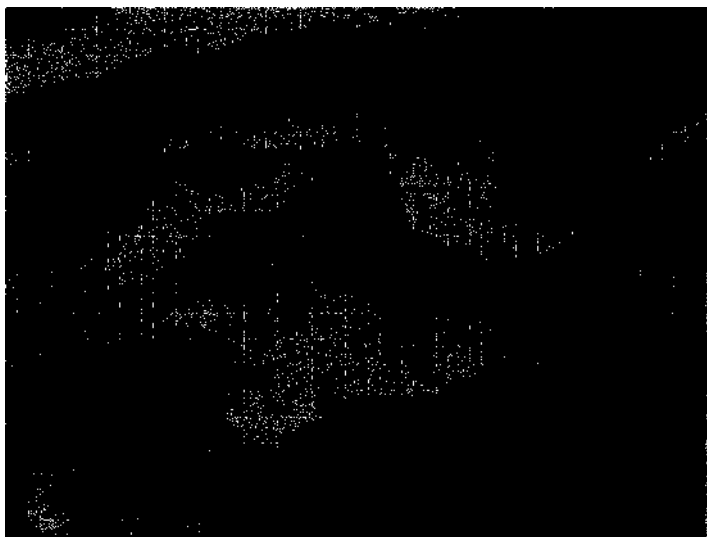
Atlantic Plateau Regions

The Guiana Massif. The northern Gondwanaland remnant is divisible into two contrasting portions of which the western, or Venezuelan, is the more elevated. This region is drained in a general north-westerly direction by tributaries of the Orinoco. The eastern portion is drained by independent rivers, whose general flow is northward. The crystalline core is overlaid by deposits of Palaeozoic sandstones. Of such sedimentaries Mount Roraima is composed. Their occurrence along a belt continuing eastward across the plateau gives rise to the independent

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streams (see p. 31), some of which have cut back and now have their sources in the main watershed. Rapids occur near the mouths of the streams indicating rejuvenation induced by re-elevation.

The coastal plain is narrow. Tidal deposits exposed by



THE TGUASSU FALIS
The Devil's Gorge from the air
Photo E. N. A.

re-elevation are liable to inundation, and the cost of draining them and the alluvial lands behind them is prohibitive, having regard to the paucity of population and adverse climatic conditions. Higher on the plateau surface, where the rainfall is heavier and more evenly distributed, forests abound. Those of the lower levels yield heavy hardwoods of the 'greenheart-mora' group. Balsa and balata are obtained from the higher forests.

The savana of the upper Rio Branco is continued over the low Orinoco-Essequibo divide into the valley of the Rupununi. Here, with lower temperatures and a long dry season during the northern winter months, the dominant natural vegetation is grass.

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The Brazilian Massif. The great Brazilian uplands present a steep scarp towards the Atlantic Ocean, and the coastal plain is very narrow. The plateau surface of the interior is drained northward to the Amazon and southward to the Parana-Paraguay system. The courses of the great tributaries of the



A TREE 'ISLAND' OF THE CAMPO

Photo Paul Popper

Amazon are impeded by cararacts at the outcrops of harder rocks. Those of the Parana have falls where they cross the basaltic ledges characteristic of the southern limb of the massif. The greatest of these falls are those near the mouth of the Iguassii river. The maturity of the rivers on the plateau is a result of the long continued freedom from disturbance of this element of Gondwanaland. There is no evidence of more recent submergence or of glaciation. In the south volcanic intrusions have resulted in mineral concentrations, particularly in Eastern Brazil.

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The distribution of the major types of natural vegetation in this tropical plateau region is closely related to the main features of its relief. Between the deeply cut river troughs the flat-topped remnants of the plateau are known as *chapadoes*.¹ To the east of the Parana-Sao Francisco trough these remnants assume the scale of mountain ranges. The rivers of the scarp face have cut back into the valleys of such rivers as the Parahyba, Doce, and Sao Francisco, thus giving them an 'elbow' before reaching the coast, below which their profile is less mature. The Rio Sao Francisco, for example, descends from the plateau in a series of cataracts, the Paulo Affonso rapids.

The dominant type of natural vegetation on the Matto Grosso plateau is tropical grass, the Brazilian campos² being comparable to the African savana. Obstacles to the economic development of the region are drought in winter, violence of the rainfall in summer, great distances and difficulties of transport. In the middle Rio Sao Francisco valley climatic conditions are even less favourable. Violent storms, mostly in the first quarter of the year, do great damage to the soil, and consequently the natural plant cover is impoverished. For the rest of the year intense evaporation produces conditions of semi-permanent drought. Hence the grasslands of the campos give place to an association of cactus and drought-resisting thorn shrubs known as *catinga*. With a rather more generous rainfall on the *sertaos*,³ the higher plateau surfaces nearer the Atlantic Ocean, the characteristic vegetation resembles the savana of the Matto Grosso intermingled with the xerophilous association of the *catinga*. For economic plants of this region see p. 125.

The natural vegetation of the coastal plain and of the windward slopes of the high serras is selva.⁴ Much of the evergreen forest of the Matta, the narrow coastal plain from the mouth of the Rio Sao Francisco to Cape Sao Thome, has been cleared for cultivation.

The montane tropical forests of the eastward facing slopes of the plateau edge and of the serras crossing the plateau differ greatly from the selvas. They are found above the 3000 foot contour, or about a thousand feet above the average plateau level. In them hardwoods predominate, and there is dense

¹ *Chapadoes* — plateau.

²

Cainpo = tract of country.

³ *Sertao* — backwoods, or interior.

⁴ *Selva* — forest.

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undergrowth of tree ferns and bamboos. In the south of the region the most useful tree is the Spanish cedar. Towards the

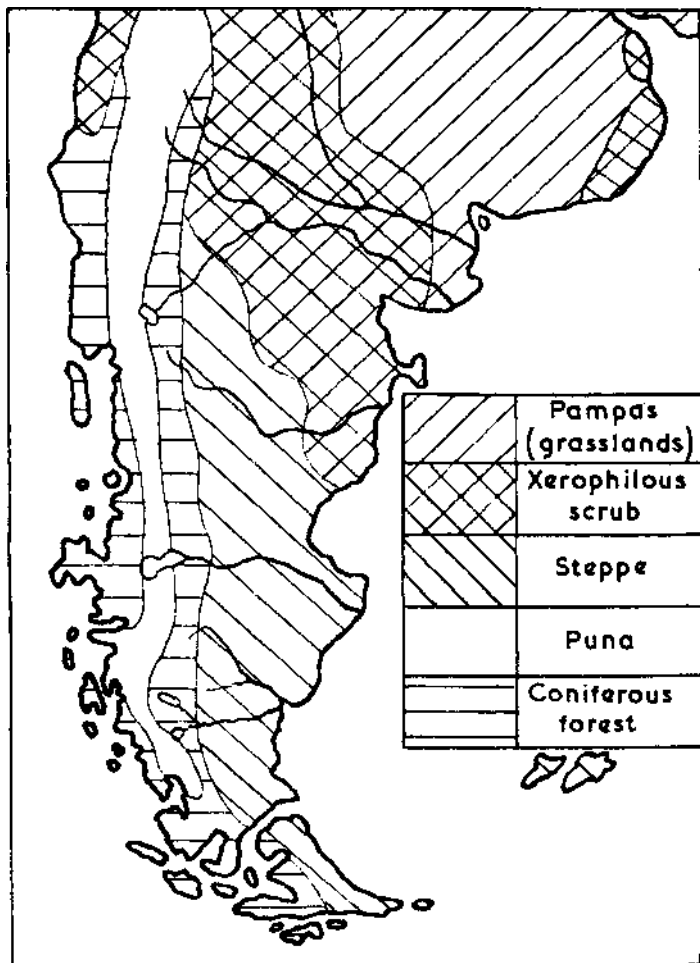


Fig. 17. COOL TEMPERATE LANDS: NATURAL VEGETATION

south-east the open campos become *campos cerrados*? whose typical tree is the Araucaria of the Parana pine forest. In the sixteenth century Brazil's economy rested upon its hardwood

¹ *Campos cerrados* = densely wooded tracts.

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timbers and dyewoods, '*pao brasil*,' from these upland forests and 'gallery forests' along the watercourses in the drier regions.

The Patagonian Plateau. The third Atlantic plateau lies wholly in temperate latitudes. It ends abruptly near the coast and the absence of any width of coastal plain except near the largest estuaries points to recent elevation. The abruptness of its western edge is marked by the infilling of the pre-Cordilleran trough with glacial deposits in the south and volcanic material in the north. (See also p. 140.)

As a natural region this plateau suffers from aridity, from poverty of soil, and from sparseness of vegetation. Except near the river mouths and again close to the Andes, where irrigation might be possible, these adversities are irremediable. The rivers are subject to extreme seasonal fluctuations, the more so in the north where no glacial lakes afford natural storage as they do from Lake Nahuel Huapi (lat. 41° S.) southward. In the extreme south the streams have cut back beyond the low Cordilleran crest into a region of perennial heavy rain. As in other arid regions the rivers, fed by the rain on the mountains to the west, are deeply trenched. The steep walls of the river trenches are called *barrancas*¹ a name commonly applied to riverside bluffs elsewhere in Spanish-speaking South America. Seasonal inundations convert shallow depressions into swamps of various types. *Mallins*² occur near the mountain zone or near the coast, and in either case they are filled with fresh water owing to the slightly heavier rainfall in winter. In the intervening region *salitrales*³ occur. Here saline deposits left by evaporation are re-dissolved during the wet season. *Manantiales** are depressions filled only by rain water. No deposits of terrigenous salts occur in them.

On the plateau surface conditions have not favoured the formation of soil. The lack of vegetative covering has deprived it of natural protection against wind erosion which has removed the finer material from the deposits overlying the resistant Archaean foundation. Any economic development is necessarily restricted to the river valleys.

Irrigation is possible only where the river valleys are broad, the soil free from salt, and frost not excessive. These conditions are found in the north, as, for example, at the mouth of the

¹ *Barranca* = gorge, ravine.

³ *Salitral* — nitrous.

² A *mallin* is a shallow depression.

Manantial — flowing.

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Rio Negro, where the rivers, lack the natural storage enjoyed by those of the cooler south. There is little, therefore, to threaten the predominance of the sheep pastures throughout the region.

The Islands. In the island of Tierra del Fuego the Coast Range of Chile is contiguous with the low Atlantic plateau. To the east of Cape Virgenes lie the Falkland Islands. Both these low plateau remnants are exposed to gales, and have already suffered soil erosion by glaciation. Apart from the coniferous forests of the wetter Pacific coast the natural vegetation is grass, and there is very little cultivation.

Pacific Cordilleran Regions

Altiplano. The very high intermontane basins enclosed by the Western and Eastern Cordillera vary greatly in natural characteristics according to the latitude and altitude. South of the equator the altiplano extends through Peru and becomes considerably broader in Bolivia. It merges in the south into the Puna de Atacama of Argentina.

Of the smaller basins of the altiplano north of the Nudo de Vilcanota the most important is that in the region of Cerro¹ de Pasco. Here the outstanding characteristic of the region is its mining activities. The natural vegetation is puna, typical of a severely arid climate. It consists of bunch grass and other small plants widely scattered.

The great altiplano of Bolivia, south of Vilcanota, includes the drainage basin of Lakes Titicaca and Poopo and the Rio Desaguadero. Its average elevation is about two miles above sea-level and the surface has been covered to a great depth by material from the enclosing Cordilleran slopes. The original lake included these two lakes and the Salar de Uyuni and was drained by an effluent in La Paz gorge. The lip of the gorge is now 6000 feet above the level of Lake Titicaca, and the Rio Desaguadero flows in the reverse direction. Elevation appears, therefore, to have been more rapid at the northern end of the altiplano. Considerable desiccation has taken place since the period of maximum precipitation, the Pleistocene. Puna grass is the characteristic vegetation of the region. In the south, Lake Poopo is salt; *salars*, salt swamps, are numerous. The eastern slopes of the Cordillera Oriental are forested, but in the

¹ Cerro = hill.

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river valleys of the headstreams of the Madeira the forests of the wetter uplands give place to xerophytic shrub. These slopes of the Montana and Yungas regions face north-eastward and are very abrupt.

The mineral zone of the Andes may be traced where volcanic

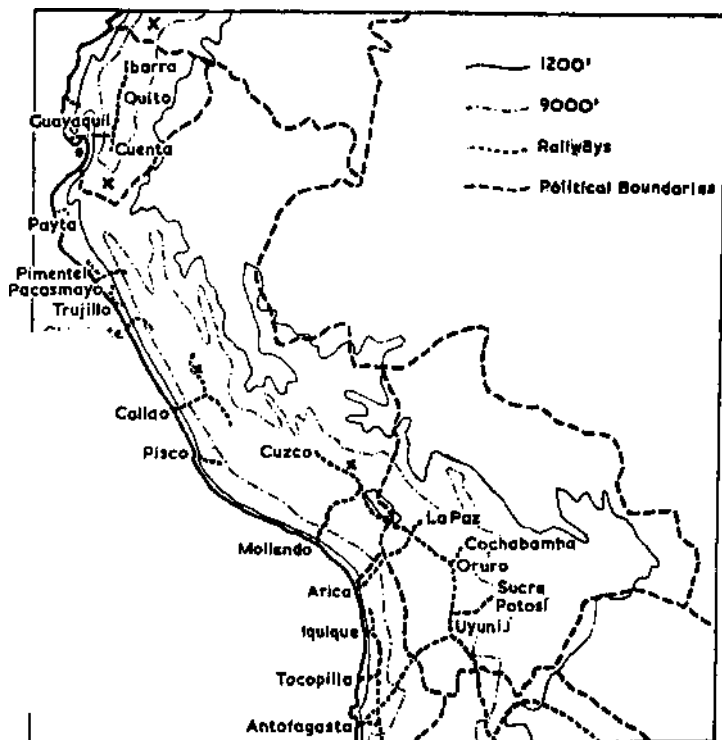


FIG. 18. CENTRAL ANDEAN REGION

intrusions have occurred in the older sedimentaries. It therefore follows the Western Cordillera through Ecuador and Peru, and then includes the granitic core of the Cordillera Real of Bolivia before returning to the Western Cordillera again in northern Chile.

Puna de Atacama. To the south of the Bolivian *solars* the topography of the intermontane region is modified. The Puna de Atacama is a gently tilted plateau surface, deeply trenched

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by the headstreams of the Parana-Paraguay system. These streams emerge from the Cordillera Real by *quebradas* and pierce the Pre-Cordillera by *valles* before flowing south-eastward across the Chaco. The surface of the Puna is much broken by parallel volcanic ridges, and in the Cordilleran rims of the region active volcanoes are numerous. The highest is Llullaillaco, which is 22,146 feet. In the porous volcanic ash of this arid region the tola bush gives its name to the poor steppe vegetation characteristic of the Puna de Atacama. The Western Cordillera here maintains an average height of over 18,000 feet for a greater distance than elsewhere in the Andean system, and most of the peaks are snow-capped throughout the year.

Paramos. North of the Equator the intermontane element of the Cordilleran system does not lie at such great heights as the altiplano, nor does it suffer the same degree of aridity. The broader surfaces in Colombia, too elevated for cultivation, are, therefore, grasslands, and are known as *paramos*. The most extensive is that on which stands the capital, Bogota. Again, in contrast to the unhealthy lowlands, a similarly situated depression is to be noted in Venezuela.

Pacific Coastlands. Very diverse natural regions are found west of the Andes and south of the Gulf of Guayaquil. In Peru, where neither the Coast Range nor the Longitudinal Valley are well marked, desert conditions prevail between the coast and the sierra zone. The Longitudinal Valley here is obscured by accumulations of rock waste from the mountain slopes. Irrigation from numerous short streams has produced the ribbon oases characteristic of this region. The mineral wealth of the country is concentrated in the Western Cordillera.

In northern Chile the isolated granitic blocks of the Coast Range become more prominent, and behind them the Longitudinal Valley is discernible in the Pampa de Tamarugal. Extreme aridity persists throughout this Chilean portion of the Atacama Desert. The region is pre-eminent for copper, iron ore, and nitrate of soda.

At the southern limit of the Atacama Desert the Longitudinal Valley is obstructed by an intricate complex of high Andean spurs which extends to the coast in the neighbourhood of La Serena and Coquimbo. To the south the valley can again be traced with little interruption to its submergence at the Gulf of

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Ancud. The Coast Range also reappears rising abruptly from the coast to a dissected plateau surface.

Although the rainfall *regime* is typically Mediterranean, very little occurring in summer north of the Rio Bio Bio, and although the natural vegetation is characterized by hardwood shrub forest resembling that of the European maquis, farming is almost entirely restricted to cattle rearing. There is some viticulture in the irrigated valleys, and subsistence crops are raised.

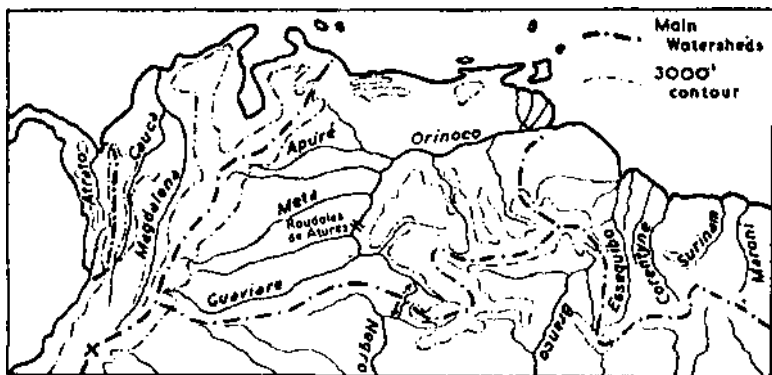


FIG. 19. NORTH-WEST ANDKAN REGION: DRAINAGE BASINS

The valley of the Rio Bio Bio marks the transition to the beech and pine forests of temperate southern Chile. It also serves to differentiate between the unbroken valley to the north and that to the south upon which glacial moraines have encroached, causing the formation of morainic lakes. There is no rainless season. Among farming activities stock raising predominates. Wheat and barley are cultivated (see p. 170). The Cordillera north and south of the Rio Bio Bio are also contrasted. To the north their height everywhere exceeds 10,000 feet. To the south the foreland is marked by volcanoes.

North-western Lowlands. North of the Gulf of Guayaquil the lowlands included within the Cordilleran system are the valleys of the Cauca and Magdalena and the Maracaibo Depression, together with the San Juan-Atrato Depression. The latter and the narrow Pacific coastal plain are densely forested with equatorial selvas. The valleys of the great northward-flowing rivers are under a similar type of natural vegetation, except

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that the Andean slopes and upper basins carry mountain forest or paramo steppe according to elevation. Where, as in the northern coastal region, the tendency to winter drought becomes more marked, the selvas give place to tropical scrub. The Maracaibo depression is further characterized by its pre-eminence as an oil-bearing region.

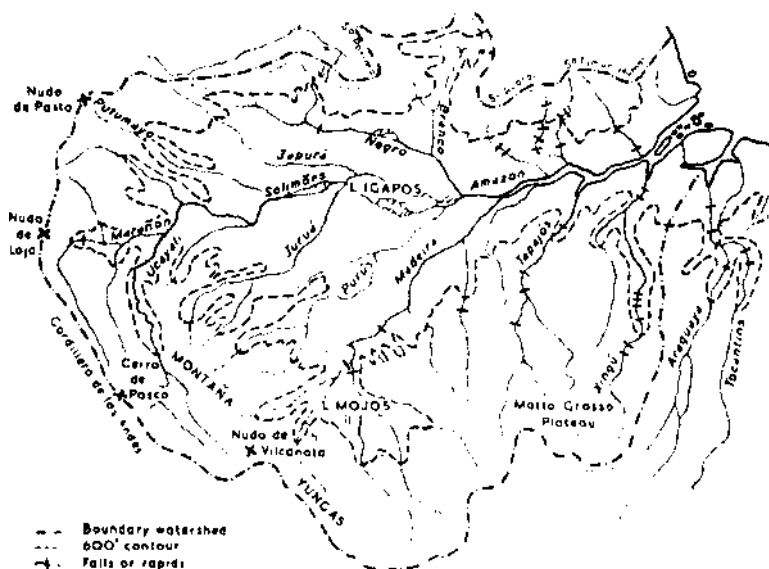


FIG. 20. AMAZON BASIN

The Great River Basins

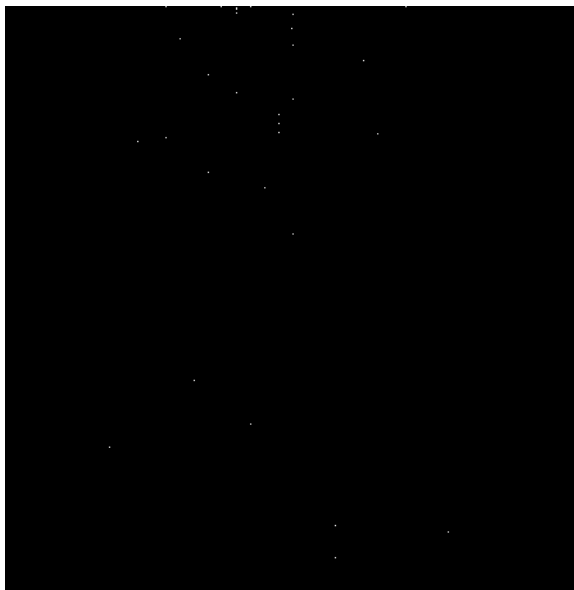
The Orinoco Basin. The greater part of the Orinoco basin lies in a region of seasonal rather than distributed rainfall. Two rainy periods occur near the coast, and in the higher Mesa¹ region of the south rainfall tends to be more evenly distributed throughout the year. The Mesas are plateaus where the crystalline rocks of the low extension of the Guiana massif are overlaid with gravels. The surface is remarkably uniform except where trenched by rivers flowing south-eastward from the Cordillera. The northern boundary of the Mesa region is a low east-west

¹ A mesa is a plateau remnant.

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scarp overlooking the valley of the Meta. The lower courses of the rivers are liable to flood, and fells or rapids occur on the main stream as noted on p. 33.

Much of the Orinoco basin is savana. On the Andean slopes are tropical forests, and the delta is a region of mangrove swamp. As the low Amazon divide on the Mesas is approached, savana



AN INDIAN GOLD-WASHER OF THE AMAZONIAN SELVAS

Photo Paul Popper

gives way to selvas of the *llanura*. The savana deteriorates under the lee of the coastal range. In the lower river valleys extensions of the selvas occur. In the delta and its hinterland oil is of great importance.

The Amazon Basin. The great equatorial lowland of South America extends from about latitude 5° N. to about 18° S. It covers more than thirty degrees of longitude. It is drained by the Amazon, most of whose basin of two million square miles is less than 600 feet above sea level. Uniformity of climate and natural vegetation characterizes the whole of the lowland. The dense forests of the selvas cover almost the entire basin and are

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extended southward up the valleys of the great tributaries. On the west the selva merges with the tropical mountain forest of the steep slopes of the Cordillera in the Montana and Yungas regions. The plateau traversed by the tributaries of the south is savana. Within the basin itself savana also occurs in the

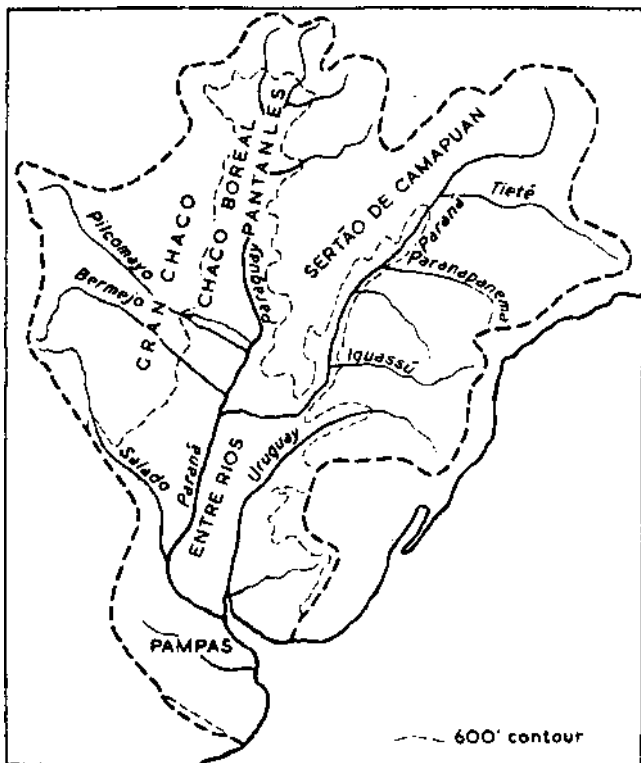


FIG. 21. PARANA-PARAGUAY BASIN

upper basin of the Rio Branco as an extension of that of the Rupununi, and again on the eastern side of Marajo Island, where the rainfall regime is distinctly seasonal, and the *varzea* of the western side gives place to *terra firme*.¹

Varzea. *Varzea* is the soft surface near the rivers. It is liable to frequent inundation and is densely forested. Denser

¹ *Terra firme* — solid ground.

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forests of greater trees are found on the *terra firme*, the harder ground of consolidated late Quaternary deposits. Within the Amazon basin there are two swampy lagoon regions, whose significance is noted on page 179. The tributaries of the Amazon, as well as the Tocantins and the Araguaya, which share its mouth, are all impeded by falls along a line roughly parallel to the 600-foot contour where older and more resistant strata outcrop.

The chief of the hardwoods of the selvas is mahogany, which occurs generally throughout the forests, the better-drained soils yielding the better timber. Another cabinet wood is rosewood. Balsa is a very light and strong wood much in demand for raft building and it is found largely in the northern and western margins of the selvas. The principal hevea region is in the south-west, around the headstreams of the Madeira river. Castilloa, another rubber producer, grows for the most part south of the Amazon, while balata is found north of the river. The Brazil-nut tree is the principal economic tree of the eastern selvas.

The Warm Temperate Lowlands. The basin of the Parand-Paraguay river system extends over more than twenty degrees of latitude. It comprises therefore a number of diverse natural regions differentiated mainly by their climate and vegetation.

The two main streams descend from regions of very heavy rainfall, the greater part of which occurs in summer. To the west of the Paraguay valley both aridity and the preponderance of summer rain rapidly become more marked. Streams rising in the Cordillera are subject to great seasonal fluctuations and are liable to change their course after floods. As rainfall decreases southward they fail to reach the Parana and the sea. (See p. 123.) Around the estuary rainfall is evenly distributed throughout the year. Such wide variations in rainfall *regime* contribute to the recognition of certain well differentiated types of natural vegetation within the great river basin.

North and south of the estuary of La Plata are grasslands known as Pampas. Although the winters here are neither severe nor dry, the natural vegetation is tall prairie grass, or 'pasto duro',¹ rather than forests. It may be that the grasses have succeeded to an earlier cover of *monte*,² the stunted hard wood scrub found in the semi-arid western margins of the basin

¹ Pasto duro = coarse pasture. ² Monte = mountain, or forest.

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or on the drier limestone soils to the south. North of the estuary, in Uruguay, the Pampas receive more than thirty inches of rain per annum, and there is an average of over three hundred days without killing frost in the year. The surface, however, with its frequent exposures of the crystalline plateau, is less suited to agriculture than the deep alluvial and loessic soils of the drier and cooler Argentine pampa.

The region of inland drainage is bounded in the north by the Rio Salado. The soils may be graded from east to west, from the stoneless chernozem (black earth) of the Humid Pampa through the brown soils and sandy loams to the poorer grey soils of the semi-arid 'piedmont.' This is a region of *monte* or xerophytic shrubs.

Although usually regarded as a distinct natural region, El Gran Chaco represents the transition from the semi-arid *monte* of the Rio Salado valley to the 'green hell' of the Amazon divide. The region is bounded in the west by the foothills and valleys of the Cordillera Real and in the east by the swamps of the Paraguay valley.

The surface rises steadily westward, and rainfall, particularly the scanty rainfall of winter, diminishes rapidly in the same direction. While adequate moisture is available for vegetation on the east and north, the southern margins of El Gran Chaco are within the great drought axis, and the western valleys are dependent for water upon the streams descending from the Cordillera.

In the very warm and moist lowlands and river valleys to the east of the Chaco dense forests occur. The most important trees here are varieties of quebracho. The Chaco proper is found on the higher plateau surface. The vegetation of the Chaco Austral, between the Salado and Bermejo rivers, resembles to some extent the *monte* and consists of stunted hardwood trees interspersed with coarse bunch grass. The dominating species among the sclerophyllous trees is the algarrobo. North of the Bermejo, in the Chaco Boreal, the woodlands are denser and the trees, as in other moister regions, are deciduous. Park-like scenery is typical of this region, and the pastures are of the 'open' type.

To the east the characteristic tree is the Araucaria, or Parana pine. The association of woodland and pasture, characteristic of this southern limb of the Brazilian plateau, is known as

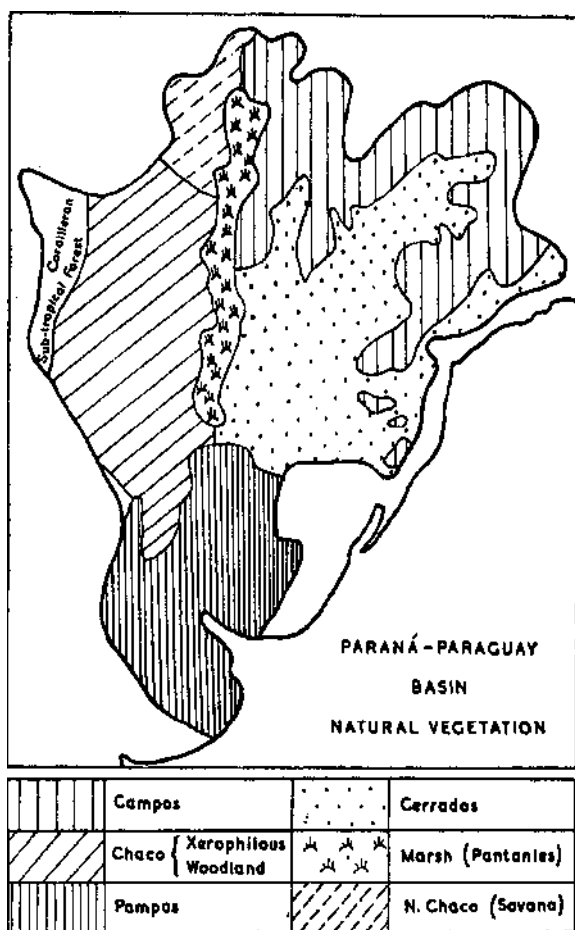


FIG. 22

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campos een ados. In Entre Rios the *pantanal*¹ forested swamps of the Paraguay valley give place to natural grasslands transitional in character between the prairie of the Humid Pampa and the drier scrub land further west.

¹ *Pantanal* = swampy, marshy ground.

CHAPTER V

HABITATS AND ECONOMIES

Indian Settlements

Forest Clearings. From the primitive clearings of the selvas to the cities of modern civilization the way of life of the inhabitants of South America presents an infinite variety of economy and culture. Very few communities owe nothing to Spanish colonial and more recent commercial influences. It is only in the remotest regions, for example, in the depths of the equatorial forests or on the highly elevated *paramos*, that a pre-Columbian economy survives. External contacts, although nowhere entirely absent, have left but very little impression upon the lives of these primitive communities. Nor are they likely to be much disturbed by the rapid economic development of more amenable regions of the continent.

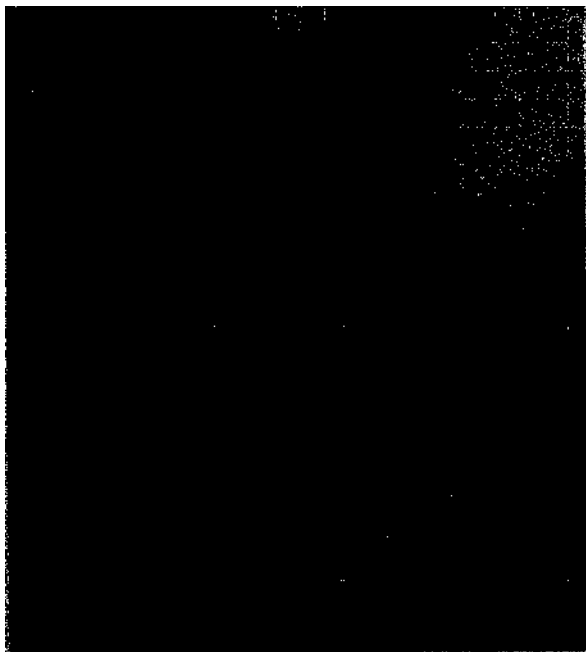
Of the South American ways of life that have survived from pre-Columbian days the most primitive is that of the Indians living in the forested lowlands of the Amazon basin. External contacts are here at a minimum, although seldom entirely absent. The consequences of these contacts, as far as they modify the daily life of the people, are very slight. The people themselves are not capable of any marked response to the stimulus of external relationships. For this reason the withdrawal of outside contacts may result in a relapse on the part of the native population towards their primitive social and cultural status. Such was the case at the collapse of the rubber boom at the beginning of the nineteenth century.

This inability of the people to better their living conditions and improve their cultural status reflects the adversity of their environment. Climate is for them a monotonous repetition of the unvarying daily weather. They are surrounded by the gloom of the forests which obscure the sky and present in themselves a uniform monotony of subdued colouring. Man's instinct to learn more of his surroundings is thwarted by the impenetrability of the selvas, as are his efforts to till the ground by the rapid reconquest of his clearings by forest vegetation,

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So far from finding in cultivation a stable reward to anchor him to the soil, man gains but bare subsistence from his clearing until his unequal struggle against the forest drives him from it.

Such an economy is one of shifting agriculture. After a few



AN INDIAN HUT IN THE SELVAS

Photo Paul Popper

years it is easier to make a new clearing than to continue to maintain the old one. There can be no permanent settlement, no storing of surplus, and consequently no incentive or *event* opportunity to adopt improved methods of cultivation and to achieve any amelioration of the way of life. These conditions also limit strictly the social horizon of the people. They work in small groups or in families and have little to do with outsiders, except where a river permits some measure of commerce. They are, therefore, not conscious of their part in the country which claims their soil and their allegiance.

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Forest clearings are made on the lighter and better-drained soils of the *terra firme*, where there is no risk of inundation from the rivers. Such soils are easily cultivated with the primitive implements of the aborigines. The principal subsistence crop raised is cassava, and other indigenous crops for example,



AN INDIAN CLEARING IN THE SELVAS

Photo Paul Popper

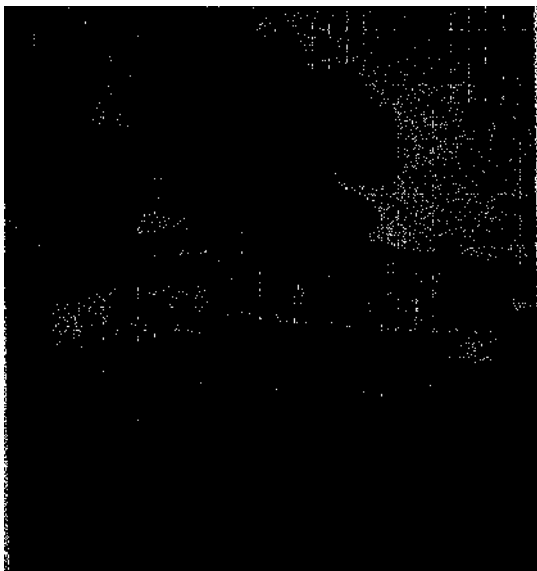
maize and bananas—may be grown. In the most primitive circumstances the dwellings of the people consist of roofs of thatch laid over a framework of light timber, the sides of which are left open.

By trade, relations are established with neighbouring market centres and ultimately with the great industrial markets of the northern hemisphere. Such slender contacts are not, however, without consequences affecting the economy and culture of the

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aborigines. They may be reflected in their clothing and in the use of simple domestic and horticultural implements.

Trading-posts. The principal trading-centre in the west of the Amazon basin is Iquitos: that in the east is Para. There are also, especially in the west, a number of small river trading-posts. To these the Indians bring produce gathered in the



A RIVERSIDE VILLAGE ON THE AMAZON

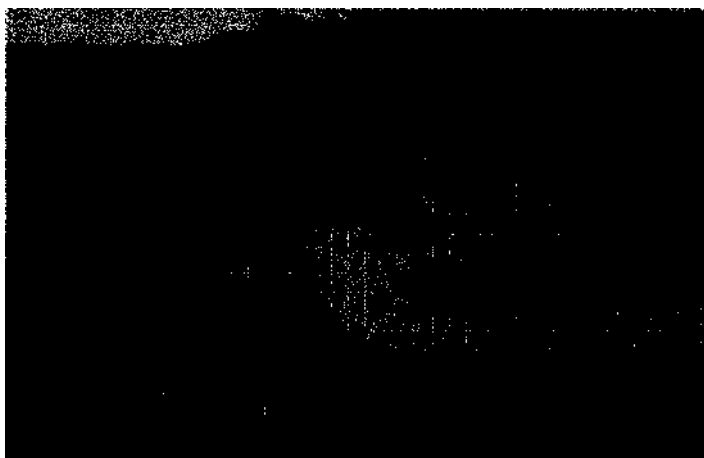
Photo Paul Popper

forests and the spoils of their hunting and fishing. Their main weapon is the blow-gun, from which they shoot arrows dipped in *curare*, a vegetable poison. The commodities, destined ultimately for European and North American markets, include peccary skins, nuts of the tagua palm, which furnish a vegetable ivory, and forest gums used as a base for chewing-gum.

Where timber, chiefly Spanish cedar and mahogany, is extracted from the forests, milling machinery has been introduced. Contact with external markets may be responsible for the introduction of non-indigenous cash crops. Among such,

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sugar, cotton, and coffee also call for the introduction of mechanical transport. But none of these crops enjoys an ideally favourable climate, since sufficient sunshine is lacking. Their small yield is uncertain, and they are inevitably extremely sensitive to the fluctuations of the world markets.



HENRY FORD RUBBER PLANTATION: BELTERRA

In the foreground Stands the modern hospital for the workers, with a row
Of their cottages sweetly beheld.

This reorientation of the aboriginal economy demands improved communications, notably roads, and complementary imports, such as woven cloth and hardware goods. The status of the Indian is affected by such developments in that the business administration is undertaken by white men, while the native labour-force depends upon an exotic organization rather than upon the primitive autarchy of the clearings. Regulated immigration has been more successful in the east than in the west. An attempt to settle Poles in the lowlands of the Peruvian Oriente proved disastrous, but there have been more fortunate settlements of Japanese near Para, where rice, sugar, and cotton have been cultivated.

Plantations. In recent years planned settlements have been undertaken in the east of the Amazon basin by great industrial interests of the northern hemisphere. Such are the rubber

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plantations of the Ford Company at Boa Vista (Fordlandia) and Belterra. Both these plantations are on the Rio Tapaj6s, since water transport is necessary for the export of raw rubber, and for supplying the needs of the white people and their industrial undertakings. The labour force is Indian, and experience at the earlier settlement at Boa Vista showed that the most suitable dwellings for them followed the native pattern of an open timber frame with a roof of thatch, the timber being provided by local sawmills. Although Boa Vista developed from an older plantation of the days of the rubber boom, Belterra has been found to possess definite advantages of site as an old trading-post: The river-banks here afford better wharfage, and the *terra firme* is better drained. Domestic water is supplied from a deep well. The strain of the native rubber-trees has been improved by the introduction of grafting stock from the East Indies, where American planters have already had considerable experience.

On the Paramos. In the high intermont basins of the Andean region occur other survivals of pre-Columbian agriculture and pastoral farming, relics of the economy of the Inca empire. Nearness to the equator deprives these high paramos of any marked seasonal variations of climate, while their great elevation of more than two miles renders them liable to severe frosts at all times of the year. Day temperatures are never high, and precipitation is scanty. Under such climatic conditions soil formation is retarded, and the best soils are found in lacustrine deposits near the plateau lakes. The coarse herbage supports flocks of llama and alpaca, representing the indigenous fauna of the continent. Little cultivation is possible, but barley is/ grown under conditions which do not permit it to ripen, but only to furnish a supplementary green fodder for the flocks. The native cereal is quinoa. Native root-crops include potato and oca. The former is the chief article of diet. In the absence of timber the dwellings are built of *adobe*,¹ or sun-dried brick. The roofs are of thatch and the walls are pierced by only one opening, the entrance. Fuel is provided by the scanty bushes of the plateau vegetation.

Spanish colonial influences did not penetrate to the higher and poorer ranches. The most remote of these small farms remain in Indian hands while others, still barely capable of

¹ *Adobe* = unburnt brick dried in the sun.

HABITATS AND ECONOMIES

sustaining a family, are owned by mestizos. They are almost wholly self-supporting, their only trade being the exchange of their slender surplus of home-made woollen blankets for such essentially tropical products as sugar, salt, and coca. Their clothing may be supplemented by the purchase of cotton goods,

Haciendas

Colonial Tenure. At the conquest the better lands were grouped by the Spanish authorities into large estates, *latifundias* or *haciendas*.¹ Survivals of this Spanish colonial system of land tenure are found rather in the north and west of the continent than in the more recently developed Pampas of Argentina. The Portuguese equivalent of the *hacienda* is the *fazenda*. The *haciendas*, originally granted by the central authorities, are usually in private ownership, although some lands continue to be held by the Church. Much of the social and economic structure, deriving from the three centuries of colonial exploitation, survives in regions least affected by the commercialization through foreign interests which has characterized the development of the continent during the hundred years or more of political independence.

Management is generally in the hands of white men, and where the owner does not reside in the *hacienda* he is often a criollo business man in the nearby town. The labour force is Indian and mestizo, although in Brazil it may be of European descent and may also include Negroes.

The *haciendas* furnish examples of the progress of commercialization. Contact with the local market becomes extended into participation in foreign and overseas trade. Eventually criollo ownership gives place to management on behalf of foreign capital. In this progress modern means of communication and imported mechanical equipment are determining factors, and the type of agriculture tends toward specialization.

Pastoral Haciendas. Dating from Spanish colonial times are pastoral *haciendas* typical of the llanos of Venezuela and Colombia. It was from this region that Paez the mestizo with his army of *llaneros*² came to the support of Bolívar. Extensive natural pastures are located on the mesetas, remnants of the crystalline plateau surface deeply dissected by the tributaries

¹ *Hacienda* = landed property, plantation, ranch.

² *Llaneros* — men of the llanos, or plains.

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of the Orinoco. Heavier soils, retentive of moisture, occur near the Guiana highlands, and here the grass of the savana does not become scorched in the dry season. The pasturage elsewhere is poor and the soil light.

J Such marginal lands are occupied by squatters until depreciation of the pasture compels its abandonment. The squatter's dwelling resembles that of the Indians of the selvas, having a thatched roof supported by a timber frame, the only wall being on the side facing the prevailing easterly winds. The old *haciendas* are owned by white men, sometimes business or professional men resident in a neighbouring town. The managing staff is housed in a brick-built *casa grande* and the native or mestizo labour force is accommodated in thatched dwellings.

It is estimated that the whole region is capable of carrying many more cattle than at present. Until it does so its commercial relations will remain restricted to its own market towns. To these goes the surplus of its agricultural production. This does not reach any considerable dimensions, cultivation being devoted in the main to subsistence crops for the white people employed, of which maize and vegetables are the chief. The labourers on the poorer lands adopt a system of shifting agriculture imposed by the marginal conditions.

Agricultural Haciendas. In regions of more abundant rainfall the Spaniards established *haciendas* principally engaged in agriculture. It was from one of these, at Aragua, that Bolivar the Liberator came. Throughout the colonial period trade with the Mother Country was restricted to certain ports, and cultural influences other than Spanish were not tolerated by the home Government. The chief commodity produced for commerce was usually cane-sugar, for which a mill was erected near the *casa grande*. Sugar-cane is still cultivated on irrigated land in the *haciendas* of the intermont plateau of Venezuela and in the upper valleys of the Peruvian headstreams of the Amazon. Near the *casa grande* are to be found plantations of cacao and coffee as well as orchards of tropical fruits. These are sent to the local markets where may also be the town residence of the owner. The labourers, successors to the slaves of colonial times, live on smallholdings, or *chacras*, where they raise subsistence crops.

¹ *Casa grande* — the big house (as still used in English villages).

HABITATS AND ECONOMIES

Commercialization is responsible for the introduction of modern mechanical agricultural and transport equipment. This is particularly the case vvhhere, as in Ecuador, the cultivation of cacao has given place to that of the more perishable banana. Mechanization is the more profitable as the size of the *hacienda* increases, and the tendency is for the larger estates to be operated by foreign interests in the place of the Creole aristocracy.

Pastoral Fazendas. In Brazil two major types of *fazenda* may be similarly distinguished, the pastoral and the agricultural. The interior plateau-surface suffers from seasonal drought and the grass growing on light soils is easily scorched. In the river valleys moister conditions prevail, and in such localities subsistence crops may be raised. Cattle are pastured in the natural grasslands of the campos, but, owing to the prevalence of *garapate* (tick), the better breeds of temperate latitudes cannot be introduced. Resistance is effected by crossing Creole cattle with the zebu or humped cattle from Portuguese India. The quality of the meat is not of the first grade required for export, but meat-packing factories are maintained to meet local demands. In the wet season of summer the pastures can support a great increase in the herds, and it is then that cattle from further west are moved into the region on their way to the markets in the east. There is some production of *herva matte* (*yerba mate*) on these pastoral *fazendas*, but its commercial status is threatened by the competition offered by Argentine plantations.

Agricultural Fazendas. The outstanding crop of the agricultural *fazendas* is coffee. The cultivation of coffee was introduced into Brazil from Venezuela and reached its present location by experimental stages, moving first southward to the coastal slopes of the Serra do Mar and then westward to the plateau region beyond Sao Paulo. The earliest established *fazendas* are in the neighbourhood of Campinas: the most recent are in the zone to which the railway net has radiated, forming an arc sweeping round from west to north.

The owner, whether of an old or a new *coffecfazenda*, is often resident in one of the large cities, and the work of the estate is entrusted to a manager and *colonos*, or colonists. All are Brazilians, and the distinction between the administrative staff and the labour force is not a racial one as on the *haciendas* of

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Spanish South America. The workers are accommodated in huts, but their subsistence crops are generally not raised in their own smallholdings, but are planted between the rows of coffee bushes.

Mining Communities. Throughout the continent the geographical environment of mining communities varies very considerably. More often than not they are found in localities incapable of affording them the necessities of life. Whether on the arid slopes of the high Andes or in the dense forests of the river valleys of the north of the continent the sustenance of their workers depends upon imported commodities. Modern mining methods, however, compel their reliance upon foreign equipment and capital. As a human activity mining is trebly extractive: it extracts the ores from the earth; it sends the minerals out of the country for refining and manufacture; the profits earned are dividends on foreign capital.

