

A SERIES OF ELEMENTARY EXERCISES UPON GEOLOGICAL MAPS

This series of exercises is a companion work to the author's widely used *Simple Geological Structures* and his latest work, *Selected Exercises upon Geological Maps*. It is a graded series of maps and exercises in which the elementary principles of simple geological structures are illustrated, and is intended to enable the student to understand the elementary principles and to lead up to a study of more difficult maps and structures.

by JOHN I. PLATT

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A SERIES OF ELEMENTARY EXERCISES UPON GEOLOGICAL MAPS

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INTRODUCTION

STUDENTS of geology and physical geography have some difficulty in obtaining examples of simple geological maps. This series of exercises has been constructed with a view to supplying that need. It is hoped that they will enable the student to understand the elementary principles and lead up to a study of more difficult maps and structures.

In the early stages, mapping exercises must include much simpler structures than those commonly found in the field, but it is advisable that the maps for this purpose should conform strictly to geometrical laws in order that they may serve as a basis for subsequent study. This has been done in this series, and in consequence in the maps in which the beds are folded the vertical thickness and not the true thickness has been kept constant. Several of the maps are based on actual areas.

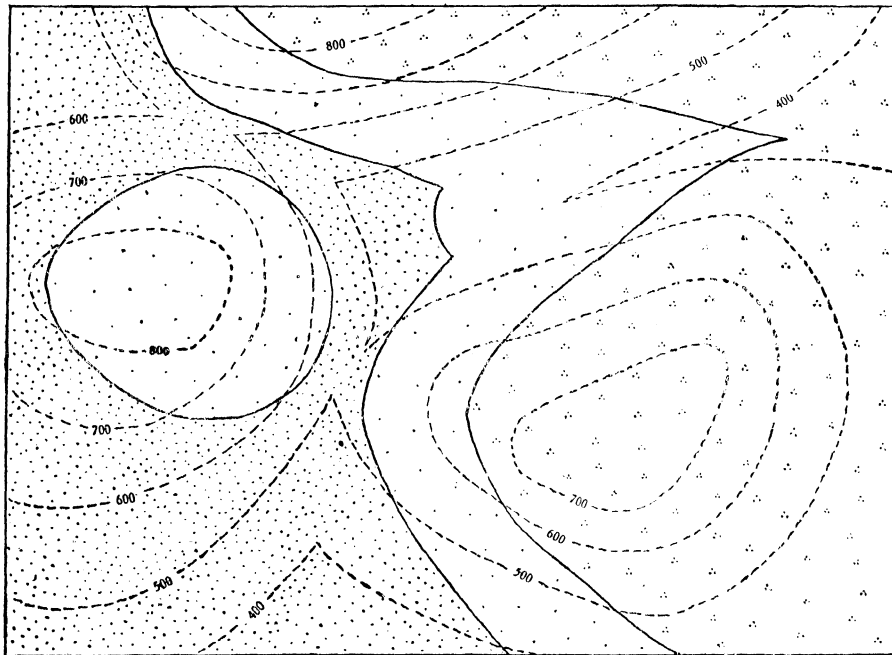
It will be seen that the exercises are graded and have been arranged to supply sufficient maps and problems to cover a complete course in elementary geological maps. In general, the problem presented by each map could be stated as:—

“Describe fully the geology of the area represented on the map and draw a section (or sections), to scale, across the area to illustrate the structure.”

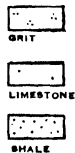
No index is given to some of the maps and in these cases part of the exercise is to determine the true sequence of the beds. To assist in indicating them, however, the beds have been lettered on the maps.

These exercises should be used in conjunction with “Simple Geological Structures,” by John I. Platt and J. Challinor, which is a series of notes on the elementary but essential principles concerning the reading of simple geological structures and their implications from a geological map, and a series of illustrative map-exercises worked out and explained. “Platt’s Selected Exercises upon Geological Maps” gives additional exercises to those in this series, most of them being more advanced.

No. 1 PLATT'S EXERCISES ON GEOLOGICAL MAPS

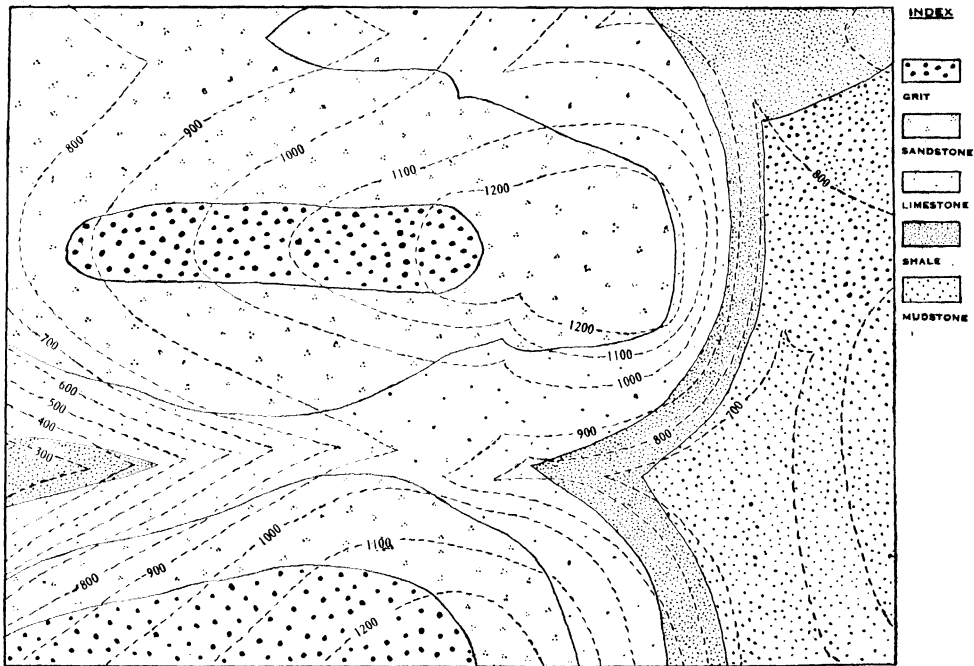


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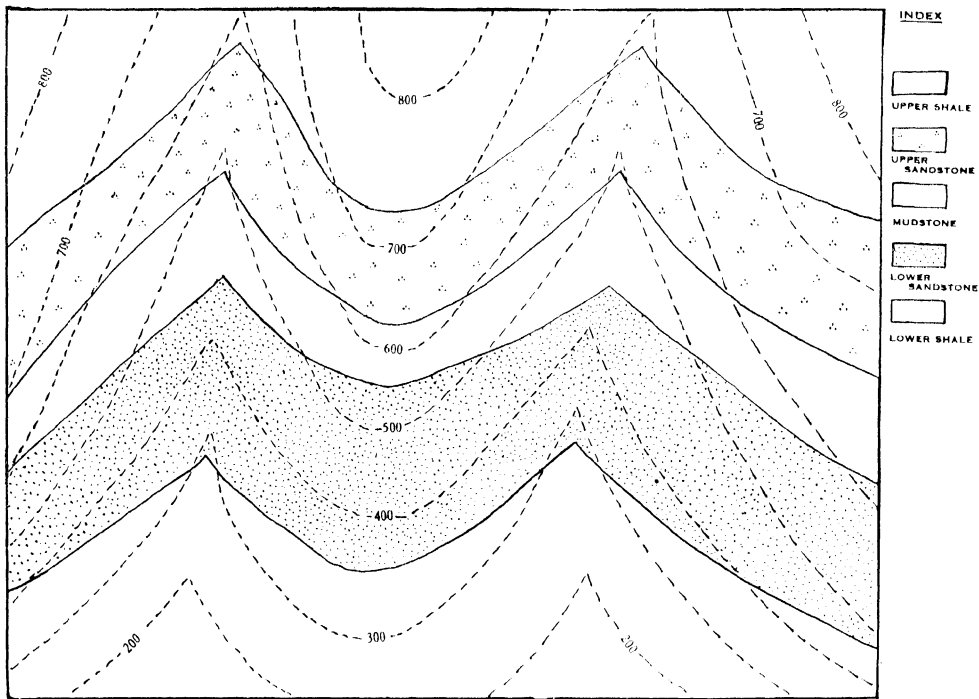


SCALE: 1 inch = 1,000 feet.

