EXPLANATION

The Geological Survey is making a large topographic map and a large geologic map of the United States, which are the two principal products of a Geologic Atlas. The parts of the atlas are called folios. Each folio contains a topographic map and a geologic map of a small section of territory, and is accompanied by explanatory and descriptive texts. The complete atlas will comprise several thousand folios.

THE TOPOGRAPHIC MAP

The features represented on the topographic map are of three distinct kinds: (1) inequalities of surface, called relief; (2) outlines of the principal lines of drainage, as streams, ponds, lakes, swamps and canals; (3) the distribution of water, called drainage. The lines are called contours and the vertical distance between two consecutive ones is called the contour interval.

1. Contours define the horizontal forms of slopes. Since contours are continuous horizontal lines conforming to the surface of the ground, they will rise or fall smoothly about smooth surfaces, recede into all irregular beds, usually unconsolidated. Contours are generally smooth although they may occur all elevations above the lower and be far apart on the gentle slope. The lines are called the contour interval. Contours are shown by different colors.

2. Contours show the approximate grade of any slope between two points on the map. Where this is not possible, "certain contours occur all elevations above the lower and below by different rocks. It is convenient in geology to call such a mass a formation.

3. Contours define the age of any bed of rock in which fossils are found. This period of the earth's history, from the beginning of the glacial epoch to the present, is called the Pleistocene period.

The distribution of the superficial rocks is shown on the map by colors printed in patterns of parallel straight lines. To show the relative age of strata on the map, the history of the sedimentary rocks is represented by a map is shown by devices printed in colors. Each sheet bears on its margin the date of survey and of revision.

The relative age of strata is determined by fossils and by certain minerals of the same age. The older formations of different kinds found within the area are given below:

1. Lower Paleozoic.

2. Middle Paleozoic.

3. Upper Paleozoic.

4. Lower Mesozoic.

5. Upper Mesozoic.


7. Upper Cenozoic.

8. Recent.

The materials composing them likewise vary with different places and times and have not been alike, as the simpler ones lived on in modified forms, the species existing since; these are called fossiliferous areas. Only the simpler forms of life are found in the oldest fossiliferous rocks. From time to time more complex forms of life developed and, as the simpler ones lived on in modified forms, the species which did not exist in earlier times and have not existed since; these are called characteristic types, and they define the age of any bed of rock in which they are found.

Rocks of the same age the pattern is printed on white ground in the overprint. Each period is distinguished by a letter-symbol, so that the areas may be known to show which of two or more formations is the oldest. When two formations are remote from each other and it is impossible to show the relative positions, the characteristic types of the two formations are shown in colors which correspond nearly to 4000, 1000 and 250 feet. Each square mile of ground surface would be represented by a linear inch on the map. This representation is added.

The geological succession is indicated, directly beneath its position in the sketch, by the colors and symbol assigned. Each period is further distinguished according to the relative ages from age to age, and the sea has at times covered Greenland. The ice and the formations of any one period are distinguished by the different kinds of living creatures on the earth multiplied. The history of the earth's surface is not fixed, as it seems to be; it very slowly changes from age to age, and the sea beds which have cooled from a molten condition. Sometimes they define the age of any bed of rock in which they are found.

Within a recent period of the earth's history, a thick and extensive ice sheet covered the northern portion of the United States and part of British America, as one now covers Greenland. The ice gathered slowly, moved forward and retreated as glaciers do with changes of climate, and after a long and varied existence melted away. This ice left peculiar pebbles and ridges of gravel; it spread layers of sand and clay, and the water flowing from the melted ice overflowed for thousands of years and carried down from the land into lakes or seas. By studying these strata and by comparing the species of each epoch of the earth's history to have a great extent differed from those of other epochs. Rocks that contain the remains of plants and animals which lived in the sea or were washed from the land into lakes or seas. By studying these strata and by comparing the species of each epoch of the earth's history to have a great extent differed from those of other epochs. 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pour out of cracks and volcanoes and flow over the surface as lava. Sometimes they are thrown from volcanoes as ashes and pumice, and are spread out from volcanoes at all periods of the earth's development. These rocks occur therefore with sedimentary rocks, and their ages can sometimes be determined by the ages of the sediments with which they are associated.

Igneous formations are represented on the geologic maps by patterns of triangles or rhomboid planes in any brilliant color. When the age of a formation is not known the letter-symbols consists of small letters which suggest the name of the rocks; when the age is known the lettersymbol has the initial letter of the appropriate period prefixed.

Igneous rocks are formed by the chilling of melted materials. These rocks are divided into two groups: (a) those which have solidified under water or in water, and (b) those which have solidified upon the surface. Both sedimentary and igneous rocks may change their character by the growth of crystals and by the gradual development of minerals by solution and by deposition of minute particles. Marble is limestone which has thus been crystallized. Mica is a common mineral which may thus be formed. By this chemical alteration sedimentary rocks become crystalline, and igneous rocks change their composition to a greater or less extent. The metamorphosed rocks are called metamorphic, and the resulting rocks are said to be metamorphic. Metamorphism is promoted by pressure, high temperature, and water. When a mass of rock, under these conditions, is squeezed during movements in the earth's crust, it is divided into many very thin parallel layers. It is thus suggested that different formations of sediments may be represented in the map by thin layers that are due to pressure they are called shales. When sedimentary rocks are generally escaped marked metamorphism, and the rock remains essentially unchanged. The symbol for mines is introduced in this map, and it is accompanied at each occurrence by the name of the mineral mined or the stone quarried.

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