Of survivals from colonial times the placer-mining for gold in the river valleys of the north-west and the lode-mining, again for gold, on the Brazilian campos furnish examples. For placer-mining little equipment is necessary, nor need the labour force be numerous. Such small-scale workings are often dependent upon the financial support of a non-resident land-owner. Examples occur in the north-western river valleys. On the Brazilian campos the colonial character of the gold-mining industry has become submerged beneath the modernization of its methods and organization. Foreign capital has enabled deep-shaft mining to supersede the original digging, and relations with ports are maintained by roads and railways. The administrative and technical staff is drawn from North America and Europe. The labour force is recruited locally, and housed in specially constructed towns.

These conditions are generally typical of mining establishments to-day. Variations may be imposed by local topography and natural vegetation. In the high Andes, where there is no immediate source of labour supply, the Indians are attracted to the mines from their agricultural holdings further afield. In Guiana the bauxite quarries are worked by negro labour. The nitrate fields of the Atacama Desert have to rely on imported labour.

While there is everywhere a marked distinction between the housing of the labour force and that of the technical and

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administrative staff similar to that observable on the *haciendas*, the siting of the dwellings is determined by the requirements of the industry. The miners are accommodated near the mines, particularly where, as in the high Andes, long distances have to be walked underground. The European and North American technicians and executives may be housed at a lower elevation near the smelters, power-plant, and transport sheds. Transport between the mine and its technical headquarters demands such equipment as cable-ways, tramlines, and narrow-gauge railways, and the situation of the mine enables gravity to economize cost. Where, as in Bolivia, local fuels are inadequate and imported fuels costly, smelting cannot be carried out locally and ores have to be exported.

In the arid highlands water may be brought down by pipes from mountain lakes. Where the supply is liable to be checked in winter by freezing, supplementary supplies may, as in the Chilean copper-mines, be pumped up from lower and warmer levels. The nitrate fields are also largely dependent upon Andean water resources, and pipes supply the oilfield of the arid Peruvian coast. The water is not used for irrigation, but for the domestic needs of the mining population. Water-power operates the stamping-mills and electrical installations.

Estancias

Labour Force. Recent immigrant streams into the continent have been directed to the temperate lands of the south-east lying beyond the Tropic and having an Atlantic frontage. The territory includes Patagonia, the Argentine and Uruguayan Pampas, and the southern states of Brazil. In none of these regions had the aboriginal Indians established a sedentary economy, and the present-day pattern of occupancy here owes nothing to pre-Columbian settlement. For the most part climatic conditions preclude negro habitation, and so the racial composition of the population is almost wholly of European stock with Mediterranean strains predominating.

Estancias and Haciendas. In many respects the grasslands of the south-east offer a direct contrast to the cultivated lands of the north-west. Instead of a tropical climate compelling European administration to rely upon a non-European labour force, the temperate pampas, lacking any aboriginal population,

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are climatically suited to Europeans. The undulating surface of the treeless plains contrasts with the restricted valleys of the high Andes. In the place of the colonial economy of the north-west, founded upon precious metals and distinctively tropical agricultural products, the pampas contributed important supplementary supplies of primary products called for by the rapid industrialization of Europe.

While in the Andean valleys the *haciendas* may tend to expand by absorbing neighbouring holdings, the *estancias*¹ of the south-east exhibit the reverse tendency. A typical pastoral *estancia* may cover as much as forty square miles in beef-cattle country, or even more in the drier sheep pasture lands. In the immediate hinterland of the coastal and estuarine concentration of population the *estancias* are less extensive, and the greater part of the cultivable land is occupied by small farms often tenanted by immigrants.

Pastoral Industry. The great *estancias* of Argentina's 'middle west' are essentially pastoral in character. They have inherited this tradition from colonial times, but with important modifications. Capital investment, largely foreign, has equipped the basic industry with modern processing, storage, and transport. Industrialization in the northern hemisphere, the principal source of the invested foreign capital, has stimulated the demand for its products, agricultural as well as pastoral. Previously the pampas had been able to offer Europe little that could not be produced there in sufficient supply. Under the dominion of the gauchos, therefore, exploitation lacked incentive, economic development was rudimentary, and even individual holdings were ill defined. With the achievement of independence, the economic outlook of the region was reoriented towards the Atlantic shores to which European immigrants began to come. Industrial Europe, moreover, sought markets for its manufactures where it also looked for food and raw materials.

Thus the size of the holdings came to be related not only to the quality of the pasture and the extent to which supervision was possible, but also to the return upon the various forms of capital equipment in a lengthening chain of production. The necessary delimitation of the *estancias* was assisted to a vital degree by the introduction of wire fences in the late nineteenth century. Economic pressure tends to reduce the size of the

¹ *Estancia* — mansion.

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holdings particularly where such capital factors as railways, proximity to *frigoríficos*, and shipping facilities have to be met by intensive production.

To meet the persistent demands of the market for more and better beef, prize cattle are purchased for breeding purposes. Some of these may be imported from abroad—for example, Shorthorns and Herefords from the United Kingdom—others may be reared from imported stock on smaller specialized *estancias* near the coast. Similarly, improved strains of sheep are introduced in the drier pampas in response to market demands for higher qualities of wool and mutton. The development from gaucho pastoralism, with its herds of criollo cattle roaming unfenced pampas, to the modern *estancia*, devoted to the scientific management of first-grade cattle, has also necessitated improvement of the pasturage.

Location is largely responsible for the size and character of individual holdings. The commercial and industrial population is concentrated on the shores of La Plata estuary and the banks of the lower Parana. In the extreme east, therefore, the holdings are small and devoted to truck farming¹ and dairying for the local markets. As pastoralism predominates in the Humid Pampa, the holdings increase in size and the maximum is attained in the dry western pampa. With the transition from humid to dry pampa cattle give place to sheep.

The principal buildings of an *estancia* include the dwelling for the owner, if resident, for the manager and the domestic and labour force, and workshops and stables. The *casa grande* is set amid a *monte* of trees planted for shade. Orchards are cultivated, and the arable land is also within easy reach.

Alfalfa. In the Humid Pampa agriculture is organized round the production of alfalfa. This crop flourishes best when not exposed to frost or drought, but it deteriorates after about five years on the same land. Rotation has, therefore, to be practised, the most suitable alternative for fodder being maize. The *estancias* thus afford a market for alfalfa seed raised on the *chacras* under the hardier conditions farther south. Alfalfa is the dominant crop also in the dairy farms in the estuarine hinterland. Here, as in the north-western river valleys^{77t} it is grown for hay, of which it yields five crops in a season. It is also used in Peru and Brazil to restore land impoverished by

¹ Truck farming is the farming of miscellaneous crops for a local market.

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. the cultivation of cotton, which is an extremely exhausting crop.

Chacras. Progressive commercialization of the beef-raising industry has led to the partitioning of the estates for agricultural in place of pastoral activities. The tenant farmer usually depends upon his family for the working of his *chacra*. A diversity of crops is raised, largely for subsistence, although there may be some export of the surplus of grain. Much of Argentina's trade in maize and wheat comes from the small farms near the river and ocean frontage, and from larger holdings inland which have resulted from the fragmentation of the great pastoral *estancias*. The tenant farmer, often an immigrant from some part of Mediterranean Europe, has but little capital at his back, and must perforce be content with meagre profits. Nearly half his arable land may be under wheat, grown in rotation with other temperate grains. The rotation, however, is not necessarily a yearly one, since wheat can be grown with fair success for two or three years on the same land. Alfalfa is cultivated for seed.

The immigrant tenant farmer has little prospect of doing more than struggle along on a slender profit-margin. He must, therefore, restrict his attention to cereal crops, for which there is always a sure market. Where conditions favour dairying there may be some tendency for holdings to increase in size by reabsorbing neighbouring tenancies.

CHAPTER VI

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Native Races

The 'Indians.' The total population of the South American continent to-day may be estimated at more than 91 millions, forming nearly three-quarters of the total population of Latin America. The three Guianas account for only half a million people. The largest single political element in Latin America is Brazil, whose population amounts to nearly half of that of the continent. Portuguese is, therefore, the language of half the continent, but of still greater significance than that of speech are the divergencies between Spanish and Portuguese South America in early exploitation, colonial development, and traditional sympathies.

The partition of the continent between Spain and Portugal was effected in 1494 by the Treaty of Tordesillas, the year following the second voyage of Columbus and six years before the Portuguese discovery of Brazil by Cabral in 1500. The impact of these two representatives of European civilization upon the native social structure had by no means uniform consequences. The native 'Indian' societies were found at widely varying stages of economic and social development, and divergent motives actuated the invading colonists. Differences, too, in the economic potentialities of their respective spheres of influence inevitably asserted themselves.

The native population of South America is known collectively as 'Indian.' This term is a misnomer perpetuating the error originally made and persisted in by Columbus. It is generally supposed that these native races descended in the first place from immigrants from Asia. If this is so, not only is the distance involved in such a movement immense, but the time required for its accomplishment is all the longer by reason of the successive acclimatizations demanded. The route would lie along the shores of the Pacific Ocean, and would cover more rather than less than a great semicircle. It would cross the Bering Strait nearly in the latitude of the Arctic Circle, and would then

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traverse in succession a comprehensive and representative selection of the world's major natural regions before crossing the equator.

The positive evidence in support of this presumed Asiatic origin is the character of the hair of the South American Indians. Like that of the Mongol races, it is straight and dark, while its microscopic section is round rather than oval. The absence of hair on the body is another characteristic typical of the aboriginal South Americans as of the Mongolians and certain tropical peoples. There are no cultural or linguistic similarities to corroborate the connexion of South American and Asiatic races. The Iberian conquerors in the fifteenth century, therefore, were confronted by a native people whose social and cultural development owed nothing to external influences.

Among the Indians certain distinctive types may be observed, according to their habitat and social development. In the densely forested tropical lowlands of the Caribbean shores and the Amazonian selvas typical tribes are the Caribs and Arawaks. There are also 'wild' Indians to be found in the interior of the selvas, while Caribs are typical of the less inaccessible regions near the mouths of the river. The forested shores of the temperate lands of southern Chile are the home of the Araucanians, the last Indians to be subdued by European invaders. The native races of the major treeless regions also present contrasts in social development and organization. In the high Andean plateaus are the Incas, among whom the Aymara-speaking tribes of the Bolivian and Peruvian plateau successfully withstood the encroachment of their neighbours to the north. The low-lying grasslands of the south-east are the domain of semi-nomadic pastorals such as the Guaraní and Ges.

The Inca Empire. The most advanced of these peoples were the Incas, who before the Spanish conquest had established a vast empire. Their capital was Cuzco, in the upper valley of the Urubamba. At its greatest extent the empire included Quito in the north, and reached as far as Tucuman in the south. Like the modern but more restricted Peru, it embraced not only the high plateau lands but also the desert region of the Pacific coast. An estimate of the population of the empire at the time of the Spanish conquest places it at about ten millions.

The resources of the empire were sufficiently varied to enable

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its diverse regions to function complementarity. Cultivation yielded tropical crops such as cotton in the lowlands, where water was available, while the indigenous cereal, maize, flourished at the higher altitudes. The chief food product of the forests was cocoa. Potatoes and beans were also important articles of diet from these regions, which have also become well known for medicinal commodities, cinchona, cascara, sarsaparilla. The upland pastures provided wool from the native animals, llama and alpaca. Along the coast fishing was important. The great mineral wealth of the empire played no part in its economic development. The main use of gold was for purposes of ritual, due to its resemblance to the Sun-god. It had no value as a medium of exchange.

In the absence of any form of money the exchange of commodities between the various regions of productivity was effected by barter. This necessitated an empire-wide system of highroads, some crossing the plateau lands from north to south, as do modern routes, some giving access to the coastal plain. Trading was done at post-houses, and the goods conveyed either by men on foot or loaded on to llamas. Some of these Inca roads to-day form part of the system related to the Pan-American Highway, while the present Carretera Central of Peru, which is incorporated in, the Highway itself, was formerly the Inca post road from Cuzco to La Paz.

The weakness of the Inca empire, although the most advanced and most powerful pre-Conquest organization on the continent, lay not in any lack of personal courage in its people, nor in its failure to balance its adequate agricultural economy by the exploitation of its vast mineral wealth. Its fundamental weakness was inherent in its lack of spiritual values as expressed in its social structure. The mass of the people was pervaded by a national discipline of iron. Their ruler was the Sun-god personified. All human activity was virtually slave labour. For the individual no escape was possible from the limitations and restrictions of a caste system more arbitrary than that of the Hindus. The democratic idea and ideal of the family and family life was unknown, and could have played no part in such a social environment. The individual was not inspired by loyalty to his family, but was bound to submerge his individuality in blind obedience to the *ayllu*, or labour caste.

Of the Inca artifacts much is believed to have been derived

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from their predecessors. Their achievements were not inconsiderable and much of their work has survived through the post-Conquest centuries. Reference has already been made to their system of highways and to their organization and the establishment of post-houses for the purposes of trade. Their houses and temples were immense edifices of hewn stone. Their ignorance of the function of the keystone of an arch not only weakened the structures, but forbade progress in architectural design. Another engineering element they lacked was knowledge of the wheel, and in this respect they were notably inferior to the aborigines of the northern continent.

The people of the arid coast-lands also had permanent dwellings of sun-dried brick, or *adobe*. This material, although adequate in a rainless climate, offered little inducement or opportunity for progress in design. In the eastern forests and grasslands of the continent shelter against rain was constructed of the broad leaves and strong stems of local plants. Such dwellings could not prove durable, but ample material for reconstruction was readily available.

Nor had the use of metals contributed to their advancement. The whole continent is remarkably deficient in fuels for smelting, but the use of copper was known to the people dwelling in the region of Tucuman, just beyond the south-eastern extreme expansion of the Inca empire. Gold was used in ritual. The priest-king who ruled over the Chibcha Indians of the Colombian valleys was liberally sprinkled with gold dust before bathing ceremonially. Gold, again typifying the Sun-god, and precious stones, were also thrown into the water by the devotees. From this custom arose the legend of El Dorado, the gilded one. The Temple of the Sun was covered inside and out with gold, but the metal had no other use except for ornament. The ritual of worship was barbaric in the extreme, and the Inca concept of the Sun-god was, if anything, inferior to that of the Creator worshipped by their predecessors. While the Creator might be presumed to welcome offerings from the fields and forests, the appeasement of the Sun-god demanded human sacrifice. Deprived of the priest-king and with the illusion of his divinity shattered, the national society was betrayed by its utter lack of cohesion, and the people passed from one slavery to another.

Other Indian Peoples. The more primitive races of the selvas and the Caribbean littoral were able to offer even less

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opposition to the civilized invaders. Their culture and social development were those of savages—that is, of forest-dwellers. They had no towns, but lived in villages, each of which was under its own headman or chief. The villagers were inter-related, and the chief was in some measure a family patriarch. Only among the islands of the delta of the Amazon had any progress been achieved beyond these primitive conditions. For shelters rather than dwellings the materials afforded by the forests sufficed. Foodstuffs also were gathered in the forest, and clothing was at a minimum. Even more primitive still were the Indians living in the depths of the selvas, tribes of whom survive to this day as 'wild' Indians. Seamen and others should be interested to know that to the people of the Amazon we owe the hammock, the name being derived from the native Indian word *hamaca*.

Contrasted with the two foregoing groups of peoples, the cultivators of the Andean plateaus and the collectors of the dense forests, are the gauchos of the temperate grasslands. These people were hunters, relying principally on the chase for their food. As was the case with the hunting Indians of North America, the horse was not available for the pursuit of game until its introduction to the continent by the Spaniards. To enable them to secure on foot the faster-moving animals of the pampas the gauchos had devised the bow and arrow and the bolas, a leather thong weighted at both ends. In the south, against an increasingly adverse environment, the aborigines of Patagonia and Tierra del Fuego had reached a still less-advanced stage of progress than had those of the warmer and moister and more productive pampas. The sea, however, afforded them some compensation, and those dwelling on the shores of the Strait of Magellan pursued a maritime economy. The only race that by reason of its warlike qualities was able to withstand successfully the attempts at military conquest by the Spaniards, as well as the Incas expanding southward along the Pacific shores, was that of the Araucanian Indians of southern Chile.

Early Explorations

The Fifteenth Century. It is improbable that the north coast of the continental mainland of South America was visited by Spaniards before 1494. In this year Columbus sent out an

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expedition from his recently established colony, Isabella, in Hisgltioli, to investigate the pearl fisheries of the Caribbean. The colony he founded during his first voyage in 1492, Navidad, was found at his second voyage, in the following year, to have failed, having most likely succumbed to an attack by the natives. His repeated attempt at colonization in 1493 proved successful. The expedition is reputed to have explored some 2500 miles of the coast of the mainland, and so must have covered considerably more than half, if not nearly the whole, of its entire length. The report of this exploration must have been in the hands of Columbus when he planned his visit to this shore in 1498. The Treaty of Tordesillas had been signed in 1494 and the line of demarcation, crossing the coast in the vicinity of Para, would mark the eastward limit of Spanish progress along the north coast.

Both Spain and Portugal were primarily concerned with the search for an alternative route to the East Indies. Their object was to establish a secure highway for the rich commerce of the Far East, which should avoid the lands of the Middle East lately over-run by the Turks. Portugal struck southward, and in 1479 was able to secure in an agreement with Spain the recognition of her right to the Cape Verde Islands and the African shores as far as the Guinea coast. She thus consolidated the work of her seamen during the previous half-century, which had been initiated by Prince Henry the Navigator, beginning with the discovery of Cape Bojador in 1434. Cape Verde was found in 1445, and the remainder of the Guinea coast was wholly revealed in the year following the agreement with Spain. To Spain were secured the Canary Islands, the first stepping-stone towards the West.

The two powers were now able to continue explorations in their respective spheres, Portugal seeking southward for a route to the East round the barrier of Africa, and Spain westward, whose way led to an unsuspected barrier, the Americas. The progress made by Portugal was fairly rapid, and in 1498, ten years after its discovery, the Cape of Good Hope was rounded by Vasco da Gama, who thus opened the sea-route to India.

The Treaty of Tordesillas. Portugal's interests, therefore, lay in the South Atlantic, but Spanish activities, directed towards the west, threatened to encroach upon her recognized domain, and caused her anxiety for the security of her sea routes at their

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northern end. Protests were of little avail, for in 1492 Spain was granted four Bulls by the Pope. By these Spain was confirmed in her right to the Indies, should she reach them before the Portuguese,"while the line of demarcation was declared to be a hundred leagues west of the Azores. Two years later Portugal had to accept a compromise in the Treaty of Tordesillas, by which the line was drawn 370 leagues west of the Cape Verde Islands. An east-west line for which Portugal asked would have placed the Portuguese always on the left flank of the Spaniards advancing westward. At the time of the treaty, 1494, Columbus had visited some of the Caribbean Islands, but in the same year, turning his attention to his left flank, succeeded in revealing much of the northern coast of the mainland. The Portuguese would have been more content with an east-west line, but it was not until six years later that Cabral revealed that the line of the Treaty of Tordesillas had allotted to Portugal a share of the mainland of the continent. His discovery in 1500, however, was greatly to the advantage of Portugal, securing as it did the control of what has more recently come to be known as the Dakar Strait, the gateway to the South Atlantic.

There was no immediate attempt at colonization on the mainland on the part of either Spain or Portugal. Columbus made his fourth and last voyage of discovery in 1504, and died in 1506. Four years later, and ten years after the Portuguese discovery, the Spaniard Qjeda made three attempts to found settlements in the Spanish mainland. All these colonies failed, partly through the unhealthiness of the climate and partly through opposition from the natives. In 1513 Vasco Nunez de Balboa reached the shores of the Pacific in the Isthmus, and conditions here were found to be healthier. But the foundation of the city of Panama was not undertaken until 1519, the year that saw the opening campaign in the conquest of Mexico. The first colonization of Brazil by the Portuguese was delayed until 1532, seven years after they had dispatched an expedition to contest a French claim to territory in that region. The French claim itself followed the institution in 1524 of the Council of the Indies at Seville, the European port which exercised a monopoly over the trade of these Indies.

The Sixteenth Century. At the beginning of the sixteenth century, therefore, Portugal was aware of her possession of part

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of the mainland flanking her entry into the South Atlantic, and Spain had become acquainted with her share of the northern coast of the continent, and could thus feel that the left flank of her westward advance was secure. On his third voyage, in 1498, Columbus had touched at Trinidad. He noted the presence of a great river in observing the freshness of the water off the mouths of the Orinoco, and he is thought to have seen something at least of the peninsula of Paria. In the following year Vespucci sailed eastward along the coast. If, as has been suggested, he reached as far as latitude 5° S., he not only anticipated the Portuguese finding of Brazil, but failed to observe the limits imposed on Spanish exploration by the Treaty of Tordesillas five years previously. At the same time Ojeda worked westward along the coast from the Surinam river to the Gulf of Maracaibo. His work was completed by Rodrigo de Bastidas, who reached the Gulf of Darien, and amplified by Alonzo Nino, who established a pearling-colony on Margarita Island, and explored the neighbouring coasts in some detail.

The rest of the Atlantic coast was revealed in 1501 by Vespucci, sailing now in the service of the King of Portugal, and in 1503 Columbus continued his quest along the shores of Central America from Honduras to the Gulf of Darien.

Ojeda had made unsuccessful attempts at colonization on the north coast. Better fortune attended the settlers in the early decades of the sixteenth century. On the mainland, near to Alonzo Nino's colony on Margarita Island, Cumana was founded in 1520. Coro, on the isthmus of the peninsula of Paraguana, was established in 1527. Santa Marta and Cartagena, on either side of the delta of the Magdalena river, were founded in 1525 and 1532 respectively. On the other hand, Portuguese settlement was delayed almost until the latter year, when, in 1531, Santos, at first called Sao Vincente, was founded on the Atlantic coast, very near the limit set by the Treaty of Tordesillas. Interest in this region had been awakened by the voyage of Sebastian Cabot, four years before, up the Parand river.

With the creation of the settlements on the north coast of the continent, the Spaniards were also engaged upon the extension of their influence and control in the west. Balboa had crossed the Isthmus of Darien in 1513. Five years later he was executed on a charge of conspiracy. The foundation of the city of

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Panama, therefore, was due to the Spanish governor, Pedrarias. This city became the first base from which was prosecuted the search for the wealthy lands of the Incas of Peru. The land was discovered by Bartolome Ruiz, who in 1524 had been sent forward by Francisco Pizarro from the swamps of San Juan. On receipt of the news Pizarro established a forward base at Tumaco, and then set out for Spain, where he obtained for himself the right to subdue the newly founded territory of fabulous riches. On his return he set up a more advanced base at Tumbez, on the southern shore of the Gulf of Guayaquil, opposite Puna Island, where was also a Spanish settlement. His first expedition set out in 1531 from Payta, at the mouth of the Piura river, and reached Cajamarca. The reports of the great riches of the country proved true, and further reports led him farther south to the Inca capital, Guzco. By 1533 Cuzco was his, and two years later Lima was founded as the base for yet more penetrations. In 1540 the conquest of Peru was complete.

During this early period the penetration of the continent from the southern Atlantic coast proceeded slowly. It is only within recent times that the basin of the Parana-Paraguay rivers has been recognized as the political gateway to Latin America. Juan Diaz de Solis discovered La Plata estuary in 1515, and twelve years later Sebastian Cabot followed the Parana river as far as the Apice rapids. Both Spain and Portugal now became active in this southern region. Portugal appeared content to stake her claim by founding the city of Santos almost as far west as the demarcation line of the Tordesillas Treaty permitted. Spain sent Mendoza to the estuary, where he founded the city of Buenos Aires in 1535. Three years later the city of Asuncion was founded. Little mineral wealth was reported in this region, but Mendoza's accounts resulted in the sending of de Vaca to re-establish the city of Buenos Aires, which had succumbed to the hostility of the native Indians, and to prosecute further investigations of the river basin. About this time also, in 1537, Spaniards, under Sarmiento, made an unsuccessful attempt to found a colony on the Strait of Magellan. It, too, succumbed to the hostility of the Indians. De Vaca reached the falls of Iguaçu in 1541, but returned with no encouragement for the colonization of the region he traversed. He had had previous experience in exploration when, in 1539, after the death of its leader, he brought back to the Gulf of Mexico the

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expedition which had set out from Florida under de Soto, and had covered a vast tract of country extending from Georgia to the lower Mississippi valley.

In one other region Spanish exploring parties had been active with but little or no success. These parties followed up the course of the Orinoco river past the mouth of its tributary, the Meta, to the Raudales de Atures. Their failure was due to the hostility of the native Indians. The search for El Dorado languished until, in 1584, de Albuja, the sole survivor of an ill-fated expedition, returned after living among the Indians for ten years. His story and the report of what he had learned during that period revived interest in the quest, and in 1595 an expedition was sent to the region by Antonio de Bencho, who had himself, while Governor of New Granada, explored the valleys of the Meta and the Orinoco.

When Francisco Pizarro established his headquarters at Lima in 1535, the Spaniards were already beginning to penetrate the mountainous interior of the north-west from Cartagena and Coro. Their penetration by way of the valleys of the Parana and Paraguay rivers was only less fruitless than their search for El Dorado in the region of the Orinoco. In 1536 Quesada conquered New Granada and subdued the Chibcha Indians, the most powerful of the north-western tribes. Two years later, having ascended the valley of the Magdalena river, he met at the city of Santa Fe de Bogota, founded in the same year, 1538, Federman and Benalcazar. The former had set out from the colony at Coro established by the company of Augsburg merchants, and had travelled up the Cuenta valley and across the high mountainous divide into the valley of the Magdalena. The latter was the conqueror of Ecuador five years previously, and had come from the west by way of Quito and Popayan and his newly established post at Cali. In the same year another Spanish expedition followed Benalcazar's route in the reverse direction, from the valley of the Cauca to that of the Piura.

Little was done from the Lima base during these years between the foundation of the city in 1535 and the meeting of Quesada, Federman, and Benalcazar at Santa Fe de Bogota in 1538. The delay was due to civil strife among the Spaniards as much as to the opposition of the native Indians. In 1539 Francisco's brother, Gonzalo Pizarro, made a journey, disastrous in its loss of human life, across the Andes into the forested

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swamps of the Napo river in search of cinnamon. The general failure of this undertaking was relieved by Orellana, who built a boat and with it followed the Amazon river to its mouth. He did not, however, find the rich lands, successive reports of which served to lure him ever eastward.

Somewhat better fortune awaited those explorers who struck southward and south-eastward from Peru. Valdivia planted a farming colony at Coquimbo, in latitude 30° S., very near the northern limit of effective winter rain. He founded the town named after him in 1552, ten degrees farther south, but his farther progress was forbidden by the opposition of the Araucanians. The Chiloe Archipelago was not discovered until 1577. Turning east across the Andes, he subdued a large tract of country in Patagonia.

Farther north the richest city of the continent was founded in Potosi in 1545. Santiago del Estero was established in 1553 and Mendoza six years later. By the next year, 1560, the Spanish overland trade route from the Parana-Paraguay basin was inaugurated, leading across the Andes to Peru and thence to Europe. Spanish commerce was forbidden to use La Plata estuary, the natural outlet for its hinterland, and as a result considerable smuggling ensued. The same year, 1560, also saw a revival of the quest for El Dorado. Civil strife in his domain made it appear advisable to the Viceroy of Peru to divert popular attention by this means. He therefore sent out de Ursua from Lima to the Amazon by way of the Huallaga river. Having murdered their leader, the survivors quarrelled among themselves, and some returned up the Rio Negro to the Orinoco river.

Further Explorations

Missionary Expeditions. Explorations of South America during the seventeenth and early eighteenth centuries fall mainly to the credit of Catholic missionaries, for the most part Jesuits. Portuguese progress was slow and usually in response to the stimulus of threatened encroachments by other nations. The need for slaves to labour in the coastal plantations and the search for gold led adventurers across the Brazilian plateau to the Uruguay river in the south and to the valley of the Rio Sao Francisco, which was explored by Jesuits. The French and

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Dutch, not recognizing the validity of the partition under the Treaty of Tordesillas, made settlements on Maranhao Island and along the Xingu river, respectively. Portugal, therefore, founded the city of Para, and established its overland connexion with Pernambuco. In 1637, about twenty years later, a Spanish expedition descended the Napo and Amazon rivers, and again Portugal was moved to reply. Teixeira was sent up the Amazon to explore the river and reached Quito. Spanish jealousy obliged him to return in company with two Jesuits, whose report of their journey was not made public by Spain.

The Spanish missions advanced towards the interior of the continent from two directions. Eastward they penetrated from the Viceroyalty of Peru across the Cordillera to reach the Indians dwelling in the valleys of the tributaries of the Marañon and Madeira rivers. Among these tribes were the Omaquas of the lower Napo valley, who, in 1541, had compelled Van Hutten's expedition from the Orinoco basin to withdraw from their lands, which a century and a half later were the scene of the labours of the great Jesuit missionary, Samuel Fritz. The valley of the Napo leads almost due east from Quito, and was followed by missionary parties as early as 1602, and again in the middle of the seventeenth century, when other headstreams of the Marañon, the Huallaga, and Ucayali rivers were explored. In 1670 a missionary expedition from Cuzco opened up the country of the Beni river. Missions sent out from La Plata estuary worked northward up the valleys of the Parana, Paraguay, and Uruguay rivers. Thus the Guarani Indians of the Uruguay came under their influence, but in 1626 the Spaniards came into contact with Portuguese prospectors near the accepted line of demarcation. So the advance up the Paraguay river made the greater progress, and eventually a Jesuit mission in this region reached the Chiquitos Indians in the upper valley of the Mamore river.

The great missionary, Samuel Fritz, devoted nearly forty years to his labours among the Indians of the Marañon and Napo Valleys. His religious work was not without considerable political significance, as it inevitably brought him into contact and conflict with the Portuguese. On the first of such occasions he sought help in sickness at Para, where Portuguese suspicions were aroused, resulting in his remaining there under arrest for two years. Later there arose once more the question of the line

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of demarcation, but his principal antipathy to the Portuguese sprang from their raiding of his Indian flock for slaves. Fritz also made a noteworthy contribution to geographical knowledge in publishing a map of the territory over which he eventually held sway as Superior of his Order. He died among his Indians in 1724, a great exemplar of the Spanish ideal of conquest, to be succeeded by the salvation of the souls of the natives within the Church.

In their search for slaves the Portuguese do not appear to have scrupulously observed the line demarcated by the Treaty of Tordesillas. In 1774 the Jesuit, Father Ramon, encountered their raiders in the Orinoco valley and journeyed eastward with them down the valley of the Rio Negro. Nor at this time had the search for El Dorado been abandoned. Yet other journeys undertaken during the first half of the eighteenth century revealed more of the Matto Grosso plateau where minerals were discovered in 1734, and El Gran Chaco. To the latter half of the century belong the exploration of the Chilean archipelagos, and the travels of Falkner and Viedma in Patagonia.

Scientific Expeditions. Remarkably few Spanish names appear in the records of South American exploration from the beginning of the nineteenth century onward. The whole of the continent had been revealed, and by the middle of the century the details of the surface were fairly well known, with the exception of three regions. In the most southerly of these regions, Patagonia, Falkner and Viedma had explored the valleys of the Rio Negro in 1778 and the Santa Cruz river in 1782 respectively, but little more was known of the land south of La Plata estuary. Farther north El Gran Chaco had been visited in 1741 and previously in 1721, but had also proved forbidding as a human environment and uninviting in its lack of minerals. The third region was the selva of the Amazon basin, where travel was restricted to the rivers, whether the penetration was from the Orinoco basin in the north or across the Andes in the west. The early years of the century, moreover, witnessed the disintegration of the great continental empire of Spain, and the gaining of political independence by its population, white, coloured, and mixed. The seeds of this disintegration had been inherent in the Spanish colonial system at its inception three centuries before. Its fruition coincided with the investigation of the continent by men of other nations, intent

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upon the advancement of science. Among the earliest of such scientists was La Condamine, who, in 1736, visited the basin of the Amazon and continued into Peru with the object of measuring an arc of meridian.

The great scientific pioneer who worked in this continent was Humboldt, whose name is perpetuated in that of the cool ocean current flowing up the Pacific shores. Like some of the seekers for El Dorado, he set out from Cumana and explored the basin of the Orinoco. His estimate of the economic potentialities of the Cassiquiare Canal¹ has not yet been fulfilled. His next journey took him across the Andes from the valley of the Magdalena river to the more northerly headstreams of the Amazon and along the coast from Trujillo to Lima. He first noted the general pattern of the Cordillera, bifurcating from a series of mountain knots. Humboldt's explorations occupied the years from 1799 to 1804.

Of nineteenth-century explorations in South America only brief mention is possible, but the more recent history of the continent's republics lends interest and significance to the nationality of the explorers. At the beginning of the century Germans were active in Brazil, while more recently Germans, attached to the staff of the oldest university on the continent, the University of Cordoba, surveyed routes leading from Argentina up the valleys of the Bermejo and Pilcomayo into the Cordillera. In the last decade of the century the Brazilian Government undertook an exploration of the country's interior. A few years previously British and German parties in the *Alert* and *Albatross* respectively had surveyed the Patagonian coast, but the Germans also carried their investigations farther inland. British explorers, Maw in 1827, and Smyth and Love in 1834, explored alternative transcontinental routes from Lima to the mouths of the Amazon, while in the former year Poppig followed the route taken by de Ursua in 1560, the first crossing of the continent in these latitudes since Orellana's voyage of 1539-40. The most important British undertaking was the naval survey under King and Fitzroy of the coast from La Plata estuary to the Gulf of Guayaquil in the years 1826-30. It was in Fitzroy's

¹ This canal was formed by flood water from the Orinoco crossing the weak divide to the Rio Negro. Further erosion, which would result in the beheading of the Orinoco, does not occur since there is practically no gradient and the bed of the canal is on hard rock.

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ship, the *Beagle*, that Charles Darwin sailed. Also associated with this southern region is the name of d'Orbigny, a French scientist. Another British explorer, Musters, carried out very important explorations in southern Patagonia before the end of the century. In the year 1869-70 he explored the coast from the Strait of Magellan to the mouth of the Rio Negro, and also followed the valley of the Rio Chico to the foothills of the Cordillera.

Other British explorers of this century include Wallace and Bates on the Amazon, and later Chandless, who, during the years 1862-69, covered most of the region between the Madeira and Tapajos rivers, as well as the upper basin of the headstreams of the former river. The eastern slopes of the Peruvian Andes and their dense forests were the scene of the labours of yet another British explorer, Markham.

Schomburgk, between 1835 and 1844, explored the important natural routes of the valleys of the Essequibo and Rupununi in British Guiana. He visited Mount Roraima in the Venezuelan frontier and followed the Orinoco almost to its source. The source of this river was seen for the first time by an air expedition in 1944. He returned to the Orinoco delta after traversing Brazilian territory by following the Cassiquiare Canal to the Rio Negro and then ascending the Rio Branco. During the years immediately following, 1843-47, the Count Francois de Castelnau pursued investigations in the interior of Brazil. He visited the sources of the Paraguay headstreams and traversed a great deal of El Gran Chaco. Reaching Lima by way of Potosi, he returned eastward to Para by way of the Urubamba and Ucayali rivers to the Amazon. The most notable achievements of the present century are those of Hamilton Rice, who, after visiting the Rio Negro in 1907, carried out explorations in the region of the Cassiquiare Canal in 1919-20, returning in 1924 to the Rio Branco and its eastward-flowing tributary, the Uraricoere. In the following year Colonel Fawcett penetrated to the Matto Grosso from the east and was lost. He is presumed to have been murdered by Indians.

Independence

The Viceroyalties. The Spanish empire in the new world was divided into two viceroyalties—that of Mexico, north of

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the Isthmus of Panama, and that of Peru, taking its name from the native designation of the land of Biru. Venezuela, originally explored by the Augsburg merchants, continued as within the *audiencia* of Santo Domingo. Towards the end of the eighteenth century this southern viceroyalty was subdivided into three.

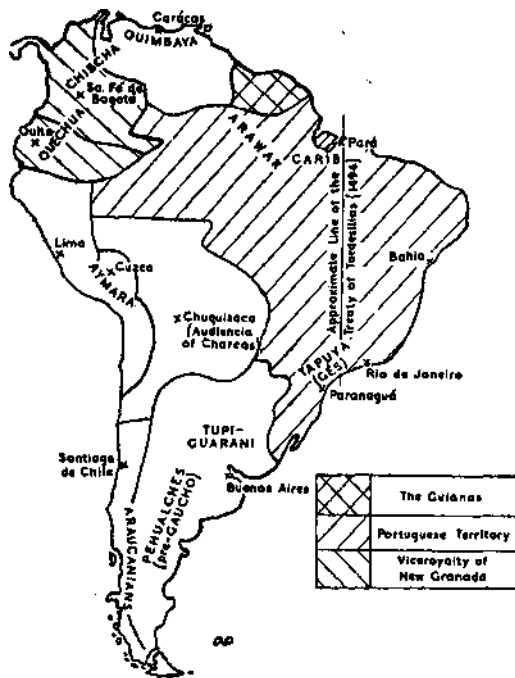


FIG. 23. SPANISH AUDIENCIAS AND CERTAIN NATIVE TRIBES

The name of Peru survived in the viceroyalty approximating to the former Inca empire, and included the present countries of Peru, Bolivia, and Chile as far south as the Araucanian territory. To the north lay the viceroyalty of New Granada, the present republics of Ecuador and Colombia, including the territory accessible up the great river valleys from the western Caribbean coasts. The third viceroyalty was that of La Plata, east of the Andes.

Independence. The issue between the Creoles and the home Government was as much cultural and social as it was economic

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and political. From the dependence of the early colonials upon the home country for all the requisites of a European Way of life their descendants, the Creoles, had progressed by the end of the eighteenth century to an economic, social, and cultural level at which it was inevitable that they should resent the

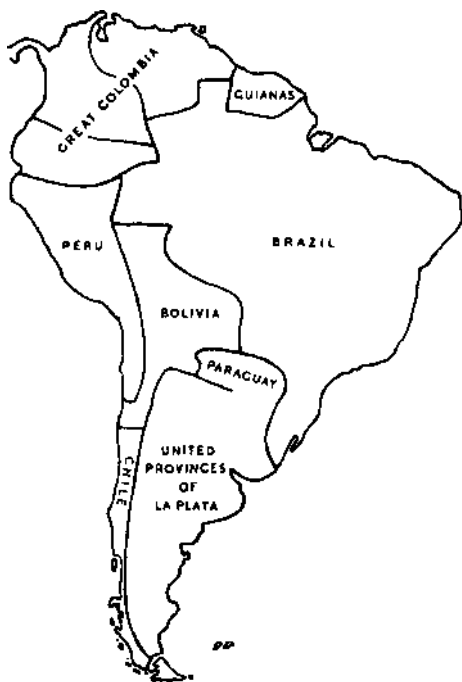


FIG. 24. POLITICAL PARTITION AT THE CONGRESS OF PANAMA (1826)

political domination and commercial monopoly of the home Government. Liberal ideas, which at this period were rapidly gaining ground in Europe, were brought to South America, not only by men defying the artificial restrictions on trade, but also by Creoles of influence who had visited the continent. Among these were the two great Liberators. Their opportunity came when the commercial power of Spain was threatened by the three great colonizing nations, each of whom" still retains a foothold in the South American mainland, and when the political independence of Spain was yielded to Napoleon. The

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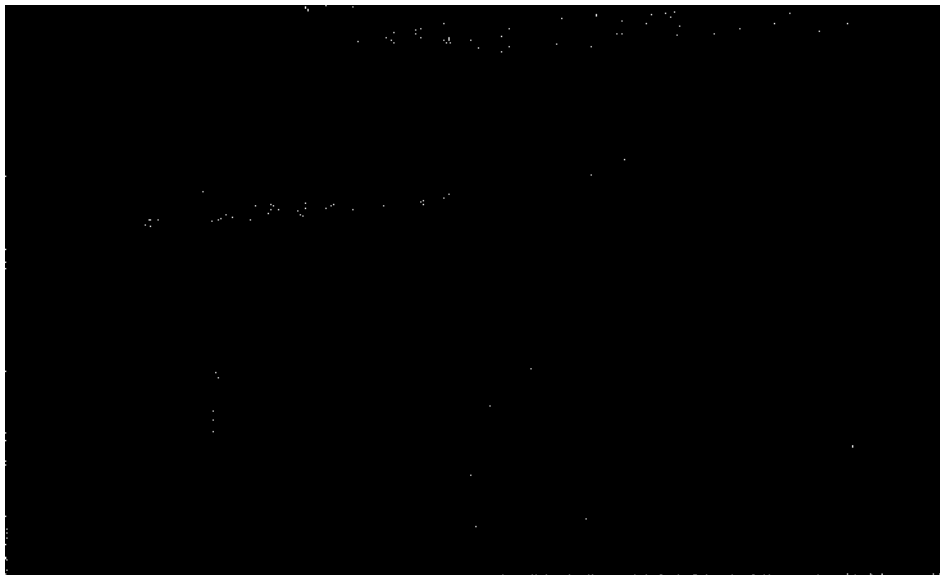
grievances of the Creoles were directed rather against the representatives of Spanish authority than against the Spanish crown.

Colonial Possessions. The only part of the South American



FIG. 25. PRESENT POLITICAL DIVISIONS

mainland that is not autonomous is Guiana. To-day the world's largest colonial empires have each of them a share in Guiana, the present political partition dating from 1814. The colony of the Falkland Islands was established by Great Britain in 1833 for the protection of her interests in the seal



NATIONAL PARK OF SAN CARLOS DE BARILOCHE

Typical of Argentina's 'Switzerland.'

Photo Paul Popper

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fisheries. They are now an important base for the whaling industry of the South Atlantic.

Pan-American Union. The earliest European recognition granted to the newly established republics is to the credit of the same British Foreign Secretary, Canning, who had pledged the support of Great Britain to the Monroe Doctrine. The course of independence had been assisted materially by British sailors and soldiers. Their debt to Great Britain was fully acknowledged by the Liberators. By the Monroe Doctrine the United States, itself young in independence, sought to assure the newly formed republics of its sympathy and protection. Three years later, in 1826, Bolivar, envisaging some form of federation of all the Spanish-speaking peoples of the Americas, called together their representatives at his Congress of Panama, and so inaugurated the movement towards a Pan-American Union. The Union was definitely established in 1889 at the First Pan-American Conference held in Washington.

At subsequent Pan-American Conferences the twin themes of commercial and political solidarity were steadily developed in close sympathy. At the seventh Conference at Montevideo in 1933 the United States declared unequivocally in favour of a policy of nonintervention and forthwith proceeded to implement it. In 1936 at Buenos Aires the Pan-America Peace Pact was signed and the eighth Conference, held at Lima in 1938, made the famous Declaration avowing continental solidarity against foreign intervention and common action among the republics for the defence of the hemisphere. By the Havana Act of the ninth Conference of 1940 the states of the Western Hemisphere assumed collective trusteeship for European possessions within their orbit, which were then gravely threatened by the course of the war in Europe. They also agreed to a close measure of economic co-operation. Four years later, at the next Conference, held in Mexico City, by the Act of Chapultepec all the republics, excepting only Argentina, guaranteed the territorial integrity and political independence of all American states, and pledged themselves to maintain the security of the Western Hemisphere.

CHAPTER VII

TRANSPORT AND COMMUNICATIONS

Inca and Colonial Empires

The Inca Empire. When the Spaniards arrived on the South American continent at the beginning of the sixteenth century they found on the high Andean plateaus of Peru and Bolivia a well-organized empire numbering up to ten million people of various races distinguished by their several languages. The supreme ruler was the Inca and his authority throughout the empire was absolute. Government demanded an efficient system of communications. Reciprocal trade between complementary regions of the empire was also highly developed. At its greatest extent the empire covered some thirty-five degrees of latitude. On the east further progress was barred by the impossibility of cutting roads through the dense forests of the eastern slopes of the Cordillera. The advance towards the north, however, necessitated the establishment of a second capital at Quito complementary to Cuzco. Its position midway between the Colombian paramos and the unsubdued Araucanians made the ancient capital the natural focus of the four great highways of the Inca, two leading north-westward and two southward. These roads were soundly paved and parts of them remain in use to the present day. All traffic along them was on foot since in spite of other great achievements no animals had been trained for riding, nor had the people evolved, as had the Indians of the northern continent, any form of travois or wheel. Communications were maintained by highly trained runners, the messages being conveyed by means of knotted cords carried in a hollow stick. Merchandise was carried by the Indians themselves and by llamas.

The Spaniards, As in North America, the Spaniards introduced the horse and the mule for riding as well as beasts of burden. These animals, however, by reason of their need for better pasture, do not threaten the supremacy of the llama at great altitudes. The mule is better suited than the horse to mountain travel, but with these animals came the introduction of wheeled traffic.

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Railways

Short Independent Lines. Very soon after the republics were established the first railway in South America was built. This was a short length of line built in 1835, leading inland from the Venezuelan port of Tucacas. It soon fell into disuse, but at the beginning of the great railway-building era in 1877 it was revived and extended to Barquisimeto. This line is typical of the earliest and rudimentary form of lay-out, that of short lines independent of one another, feeding either river traffic or ocean trade. Other short lines ancillary to river traffic are those built to circumvent such obstacles to navigation as rapids or falls.

Examples of the former type of short independent lines may be seen in the many mineral railways of northern Chile and Peru, usually owned by the mining companies, and representing therefore an investment of foreign capital. The Patagonian ports are also served by unco-ordinated lines leading to sheep stations in the interior. For a short account of the Peruvian railways see p. 101. In northern Chile the mineral lines of the Atacama Desert lead inland from open roadsteads, and have been brought into a unified system by a trunk-line, the Longitudinal Railway. This trunk-line is, however, of varying gauge, narrow in the north, broad in the south. The Pacific War of 1879-82 emphasized the need for more direct and efficient communication throughout the country, and the building of the Longitudinal Railway was undertaken during the last decade of the nineteenth century.

In Colombia the Honda rapids on the Magdalena river necessitate a railway from Beltran to La Dorada. There are also short lines feeding the main river artery of the country. Thus the journey from Bogota to the coast involved, in 1930, "the train from Bogota to Girardot, the steamer from Girardot to Beltran, the train from Beltran round the rapids to La Dorada, the steamer from La Dorada to Barranquilla, and the train from Barranquilla to Puerto Colombia, where the liners call." (K. G. Grubb, *Amazon and Andes*.) To-day ocean steamers can reach Barranquilla by way of the Bocas de Ceniza. Bogota will also be brought into direct contact with the Pacific port of Buenaventura by the completion of the railway through the Quindio Pass. Other Colombian railways are detailed on p. 234 and the Chilean system on p. 175.

TRANSPORT AND COMMUNICATIONS

Another well-known line built to circumvent rapids is the Madeira-Mamore Railway. It was opened in 1912, after some forty years of struggle against climate, disease, and forest. It failed, however, to stimulate the trade in rubber for which purpose it had been undertaken, and the Bolivian extension to Riberalta has not materialized.

Some of the Pacific ports are served by railways which penetrate inland beyond the sierra zone of the Western Cordillera to the high intermont basins. From Duran, opposite Guayaquil, such a line, opened in 1908, connects with the capital, Quito, and an extension is proposed via Ambato following the mule trails to the Oriente. (See p. 226.) The most difficult of these railways is the Central Peruvian which from Callao and Lima follows up the valley to the Rio Rimac to Oroya and Morocacha and Huancayo. With the Southern Peruvian line from Molendo and Arequipa, which extends to Cuzco and Puno, Peru has on the altiplano a system approaching a longitudinal trunk-line, with which will be incorporated a similar lay-out in Bolivia.

