intensive study of the mutations of specific genes selected as best suited to detailed genetic analysis, in the hope of developing more sensitive criterions for the identification of gene mutations.

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Erosion Phenomena

Jean Piccard

Department of Aeronautical Engineering, University of Minnesota

THERE are a number of interesting erosion phenomena that are not the result of an equilibrium between heat exchange by radiation and by convection, yet the effects are in some cases so similar to such equilibrium effects that at first glance these erosion phenomena appear to belong in the same class.

Fluted rocks. In many mountain regions one finds very striking erosion phenomena in limestone: well-formed channels leading downhill. Their bottom is invariably rounded, and the ridges between the channels are exceedingly sharp. These channels vary in width from a fraction of an inch to several feet, and their length may easily attain 30 ft. On the side walls of the larger channels new, smaller channels are formed. They too lead in the direction of maximum inclination. They are undoubtedly formed by rain water containing, of course, carbon dioxide.

The explanation is a very old and simple one: If a slightly inclined rock surface, probably originally polished by glacier action, is not perfectly flat, then after each rain the deeper places will remain wet longer than the protruding parts. At these places the erosion proceeds faster than at elevated, drier regions. The differences between high and low are, therefore, accentuated by rain water. The edges between two channels get more and more elevated above the deeper parts of the rock and, after each rain, they are the first to dry. These ridges between the channels get sharper and sharper, and they can, without exaggeration, be compared to knife edges. At some places the water seems to have found a vertical crack, and these cracks are then widened to deep crevasses, which may have a width of several feet. It is well known in such mountain regions that sheep can be killed when they fall into these holes.

Similar formations can be observed in gypsum rocks. I have climbed, with the aid of a rope, down into some of these vertical shafts, which had a perfectly circular cross section and the walls of which were quite smooth. These "chimneys" in gypsum rocks are harder to explain, but they may well be related to the better known fluted rocks in limestone.

Action of acid on files. It is well known that if a dull file is dipped for a few minutes into concentrated hydrochloric acid, it will come out considerably sharper than it was before the dipping. This phenomenon is very similar to the formation of fluted rocks, but it is more difficult to explain because there is no reason why the action of the acid should be less strong on the ridges than on the grooves. Here we apparently need a geometric explanation.

Let us assume that we start with an iron plate that is fluted with alternating convex and concave cylinder surfaces, all of the same radius of curvature. If the acid acts with the same speed on the ridges and on the grooves, the radius of curvature of the grooves will increase until the concave cylindrical surfaces of the grooves meet, whereas the radius of curvature of the ridges will decrease. When these radii have reached a zero value, the grooves meet and a maximum sharpness of the ridges is attained. From then on any further action of the acid will produce no further improvement of the file but will produce a gradually progressing deterioration. The radius of curvature of the convex areas remains zero indefinitely, but the angle at which the concave areas meet gradually approaches 180°. This gradual "resmoothing" of the file is in sharp contrast to the formation of fluted rocks which, as years or centuries pass, always progresses, never recedes. The ridges on the file, in contradistinction to the ridges on the fluted rocks, are exposed to the action of the acid for the same length of time as the grooves.

"Dish formation" in old avalanche snow. When, during the winter, an avalanche has come down a mountain slope it frequently remains strongly compacted in the bed of a small creek for a considerable part of the following summer. In this case it is likely that the creek will again find its way along the bottom of its old bed, deep under the old avalanche snow. Soon warm air, too, will find its way along the water and will form a tunnel under the avalanche. When this tunnel is open at both ends of the snow field a considerable air flow takes place downward through this tunnel whenever the temperature of the outside atmospheric air is above freezing. This air drift produces a rapid melting of the old snow, and toward the middle of the summer a sizable tunnel has been formed. Tunnels of this sort are frequently 5 to 10 ft high, and it is easy to follow the creek for considerable distances under the snow mass.

It is quite evident that under these conditions the melting is done entirely or almost entirely by the flow of warm air. The sun never reaches the ceiling of these caves, and the radiation by the bottom of the cave which itself is near freezing, seems to be negligible.

"Dish formation" on remnant of old avalanche, Simplon Pass, Switzerland, May 1954.

Under the described conditions we invariably see a very striking phenomenon on the ceiling of the cave as well as on the walls. The whole surface of the snow is composed of a multitude of concave spherical surfaces or "dishes" forming sharp ridges at the place where two of these surfaces meet. The borderline of each dish is, therefore, polygonal. The dishes often reach 1 ft in diameter. There is little doubt that these ridges are formed in the same manner as the sharp ridges of the old file dipped into hydrochloric acid. It is, however, rather surprising that the phenomenon does not come to an end. Apparently there are always enough irregularities in the snow to prevent the theoretically possible formation of an entirely smooth surface. It may be noted that the formation of dishes is not confined to the inside of the caves; it is also seen, although less well pronounced, on the upper surface of the snow field.

Sophia H. Eckerson, Plant Microchemist

FOLLOWING a week's illness, Sophia Hennion Eckerson, retired plant microchemist at Boyce Thompson Institute for Plant Research, died on 19 July 1954. Born in Old Tappan, N. J., Dr. Eckerson had an inheritance of old Dutch and French blood from her parents, Albert Bogert and Ann (Hennion) Eckerson.

Entering Smith College as a mature student, after helping younger brothers establish themselves in their chosen fields of medicine and art, she received her A.B. degree in 1905 and her A.M. degree in 1907. In 1911, she received her Ph.D. at the University of Chicago, where she continued on the staff until 1920, although the school was not then noted for its liberal attitude toward women on its scientific staff. Her ability as a microchemist led to appointment under that title for a term at Washington State College in 1914; with the Bureau of Plant Industry, USDA, Washington, D.C., 1919; with Cereals Division, 1921–22; with the University of Wisconsin, 1921–23. Becoming plant microchemist at Boyce Thompson Institute when it was organized in 1924, she continued in this position until retirement in 1940.

A versatile person with wide interest in letters and art as well as science, Dr. Eckerson showed the effect of her early training in plant physiology with William Francis Ganong, an outstanding teacher. Her earliest publications are cited in the second edition of *The Teaching Botanist,* which he was then preparing. Throughout her life, she influenced young scientists, whether as aspirants for the doctoral degree, with a thesis to develop and write, or as members of formal classes or informal groups, organized to take advantage of her ability to teach them the special methods she had developed for following metabolic processes in plants by detection of the products through crystallization or by color reactions. Indeed her many students used the mimeographed copies of her "Outlines of plant microchemistry" as a class textbook, so that although she was too much of a perfectionist to publish the last draft of a book designed for class use, her methods have been widely disseminated and incorporated into the textbooks of others.

Throughout her career, she gave generously and enthusiastically of her time and experience to many in organizing and pursuing botanical problems as well as