No. 2 PLATT'S EXERCISES ON GEOLOGICAL MAPS

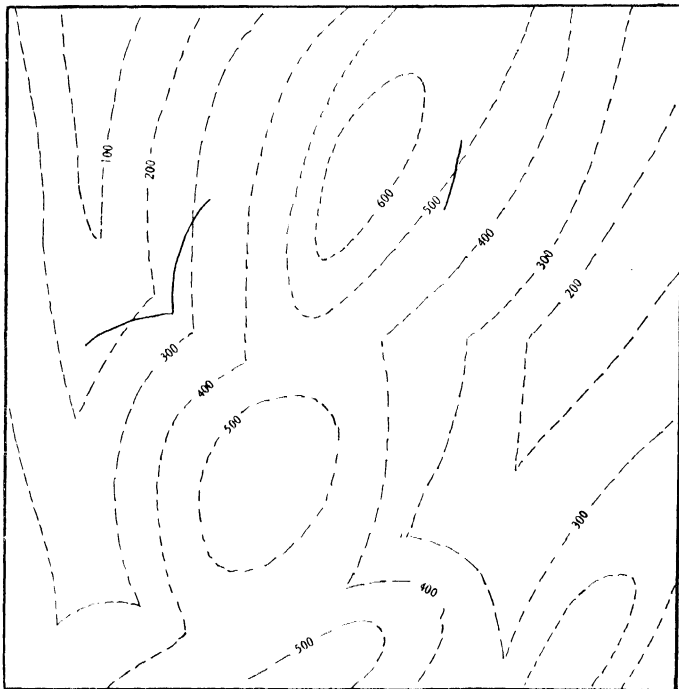


No. 3 PLATT'S EXERCISES ON GEOLOGICAL MAPS



SCALE: 1 inch = 1,000 feet.

No. 4 PLATT'S EXERCISES ON GEOLOGICAL MAPS



PROBLEM:

The continuous line on the map indicates the outcrop of a coal-seam. Assuming the coal-seam to have a constant strike and dip, determine the amount or direction of dip and complete its outcrop throughout the area.

Also complete the outcrops of two other seams, which are respectively 100 feet vertically below and 200 feet vertically above the one first drawn.

SCALE: 1 inch = 1,000 feet.

No. 5 PLATT'S EXERCISES ON GEOLOGICAL MAPS

In each of the problems given below, assume the coal-seam to have a constant dip and draw a plan of the country, using a scale of 1 inch = 1,000 feet, and determine the direction and amount of dip of the coal-seam.

PROBLEMS:

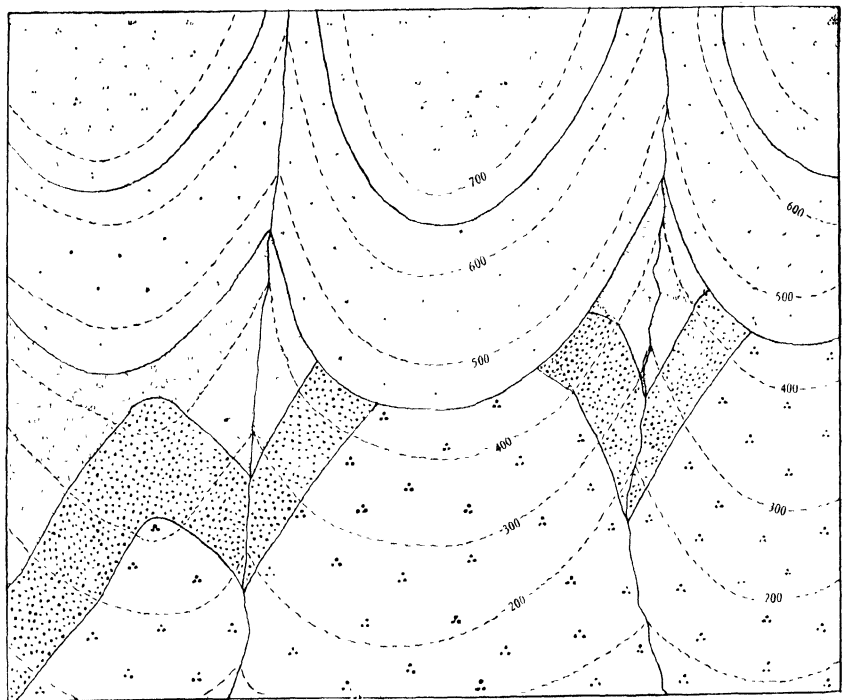
- (a) Bore-holes were sunk at A, B, and C, which are at the same altitude above sea-level and which lie at the corners of an equilateral triangle whose length of side is 6,000 feet, C being west of B, and A north of the point midway between B and C. A coal-seam was encountered at a depth of 600 feet in the bore-hole A, 400 feet in B and 200 feet in C.

- (b) In problem (a) substitute the following figures: 750 feet in A, 1,410 feet in B, 420 feet in C.

- (c) Bore-holes were sunk at A, B, and C, which are at the same altitude above sea-level. B is 8,000 feet due east of A, and C is 4,000 feet due south of a point midway between A and B. A coal-seam was reached in the bore-holes at the following depths: A at 250 feet, B at 850 feet and C at 700 feet.

- (d) Bore-holes were sunk at A, B, C, and D, which are situated at the N.W., N.E., S.E., and S.W. corners respectively of a square of level country, the sides of which are 5,000 feet long. A coal-seam was reached in the bore-holes at the following depths: In A at 160 feet, In B at 400 feet, and in D at 600 feet.