Radial Systems. Only in the more highly developed parts of the continent does the railway lay-out assume a radial pattern. Such is the case in Argentina, Uruguay, and Brazil, the foci of the several systems being the great Atlantic ports. The topography of the hinterlands presents no considerable obstacles once the great Brazilian scarp is surmounted.

Brazil. Brazilian railways date from 1854, only a few years before the first of the Argentine lines. Those radiating from Rio de Janeiro must first cross the Serra da Estrella and the valley of the Rio Doce before climbing the Serra da Mantiqueira. One line serves the mining-region of the Serra do Espinhago, and eventually reaches the Rio Sao Francisco at Pirapora. The other travels in a north-westerly direction across the Serra Matta da Corda, and so into the upper valley of the Paranahyba river. The state Central Railway to Pirapora is a broad-gauge line as far as Bello Horizonte, where it changes to metre guage. The French-built line from Victoria to Itabira is also a metre-gauge line, as is the Leopoldina Railway along the coastal plain from Rio de Janeiro to Victoria.

Sao Paulo is for its state the focus of a radial railway-system. Between Santos and Sao Paulo a gap in the Serra do Mar gives access to the top of the plateau, without the additional difficulty

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of the crossing of a deep river trench as is the case with the lines leaving Rio de Janeiro. From Sao Paulo a line leads northward through Ribeirao Preto and Uberaba, and a continuation is projected to Goyaz to serve the Federal District. On crossing the Paranahyba river this line meets one running north-westward from Rio de Janeiro. The farthest west is reached by a line crossing the Tiete river at its confluence with the Parana at Itapura and continuing to Puerto Esperanca. The third line from Sao Paulo travels southward and has branches serving the Atlantic ports of Paranagua, Sao Francisco, Porto Alegre, and Rio Grande do Sul.

Joazeiro seems likely to become the internal railway focus of the north-eastern region of Brazil. It is already connected to Bahia, and may send lines in due course across the Serra do Piahy and the Serra d'Araripe to integrate into a single system lines leading inland from the ports of Sao Luiz and Ceara (Fortaleza). At present the terminus of the Sao Luiz line is at Therezina, on the Piahy river. The Ceara Railway, similarly, does not yet cross the watershed, but in addition to the projected link with Joazeiro, an eastward extension from Pambal would give direct railway connexion between Parahyba and Fortaleza, and thus to the ports of Natal, Pernambuco, and Macei6, which are already joined by a coastal railway. This line, in its turn, will be continued across the lowlands of Alagoas and the Rio Sao Francisco, to give access through Aracajii to Bahia.

In Brazil, as in Argentina, the building of railways preceded the development of the economic resources of the interior, in this respect contrasting with the United States, where railways followed the pioneers westward across the prairies. Some of these lines, as has been noted, are already reaching out far into the interior. These are also planned in order to give direct connexion with neighbouring states. The line to Puerto Esperanca, on the Paraguay river, is to connect with a Bolivian line from Santa Cruz, and the trunk-line from Sao Paulo to the south leads to the national systems of Uruguay and Argentina.

Argentina. In Argentina the unification of the national railway system is impeded by the extreme variety of gauges in use. The first line to be built in the republic was the Buenos Aires Western. This was built in 1857 by British capital to the broad gauge (5 ft. 6 in.) in order to take rolling-stock released

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from the Crimea. Other lines, all originally British built, adopted this gauge. They were the Buenos Aires Great Southern, the Central Argentina, and the Buenos Aires and Pacific. The last named was the first of the broad-gauge lines to be taken over by the government, largely in deference to national sentiment. British-built lines of standard gauge (4 ft. 8½ in.) serve Eutre Rios and the north-east. Metre-gauge lines function as pioneers in the northern and Chaco regions, the Cordoba Central built by British capital, and the Santa Fe built by French, as was also the Buenos Aires Provincial system.

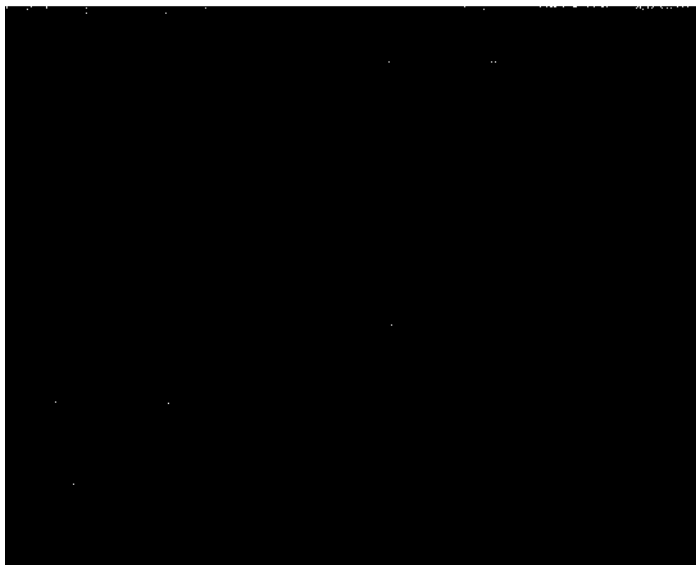
The port of Bahia Blanca forms a second focus of the Argentine railway net and is interesting as sending two lines westward to Zapala and Bariloche respectively, which will eventually be connected across the Andes with the Chilean system. The former extension will use the Pino Hachado pass and the Bio Bio valley to reach Concepcion and the Chilean coalfield. This project will result in redirecting the economic orientation of this sub-Andine region once again towards the Pacific instead of towards the Atlantic. The continuation of the line west of Bariloche will provide a transcontinental route to Valdivia and Puerto Montt. In addition to the Trans-Andine Railway from Buenos Aires to Valparaiso a new line was opened in 1948 across the Puna de Atacama. This line connects the Argentine metre-gauge system at Saka and Rosario de Lerma by way of a *quebrada* to San Antonio de los Cobres,¹ whence the Chorillos Pass (14,655 ft.) leads to Antofagasta. The difficulties of this trans-Puna line are immense, and the labour and capital involved enormous. The Puna is as far from Buenos Aires as the north of Scotland is from the Riviera. The line will serve to facilitate the exchange of nitrates for the foodstuffs of north-west Argentina. It will, therefore, follow the old Puna trails to the desert mineral-region, as does the line from Jujuy up the Humahuaca *quebrada* follow those to the Bolivian plateau through La Quiaca.

Bolivia thus appears as the goal for lines extending across the continent from the radial nets of both Argentina and Brazil. These lines seek to assist and to share in schemes for the development of the eastern plateau and lowlands of the Bolivian Oriente, and to offer an Atlantic outlet as compensation for the

¹ Cobre = copper.

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External communications assumed importance with the re-orientation under Spanish control of the economy of the empire. These were maintained by mule trails across the Cordillera leading to the pastures of the eastern foothills. The demand for horses in Chile gave rise to an illicit trade carried on by the



MULE TRANSPORT IN THE PERUVIAN ANDES
Fox Photos

Indians of western Patagonia across the frontier. Over much of the continent, and especially in the mountainous regions, mule trails are still the only routes available for travel, as is illustrated by the plea of an importer of foreign manufactures, "Send me nothing that cannot be carried by two men and a mule." (Trend, *South America*.) Trails from the lowlands of western Argentina lead up the *quebradas* to the Puna de Atacama. The Oriente is similarly related to the *paramos* of Ecuador. Despite the development of the great river highways of Colombia as internal lines of communication, much of the travel in this country is still over mule trails.

In the open country of the Pampas the development of roads raised its own problems. Road metal is lacking, and the soft

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surface made the beaten tracks impassable after rain. Frequent detours across the treeless plain soon widened the unfenced tracks. These problems were combatted by the introduction of barbed wire in the middle of the nineteenth century, and by the importation of road metal. More recently motor traffic has made road-building programmes of more urgency than the construction of railways, dependent, as these are, almost everywhere upon imported fuel. The Pan-American Congress of Roads in 1925 and the discussion of the Pan-American Highway project in 1929 stressed the international aspects of these programmes. The work of President Leguía in Peru is noted at p. 208.

Simon Bolivar Highway. As external communications roads assist the trade of a state with its neighbours; they may also contribute to the propagation of ideals—for example, Bolivar's 'Americanism' and Pan-Americanism of to-day. Appropriately, the great highway linking the capitals of the north-west, Caracas, Bogota, and Quito, bears the name of the Liberator, the Simon Bolivar Highway. The Venezuelan section, the Gran Carretera Transandina, leads by way of Barquisimeto and the Paramo de Muchuchies to the Colombian border at San Cristobal (p. 246). The Colombian road from Ciicuta to the Ecuadorean frontier is complete, and in 1930 Ecuador opened the remaining section linking the Rumicacha natural bridge on the frontier with Quito and Guayaquil. Like Venezuela, Peru has in recent years undertaken an extensive road-building programme. From Callao and Lima the Andean Highway, the Carretera Central, goes right across the country by way of Oroya and Cerro de Pasco to Pucallpa on the Ucayali river.

Pan-American Highway. Both the Simon Bolivar Highway and the Peruvian Carretera Central are related to the great project of a Pan-American Highway. The idea originated in the United States in 1880 as a proposal for a Pan-American railway, to which, in 1920, was added the suggestion that roads should be included in the scheme as feeders. Five years later the first Pan-American Congress of Roads met in Buenos Aires. Entering South America from the Isthmus of Panama, the proposed route encounters its most serious obstacle right at the outset in the impassable densely forested swamps round the mouth of the Atrato river. Until these can be negotiated the

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Highway will be reached by ferry at the Colombian port of Turbo. The valley of the Cauca river carries it to the Nudo de Pasto and the natural bridge of Rumicacha. From Quito it makes use of the Inca road which connected the two capitals



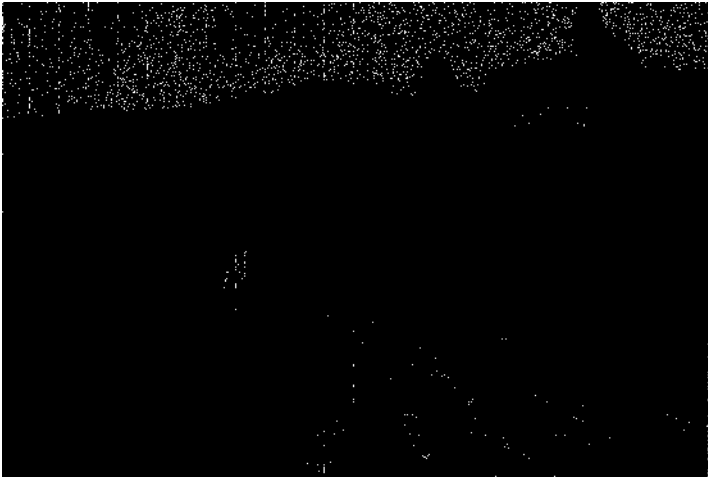
FIG. 26. PAN-AMERICAN HIGHWAY

of the empire, but a few miles south of Riobamba the road comes to an end. Beyond this gap the Highway is represented in Peru by a first-class road along the coastal plain from Talara through Lima to the Chilean frontier. The Atacama Desert now presents a formidable obstacle, but the Highway is planned to cross the

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Andes by the Uspallata pass and so to connect Buenos Aires and Santiago.

Bolivia. Bolivia, whose geographical situation makes her the least favoured among all the South American states for the building of railways, is, however, already well placed as regards



PAN-AMERICAN HIGHWAY NEAR QUITO

Photo Paul Popper

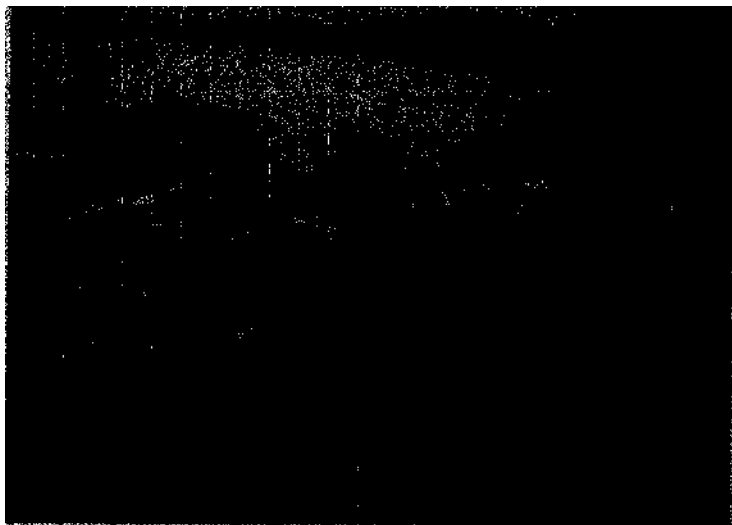
highways. A national system of trunk-roads makes the capital, La Paz, accessible both from Peru via Puno and from Argentina via La Quiaca. The Argentine highway from Buenos Aires through Rosario to Cordoba, opened in 1936, will also, while serving the sub-Andean regions, bring Bolivia into closer relationship with La Plata estuary.

Rivers and Seas

As inland waterways the value of the rivers of South America is depreciated in several ways. Their mouths, deltaic or estuarine, are mostly shallow, and liable to obstruction by sandbanks. Rapids or falls occur where the rivers cross either the

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outcropping of the crystalline massifs or the basaltic ledges of southern Brazil. Those whose valleys penetrate deep into the Eastern Cordillera do so by gorges through which their flow is torrential. All streams descending from the Andes, and especially those beyond the limits of equatorial climatic conditions,



RIVER TRANSPORT IN BOLIVIA
A stern-wheel paddle steamer on the Mamore river.

are liable to very sudden fluctuations whose unpredictability constitutes a severe menace in their courses across the arid regions of the interior. Very few of the larger rivers serve to relate mutually complementary regions. Their use, therefore, is not in great demand for the purposes of internal trade, nor where the axial streams flow parallel to the equator can they offer to external commerce much or varied produce. The immense distances involved are an additional handicap.

Paraguay River. One great river system, however, remains unique in South America since it contrasts in many essential ways with those of the Orinoco, Amazon, Magdalena, and Sao Francisco. The main streams of the Parana-Paraguay system flow from north to south, and, in addition to traversing a greater

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range of natural regions, this is the only river system on the continent serving more than one country to the extent of having in consequence international significance. No less than five countries are interested in the navigation of the Parana-Paraguay system which gives them access to the great estuary



RIVER STEAMER, MARAJO ISLAND

Photo Paul Popper

of La Plata, the most efficient gateway to the interior of the continent. One of those countries, Paraguay, has little other outlet: two others share the estuary, Uruguay and Argentina: both Bolivia and Brazil are interested in it as an alternative contact with world markets. The dominant power in this political situation is Argentina. Some mention of the River Plate Conference will be found at p. 160. Argentine steamers navigate the Paraguay river as far as Asunci6n. For vessels drawing up to twelve feet, the river is navigable as far as Villa Concepci6n.

Another international system of water-traffic functions on Lake Titicaca, where steamers of the Peruvian Corporation

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maintain services between the Peruvian port of Puno and Guaqui in Bolivia. In the agricultural lowlands of Ecuador the rivers are the usual means of transport and communication, and Uruguay similarly makes considerable use of natural waterways (see p. 153). The Bolivian reaches of the great tributaries of the Madeira river are navigable, and, as on Lake Titicaca and the Desaguadero river, Peru maintains steamer services on the Ucayali and Huallaga rivers.

Sea Traffic. Coastwise, and river navigation in Brazilian waters is forbidden to foreign vessels. In Chile also an embargo on foreign shipping engaging in coastwise traffic protects the Longitudinal Railway from competition. Venezuela similarly forbids foreign competition in coastal waters. Venezuelan shipping is now amalgamated with that of Colombia and Ecuador to form the 'Grand Colombian Merchant Navy.' The Paraguay river is navigated by Brazilian and Argentine shipping, the controlling interest of the latter being British.

Government schemes are also afoot for the modernization of the Chilean harbours which in the mineral-bearing north of the country are often merely open roadsteads (see p. 167). The Argentine and Brazilian governments maintain much of the capital equipment required by the storing and grading of staple primary commodities.

Airways and Telegraphs

Like the railways a century ago, internal air-lines, now national concerns, were originally foreign undertakings. Up-to-date information supplied by Pan-American Airways shows the continent encircled by their trunk-lines. Every national capital is linked by air to New York. Within the republics national air-lines are in affiliation with the trunk-lines. Panair do Brazil has services round the coast from Para to Porto Alegre. From the former, towns in the Amazon valley are served as far as Iquitos, while from Manaus Porto Velho is reached. Rio de Janeiro and Sao Paulo have systems radiating to the interior, and from the latter lines reach out towards Bolivia as far as Corumba and Cuyabá. Asunción is connected to Curitiba.

The lines of the former Lloyd Aereo Boliviano serve all the large towns of Bolivia, notably La Paz, Riberalta, Santa Cruz, and Yacuiba. In Colombia the national services of Avianca

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operate up the valleys from Barranquilla to Medellin and Cali, and to Bogota, whence the interior is penetrated towards Venezuela and Brazil.

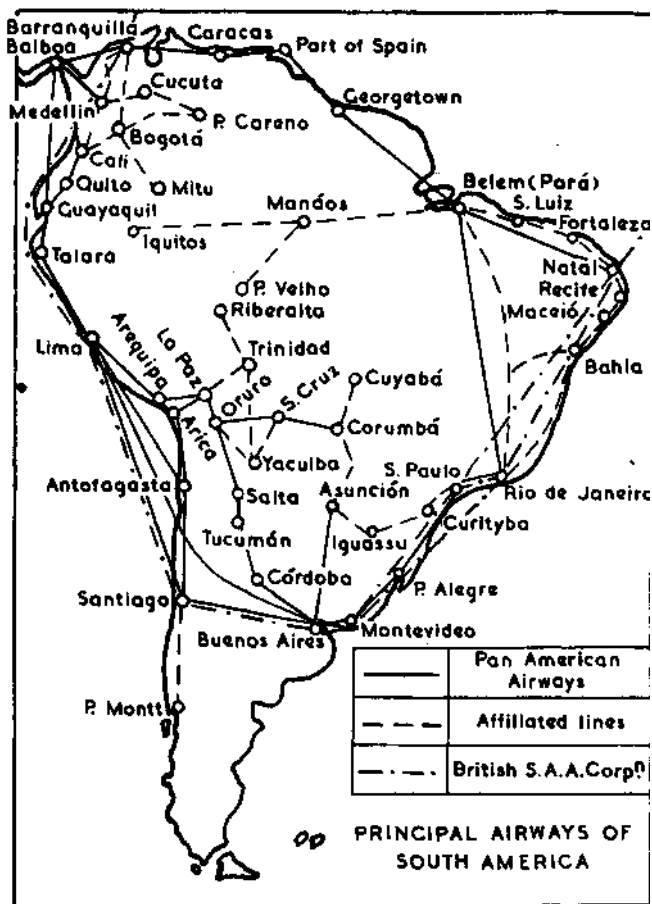


FIG. 27

With acknowledgments to the British South American Airways Corporation and Pan-American Airways.

Chilean air-lines are referred to at p. 175. National services connect the Peruvian ports with the Oriente. For Venezuelan air routes see p. 253.

The Atlantic coast is also served by the British South

TRANSPORT AND COMMUNICATIONS

American Airways Corporation operating from London. The Atlantic is crossed between Natal and Dakar, and the service extends to Santiago in Chile, where it meets the British west-coast route.

The great Atlantic ports have submarine cables to Europe, as has Peru with Chile, Ecuador, and Colombia. Radio communication is now a national enterprise in the several republics.

CHAPTER VIII

ARGENTINA

THE Viceroyalty of La Plata embraced the lands now known as Argentina, Uruguay, Paraguay, and so much of Bolivia as was not within the Presidency of Charcas.

The People. Argentina boasts a greater racial homogeneity among its population than is to be found in any other of the South American republics. What has been termed the "second European immigration" began towards the end of the nineteenth century. As conditions, however, became more stable, the trickle of European immigration prior to 1880 became a steadily increasing flood. The majority of the immigrants is no longer Spanish but Italian. Less than 1 per cent, are English, and the proportion of Germans is still lower. But the occurrence of English surnames among Argentines of influence and position should be noted. There are German communities towards the north-east of the country. Irish immigrants favour the cattle- and wheat-lands near the Parana river. Welsh settlements occur in Patagonia, more particularly on the Chubut river. Nevertheless the basis of the population of Argentina remains Mediterranean in type.

Argentina may claim also among the South American states the highest proportion of literacy in her population. She is entitled to similar supremacy for cultural achievement. That progress in these directions is steady is testified by the decline of illiteracy among voters, which in 1930 was estimated at 35 per cent, and in 1936 at 22 per cent. In Buenos Aires only 2½ per cent, rank as illiterate.

Within sixty years of the rediscovery of the continent by Columbus the University of St Mark was founded in Lima by Charles V (1551), and another sixty years afterwards the University of Cordoba was established (1613). That the latter antedates the University of Buenos Aires by more than two centuries reflects the direction of the Spanish advance into the region of La Plata from the north-west. Other universities, besides that of Buenos Aires, founded since the country gained

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its independence, are those of La Plata, Tucuman, and Santa Fe. The last-named has more recently established branches at Rosario and Corrientes.

Position. Although the great estuary was discovered by Mendoza as early as 1534, the Spanish colonial empire of the south was constrained by the home Government to direct its commerce and other dealings with the mother country by way of the Pacific coast and the isthmus of Panama. The region of La Plata thus remained economically tributary, or ancillary, to the mining-communities in the Andean region. Its natural resources, lacking in minerals, predisposed it to pastoralism for the support of the military and the miners. There was little agricultural development. The lifeline of the region was the difficult cattle-trail across the Cordilleras and high plateaus to the north-west rather than the ocean to the east. A natural protest against this accentuation of the physical isolation of the pastures took the form of smuggling by way of La Plata estuary. In this foreigners—British, Dutch, and French—participated. The nearness of the estuary to the line fixed by the Treaty of Tordesillas, moreover, would have exposed Spanish shipping to encounters with the Portuguese. The partitioning of the Viceroyalty of La Plata from the original Viceroyalty of Peru towards the end of the eighteenth century called for the removal of the restrictions forbidding commerce by way of the estuary. The latter half of the following century witnessed a rapid development of pastoral activities, due to the introduction of railway transport. The progressive exploitation of the Pampa thus contrasts with that of the western prairies of the northern continent, where railways followed in the wake of the pioneers. With the accelerated building of railways in the 1880's, cultivation was rapidly extended, and early in the twentieth century Argentina figured as one of the world's principal granaries.

The South American continent is, for an aggressor nation, an essential stepping-stone to the domination of the Western Hemisphere. Realization of this world responsibility inevitably stimulates the consciousness of Pan-Americanism among the South American republics, and imposes upon Argentina the urgency inherent in her geographical position and function as the gateway to the continent. The political security of the gateway is inseparable from the social security of its people. The three vital needs of the South American continent, as has

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been often observed, are those of manpower, capital, and modern means of communication, and these three needs are intimately inter-related. In all Latin America the climate and general geographical conditions of Argentina combine to offer the most attractive prospects to immigrants from Mediterranean Europe. Argentina is, by the same conditions, spared the social difficulties arising from the presence of numbers of coloured people. The aboriginal 'Indians' have all but disappeared, and Negroes of the Tropics are almost entirely absent. Capital, however, in the form of foreign investments, is largely British, with which fact it may be recalled that Argentina shelters the greatest number of people of British origin outside the British Commonwealth and Empire. British capital predominated in equipping Argentina with the densest and widest-spread railway net in the whole of the continent. With the scarcity of minerals, industrialization, a prime desideratum of modern social progress, is directed mainly towards the processing of the farming products in response to the insistent and increasing demands of the world's markets.

That the government is alert to these possibilities is evident in its policy in regard to the railway-system and in its undertaking of public works such as irrigation schemes, *frigorificos*, and port development. To minimize the dangers and disadvantages of too restricted an economy, in a state whose source of wealth is of necessity almost exclusively dependent upon its farming, encouragement is given to the broadening of the basis of its agriculture to include within its scope a higher proportion of tropical and sub-tropical crops. To this end irrigation in the more northern and western regions is essential, as well as the control and "development of transport to and from the estuary.

Regions

The Andean North-west. Argentina includes within its borders a large portion of the Puna de Atacama. The average elevation of this region is over 12,000 feet, or roughly 2½ miles. It is bounded in the east by the Pre-Cordilleran range, which farther north becomes the majestic Cordillera Real. It is a region of marked aridity. Only in the neighbourhood of the flanking ranges does the annual rainfall reach ten inches, or as

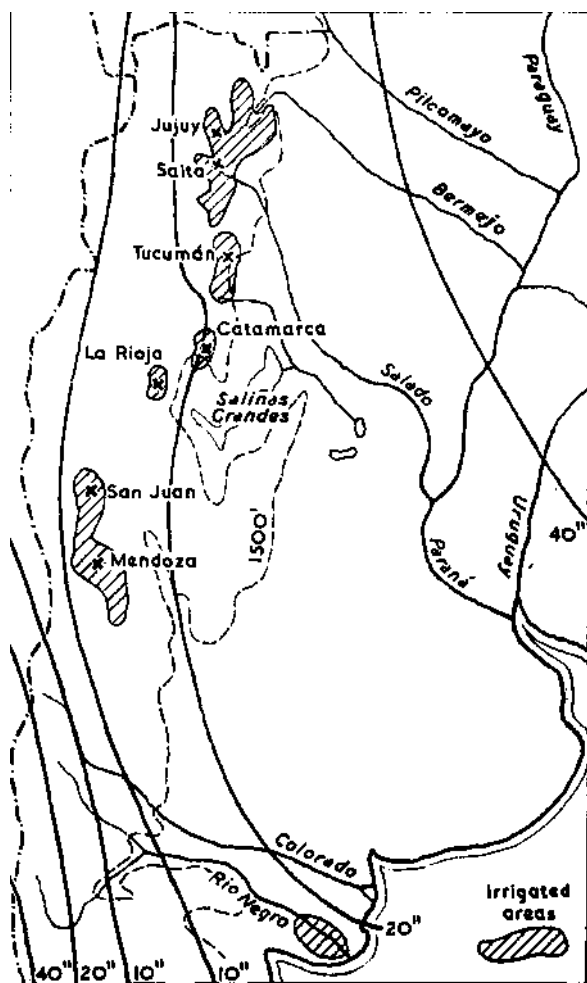


FIG. 28. NORTHERN ARGENTINA: RAINFALL AND IRRIGATION

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much as twenty near the Cordillera Real. The Puna has therefore achieved no great importance for its productivity. For the Indians it provided the llama, a typical beast of burden in the high Andean regions. The only other animal of any importance is a small, burrowing rodent, *Chinchilla nutria*. The Puna was important for the trails crossing it from the mining-centres of Oruro and Potosí to the pastures of the valley-mouths at the foot of the Cordillera Real. These supplied the miners with meat and hides, and also with mules as draught animals for the minerals sent down to the Pacific coast. The tripartite agreement of May 1941 reached by Argentina, Bolivia, and Paraguay stipulated that, among other matters of railway and river communication, a railway should be constructed, connecting, as did the ancient trails, the Puna with the lowlands of Argentina. Argentina agreed to advance the funds necessary to carry the railway on from Yacuiba by way of the upper valley of the Pilcomayo river to Sucre. Thence the Bolivian Government undertook to continue the line down to Santa Cruz in the valley of the Mamoré river. At Santa Cruz this railway from Argentina would meet the partly built line from Cochabamba which it is intended to continue eastward to Corumbá and so to São Paulo. The other points agreed upon concerned the navigation of the frontier rivers, the Pilcomayo and the Paraná, and other kindred matters which had been raised at the River Plate Conference held at Montevideo in January 1941. (See p. 221.)

The steep eastward slopes of the Cordillera are densely forest-clad, continuing the forests of the Montana and Yungas regions. A notable product of these tropical forests is cinchona (quinine) bark and among their timbers cedar is important. Owing to their comparative inaccessibility these forests are but little exploited except for supplying local needs of fuel and construction. Nor are they very extensive, and in the neighbourhood of Catamarca they merge with the more open forest of the cooler latitudes, as they do also in the lower latitudes at the higher levels above 6000 feet. The trees of this second type of forest are mainly leguminosae of which the algarrobo is characteristic. The rainfall of these eastern slopes is for the most part due to the intensification in summer of the persistent low atmospheric pressure over the Chaco region, and in consequence is heaviest on the mountain slopes nearest the Tropic. This rainfall does not extend to the highest levels of the Cordillera

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Real, where such rain as is received falls on the western side, being brought there by depressions in winter from the Pacific Ocean.

The third zone of this north-western region of Argentina is a transitional belt stretching from Oran and Embarcacion near the Bolivian frontier to San Rafael. It lies between the rapid ascent of the Cordilleras and the lower plateau surface which descends south-eastward. Separating it, however, from the plateau of the so-called Pampean hinterland is a broken line of foothills, extending from the Sierra de Ancasti to the Sierra de Lumbre. The faces of the Cordilleran ranges to the west of this discontinuous trough are heavily scored by faulting and mountain streams. In the northern half of this region the high ravines of the Cordillera Real are known as *quebradas*. Farther south between the Pre-Cordillera and the tilted blocks of the Pampean outliers the valleys are broader. Those whose drainage escapes naturally are known as *valtis*, while those whose rims are so complete as to forbid an effluent are called *bolsons*. Alluvial cones are characteristic of these valleys, situated where the gradient of the streams flowing down them is suddenly checked, the exception being the *quebradas*, whose torrents flow only during the rains. Irrigation must be resorted to since the alluvial deposits occur within the rain shadow of the higher land to the west, and strong mountain winds, notably the *zonda* the Argentine equivalent of the chinook or *fohn*, drawn towards the Chaco low pressure region and the intensely heated valley floors, are responsible for severe loss of moisture by evaporation.

The economic life of these valley settlements exhibits three phases. During the Spanish colonial era, from the sixteenth to the eighteenth centuries, their pastoral activities were devoted to supplying the needs of the mining regions to the north and north-west. The era of Independence, followed after no great interval by the building of railways, reoriented their commerce towards the Atlantic and the settlements of La Plata estuary. The third phase owes its present inaugural stages to the projected piercing of the Andes by railways which will bring the *bolsons* and *valles* into direct relation with the nitrate ports of the Chilean coast. The proposed Pan-American Highway will similarly effect some reorientation of Argentina's economic outlook and consequent cultural relations with other states in both the Americas. The Argentine section of the proposed highway

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from Buenos Aires to the Andes was opened for traffic early in 1941. (See p. 108.)

The somewhat restricted areas available for pasture are generally situated in the moister western sides of the valleys, the valley floors being devoted to cultivation. Mules are reared on the coarse hillside pastures and cattle brought up 'on the hoof' from the Pampas are rested in 'agistment pastures' before proceeding up the trails over the Andes. With the building of railways and the establishment of *ofsaladeras*¹ and *frigorificos* in the east, the cattle trade of the north-west tends to be reoriented, although trails to Bolivia, Peru, and Chile are still in use. The economic influence of La Plata estuary upon these pastures is also seen in the introduction of goats. The world demand for their skins stimulates a remunerative trade in them despite the cost and difficulty of the long journey to the coast. On the cultivated lands lucerne is grown as a fodder crop to supplement the seasonal deficiency of the natural pastures.

For local consumption wheat and maize are cultivated generally. In the competition of the world's markets these cereals would not stand the handicap imposed by their transportation to the estuary, nor is there a supplementary demand for them in the towns of the republic's major agricultural region. As regards other crops of importance, some distinction may be drawn between the northern valleys of Jujuy, Salta, and Tucuman and the southern ones of Catamarca, San Juan, Mendoza, and San Rafael. In the former the distinguishing product is cane-sugar, while wine is the special feature of the latter. Both sugar and wine, however, owe much to Government irrigation schemes, to the protection afforded them by high import tariffs, and to the highly organized industries concerned in producing and marketing them.

Unfortunately the largest area available for the growing of sugar cane has the least favourable climate for the cultivation of the crop. The risk of frost round Tucuman makes sugar-plajiting an insecure enterprise. Without Government aid in the form of irrigation control and fiscal protection, the industry could hardly survive. Irrigation is essential as the mean annual rainfall is barely forty inches. As it is, the Tucuman region yields three-quarters of Argentina's total sugar-production of half a million tons. No extension of sugar cane cultivation south

¹ *Saladero*, literally a salting-place.

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of Tucuman is possible, owing to the deterioration of climatic conditions. It is, however, spreading northward along the lowlands as far as the upper Bermejo valley and into Bolivia. For the future prosperity of the industry, as it affects both the *caneros*, who grow the cane, and the *ingenieros*, who export the sugar, two needs are paramount. Soil exhaustion, which is very marked in the case of this crop, must be combatted by the importation of artificial fertilizers. Railway extension will bring the producers into closer touch with the great consuming markets of the east.

The wine industry of the more southerly settlements is similarly highly organized; one branch specializing in the growing of the vines, the other being devoted to the making and storing of the wine. Again, as with the sugar industry, high import duties protect the home production against foreign competition. Irrigation is necessary, since in these latitudes the valleys to the east of the Cordillera receive a light rainfall in summer and none in winter. As with sugar, the demand of the home market for wine increases steadily. The Mendoza area is the chief of these wine-producing valleys, and is well connected by railways to both the Atlantic and Pacific coasts. It is, therefore, able to market stone fruits as well as table grapes not only in Buenos Aires but also overseas. The Wine Regulating Board was established in 1934, only a few months after the making of the Fruit Trade regulations, which apply generally to the whole of the Argentine production and marketing of fruits.

Another contrast between the northern and southern divisions of the mountainous north-west of Argentina is in their minerals. Again, in the northern districts difficulties of transportation and labour-supply militate against the exploitation of the copper ores in the Pre-Cordilleras. The dense forests enhance the disadvantages of the isolation and inaccessibility of the mineral-bearing areas. Petroleum occurs in two regions, one from Mendoza southward and the other along the valley of the Rio Grande de Jujuy from Salta to beyond the Bermejo river. While the oilfields are of very limited extent, owing to the severe crustal pressures which have resulted in the complex folding and fracturing of the strata, and since the individual wells are rapidly exhausted, the output of petroleum here is more likely to find a market in the neighbouring countries of Bolivia and Chile, where the scarcity of fuel outbalances the

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cost of transportation eastward. With the other minerals, petroleum is handicapped by the density of the natural forest. In the southern district the lack of railways across northern Patagonia is less marked as the potential output is smaller and less certain.

It is convenient to consider the railways as related either to the northern valleys or to the southern. From La Rioja northward to beyond Embarcaci6n the various towns have direct communication with C6rdoba. Tucupian is reached by the C6rdoba Central and the State Railway, the Central Norte, for the capital has a line through Tucuman, Saka, Jujuy, Embarcaci6n, and so to the Bolivian frontier at Yacuiba. The southern towns are interconnected by a railway-line along the foothills from San Juan through Mendoza to San Rafael, and the two latter towns have independent railways to Buenos Aires, the first-named being in direct communication with C6rdoba. From Mendoza the Trans-Andine Railway crosses the frontier by the Uspallata Pass and descends to Santiago de Chile and Valparaiso. A westward-leading trail is somewhat farther north, connecting Copiap6 with the cattle centres west of La Rioja (Fiambala and Tinogasta), whose prosperity has waned since railway communication with La Plata estuary was established.

Interior Lowlands (Chaco). From the Andean foothills of the north-west, south-eastward as far as the lower Argentine valley of the Parana, stretches the vast region of the Chaco. The name El Gran Chaco, the great hunting-ground, implies that as yet it has not been brought under cultivation, nor over most of it are its natural products exploited. It extends northward beyond the frontier river, the Pilcomayo, into Bolivia until it merges with the plateau of Matto Grosso. The southern, or Argentine, portion of El Gran Chaco is the Chaco Austral. The natural plant cover of the region is by no means uniform, and towards the thirtieth parallel its woodlands give place to the grasslands of the Pampas. The marginal zone, which may be taken as the southern limit of the region, is marked by settlements disposed roughly along a broad arc extending from Santiago del Estero and San Cristobal to the Parana valley. This line suggests the direction and progress of the advance of human activities into a region of difficulty and disappointment.

It may be regarded as disappointing, since it appears to be a

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land of fairly uniform surface, not lacking in large rivers, nor in warmth, and blessed at any rate in summer by a not inadequate rainfall. The general tilt of the surface, moreover, is towards the highway of the Parand river leading to La Plata estuary. In all these apparently favourable conditions, however, there is a factor which renders them deceptive. The surface is developed upon rocks horizontally stratified, and thus the rivers lack tributaries, since few streams are found springing from outcrops. The heavy rains coincide with the period of greatest heat. The water-table is in general high, and, in consequence, surface water accumulates. The rivers, therefore, are liable to flood, and the deposition of their 'load' is further encouraged by the weakening of their flow during the long months of drought. This, in its turn, causes the streams to raise their beds, a process which is encouraged by the growth of coarse grasses in the sedimentary deposits, and so their liability to flood is increased. The additional force of tributary water would assist in keeping the channels clear. Before agricultural development can be undertaken, two apparently contradictory conditions must be created. The excess water of the rainy season must be directed into an artificial drainage-system, and the drought of the 'winter'⁵ months must be combatted by the provision of storage facilities. While cattle may be bred on the pastures interspersed among the woodlands, particularly in the drier west and south of the region, their movement is severely handicapped through lack of fresh water at appropriate intervals—i.e., of about fifteen miles, an average day's 'march' for the animals.

The topographical features resulting from the *regime* of the rivers fall into two classes according to their shape. In the wet season a river, having by successive stages raised its bed, floods irregularly over the surrounding land, and thus* forms an *explayado*, a broad, shallow, expanse of water moving slowly, the original channel being indiscernible. Evaporation during the dry season is rapid over such an extensive water surface, and a broad area is thereby overlaid with a film of sediment. The swampy area thus formed is called a *malezal*¹. A permanent swamp is a *Canada*.² Where the irregularity of the land surface affords a hollow, or where a stream has abandoned its bed, a long, narrow *estero*³ may be formed. A *banado*⁴ is a similar

¹ *Malezal* = weedy overgrowth. ² *Cafiada* = glen.

³ *Estero* = inlet, estuary. ⁴ *Bafiado* = irrigated (naturally).

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depression from which the water has evaporated, leaving the floor covered with sediment. Evaporation may further leave the deposits encrusted with salt and so a *salitral* is formed.

All the rivers of the Chaco are affected by these impediments, which render them useless for navigation. The old and new courses of the Rio Bermejo are sufficiently divergent to be shown on ordinary atlas maps. Former courses of the Rio Pilcomayo have given rise to *esteros* and *salitrales*, and its present course is hindered by *explayados*.¹ Conditions become more adverse to the rivers of the south. Here the Rio Dulce, on whose banks stands the town of Santiago del Estero, fails eventually to reach the sea.

Salts swamps, known as *salinas*,² occur on both sides of the northern spurs of the Sierra de Cordoba.

The cultivated zone near the southern margin of this region extends north-west towards Tucuman. Economic development was here, as elsewhere in Argentina, inaugurated and subsequently stimulated by the building of a railway, in this case the Argentine Central, following the valley of the Juramento-Salado. Apart from subsistence crops for local consumption, the outstanding crop is cotton, the acreage under which is increasing rapidly. In the year 1938-39 Argentina produced enough cotton in this region and in the lower valleys of the northern rivers to place her third on the list of South American producers, and the yield for the following year (1939-40) was half as much again as that for 1937-38. It may be that soon she will overtake Peru for second place, if she has not already done so. Future expansion will call, as is usual in South America, for a greater supply of labour and increased modern means of transportation, while among insect pests the locust is a menacing problem. Since about a quarter of the total crop is exported, the expansion of the producing industry will be directed towards an increasing output of the longer staples comparable to the North American middling grades. The bulk of the crop is of the short-stapled 'Chaco' variety.

Woodland of varying extent and density occurs throughout the whole of the Argentine region from the valley of the Juramento-Salado to that of the Pilcomayo on the northern frontier. The extraction of timber and other forest products, notably tannin, depends to an overwhelming degree upon

¹ *Explaydo* = inundated.

² *Salinas* = salt swamps.

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proximity to the railways. The general character of the forests in the west is tropical evergreen, while in the south the drier climate favours hardwoods. These are utilized entirely for local requirements of fuel and constructional timbers. In the north the moister lands of the great river valleys carry extensions northward of the denser tropical forests of the Parana valley. Here cedar is a typical timber tree. The most important, however, is quebracho,¹ of which Argentina has practically a world monopoly. Of the several varieties of this tree, the red is the best both for the durability of its timber, and for the yield and quality of its tannin extract. Red quebracho flourishes best away from swampy soils, and also away from higher and, therefore, drier ground. The best specimens were formerly found in the extreme south of the forest zone, but with the working-out of the more accessible forests in Santa Fe province the main centre of the quebracho industry is now in the Gobierno del Chaco farther north. In the warmer latitudes the quality of both timber and tannin deteriorates, but with the rapid exploitation of the forest resources farther northward movement is inevitable. This is the more so since the tannin is obtained from the heart of the tree. Much of the timber cut, therefore, is wasted. Beyond the Pilcomayo, in Bolivia and Paraguay, quebracho occurs, but not of such a quality as to threaten the supremacy of Argentina's virtual monopoly. It is of great advantage to the tannin industry that factories for the extraction of the tannin are established in the forests themselves, where the felling of the trees can be carried on close at hand. This type of organization demands not only capital expenditure, but the provision of homes and sustenance for the workers employed. In view of her financial position, however, Argentina is, on this ground, the more assured of the continuance of her monopoly.

The northern forest regions, mostly in Misiones, are also notable for the production of *yerba mate*. The tree (*Ilex paraguayensis*) is found growing wild, but plantations have recently been established to meet the ever-increasing demand of the home market, where *mate* 'tea' constitutes the standard beverage, and the requirements of the neighbouring countries of Paraguay and Brazil. The Argentine demand is stimulated by the need for an anti-rheumatic corrective to mitigate the consequences of the ill-balanced meat diet of the Pampas. The

¹ The word *quebracho* means axe-breaker.

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areas suitable for plantations, however, are severely limited, since the tree flourishes satisfactorily only in the restricted red soils available near the rivers.

The courses of the railways traversing the Chaco country are remarkable in that they have to avoid the swampy and floodable

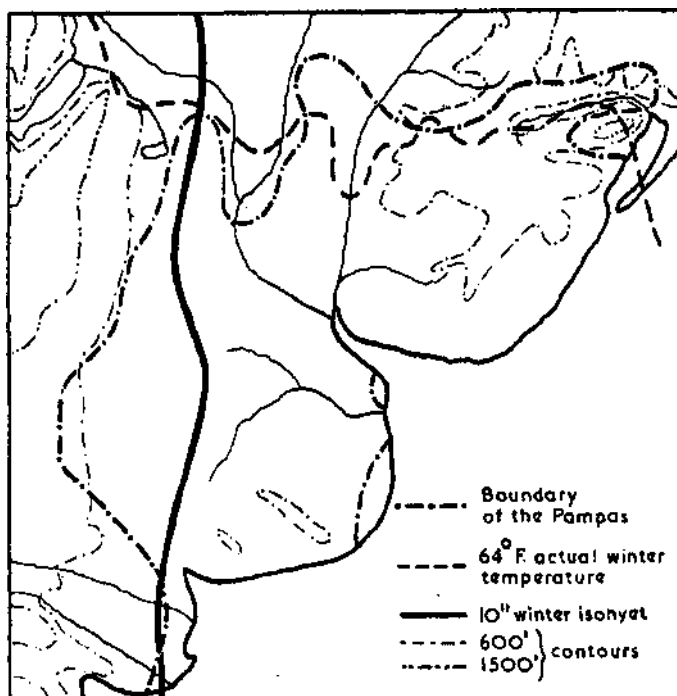


FIG. 29. LIMITS OF THE PAMPAS

lands near the rivers. This applies to the valley of the Paraná, as well as to those of its tributaries. The Chaco Central leads north-westward from Formosa on the Paraná river to Embarcación along the Pilcomayo-Bermejo watershed. A parallel line connects Resistencia and Salta, but that following the main river southward to Santa Fe is at some distance to the west of it. Two lines, on either side of the Juramento-Salado lead from the lower Paraná valley to Tucumán.

The Pampa Regions. The Pampas are a natural region of warm temperate grassland lying on the east of the continent,

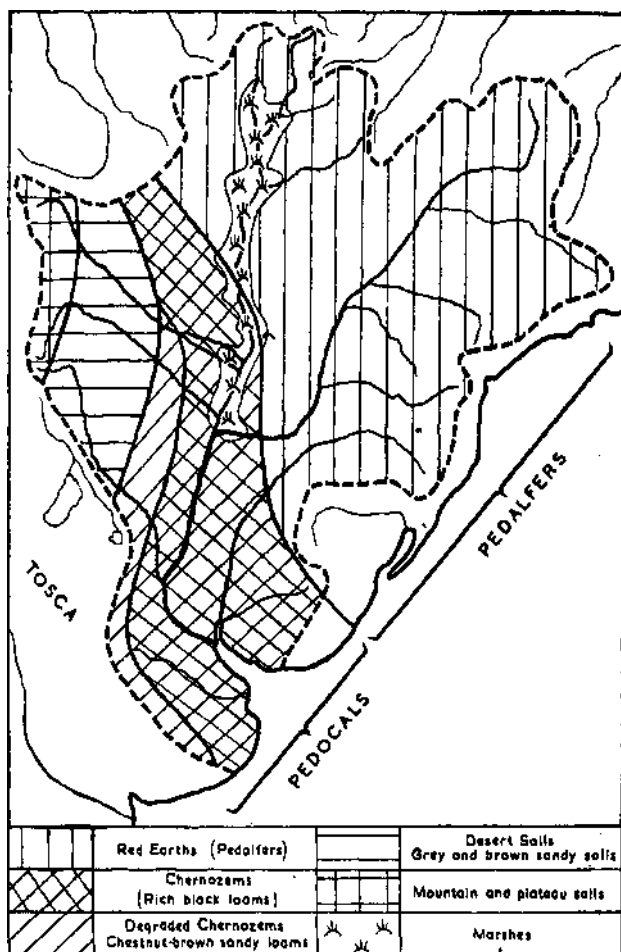


FIG. 30. SOILS OF THE PARANA-PARAGUAY BASIN

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between the thirtieth and fortieth parallels. On the west the Pampas are bounded by the steeply rising Archaean Sierra de Córdoba. Ranges of similar formation but of lower altitude occur within the Pampas to the south. These are the Sierra de la Ventana and the Sierra de Tandil. The western half of the region is a region of inland drainage.

