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A FIELD STUDY OF LAVA FLOW.

By GEO. A. BARKER

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ONE of the branches of physiography, which seems destined to remain a text-book subject for most students, is vulcanism. While there are many portions of our country where igneous rocks are found, most of the phenomena of volcanoes in the making are absent. We can never hope to study vulcanism as we study erosion to seize upon the force in action. To most of us, vulcanism must always remain in the realm of geology rather than physiography. We can hardly hope to bring it home to the pupil.

It occurred to us, when going over this part of physiography, that, as we were near a great steel mill, something might be learned of lava phenomena, especially lava flow, from the molten refuse, or slag of the mill. An investigation into conditions showed they exceeded our fondest expectations. This molten slag is poured down a slope at the foot of which is an abandoned stone quarry now filled with water.

The class was taken to the place where the molten slag, or lava, as we may call it, is poured down the slope. Fig. 1 shows very well the general surroundings. In the foreground some cooled flows can be seen. A study of the molten flow was taken up. The change in color of the lava as it was poured down the slope was noted, as well as the change in velocity of flow as the material commenced to cool. Some stones dropped into the molten flow demonstrated its density as they moved along with it.

After the slag had been on the slope several minutes, a study was made to find whether it was molten still, and, if not all molten, what part had cooled. Several stones were thrown on it and they sank through the crust displaying the glowing interior. The broken up appearance, due to flowage underneath, after the surface had cooled to rigidity, duplicated in miniature the surface of natural flows which are thick and slow-moving. Several flows with such roughened surfaces are shown in Fig. 1.

To distinguish between the different flows was the next question. Here no difficulty was found. First, the flows differed in color, scarcely two being of the same color. In the second place, they differed in texture all the way from the very liquid, ropy flow shown in the foreground of Fig. 1 to the dark-colored rough mass to the left of it.

Where the lava flowed into the water an interesting study was made. As soon as the flow strikes the water, a cloud of steam almost obscures it, but beneath the steam it may be seen boiling up from the water it has

suddenly vaporized. A kind of pumice of a very cindery, fragile nature is made as the lava strikes the water. But more lava runs down the slope and is changed to pumice until a sort of cindery platform is formed. Higher and higher it is built by the boiling up of the lava, combined with its explosion and expulsion several feet into the air in a molten state. Fig. 2 shows a closer study of one of these cones. In the background and to the right and

FIG. 1.

Ropy Flow in Foreground. Cindery Flow in Background.

left can be seen the cindery pumice platform which was built before the crater was formed. The hardened material on the right of the cone was the molten material thrown into the air to drop on to the side of the cone.

A very interesting case of chemical metamorphism was noted. In one place the lava runs over a ledge of Niagara limestone calcining the stone on its upper surface.

After the study of lava flow and cinder cone is completed, a collection is made of the various artificial lavas which duplicate, in a sense, the natural lavas. It is unfortunate that most of these artificial lavas are not

produced in the flow itself. They are part of the cooled crust on the inside of the ladles which crust is forced out after the ladle is emptied. One of the most interesting of these rocks is a kind of scoria which forms the bulk of this crust. It is honeycombed with cells, so much so, indeed, that it floats for some time if thrown on the water. If some of the cells are

FIG. 2.

Completed Cinder Cone. Water in the Background.

broken open a slight odor of hydrogen sulphide is noted. This is probably the gas which made the bubbles. The lava flow usually has very small bubbles near its surface and below the surface shows very well the distortion of the pores or cells due to flowage after they were made. Against the ladle on the inside a sort of obsidian, dark brown and semi-transparent, is formed. We have already spoken of the pumice cinders where the lava flows into the water.

After the whole study has been made a recitation is held on the spot and the distinctions between this flow and the lava flow of volcanoes are pointed out. Other phenomena of volcanoes not represented here are brought out by questioning the pupils who have already had the text-book on this subject.

I do not want to say that such a study of lava flow may not arouse some misconceptions in the pupil's mind, but I know that the pupils are several steps nearer to a real knowledge of vulcanism than the text-book would have taken them.

EDITORIAL

WORDS VERSUS THINGS IN GEOGRAPHY TEACHING.

GEOGRAPHY teaching unfortunately still continues in many schools to be a study of words with little attempt to make the work real or meaningful to the pupils. In spite of all the recent emphasis of home geography, for instance, many teachers have not yet found that the central thought of home geography is the study of the relations between the pupils and their own environment; they teach words from a text-book and not things; they study home geography as if it were concerned with Central Asia or the antipodes, and do not found it on the home locality as they should. Beginners in geography need to study things, and then to read about them in words, but the memorizing of sentences or paragraphs blindly is as valuable as the learning of the Greek alphabet, and no more so. Many children study about rivers, lakes, divides, transportation, trade, etc., with no conception that these are to be seen in their own locality, or that they in their daily lives cannot help but be affected by these or other simple geographical factors. In the study of many portions of school geography the impressions must and should be first presented through the printed word; but not so the elements of geography, with which all later phases of the subject must be compared and through which interpreted. The memorizing of words or sentences is not necessarily the absorption of ideas. Pupils may and do study and memorize words and indeed whole sentences, as the typewritist reads sentences with no conception of their meaning; they may indeed be able glibly to write the words of the text, but they may have no knowledge of what it is all about.