No. 6 PLATT'S EXERCISES ON GEOLOGICAL MAPS



INDEX

CARBONIFEROUS



SANDSTONE



LIMESTONE

ORDOVICIAN



GRIT



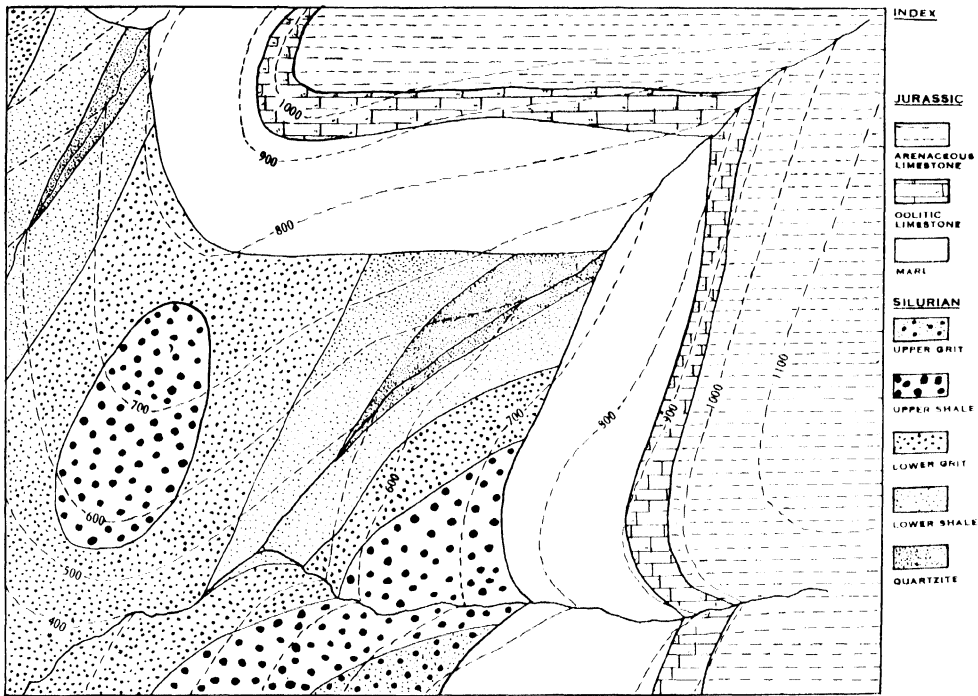
CONGLOMERATE



SHALE

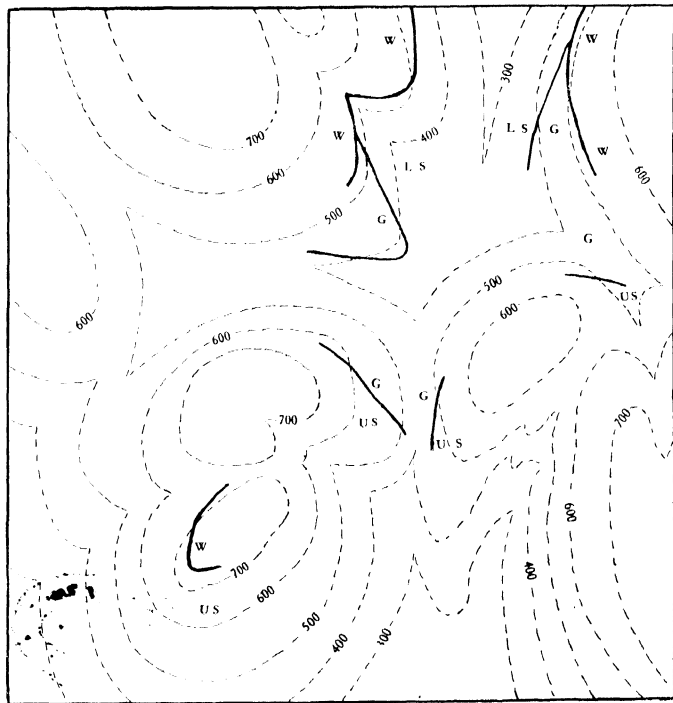
SCALE 1 inch = 1,000 feet

No. 7 PLATT'S EXERCISES ON GEOLOGICAL MAPS



SCALE: 1 inch = 1,000 feet

No. 8 PLATT'S EXERCISES ON GEOLOGICAL MAPS



SCALE: 1 inch = 2,000 feet.

INDEX

SILURIAN

W
WENLOCK SHALE

ORDOVICIAN

U.S.
UPPER SHALES

G
GRIT

I.S.
LOWER SHALES

PROBLEM:

In the area shown on the map, Wenlock rocks rest unconformably upon Ordovician rocks, and the sequence of rocks is as shown in the index. After careful examination of the area, the only exposures discovered were as shown.

Assuming that each bed maintains a constant strike and dip throughout, complete the geological map of the area.

No. 9 PLATT'S EXERCISES ON GEOLOGICAL MAPS

(a) PROBLEM:

In searching for coal in a certain coalfield, four bore-holes, A, B, C, D, were sunk at the N.W., N.E., S.E., S.W. corners respectively of a square of country each side of which was 6,000 feet long. Two coal-seams were encountered in each bore-hole and it was found that the seams had a constant dip. The bore passes through the following levels (given in feet) in the accompanying table.

				A	B	C
First Coal	...	...	...	200	468	1,007
Second Coal	...	...	...	375	643	1,182

If A, B, C, and D are all at the same height above sea-level, draw a plan of the square of country above mentioned, using a scale of 1 inch = 1,000 feet, and mark upon it the following and other necessary information:

1. The direction and amount of dip of the coal-seams.
2. The depth of the seams in the bore-hole D.

(b) PROBLEM:

A, B, C, and D are situated at the N.W., N.E., S.E., and S.W. corners respectively of a square of level country, the sides of which are 5,000 feet long, while E is situated exactly in the centre of the area.

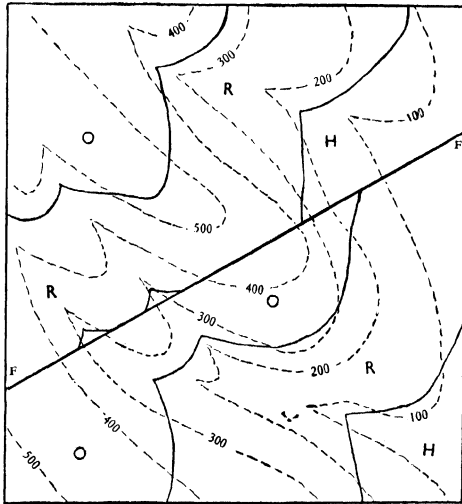
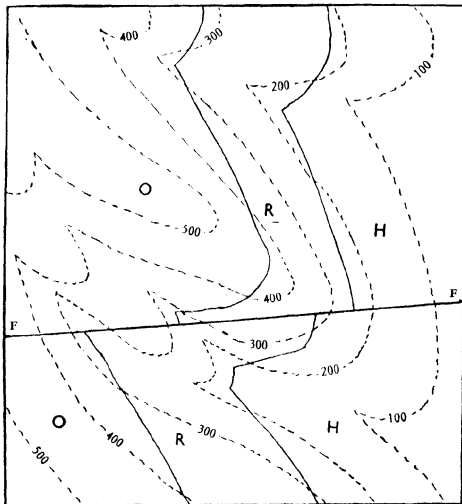
Bore-holes at A, B, and E pass through the following formations (depths in feet below the surface of the ground):

				A	B	E
Base of Permian	...	...	...	700	100	200
Coal-seam	...	...	...	1,000	700	400

Draw a plan of the area on the scale of 1 inch = 1,000 feet.

- (i) Determine the strike and dip of the rocks.
- (ii) Indicate the area underlain by the coal-seam.

No. 10 PLATT'S EXERCISES ON GEOLOGICAL MAPS



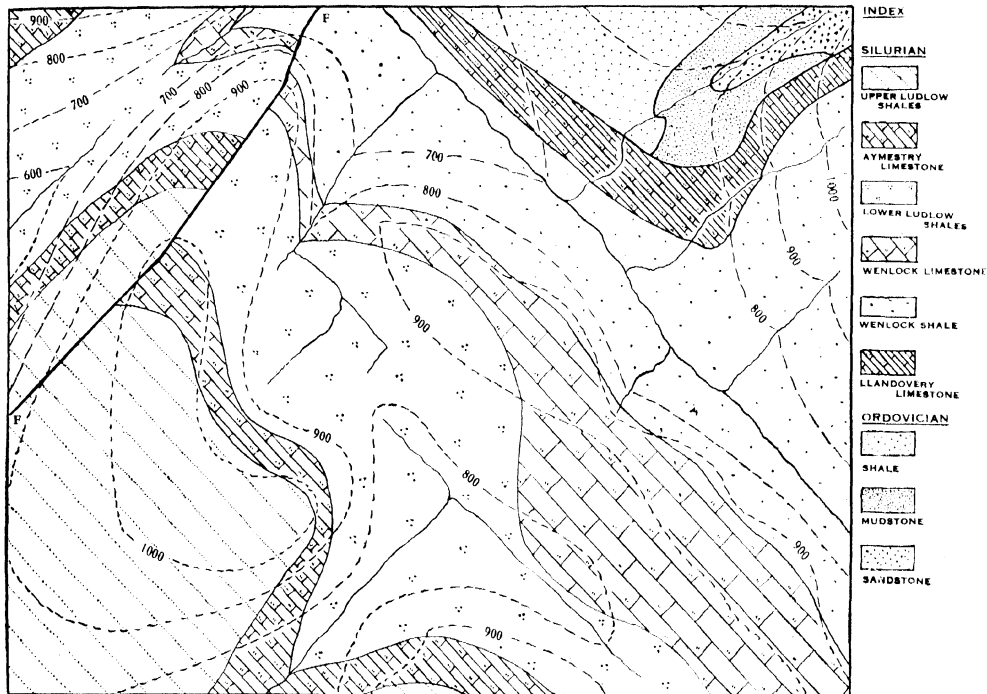
SCALE: 1 inch = 1,000 feet.