The major types of soil vary also from east to west. From the chernozems, or black earth lime-accumulating (pedocal) soils of the east, they grade through the chestnut-brown soils to the lighter desert soils, still pedocals, of the west. Between the Sierra de Córdoba and the Sierra de la Ventana is a region where limestones occur, often exposed and known as Tosca. This is the region of poorest vegetation in the Pampas, and may be regarded as constituting its limit in the south-west. The soils are in large measure due to the action of the winds, which remove the lighter material from the western surfaces and deposit it farther east. These deposits become consolidated in the eastern region of increasing humidity. From east to west, therefore, the soils range from the rich black loams near the estuary, through finer sandy loams, to the more purely sandy soils of the west. Clays are found in the extreme east, south of the estuary, and the surface here, as in the Tosca region, is much interrupted by small and shallow lakes. As distinct from the shorter streams, which enter the sea between La Plata estuary and the mouth of the Rio Colorado, and which rise within the Pampas region, the larger rivers entering mostly from the Chaco region suffer the disabilities of the *regime* which has already been described. (Seep. 123.) Only persistent dredging maintains a channel for ocean-going steamers to reach Rosario.

Argentine Pastures. The economic development of the region was long delayed for reasons already indicated. The character of the earlier stages of this progress, which dates from the middle of the nineteenth century, has contributed in no small degree to the present social organization of the agrarian community, and to the system of land tenure typical of the region. So long as the productivity of these pastures was, as it were, tied to the mining activities to the north-west, little progress was possible. With the opening of the ocean trade-route to the east, and its feeding by railways, European markets became accessible. Their demands were at first met by the export of hides, tallow, and wool, but the transportation of meat to them was not then

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possible. The difficulties of the natural water supply called for extensive pastures, and thus arose the great *estancias*. (See p. 75.) With the introduction of refrigeration towards the end

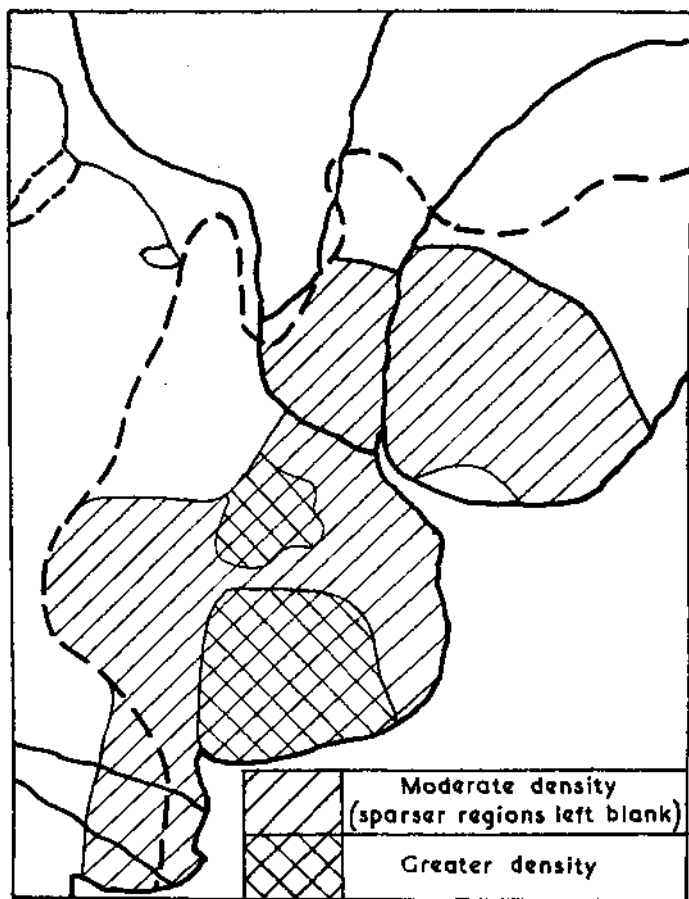


FIG. 31. PAMPAS: DISTRIBUTION OF SHEEP

of the century, the export of meat assumed greater importance than that of wool and hides, but the change necessitated no partitioning of the *estancias*. Another notable consequence of the establishment of *frigoríficos* was the need for better meat-yielding breeds, both of sheep and cattle. There is still a steady

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stream of live prize-stock from Great Britain to Argentina, especially of breeds yielding first quality beef. Cattle moreover, are more favoured than sheep by the extension of the cultivation of alfalfa, which has spread across the Pampas from the north-west. This is because sheep nibble so closely as to ruin the crop,

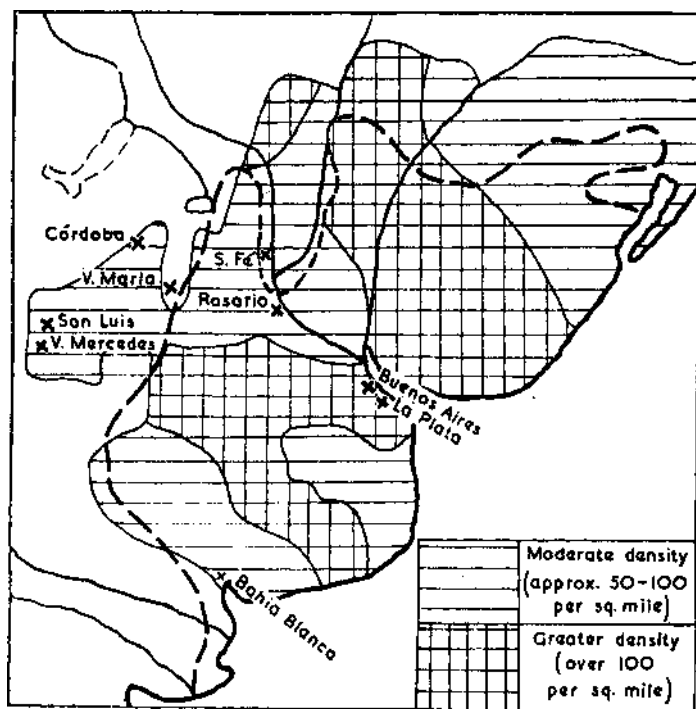


FIG. 32. PAMPAS: DISTRIBUTION OF CATTLE

which otherwise would recuperate the soil by increasing the nitrogen content.

The preference for bulls of British pedigree stock is so well established as to have become traditional in the *estancias*. More than half the total number of cattle are of the Shorthorn variety, and these, with Hereford and Aberdeen Angus, make up just over two-thirds of the total. These breeds yield the finest beef. The climate allows them to remain in the open all the year round, and the lucerne pasture is eminently suitable

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for fattening. 'Baby beef,'⁵ which finds a ready market in the United Kingdom, is fed almost entirely on maize silage. Argentina is the world's greatest exporter of beef, accounting for 45 per cent, of the total, while ranking third for mutton with 20 per cent. Refrigeration was introduced in the last decade of the nineteenth century. This allowed beef to be stored and transported at a temperature of 17⁰ F. and so enabled it to keep almost indefinitely. The constant demands of the consuming markets do not require the beef to be kept for a lengthy period. The time elapsing between killing and eating need be little more than that necessitated by the voyage. Chilled beef, moreover, makes more palatable eating than frozen. For chilling the temperature maintained is 30⁰ F. and by this means the beef can be guaranteed over a period of forty days. Most of the meat export is handled by the *frigorificos* of Buenos Aires, La Plata, and Zarate, in La Plata Estuary. Some also passes through the *frigorificos* at Bahia Blanca and Rosario.

A more recent development of the pastoral industry is the export of dairy produce. Cheese was first exported in 1894, and casein, of which Argentina at present supplies about three-quarters of the world's total export, in 1898. The great majority (85 per cent.) of the dairy cows are Durham cross-breeds, but a number of Holsteins are also kept for this purpose.¹ The production of butter, of which casein is a by-product, is supervised by La Direccion de la Industria Lechera.² The demands of the principal buyers, Germany, formerly, and the United States of America, determine the marketing standards. As the First World War stimulated the butter trade in its early stages, so the more recent conflict may be expected to revive the export trade, which had already shown some decline. From 1932 to 1937 the home consumption of butter doubled itself.

The most numerous breeds of sheep are Lincolns and Argentine Merinos, each of them accounting for nearly a third of the total. Lincolns and Romney Marsh sheep make up half the total, and Australian Merinos and Corriedales (a New Zealand cross-bred between Merino and Lincoln or Leicester) are the most popular of the other breeds kept. The remaining breeds are, however, of types familiar in the downlands of England. Thus again is emphasized the importance of British stock to the

¹ In January 1949 the first Guernsey dairy herd was sent from the United Kingdom to Argentina. ² Leche = milk.

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Argentine pastoral industries. The increasing demand for mutton-providing animals, as distinct from wool-producers, consequent upon the introduction of refrigeration, will sustain the preference for English breeds rather than Merinos. The greatest density of sheep is in the province of Buenos Aires, but the sheep pastures extend throughout the whole length of Patagonia, and include as much of Chile as lies within the hinterland of the Strait of Magellan. More than three-quarters of the wool produced is from cross-bred animals, the proportion of coarse wool being about equal to that of fine and medium combined. The bulk of the remainder of the wool clip is Merino. Other animals having an important share in the economy of Argentina are horses and pigs. The introduction of the horse dates from 1535, when Mendoza turned loose on the Pampas five mares and six stallions. Of some ten million horses in the state, one and a half million are of the heavy types—Percheron, Clydesdale, and Shire. The most popular breeds of pig are Jersey and Berkshire, accounting for more than a quarter of the total.

Argentine Cereals. In the early twentieth century the value of the exports of cereals began to overtake that of the pastoral products. So long as the world total of agricultural land remains barely adequate to furnish the world's market with its total demand for cereals, this trade will prove the more profitable to Argentina. To-day the supremacy of cereals in this respect is assured of continuance. But the nature of the work and organization involved in the satisfying of the external demands for cereals calls for the cultivation of smaller units than the pastoral *estancias*. There has, therefore, arisen a class of tenant-farmers who cultivate shares of the great estates for a term of years. At the end of their tenure the exhausted soil is put under alfalfa, and so for an interval returns to pasture. The cultivators appreciate the disadvantages of their role in the social edifice of the state, and the state similarly has to face the lack of a settled agricultural population. Hence follows the problem of the reorientation of agrarian policy, a problem that is at the root of some of Europe's difficulties. The problem is the more acute as the yield is liable to fluctuations from year to year, due to the uncertainty of the semi-continental type of rainfall, the violent changes in level which characterize the *regime* of the rivers, and the prevalence of insect pests, the locust

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in particular. All these bear the more heavily on the tenant cultivators, as they have no continuing interest in the land they till.

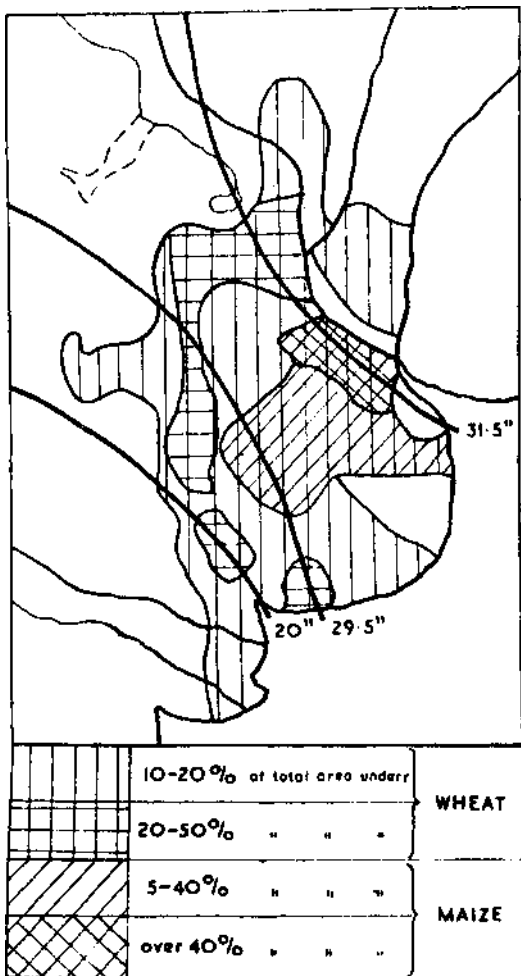


FIG. 33. PAMPAS: DISTRIBUTION OF WHEAT AND MAIZE

Based on a map issued by the Argentine Chamber of Commerce in Great Britain.

The area within which the cultivation of maize is possible is naturally more restricted than that devoted to wheat. It is bounded approximately by the two mean annual isohyets of

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31½ and 29½ inches, which trend from north-west to south-east. Its southward extension is limited by the incidence of frost. While the soils of most of the area under maize are chernozems, there is some cultivation of the crop in the valley of the Rio Salado of Buenos Aires where the clay soils are better drained. The zone of maximum production extends westward from the lower valley of the Parana below Rosario. Most of the export is handled at Rosario.

Argentina is second only to the United States of America for production of maize, and is the world's largest exporter, furnishing two-thirds of the world's total exports of the crop. Nearly all the maize imported into the United Kingdom is of Argentine origin. This is usually known as 'Yellow Plate Maize,' but it belongs rather to the red variety, which is used for the feeding of stock and for industrial purposes. The yellow variety is the more favoured for human consumption in the form of cornflour and other food products. White maize supplies the Argentine home markets. The red and yellow 'Flint Maizes' are most suitable for the export trade, as their low moisture-content endows them with good storage qualities. The smaller varieties are used for poultry-feeding. The industrial purposes referred to include, besides the making of whisky, the production of glucose and alcohol.

Wheat is grown everywhere in the maize zone, excepting the lower valley of the Rio Salado and the lower Parana valley. The land under wheat, moreover, extends farther north, west, and south than that in which maize can be cultivated. From October to February nearly four inches of rain a month fall in the immediate neighbourhood of the thirtieth parallel, thus setting a northward limit to the cultivation of wheat. On the west and south aridity is the controlling factor, coupled with the lower temperatures in the latter direction. The isohyets are given for December as being typical of the summer months. (Fig. 29.)

About a quarter of the world's total exports of wheat comes from Argentina, which ranks as the world's fifth producer and second exporter of this grain. The mode of classification of the exports indicates the locality of production rather than the intrinsic qualities of the wheat, but the bulk of the crop is certified as of medium baking quality, a fair proportion ranking somewhat higher. The wheat lands already extend

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north-westward along the valley of the Rio Salado to the borders of the Chaco Central. In the west they have reached C6rdoba and San Luis. The chief wheat exporting ports are Rosario and Santa Fe on the Parand river, serving the northern end of the wheat zone, Buenos Aires, and, for the southern end of the zone, Bahia Blanca (seep. 78). Further advance would appear to be limited in the north-west by the Salinas Grandes swamps of Santiago del Estero and by the Sierra de G6rdoba immediately to the west. Farther south, in the region of San Luis, irrigation would be necessary. Apart from the narrow coastal plain from the head of La Plata estuary to Mar de la Plata, where an even rainfall *regime* prevails, the wheat lands are a region of summer rainfall, comparable to a monsoon *rigime* since the seasonal rain-bearing winds are drawn inland through the agency of a continental low-pressure system. The Government appreciates that the immediate interest of the industry would be better served by improving the quality of the exported grain than by attempting to increase the yield per acre. As in North America, the western marginal lands call for drought-resisting types.

Argentina takes first place in the world not only as a producer of linseed, but also as an exporter. She supplies four-fifths of the total of the world's exports. The flax-growing region extends westward from the lower Parana valley, and thus embraces the northern warmer half of the wheat zone. While the chief use of the oil is for paints, the residue of the crushed seeds forms a valuable food for cattle, the more so as it is rich in iodine. Such artificial feeding stuffs are in greater demand in countries of more severe climate than Argentina, where cattle can be kept in the open all the year round.

Besides alfalfa, or lucerne, important fodder crops grown in Argentina are oats and rye. These, as well as barley, are cultivated in the cooler and drier southern half of the wheat zone. Barley supplies the home breweries and distilleries and is also fed to livestock. The export of oats through Bahia Blanca, for both animal and human consumption, amounts to about half the total crop. Some barley is also exported, but very little rye.

Seeing that half of Argentina's foreign income is derived from her grain exports, it is of prime importance that the production and marketing of the crops should be soundly organized and

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regulated. These responsibilities are vested in the Comision Nacional de Granos y Elevadores. The Comisi6n inspects standing crops and undertakes, as far as elevators are available for it, the storage of the grain. On the marketing side its duties include the classification of the crop according to recognized standards, and the issue of 'informative certificates' to the shippers.

In the extreme south of the Pampas, in the lower valley of the Rio Negro, a rapidly growing fruit industry has recently¹ been established. The orchards are entirely dependent upon irrigation. Here the Argentine Ministry of Agriculture exercises strict supervision over the cultivation, packing, and shipping of the fruit. Most of the export goes to the United Kingdom and becomes available to British consumers in their spring season after a voyage of three weeks. The fruit which is shipped through Bahia Blanca includes pears and apples as well as table grapes and peaches. In the warmer districts farther north along the estuarine shores citrus fruits are cultivated and exported under similar Government supervision. Ground-nuts, very rich in oil, are also an important crop in this more northerly region, being grown entirely for home consumption. Some progress has been made with the plantation of tobacco.

Industrial Development. The usual estimate of Argentina's economic function as that of a primary producer needs to be accepted with some reserve. It is true that for some time to come the republic will continue to find in her pastoral and agricultural production her main contribution to the world's economy. But the Second World War affected the balance within that contribution in two ways, neither of which may necessarily prove transitory. The export, and therefore the earning capacity, of agricultural products was depressed, while the output of pastoral products, which are subject before shipping to considerable processing, increased steadily. An insistent demand for certain classes of machinery and machine tools had perforce to remain unsatisfied, but in addition to the expansion of meat refrigeration and packing, and allied industries, there were significant developments, particularly in the establishment of textile factories. The course of the war, moreover, enabled Argentine producers to establish commercial contacts

¹ The regulations for the fruit trade were formulated in 1933.

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with new markets, among which the most notable was South Africa.

The causes of these reorientations, both of production and of commerce, were largely due to Argentina's geographical position. The temporary closing of the Mediterranean route diverted shipping bound from the United Kingdom for the Far East by way of the Cape of Good Hope. For the most part this traffic consisted of war material, and so South Africa was deprived of a normal source of supply. With the reopening of the short route to India and the East, the South African market for South American goods assumed once again its usual status. In the Atlantic Ocean war risks affected the character of both the import and the export trade of Argentina. The total industrial energy, moreover, of the great manufacturing countries of the northern hemisphere, the United Kingdom and the United States of America, was devoted to the production of munitions of war. Their pre-war markets in the southern hemisphere became opportunities for Argentine enterprise and, within a few months of the Japanese attack on Pearl Harbour (December 7, 1941), Argentina was supplying textile and leather goods over a wide range to her neighbours in South America, as well as to South Africa. In the export trade cheap and bulky commodities like cereals could no longer compete for shipping space at heavy war risks with the more valuable and less bulky meat cargoes, in which the resources of the northern hemisphere fall far behind those of the southern. During the years of war the total value of Argentine pastoral products was nearly doubled, while that of her agricultural products fell to little more than a third of the pre-war figure. For the same period, manufactured and semi-manufactured exports expanded to fourteen times their pre-war value. These changes must inevitably effect the character of Argentina's post-war commerce. The output of her factories of foodstuffs, as distinct from the yield of her crops, and the output of her manufacturing industries have received a stimulus and found wider markets that will not be lost with the removal of war conditions.

The total population employed in meat processing and packing factories is double that engaged in the production of pastoral and agricultural commodities. It is destined to increase, and so Argentina will attract not only farming immigrants as in the past, but also urban industrialists. The number of

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factories engaged in a particular activity is of little significance since the individual capacity of factories varies very considerably. In Buenos Aires is the largest *frigorifico* in the world, capable of dealing with 5000 cattle, 10,000 sheep, and 1000 pigs in ten hours. *Frigorificos* and *elevadores* are prominent features of all Argentina's great ports. Rosario, at the northern end of the wheat zone, handles half of Argentina's grain export, while one of the largest *elevadores* in the world is at Bahia Blanca, the port for the southern end. Supported by the pastoral productivity are butter and cheese factories, as well as nearly five hundred boot and shoe factories, taking the output of the tanneries, which consume the quebracho tannin. Agriculture, whether of the plantations of the Tropics or of the *chacras* of the Pampas, supplies the need of cane-sugar mills, oil-seed crushing mills, and flour mills. Textile factories deal with all stages in the manufacture of finished goods, two-thirds of the cotton ginneries being situated in the Chaco region. There is also some oil refining for the oilfields of Patagonia (see p. 143). It will be seen that much of Argentina's industrialization is located along the shores of La Plata estuary and the lower right bank of the Parana river. The left bank of the river is swampy and so useless for any form of production. The great river system itself brings down heavy loads of sediment, thus necessitating constant dredging to maintain navigable channels to the river and estuary ports. Another disadvantage is the prevalence of fog, due to the warm, moist air following the rivers from the Tropics being chilled by air from the sea cooled by the 'back-wash' of the Falkland Current.

Not only does the Government exercise supervisory control of the export trade, but much of the industrial power, transport, and irrigation are due to State enterprise. In the matter of railway communication the Government is the pioneer in such sparsely peopled and little developed regions as the Chaco and Patagonian steppes. The Government's avowed intention to nationalize the entire railway system is of special interest, seeing that the greater part of it was due to the investment of British capital. (See p. 146.)

The provision of irrigation schemes also devolves largely upon the Government, by reason of the amount of capital outlay involved which could not be raised by private concerns. In the drier regions to the west and south of the pastoral Pampas,



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irrigation enables the cultivation of cereals and fruit to furnish an additional source of income to that of the cattle pastures. The valley of the Rio Negro is the seat of a flourishing fruit industry while temperate grains, wheat and barley, as well as alfalfa, are grown on the irrigated lands a little farther north. The other main regions where irrigation is practised are at the foot of the Andean slopes. Here, as noted at p. 120, sugar is an important crop and a wine industry is very successful. In these western districts barley and alfalfa are cultivated on irrigated lands at greater elevations.

Much of Argentina's industrial power is derived from imported coal consumed in steam raising. Such coal as may be produced within the republic is little in quantity and poor in quality. About one-half of the country's total requirements in coal was supplied prior to the last great war by the United Kingdom. Nor is water-power readily available. The region of most progressive industrialization is centred round the capital, Buenos Aires, to which imports of coal can easily be brought. But this region is the farthest from any potential sources of hydro-electric power. The prospects of development in this respect within the limits of the Pampa region are very slender. The major areas of irrigation are of more promise than the estuarine industrial region and, with Government capital, may be expected to develop and use this type of power.

Patagonia. The name Patagonia is not that of a political unit, although the northern boundary of the region may be taken as the Rio Negro, which is the boundary of the two Territories of the Neuquen and of the Rio Negro. The principal physical constituent of the region is the plateau whose general tilt is towards the Atlantic, but whose surface at the same time becomes narrower and lower towards the south. This plateau element is separated from the Andean Cordillera by a tectonic trough which forms a deep trench extending southward from about the fortieth parallel. As the height of the Cordillera diminishes towards the south, the edge of the plateau on the eastern side of the trench is often as high as, or even higher than, the mountains themselves. In the south the trench is often filled with volcanic material, while farther north its continuity is frequently interrupted through the deposition of glacial debris.

The topography of the plateau surface is typical of an arid

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windswept region developed by little disturbed horizontal sediments overlying a crystalline base. On the west, near the Cordillera, lava sheets, associated with the geologically recent elevation of the mountain system, have spread over the surface. Glaciers, of a still more recent geological age, as well as rivers, suddenly checked in their rapid descent, have also added their detritus in the sub-Andean region. The strong drying winds have removed and continue to remove the lighter sand from the surface, leaving it covered with shingle and coarse material. Consequently this arid surface is termed generally a shingle desert. The wind-borne load is deposited farther east in hollows of the surface, and is also employed in sculpturing outstanding rock faces. Near the coast the dissection of the plateau surface presents the characteristic features of mesa country.

Tierra del Fuego, the eastern half of which is Argentine territory, differs somewhat from the mainland in the nature and disposition of its main structural elements. It is a low plateau bounded, not by a portion of the Cordillera, but on the west and south by a continuation of the Chilean Coast Range. The Falkland Islands also do not share the general characteristics of the Patagonian plateau. In both these regions heavy glaciation has developed along lines of tectonic faulting, incisions resembling those of fiordic country.

Apart from the forests of the eastern slopes of the Andes, the natural plant-cover of the Patagonian plateau is sparse, poor in quality, and irregularly distributed. Only in the extreme south and in Tierra del Fuego is there any exploitation of the timber of this extremely isolated region. The port of Ushuaia on the Argentine coast of the Beagle Channel sends its produce of temperate hard and soft woods to Buenos Aires.

The little rain that falls over most of the region south of the Rio Negro occurs chiefly in winter. The loss by evaporation in summer is therefore especially grievous. In the extreme south, however, not only is the rainfall heavier, but the greater part occurs in summer and the winter also has a fair proportion. There is also some increase in the amount of rainfall along the Patagonian coast due to the passing of local depressions. The hollows in the plateau surface nearer the coast are, therefore, kept supplied with fresh water which, when it evaporates, leaves no saline incrustation behind. (See p. 53.) The best pastures, therefore, will be in the east near the coast, and in the

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south within easy access of the Strait of Magellan. Elsewhere, not only do the aridity and general poverty of the natural vegetation, but also the great distances between the water supplies for livestock, impede the extension of sheep pastures. The areas in which wells might be sunk are restricted by the geological nature of the development of the plateau surface. The sedimentary covering of the impermeable crystalline base is in general of very irregular and often shallow distribution.

On the moister and more permanent pasture of the sub-Andean region some cattle are reared. In colonial times trade in cattle and horses, mostly stolen from the settlers, was conducted from Choele Choel, an island in the Rio Negro. The traders were Indians and their market was Chile. After the Indians had been ruthlessly subdued by the great Argentine dictator, Rosas, towards the end of the nineteenth century, Chileans infiltrated across the Andes, and the main centre of cattle-trading between the two countries moved farther up to Chos Malal. This infiltration gave rise to a frontier dispute, and when the boundary was demarcated the Chileans withdrew from the disputed region, leaving it to be settled by Argentines from the Mendoza area.

Cultivation is increasingly characteristic of those areas where irrigation is practicable. The responsibility for such schemes is largely that of the Government. The activities in the Rio Negro valley have already been mentioned (see p. 140), and may be regarded as symptomatic of the gradual encroachment of cultivation upon the northern margins of the pastoral region. The headstreams of the Rio Negro, the Neuquen and the Limay, are also utilized by the Government for irrigation schemes in the sub-Andean region. Here also the railway is a pioneer in agricultural development. Of the two main headstreams, the Limay is the more fortunate in that it issues from a natural storage lake, Nahuel Huapi. From this lake southward the Patagonian rivers have a similar advantage over those of the north. They are, therefore, the more useful and reliable for the purposes of irrigation schemes, since their flow is more regular and with less tendency to flood. On the plateau itself the deep trenching of the rivers makes the undertaking of irrigation impracticable. Where conditions in this respect are more promising the climate is not only drier but cooler.

The principal activity of Patagonia is likely, therefore, to.

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remain concerned in the rearing of sheep. The chief pastures are along the coast, up the river valleys, and in the hinterland of the Straits of Magellan. Further extension will be limited to these three types of area. Owing to the sparseness of the population, merinos are generally preferred, since this breed requires less watching as it 'mobs' better than other types. The merino is primarily a wool producer, but there is some output of mutton also from the Patagonian coast. The sheep pastures of the extreme south are devoted mainly to wool production. The ports have refrigeration facilities, and they are situated on the Strait of Magellan and at the mouths of the great rivers. Ships do not secure a whole cargo at any one port, but, beginning with Punta Arenas, a Chilean port, call in succession at river ports as far as Bahia Blanca before shaping their course across the Atlantic. As in the Pampas, the provision of refrigeration, in stimulating the trade in mutton, has led to the introduction of cross-bred sheep in Patagonia. The chief cross-bred is the Corriedale. The chief Argentine ports between Punta Arenas and Bahia Blanca are Gallegos, at the mouth of the Gallagos river, Puerto Deseado, on the river of that name, Rawson, on the Rio Chubut. Short railway-lines also lead inland westward, but only the lines from Bahia Blanca reach the sub-Andean region. The sheep of the Falkland Islands are reared mainly for their wool and, in the absence of refrigeration facilities, live sheep are sent to Patagonia. An interesting feature of the sheep-rearing areas is the predominance of Welsh settlers in the neighbourhood of Rawson.

Welsh settlers are also numerous at Comodoro Rivadavia. Here is the principal oilfield of Patagonia. The average output is more than two million tons, and exceeds that of the Mendoza field. Some refining is done at the port. Future development may not be great, since the field itself is severely restricted to a small coastal region. There is also a small oilfield at Plaza Huincal at the confluence of the Rio Neuquen and the Rio Limay, on the railway-line from Bahia Blanca to Zapala. The total output of Argentine oil is only about one-tenth of that of the Venezuelan fields, nearly one half of it being produced from Government-owned fields.

Argentine and the United Kingdom. For the last year before the Second World War—*i.e.*, from 1938—Argentina had an adverse trade balance, the deficit amounting to just over 4 per

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cent. of the income from exports measured in Argentine currency. Before the end of the war—*i.e.*, in 1943—this adverse balance had been converted into a favourable one of considerable proportions. The surplus balance amounted to more than 55 per cent, of the income from exports. Argentina, therefore, had considerable purchasing power in foreign markets.¹ The consequences of war conditions are reflected in the fluctuations of the apportionment of her trade with her principal markets and customers. In both imports and exports the tendency during the years of war was for trade to become more concentrated among the countries concerned—the United Kingdom, the United States of America, and Brazil—with the addition of South Africa as a new customer for Argentine exports. Again, in both imports and exports, the share of the United Kingdom exceeded that of the United States of America. Imports from Brazil, however, increased nearly five-fold in the six years, and in 1943 exceeded in value those from any other single country. During the same period the proportion of exports to Brazil remained all but stationary, declining very slightly, while that of exports to the United States of America was nearly trebled. The United Kingdom remained the principal and so the most influential purchaser of Argentine products, taking nearly as much as one-third of the total annual export in 1943. Only from Uruguay, among all the other South American republics, does the United Kingdom purchase such an important proportion of the country's exports.

Included in the Argentine population is the greatest number of people of British descent to be found outside the British Empire and Commonwealth. This element of the population is not restricted to a single social or economic horizon. It includes pastoralists and petroleum miners, as well as administrators and commercial executives. It therefore influences every phase of national activity. The Argentine Creoles have no cause to resent the presence of useful descendants of an alien race, who do not as such interfere with the working of the state. Moreover,

¹ The Andes Agreement, in force from February 1948 to March 1949, provided for the purchase of meat with Argentine sterling balances and imports of British manufactured goods. The balances were released for the sale of the British-owned railways.

Long-term contracts for the purchase of meat, in specified annual quantities, were made by the Anglo-Argentine Trade Pact of June 1949, as were also contracts, subject to annual review, for the exchange of other foodstuffs against coal, oil, and manufactured goods.

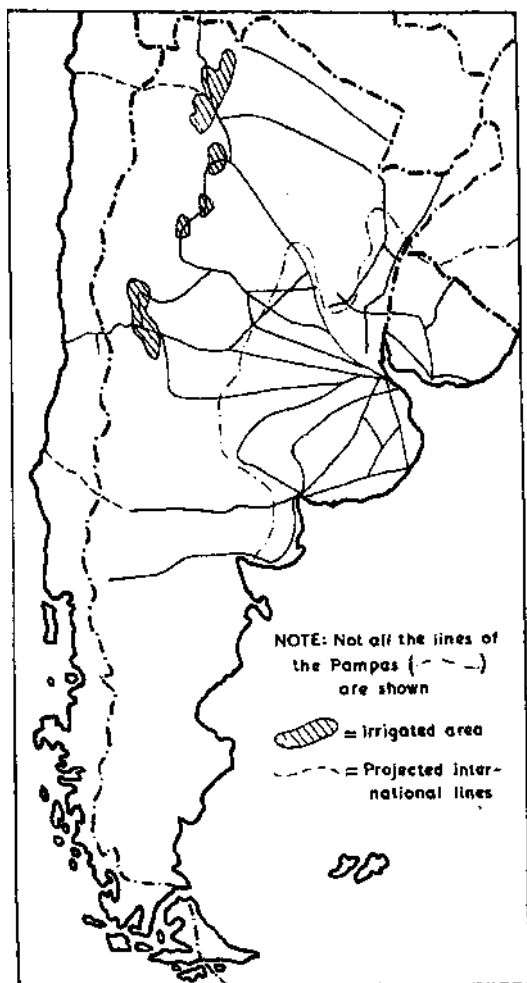


FIG. 34. ARGENTINA: RAILWAY NET
The Salta-Antofagasta line is now open.

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it is to British capital and administration that Argentina owes her first railways and as a nation she is not unmindful of the part these railways have played in opening up and assisting the development of the vast hinterland of La Plata estuary. The first British-built railway taken over by the state in pursuance of its policy of nationalization was the line that serves the Trans-Andine railway from Buenos Aires to Valparaiso. The national ownership of this line had no little sentimental appeal and value for the Argentines. The Government acquired the entire system in 1947 for £150,000,000.

British interests, therefore, enjoy a promising prestige in Argentina. This is reflected in the popular preference for British goods, and this important factor in the allocation of foreign trade is also stimulated in the popular imagination by the presence of other means of transport. The operation of an air-line is in the eyes of the people a powerful advertisement for the country that makes this vital contribution to the economy of the republic.

This consideration affords one clue to the nature of British-Argentine commercial intercourse in the immediate future. Capital goods will undoubtedly be in great demand, not only to make possible the desired expansion of industrialization, but also to replace the machinery which has necessarily suffered excessive deterioration through lack of replacements during the war years. In 1943 the Argentine trade account with Brazil showed an adverse balance, the total value of the imports exceeding that of the exports by nearly 50 per cent. The goods supplied were mainly consumer commodities such as, for example, textiles. Trade with the Axis powers ceased during the war and is unlikely to recover. The United Kingdom and the United States remain to share the bulk of both the import and export trades of Argentina, since the South African market for Argentine exports is likely to decline to its pre-war proportion. Europe will continue to present huge demands for Argentine produce and British interests in the Argentine import trade do not necessarily conflict with those of the United States, but, broadly considered, they are complementary.

CHAPTER IX

URUGUAY

As in the language of its people, Spanish, so in its official title, La Republica Oriental del Uruguay, the 'eastern republic' of Uruguay perpetuates its descent from the Viceroyalty of La Plata and the United Provinces of La Plata. The eastern district, Banda Oriental, finally achieved its independence in 1828, and became a republic in 1830.

The People. The population of Uruguay is almost wholly of European descent. There are no representatives of native South American races. Immigrants come mainly from Central European countries, and there are numbers of farmers of French and Italian extraction in the agricultural districts. In comparison with other parts of the South American empire, Spanish colonization in Banda Oriental was long delayed, and of correspondingly short duration. In the liberation of the country from the domination of its two greater neighbours effective aid was given by Britain. Uruguay, therefore, cherishes traditional ties with the United Kingdom which are observable not only in her commercial relations, but also in the realms of internal and external politics. The republic has the reputation of being the most democratic in the continent. The general level of popular education is sound. In international relations Uruguay is at least as well disposed towards the United Kingdom as any other of the South American republics, and the incidents of the *Graf Spee* enhanced Britain's prestige among Uruguayan people. In the years before the Second World War Nazi influence was at a minimum, as being incompatible with the democratic inspiration of the people, and contrary to their habitual commercial and cultural relationships.

Relief. Structurally Uruguay belongs to Brazil, the surface forming part of the great plateau to the north. As in Brazil, the plateau in Uruguay presents a scarp towards the Atlantic Ocean, but as the general level of the surface is much lower this feature of its eastern limit is less well marked. The plateau surface itself has been considerably reduced by the natural drainage,

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most of which is carried south-westward to the Uruguay river by the Rio Negro and its tributaries, the chief of which is the Rio Yi. The uplands reach their greatest elevation in the Cuchilla de Santa Anna, where the water-parting between the Rio Negro and Jacuhy drainage systems approximates to the

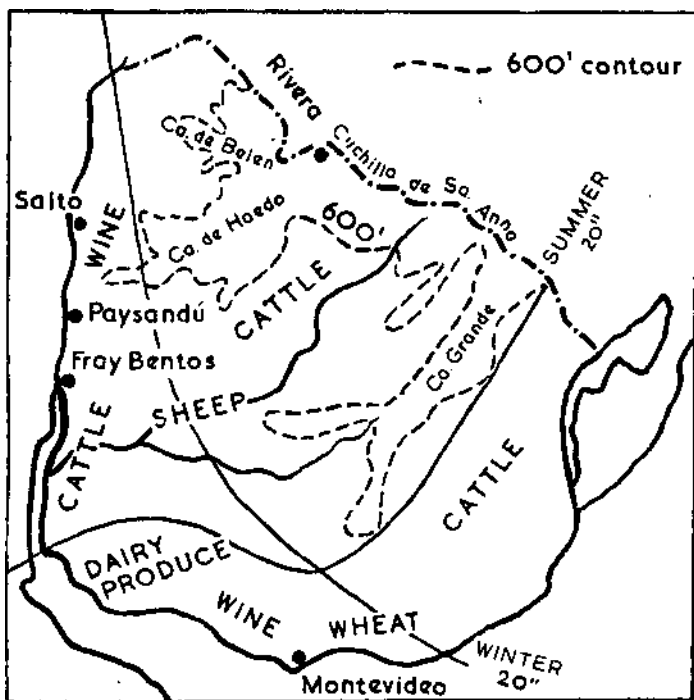


FIG. 35. URUGUAY

international frontier. The greatest height, however, is not much more than two thousand feet. From the Cuchilla de Santa Anna two plateau remnants enclosing the valley of the Rio Negro extend in a south-westerly direction. They are the Cuchilla Grande and the Cuchilla de Haedo. From the latter shorter streams drain westward into the Uruguay river leaving intervening spurs pointing in the same direction. The greater part of the surface of Uruguay lies below the six-hundred-foot contour. The eastern frontier is a lagoon, Lake Mirim, separated from the sea by a low sandy peninsula.

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The crystalline rocks of the Brazilian plateau base continue into Uruguay, forming the structural axis of the uplands. They are flanked to the east and west by sedimentary deposits. The zone of sedimentaries on the east is very narrow. The narrow eastern coastal plain is agriculturally the least promising part of the country. To the west the deposits merge with the rich black soils (chernozems) of the Pampas, and in the valley of the Uruguay river are overlaid by recent alluvium. The best pastures and the most productive soils are found in the lowlands of the south and west.

Climate. The country is well favoured climatically. Neither drought in summer nor frost in winter is of sufficient frequency or duration to constitute a hazard to farming activities. Practically the whole of the country receives an average of forty inches of rain in the year, and the average rainfall is more or less evenly distributed throughout the twelve months. The eastern plain has a slightly marked maximum of rainfall in the winter. The western river plains receive a little more rain in summer than in winter. The southern coastal districts, while experiencing no month of a marked maximum of rainfall receive in the course of the year a slightly smaller total than does the surface of the plateau to the north. It is possible thus to discern in Uruguay four regions according to the *regime* of the rainfall. In winter the rainfall, particularly in the eastern region, is, in consequence of the passing of coastwise depressions, associated with the northward approach of the westerly wind belt. In summer there is a monsoonal indrawing of the air towards the low pressure centred over the Matto Grosso plateau. The effects of this movement are most noticeable in the western lowlands. Uruguay is, therefore, at all times of the year situated marginally to the major climatic controls that affect the region. The incidence of actual, as distinct from average, rainfall is consequently subject to some uncertainty from month to month.

Forests (North). Only a small proportion, between 2 and 3 per cent, of the total surface of the country, is forested, and this is mainly confined to the northern uplands and their adjacent river valleys. Where the crystalline base of the plateau is exposed, or but lightly covered by soil, the forest zone is discontinuous. Elsewhere the dominant tree of the upper levels is the Araucaria pine. Hardwoods are the

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characteristic tree of the eastern lowlands. In the valleys opening westward towards the Uruguay river, evergreen trees abound, among which the Spanish cedar is the most useful for constructional and general timber purposes.



AN URUGUAYAN BEET-SUGAR FACTORY

Fox Photos

Agriculture (South). The principal agricultural belt is in the south, a coastal strip along the shore of La Plata estuary. The cereals cultivated include maize and wheat. Of the latter an exportable surplus is raised. Linseed is an important crop supplying markets in the United Kingdom and the United States. Progress has been made in viticulture not only on the hill slopes of the southern region, but also on those of the plateau spurs of the western. There is a small export of wine.

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Pastures (West). The great pastures occur in **the** basin of the Rio Negro and in the valley of the Uruguay river to the west of the republic. Additional grazing has been provided by **the** clearing of the forests where these formerly encroached upon the lowlands. Both the climate of this western region and the chernozem soils favour the growth of natural pasture yielding coarse grazing known as 'pasto duro.' Finer pastures are found in the southern region where the rainfall is not as heavy, and where actual temperatures in summer are more moderate.

Both cattle and sheep can be kept in the open all the year round. The best qualities of beef come from the finer pastures of the south and are dealt with in the *frigorificos* at the ports. Dairy-farming is also a rising industry in this region. The principal breeds favoured are Herefords for finest quality beef, and Durhams for dairying. Coarser grades of beef from **the** western pastures are handled at the *saladeros* of the river **ports**. Here the meat is dried and salted for markets where refrigeration is not necessary. Uruguay's best customer for meat, mainly beef, is the United Kingdom and Britain's market for Uruguayan hides is overtaking that of the United States. Unlike Argentina, however, Uruguay cannot rely to any great extent upon alfalfa as a supplementary fodder since this deep-rooted plant does not flourish in the moist soils of the river lowlands. Sheep are pastured on the better-drained lower slopes of the basin of the Rio Negro. They are reared mainly for their wool, and the greater part of the wool clip goes to the United States of America.

Minerals. Apart from a little gold and some precious stones, such as amethyst, Uruguay has no mineral resources. The Brazilian coalfield of Rio Grande do Sul and the neighbouring provinces does not extend beyond the international frontier. A hydro-electric scheme is projected for the Rio Negro.

Communications. The republic as a whole is well served by railways. A comprehensive network radiates from the capital, Montevideo, over the lowlands. There are no formidable physical obstacles to be overcome. In the west the railways serve a series of river ports on the Uruguay river. The building of railways began rather later in the nineteenth century than was the case in Argentina, and was approximately contemporaneous with the period of maximum development in the latter country. A feature of great advantage to the Uruguayan

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systems was that the general lay-out was planned in advance of the inception of building, and all lines were laid down to the standard gauge (4 ft. 8½ in.). A further step in railway development was taken in 1935 when a commission was appointed to



THE FIRST URUGUAYAN WOOL-PRESS

Fox Photos

integrate the several systems as a co-ordinated whole. The Central Uruguayan line was built by British capital and became the property of the state in 1948. Going northward from the capital, it climbs to the plateau and meets the Brazilian railway-system on the frontier at Santa Anna do Livramento, where there is a change of gauge, which has, nevertheless, no political significance. From this trunk-line branches serve the ports on

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the Uruguay river. These ports are also connected to the capital by lines of the Midland system.

The Uruguay river is navigable as far as the rapids above Salto, and from there again to San Tome. The chief river ports, many of which bear names familiar for their meat trade, include Paysandii, Fray Bentos, Soriano. As frontier towns they are also important for ferries giving access to the Argentine railway-system.

Commerce. Although the total population of Uruguay is only a little more than two millions, the country takes no mean position among the world's meat producer! This is due, not so much to the number of cattle kept, as to the quality of the pastures, which afford prime quality beef at an early age. Uruguay's best customer for meat is the United Kingdom. In hides and in linseed the United Kingdom rivals the United States of America and may in the near future rank as Uruguay's best customer in these commodities also. The United States still purchase the greater proportion of the Uruguayan wool-clip. The export of raw textiles, however, is surplus to the requirements of the country's spinning-mills. The domestic demand is naturally likely to increase steadily, if slowly, and will increase further when more abundant industrial power is available. The country's total consumption of coal is imported, and British coals are favoured above others for their quality. The completion of a hydro-electric installation on the Rio Negro has been inevitably delayed, but may be expected in the near future. Machinery has also to be imported. The output of the Uruguayan mills does not yet compete with the finer classes of material issuing from older established industrial regions, but the production of coarser textiles, more particularly those depending on (locally grown) short-staple cottons, is important.

In 1935 a quarter of Uruguay's total exports went to the United Kingdom. Germany ranked second among her customers with 14 per cent., and the United States third with nearly 12 per cent. The United Kingdom, therefore, took as much as her two nearest rivals together. Uruguay's chief import was petroleum. Coal and petroleum together accounted for nearly a third of the country's total imports. Other important items were sugar and manufactured textiles, as well as machinery of various kinds. In Uruguayan import trade the United Kingdom and the United States had approximately equal shares, Germany

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ranking third with about half the value of each of these countries. Before the Second World War Japan also was slowly making headway, more especially in the textile trade.

Taking 1938 as the last complete pre-war year, some changes in this distribution of Uruguayan trade may be noted. The United Kingdom's share of both imports and exports increased slightly, but the increases in Germany's shares were more considerable, while the general tendency was for trade with the United States of America to decline. The war of 1939-45 not only extinguished Germany's share of Uruguayan trade, but also seriously prejudiced the United Kingdom's share in favour of the United States. Imports from the United Kingdom, measured by their value in Uruguayan currency, were halved, while those from the United States increased, but not to a compensatory extent. The greater gain was that of Uruguay's immediate neighbour, Brazil. Although during the war period exports to the United Kingdom increased in value, those to the United States were multiplied nearly fourteen times, and new markets were found, particularly in South Africa, for textile goods.

As in the case of Argentina, the war enabled Uruguay through a favourable trade balance to accumulate reserves of purchasing power in dollars and in sterling. The stimulus experienced by her manufacturing industries, involving strain on machines whose replacement was at the time infeasible, has created an urgent demand for the employment of that purchasing power in the acquiring of more modern equipment. But by far the greater bulk of Uruguay's exports are of pastoral origin. Even in 1943 these accounted for nearly 90 per cent, of the total. The tendency during the years of war was for the decreasing percentage of pastoral exports to be more than balanced by an increasing export, not only of textiles, but also of certain agricultural products, notably linseed-oil. Future developments will almost certainly be maintained along these general trends towards a strengthening of Uruguay's position in manufactures and agricultural production, and so towards enhancing her capacity as a market for engineering products.

CHAPTER X

PARAGUAY

PARAGUAY, the remaining succession state of the Viceroyalty and later United Provinces of La Plata, although more than twice the superficial area of Uruguay, has less than half the population of this republic.

Part of the Chaco Boreal is the least developed and least promising region within the boundaries claimed by Paraguay. It comprises all the Paraguayan territory to the west of the river. Its name, 'green hell,' affords some indication of its value. A redeeming feature, however, is the access it gives to the potential artery of commerce of the Pilcomayo river. It is to be noted that Bolivia, like Paraguay, has no access to either ocean in her own territory, and that Bolivia's other territorial dispute is concerned with such access to the Pacific.

