prehistory was a leading feature among the exhibits.

From southern Asia and its adjacent islands come exhibits of the most recently discovered human fossils and the earliest crude stone tools, brought by Dr. Hellmut de Terra, who has been working in Burma, and by Dr. G. H. R. von Koenigswald, who has dug the river gravels of Java.

Java in particular has yielded rich returns to the inquiring spades of the paleontologist and archaeologist. Beginning with some sensational new finds of Pithecanthropus, the Java ape-man, three distinct types of prehistoric man have been been turned up on that island, forming a human-evolutionary sequence.

Backing up the strictly human finds in Burma and Java are fossils of man-like ancient apes found farther west, in the Siwalik Hills of India.

Underlying Unity

UNITY, underlying all the apparent diversities of research in a hundred fields of science, is stressed by Dr. John C. Merriam, in his last report as president of the Carnegie Institution of Washington. Dr. Merriam retires from the presidency on Jan. 1, to be succeeded by Dr. Vannevar Bush of the Massachusetts Institute of Technology.

Keeping the idea of fundamental unity always in sight is of particular importance in the conduct of an organization that promotes and supports so many and such diverse research programs, Dr. Merriam feels. No matter how thorough and accurate is the work of researchers, if each man's knowledge is permitted to stay unmixed in its own special, idea-tight compartment, a large part of its real value remains unrealized. Full worth of separately-gained data comes only through synthesis.

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GEOLOGY

Geologic Santa Claus Comes Up Earth's Great Chimneys

SANTA CLAUS comes up, not down, earth's greatest chimneys. Volcanoes have been for ages the avenues through which gifts from earth's internal stores have been brought to the surface, where the thin film of living beings can make use of them.

Varied indeed have been the gifts that have come to us up these chimneys of Vulcan. They range all the way from gold and diamonds to the dirt we plow and the water we drink.

Many metals, especially the heavier and rarer ones, are usually found associated with massive volcanic rock formations. The theory is that they were dissolved by the acid vapors deep under the surface, carried up near the top, and there deposited in the concentrated form which we find workable.

Non-metals, too, have come by the same route. Sulfur is obvious. Less so, but of even greater importance, is the free chlorine that is part of volcanoes' breath, for it combines with sodium to form the salt without which we can not live.

Most abundant of all the gases spouted forth by volcanoes is that compound we know as the most indispensable and universal of all liquids—water. Water is part of the crystalline structure of rocks, and as the rocks are broken apart chemically in the course of volcanic action, this water is torn away, makes its way to the surface, and wins its freedom from age-long stony bondage to become the intimate companion of life, and indeed part of life itself.

Up the volcanic chimneys also comes another gas important to life. It is the same gas that rises through man-made chimneys—carbon dioxide. Captured by plants, it is woven into food. In the bodies of animals, it is united with phosphorus and calcium to become bones and shells. Ultimately, we owe even coral and pearls to volcanoes!

This is only the beginning of the list, but it should suffice to show us that, behind those false whiskers, Santa Claus is really Vulcan.

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GEOLOGY

Rocks Flow, Then Break, Harvard Studies Show

Duplicating Conditions in the Earth's Crust, Physicist Finds Strong Steady Stress Will Fracture

NEW clues to the underground mechanism causing earthquakes, mountain formation, and other geological phenomena have been found by a Harvard physicist in the action of rocks under tremendous laboratory pressures.

David Griggs, junior fellow in geophysics, has utilized the high pressure equipment of Prof. P. W. Bridgman, to duplicate the pressure conditions in the earth's outer crust—a granitic layer extending down 30 to 50 miles.

Under the high confining pressures, which reached a maximum of about 300,000 pounds per square inch, it was found that limestone could be made to flow. A small block of it was compressed 35 per cent. in length without shattering.

Contrary to past geologic beliefs it was found that, under high pressure, rocks will not flow indefinitely but will break if deformation is carried far enough; and it was found that sudden differential stress is not required to produce fracture under high confining pressure, but that a strong steady differential pressure will cause fracture if applied long enough.

In the tests a specimen of rock is placed in a thick steel cylinder. Hydraulic confining pressure is applied through a liquid, or at very high pressures through lead. In addition a direct differential pressure is exerted on the specimen by a steel piston. Differential pressures used attain more than 1,500,000 pounds per square inch. The tests are made, it was said, under the highest one-directional stress ever controlled and measured in laboratory research.

Quartz, which is geologically important as one of the commonest minerals, remained brittle under the very highest pressures. The only change in quartz, aside from fracture, was an alteration of optical quality known as "undulatory extinction." Prior to these tests it was thought that quartz might become plastic under the high pressures.

Mr. Griggs' tests show that the flow of rocks under pressure is mathematically similar to the flow of metals. Rock substances beside limestone in which flow has been observed in the laboratory include glass, rock salt, calcite crystals, talc, shale, and marble.

The research has been supported by the Geological Society of America and Harvard University.

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