PROBLEM:

On each of the above maps the outcrops of two coal-seams which separate beds O, R, and H are shown. The outcrops are in each region crossed by a fault (FF). Determine in each case:

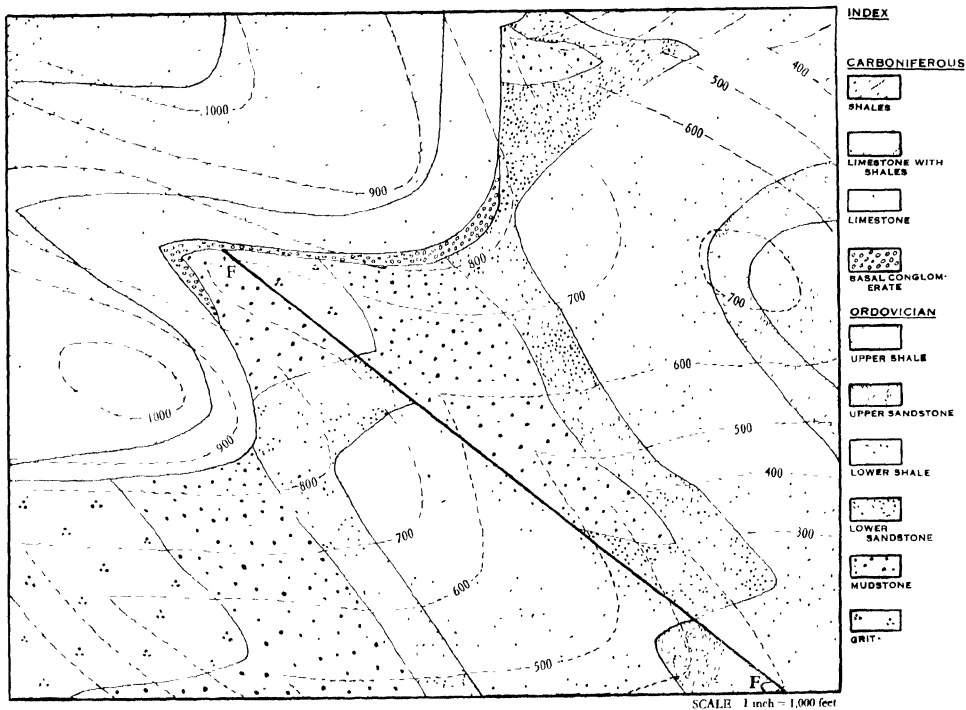
- The direction and amount of dip of the coal-seams.
- The vertical thickness of the rocks between the seams.
- The inclination of each fault.
- The vertical displacement of the downthrow of the faults.

No. 11 PLATT'S EXERCISES ON GEOLOGICAL MAPS

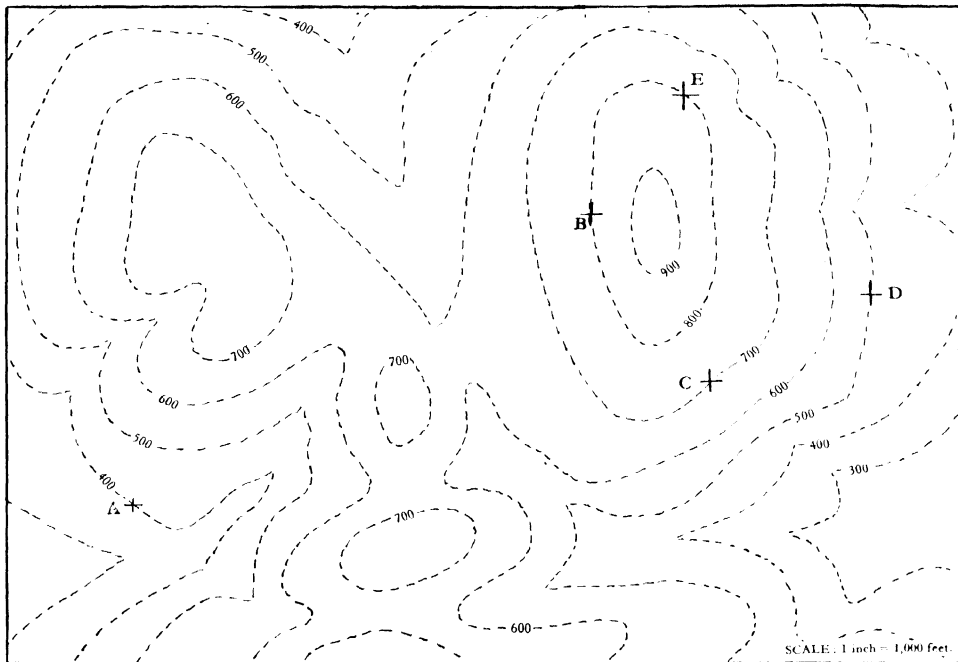


SCALE: 1 inch = 1,000 feet.

No. 12 PLATT'S EXERCISES ON GEOLOGICAL MAPS



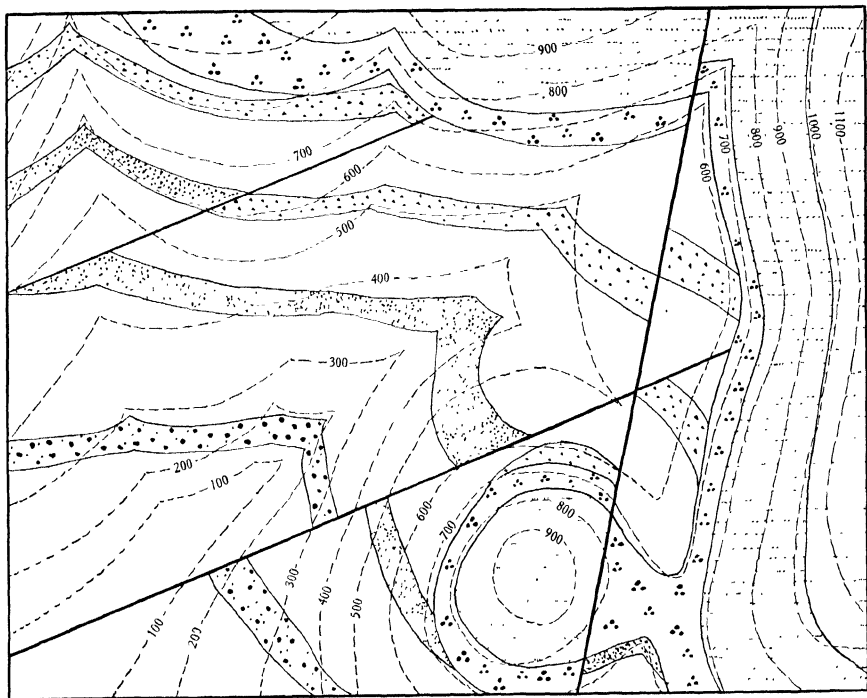
No. 13 PLATT'S EXERCISES ON GEOLOGICAL MAPS



PROBLEM

In the area shown on the map a bed of TRIASSIC SANDSTONE rests uncomfortably upon COAL MEASURES. At A, B, and C the base of the TRIASSIC SANDSTONE crops out while at A, D, and E a coal-seam crops out. All the beds have a uniform dip. Determine the dip of the beds and map in their outcrops. Indicate by shading the area underlain by the coal-seam.