The People. Paraguay is unique among the South American republics as having a population that is almost wholly mestizo in character. The mestizos are of mixed European and Indian blood, the Indian element in this case being Guaraní. Although prior to the Spanish conquest this race had not attained to the cultural and social level of the Inca peoples, they were the dominant race of the interior region, and their influence was expanding steadily, particularly in the direction of the lands now held by Bolivia. Their claim to the territory over which the disastrous War of the Chaco was fought from 1932 to 1935 was, therefore, not without historical foundation. The armistice of 1935 was ended by the Chaco Peace Pact signed at Buenos Aires on July 9, 1938. Bolivia was given free transit and access to the river port of Puerto Casado, on the Paraguay river, and the frontier was drawn from Esmeralda, on the Pilcomayo, to a point in 20° S. 62° W., and then eastward to the Paraguay river. This territorial gain did not allow Paraguay beyond the Parapiti river, to the west of which Bolivia has some oilfields. Age-long isolation, too, has bequeathed a legacy which still persists in their aversion to foreign influences in the realms of commerce and culture. The Jesuits founded well. Under them

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the land was held communally by the villages and the villagers learned something of communal self-government. The Jesuits

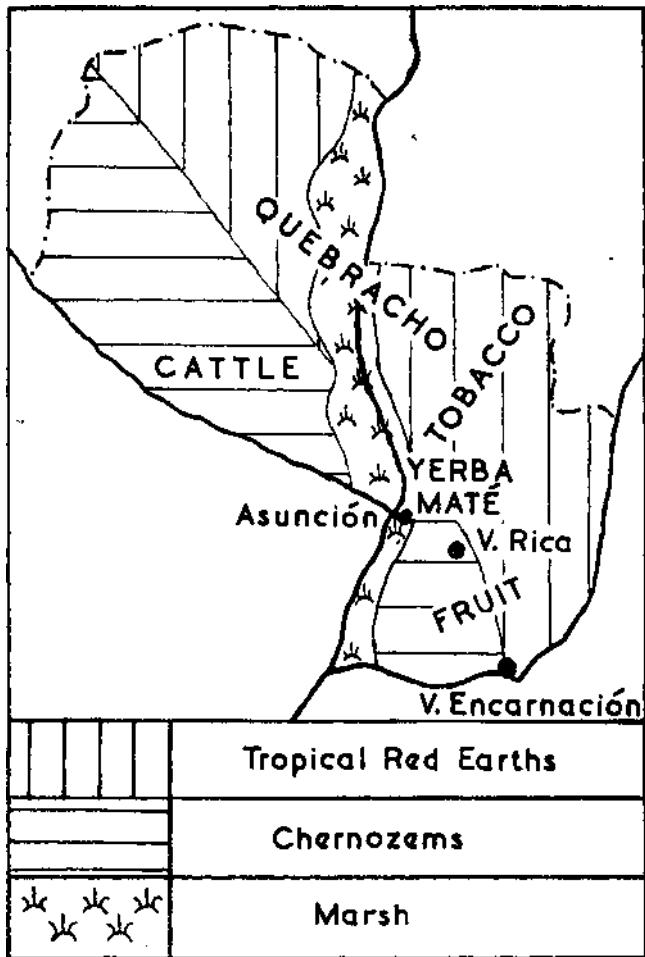


FIG. 36. PARAGUAY

also consolidated their enterprise by ensuring that the Indians were able to protect themselves against slave-hunting raids. The Second World War has broadened for the Paraguayans their avenues of commerce and stimulated their domestic industries.

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The international agreements arising from the River Plate Conference held at Montevideo in 1941 (see pp. 118 and 160) are designed to mitigate the difficulties caused by the small republic's geographical isolation. From them other beneficial contacts may be expected to accrue to this community of barely a million people.

Climate. The Chaco is distinct from the Paraguayan lands east of the river in having a drier winter, during which temperatures are high because of its situation in the Tropic and to its distance from the ocean. It falls, in effect, in the region of maximum continentality in South America. To the east of the Paraguay river the rainfall is more evenly distributed throughout the year, although summer remains the wetter season. The whole country receives an annual total of more than forty inches. The summer maximum is due to its proximity to the region of marked continental low pressure at that season, while the winter rains of the east are an extension of those experienced in Uruguay (see p. 149).

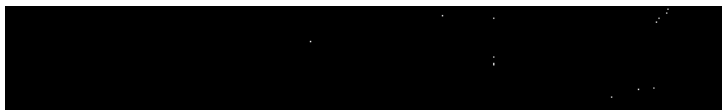
Relief. The marshy valley of the Paraguay river separates the low plateau of the Chaco to the west from dissected remnants of the Brazilian plateau. The chief of these, the Cordillera de Caaguazu, extends southward into Paraguay and forms the watershed between the Paraguay and Parana rivers. It reaches a height of over fifteen hundred feet. In the eastern portion of the country igneous intrusions, as, for example, granite, are frequent. The soils of this region are of the tropical red earth character; in the west they are of the chernozem type. In the extreme south-west of the country, in the triangle between the Parana and Paraguay rivers, the lack of strong relief and the considerable loss of surface water by evaporation during the winter months have given rise to *esteros* (see p. 123). The heavy rains of summer are responsible here for the formation of large seasonal swamps.

Production. Although more than double the area of Uruguay, Paraguay is even poorer in minerals. Copper and lead are known to occur in the eastern uplands, where igneous intrusions are also frequent, but no working of these minerals has as yet been undertaken.

Much of the country is forested, thus presenting a distinct contrast to Uruguay. Timber industries, however, are not highly developed, except for the purpose of local requirements.

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The cost of transport, first to an ocean port in a foreign country, and then oversea, forbids the development of any considerable export. In the lowlands to the east of Paraguay river and in the valley of its western tributary, the Pilcomayo, the most important tree is quebracho. For the reasons noted elsewhere (p. 125), this tree does not find its most favourable conditions so far north. The tannin extract is, nevertheless, the most important of Paraguay's exports, amounting to more than one-fifth of the annual total by value. Production and trade in this commodity



THE RIVER-FRONT AT ASUNCION

Fox Photos

are evidently both capable of development. One other important forest product also figures in Paraguay's export trade. This is *yerba mate*, yielding nearly one-tenth of the total value of the country's exports. Originally the industry depended on the collection of leaves from trees growing wild in the forests. More recently plantations have been made, chiefly in the south-east of the country. The dried leaves bulk lightly, and the immediate proximity of regular markets helps to overcome the difficulties of transportation. There is consequently a steady flow of exports of *yerba mate* from Asuncion, situated conveniently near the producing areas. Vegetable-oils are also exported, the most interesting being tung-oil. The native home of this plant is south-eastern China, and in recent years it has been introduced into Florida as well as Paraguay. The oil is used in the making of hard varnishes and glossy paints. There are possibilities and

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probabilities of expansion of trade in tung-oil, and in other tropical vegetable-oils.

The quality of the pastures does not make for the finest grade of beef, but the Government maintains packing-stations at the river ports. The chief items of output are corned beef and meat extracts. These between them account for about one-fifth of the total annual value of exports. Hides and skins amount to about half of the value of meat products. The Second World War has greatly increased the foreign demand for hides, and so has given the trade an impetus which will repay the effort to maintain it. There is some dairy farming in the south of the country, but climatic conditions as well as distance from markets do not favour the expectation of any great increase in production. Pigs and sheep are also reared in the south, the latter on the drier pastures of the plateau slopes.

The proportion of cultivable surface in Paraguay is not high. Agriculture is restricted to the drier lowlands east of the Paraguay river. The chief cereal grown is maize, and the area devoted to it lies for the most part in the south-east of the country. In the moister valley of the Paraguay river rice is cultivated. Sugar cane is grown in the extreme south, and the crop is sufficient to supply the country's needs. Tobacco can be cultivated in most of the lower lands east of the Paraguay river, and there is some export of this produce to continental Europe. Cotton is a crop of increasing importance. Sufficient is grown to supply the country's spinning-mills and a surplus is available for export. Paraguay hopes with this commodity to secure a footing in the British market by means of a fixed annual quota. Further agricultural possibilities include the cultivation of soya bean and the production of oils from sunflower and cotton seeds and ground-nuts. In the south-east of Paraguay oranges are grown, and there is a steadily increasing export of the fruit, flowers, and leaves for the making of perfumes. That the general range of the fruits grown in the country is wide is indicated by the cultivation of grapes as well as bananas. The chief routes for exports are via Buenos Aires or Montevideo, or overland by the Brazilian railway from Curitiba to Sao Paulo.

Commerce. The main Paraguayan railway runs from Encarnación on the Paraná river north-westward to Villa Rica and Asunción at the confluence of the Pilcomayo and Paraguay rivers. It is 232 miles long. At Encarnación it connects by

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means of a ferry with the Argentine standard-gauge line at Posadas. The Parana river is here two miles wide. The line from near Villa Rica to the Iguassii valley and so through Curityba to the Brazilian port of Paranagua is not yet completed. Paraguayan external commerce is, therefore, to a great extent dependent on the waterway of the Parana river, which below Corrientes flows through Argentine territory. The navigation of this main stream and its major tributaries is the subject of international agreements following the River Plate Conference of January 1941. Bolivia and Paraguay sought a five-nation agreement with Brazil, Uruguay, and Argentina, but such a scheme was successfully opposed by Argentina, who, by virtue of the weight of her special interests, preferred a series of bilateral pacts with the nations more immediately concerned with particular interests. A customs union has, however, been proposed, and Bolivia and Paraguay have been granted favourable freight and postal rates, supported by a further recommendation for the establishment of free port facilities. In addition, a beginning has been made in the requisite financial facilities for the encouragement of trade between the five nations. The Pilcomayo is also the subject of international agreements made in the same year in view of Bolivia's special interest in this river.

While it may be assumed that in the post-war years the bulk of Paraguay's trade—approximately nine-tenths of her exports and six-tenths of her imports—will continue to be, as it was before the war, with Argentina, developments will necessarily be directed towards minimizing the weakness in economic status due to dependence upon a very restricted range of export commodities. In the case of Paraguay the two dominant features are meat products and tannin export. The strengthening of the position in other commodities has already been indicated, and the increase of such surpluses may be expected to extend Paraguayan contacts in North American and European markets. Industrial plants are already in operation in cotton-mills, sugar-mills, *saladeros*, and tannin factories, and expanding industrialization will necessarily call for the importation of machinery from countries able to absorb the increase of Paraguay's primary products. Before the Second World War the United Kingdom was second on the list of countries supplying Paraguay with manufactured textiles and machinery, the annual total of such imports being about one-sixth of the value of those from Argentina.

CHAPTER XI

CHILE

GEOGRAPHICALLY the Republic of Chile is notable for its great extent of latitude. Its coastline may be compared with that of North America, extending from the Isthmus of Tehuantepec to the southern 'pan-handle' of Alaska. It experiences, therefore, the widest possible variation of climate, and includes within its borders the driest as well as one of the wettest regions of the continent. The eastern frontier follows the crest line of the Andes, and the administrative divisions of the country are for the most part determined by the topography. Watersheds, secondary to the main continental divide, are the boundaries between the provinces, all but two of which extend across the entire breadth of the country from the Pacific to the Andes. The major natural regions of the country are disposed in narrow but long belts parallel to the shores of the Pacific.

In Spanish colonial times the territory remained remote from the general trend of economic development and occupied a somewhat unique position in the Spanish colonial empire. The natives of the south, the Araucanians, resisted the white invaders with more success than did the more civilized Changos of the north. The territory south of the Bio Bio river was acknowledged as Indian territory by the Treaty of Quillin (1640). A later treaty in 1766 gave the Indians the right to send an accredited minister to represent their interests in Santiago.

Spanish colonial policy, moreover, imposed severe restrictions upon the economic relationships of the region. Trading-ships were not allowed to use the Cape Horn route, and thus the external contacts of Chile were confined to Peru and Argentina. Such a handicap retarded the development of the territory, and the ban on direct trading was not lifted until late in the eighteenth century. In this connexion it may be noted that the university of Santiago was not founded until 1747, more than a century after that of Cordoba (1613).

Revolutionary outbreaks began in 1810, five years after Spanish sea-power had been broken at Trafalgar. At the battle

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of Maipii in 1818 the Republic of Chile was liberated. As in Argentina rivalry between Buenos Aires and La Plata for recognition as the capital seat of government disturbed the internal stability of the young republic, so in Chile the rival claims of Santiago and Concepcion weakened the revolutionary front.

The eastern frontier was the subject of a dispute with Argentina in the opening years of the twentieth century. The statue of Christ the Redeemer erected in 1902 commemorates the fact that war was avoided and a peaceful settlement concluded. In the south the Cordillera becomes less effective as a physical barrier, and the demarcation of the frontier involved some transference of Chilean nationals from Argentine territory to Chilean. In the extreme south the boundary line swings away from the continental divide to Cape de las Virgenes, giving Chile both shores of the Magellan Strait and the western half of Tierra del Fuego.

The remoteness of Chile from the great trade-routes of the world has been to some degree mitigated by the opening of the Panama Canal in 1914. The Second World War, however, has occasioned a very considerable redistribution of the country's external commerce. Between 1938 and 1943 the United Kingdom's share of the total value of Chilean exports fell from about 22 to 2 per cent., while that of the United States increased from 16 to 70. As with other South American republics, war conditions have stimulated Chilean trade with her continental neighbours. The most notable developments have been in her imports from Argentina, Peru, and Brazil. The value of these from the last-named country increased during the war years nearly fifteen-fold. Among the foodstuffs imported tropical products naturally rank high, and the dominant feature of the remainder of Chilean import trade is the preponderance of manufactured textile goods. Although agriculture employs as much as two-fifths of the population of the country, the mining-industries account for four-fifths of the total exports. Chile is the only producer of nitrate of soda, and the world's second producer of copper. Her pre-eminence, however, for both these commodities is being seriously challenged. Artificial nitrates can be produced more cheaply than the natural mineral whose principal value now is in its iodine content. Two of Chile's principal nitrate markets, however, may be noted: Egypt, less

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accessible to the producers of artificial fertilizers, and Germany, which, for other purposes and reasons, continued to import Chilean nitrate in spite of her world supremacy in synthetic production. Chile's most serious competitors in the production of copper are Canada and Northern Rhodesia, in both of which output tends to increase, while that of Chile decreases.

The continued economic prosperity of Chile, therefore, requires that the *broadening of her economic basis* shall strengthen her position as an exporter of "manufactures, more especially textiles.. In the realm of primary production there are possibilities in the expansion of the export trade in frozen mutton and wool. During the year 1938 the United Kingdom purchased practically the whole of the Chilean meat exports, as well as more than half those of wool. Nearly a third of the export of barley also came to the United Kingdom. Wine and timber, the two next promising items of Chilean export, did not figure to any appreciable extent in British purchases. They are, however, increasingly popular in South American markets and afford considerable scope for post-war development.

The great mineral wealth, which constitutes almost the entire basis of Chilean economy, is located in the arid northern regions of the country. Desert conditions in this all-important region demand that its population absorb a large proportion of the exportable surplus of the farming products of the more densely peopled central and southern provinces. Only about 6 per cent. of the total population of the country live in the northern desert provinces, which between them account for some 80 per cent. of the total value of its exports. During the year 1938 rather more than two-thirds of the total value of mineral exports from Northern Chile were derived from copper bars. Most of the remaining third came from nitrate of soda and iodine. The United Kingdom took about a third of the copper exported. The list of minerals exported is completed by comparatively small quantities of gold and sulphate of soda. The importance of this mineral trade to Chile is all the more striking when it is observed that this desert territory, comprising about a quarter of the total area of the republic, was annexed as a result of the Pacific War (1879-82). The tendencies already noted in the world's nitrate and copper markets, therefore, make the more imperative the proposed development of Chilean domestic industries and agricultural production.

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The Pacific War was fought to determine the ownership of the nitrate territory. Chile and Bolivia compromised over the Chilean claim to it in 1866 and agreed to joint working of the

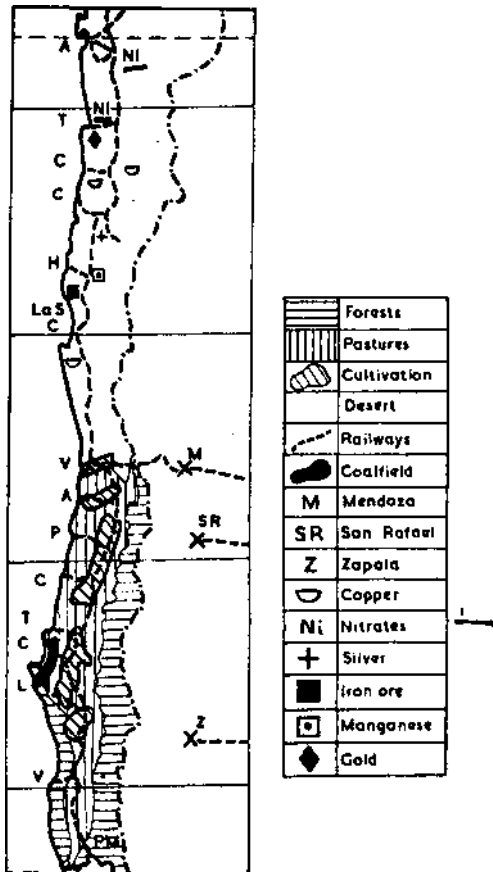


FIG. 37. NORTHERN AND CENTRAL CHILE: ECONOMIC RESOURCES

mineral fields. This agreement was confirmed and renewed in 1874. Bolivia, however, became anxious about Chilean aggression, real or imaginary, and entered into a treaty of mutual support with Peru. The agreement of 1874 was terminated in 1878 by the taxing of Chilean exports. Peru supported Bolivia,

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and Chile had the backing of foreign nitrate interests. The Chilean navy, moreover, exercised a decisive influence in the struggle. By virtue of her naval supremacy Chile was able to occupy Lima and the whole of the intervening coast. The Peace Treaty of Ancon (1883) deprived Bolivia of her access to the sea, and the border provinces of Tacna and Arica were awarded to Chile for a period of ten years. The plebiscite to determine their ultimate ownership was never held, but in 1929 Tacna was ceded to Peru, Arica remaining Chilean. Bolivia still maintains her claim to an outlet on the coast, in spite of the indemnity paid by Chile in 1904.

Minerals. Nitrate. The nitrate deposits lie around the *solars* immediately behind the Coast Range, near the ports of Tocopilla, Mejillones, Antofagasta, and Taltal. The export of nitrate began in 1825, the Year following the attainment of independence by Peru. Shipments during the first year of the trade amounted to only a thousand tons. For more than a century the nitrate industry was developed by British capital, the firms being the Anglo-Chilean and Lautaro nitrate companies. The First World War of 1914-18 stimulated the production of synthetic nitrates in Europe, at prices with which the Chilean industry could not compete. Following the slump of 1928 copper-mining interests assumed control of the nitrate companies, and some modernization of the equipment was undertaken. In the face of continued competition from synthetic products and the strain of the world depression of 1931 the national Government embarked upon the reorganization of the industry. The Compania Salitrera de Chile, 'Cosach,' was formed, in which the Government held half the stock in return for the remission of export duties. It was thus hoped to reduce prices to enable the mineral to compete in the world market with the synthetic product. A further slump in world prices, however, prevented the realization of this objective, and in 1934 'Cosach' was dissolved. The former nitrate companies succeeded to the producing side of the interests together with the Compania Salitrera de Tarapaca y Antofagasta, while the marketing organization, the Compania de Ventas de Salitre y Yodo, assumed responsibility for 'Cosach's' international loan which had been raised in New York and London. At the same time the Compania de Ventas came to a quota agreement with the European producers of synthetic nitrates. Up to the

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outbreak of the Second World War Germany continued to purchase Chilean nitrate on a huge scale, despite the fact that she was the world's largest producer of synthetic nitrate. Payment was made through the compensation system by 'Aski' marks. In this way, although Chilean purchases of German manufactured goods were stimulated, Chilean reserves of negotiable currencies were steadily depleted. By a law of 1945 the Chilean Government guaranteed the security of foreign investments.

Freed from the dangers of the compensation system, and strengthened by its close association with the copper-mining industry, nitrate production has, however, one further difficulty with which to contend. The reserves of high grade caliche are diminishing rapidly and, in consequence, improved methods of extraction are imperative if the cost of the marketable product is to be maintained at a competitive level. The caliche is the rock in which the nitrate of soda occurs. The severely arid climate not only is responsible for the occurrence of this highly soluble salt, but also enables the process of extraction by solution and evaporation to be carried out in the open. The caliche is found often at a considerable depth around the margins of the *salars*.

Reports published at the end of December 1945 indicated striking progress in both the producing and marketing sides of the nitrate industry. The *Compafiia de Ventas* effected total sales for the year of 1,436,282 tons, an increase of nearly 37 per cent, on the previous year. It was estimated that the total output for the following year, 1946-47, might reach two million tons. In this prosperity the three producing companies, Anglo-Chilean, Lautaro, and Tarapaca y Antofagasta, all share, and further increases in the total world demand are anticipated. To meet the increased demand, modern mechanized equipment is toeing added to that already installed, in order still further to economize in the cost of production. In this connexion, the rehabilitation of the German synthetic industry[^] is of interest and importance. Even so, the natural nitrate has one advantage over the synthetic which, so far, has not been seriously threatened by other sources of supply. Its iodine content gives it a world monopoly in the production of this commodity. The annual output of iodine is strictly regulated to avoid over production and any consequent fluctuations in world prices. It is

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this iodine content that makes Chilean natural nitrate especially suitable as a fertilizer for the cotton fields of the United States.

The coast is not well favoured with natural harbours. Ships lie in open roadsteads off a lee shore, and much of the loading is done from lighters. The Government has in hand a scheme for modernizing harbourage at some of the larger and more naturally favoured nitrate ports, such as Antofagasta, which is also the terminal of the Bolivia Railway, and handles in addition Chilean copper exports. Other lines terminating at nitrate ports are spurs from the strategic national Longitudinal Railway (see Fig. 38).

Minerals. *Copper** Chile's high rank as the second world producer of copper is not secure from competition, but the total preign income derived from exports of this mineral is about double that from sales of nitrate. The tendency is for the Chilean 'percentage of the total world production of copper to decrease, while that of the more favoured African fields increases. These have the advantage of more recent exploitation, while much of the more accessible and better grades of Chilean ore has already been worked. The African ores, moreover, are of a higher grade than the Chilean and yield by-products, notably the precious metals, which are lacking in the Chilean ores. The location of the Chilean copper-fields also imposes severe disabilities. In the desert region both fuel and hydro-electric resources are absent. The concentration of the ores is subject to handicaps which result in enhanced production costs. Some of the ore, for example, that at Collahuasi, is at a height of fifteen thousand feet. The output from this mineral centre in Tarapacd province places it nevertheless among the chief of the Chilean copper-producing regions. These are all situated in the Western Cordillera. The resources of the Coastal Range, which until the end of the nineteenth century made Chile the world's leading producer of copper, are now so far worked out as to supply only a minor proportion of the country's output. The ores of the Coastal Range were, however, of a higher grade than those now being exploited in the Western Cordillera. For the smelting of the lower grade ores modern machinery has been installed, first at El Teniente in 1904. Production costs of this supremely important item in Chilean. therefore, remain high, and the need for capital investment is greater than ever. The chief copper-mining centres in Chile, besides Collahuasi, are

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those of the Anaconda company at Potrerillos, in Atacama province, and those at Chuquibambilla, in the north, and at El Teniente, in the most southerly extension of the Andean mineral zone, east of Rancagua.

Minerals. *Borax, Sulphur.* Other minerals occurring in the Chilean arid regions are borax and sulphur. Neither is worked to any great extent, and there are no exports. Borax occurs in the form of biborate of sodium and is found encrusted on the margins of *salar*s. The chief Chilean deposits are in the neighbourhood of Ascotan on the Bolivian border in the north of Antofagasta province. It is estimated that there is sufficient borax there to supply the needs of the world, but by reason of its inaccessibility at a height of twelve thousand feet, it cannot compete with the more readily available resources of California and Nevada. Sufficient sulphur is worked in the same region to supply the requirements of the neighbouring nitrate fields for blasting-powder. This mineral occurs on the slopes of the volcanoes from which it has been ejected. Again the aridity of the climate is an important factor in its conservation.

Minerals. *Coal.* Chile is the most favoured of all South American countries for coal. The annual production of about two million tons is more than two-thirds that of the entire continent. The coalfield extends along the coast, both north and south of the mouth of the Bio Bio river, from the port of Lebu to Puerto Talcahuano and Tome. There are also small deposits of lignitic coal on the Straits of Magellan, as well as a little petroleum. The principal workings of bituminous coal are in the neighbourhood of the ports of Coronel and Lota. The government schemes for the broadening of the basis of the national economy include the modernization of the harbours and port equipment, especially at Concepción on the estuary of the largest river crossing the coalfield. It is also proposed to bring the southern portion of the coalfield into direct relation with Argentina by railway. The link projected will lead from Curacautin to the Pass of Pino Hachado. (See p. 103.)

Chilean coals are of sufficient quality for general steam raising purposes, although less useful for smelting. They are, therefore, in some demand by ships for bunkering, although the softer coals of Magellan's territory are of no such use. Much of the raw material used by the growing iron and steel industry is scrap metal. Developments are controlled by the Corporación

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de Fomento de la Producción, an organization established by the Government in 1939. Krupps also before the war were concerned in the expansion of the steel works at Corral. With the restriction of foreign imports during the war the Chilean industry had to rely upon pig-iron and steel supplied by the foundries at Valdivia.

Minerals. Other Metals. Within the arid region gold is perhaps the most important of the minerals whose production is as yet on only a restricted scale. The annual output of gold is, however, increasing steadily and the chief centres are near the port of Taltal, the most southerly of the nitrate ports, and at Inca to the south-east on the Longitudinal Railway. Further south near Copiapo, and still within the Longitudinal Valley, silver is mined, but the annual production of this mineral is decreasing. Resources in iron ore are more promising. Output is increasing, and in 1937 and 1938 exceeded that of Newfoundland. The annual total is in the neighbourhood of a million metric tons. The iron is mined in Coquimbo province, a short distance north of La Serena, and again near the small port of Cruz Grande (29° S.) at the southern margin of the desert. Further north still is the small town of Manganese whose name indicates the kind of ore worked there. The northern province, Tarapaca, yields also some tungsten.

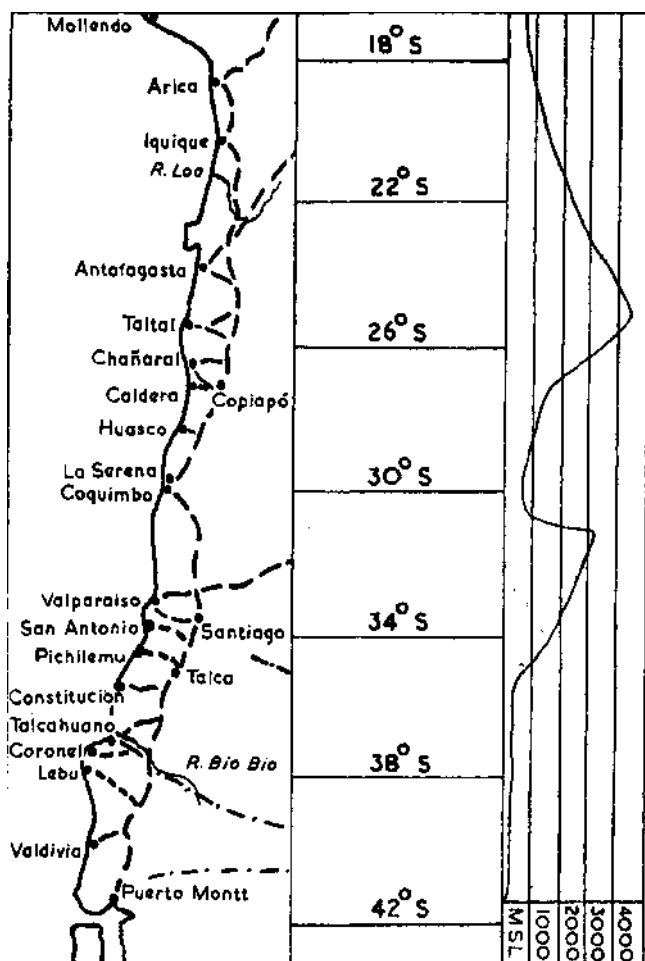
Population. Nearly seven-eighths of the total population of Chile are located between the thirtieth and fortieth parallels of latitude. The greatest concentration is in the provinces of Valparaiso and Santiago, which between them shelter almost a third of the people. South of the Bio Bio river, in the coastal province of Arauco, dwell a hundred thousand Araucanian Indians. The remainder of the Chilean population is white or mestizo, the latter being in the majority. Recent immigrants from Europe have come mainly from Spain, Italy, and Germany. These account for about two-thirds of the total, and of them one half were Spaniards. Most of the remaining third were British, French, and Yugoslavs in about equal proportions. German colonists now number about two hundred thousand and they are to be found in the southern towns, such as Valdivia and Puerto Montt, and in Punta Arenas. German immigrants first began to arrive in the country in 1849. As in other Latin American republics, the intermarriage of Germans with other elements of the population has not led to their assimilation, and

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in Chile their racial identity has been fostered by organizations such as the Deutsche Chilenischer Bund and the Asociacion de Amigos do Alemania. The headquarters of these societies were not in the southern regions preferred by German immigrants, but in the capital, Santiago.

Agriculture. Immigrants from the European Mediterranean lands find in the 'heart' of the country geographical conditions of climate, economy, land culture approaching those of their native homeland. Here the dominant activity of the people is agriculture, which engages two-fifths of the total population of the country. About half as many are occupied in industry. The extent of cultivable land is, however, restricted by the configuration of the narrow Longitudinal Valley in these few degrees of latitude, and it is probable that the agricultural lands could not attract and support a more generous immigrant influx. At the same time there are overseas markets eager to absorb available export surpluses, and so contribute to the broadening and stabilizing of the general national economy.' This consideration is recognized by the Government as the more urgent, in view of the present tendencies, noted above, in the mineral markets in which Chile is interested. There is from this region some export of wheat and barley (see p. 57). Malting barley is also exported to certain tropical South American countries, among which Peru and Bolivia are also purchasers of Chilean-grown rice, the most recent addition to Chile's list of exported cereals. Of greater promise is the trade in Chilean wines which are of very sound quality. Conditions of soil and climate favour the cultivation of vines, and with the return of normal trading facilities, development of this industry may be expected. Both wines and grapes are gaining in favour in neighbouring South American countries, as well as in the northern hemisphere. Promising developments are also afoot in the various branches of the fruit export trade, fresh, dried, and tinned. Only a very small proportion of this trade comes to the United Kingdom. Apples are the most remunerative item in the list of fruits exported. The bulk of the crop comes from the province of Arauco. Mediterranean fruits are grown in the wine-producing regions of Valparaiso and Santiago, and among them dried peaches meet a steadily increasing demand in the western hemisphere.

Pastures. In the region of transitional climate between the



Railways projected

Railways

FIG. 38. LONGITUDINAL VALLEY OF CHILE: RAILWAY SYSTEM AND PROFILE SECTION

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northern desert and the Mediterranean heart of the country, rough pastures afford some grazing for cattle. It is a region of winter rainfall. In the north of Coquimbo province the total is less than ten inches, and in the province of Aconcagua it is only slightly more. The pastures, therefore, do not yield sufficient beef to supply the needs of the country, and the deficiency has to be met by imports. Geographical conditions make it unlikely that the industry can be expanded to warrant the establishment of *frigorificos* and the development of an export trade in beef. The coast, moreover, shares with the rest of the northern Chilean coast in a marked absence of natural harbourage.

In the temperate southern provinces of Chile cattle-rearing yields some dairy produce, but again these items do not rank among the country's exports. Sheep pastures do, however, become increasingly important as far as the Straits of Magellan. As has been noted, the United Kingdom in 1938 purchased almost the whole of the export of Chilean meat—that is, mutton—rather more than half the export of wool, and a quarter of the export of sheepskins and hides. Punta Arenas has a considerable refrigerating industry and in normal times is a regular port of call for British meat-carrying ships. These ships call also at Patagonian ports for part cargoes to complete their loading to capacity. There would appear to be sound prospects of expansion in the Chilean wool and mutton trade.

Forests. The natural forests of temperate southern Chile are capable of more intensive exploitation. Much of the export of softwood, timbers, goes neighbouring countries, whose natural resources in this respect are meagre. During the war years the United Kingdom became interested in Chilean larch, and it is possible that this trade will be fostered in the future. Owing to their distance from the great timber-markets of the northern hemisphere, the Chilean forests have generally not been worked to any considerable extent. The quality of the timber, moreover, is adversely affected by the extreme humidity of the climate. But their reserves are enormous, and with modern equipment and organization the Chilean timber industry may be expected to assume an important role in the national economy. Some hardwoods are produced, and the manufacture of plywood is increasing.

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Industrialization. Within comparatively recent years industrial development in Chile has made no little progress. During the interval between the two World Wars, and particularly at the time of stringency imposed by the world-wide depression of the late 1920's and early 1930's, Chilean manufacturing industries were obliged to have greater recourse to locally produced raw materials in order to maintain supplies in the home markets. These developments were fostered by the Government, and early in 1939 the Corporation de Fomento de la Producción was established to furnish long-term loans to national industries. The disastrous earthquake of January 1939 threw an additional and very heavy burden upon the struggling industries, but in March 1946 a supreme decree restored the financial situation, and it became no longer necessary to allocate funds from the service of the external debt to the Corporación de Reconstrucción y Auxilio, which had been set up to assist the devastated area. This decree, together with the law of May 1945 giving guarantees to foreign investors, should assist materially in the promoting of the national economy. The lack of population, however, remains a severe handicap. With barely five million people to supply, the home market is restricted and soon saturated, especially with metal goods and the more durable types of domestic equipment. Without the stimulus of a more regular and sustained demand from the home market, consequent upon a rapid increase in numbers of population, the installation of capital equipment must proceed somewhat slowly. The steel-mills at Valdivia consume Chilean ores, others depending largely upon scrap metal. The great Longitudinal Railway is justifiably appreciated by Chileans as a great national achievement. Its purpose, however, is strategic rather than economic, and the system functions at very little financial profit. To protect the railway from competition all coastwise shipping is restricted to Chilean vessels.

Textiles are typical of the less durable goods for domestic consumption and, therefore, offer greater attractions in the way of industrial development. Thanks to the sheep pastures of the central zone, Chile is almost self-supporting in her requirements of wool. Ninety per cent, of the raw wool consumed in Chilean factories is produced within the national borders. There is some import of manufactured woollen cloth from neighbouring republics and, as has been noted above, the value of wool

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exported, mainly from the south, is greater than that of any other export excepting the great minerals, copper and nitrate of soda. There would, therefore, appear to be some prospect for the increasing of the total capacity of the country's woollen mills, although the market for the importation of finer counts need not necessarily be adversely affected. Some cotton-spinning is done, much of the raw material coming from Peru.



THE USPALLATA PASS, CHILE

Electric train approaching Hotel Portillo station.

Photo Paul Popper

There is no local cultivation of cotton. The yarn produced is consumed by the spinning- and other mills within the country, and, as with the woollen industry, the finer grades of cloth are imported. The bulk of the home demand is for the coarser and cheaper grades. Some locally grown flax is utilized in the linen-mills, and developments are afoot in the manufacture of artificial silk. Formerly there was a considerable import of the less expensive cloths from Germany, Italy, and Japan, only about half of the domestic requirements being met by the national production. This trade has now been liberated from the restrictions imposed upon it by the 'Aski' mark, or barter compensation

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system. The increasing production of plywood is a further example of the progress of industrialization based upon a fuller utilization of locally produced raw materials. Chilean nitrates also furnish the basis for the growing manufacture of heavy chemicals, an important factor in the protection of the mining industry from the competition of synthetic manufacture.

Railway construction in Chile began about the middle of the nineteenth century with the building of short lengths of independent lines, generally of narrow gauge, to accommodate the mineral traffic of the arid north of the country. The Pacific War of 1879-1882 emphasized the need for more direct and efficient communication throughout the length of the country, and the building of the Longitudinal Railway was undertaken in the last decade of the century. This system is not, however, of uniform gauge throughout its entire length, the northern portion being of narrow gauge, while the southern is a broad gauge line. From the coast at Tacna, ceded to Peru in 1929, and Arica the line strikes inland and follows the Longitudinal Valley southward until the upland complex within the valley compels it to seek the coast again in the neighbourhood of La Serena. From this northern section spur lines run off to the nitrate ports, Pisagua, Tocopilla, and Antofagasta. Iquique is served by the main line. South of La Serena the line resumes its inland trend and continues in the Valley to Puerto Montt. There is one transcontinental railway connecting the Chilean and Argentine systems by way of the Uspallata Pass. Other transcontinental projects have been noted on p. 103.

The coastal trade of Chile has been restricted to Chilean shipping since 1922. The chief competitors for overseas carrying have been the United Kingdom and Germany, the former enjoying the greater share. Government schemes for the promotion of the country's economic development include the modernization of the larger ports, particularly those engaged in mineral traffic, Arica and Antofagasta. Internal communications are also supplemented by national air lines connecting the capital, Santiago, with Arica in the extreme north and Puerto Montt in the south.

CHAPTER XII

BRAZIL

Introduction

WITHIN the United States of Brazil lies almost half of the total area of the South American continent. Almost exactly half of the total population of the continent is also to be found in Brazil. It is by far the largest single unit and can still claim more than one-third of all the people of Latin America. It reaches from the equatorial into the temperate zone. Its frontiers touch every South American state excepting only Chile and Ecuador. Of all the South American republics it lies nearest to Africa across the 'Strait of Dakar' and its ports are generally nearest to those of Europe.

The People. The racial distinction between Brazil and the rest of Latin America dates from the Treaty of Tordesillas, which in 1494 gave the eastern half of its present territory to Portugal. Colonization by the Portuguese began in 1532, and with it began the racial assimilation which has led to the characterization of the Brazilians as a 'cosmic race.' A second foreign racial element was introduced early by the Portuguese, who, under the Asiento, held a virtual monopoly of the West African Negro slave trade. The fusion of these races has produced a greater variety of people of mixed blood than is usual in the other republics of Latin America. Portuguese sailor castaways married Indian wives from whom sprang half-breeds known as *mamelucos*. Mixed Indian and Negro blood produced *zambos*. There are also mulattoes of mixed European and Negro blood, as well as *mestizos*, as elsewhere in South America, descended from European and Indian intermarriage.

The native Indian races are most numerous in the Amazon basin. Arawak tribes are represented in the interior lowlands, while in the region of the delta of the Amazon Carib stock prevails. Along the coastal lands to the east of the delta 'Indians' are also found, but much of the population of this north coast of the republic is *mestizo*. West African Negroes are most numerous along the tropical shores of the east. Here the

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aboriginal Indians withdrew to the interior before the settlement of the coast by the Portuguese. There was thus no labour available for the cultivation of sugar, which was introduced from Cape Verde Islands at the time of the first settlement in 1532. Negro slaves were, therefore, imported. Slavery was not abolished in the republic until 1888 and there remains a concentration of Negroes in Bahia. There has, however, been considerable fusion of Negro and Indian blood, and the pure type of Negro is rapidly disappearing. In the south of the republic the character of the people resembles more nearly than elsewhere that of the criollos of the Argentine Pampas.

In 1763 the seat of government was moved from Bahia to Rio de Janeiro. The movement of the capital followed soon after the expulsion of the Jesuits from Portuguese South America in 1759. At the same time the economic bias of the settlements tended to move away from the sugar-planting of the north in favour of the mining of gold and diamonds. Rio de Janeiro had also the additional advantage of lying farther from the equator, and of having easier access to a more promising hinterland than had Bahia.

Immigration. At the end of the eighteenth century the most numerous element in the population of Brazil was negro. Quite half the total number of people were Negroes, and the remainder was shared evenly between the white races and mestizos and Indians. During the nineteenth century the racial composition of the population underwent considerable modification. Dom Joao, who had fled from Portugal under British escort in 1807, introduced two thousand Swiss immigrants. These founded in 1818 the settlement at Nova Friburgo, near Rio de Janeiro. They were followed in 1820 by German settlers. Italians, who began to arrive about forty years later, form to-day with the Portuguese the greatest foreign element in the population. Immigration is now regulated by the constitution of 1934, and for each nationality the annual intake is restricted to two per cent, of its total for the previous fifty years. During the fifty years from 1887 to 1936, out of a total entry of just over four million immigrants, three-quarters came from Italy, Portugal, and Spain, the last named supplying only half the number of either of the other two. Italian entrants are consistently more numerous than Portuguese, the ratio being of the order of seven Italians to six Portuguese. In more recent years

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the number of Japanese immigrants has increased steadily. About a quarter of the total number of immigrants in 1936 were Japanese.

Germans and Japanese. It has been estimated that of the forty-three million people in Brazil about one million are Germans. Their settlements are mainly in the south of the country, chiefly in Rio Grande do Sul. Before the First World War the immigrants were mainly of the artisan classes and their migration was due to economic circumstances. After the great world-wide depression of about 1930 the intellectual classes began to be represented. On the commercial side, German interests secured control of the Brazilian trade in *yerba mate*, the universal beverage of the continent, and their technicians operated Brazilian air-lines. Special financial facilities were also given to Germans for the export of minerals, against credits in the Reichsbank to be used in the importing of German manufactured goods. Japanese had also entered Brazil in increasing numbers and the immigration law under the constitution of 1934 was designed to check this movement. They had, however, penetrated to the Amazon region, where a trading organization was established by subsidiaries of the Mitsui house to compete with the United Fruit Company. The strategic value of this activity was in its proximity to the narrowest part of the Atlantic Ocean. The Brazilian government in 1938 stipulated that every settlement should contain no less than thirty per cent. Brazilians in its population, and that no other nationality, except Portuguese, should attain a strength of more than 25 per cent.

Contrasts, North and South. Geographically the republic of Brazil falls into two strongly contrasting halves. The northern half is the vast drainage basin of the Amazon river, and the remainder is the plateau whose surface slopes steadily upward to a high scarp facing the Atlantic Ocean across a narrow coastal plain. Between these two regions little communication is possible or needed. Such as there is goes almost entirely by sea in Brazilian-owned ships.

Within the basin of the Amazon, Brazilian territory attains a height of fifteen hundred feet in only a small area round the headstreams of the rivers Jurud and Puriis. Major relief features are, therefore, absent, but minor features are not without interest and importance. Before the uplifting of the Andean

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system the main river flowed westward. Evidence of this reversal is to be noted in three regions. It is indicated in the east by terraces of lacustrine deposits in the valleys of the main river and its last great tributary the Xingu. In the middle valley, between the Japura tributary and the main stream, which is here called the Solimoes, are many swamps, remnants of lakes which have not yet accommodated their drainage to the reversed flow of the river. Still nearer the Andes, in the valleys of the Mamore and Beni rivers are similar swamp remnants of the 'Lake Mojos' of the geologists.

With so little gradient for about two thousand miles of its course the river, as well as its tributaries, has built vast alluvial tracts of *varzea*, and at some distance from the rivers *terra firme* appears, as mentioned above on p. 60.

The orographic features of the plateau are of a different order. Sedimentary deposits on the fringes of the Amazon basin indicate submergence in early geological times, but there is no evidence of submergence more recent than the Cretaceous period. During the long and more recent period of emergence considerable denudation has removed much of the deposits from the plateau surface. There is no evidence of glaciation. The horizontal disposition of the sedimentary strata on the northern and western margins of the plateau indicates that since Mesozoic times they have suffered no disturbance from folding or other orogenetic movements. There is evidence, however, of considerable volcanic activity, particularly in the south, dating from pre-Cambrian times.

In respect of relief and climate the northern half of Brazil may be considered as broadly uniform, in contrast to the diversity of these conditions in the rest of the country. A similar contrast may be observed in the natural plant cover of the two regions, as well as in what they have to offer for man's exploitation. Likewise, the economic development of the basin of the Amazon is founded almost entirely upon its forests, whereas the plateau region contributes, in addition to forest products, those of its pastures, its cultivation, and its mines. Industrial and commercial development has, therefore, advanced further and in a greater variety of directions in the south than in the north. For most everyday purposes the name of Brazil means the south, or more correctly, the small area in the south in which the bulk of the population is concentrated.

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Selvas .

For reasons indicated above it would appear that the selvas of the Amazon are destined to remain, for some time at least, a region in which human activities are restricted to the collection and extraction of natural products. Such cultivation as there is, is for the raising of tropical food crops for the benefit of neighbouring towns. It is necessarily restricted to the alluvial

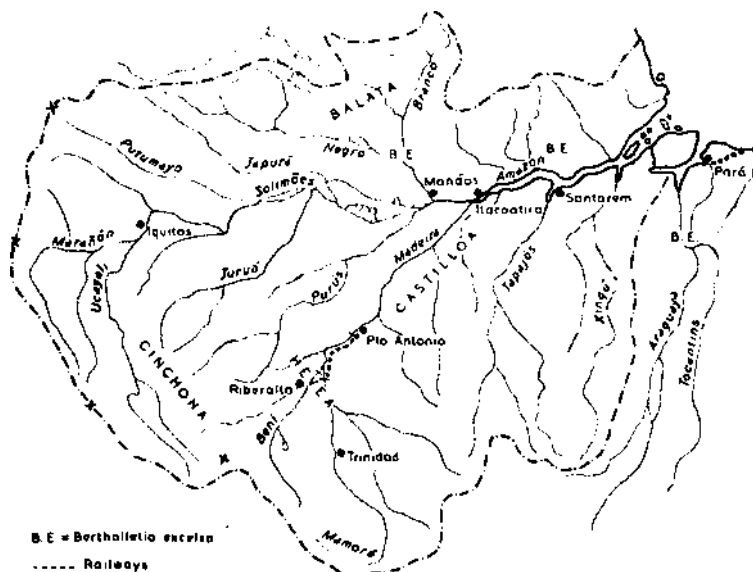


FIG. 39. AMAZON BASIN: PRODUCTS

lands free from liability to flood. Most of the plantations are therefore near the delta of the river in the state of Pard. The only crop furnishing an exportable surplus is cacao. The variety cultivated in this region is *forastero*. For quality it does not compete with the 'highland bean' or 'criollo' grades of Ecuador and Venezuela, but it yields a sound cocoa suitable for general manufacture, particularly of bitter chocolate. Sugar cane is also cultivated, stimulated by the local demand. The climatic conditions are hardly ideal for this crop, which requires a rather more generous allowance of periods of warm sunshine than is accorded it in these very low latitudes. As with cacao,

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more favourable conditions for the cultivation of cane-sugar are found on the northern shores of the continent. Other food crops for local consumption include rice, which, although needing an abundance of water, requires control of the water supplied to its roots, and mandioca from whose roots tapioca is made.

Rubber. The chief wild product of the selvas is rubber. The principal rubber-yielding tree is the hevea, the botanical name being the latinized form of the native Indian word for the product. Other important trees for rubber occurring in the Amazonian selvas are balata and castilloa, while yet others are found, wild or in plantations, to the east of the delta. Hevea is found in greatest abundance in the west of the river basin. The Brazilian portion of the hevea region is drained by the head-streams of the Marmore, Purus, and Jurua rivers. The corresponding region drained by left bank tributaries of the main stream, the Putumayo, for example, is not Brazilian territory. Hevea does not flourish to best advantage in swampy ground. The best latex is obtained from trees growing in the better drained soils of the *terra firme*. Castilloa, too, prefers a well drained soil, and the principal region of its occurrence is on the higher ground south of the Amazon river from the valley of the Puriis eastward to that of the Tocantins river. Balata, a harder wearing product suitable for driving belts and similar mechanical devices, comes from the extreme north of the state, in the upper basin of the Negro-Branco drainage.

