

prove to us that this retreat of the ice, far from having been instantaneous, was on the contrary accomplished in a gentle and gradual manner; from which I conclude that the epoch of greatest extension of the ice must have lasted a long time.

The retreat of the ice into more and more narrow limits also began from centers of movement in chains where there are no glaciers in our day: this is shown by observations of MM. Renoir and Hogard on the polished rocks and moraines of the Vosges, and those which I have already reported concerning the Dent de Vaulion, which was a glacier surrounded wholly by Jurassic rocks, undoubtedly from a time when the alpine glaciers had attained no greater height than the slopes of the Jura.

The scattered boulders, which differ so markedly from the moraines in their general arrangement, cannot therefore be in any way confused with the latter; since they were strewn before the formation of the moraines, that is to say, while the ice still occupied the entire Swiss plain.

On the other hand, when we consider that all our scattered boulders are so many splinters broken off from the

mass of the Alps since their elevation, and that consequently they must have been transported to the places they occupy after this uplift, we are naturally led to ask how it is that they did not fill up our lakes. There are only two possible causes: either the lakes were protected in some way from invasion by the boulders, or else they did not exist when this transportation took place. But we have already seen earlier that this last supposition is contradictory to the facts, since we have observed on both their banks moraines arranged like those of a glacier which undergoes oscillations. I believe in consequence that our lakes are due to the uplifting of the Alps, or at least to dislocations produced by that cataclysm.

The north of Europe is the center of another region of boulders, which are scattered over England, Germany, Poland and Russia, about which M. Pusch has published very interesting general observations. The polished rocks which accompany them have been described by M. Sefstroem.

The north of America, with its scattered boulders and its polished rocks present repetition of the same phenomena in that part of the world.

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it can be profitably moved, Mr. Duncan explained in his report.

"The exploitation of the lower-grade deposits," he said, "is dependent upon the opening up of the area by the successful development of the higher-grade ore. Undoubtedly, other important ore bodies will yet be found."

Although all the flying done by the survey parties was far inland, they never found it necessary to use airplanes on wheels. In fact, it would have been almost impossible to find a suitable landing place for wheels, while myriads of lakes and rivers provided the best of runways for pontoons in summer and skis in winter.

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#### ARCHAEOLOGY

### Air Gun Used to Dust Delicate Artifacts

**A**RCHAEOLOGISTS have discovered a new use for compressed air. They use it when working at ancient Indian sites to blow the dust of centuries from fine, delicate specimens, such as fur robes, burned matting, or badly disintegrated wood or bone.

The apparatus which has been successfully used by the Van Bergen-Los Angeles Museum Expedition in its work at caves and old village sites is simple. It consists of a small, portable air tank ordinarily used in spraying vineyards and orchards. The tank has a trigger-controlled nozzle through which air, instead of the spraying compound, is directed upon archaeological material too delicate to stand the touch of hands or even a fine camel's-hair brush.

In deposits such as debris of the old Basket Maker Indians, in which perishable materials are found, the air tank and hose with its readily controlled nozzle are most useful. Often, the fine dust of the centuries which has settled upon the artifacts left by these people who died some 1500 to 2000 years ago is soft and fluffy as ashes. Trenching is difficult. Even such tools as the ever-present and easily wielded trowel, the main digging tool of every well-trained archaeologist, prove too heavy.

When such difficulties are met the air gun is brought into play. Steady, gentle air currents are directed at the layers of dust, chaff, light straw and such debris, whisking them to one side, quickly and evenly, leaving the specimen or specimens bare, ready for photographing and, if necessary, treatment for future preservation.

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#### MINING

## Airplanes Enable Geologists To Survey Arctic Copper

**F**LYING in a few hours over sections of the Barren Grounds of the North West Territories of Canada, which could be crossed by dog team or canoe only in weeks or months, aerial prospectors have found valuable deposits of copper within the Arctic circle.

This discovery, a recent achievement of man's newest mode of travel in one of the world's most inaccessible and undeveloped regions, is described in reports to the Canadian Mining and Metallurgical Institute by J. P. Norris and Gordon G. Duncan, each a member of geological parties that made extensive surveys with both plane and canoe.

The territory in which the newly-found copper deposits were surveyed lies along the Coppermine River between Great Bear Lake, Canada's largest inland body of water, and Coronation Gulf on the Arctic Ocean—in a land that is practically barren of trees

and where in the winter the temperature falls under 50 degrees below zero and in the summer rises to more than 90 degrees Fahrenheit.

Yet the geologists who visited this region believe that when the world demands it, copper can be satisfactorily sent from this distant land of contrasts, either across Great Bear Lake, down Great Bear River to the Mackenzie River and hence to the Arctic Ocean, or directly to the Arctic at Coronation Gulf. Some deepening of rapids would be necessary in the rivers, but no difficulty is expected by ocean-going vessels rounding Alaska and coming into the Arctic Ocean as far as Coronation Gulf, for this has been done in the summer for a number of years.

Some high-grade copper ore has been found, but during the short time the parties were in the field they could not determine how extensive the deposits are. If this ore is in sufficient quantity,