No. 14 PLATT'S EXERCISES ON GEOLOGICAL MAPS



INDEX

JURASSIC

ARGILLACEOUS LIMESTONE

OOOLITIC LIMESTONE

CALCAREOUS SANDSTONE

SILURIAN

SHALE

GRIT

SHALE

GRIT

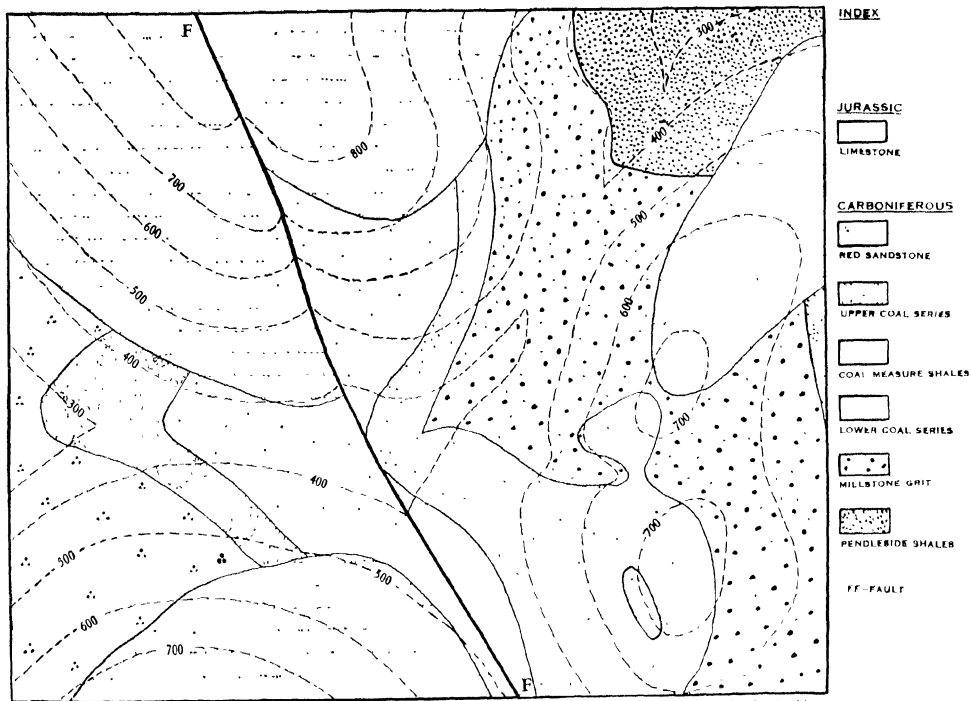
SHALE

GRIT

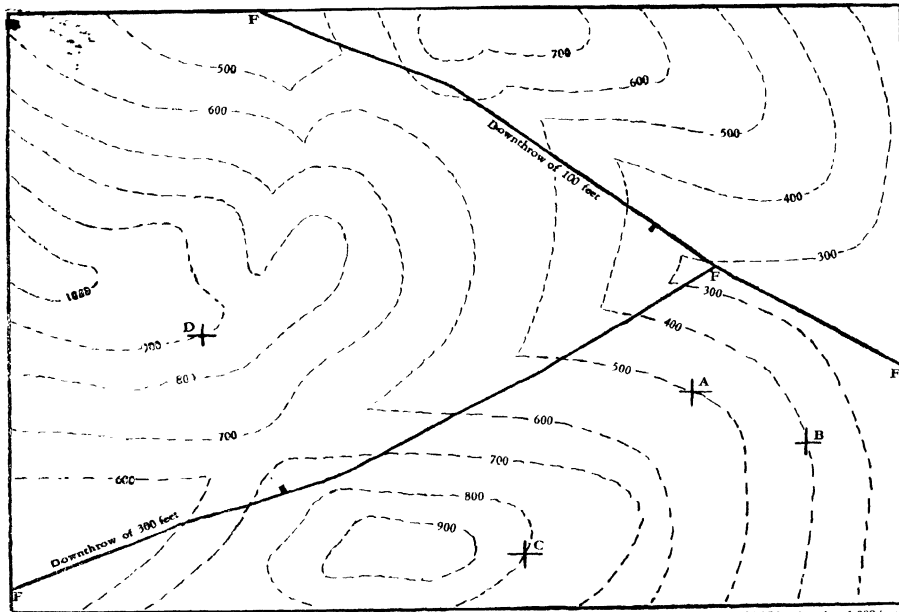
SHALE

SCALE: 1 inch = 1,000 feet.

No. 15 PLATT'S EXERCISES ON GEOLOGICAL MAPS



No. 16 PLATT'S EXERCISES ON GEOLOGICAL MAPS



PROBLEM

In the area represented on the map two coal-seams, separated by shales, crop out. In the bore-holes A and B the lower seam is encountered at a depth of 100 feet, whilst in the bore-hole C the upper seam is encountered at a depth of 100 feet and the lower seam at 500 feet.

Assuming the dip and strike to be constant throughout the area and that the faults affect the seams, trace the outcrop of both seams.

Give the depths of the seams in the bore-hole D.

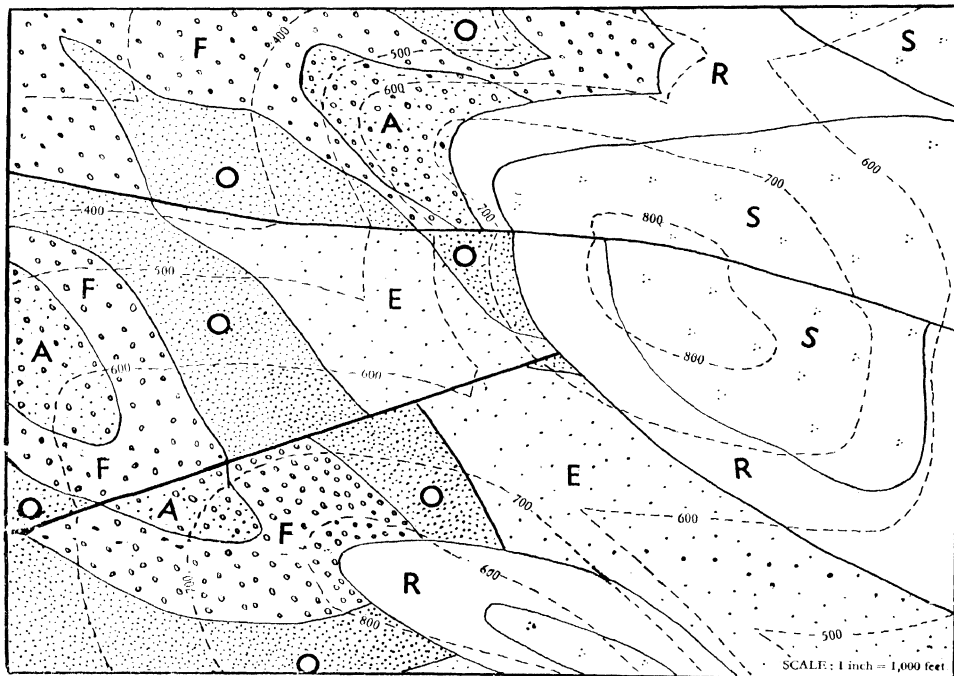
Give a full description of the faults.