The chief ports handling the export of rubber are Manaus, at the focus of the river valleys leading from the balata and most of the hevea regions; Itacoatira, just below the confluence of the Madeira river, and Para, at the mouth of the main river, whose name is still descriptive of the world's best quality crude rubber. Manaus lies on the Rio Negro just above its confluence with the Amazon and conveniently below the confluences of the Jurua and Puriis rivers. Although a thousand miles from the ocean, it is accessible for large steamers, and its trade has been sufficient to warrant the installation of a floating dock to meet the changes in level of the river water which has a range of some forty feet, nearly double the tidal range of the Thames. In addition to rubber, Mandos is also the most important collecting centre for timbers extracted from the forest. These include mahogany, ebony, and rosewood among the heavy cabinet

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woods, and balsa, a light but very strong timber found near the northern frontiers of Brazil. The timber is floated down to Manaos in rafts, the heavier woods being loaded on to balsa where this is obtainable. Manaos is also the market for cattle reared on the Brazilian savanas in the lee of the highlands of Venezuela and the Guianas.

In 1913 South America contributed nearly 40 per cent, of the world's total of rubber. A quarter of a century later, in 1938, the estimated share of the continent was less than 2 per cent. In this year three-quarters of the world's rubber was produced by Malaya and the Netherlands East Indies. The immense advantages of plantation production are thus evident. Hevea- and balata-trees are 'tapped' and castilloa-trees felled to obtain the rubber. In the collection of wild rubber, the labour is paid for according to results. Naturally the more accessible trees are worked first, and as they become rarer collection is more difficult. Apart from the destruction of castilloa-trees, other rubber-producing trees are ruined and ultimately destroyed by 'over tapping.' By this is meant making the incisions deeper to increase the flow of latex so that the cambium, the 'inner bark,' is damaged and the tree perishes. The latex collected by the unskilled natives is coagulated by drying it round a revolving stick held over a smoky fire. Repeated pouring of fresh latex on to the growing lump of rubber produces inequality of tension in the whole mass. The marketable product is, therefore, not standardized, as is the case with crepe rubber, made by coagulating the bulked latex in a tank by means of an organic acid. In a plantation, moreover, the trees can be cared for during growth and their age is known, an important point since the best latex is yielded by trees of seven years' growth. The Brazilian Government is now encouraging the making of plantations with a view to putting on the world market a product of standardized and reliable quality. The global war of 1939-45 has provided the opportunity for such trade by the loss of the Far Eastern plantations temporarily to the Japanese. The Ford Company's plantations are mentioned at p. 70.

Nuts. A collecting industry which does not involve the destruction of the trees is the collection of the well-known Brazil nuts, the fruit of the *Bertholletia* which grows in the valleys of the lower tributaries of the Amazon. The work is not without its dangers since the pods, which are nearly as big as

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the 'wood' used in bowls and contain anything from a dozen to twenty nuts, fall from the tops of the tall trees. The greatest value of the nuts is in their edible oil, in which they are unusually rich.

On the higher ground and on the margins of the lowland basin itself the most important timber tree is the Spanish cedar. Its extraction and exploitation are severely handicapped by lack of transport and communications. The whole of the basin has to rely almost entirely upon its rivers, but a few railways have been built mainly to supplement the river highways where these are impeded by rapids. The longest line is the Mamoré-Madeira. (See p. 101.) A short length of railway from Alcobaga circumvents the rapids of the Tocantins river and a short line has also been built eastward from Para. This is the Braganza Railway terminating at the port of that name.

The Plateau

The great plateau region rises steadily from the lowlands of the Amazon basin and reaches its greatest height of nearly ten thousand feet in the Serra de Mantiqueira only about sixty miles north-west of Rio de Janeiro. The western part of the plateau is the Matto Grosso, drained for the most part northward by the Tapajós, Xingú, Araguaya, Tocantins, and other tributaries of the Amazon. The remainder of the Matto Grosso is drained southward to the Paraguay river. The boundary of the Paraná drainage basin continues southward, so close to the coast that no streams of any size flow into the Atlantic until in the extreme south of Brazil the plateau begins to break down to much lower levels. Here in the state of Rio Grande do Sul the river Jacuhy flows into the Lagoa dos Patos, but the Uruguayan frontier coincides with the return of the main divide to a position close to the coast again. The boundary divides of the Rio São Francisco have already suffered considerable deformation from eastward- and northward-flowing rivers which have cut back. The Rio São Francisco itself has cut back far enough to capture the upper courses of the Mossoro river which now is a short stream rising in the Serra d'Araripe. The most southerly of these streams in the Rio Doce and the longest is the Parnaíba, whose headstreams issue from the Serra do Piauí. The valley of the former stream is cut off from the coast by the Serra do

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Mar, a name which farther south, as here, is applied generally to the scarp face of the plateau. The rivers do not afford promising highways to the interior. The most notable falls are mentioned on pp. 50 and 51.

The surface of the plateau was exposed throughout the Tertiary and subsequent geological periods. It is therefore heavily dissected by mature rivers. Intrusions and metamorphism are associated with the great mineral concentration in the state of Minas Geraes on either flank of the Serra do Espinhago. Minor concentrations occur also to the west, in Matto Grosso, and to the south in Rio Grande do Sul. The more abundant rainfall of the southern half of the plateau region, lying to the east of the Matto Grosso, has assisted other tropical climatic conditions in the formation of lateritic red earth soils by the rapid decomposition of the exposed crystalline rocks. Where in the north-west the rainfall is much less, the porous sandstones yield drier and less fertile soils.

Forests. Tropical evergreen forests extend along the slopes of the scarp face of the plateau from the Tropic to the neighbourhood of Bahia, where they give place to *catinga*. They also covered originally the coastal lowlands, or Matta region, where much clearance has been made for cultivation. On drier ground a more open type of forest prevails, and a similar kind of forest occurs on the higher slopes of the serras of the interior that catch the trade-wind rains. On the richest soils this open forest yields deciduous hardwoods, but where the soil is poorer the character of the forest degenerates into thorny scrub. Such poorer soils are found on the serras within the *catinga* region, and the better quality of soil in the coastal lowlands in the dry north-east. In the south of Brazil the woodlands are an extension of the Araucaria or Parana pine forest, where Spanish cedar is also an important tree.

The natural vegetation of the *catinga* region is open forest. The trees do not grow to any great height and are mainly drought-resisting thorn trees with cacti. Winter is the growing season for the trees, and these are of the Leguminosae family. At higher levels the *catinga* merges into *agreste*, where the increase of rainfall favours a type of vegetation intermediate between the stunted thorn forest and the deciduous. The moister areas of the *catinga* region, in the river valleys, have been cleared for cultivation and yield subsistence crops of maize.

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beans, and mandioca. The uncertainty of the meagre rainfall, which may sometimes continue so low as to cause a succession of years of drought, is often responsible for crop failure reducing the people and their cattle to starvation. The *cattinga* region extends westward into the basin of the Parnahyba. The *sertdo* is the plateau surface immediately to the west of the scarp crest within the dry north-east of Brazil. (See p. 186.)

Grasslands. The interior plateau is not wholly a natural grassland. The name Matto Grosso, meaning the 'great forest,' is, however, not fully appropriate, nor strictly descriptive of the region to which it is applied. About a third of the total area is estimated as forested. The sandstone-capped plateau remnants between the river valleys suffer from the porosity of their surface, and in such areas grassland rather than forest is the rule. The open savana is more abundant in the south and an intermediate type of natural vegetation, *campos cerrados*, forms a link between it and the woodland. These 'closed pastures' are interrupted by clumps of trees and thorn bushes according as moisture is locally more or less abundant. Beyond the Tropic the natural grasslands are of the type known as 'pasto duro,' forming an extension into southern Brazil of the Uruguayan pastures. The soils of the southern half of the plateau surface are laterite red earths derived from the old and hard rock by rapid decomposition under tropical climatic conditions. Some cultivation of subsistence crops is possible, and the pastures support cattle whose beef supplies the *saladeros*.

Production. In the course of its history Brazilian economy has depended upon a succession of commodities. During the past three and a half centuries it has been the rule for a single product to dominate the export trade of the country, almost to the exclusion of all others. As, during each period marking a stage in economic development, a new dominant commodity has taken the place of its predecessor, the location of the country's most important area of production for the time being has shifted step by step from the north-east shoulder southward to its present position about midway along the east coast. Each of the natural regions constituting this part of Brazil, lying north of the Tropic and based upon the shores of the South Atlantic Ocean, has, therefore, in its turn been the focus of the country's economic activity. At first, at the beginning of the sixteenth century, the dominant output was hardwood timber and dye

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woods from the coastal fringe. It is from the latter, *pdo brasil*, that the name of the country is derived. Unlike the Spanish colonies, Brazil remained for two centuries a source of agricultural and not mineral wealth. Sugar was the outstanding crop, but the country yielded also some minor 'colonial products' such as cocoa, tobacco, and cotton. Gold was not discovered in Brazil until the last years of the seventeenth century. Gold held sway over Brazilian economy for rather more than a century and a half until coffee cultivation restored agriculture to its predominance among the activities of the country. It is significant that coffee's nearest rival in Brazilian export trade to-day is cotton piece goods, which in 1943 accounted for one-eighth of the total value of exports. Manufacturing is now playing an increasingly important part in Brazil's economy.

North-east Brazil

The states of north-eastern Brazil may be grouped according as their situation and relief give them a northerly or an easterly aspect. Their interior boundaries run for the most part along the principal watersheds.

Sertaos. Certain economic products, which are characteristic of the *sertaos* and of the *catinga* type of natural vegetation, occur in all these states. The volume of production of any one of these commodities varies from state to state with the size of the area where conditions are favourable to it. Thus maize is cultivated generally, but least in the northward-facing states. In 1938 Brazil was estimated to be the world's second largest producer of maize, although the crop was only one-eleventh of that of the United States. There is practically no export, since the bulk of the crop goes for domestic consumption. Cattle are reared on the dry pastures in all these north-eastern states. Hides are an important item in the export trade from the states of Bahia, Ceara, and Parahyba, but the Second World War stimulated the output of canned meat. Goatskins are also a feature of the export trade of Bahia, Ceara, and Pernambuco. To assist the development of these pastoral and agricultural activities, the Federal Government has built reservoirs for maintaining the water supply and for irrigating food crops. Excessive evaporation is countered by making the reservoirs deep **with** only a comparatively small water surface exposed. **The** first

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reservoir was made in 1906. The ports handling the exports are Fortaleza, on the north coast, and Bahia, on the east.

The north-east produces about a quarter of Brazil's cotton. Tree-cotton is grown on the dry sandstone and limestone soils of the *sertão*, but annual cotton has been introduced where

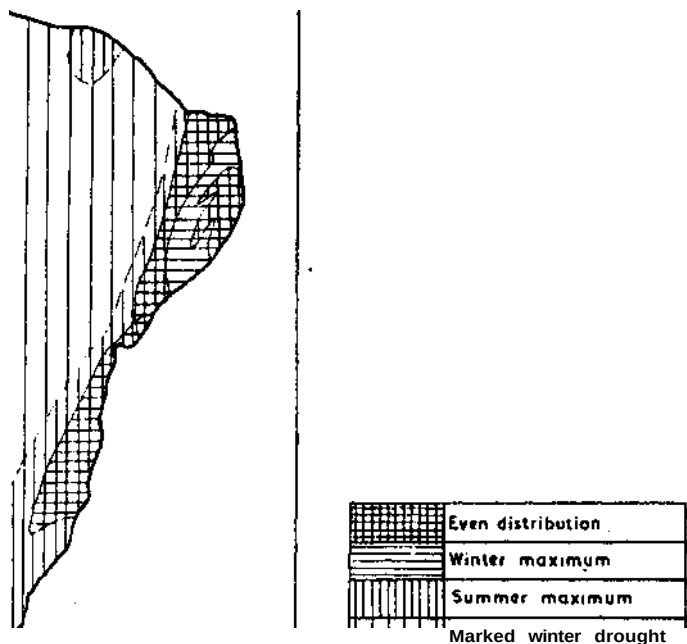


FIG. 40. NORTH-EAST BRAZIL: SEASONAL RAINFALL

conditions of soil and climate are favourable. The most serious difficulty is drought, and the irregularity and uncertainty of the rainfall does not encourage the adoption of careful methods of cultivation. The Government is, however, fostering the industry and the export trade in cotton by establishing grading stations at the ports of Pernambuco and Cearé. The bulk of Brazil's raw cotton-fibre is Paulista—that is, from the district of São Paulo—but most of the Brazilian output of cotton-seed oil comes from the north-east. The cotton crop is threatened by the boll-weevil, a pest encouraged here, as in the eastern states

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of the North American cotton belt, by the proximity of woodlands in which it can hibernate.

An important tree of the north-eastern uplands is the

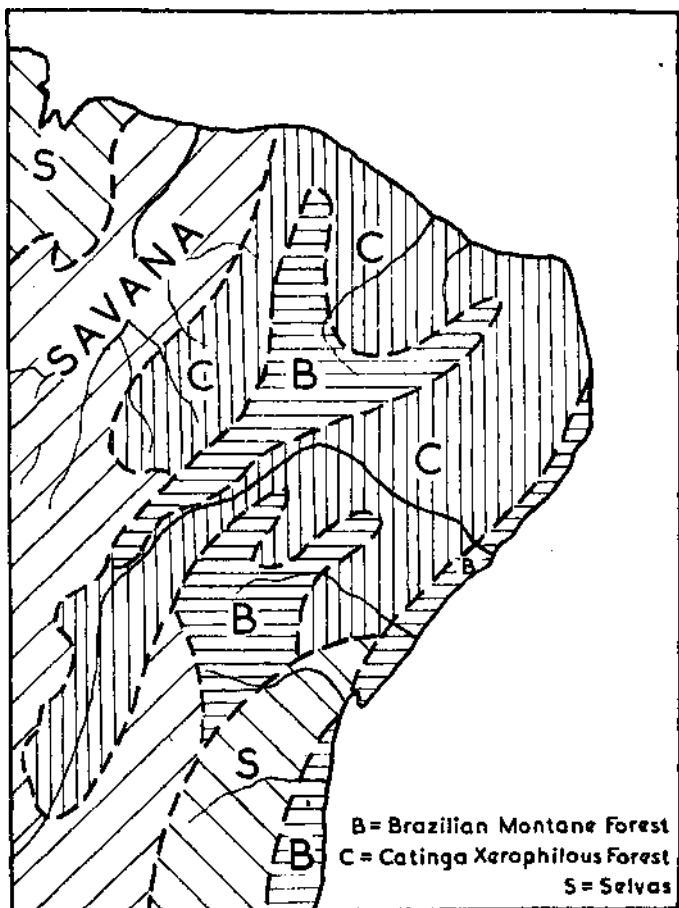


FIG. 41. NORTH-EAST BRAZIL: . NATURAL VEGETATION

carnaiba palm. The wax obtained from its leaves is in great demand, particularly in the United States, for the insulation of electric cables, and for the manufacture of soaps and polishes. Locally the wax is used for making candles, and the pith and fruit of the plant for food. The carnauba palm grows wild in

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the *catinga* regions of the states of Piauhý and Ceara, which are the leading producers. As the timber also is useful, the resources of the carnaúba industry constitute a rapidly wasting

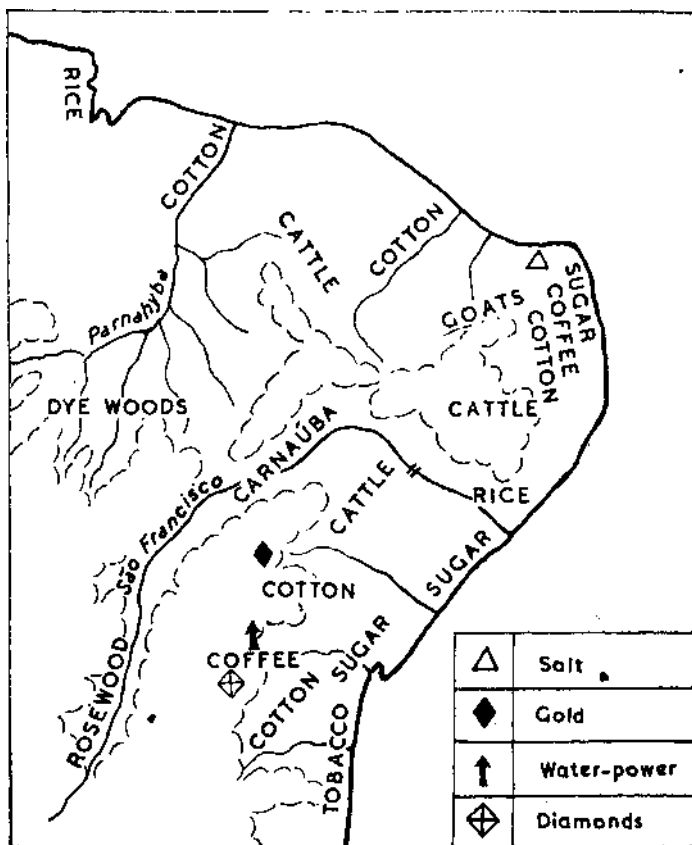


FIG. 42. NORTH-EAST BRAZIL: PRODUCTS

asset. The Indians do not make good cultivators, and plantations are very few in number. The introduction of carnaúba plantations in Ceylon will prove a serious source of competition to this Brazilian industry, the annual value of whose products was more than doubled by war conditions.

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Lowlands. To these two indigenous plants, tree-cotton and carnaiiba palm, may be added two rubber-producing trees. These are mangabeira (*Hancornia speciosa*) and manicjoba (*Martihot glaziovii*). The former is cultivated on the seaward slopes of the *sertdos* in the state of Bahia, and there is a little collection of mangabeira latex farther inland in Matto Grosso. The latter is the more important of the two, and belongs to the same family as the bitter-rooted manioc (*Manihot utilissima*), from whose roots tapioca is made. Manitoba, a native of the *catinga*, is the chief source of Ceara rubber exported through the north-coast port of that name. In tapping the latex does not flow so freely as that of the hevea, and is consequently rendered impure by picking up dirt and wood splinters. The leading states of north-eastern Brazil for these types of rubber are Ceara and Piahy.

The principal article of export from the earliest Portuguese colonies was sugar. The cane is not indigenous to Brazil. The total output does little more than satisfy the local demand. The principal producing states are Pernambuco and its lowland neighbour Alagoas.

Along with the sugar of the lowlands, coffee on the plateau slopes is an important product in the eastward-facing regions of north-east Brazil. Bahia and Pernambuco between them account for about one-twentieth of the total Brazilian output. A little coffee is also cultivated in the adjoining regions of the state of Goyaz.

Rice is grown on the wet lowlands of the coasts of Alagoas and Maranhao. There is also some production for local consumption in the moist mud soils left behind when the margins of the reservoirs are exposed by the draining off of the water or by evaporation.

Ninety-five per cent, of Brazil's total production of cocoa comes from the state of Bahia. The remainder is cultivated in an extension of these cacao plantations into the neighbouring state of Espirito Santo, and in the state of Rio de Janeiro, in the lowlands of the Rio Doce. As a cocoa-producer Brazil in 1937 took second place in the world, with nearly a fifth of the world's total production. As is the case with other commodities, the recent war has considerably enhanced the export of Brazilian cocoa, the principal buyer being the United States. Most of the trade goes through the ports of Bahia and Ilheos. The quality

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of the product is briefly commented upon at p. 180. A little tobacco is also cultivated in the coastal lowlands of the state of Bahia.

Minerals. In the uplands of the state of Bahia some minerals are found in the northward extension of the Serra do Espinhacjo. In the upper valley of the Rio Paraguassii, which enters the sea in the Bahia de Todos os Santos,¹ gold is found, but the region is more famous as being the world's chief source of black diamonds or carbonados. Near the coast manganese is worked by North American capital at Nazareth, and again farther north at Bomfim in the upper valley of the Itapicurii river. Along the shores of the state of Bahia and extending into Espirito Santo monazite sands are worked for thorium. This was a German interest before the war of 1939-45. Hiematite ores also occur in the uplands bordering the middle valley of the Rio Sao Francisco. Their exploitation is, however, impeded by the difficulties of transportation. In 1946 oil was unofficially reported to have been found near Sao Salvador, the estimated yield being 20,000 barrels daily.

Communications. The middle valley of the Rio Sao Francisco has two points of contact by railway to the coast. Rio de Janeiro can be reached by a line more than six hundred miles long from Pirapora. Bahia is rather more than half this distance from Joazeiro, where the rapids above the Paulo Affonso Falls prevent further downstream navigation. Other hindrances to the use of the rivers of the north-east of Brazil are thfcir liability to shallow water through evaporation in periods of drought, and the obstruction of their mouths by deposits of sand. Except near the mouth of the Rio Sao Francisco the coast plain is very narrow, and the hinterland of the ports is consequently restricted and difficult of access. Natural harbours are few, and such as there are lie open to both trade winds. The most favoured situation is that of Bahia (Sao Salvador), on the Bahia de Todos os Santos. This port and Pernambuco share between them practically all the foreign shipping to and from the north-east coasts of Brazil. The smaller ports are served by Brazilian coastal lines which also maintain communication between the plateau region and the ports at the mouth of the Amazon. (See also p. 102.)

¹ The Bahia de Sao Salvador de Totos os Santos is very near Cabral's landfall of 1500.

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Minas Geraes

The economic centre of gravity of Brazil moved to its present position in the central states of the eastern plateau region early in the eighteenth century. The events responsible for this move were the discovery of gold at Ouro Preto in 1693, and the finding of diamonds nearly thirty years later at Diamantina. Iron ores were first worked near Sorocaba at the Ypanema mine in 1810. The early exploitation of the mineral resources of the state of Minas Geraes was restricted to gold and diamonds, since the situation of the great mineral-bearing zone involved difficult and costly transport to the coast. The centre of the zone lies in the Serra do Espinhago between the headwaters of the Rio Sao Francisco, the Rio Doce, and the Rio Grande, a tributary of the Parana river. Between it and the nearest port, Rio de Janeiro, lies the descent into the valley of the Rio Parahyba and the crossing of the Serra da Estrella. Gold and diamonds, therefore, were the predominant minerals produced in this region until the middle of the nineteenth century, when railways made it more easily accessible. The most famous gold mine is that of Morro Velho near Bello Horizonte, and gold-mining is also carried on to the south-east and north-east of this town, at Marianna and Itabira respectively. Diamonds are found in the river alluvium of the upper Jequitinhonha river at Diamantina and Grao Mogol. Reference has already been made (p. 191) to the carbonados of the Paraguassii valley, in the state of Bahia. During the war of 1939-45 there was a very considerable increase in the annual value of exports of diamonds through Rio de Janeiro. Before the war the United Kingdom was the leading buyer of Brazilian diamonds, with Holland and Belgium each taking an important share in the trade. War-time conditions have diverted the bulk of the trade to the United States, and have also stimulated the expansion of the Brazilian diamond-cutting and -polishing industry.

Iron. To-day the leading place among Brazil's mineral exports is taken by iron ore and pig-iron and iron bars processed in the country. Brazil is estimated to possess the largest deposits of high-grade iron ore in the world. It is also estimated that one-tenth of the fifteen billion tons awaiting exploitation is hematite yielding 65 per cent, of pure iron. The presence of the hematite is due to metamorphosis of the deposits of carbonate

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ores at the time of the pre-Cambrian intrusions. Hematite is also found in the screes, and an inferior 'canga' ore occurs in the limestones. The principal iron-field occurs at the southern end of the Serra do Espinhaço between Belo Horizonte and Ouro Preto, and extends into the upper basin of the Rio Doce. From the name of Itabira da Campo, where the chief mines are

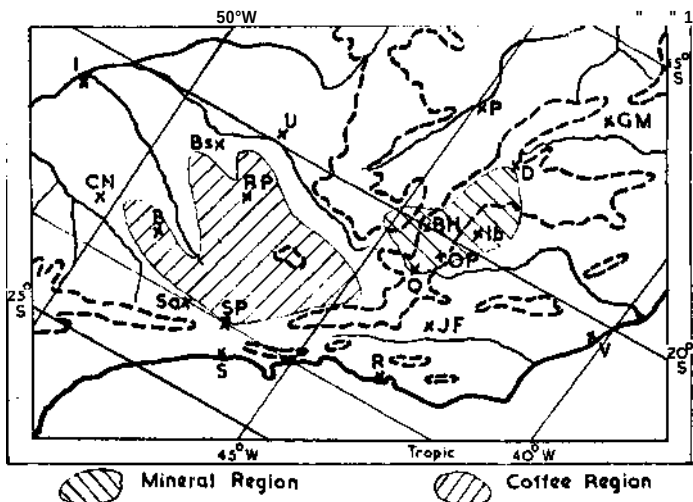


FIG. 43. MINAS GERAES AND SAO PAULO: COFFEE AND MINERAL REGIONS

The chief towns are indicated by initials. (Sec Fig. 44.)

situated, the ore gets its name of Itabirite. The export of the ores and processed raw material is handled by the ports of Rio de Janeiro and Victoria. Until 1942 the Itabira mine was British-owned. In that year by agreement with the United Kingdom and the United States the Brazilian Government took over the mine and the railway from it to the port of Victoria. The United States made a loan to assist in the further development of the industry, and the United Kingdom and the United States agreed to share equally in the purchase of the exports to an annual total of one and a half million tons for three years at a guaranteed price for the ore at the port of Victoria. Such an annual output, however, has not yet been achieved. More recently the world's greatest mass of hard iron ore has been discovered at Cauepeak, in the Itabira district.

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This ore is specially suitable for high-grade steels, and the Government already has a large steel plant in operation at Volta Redonda. This plant was originally a German undertaking. There is also some shipbuilding at Santos, and aeroplanes are built at Lago Santo.

Other Minerals. The Brazilian deposits of manganese are estimated to be the most extensive in the world. Brazil is the fifth world producer of manganese. There are also deposits in Matto Grasso, the output of which is sent down the Paraguay river. Brazil has also important supplies of other minerals used in the making of high-quality steels. She ranks high among the world's resources of chrome, scheelite, and nickel, and she produces in addition zirconium, which with nickel is used in the manufacture of high-speed tools. Copper is a more recent discovery, and some bauxite is also worked.

Industrial Development. Such coal as Brazil produces does not occur in Minas Geraes, but in the south of the country (see p. 202). It is poor in quality and not suitable for industrial use. In this central region, however, there are important hydro-electric developments where streams descend rapidly from the scarp-face to the coast. One of the largest of such streams is situated near Sao Paulo, on the Tiete river. Recently what has been described as a "huge hydro-electric power plant" has been installed at Macabii, forming part of a plan to industrialize the capital, Rio de Janeiro, only a few miles distant. Electric power, however, is not economical in the smelting of ores, and for this large imports of coal and coke will continue to be required. The recent rapid development of textile manufacturing has placed cotton piece-goods high on the list of Brazilian exports, second in value only to coffee. The principal customer for these goods during the war of 1939-45 was South Africa. In 1943 half the total annual value of exported cotton goods, representing nearly 40 per cent, of the total weight, went to South Africa. Argentina's share was about half of that of South Africa, whether by value or by weight, while the Belgian Congo took about half as much as Argentina. As the South African market turns again in time of peace to the Mother Country, Brazil may yet retain and expand her connexions in South America and Central Africa in respect of the lower-priced grades. The Brazilian ports handling the export of cotton manufactured goods are Rio de Janeiro and Santos, both situated

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conveniently near the producing area of 'Paulista' cotton, which constitutes three-quarters of the country's total crop, and both again having ample potentialities in hydro-electric power. There are mills at Rio de Janeiro and Juiz de Fora, as well as at Sao Paulo.

There are also *frigorificos* at Barbacena, north of Rio de



A BRAZILIAN COFFEE FAZENDA

Behind the drying-grounds are the dwellings of the administrative staff and labourers. Into the distance extends the Garapo.

photo E. N.A.

Janeiro, and at Mendes in the coastal plain close to the capital. The cattle dealt with at these works come from the campos of the interior of Minas Geraes and Goyaz. Rio de Janeiro's share of the export trade in frozen meat is as yet small. The bulk of the shipments are from Santos and Rio Grande. In the development of this industry the railways serving the interior are an important factor in the movement of the cattle. (See p. 101.)

Sao Paulo

Coffee. Brazil is to-day the world's leading producer of coffee. Brazilian production since 1937 has been consistently from five to six times as great as that of the nearest rival, Colombia.

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Since 1938, however, there has been some falling off in the amount of coffee exported from Brazil, but the annual value has steadily increased. The main producing region is the state of Sao Paulo, and it lies to the south-west of the great mineral region. The cultivation of coffee also extends into the valley of the Earahyba behind Rio de Janeiro and into the states of Minas Geraes and Espirito Santo. To the north of the twentieth parallel, however, the lowlands are too hot for the crop to be raised successfully. On the plateau temperatures are lower all the year round and suitable for the employment of European labour. For this purpose the immigration of Northern Italians was encouraged during the early years of the development of the industry. The plateau, by reason of its elevation, has also the advantage of shrouding the bushes with mist formed by condensation of the vapour carried by the prevailing winds from over the ocean, and thus protecting the berries from the powerful violet rays of the overhead tropical sun.

Soils. An extensive area, lying for the most part in the state of Sao Paulo, has an abundance of rich red soils eminently suited to the cultivation of coffee. So great is the extent of these soils that, in the early days of the industry, land which had become exhausted by the crop was abandoned, and new plantations made on neighbouring sites. The abandoned plantations were sometimes burned off to clear the ground for cultivation, a process which has the disadvantage of vaporizing some of the fertile mineral salts, and so furthering the impoverishment of the soil. To remedy this, and to improve and increase the yield of subsequent crops, resort must be had to fertilizers, or a system of rotation adopted.

The best soil on the plateau surface is 'terra roxa.' This is a soil which represents one of the stages in the development of laterite. The tropical red earths are formed by the decomposition and disintegration of the crystalline surface by the weather and the organic acids resulting from decaying vegetation. Their formation finds its optimum conditions in a prolonged period of alternating wet and dry seasons with uniformly high temperatures. This part of the continent bears no evidence of having suffered glaciation. The process of the formation of these Brazilian red soils may therefore be presumed to have continued through long recent geological epochs. The heavy and violent rainfall of the wet seasons dissolves the mineral salts

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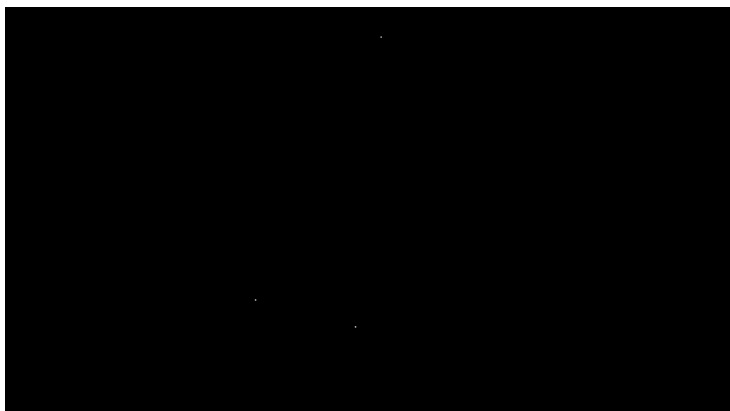
to some depth below the surface. This disintegration assists the upward capillary movement of moisture during the dry season, when rapid evaporation leads to the concentration of iron and aluminium salts at the surface. In the most advanced stage of this process, the formation of laterite, the iron often occurs in local concretions. The 'terra roxa' is also very rich in iron, a condition which makes it especially suitable for the growing of coffee. Laterite itself is not so suitable, since the very heavy rains wash out the insoluble constituents leaving the surface of a spongy texture. In Brazil laterite occurs along the east coast from the Tropic to as far north as Cape Sao Roque. The rainfall here is very heavy and persistent throughout the year, and the resultant leaching of the soil removes the lime salts from it by solution. Temperatures are always high on the tropical plateau, and the formation of humic acids is thereby accelerated. The seasonal character of the rainfall also favours the formation of 'terra-roxa' rather than the continuous rains occurring in the laterite zone nearer the coast. Coffee, moreover, requires a well-drained soil, another circumstance which prejudices the mature lateritic soils.

Organization. The first Brazilian coffee plants were smuggled into the country in 1727 and were planted on the north coast under equatorial conditions. An early attempt to cultivate coffee was made in the coastal region of Rio de Janeiro, then the new capital of the country, in 1770. Neither climate nor soil here favoured the plant, and hence followed the successful removal of its cultivation to the uplands of Sao Paulo. In the north Negro slaves had to be introduced, but on the coffee lands of the plateau farther south climatic conditions are suited to Europeans. The industry, therefore, became organized in plantations whose centres of control were the *fazendas* of the Portuguese planters.

Much hand labour is required, since the berries cannot be gathered by machinery. Coffee is unlike cacao in that the berries are all ripe at the same time. The harvest, therefore, is a period of intense activity. The berries are dried by the sun in the open air. At the ports they are graded under Government supervision. This is the more necessary since the crop earns for the country nearly half its foreign income. For the season 1938-39 Brazil produced 24 of the world's 34 million bags of coffee, and 17 of the 27 million bags consumed. In

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more recent years Brazil's production has suffered so serious a decline on account of bad weather as to jeopardize her control of the world market for coffee. The total export for 1944-45 was nine and a half million bags, of which nearly seven came from the plateau states of Sao Paulo and Minas Geraes and one-and-a-half from the coastal states of Espirito Santo and Rio



THE WATER-FRONT AT RIO DE JANEIRO
The residential quarter extends up the slopes of the Serra.
Photo E.N.A.

de Janeiro. Santos handles most of the export trade, and Rio de Janeiro has a considerable share. Smaller quantities of coffee are also exported through Victoria, Bahia, and other north-eastern ports.

Nearly all the Brazilian coffee crop (for 1944 eleven and a half out of twelve and a half million bags exported) goes to the United States. The Inter-American Coffee Agreement, by fixing annual quotas for the imports into the United States, has helped in the stabilization of Brazil's position during the recent years of drought. The Federal Government controls the volume of coffee put on to the world market and assumes responsibility for grading the exported consignments. As coffee improves in storage, over-planting is not so dangerous a risk as it is in other

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crops, since a balance can be maintained for regulating the output in years of adverse weather.

Cotton Industries. Government supervision of the grading of cotton for export from the northern ports has been referred to at p. 187. Three-quarters of the country's total production is Paulista cotton, which is consumed in the local mills, with the

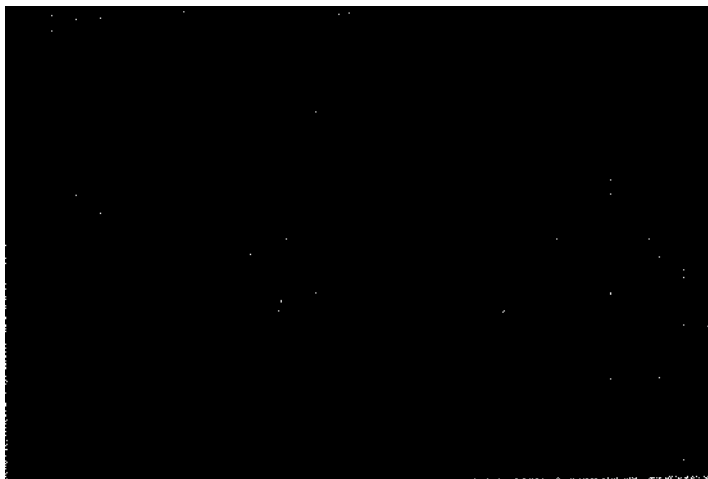


THE BRAZILIAN COFFEE INDUSTRY
The Government Experimental Station.
Photo E.N.A.

addition of some imports from the north. The chief spinning-mills are at Sao Paulo and Juiz de Fora inland, and at Rio de Janeiro on the coast. The type of cotton cultivated is an upland variety of short staple. The area under cotton tends to expand along the lines of railway serving the coffee-growing districts. Cotton prefers the moister soils and climate of the eastern fringe of the plateau surface, and so the cotton belt lies between the coffee *haciendas* and the industrial towns situated in the vicinity of water-power resources. It may be that the production of raw material and the development of the manufacturing industry will be restricted to the coarser counts. Although Brazil was stated in 1934 to be self-sufficient in production of cotton textiles, the demand for imported finer counts continued to be met from the United Kingdom until the outbreak of the war in 1939.

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With the end of the war this demand may be revived. The six years of war have also occasioned severe strain accentuated by the scarcity of replacements of textile machinery. The return to normal conditions will renew important openings for trade in such machinery, since Brazil is unable to supply her domestic industries with this equipment. The cultivation of cotton and



A BRAZILIAN COTTON MILL

Photo E.N.A.

its manufacture are factors of paramount importance in the planned diversification of Brazil's national economy, and, as has been noted above (see p. 186), cotton piece-goods are now the second largest item of her export trade.

Food Crops. Food crops cultivated on the *jagendas* include maize and beans. Brazil's position among the world's producers of maize is referred to at p. 186. The crop is for the most part destined for home consumption. Before the war of 1939-45 Santos was the leading port of export, but during the war the quantity of maize exported was considerably diminished. Beans are grown on the coffee plantations between the rows of coffee shoots.

In the hot moist valley of the Parahyba river and in the narrow coastal plain sugar cane and rice are grown. War conditions have enhanced the importance of the Brazilian export

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of rice, the greater part of the surplus of this crop coming from the state of Rio Grande do Sul. The United Kingdom and the United States agreed to take between them the whole of the surplus for the two years 1943-45, after the home demand and a proportion of the South American needs had been met. Brazil is the world's fourth largest producer of cane-sugar. Some of

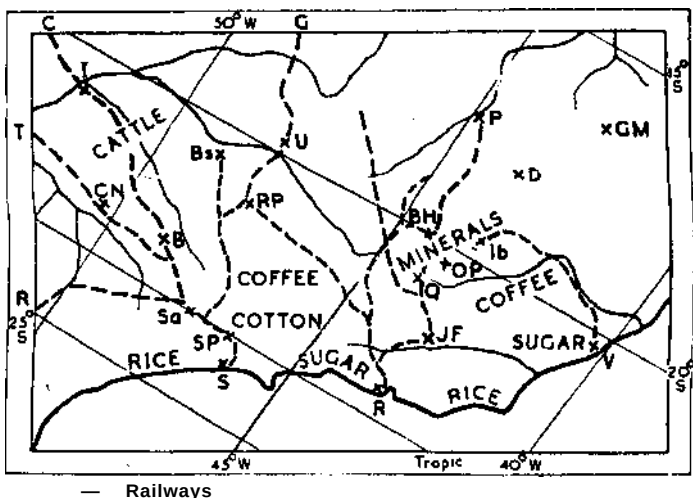


FIG. 44. MINAS GERAES AND SAO PAULO: RAILWAYS

<i>Cattle</i>	<i>Coffee</i>	<i>Minerals</i>	<i>Ports</i>	<i>Railway continuations</i>
Barretos	Ribeiro	Bello Horizonte	Juiz de Fora	G, to Goyaz
Bauru	Preto	Diamantina	Ouro Preto	C, to Corumba
Campos Novos	Sao Paulo	Grao Mogol	Pirapora	T, to Pto Tibirica
Itapura	Sorocaba	Itabira	Queluz	R, to Rivera (Uruguay)
Uberaba			Victoria	

the crop is raised on the plateau on land formerly under coffee. Only a small proportion of the annual output of sugar is exported, and that goes mostly to Uruguay and Argentina. Very little is shipped from the most densely peopled region, the ports handling the trade being those of the north-east coast, Pernambuco and Maceio.

Pastoral Products. Stock-rearing is of increasing importance on the campos of the plateau inland beyond the zone of coffee cultivation. The cattle are moved eastward, often by rail, for fattening before finding their way to the *frigorificos* at Sao Paulo and Santos. In the eastern industrial zone there is naturally a heavy demand for meat and other cattle products, but exports

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are of considerable importance. Santos is the chief port for the export of canned and frozen and chilled meat. The principal customer for these products is the United Kingdom. For hides, the state of Rio Grande do Sul is more important than Sao Paulo. Within the tropics cattle yield inferior hides and are subject to the *garapate* parasite which punctures the skin. To remedy this disadvantage cattle are cross-bred with Indian humped cattle to secure immunity. Leather industries are increasing, although for much of her requirements Brazil is still dependent upon imports.

Railways. The railway net of this region is described at p. 101.

Southern Brazil

The southern states of Brazil are Parand, Santa Catharina, and Rio Grande do Sul. Here the plateau surface is lower than it is farther north, and it is drained for the most part by streams flowing westward to join the southward-flowing rivers of the interior, the Parana and Uruguay rivers. The exception to this rule is the Jacuhy river in Rio Grande do Sul, which flows eastward into the Lag6a dos Patos. These three states are the only part of Brazil lying outside the Tropic. Frosts are more frequent than in the state of Sao Paulo, not permitting the southward extension of the cultivation of cotton. Temperatures are, however, too high for the growing of wheat, except in the extreme south of Rio Grande do Sul, where the entire Brazilian crop is raised. Rainfall is evenly distributed throughout the year, and, in contrast with the more extensive plateau surface farther north, the interior, although having a summer maximum, is not afflicted by long or frequent droughts.

From its coastal scarp along the Serra Paranapiacaba and the Serra do Mar the plateau surface declines steadily westward to the valley of the Parana river. The courses of the tributaries are interrupted by rapids or falls. (See pp. 50 and 51.) The narrow coastal plain is sandy, and in the south, where the main watershed swings westward round the valley of the Jacuhy river, swamps and lagoons occur, the largest being the Lag6a dos Patos. On the plateau surface soils of the red-earth types have been developed.

Coal. The only coal in Brazil is found within these three

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southern states. The coal, of Permian age, is poor in quality and friable. Its heating-power is low, and it is therefore of little use as a source of industrial power. There are two small coal-fields. The first, in the north, extends along the lower inland slopes of the Serra Paranapiagaba from near Sorocaba to the neighbourhood of Ponta Grossa. The other lies a few miles west of the Lag6a dos Patos and Lag6a Mirim, in the state of Rio Grande do Sul. In this state also a little copper is found in the most southerly limb of the plateau.

Food Crops. The distribution of the major types of forest resembles that of Uruguay (see p. 149). In pastoral and agricultural activities also Southern Brazil is more akin to Uruguay than to the Central and North-eastern Brazilian states. The chief cereal cultivated is maize. Only a small proportion, however, of Brazil's export of maize is from the southern states. Porto Alegre in 1938 handled only 7400 tons out of a total for the whole country of 125,000 tons exported. Rice is cultivated on the moist coastal plain, and practically the whole of the Brazilian export of this crop is from the southern ports—Porto Alegre, Pelotas, and Rio Grande. The war-time agreement between the United Kingdom and the United States on the one hand and Brazil on the other with regard to rice is referred to at p. 200. Among foodstuffs produced in Brazil one of the chief is *herva matte* (*yerba mati* in Spanish). Four-fifths of the Brazilian crop comes from the three southern states. A considerable proportion of the total production is exported to other South American countries. Argentina, where there is a well-developed industry engaged in the preparation of the leaves, takes most of the crude product exported. The Brazilian-prepared product goes to Uruguay and Chile. Most of the trade is shipped from the ports of the state of Parand, Antonina, and Paranaguá, and the near-by port of São Francisco, in Santa Catharina. A little of the crude product is exported through the river port of Puerto Esperança, on the Parand river, from Matto Grosso. Tobacco amounting to a quarter of the total Brazilian production is grown in the state of Rio Grande do Sul. Little of the southern crop is exported, the chief shipments being from Bahia. There is also in the three southern states some cultivation of oranges, grapes, and bananas, but the chief ports of shipment for the country's exports are Rio de Janeiro and Santos,

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going to Argentina. Four-fifths of Brazil's production of plywood comes from Parana and Santa Catharina, and the erection of proposed additional factories will increase the total capacity of the industry by 50 per cent.

Conclusion

The United States of Brazil owes much to the six Jesuits led by Nobrega, who four hundred years ago began the task of taking their Faith to the Indians and winning prosperity from the soil. The unity claimed in the official title of the republic has been attained as much by the fusion of the races within it as by confederation of the erstwhile captaincies-general. Miscegenation as a deliberate policy dates from the earliest days of Jesuit enterprise four centuries ago. In later years the care of the Indians was entrusted to the Commissao Rondon. Brazilians to-day afford in themselves ample evidence that the true significance of* miscegenation lies not in its physical and racial aspects, but in its influence in effecting spiritual unity. Among Brazilians the term *criollo* has none of the implication of pretended superiority, racial, social, or cultural, that it has in parts of Spanish South America.

The Jesuits introduced into Brazil the cultivation of many non-indigenous crops which to-day are staples of the country's economy. They also first taught the Indians to spin the cotton which they found growing wild in the country. They made themselves the protectors of the Indians against the slave-hunting *bandeirantes*. The Jesuit capital was set up at Sao Paulo in 1554, high on the plateau away from, and above, the commercial settlements of the coast. From this site the valleys of the tributaries of the Parana river beckoned towards the interior. The Federal District resembles Sao Paulo in being situated inland on the divide between the three great rivers of the country, the Amazon, the Parana, and the Rio Sao Francisco.

V The present boundaries of Brazil have been established since the Treaty of Madrid in 1750. Since the time when the Pope's boundary line awarded by the Bull *Inter cetera* was adjusted by the arbitration of the Treaty of Tordesillas, Brazil's territorial disputes have been settled by peaceful methods. A further tradition in Brazil's external relationships is not without interest.

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The country stands in direct descent from Portugal, the United Kingdom's oldest ally.

Some indications have already been given of the main lines along which Brazilian economy is developing. The diversification of her agricultural productivity will remedy the weakness inherent in a disproportionate reliance upon a single crop—in Brazil's case, coffee. Movement in this direction is already in progress, as it is also directed towards strengthening Brazil's position as a producer of pastoral products by the introduction of superior strains of beef catde and the expansion of the *frigorifico* industry. Industrial development has been considerably stimulated by the Second World War, and the future promises further realization of the water-power potential of the 'high watersheds in the neighbourhood of Rio de Janeiro and Sao Paulo. Brazil's frontage on the narrowest part of the Atlantic Ocean serves to emphasize the importance to her of the development of international and internal air-routes. In this connexion it is well to remember the prestige accruing to the countries equipping and operating these air-routes, as to those able to supplement the domestic production of consumer goods.

CHAPTER XIII

PERU

FROM the decentralization of Spanish authority early in the sixteenth century, and the subsequent partitioning of the South American empire, there eventually emerged in the nineteenth century the republic of Peru, claiming to be the heir to the territories of the former viceroyalty of Los Reyes. With the establishment of Spanish rule, Cuzco yielded its administrative importance to Lima, which still remains the capital of the present republic.

