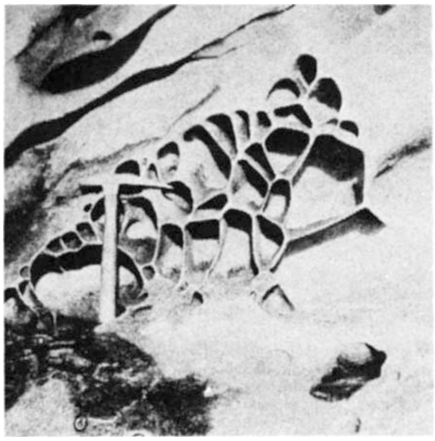

A particularly good example of the thin, delicate, weathering-resistant walls that develop between the cavities of honeycomb weathering.

honeycomb cavities in American desert rocks could be due to differential moistening of the rock surface, the hydration of feldspars at the moist sites, consequent exfoliation there, and the removal of the resulting debris by wind, rain and animal activity. On the other hand, Rondeau[8] concluded in desperation that honeycomb weathering could not be accounted for by any process at work today. Ironically, this is the only 'explanation' that can be rejected with any degree of certainty, for honeycomb weathering can be seen on a sea wall built in France in 1898 and on sandstone blocks quarried in 1902 to build a railway embankment in Washington state.

For this background information we are indebted to Mustoe[9], who also draws attention to Hume's[10] suggestion that honeycomb cavities may result from the physical action of salt crystallization. To Mustoe, too, must go the credit for undertaking a proper study of the origin of honeycomb weathering in one particular rock formation, namely, the coastal Chuckanut Formation of Washington state. Thus whereas most previous writers on honeycomb weathering have been content simply to describe the phenomenon, a few have speculated on its cause and even fewer (if any at all) have tried to investigate its origin. Mustoe has now carried out the first detailed geochemical and mineralogical work on it.

He concludes that in the case of the arkosic sandstone of the Chuckanut Formation, Hume's explanation is basically the right one. The occurrence of honeycomb cavities only on coastal exposures, the observed distribution of salt spray and the salt crystals to which it gives rise, and, above all, the measured concentrations of soluble salts on the rock surfaces, leave little doubt that honeycomb weathering at Chuckanut results from the evaporation of salt water deposited by wave splash. Moreover, the erosive action of the salts is evidently physical rather than chemical, for the small amounts of eroded sand left within the cavities are disaggregated grains with virtually no indication of chemical alteration or dissolution.

But even if salt is responsible, the problem is not entirely solved. The existence of honeycomb weathering depends not only on the formation of cavities but also on the failure of the weathering to proceed to the point at which the walls between the cavities are also eroded away, leaving no honeycomb pattern at all. Mustoe's findings on this are consistent with the view that chemical action plays no large part in the proceedings. Thus there is no mineralogical evidence of the hardening of the cavity walls by the infiltration of chemically derived cement, but there is evidence (both visual and chemical) of a covering of algae. What apparently prevents the cavity walls from disappearing is the development of a thin organic coating that presumably either acts as a physical barrier against salt spray or, by keeping the surface moist, retards the evaporation of saline solutions. Either way, it is pretty successful.

Of course, what applies to the Chuckanut Formation may or may not apply to the honeycomb weathering observed in the remarkably wide range of environments throughout the world. Indeed, on the face of it, it seems highly unlikely that a mechanism valid in a temperate coastal region would be appropriate to arid, tropical or Arctic conditions at an inland site. Yet the argument is not all one way, for even at inland sites there are possible sources of salt in migrating fluids or even in the rocks themselves. For the time being, however, questions about honeycomb weathering beyond Chuckanut must go unanswered.

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100 YEARS AGO

A RAPID-VIEW INSTRUMENT FOR MOMENTARY ATTITUDES

THE wonderful photographs by Muybridge of the horse in motion and those by Maret of the bird on the wing induced me to attempt the construction of apparatus by which the otherwise unassisted eye could verify their results and catch other transient phases of rapid gesture. Its execution has proved unexpectedly easy, and the result is that even the rudest of the instruments I have used is sufficient for the former purpose; it will even show the wheel of a bicycle at full speed as a well defined and apparently stationary object. This little apparatus may prove to be an important instrument of research in the hands of observers of beasts, birds and insects, and of physicists who investigate such subjects as the behaviour of fluids in motion.

The power of the eye to be impressed by a glimpse of very brief duration has not, I think, been duly recognized. Its sensitivity is vastly superior to that of a so-called "instantaneous" photographic plate when exposed in a camera, but it is of a different quality, because the impression induced at each instant of time upon the eye lasts barely for the tenth of a second, whereas that upon a photographic plate is accumulative.

The instrument I commonly carry with me is a very rude one, but convenient for the pocket, and is shewn below. The duration of the exposure given by it under the action of its spring is the 360th part of a second, but the beginning and end of the exposure ought not to count, so little light passing through the edges of the pupil at those times that what is then seen is relatively faint and is disregarded. I estimate its practical duration at about one 500th of a second, and it is rather less when the finger acts with a sharp tap in opposition to the spring. The instrument is shewn without its sliding lid, which protects it from injury in the pocket. An arm turns through a small angle round C, its motion being limited by two pins. Its free end carries a vertical screen, which is a cylindrical (or better, a conical sheet described) round an axis passing through C perpendicular to the arm. As the arm travels to and fro, this screen passes closely in front of the end of the box, which is cut into a hollow cylinder (or cone) to correspond. There is a slit in the middle of the screen, and an eyehole in the centre of the end of the box. When the slit passes in front of the eyehole, and the instrument is held as in the Fig, a view is obtained. A stud, S, projects upwards from the arm, and an india-rubber band, B, passing round a fixed pin and a descending spoke of the arm acts as a spring in causing the stud S to rise through a hole in the side of the box, where the finger can press it like the stop of a *cornet à piston*. In using the instrument it is held in the hand as in the Fig., with the eyehole in front of the eye. Nothing is then visible, but on pressing or tapping the stud the slit passes rapidly in front of the eyehole, and the view is obtained. After this, the stud is released and the arm springs backwards, when a second view can be obtained, or the eye may be purposely closed for the moment.

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