SCALE: 1 inch 1,000 feet

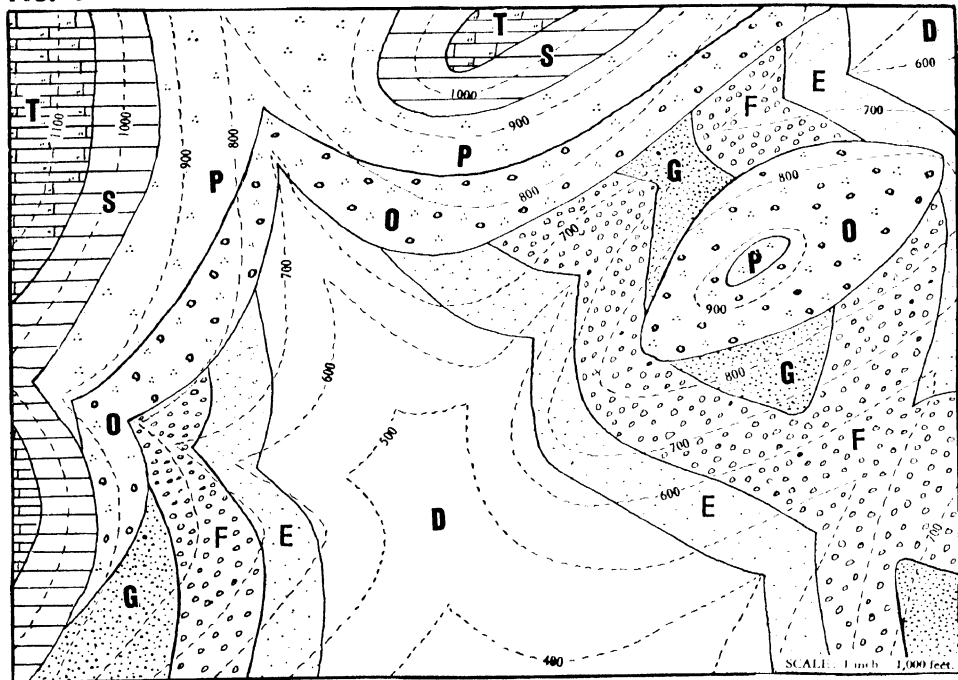
⊕ indicates the bore-holes.

—|— indicates a fault, with the downthrow side indicated.

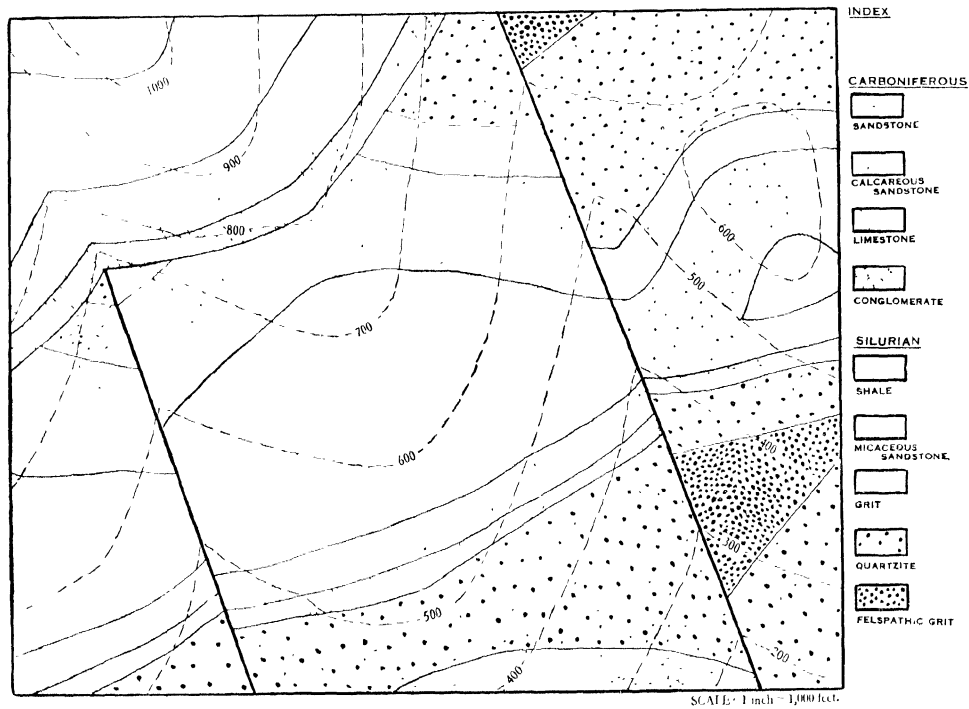
No. 18 PLATT'S EXERCISES ON GEOLOGICAL MAPS



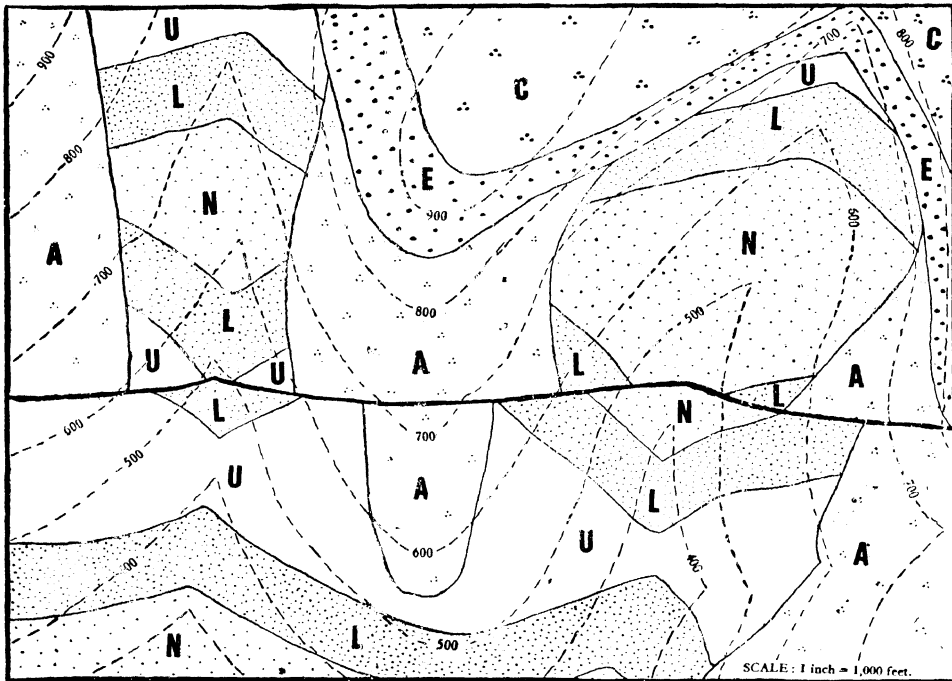
No. 19 PLATT'S EXERCISES ON GEOLOGICAL MAPS



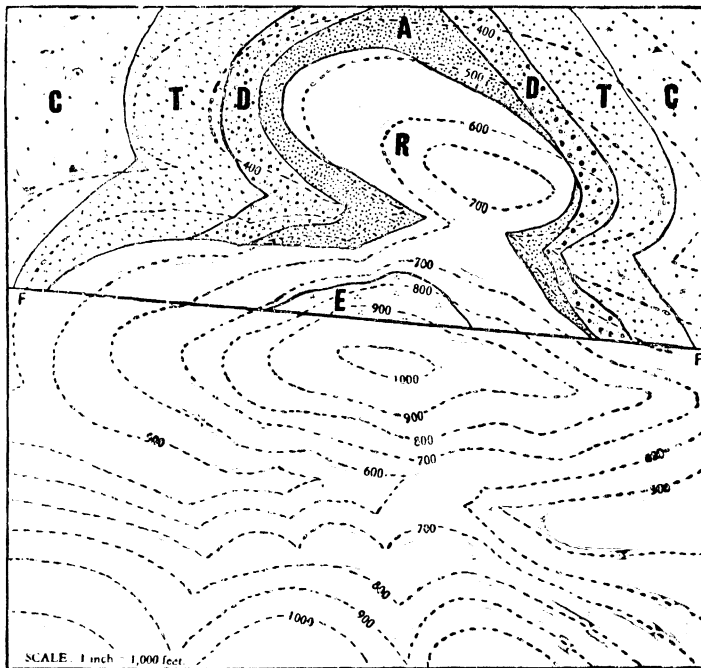
No. 20 PLATT'S EXERCISES ON GEOLOGICAL MAPS



No. 21 PLATT'S EXERCISES ON GEOLOGICAL MAPS



No. 22 PLATT'S EXERCISES ON GEOLOGICAL MAPS










PROBLEM:

Fault FF has a downthrow of 100 feet on the north side. Determine the structure of the area north of the fault and, assuming the structure to be the same south of the fault, complete the geological map of the area.