Boundaries. The attention of the authorities at Lima was early directed towards the interior of the continent beyond the Andes. Pizarro's energetic policy was responsible, not only for the expedition under Mendoza which reached La Plata estuary in 1535, but also for that under Orellana which in 1540 followed the Amazon river to its mouth. A legacy of this policy of penetration has been the protracted dispute over the boundaries between Peru and Ecuador. The Oriente was finally awarded to Peru in 1942, and the northern frontier now follows the right bank of the Putumayo river from the 75th to the 70th meridian.

Development. Most of the white population of Peru is to be found in the coastal lowlands, the *costa* region. Here agriculture is made possible through the aid of irrigation and to-day, in contrast with early Spanish colonial times, more than 80 per cent, of the total population of the country is engaged in farming pursuits. The *costa* region is not, however, solely dependent upon the produce of its farms. The infant republic owed much to its possession of apparently inexhaustible resources in guano, which it was able to place to great advantage on the markets of Western Europe. At about the same time as Peruvian guano assumed an important place in international commerce, another, natural fertilizer, nitrate of soda, was discovered in the southern province of Tarapaca, ceded to Chile in 1883. As a marketable commodity, however, guano has distinct advantages over natural nitrate. No capital equipment is needed, except the

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spade, and the labour calls for no special skill. The nitrate requires blasting and crushing machinery and the labour implied by such methods demands the supplying of food and clothing to desert-dwelling communities. So, with Chinese coolie labour, the Peruvians themselves exploited their country's resources in guano, while the aid of foreign capital had to be invoked to make possible the working of the nitrate deposits, under Government concessions.

Under inefficient Presidents, the guano trade was regarded as fair game by unscrupulous office-holders. Despite the fact that the working of the deposits could not normally keep pace with the natural rate of accumulation, the guano market was rendered unstable, and the consequent uncertainty of external commercial relations reacted adversely upon the internal prosperity of the people. Later, towards the end of the nineteenth century, extravagant schemes of public utilities were set afoot, largely dependent upon the guano revenue. The nitrate industry yielded revenue derived from export duties. Such a system was equally liable to abuse, and in 1875 the production of nitrate was declared a Government monopoly. This led within a few years to war with Chile.

In 1919 Leguia assumed the Presidency and established himself as a dictator. Under his rule great public works were undertaken, particularly the building of a national system of roads. The need for such a system is imperative not only for the articulation of the four widely dissimilar natural regions of the country—the *costa*, the sierra, the high plateau, and the eastern Montana—but also to enable Peru to fulfil its function as a vital link in the great Pan-American Highway. Foreign capital is supplied in approximately equal proportions by Great Britain and the United States. About half the British capital invested in Peru is held by the Peruvian Corporation, which now operates the guano fields. Leguia's dictatorship is also notable for its *rapprochement* with the Vatican, and for its care of the Indian population. Peonage, which was thinly disguised slavery, a legacy of the colonial *encomienda*¹ system, was abolished in 1927, and a day, June 24, consecrated annually for observance as Indian's Day.

The basis of the national economy has also of recent years

¹ Under this system a grant of land embraced the natives living on it, *tied to the soil.'

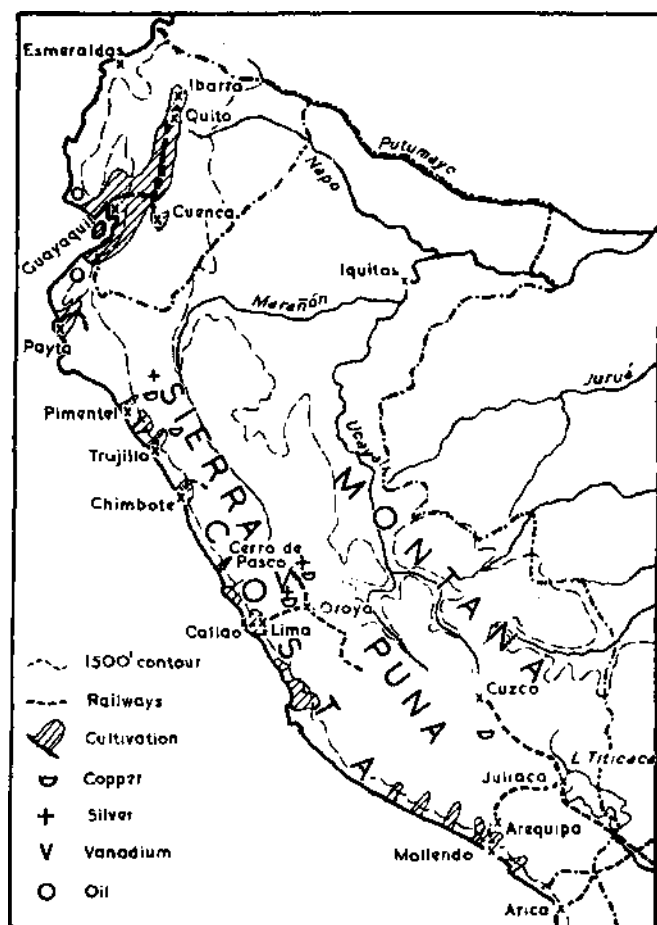


FIG. 45. PERU AND ECUADOR

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been broadened to the advantage of the people and their general well-being. The principal workings of the former fertilizer are now on the Chincha and Lobos islets. Production is restricted to the demands of the home market, and the commodity no longer figures among the country's exports. More than half the total annual value of Peruvian exports, however, is still represented by minerals—one quarter of the total value coming from petroleum. The chief oilfield is at Lobitos, near the extreme north of the coastal plain. Before the Second World War the principal markets for Peruvian petroleum were the neighbouring republics. A very extensive new oilfield was reported in June 1946 (p. 216). The war not only stimulated production of this all-important commodity, but also extended its commercial scope in countries overseas. The remaining minerals which, for the most part, find their markets in the United States, are mainly derived from the plateau region. Peruvian iron ore is a hematite of good quality.

Costa. The climate of the coastal region, which extends between the first and nineteenth parallels, is tempered by the cooling effects of the cold Humboldt Current. Continuous mists pervade the atmosphere over the inshore waters. These conditions in themselves are largely responsible for the abundance of fish and fish-eating birds, and so for the guano deposits. Irrigation is possible from a great number of small rivers rising in the sierra belt and crossing the *costa*. Only when the rivers have in their courses encountered an excess of deleterious salts are they of no use for this purpose. Irrigation schemes are among the public works for which the Government has assumed responsibility. The principal Government schemes are located near Pimentel and Arequipa. Immigration was encouraged and attracted a certain number of German, Austrian, and Southern Russian agriculturists, but the scheme inaugurated by the Government failed, and the immigrants were repatriated. Such was an unfortunate advertisement for the country's agricultural prospects in European markets.

The two principal crops of the coastal irrigations are sugar and cotton, both in keen rivalry for the leadership of the list of agricultural exports. At present sugar leads in point of annual value. War-time shipping restrictions have resulted in the diversion of much of the trade in sugar destined for the United Kingdom. The exportable surplus is now shared by practically

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all the South American republics, whether or no they are themselves sugar-producers. Peru is the chief South American exporter of sugar, there being no heavy demand from the somewhat limited home market. The plantations are all within easy reach of the coast, and production must inevitably be stimulated in the near future by the insistent world demand for this essential food. Negroes as well as Chinese work on these sugar plantations. Rather more than two-thirds of the total yield are available for export.

Peru has given its name to one of the best-known botanical varieties of cotton (*Gossypium peruvianum*), although this plant is not necessarily a native of the country. It was, however, one of the parents from which the famous hybrid was derived and named after its inventor, Sakellaridis. Nearly three-quarters of the total crop is exported, but with Government encouragement of rising manufacturing industries this high proportion may be expected to diminish. There is a general absence of frost, but at the same time the maximum temperature is no higher than that experienced in the more typical cotton-growing lands in higher latitudes. Irrigation is necessary, but for this very exhausting crop adequate supplies of guano are available locally.

Egyptian cottons—for example, long-stapled Mitafifi—have been introduced to improve the strain of the Peruvian varieties. The best qualities, which are in fact superior to any grown in the continent, are exported to the United Kingdom and the United States. Lower grades are taken by other South American countries, particularly Chile. There is also trade in general grades with the European continent. Developments in the Peruvian cotton-manufacturing industry may also be expected to stimulate the production and manufacture of wool, since the * rough' varieties of Peruvian cotton are especially suitable for mixing with wool. The export of cotton-seed cake has lately been prohibited. This step has been rendered necessary partly by the deficiency of fats produced within the country for human consumption in war-time, and partly by the need for an additional fertilizer on the irrigated cotton-growing lands.

Of other fibres, the cultivation of flax has been attempted in the *costa* region. On account of the climate, however, the venture proved unsuccessful. Sericulture has also been introduced in this region, and with greater success, the operatives being Japanese immigrants. This development has given rise

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to an urgent racial minority problem. The presence of Japanese communities is not restricted to the requirements of the silk industry, but may be noted also in proximity to the oilfields of both Peru and Ecuador. The Japanese do not assimilate with the local populations, white, mestizo, or Indian. Their village communities are severely self-contained, some even having Japanese mayors. Japanese immigration was, therefore, forbidden by law. It may also be noted that, as the Japanese Fukuara Company was engaged in the fruit trade in the Amazon valley, other Japanese held the famous 'Quinine Concession' in the Montana region, close to the Ecuador frontier. Of these two commodities, silk and quinine, the former undoubtedly offers Peru some opportunity of participation in the post-war reorganization of world trade, with its inevitable reorientation of the trade previously in the hands of the defeated nations. Peru already enjoys a secure position in South American textile markets.

The Peruvian oilfields lie in the extreme north of the country, near the coast in the region of the Amotape mountains. The oil is refined at the small port of Talara by a Canadian Company. Tankers in the open roadstead are loaded from pipes.

Other farming products of the *costa* region include a somewhat more generous range of cereals and fruits than may be cultivated elsewhere in comparable latitudes. These products supply home markets only. The chief cereals grown are rice and maize, while among the fruits may be noted some of typical Mediterranean cultivation—for example, olives and oranges, besides grapes and dates. Tobacco is also grown for local consumption.

Sierra. It may be observed that of the nine highest points in the world reached by railways all are in South America. Of the nine highest points, six, including the highest of all, are in Peru, the remaining three being in Bolivia. Two railway systems reach the interior plateau, the Peruvian Central and the Southern Peruvian. (See p. 101.) The highest point of all reached by a railway is at Morocacha station, on the former system. All these lines, whether merely penetrating or traversing the sierra, necessarily utilize the valleys of the short streams which dissect these very steep western slopes. Many of these streams are already harnessed for the development of hydro-electric power. The most notable scheme is that on the Santa river in

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the hinterland of Chimbote Bay. Here the national Government, with the support of American capital, has undertaken important power developments in connexion with the iron and steel industry in that locality. As elevation increases along the western sierra both aridity and temperature decrease. There is sufficient moisture to support evergreen trees to an elevation of



LAKE TITICACA NEAR PUNO, PERU

The *balsas* (rafts) are constructed of totora reeds, and the people are Aymara Indians.

Photo Paul Popper

about 8000 feet, and the streams afford promise of hydro-electric potential adequate to the estimated requirements of the country. This is of special significance in view of forthcoming industrial developments and the virtual lack of coal in Peru. Foremost among these developments is the Government's plan to increase the output of woollen and cotton textiles and to improve the quality of Peruvian products. At the same time greater reliance will be placed upon the provision of the necessary capital from national resources.

Puna. The Puna, or high inter-Cordilleran plateau of Peru, extends throughout almost the entire length of the country from north to south. Although near the Ecuadorean frontier it is narrow and barely a mile high, it broadens steadily towards

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Bolivia, and attains an average elevation of more than two miles. The population is almost wholly Inca with a small proportion of mestizos. The Indian population is estimated at rather more than half that for the whole country, while a quarter of the total population is mestizo. The assimilation of the Indians of the plateau is consequently a vital concern to a country whose *criollo* governing classes are in a marked minority, numbering little more than an eighth of the total population, and largely restricted for their habitat to the coastal plain. The policy of the Government is to bring the Puna into closer relations with the *costa* on the one hand, and the Montana on the other, by the construction of highways and the development of air routes.

In the Government's schemes for strengthening and developing the national economy the pastures of the Puna will have an increasingly important share. At present the export of wool is not considerable, but early in the present century superior merino-grade sheep were introduced in order to improve both the quantity and the quality of Peruvian wool. The chief sheep pastures are in the basin of Lake Titicaca. The native animals of the Puna are the alpaca, llama, and vicuna. These all yield wool, and before the Spanish conquest the Indians were breeding the alpaca for this purpose. Vicuna wool is very fine, but its export has been prohibited since 1944. The United Kingdom and the United States are both purchasers of Peruvian wool of the finer grades best suited to their manufacturing requirements. The Spaniards also found the native animals used as beasts of burden. For the same purpose they introduced horses and mules, as they did elsewhere in the New World.

Agriculture in the Puna is confined to crops for home consumption only. The principal cereal grown is maize. Wheat also is cultivated, but considerable additional supplies have to be purchased from Australia. This absorbs rather a high proportion of Peruvian sterling funds. Barley and quinoa, a kind of buckwheat, are among other temperate cereals raised on this high plateau. Tobacco is grown for local use, and of the root crops potatoes are the chief. The Inca Indians had already, before the Spanish conquest, resorted to irrigation for the benefit of their agriculture. The rivers utilized were naturally the headstreams of the Amazon system, notably the Ucayali, in the Eastern Cordillera,

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The great wealth of the Puna is in its minerals. Chief among these is copper, which is worked at many points in the great mineral belt of the Eastern Cordillera. Peru produced in 1938 about one-fiftieth of the world's copper, ranking almost equal to Mexico. During the war of 1939-45, however, vegetable products showed a much greater increase in production than minerals, whose increase was in value rather than in volume. The war diverted exports to the United States, and trade with the United Kingdom was almost entirely restricted to cotton. The most important copper mines are in the neighbourhood of Cerro de Pasco. There is also a little coal found here, and smelting and refining are done at Oroya. Water-power is available locally. The industry is in the main an American enterprise.

Lead ores are also worked near Cerro de Pasco, the total weight of lead extracted in 1938 being considerably greater than that of copper. By-products of the refineries include gold and silver. The total production of gold is not great, but Peru is the world's fourth largest producer of silver, contributing in 1938 some 8 per cent, of the world total. Difficulties of access and transport impede the exploitation of these resources in precious metals and handicap them in competition with the much greater output of the leading producer-countries. For instance, Mexico and the United States between them account for more than half the world supply of silver, while South Africa and North America share a similar proportion of the world's gold.

In association with the lead and silver ores, stibnite, the sulphide ore of antimony, is found. Peruvian production of this mineral from the intrusions of the Eastern Cordillera is increasing steadily. Nearly half the world's supply of antimony, however, comes from Bolivia and Mexico. Zinc, similarly associated in its occurrence with lead and silver, is also found, but the Peruvian output is not great, the lack of coal proving a deterrent to local smelting. In the same association of minerals occurring in proximity to igneous intrusions in the Cordillera are tin, molybdenum, tungsten, and vanadium. Only in the case of the last-named is the world position of Peru important, although in the years immediately preceding the war of 1939-45 the output of both tungsten and molybdenum was increasing rapidly. Peru is the world's largest producer of vanadium,

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accounting for nearly a third of the world's total production of this metal in 1938. The producing region is in the Cerro de Pasco region, in the province of Junin. The chief use of this metal is in the hardening of steels for the making of high-speed tools.

Montana. The region of the eastern slopes of the Eastern Cordillera is known as the Montana, and the territory claimed by Peru extends for some distance into the Amazonian lowlands. The inhabitants are practically all Indians, there being very few Europeans and mestizos in the region. In general the settlement of successive boundary disputes relating to the eastern frontiers of Peru has favoured this country's claim to include within its borders a zone which would afford a footing in the natural highway to the Atlantic, while offering some prospect of exploitation of its distinctive forestal, pastoral, and agricultural produce. It forms part of the natural hinterland of the river port of Iquitos, and under the Spanish Empire was included in the Comandancia General de Maynas. It is known to possess some resources in petroleum. In June 1946 deposits extending over 75 million acres were reported. These may place Peru in the forefront of the world's oil-producing countries. The rivers Ucayali and Huallaga, as well as the Marañon, are navigable for long distances into the foothills of the Cordilleran country. Iquitos can be reached from the Atlantic by small ocean-going steamers. The national Government is also endeavouring to bring the Montana region into closer relation with the rest of the country by the development of air routes.

Below an elevation of about six thousand feet this eastern zone of Peru is densely forested, but at greater elevations natural grasslands occur. The region of the watershed between the Ucayali and Huallaga rivers is known as the Pampas de Sacramento. The forests are a continuation of those of the great hevea region of western Amazonas. In common with the Brazilian industry, rubber production here has declined in the face of competition from Malaya and the Netherlands East India. An attempt to revive the industry has been made in Peruvian territory, but the plantations have not proved successful owing to the difficulty of access to external markets. The balata industry, too, has not prospered since the exploitation of the product involves the felling of the trees, and replanting is consequently essential to its continuance. At higher

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levels within these forests timber trees are found which support the saw-mills at Iquitos. Chief among these trees is the Spanish cedar, but mahogany and rosewood also occur. The great distance of Iquitos from the sea is a considerable hindrance to the external marketing of these timbers. The Montana formerly enjoyed the monopoly of the world production of quinine, a febrifuge extracted from the bark of the cinchona shrubs. This trade also has all but vanished before the competition of plantations in Ceylon, southern India, and the East Indies. Coca, the plant which yields cocaine, is cultivated as being necessary for the Indian population. The chewing-product is manufactured for their use in Lima and coca cake is exported under government licence. A vegetable insecticide, *barbasco*, or 'cube,'⁵ is also produced, the chief market for which is the United States.

Cacao and coffee are both cultivated on the valley slopes within the Montana region. The former was among the staple foods of the Inca Indians at the time of the Spanish conquest. The principal plantations are those of the Peruvian Corporation in the valley of the Perene river, a headstream of the Ucayali which rises not far from Oroya. They are therefore within fairly easy reach of the mining communities of the Cerro de Pasco region. The forests also yield vanilla and tagua (vegetable ivory) nuts. The Government is hoping to encourage the utilization of the pastures above the forest level for stock-raising. Here again the products would be destined for consumption within the country rather than for export.

Communications. If Argentina is the twentieth-century gateway to South America Peru was for the four preceding centuries the front door through which access was gained to the greater part of the steadily expanding Spanish colonial empire. Moreover, Peru had previously been the seat of the Inca Empire, and the Incas had developed an efficient system of post-roads. Some of these roads are still in use and have their place in the Andean Highway and in Peru's share of the proposed Pan-American Highway. (See Chapter VII.) The development of air communications will also bring the Amazonian river ports into closer touch with the Pacific coast. Besides the Amazonian streams, Lake Titicaca and its effluent, the Desaguadero river, carry steamer services between Peru and Bolivia. Mollendo has no natural advantages as a port, being merely an open

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roadstead. Callao is the best-situated port on the Peruvian coast, and here the Government has undertaken improvements, the anchorage being sheltered by the island of San Lorenzo. Coastal shipping is restricted to Peruvian vessels, and is important in the absence of a trunk-line corresponding to the Longitudinal Railway of Chile.

CHAPTER XIV

BOLIVIA

IN many respects Bolivia may be regarded as the focus of the continent. The Andean plateau is here at its widest. From it the natural drainage radiates northward to the Amazon and southward to the Parana. The situation of Bolivia in South America resembles that of Switzerland in Europe, but its economic function in the continent is subject to such severe handicaps that no comparison on these grounds is possible. The total population, at present barely four millions, is slightly less than that of Switzerland, although Bolivia has more than thirty times the area. The annual Swiss revenue is about four times the Bolivian, and Switzerland has in operation nearly three times the total length of the Bolivian railways. These contrasts indicate emphatically the handicaps borne by Bolivia in her lack of labour supply, of modern transport, and of financial capital. Moreover, Bolivia is the only country in the western hemisphere lacking direct access to the sea.

The Western Cordillera forms the frontier with Chile. The high plateau is bounded by the two main chains of the Andes, and is drained internally to the salt Lake Poopó and the Salar de Uyuni. Corresponding to the Montana region of Peru is the Yungas of Bolivia, which descends north-eastward to the Llanos de Mojos. The northern lowlands are drained by the Mamoré and Beni headstreams of the Madeira river. To the south the Llanos merge into the Chaco Boreal.

Under the Spanish colonial empire the plateau region enjoyed sufficient prosperity to enable the silver-mining centre of Potosí to become the largest town of its time in the western hemisphere. The republic took its name from that of the great liberator of the north, Simón Bolívar. The native Indian population forms some 80 per cent, of the total. Three-quarters of the people are illiterate. To-day the care of the Indians, which until the end of the eighteenth century had been the urgent concern of the Jesuit missions, and which, in the twentieth century has been accepted as a national responsibility in the

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neighbouring republic of Peru, is a problem vital to the interests of a state where the 'forgotten man' preponderates to such a marked degree.

Nor has Bolivia been fortunate in her relations with neighbouring states. As a result of the Pacific War of 1879-82

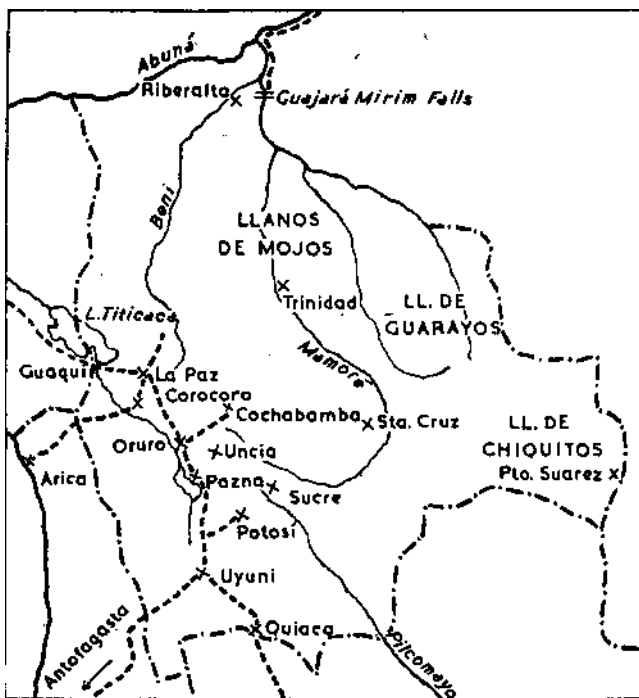


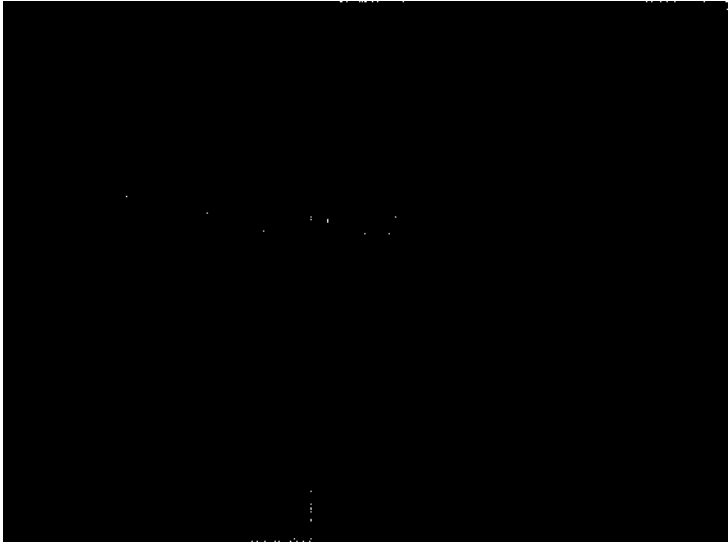
FIG. 46. BOLIVIA: RAILWAYS

(p. 163) all direct access to the Pacific coast was lost. The importance of the lost ports, from Antofagasta to Mejillones, has subsequently been enhanced by the building of the Antofagasta-Bolivia railway. Further territory was lost fifty years later in the disastrous Chaco War of 1932-35, but the revised frontier, although awarding to Paraguay an extension towards the north-west, does not wholly deprive Bolivia of her river frontage on the Pilcomayo, nor does it threaten her eastward outlet via Puerto Suarez and Corumba. On the northern

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frontier Bolivia also yielded to Brazil her share of the Territorio do Acre.

External Communications. Railway development in Bolivia has been seriously retarded by lack of funds. The line to Antofagasta is now Bolivian property, and affords direct communication to this Chilean port, as also does a line from La Paz



TRANSPORT THROUGH THE SKLVAS OF THE RIO PIRAI, BOLIVIA

Photo Paul Popper

to Arica. Arica is thus within a day's journey from La Paz, the times required to reach the other ports being twice as long. Buenos Aires is nearly four days' travel from La Paz. The trunk-line enters Bolivian territory at Guaqui from Puno on the railway-system of southern Peru. It follows the valley of the Desaguadero river to Lake Poopo, bifurcating at Uyuni to connect with the Chilean and Argentine railways. From Oruro a branch line reaches Cochabamba. These lines will eventually be continued to connect with navigation on the Beni and Mamore rivers, and to link up via Santa Cruz with the Brazilian railway from Santos to Corumba. In southern Bolivia a branch leaves the main line for Potosi and Sucre, thfc capital. For the agreement of May 1941 with Argentina see p. 118.

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The Guaqui-Puno line affords to Bolivia an outlet to the port of Mollendo via the junction of Juliaca. Communication with

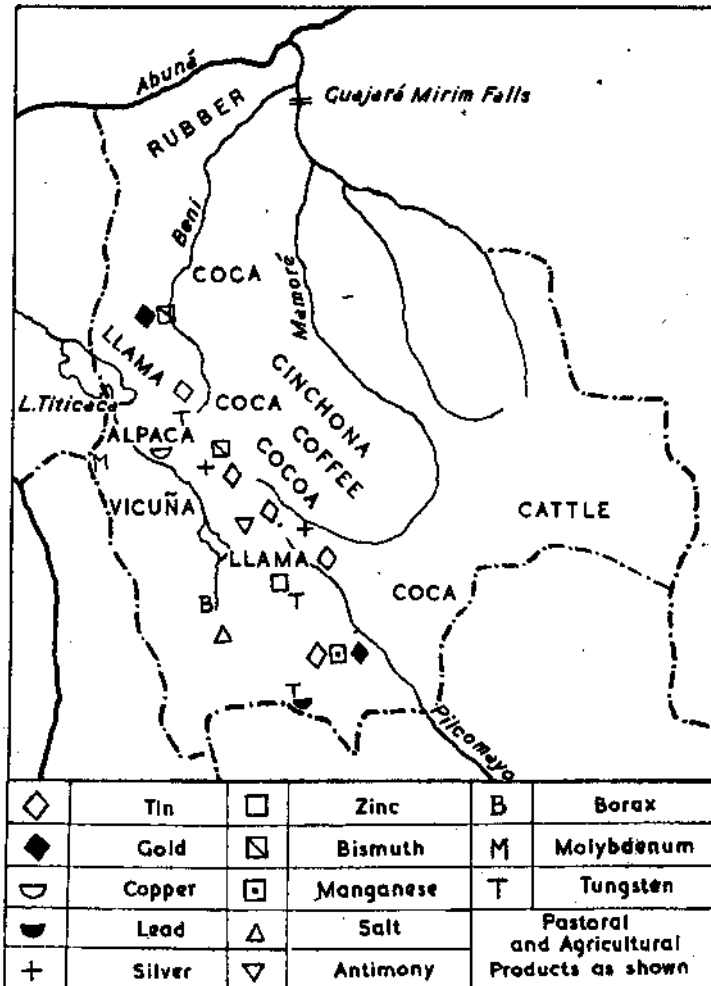


FIG. 47. BOLIVIA: ECONOMIC RESOURCES'

Peru is also maintained by the steamer service of the Peruvian Corporation on Lake Tí ticaca between the ports of Guaqui and

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Puno. River navigation in Bolivia is as yet undeveloped. Navigation on the Pilcomayo river was placed in 1941 under an international committee. On the eastern frontier steamers ascend the Paraguay river as far as Corumbá. The Bolivian rivers, the Beni and the Mamore, which feed the Madeira, are liable to considerable fluctuations in volume, and the main stream itself is impeded soon after reaching Brazilian territory by the Santo Antonio Falls.

The development of the internal air routes is in the hands of Pan-American Airways (see Chapter VII). Air travel to Europe is by way of Brazil. The internal airways and the national railways both trend, therefore, in the same direction, that of bringing the eastern llanos and lowlands into closer relation with the more densely peopled plateau. At the same time friendly contacts will become established with Brazil.

Minerals. Only a fifth of the total population of Bolivia lives in the lowlands. In the highland region the principal concentrations are in the valleys of the Eastern Cordillera facing towards Brazil and Argentina. The great mineral wealth of the country is found, often at great altitudes, on the inward-facing slopes of the Cordillera. The disadvantages of such a location are manifest. Not only are the ores difficult of access, owing to their altitude and the mountainous character of the country, but their marketing is also prejudiced by the distance and difficulty of transport to the coast. Bolivian exports of silver at the present time amount to only about one-fortieth of the world's total production. The annual output fluctuates somewhat, but there is no marked increase. The slenderness of Bolivia's contribution to the total world supply of this metal makes the producing industry very sensitive to the movements of world prices. Silver ores occur at many places from La Paz to Potosí. The chief producing-areas are to the south-east of the silver city of the Spaniards, at Pulacayo, and to the north-east near Lake Poopo, at Pazna and Uncía.

The most important Bolivian mineral now is tin. Stanniferous ores occur in association with those of silver in the great mineral zone where concentrations are due to the intrusion of the crystalline base through the Palaeozoic rocks. Veins are located at a height of three miles above sea-level, but some ore is reclaimed from the residual dumps of the Spanish silver workings. Owing to the lack of power, neither hydro-electricity

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nor coal being available, the ores for export are hand-picked. The scarcity of labour, particularly at such elevations, aggravates the difficulties of the industry. Nevertheless, Bolivia is the third largest producer of tin in the world. In 1938 the leader was British Malaya with 26.7 per cent., Bolivia following, with 15.8 per cent., very close after the Netherlands East Indies. The annual Bolivian export, moreover, showed a decided tendency to increase more rapidly than that of its competitors. Recovery has also been stimulated by the freeing of the industry from the restrictions of compensation-trading with Germany. The United States is the chief purchaser of Bolivian tin to-day.

Bolivia takes also a high position among the world's producers of two other important minerals, antimony and tungsten. She leads in production of antimony, her exports accounting for at least a quarter of the world's total. For tungsten she ranks fourth with 7 per cent., but her output of this mineral is increasing steadily. Exports of tungsten are almost equal to the total production of the United States, the chief purchaser. Bolivia's other metals are not so abundant as to play any important part in world production. The greater part of her copper comes from the region of Corocoro, near La Paz, and conveniently near the railway to Arica. The output of lead and zinc ores tends to diminish, and there is very little gold. Bismuth occurs in close association with the tin of the La Paz and Potosi districts. There are reliable indications of the presence of crude petroleum and natural gas in a zone extending northward from the oilfield of north-west Argentina along the eastern front of the Cordillera into Peru and Ecuador. Exploitation of these resources was in the hands of the United States Standard Oil Company until the concession was cancelled in 1937. It is now the concern of Bolivian National Oil Deposits, a State monopoly, and the oil is piped by a German-built line to a refinery in Paraguay. Some oil also goes to Argentine refineries under an agreement of 1938, and a similar agreement is in force with Brazil.

Agriculture. Agricultural products figure only to a very limited degree in Bolivian commerce. The chief crop which yields an exportable surplus is coffee, cultivated in the upper valleys of the Eastern Cordillera. From the same region coca is exported to neighbouring republics. There is also some production of quinine and cocoa. Among the cereals grown the

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chief is rpaize, which can be raised generally throughout **the** country. At higher altitudes temperate crops, such as wheat, barley, and oats, are cultivated. In the Amazonian lowlands of the north-east rice is grown, and at one time rubber was an important product accounting for about a quarter of the country's total exports by value. In the Chaco lowlands of the south-east cotton is of increasing importance. Another native of the tropical New World, the potato, is grown generally throughout the country. The lower eastern pastures yield hides of which there is some export. Those of the altiplano provide a small export of wool, partly from the sheep of the southern part of the country and the neighbourhood of Lake Titicaca, and partly from the llama, alpaca, and vicuna, natives of the region.

But the need for a broadening or even readjustment of the national economy is imperative. Hitherto little use has been made of the navigable rivers which constitute the natural outlets for the agricultural regions. The vital problem for Bolivia is the human factor. Not only are the eastern lowlands sparsely peopled, but the native Indians do not as yet enjoy the status accorded to those of Peru. The only commodity in which Bolivia excels is tin. Her basis for trade with her neighbours is therefore slender.

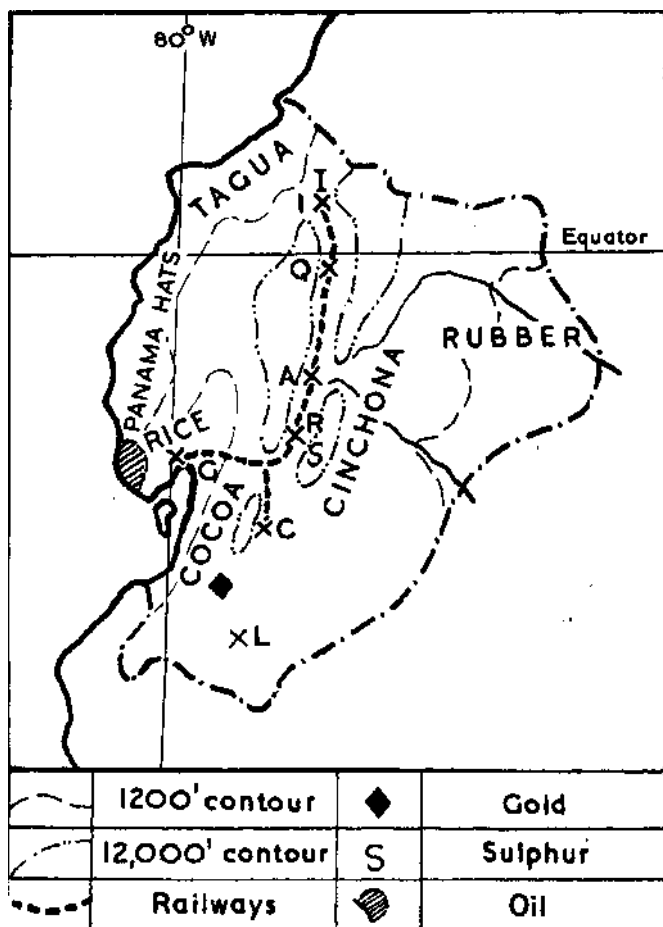
CHAPTER XV

ECUADOR

TOWARDS the end of the fifteenth century the Indian Kingdom of Quito was conquered by the Incas of Peru, thus marking the northward limit of the advance of the great Inca Empire. Well before the end of the century Spanish settlements had been established among the headstreams of the Napo river, of which the chief were at Archidona, the local capital, and Tena, the 'gateway to the lowlands,' both founded in 1560. These settlements in the Oriente were, however, dependent, economically and politically, upon Lima rather than upon Quito. This geographical fact contributed ultimately to the lowlands of the Oriente being awarded in 1938 to Peru instead of to Ecuador.

Central Uplands. In Ecuador the Andean system is much narrower than in Peru and Bolivia. The Ecuadorean Cordillera extends from the mountain complex of Loja, near the Peruvian border, to that of Pasto, which is just within Colombian territory. The inter-Cordilleran plateau is enclosed between the two ranges which here constitute the famous 'avenue of volcanoes' forming the physical backbone of the country. The greatest of the volcanoes is Chimborazo (20,702 feet high). Minor mountain complexes break up the surface of the intermontane depression into a series of basins. Before the Spanish conquest Indian settlements had developed on the cultivable lands of these basins of which the most important was that of Quito. The Quito basin is crossed by the equator, and lies at a height of 9500 feet. Its natural drainage is north-westward to the Pacific by the headstreams of the Esmeraldas system, at whose mouth is the port of the same name. The economic outlet for the Quito basin is therefore southward to Guayaquil by way of other inter-Andean basins and particularly that of Ambato. From both Quito and Ambato the Oriente can be reached by mule tracks, and a railway has been projected.

Temperatures are considerably moderated by the great altitude of the basins, although this decreases southward from the equator. Rainfall also, abundant in the north, decreases until



A — Ambato
I = Ibarra

C = Cuenca
L = Loja
R = Riobamba

G = Guayaquil
Q = Quito

FIG. 48. ECUADOR

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semi-arid conditions obtain in the southerly basin of Cuenca. The rain is brought to the eastern slopes of the Cordillera by winds from the Amazon basin. Thus these slopes receive heavy rainfall throughout the year. The western slopes, on the other hand, receive their rainfall from the Pacific during the first half of the year. Temperate cereals are cultivated, but the crops of maize, wheat, and barley are insufficient to supply local needs, and imports, particularly of wheat, are necessary.

The Ecuadorean Andes are not rich in minerals. Gold has been the principal of such resources since the Spanish invasion, and its importance increased with the finding of quicksilver in the middle of the sixteenth century. The gold-mining centre is near Loja, at Zaruma. Small quantities of lead and iron are also found. Copper is now the most valuable mineral produced, and ranked in 1943 fourth on the list of Ecuadorean staples. A hydro-electric installation is in operation near Quito.

Occidente : Costa. The surface to the west of the Cordillera descends irregularly to the coast, being interrupted by spurs projecting from the main mountain system. The coast itself bears evidence of recent subsidence following the emergence in Quaternary times of the Cretaceous deposits which are widely developed in the hinterland. North of the equator the main drainage system is that already mentioned originating in the basin of Quito and entering the sea at Esmeraldas. The frontier river, the Mira, drains the basin of Ibarra. To the south the rivers of the Guayas system flow from north to south to enter the sea in the Gulf of Guayaquil. This drainage system is separated from the west coast by a series of low hills of Cretaceous formation. Climatically also the littoral is divided near the equator. Throughout the whole of the Occidente the amount of rainfall received diminishes westward. The extreme west, south of the equator, is practically desert. Elsewhere a rainy season of six months alternates with an equal period of drought, the differentiation becoming less marked towards the north.

The northern part of the littoral is densely forested. Mangrove swamps occur along the coast particularly in areas of estuarine alluvium. Hardwoods of types characteristic of the selvas are found in the forests but, owing to the dearth of labour, capital, and means of transport, they are not exploited. Wild rubber is obtainable from castilloa-trees, as well as vegetable ivory from



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the nuts of the tagua. The 'Red Bark' cinchona tree of this region is the richest of its kind. To the south of the equator these forests are extended in the interior at elevations of more than two thousand feet as far as the Rio Guayas estuary.

In the arid coastlands, between Punta Galera and the peninsula of Santa Elena, little cultivation is possible. A notable product, however, is toquilla straw, from which Panama hats are niafe. Petroleum is a more important and more promising product of the Santa Elena peninsula. The oilfield is a continuation of that of northern Peru on the opposite shore of the Gulf of Guayaquil. Production is mainly in the hands of Anglo-Ecuadorean Oilfields and Ecuador Oilfields, and the export of crude petroleum, amounting to about a quarter of a million tons annually, represents almost one-eighth of Ecuador's foreign revenue. Competition is possible in the future from oilfields in the Oriente, where the American Standard Oil and the Royal Dutch Oil Companies are prospecting and exploring for a pipe-line route.

In the moister deltaic lowlands of the mouth of the Guayas river and the eastern shores of the Gulf of Guayaquil rice is an important crop. The cocoa cultivated in this region is of exceptionally fine quality. It is grown on Puna Island within the Gulf, and in the Jambali district on the southern shore. In recent years witchbroom disease has afflicted the plantations, and the output of this staple of Ecuadorean economy has declined. Resistant strains have been introduced, and with the aid of irrigation in the zone of seasonal rainfall the production of both rice and cocoa could be increased. Both crops afford important exportable surpluses. The rice goes almost entirely to the lands of Central and South America and the Caribbean Sea. The chief markets for the cocoa are Holland and the United States. Ecuadorean tobacco, a Government monopoly, is second in quality only to the Cuban from which seed it is derived. The best grows near Esmeraldas and to the south of the Gulf of Guayaquil. There is no export at present.

Sierra. Agricultural development is also possible in the uplands in the hinterland of the littoral, where the rainfall, although seasonal, is more abundant. On the mesas of the valley sides in the sierra zone the level tracts are cultivable. The light brown soils derived from Tertiary sandstones found at higher levels are fertile, and even in the dry season the air is humid.

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Cane-sugar is cultivated and refined locally on the small holdings where it is grown. Coarse brown sugar and rum (*aguardiente*) are produced. Bananas are the chief fruit grown, the surplus supplying the Chilean market. Some oranges also are exported. The cultivation of a wide range of tropical and semi-tropical fruits is considered possible, and sisal has been grown successfully.

The forests yield a variety of hardwood timbers, among which are mahogany, *lignum vitae*, and balsam. There is but little exploitation of these resources, although small quantities of these timbers are exported to neighbouring countries. War-time demands made balsa wood the most valuable of Ecuadorean timbers, the value of its production in 1943 being exceeded only by that of rice and cocoa. Much of the produce of the interior finds its way along to the coast on rafts of balsa wood. Its qualities account for the great demand for it in the United Kingdom, where it is used in the construction of aircraft. Other wild products of the forests are rubber, cocoa, cinchona, and kapok, of the last named of which there is some export.

Cattle are bred on the upland pastures. The export of hides, skins, and animal wool has declined and is now non-existent. With Chile, however, Ecuador is one of the three South American countries which do not need to import butter. The other country is Argentina, which has an exportable surplus of butter.

Oriente. There is as yet very little development of the territory to the east of the Eastern Cordillera. The land is difficult of access and inhabited by primitive Indian tribes. Those of the south are unsubdued, but the Indians of the Napo river are amenable to government. Their economy is partly agricultural, their cultivated crops including the banana and *Manihot utilissima*, from which tapioca is obtained. In the forests hevea rubber and cocoa grow wild, as well as coca and cinchona, which are characteristic of the Montana region to the south. Excellent coffee is grown near the settlements, and in 1943 it ranked fifth for total value of production. It is one of the more important of Ecuadorean exports, and its sales abroad may be expected to expand.

The Napo river district is notable for indications of the presence of petroleum. (See p. 230.)

Trade and Industry. The United Kingdom's share of Ecuador's trade is small, amounting to a little more than 1 per cent.

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of the exports, and 6½ per cent, of the imports. Half the country's imports are supplied by the United States, which country takes over 60 per cent, of the exports. It is also noteworthy that in 1943 Ecuador's imports were worth about two-thirds of the exports. The needs of the country are, however, in lines which the United Kingdom may well supply—agricultural and milling machinery and high grades of manufactured textile goods. Railway and mining equipment are also needed. Industrial development may be looked for in the manufacture of the cheaper grades of textiles to replace the trade formerly supplied by Japan. Oil-refining is already in operation, and there is some refining of copper. An attempt has been made to extract tannin from mangroves, and there are prospects of a cellulose industry being set up. The Pan-American Financial Congress of 1920 recommended the protection of Ecuador's industries by means of tariffs, and the recommendations were embodied in the laws of the country.

Among the Andean republics Ecuador is exceptional in that her productivity is predominantly agricultural. But for balsa wood, for which she at one time enjoyed almost a monopoly of production, none of her staple agricultural products can exercise a ruling influence on the world's markets. Ecuadorean coffee and cocoa are, however, of supreme quality, and so may be relied upon to sustain a steady demand for high-grade materials. Both Oriente and Occidente are endowed with fertile soils, and great variations in elevation make for a generous range of cultivable crops. These may be exported to meet not only the requirements of expanding overseas markets, but also the needs of domestic manufacturing industries.

Routes. The uplands of Ecuador lie on the natural route from the Caribbean coast to the Chaco lowlands and beyond. This route leads up the Cauca and Magdalena valleys to Quito and Cuzco. A trail in colonial times followed this route. The Ecuadorean section of the Pan-American Highway is not yet complete. The harbour at Guayaquil, among the best along the entire Pacific coast of the continent, is connected by railway to Quito, and a further line is projected to the port of Esmeraldas.

CHAPTER XVI

COLOMBIA

THE Viceroyalty of New Granada was established towards the end of the eighteenth century, and included the Audiencias of Quito and Santa Fe de Bogota.

The secession of Panama was caused by the failure of Colombia to ratify the treaty made in 1902, by which the Canal Zone was to be purchased by the United States of America, who had already agreed to buy out the French company that had the work in hand. A route for an inter-ocean canal on Colombian territory is to be surveyed by an agreement of 1948 with the United States. Recent boundary disputes with Venezuela have been concerned with territory expected to yield petroleum.

People. The total population numbers nearly ten millions, of whom half are Indians, the remainder being whites or mestizos in about equal proportions. The Indians are in the main of Chibcha stock, and are most numerous in the Andean region and in the east of the country. They are cared for by Jesuit missions. Some Negroes are found in the coastal lands, where they are better able than the Indians to endure the debilitating climatic conditions.

Position. Nearness to the Panama Isthmus was from the earliest days of the Spanish conquest a vital factor in the strategic importance and economic prosperity of Colombia. Even before Pizarro had established his capital at Lima, a Spanish engineer in 1530 put forward a proposal for cutting a canal across the isthmus. The densely forested swamps of the coastal lowlands were an effective barrier to the development of a land route leading southward from the isthmus, and to-day the most convenient mode of travel from Colombia to Central America is by boat from the Gulf of Uraba. The Colombian hinterland, moreover, yielded gold, which is still the country's third most valuable export, and the Chibcha legend of El Dorado continued for not a few centuries to lure prospectors into the hinterland. Panama is still a paramount influence in

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Colombia's external relationships, and the loss of the territory is mitigated not only by the proximity of her twin seaboards to the routes converging upon the Canal, but also by her possession of virtually limitless natural aerodromes in the llanos.¹ (See p. 112.) Internal air developments were before the Second World War almost entirely in the hands of Germans. Another German concern was the only firm engaged in building ships for river and coastwise traffic. The harbour at this port has been improved recently by deepening. German-Colombian Trade Agreements were made in 1936, 1937, and 1938. The most important of the Colombian products concerned was coffee, which was, however, resold against free exchange.

Internal Routes. The earliest trails inland from the coast followed the valleys of the Cauca and Magdalena rivers. The former is navigable as far as Carceres, the latter to La Dorada, where the streams are impeded by rapids. Both valleys converge upon Pasto, and the trails continued southward to Lima on the one hand, and to the Parana valley on the other. Simon Bolivar's Highway is followed by a modern road as far as Bogotd. This Trans-Andine Highway crosses the Magdalena river at Honda and continues to Medellin. The Cauca valley is noted at p. 107.