No. 23 PLATT'S EXERCISES ON GEOLOGICAL MAPS

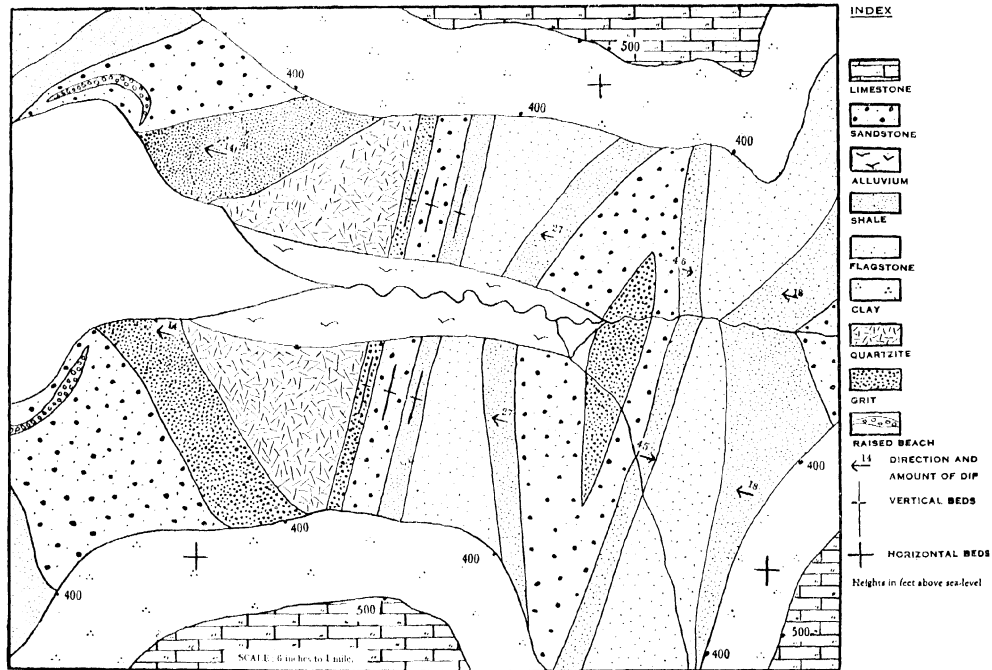


INDEX

- JURASSIC**
-  LIMESTONE
-  MARL
- ORDOVICIAN**
-  SANDSTONE
-  SHALE
-  MUDSTONE
-  GRIT
-  DOLERITE
- FF - FAULT**

SCALE. 1 inch = 1,000 feet

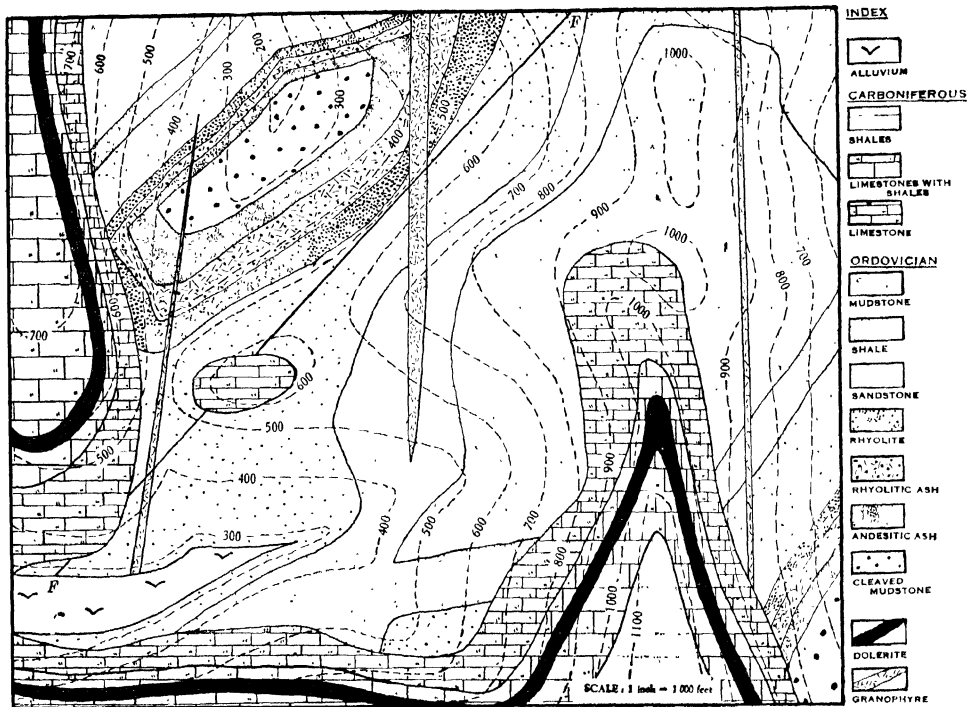
No. 24 PLATT'S EXERCISES ON GEOLOGICAL MAPS



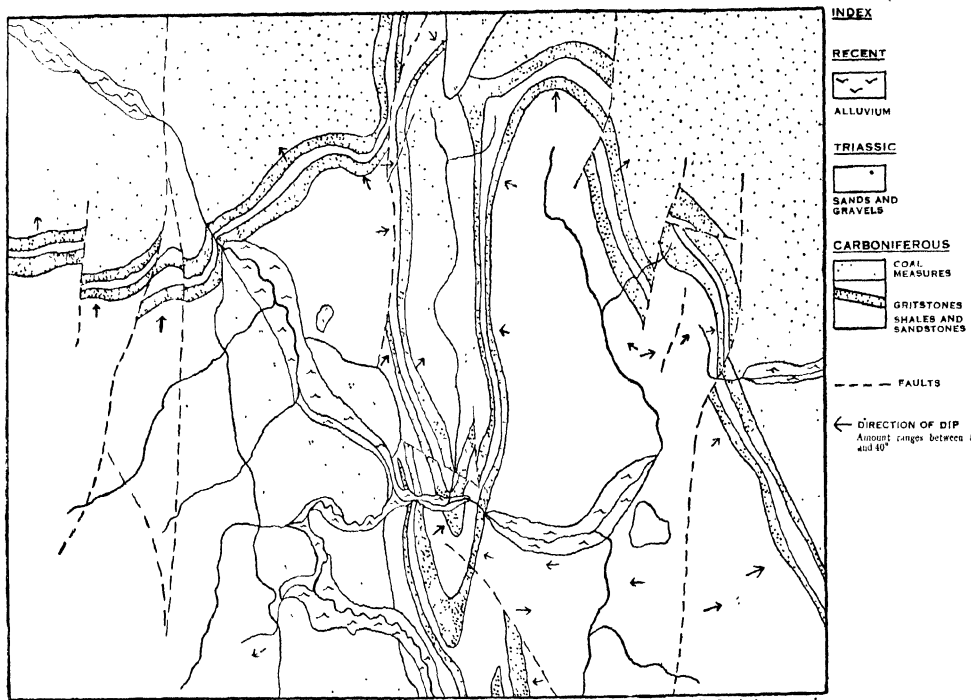
NOTE:

In the index to this map, the beds have not been arranged in their proper order. Part of the exercise is to find out the true sequence.