There is as yet no trunk railway system in Colombia. Nearly all the lines are of narrow gauge, and for the most part railway transport is ancillary to river navigation. The principal exception to this latter rule is the line from Buenaventura over the Western Cordillera to Cali, in the Cauca valley, and Popayan. This route brings the southern plateau region into direct relation with a port. Most of the remaining systems were built to circumvent rapids on the rivers or to enable upland centres to have communication with the rivers. One line, however, connects the Cauca and Magdalena valleys: the Antioquia Railway crosses the Cauca river to reach Medellin and continues to Puerto Berrio on the Magdalena river. Another line to connect the two valleys is projected from Ibague, continuing that already in operation from Girardot where the Magdalena is bridged, to Cartago on the Cauca river. From Cartago the Caldas Railway to Manizales enables traffic to avoid rapids.

¹ " Within the past few weeks the discovery was made of secret air landing-fields in Colombia within easy reach of the Panama Canal."—President Roosevelt, in a wireless address, September 11, 1941.

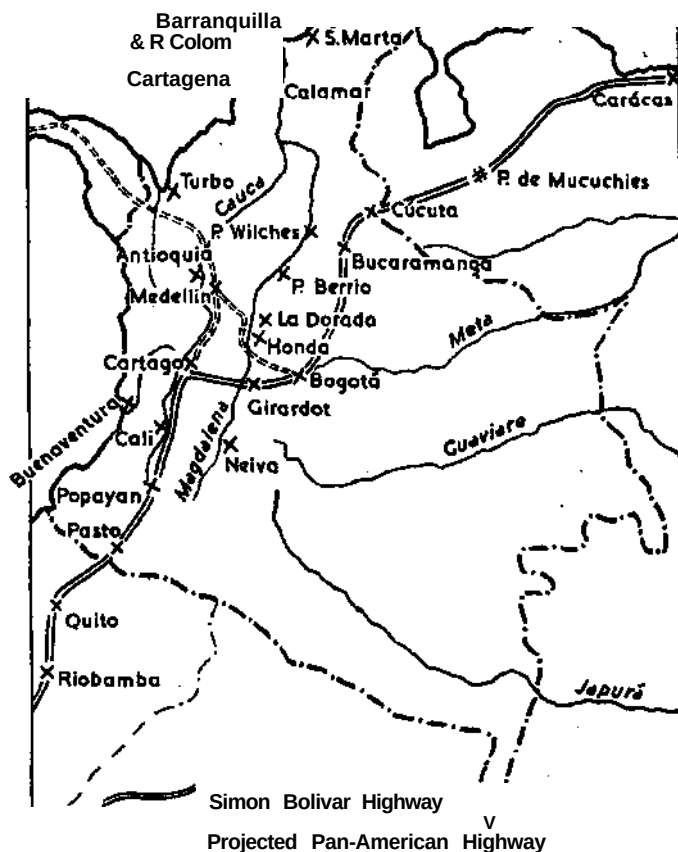


FIG. 49. COLOMBIA: TRANS-ANDINE HIGHWAY

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The projected railway will thus enable Buenaventura to serve as a port for the upper valleys of both rivers. Bogota, the capital, has lines running northward for a short distance across the plateau, and is connected to the Magdalena river at Girardot, whence a branch follows the river southward to Neiva. Farther down Puerto Wilches is joined by railway to Bucaramanga. Of the Caribbean ports, Cartagena has a short line to Calamar, on the Magdalena river, and this is continued to Santa Marta. Barranquilla, at the mouth of the river, has railway connexion with the small port of Puerto Colombia. In 1931 the National Railways Council was established to co-ordinate these various systems and to develop a unified national network.

Pacific Colombia. From the Nudo de Pasto, in the extreme south of the country, the Andes extend northward across Colombia in three great Cordillera. In the western and central ranges the crystalline core is exposed, and the Cretaceous and Tertiary flanks bear evidence of considerable volcanic activity and igneous intrusions. Cretaceous and other Mesozoic sediments are characteristic of the Eastern Cordillera. Like the broad features of the relief of the country, the natural drainage also radiates from the Nudo de Pasto. There is evidence of subsidence along the Colombian Pacific coast similar to that farther south in Ecuador, but there has been geologically recent re-elevation of the Caribbean coast.

Because the Western Cordillera are crossed by roads and railways using fairly easy passes, the middle and upper portions of the valley of the Cauca river belong rather to Pacific than to Caribbean Colombia. The valley of the Patia river, however, leads to the high semi-plateau region of Pasto whose surface, not having suffered dissection by glaciation, offers no further prospect of a transverse route. To the north the Cresto de Gallo, in the Western Cordillera, behind the port of Buenaventura allows a railway, climbing only to five thousand feet, to reach Cali, on the upper Cauca river. The crest of the Central Cordillera marks the effective boundary of the hinterland of the port of Buenaventura.

The coastal lands are swampy and are covered by dense mangrove forest. Little economic exploitation is possible, although, as noted in Ecuador, some tannin extract is obtained from the mangroves, but more particularly from the Caribbean coast. There is a small tannin extraction industry at

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Buenaventura. This port has the advantage of possessing a good harbour on the Bahía del Chocó. Its access to a hinterland of well-varied geographical conditions promises some increase in its importance for trade. The sierra zone produces cocoa and bananas. The gravels of the river valleys yield platinum and gold. Colombia is the leading South American country for production of gold, her output being about double that of Peru or Chile. At higher levels than the cocoa plantations of the sierra, coffee is cultivated on the sides of the upper Cauca valley. There is also a little coal found here. This coal is, however, difficult to reach, and is of inferior quality. The altitude of the upper Cauca valley makes it suitable for habitation by white people, and it has been suggested that cotton might be raised here where the rainfall is less than it is on the lower lands of the coast and Atrato-San Juan depression.

Magdalena Valley. Between the Central and Eastern Cordillera a fault depression forms the middle and upper portions of the Magdalena valley. The tributaries descending rapidly from the steep slopes on either side, therefore, deposit large quantities of detritus, which impede the course of the main stream. (See p. 100.) Above the rapids no great settlements have developed along the river itself. The obstacle to communications presented by the Central Cordillera has made the middle and upper valleys economically tributary to the Caribbean coast. Economic development has been retarded by the isolation of these regions, but some cocoa and coffee are cultivated on the lower and upper slopes respectively. Cotton also, as in the upper Cauca valley, may be introduced when transport facilities are improved. Below La Dorada the Magdalena valley merges with the Caribbean coastal lowlands.

Caribbean Colombia. The Caribbean coastlands of Colombia extend from the Gulf of Urabá to the Goajira peninsula. Inland they include the lower valley of the Cauca-Magdalena systems, and the valley of the Cesar river, which flows south-westward from between the Sierra de Perijá and the Sierra Nevada de Santa Marta to join the Magdalena. The whole of this confluence region is swampy and liable to inundations from all three rivers. The surface is covered by innumerable shallow lakes, of which Lake Zapatorá is the largest, which receive the flood waters. Within this coastal region there are considerable

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climatic variations associated principally with the incidence of winter rainfall. The Darien coast, south-westward from Cartagena, which includes the valley of the Sinu river, suffers from marked drought in winter, as does the Goajira peninsula. Between these two dry regions the plains around the mouths of the rivers, the Cesar as well as the Cauca and Magdalena, receive a more even distribution of rainfall, although here again summer is the wetter season.

The wetter part of the coast itself is under mangrove swamp. On the drier coastlands *divi-divi*, a leguminous tree of the open forest, yields pods containing a tanning extract in place of the mangrove tannin of the moister regions. Another product of the drier open forests is *chicle*, from which chewing-gum is made. There is a small output of mahogany from the tropical forests, as distinct from the mangrove swamps, where, owing to the excess of water, the timber would be fibrous. Sugar cane is cultivated near the coast where the bright sunny periods of the dry season favour the conversion of the sugar. Bananas are also an important crop for export. The risk of hurricanes when the fruit is ripe is avoided by exporting it green to overseas markets, particularly the United Kingdom, where it is allowed to mature in storage. A little cotton is grown near Barranquilla, and its cultivation could be extended to the drier regions. In these regions cattle-rearing is carried on, the chief centres being in the valleys of the Cesar and Sinu rivers. The future development of this activity demands the provision of refrigeration facilities at the ports within fairly easy reach of these pastures. The Goajira peninsula is even drier, and is inhabited mainly by Caribs who are semi-nomadic pastoralists.

After coffee, which accounts by value for about half of Colombia's exports, petroleum comes second. There is a number of small oilfields on the fringes of these northern lowlands. The chief of these is the Infantas field near Barranca Bermeja in the Magdalena valley. Others are at the head of the Gulf of Urabá and near Ciicuta on the Venezuelan frontier. The oil is, however, somewhat difficult of access since the earth movements which were responsible for the recent elevation of the region have trapped the oil-bearing sands in restricted hollows. The oil of the Infantas field is piped to Cartagena, near the mouth of the Magdalena river, and to Lorica, on the Sinu river. A recent development in the oil industry is the

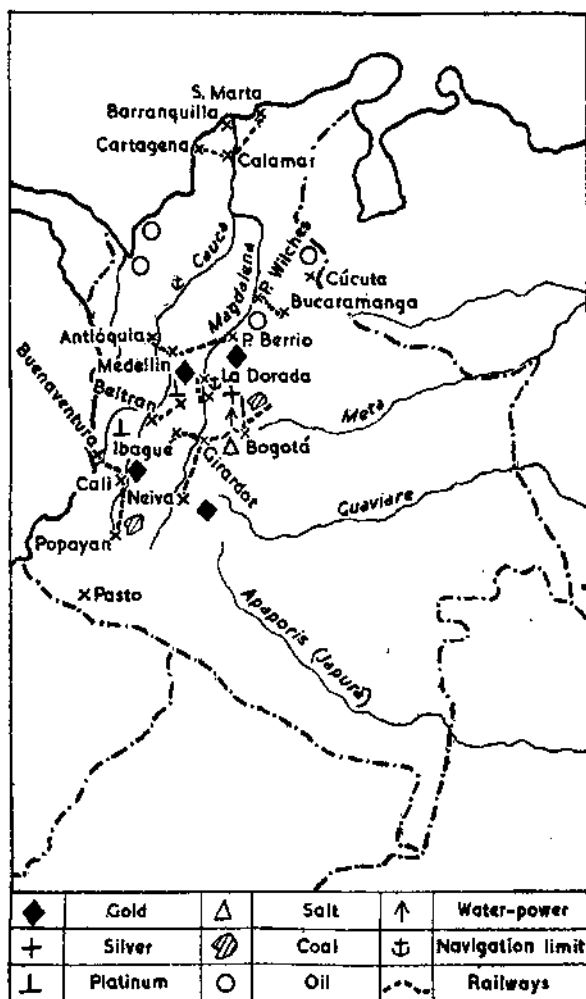


FIG. 50. COLOMBIA: MINERAL RESOURCES

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granting of a concession to the Royal Dutch Shell Oil Company, under which twenty new wells were drilled in 1944.

Eastern Plateaus. The greater proportion of the white inhabitants of Colombia live on the high plateaus of the Eastern Cordillera and their extension in the Sierra Nevada de Santa Marta. The national capital, Bogota, is situated at a height of 9000 feet above sea level. The Paramo resembles moorland with heath and shrubs and coarse grass. Its rival city is Medellin, in the Cauca valley, which is the commercial centre of the country, situated at a similar altitude. Near the areas of densest

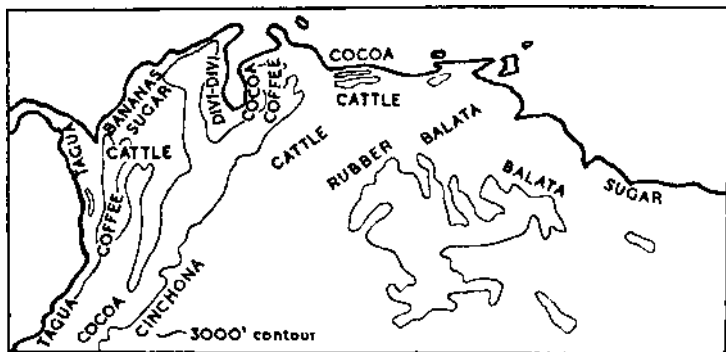


FIG. 51. NORTH-WEST ANDEAN REGION: AGRICULTURAL AND PASTORAL PRODUCTS

population these grasslands have given way to cultivation. Temperate cereals are cultivated in these fertile soils, the chief crops being maize, wheat, and barley, as well as potatoes. The pastures support goats, which are kept for their meat and milk. There is not much rearing of sheep. In a situation somewhat similar to that in the upper valley of the Cauca river there is a small coalfield in the Cretaceous measures of the plateau to the north of the capital. The quality of the coal is not good, and a more important source of power in this locality is a hydro-electric installation near Bogota. The world's chief source of emeralds is at Muzo, in the upper valley of the Carare river, a tributary of the Magdalena a few miles due north of Bogotd.

Llanos. The plains beyond the Eastern Cordillera are drained by a number of streams which flow in a general south-easterly

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direction to the Orinoco and Amazon rivers. The low watershed between these two drainage systems crosses Colombia from the Eastern Cordillera near Neiva almost due east. The chief Colombian rivers of the Orinoco system are the Meta and Guaviare. The principal river of the southern plains is the Caqueta, later known as the Japura before it joins the Amazon in Brazilian territory. As the main Orinoco-Amazon watershed is approached the natural grasslands, or llanos, of the Meta plains give place to the tropical forests of the Caqueta basin. Similar forests are to be found on the Cordillera slopes fringing the llanos, but as altitude increases the type of forest is graded through sub-tropical into temperate. The principal timber trees of the moister, tropical, evergreen forests are mahogany and Spanish cedar. Deciduous trees are characteristic of the forests where the incidence of rainfall becomes markedly seasonal, *lignum vitæ* being a typical timber in such regions.

From the time of the merchant Federman to that of the Liberator, Bolivar, the natural highway to Colombia lay across the Meta plains. Travel is not hampered by the density of the vegetation, and this region has also the advantage of a dry season when the surface is free from inundation. In Spanish colonial times ships could sail for some distance up the rivers aided by the prevailing north-east trade winds. The outward margin of the Cordilleran foothill region, however, is marked by rapids and waterfalls, which prevent navigation. The llanos of the Meta plains and the forests of the *llanuras* of the Caqueta basin are, therefore, isolated physically from the rest of Colombia by the Eastern Cordillera and politically by the interposition of Venezuela between them and their natural outlet to the Atlantic. Near the rivers the soils of the llanos are alluvial while over the greater part of the area they are derived from Quaternary sediments. They are therefore suitable for pasture or for agricultural development if given adequate relations with the more populated parts of the country and with the ports on the Caribbean Sea.

Commerce. Hitherto at least a half of Colombia's trade, both inward and outward, has been with the United States of America, and for her requirements of foreign currencies Colombia has relied upon a very limited range of commodities—petroleum, gold, and coffee. Of these coffee is the most important, and in 1943 represented 85 per cent, of the country's total export to

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the United States, The need for a broader basis of national economy has been recognized by the Government in the foundation of the Instituto Nacional de Abastecimientos.¹ The Institute assists agriculturists with technical advice in matters of production, standardization, and marketing. An agricultural Five Years Plan was inaugurated in 1945. It is hoped that, as a result of the disappearance of the Hamburg market in consequence of the war, the centre for European trade will move to London. Much of the exploitation of the country's resources in petroleum is in the hands of United States capital, and the output goes for refining to Netherlands West Indies islands and to Canada and the United States.

Machinery, and particularly that for textile production, is obtained from the United States, but for manufactured textiles British goods are preferred. Expansion of export trade to the United Kingdom may also be looked for in coffee—the mildness of the Colombian product being in its favour—in cocoa of high quality, and in bananas.

¹*Abastecimientos* = provisions.

CHAPTER XVII

VENEZUELA

VENEZUELA was given its name by the earliest Spanish explorer, Ojeda, who in 1499 found the native Indians living around the shores of Lake Maracaibo in dwellings built over the water on piles in a manner reminiscent to later anthropologists of the prehistoric lake dwellings of Switzerland. To-day the shores of the Lake (from which the name first given to the land extended eastward over the Spanish *audiencia* of Caracas) are the economic focus of the country by reason of their great resources of petroleum. As in Colombia, the United States of America has the predominating interest in both the export and import trade of the republic, although to a less marked degree than in the former country. The United Kingdom figures to a larger extent in Venezuelan trade than in Colombian, sharing with the United States most of the export of petroleum.

The total population numbers about four millions, of which about three millions are Indians or mestizos. As in early Spanish colonial times, the Indians are under the care of Jesuit missions. On the coast Negroes are found, but the type is not pure-blooded. Immigration of Europeans is encouraged. In 1946 the Government declared its readiness to receive an annual quota of 50,000 agricultural immigrants, and came to an agreement with Italy to give preference to workers from that country. The reason for this shortage of labour on the land was given as the absorption of almost the total available manpower by the petroleum industry.

Maracaibo Depression. Venezuela is bounded on the west by the Sifra de Perija and on the south-east by the Parima and Pacaraima ranges of the Guiana highland plateau. The Maracaibo depression lies between the Sierra de Perija and the extension of the Sierra de Merida in the Lara and Faloön ranges. Petroleum and asphalt were first reported in this region towards the end of the nineteenth century. In 1907 the Government granted concessions to foreign companies, and to-day about half the foreign capital employed is that of the Royal Dutch

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Shell Oil companies, more than half the remainder belonging to the American Standard Oil Company. The first well was sunk in 1913 at Sucre, and in the following year production began at Mene Grande. Rapid developments date from the great discoveries of petroleum on the eastern shore of the Lake

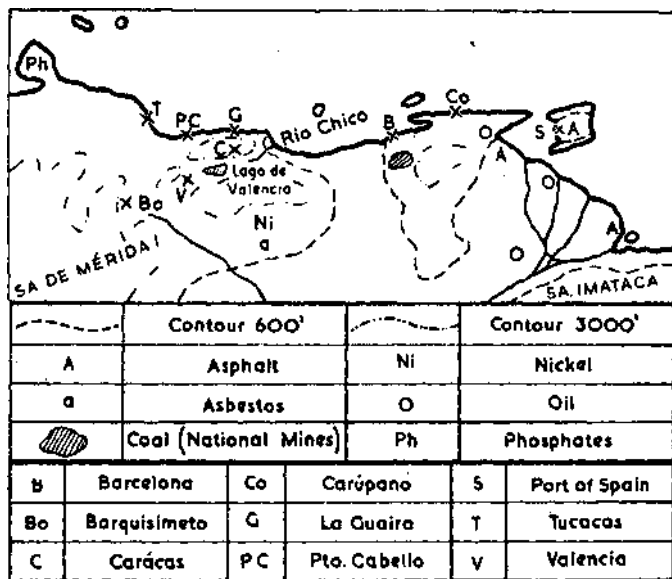


FIG. 52. VENEZUELAN COAST REGION

in 1922, and expansion of the industry to its present proportions occurred four or five years later. Much of the crude oil is sent to Curacao and Aruba for refining, the first shipments for this purpose having commenced in 1917. Some refining is done on Venezuelan territory, as, for example, at San Lorenzo. The principal purchasers of Venezuelan oil are the United Kingdom and the United States. In 1938 Venezuela was the third of the world's oil-producing countries, the leader being the United States. The output of the Russian fields was only slightly greater than that of Venezuela (and in the following year slightly less).

The whole of the eastern shore of the Lake is now one vast oil-field, and the greatest production is from the wells of Mene Grande. From here the oil goes by pipe-line to San Lorenzo.

SOUTH AMERICA

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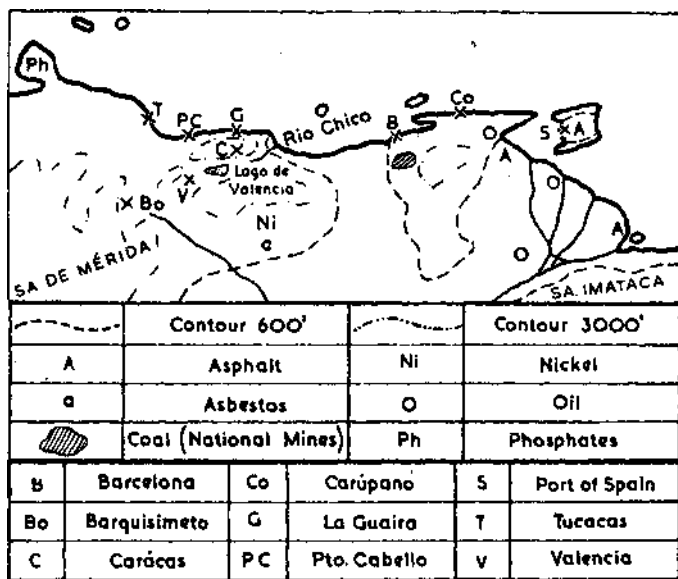


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VENEZUELA

Over a length of fifty miles the oil-field extends five miles inland and as much as eight miles beneath the shallow lake itself. The lake is shallow, and the entrance from the Gulf of Maracaibo is restricted by the Island of Toas, a result of recent elevation of the region. The petroleum deposits are derived from the great wealth of marine life which flourished in these warm shallow



OIL, DERRICKS IN THE MARACAIBO LAGOON

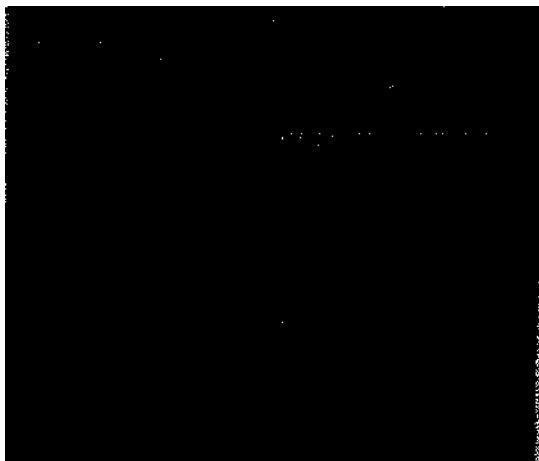
Photo E.N.A.

waters in Eocene times. No great coastal disturbance has occurred subsequently, as was the case in the Colombian oil-fields to the west. On the western side of the Lake petroleum is found at Concepcion and La Paz, near the port of Maracaibo.

Tankers can load with oil from pipes in the Lake, their size being restricted by the shallowness of the waterway into the Gulf, which at high tide is only fourteen feet deep. Outlets by railway will be available when the projected lines from Trujillo to Barquisimeto and from Tachira on the frontier to Ciicuta in Colombia are completed. The latter will then give connexion to Encontrados, the head of navigation on the Catatumbo river, and will afford an outlet for both the Venezuelan and Colombian sections of the frontier oil-field. In general, however, the Government is more interested in the provision of roads as competitors with the foreign-owned railways. The Venezuelan

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portion of the Simon Bolivar Highway is complete. A good road along the eastern shore of the Lake connects the oilfields, in succession from north to south, of La Rosas-Cabinas, Lagunillas, Bachaquero, and Mene Grande. At Mototan, near Trujillo, this road meets the Trans-Andine Highway from Carora and



AMNAY, A VENEZUELAN OIL-REFINERY

Note the housing project in the background.

Photo Paul Popper

Barquisimeto, which here begins to follow the upper valley of the Mototan river to a pass, the Paramo de Mucuchies, at a height of 14,000 feet, from which it descends by the upper valley of the Chama river to cross the frontier near Ciicuta.

Other petroleum fields which rival in output the Maracaibo fields are situated in the east of the country in the neighbourhood of the Orinoco delta (see p. 251). Asphalt also is obtained from these fields, which have a structural counterpart in the oil-field and asphalt lake of Trinidad.

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Cordilleran Venezuela. With the exception of Maracaibo the largest *settlements* in Venezuela are situated on the coast between the Golfo Triste and the Peninsula de Paria, and in its upland hinterland. The Andean Cordillera are continued eastward from the Sierra de Merida to the Peninsula de Paria and Trinidad, and a northerly extension covers most of the

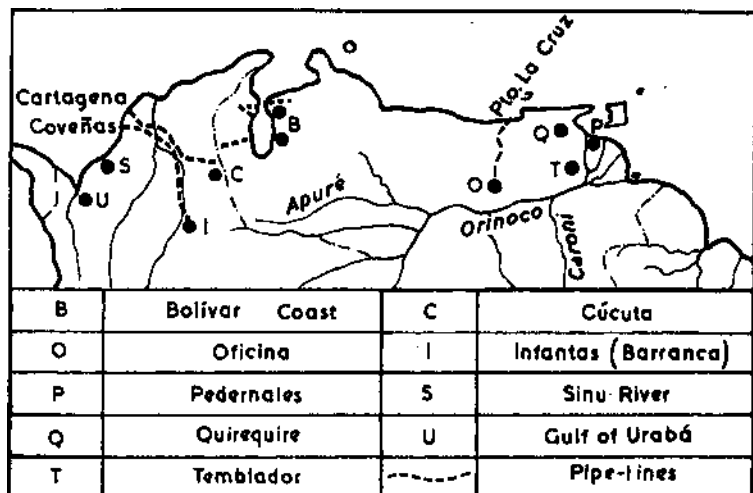


FIG. 53. COLOMBIA AND VENEZUELA: OIL-FIELDS

states of Lara and Falcon. The northern Cordillera of Venezuela are not, however, an unbroken range. In the west a gap occurs where the Orinoco watershed descends to the plateau region, from which the Cojedes river flows to the south-east and the Yaracuy river north-eastward to the Caribbean Sea. In the gap is the important town of Barquisimeto, the fourth largest in the country, while the ports for the region are Puerto Cabello and Tucacas. To the east faulting has resulted in the depression of the Lago de Valencia. In the region of the lake itself are Valencia, Venezuela's third largest town, and Maracay, while in the highland region nearer the coast is the capital, Caracas, a town of nearly a quarter of a million people, and its port, La Guaira. Farther east is the most considerable break in the Cordillera, named after its port, the Barcelona Gap, and drained by the Unare river. Near to it and on the coast is Cumaná, and

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on the Peninsula de Paria are the fairly large ports of Cariipano and Rio Caribe, serving the delta region of the Orinoco. The depression of the Lago de Valencia and the valley of the Rio Chico have their counterpart in the east in the lowlands of Trinidad and the submerged area of the Gulf of Paria.

Barquisimeto lies in the gap between the eastward-trending Caribbean Cordillera and the Sierra de Merida. It is the terminus of the first railway, the Bolivar Railway, built in Venezuela. The other terminus of this line is Tucacas on the coast, and there is a branch to Puerto Cabello. An extension is projected to Trujillo. This will follow the general course of the Trans-Andine Highway, and thus Barquisimeto is at the intersection of the highland route and the natural route of the Cojedes and Yaracuy valleys. By reason of the scanty rainfall, which occurs in summer, the region is one of savana and cattle-rearing is the main occupation of the people, giving rise to some export of hides from the ports. The establishment of a refrigerating industry has been attempted at Puerto Cabello, where there is a fairly good harbour, and which is on the Great Venezuelan Railway from Valencia.

The Valencia depression and the valley of the Rio Chico are also within the region of very moderate summer rainfall. The very narrow coastal plain is moister than the interior valleys, and is fringed, particularly in the swampy region of the state of Sucre, to the east of the Barcelona Gap, by tropical forests. The northern slopes of the Cordillera are also forested, and there is some extraction of mahogany. From the Barcelona Gap westward drier conditions prevail, and the forests are of a more open type, deteriorating ultimately into scrub. On drier soils the most important tree is Spanish cedar. The southern slopes receive less rainfall than the northern, and consequently do not support forests to any extent. As in Colombia, cacao is cultivated on the lower Cordilleran slopes, where the rainfall is adequate, and at higher levels, between 3000 and 6000 feet, coffee can be grown in climatic conditions suitable for Europeans. The cocoa is of a very high quality and capable of meeting the European demand for first-grade raw material. Coffee is the second most important export of Venezuela, although heavily overshadowed by petroleum. The proportion of coffee in the total value of Venezuelan exports is less than 5 per cent. Like cocoa, it is of high quality, and both products



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have to face British and Dutch competition in the world's markets, which before the war operated through Hamburg.

The chief agricultural region of Venezuela is the basin of the Ldgo de Valencia. Here irrigation is possible and the tropical red soils are very fertile. The marked dry season is, however, a considerable disadvantage. Both mgize and cotton are grown together in the same fields. The maize is sown at the beginning of the summer rains in May, and is, therefore, ready for harvesting in August, three months later. Cotton is sown in July, by which time the maize is well-grown, and can be picked in November. There are cotton-mills in the Basin at Valencia and Maracay, and in the capital, Cardcas. Sericulture has also been introduced during recent years. There is some export of fruit and vegetables to the neighbouring islands of the West Indies, a trade which has the unfortunate consequence of maintaining high prices for such necessities in Venezuela itself.

Apart from gold, which takes third place among Venezuela's exports, there is little exploitation of the mineral wealth of the Cordilleran region. In the north-western state of Falcon phosphates are worked. Nickel and asbestos occur to the west of the Barcelona Gap, and iron ore is mined in the highland east of the Gap, and in the Sierra de Imataca south of the Orinoco delta. Large deposits of coal, of similar geological age and formation to those of Colombia, are known to exist on the southern flanks of the Caribbean Cordillera in the state of Guarico, and there are small coalfields near Coro, at the southern end of the isthmus of the Paraguana peninsula, and near Barcelona.

The Great Venezuelan Railway, a broad-gauge line, runs from east to west along the Valencia depression and gives the region connexions with the coast at Puerto Cabello, in the west, and La Guaira, in the east. This line also serves the capital, situated at a height of 3000 feet behind La Guaira.

Orinoco Basin. With the exception of the extreme south of the Terniorio Amazonas, which is drained by tributaries of the Rio Negro, the remainder of Venezuela lying to the south and east of the Cordilleran ranges is within the basin of the Orinoco river. The southern frontier of the country with Brazil follows the Amazon watershed along the Sierra Parima and the Sierra Pacaraima. The southern portion of Venezuela extends over much of the Guiana Highland plateau. The lowlands extend

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from the basin of the Apure river in the west to the delta in the east. The course of the main stream swings eastward below the confluence of the Meta river and thus keeps close to the Guiana Highland. It is navigable as far as the Raudales de Atures, and the Apure river is navigable up to the 600-foot contour well above the confluence of the Cojedes river. Beyond the Raudales de Atures the Orinoco can be used for traffic to the Rio Negro by way of the Cassiquiare Canal. The rivers of southern Venezuela, therefore, assist in the penetration of the interior once the swamps of the delta are passed, and the prevailing trade-winds were also in favour of shipping using these routes in Spanish colonial times to approach New Granada. The dry season lowers the level of the water, however, and increases the difficulties of the rapids of the lower Orinoco at Boca del Infierno and Maipures.

The natural vegetation of the river valleys is tropical forest, and the trees yield rubber and balata. There is little exploitation of these products, and the swampy character of the delta region is adverse to the development of a port. A railway has been proposed to avoid the difficulties of navigation between Atures and Maipures, but there is as yet no demand for additional means of transport. Apart from the river valleys the rest of the Venezuelan basin of the Orinoco is savana, merging into brushwood and forest in the moister regions near the Cordillera. Cattle-rearing is the main human activity, and the chief centre for trade is San Fernando de Apur6; from which point routes lead north-westward over the Cordillera. On the lower Orinoco is Ciudad Bolivar, formerly called Angostura, the capital of the Liberator. From this city a route leads northward through the Barcelona Gap to the coast and thus provides an additional outlet from San Fernando de Apur6. The mesas, or low plateau terraces, in the Apure region, with their drier soils, support only coarse grasses unsuitable as pasture.

In the east of the lowland region oil-fields of recent development have rapidly become of great importance. In 1924 petroleum was obtained from a newly opened well at Quirequire, in the lowland immediately to the west of the Gulf of Paria. The oil was exported from the small port of Cacigito. Ten years later oil was produced at Pedernales, on the south-eastern shore of the gulf, and three years later at Temblador, almost due south of Pedernales, in the neighbourhood of

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Bermudez Lake. As in Trinidad at Lake Brea, asphalt occurs in these oilfields. The chief centre of the eastern Venezuelan petroleum industry is now Qficina, to the north of Ciudad Bolivar. From here the oil goes by pipe-line to Puerto la Cruz, near Barcelona, and a railway to connect the two places is projected. A British company has been granted a concession



LA GUAIRA AIR-PORT

The Constellation aeroplane belongs to Venezuela's Linea Aeropostal.

Photo Paul Popper

to drill for oil beneath the shallow waters of the Gulf of Paria, where, as in Lake Maracaibo, the absence of tides and currents permits such operations. In 1946 this company was producing marketable quantities of both petroleum and natural gas.

Commercial Development. In 1934 petroleum accounted for a little more than 90 per cent, by value of the total of Venezuelan exports. This commodity is bound to maintain its lead over the rest of the country's production for a very long time to come, and future developments will result in a rapid increase in the total quantity available for export. Much of the capital engaged in the industry is British. As in the region of Lake Maracaibo,

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the extension of oil production in eastern Venezuela will stimulate in the lower Orinoco valley the development of modern means of transport. With this development the decline in cattle-rearing and trading may be expected to be checked, and the Government is actively encouraging agricultural pursuits in the Valencia basin. Both cotton and maize, although grown together in the fields, are crops which rapidly exhaust the soil, and the burning of vegetation during the dry season accentuates" the impoverishment by removing the nitrates from it. Phosphates are, however, available in the state of Falcon. With the closure of the Hamburg market and *entrepot*, the wider resources of London may be expected to attract increasing supplies of the high-grade cocoa and coffee for which Venezuela has a sound reputation. The refrigerating industry of Puerto Cabello needs, for its revival and extension to other Caribbean ports, more adequate transport facilities than are at present available, and political security for the foreign capital invested in it. Despite the disadvantages of distance the United Kingdom before the Second World War was able to supply more than a quarter of Venezuela's needs in imports. The chief requirements are in such classes as mechanical vehicles, iron and steel goods, and cotton textiles. The share of the United States amounted to nearly a Kali of the total imports. Pan-American Airways maintain coastal services connecting the capital and Caribbean ports with Port of Spain, Barranquilla, and the northern continent. The Government-owned Venezuelan National Airways serve the interior centres, and the oil companies maintain private air services between the oilfields and inland centres.

Although structurally Venezuelan, the island of Trinidad is treated with the West Indies in the author's *North America* (second edition, chapter VII).

CHAPTER XVIII

THE GUIANAS

EACH of the world's three great colonial empires is represented in the small portion of South America that is not independent. The British, Dutch, and French colonial empires are the only ones that reach a total population of more than sixty millions, and each has a share in the Guianas. The Dutch were the first of these three countries to take an active interest in the commercial exploitation of the Guiana coastlands and, within a hundred years of the first sighting of them by Columbus in 1498, had established themselves in trade in this region. By 1616 the Dutch had established settlements at the mouths of the Demerara and Essequibo rivers and at 'Kyk ober al' at the confluence of the Cuyuni and Mazaruni rivers, which share the estuary of the Essequibo. During the next forty years they had expanded their settlements north-westward along the coast as far as the Pomeroon and Maruca rivers, having as early as 1624 pushed eastward and established themselves at the mouth of the Berbice river.

In the meantime British and French traders had established themselves on the rivers to the east, and in 1652 there was an English settlement at the mouth of the Surinam river, and French posts at the mouth of the Oyapock river and at Cayenne. The English settlement was extended in both directions along the coast by virtue of letters patent from Charles II relating to the territory between Coppename and Maroni rivers. These lands were, however, ceded to the Netherlands at the Peace of Breda, in 1667, in exchange for the Dutch settlement on the Hudson River, now New York. Thus the French were left in possession of their present coast from the Oyapock to the Maroni rivers, and the Dutch held the coasts of the present Dutch and British territories.

This partitioning of the Guiana lands persisted for more than a century, although within the Dutch possessions administrative changes took place. The first Dutch West India Company had been founded in 1621 and established its headquarters on the

THE GUIANAS

Essequibo estuary. In 1674 the New Dutch West India Company replaced the former and was granted a charter in 1682. The former British territory of Surinam was placed under a separate chartered society. During the next hundred years, however, the three chief Dutch settlements, on the Berbice,

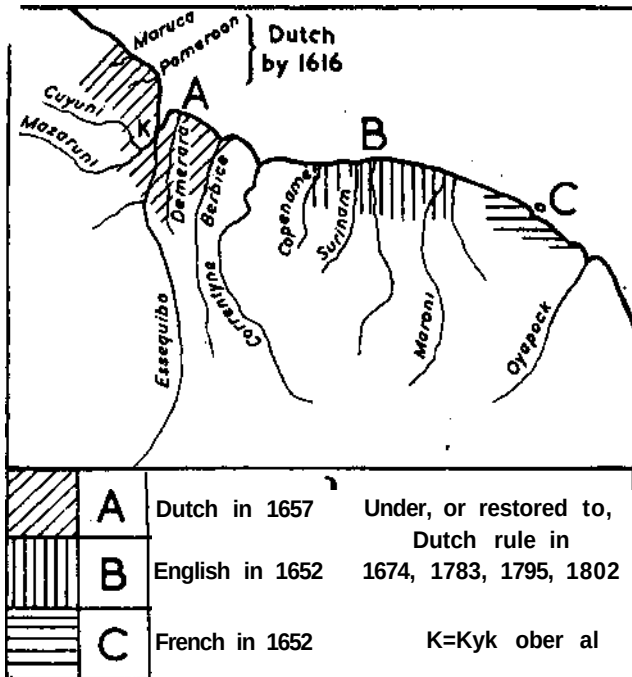


FIG. 54. THE GUIANAS

Demerara, and Essequibo rivers, became separated for administrative purposes. In 1732 the home Government assumed responsibility for that on the Berbice, and forty years later the Demerara and Essequibo settlements were separated. When Holland again had possession of them, however, they were reunited, and remained so until the Company was wound up in 1795, and the settlements came under the full control of the Government.

Before this happened they had been captured by the British in 1781, and again in the following year by the French, who

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restored them to Holland. They remained Dutch from 1783 to 1796, when they were again seized by Britain, who restored them to Holland at the Peace of Amiens in 1802. The next year Britain once more, and for the last time, took possession of them, and Holland formally ceded them by the Peace of Paris in 1815. They were consolidated into a single colony seventeen years later. Their present Constitution dates from 1928 and is vested in a Legislative Council of fifteen official and nineteen unofficial members under the presidency of the Governor. For administration the Dutch colony of Surinam was separated from the Dutch West Indies in 1845. The Governor is president of an Advisory Council, consisting of a vice-president and twelve members nominated by the Queen. The French colony is under a Governor, and the Council General of eight members is elected by the French residents. A deputy represents the colony in the French Parliament.

Coastal Plain. The coastal plain is broader to the east of the Orinoco delta than it is along the Caribbean shores. It is overlaid by rich alluvial sands and clays which have drifted westward from the mouths of the Amazon owing to the set of the tides and surface currents or drifts actuated by the trade-winds. Recent re-elevation has also assisted in the formation of the plain, the outer margins of which are still liable to inundation. The reclamation of land by artificial drainage was undertaken by the Dutch in the earliest years of their occupation, and their canals are a feature of the shorelands of British Guiana.

Temperatures are high all the year round, and there are alternating wet and dry seasons. The longer wet season lasts for four months in the summer and begins soon after the vernal equinox. The shorter wet season of about ten weeks is associated with the most southerly incidence of the trade-winds near the autumnal equinox. Seasonal differentiation becomes less marked as the coast of Dutch and French Guiana curves towards the equator. There is, therefore, in this direction a gradation in the character of the natural vegetation. Near the mouth of the Corentyne river, which forms the boundary between British and Dutch territory, the savanna of the Demerara and lower Berbice valleys merges into the tropical forests, which eventually reach full development in the coasts of the Amazon basin. To the west of the Essequibo estuary the coast has a more northerly trend than in the savanna region, and the increase in rainfall

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from winds more directly inshore supports an open type of leguminous forest.

Tropical plantation agriculture is the dominant human activity in the coastlands. The sparsity of population in French Guiana, however, limits the importance of agriculture in that

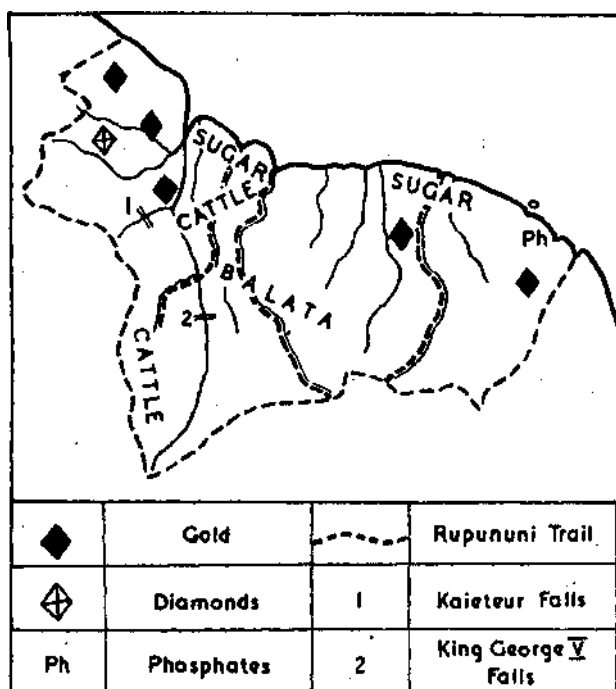


FIG. 55. THE GUIANAS: ECONOMIC RESOURCES

territory. There are about a third of a million people in British Guiana and half as many in Surinam, but the population of French Guiana numbers only about thirty thousand. The chief crops raised are cane-sugar, rice, and cocoa. The more marked alternation of wet and sunny periods makes British Guiana more suitable for sugar production than the colonies lying to the east of it, and the name of Demerara is noted in connexion with this product. Coconuts, which are characteristic of all tropical shores, support a small copra industry, and bananas are grown

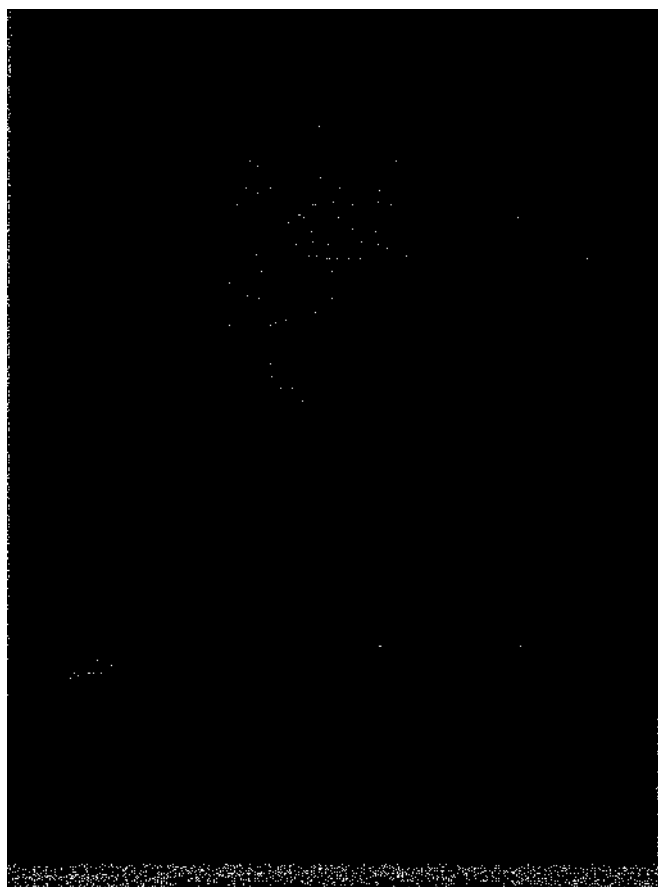
SOUTH AMERICA

throughout these coastal lowlands. The wetter French territory also produces a small supply of manioc. The lowland forests of Dutch Guiana above the swamps yield some balata and some tropical hardwoods such as mahogany, ironwood, greenheart, and purpleheart. There is, however, very little exploitation of forest resources either on the coast or on the rising ground of the hinterland.

The principal settlements are all on the coast, and have developed from the trading-posts established by the Dutch* in the seventeenth century. The capital of British Guiana is Georgetown, formerly Stabroek, at the mouth of the Demerara river. It is connected by a railway to New Amsterdam, at the mouth of the Berbice. The Surinam river, which gives its name to Dutch Guiana, has at its mouth the capital, Paramaribo. The capital of French Guiana is Cayenne. The eastern frontiers of these last two colonies are respectively the rivers Maroni and Oyapock. Pan-American Airways connect these towns with one another and with the United States. There are also air services to Buenos Aires.

Hinterland. Nearly nine-tenths of the total area of the three Guianas is forested. Exploitations of these forests is retarded, however, by lack of easy access to the coast. Only one railway leads inland—that from Paramaribo up the Surinam valley to Dam. The rivers are impeded by falls or rapids even in their lower courses, due to rejuvenation resulting from recent re-elevation. In the river valleys of the zone of sand and clay immediately behind the coastal lowlands gold and diamonds are found. In addition to the river gravels gold also occurs in lodes. It was first discovered in British Guiana in 1884 and in 1938 was the colony's second most valuable export. The most productive region is the upper valley of the Cuyuni. The leading export is bauxite, a clay from which aluminium is obtained by refining. This clay occurs in the clay belt behind the coastal plain. Between them British and Dutch Guianas supply nearly a quarter of the world's total annual output of bauxite. The British colony produces half as much again as the Dutch, the output being second only to that of France. Most of the export goes to Canada for refining by hydro-electric processes.

Highlands. Southward the surface of the three Guianas rises steadily to the Acarai mountains, which form the frontier with



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Brazil as well as the watershed of the Amazon basin. The crystalline base of this Gondwanaland plateau has been overlaid with Mesozoic sediments, through which later intrusions occurred. Denudation has, while removing much of these sediments, left standing large residual blocks, of which the greatest culminates in the peak of Roraima, on the borders of British Guiana, Venezuela, and Brazil. The dry sandstone surface in the interior of British Guiana is a region of savana, largely devoted to cattle-rearing. The cattle are moved to lower lands along the trail of the Rupununi valley. A good road now follows the trail. A proposal that the Rupununi savana should be developed as a refuge for a Jewish population was reported on investigation as impracticable.

The plateau region is known to contain minerals of which there is at present little exploitation. Iron ore occurs in the Sierra de Imataca, on the Venezuelan frontier. In British Guiana there is a little silver, manganese, and mica. Of more interest is the recent discovery of euxenite in the Rupununi district. This mineral contains oxides of uranium, a radioactive element. On the upper courses of the rivers are large waterfalls. The chief of these are the King George V Falls, on the Essequibo river, while on a small tributary, the Potaro, are the Kaieteur Falls. This name is derived from two Indian words, *koi* meaning 'old man,' and *tuok* meaning 'fall.'

Commerce. Before the Second World War the United Kingdom supplied British Guiana with more than half the colony's import requirements, and shared with Canada the greater part of the exports, chiefly sugar, bauxite, and gold. The share of the United States (in 1936) amounted to less than 10 per cent, of the imports and a little more than 5 per cent, of the exports. The granting of a defensive base to the United States in 1940 may be expected to give more encouragement to American trade. The base is situated on the Demerara river about twenty-five miles from the mouth. The imports include machinery, manufactured textile and metal goods, and flour. Sugar accounts for nearly half the total value of the exports. Roads are being developed with the aid of the Colonial Development Fund, with the aim of bringing the interior mining, timber, and cattle regions into closer connexion with the ports.

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