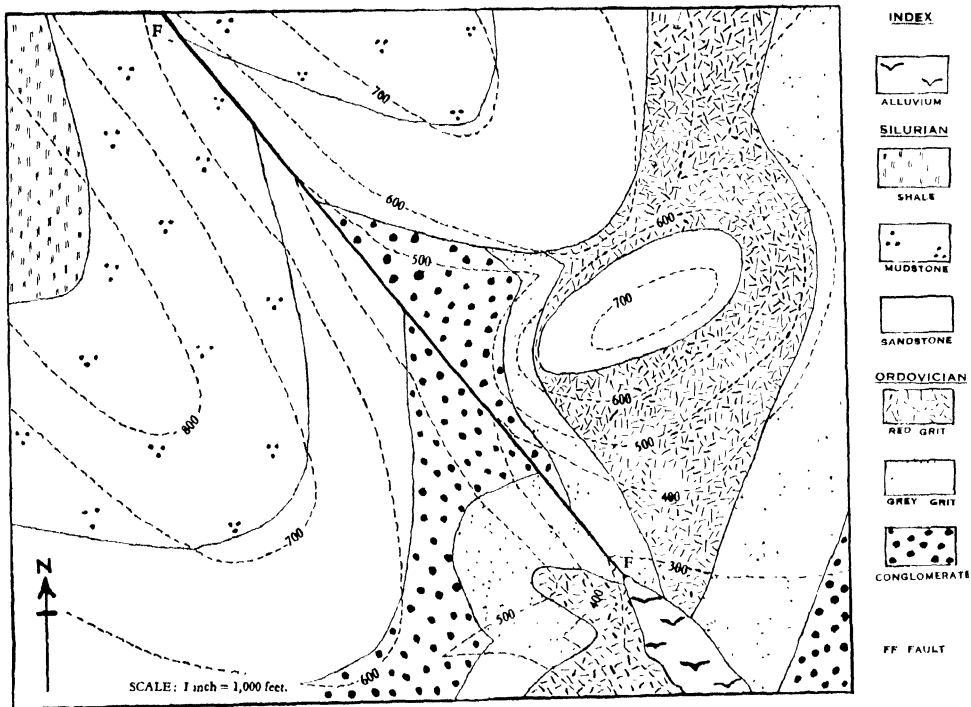
No. 25 PLATT'S EXERCISES ON GEOLOGICAL MAPS



No. 26 PLATT'S EXERCISES ON GEOLOGICAL MAPS



No. 27 PLATT'S EXERCISES ON GEOLOGICAL MAPS



INDEX



ALLUVIUM

SILURIAN



SHALE



MUDSTONE



SANDSTONE

ORDOVICIAN



RED GRIT



GREY GRIT



CONGLOMERATE

FF FAULT

No. 28 PLATT'S EXERCISES ON GEOLOGICAL MAPS

(a) PROBLEM:

Draw a contoured map of a square tract of country which is drained by a main river flowing in a northerly direction. The length of side of the square is 8,000 feet. The general direction of the river is along the axis of an anticline in a rock series which consists of LIMESTONE (highest bed), SANDSTONE (200 feet in vertical thickness), and SHALE (lowest bed). The dips on the limbs of the anticline are $1/12$ W. and $1/8$ E. respectively.

Using the scale of 1 inch = 1,000 feet, draw a map of the area and also a dip section across your map.

(b) PROBLEM:

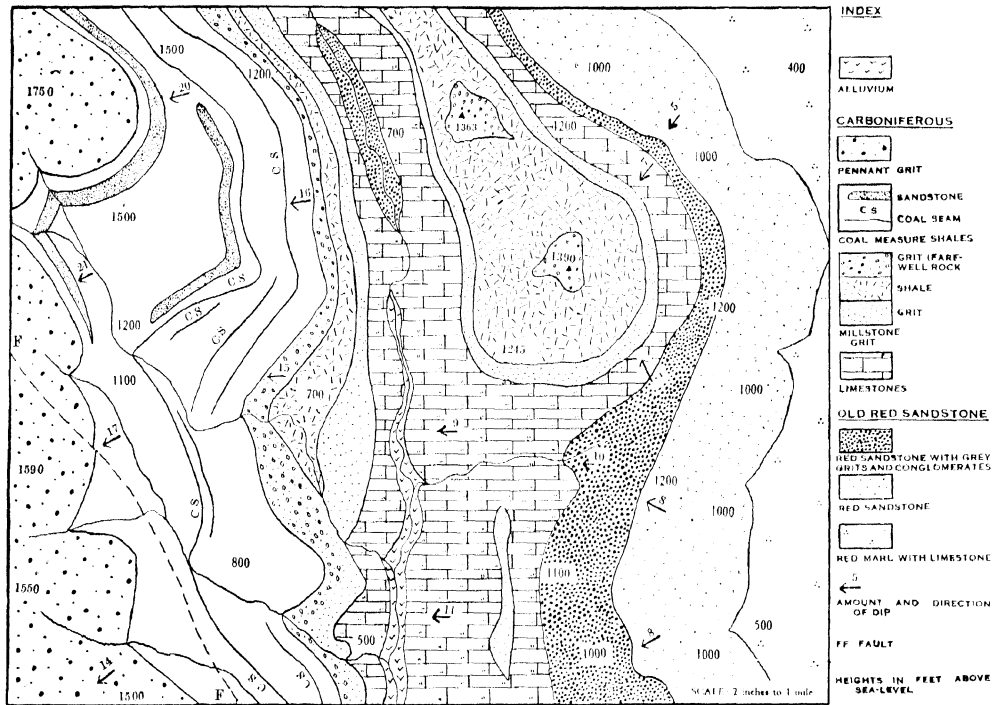
The following is a description of a tract of country which is 9,000 feet from E. to W. and 7,000 feet from N. to S. A range of hills in the north attains a height of 1,200 feet and is drained towards the S.E. by a river with three tributaries. An isolated hill occurs in the S.W. and attains a height of 1,100 feet.

Jurassic rocks crop out in the hilly regions to the N. and S.W. and they have a dip of $1/10$, N. 10° W. The *Jurassic* rocks consist of an ARENACEOUS LIMESTONE which rests upon an OOLITIC LIMESTONE, which latter is 200 feet in vertical thickness.

The *Jurassic* rocks rest upon folded *Silurian* rocks, which consist of three beds: SHALE, GRIT (100 feet in vertical thickness) and SANDSTONE (the oldest rock). The dips on the limbs of the folds are (reading from west to east) $1/7$ W., $1/5$ E. and $1/7$ W. The western fold axis passes beneath the isolated hill in the S.W.

Draw a map of the country represented by the above description, and draw a section (or sections) across it to illustrate the structure of the area. Scale: 1 inch = 1,000 feet.

No. 29 PLATT'S EXERCISES ON GEOLOGICAL MAPS



PETROLOGY OF THE IGNEOUS ROCKS

by F. H. Hatch, A. K. Wells and M. K. Wells
Tenth Edition Demy 8vo 45s. net

Completely revised by A. K. Wells and M. K. Wells, much of it has been rewritten, and many new illustrations have been added. In the first section the component minerals are described more fully than in previous editions, with special reference to their inter-relationships. The major part of the book deals with systematic petrography, and although it is descriptive rather than petrogenetic in its approach, modern views on problems of petrogenesis are discussed in an expanded section on the origins of rock-types. A critical review of the classification as it affects each main rock-type is included, while a special feature has been made of adequately illustrating the latter.

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