ON THE DETECTION OF GLACIAL STRIÆ IN REFLECTED LIGHT.

It is known that in many regions of glaciation, owing to the softness or attitude of the country, particularly in the case of schists, all traces of bed-rock striæ have seemingly been effaced by post-glacial weathering. The country about Orange, a little west of the north central part of Massachusetts, affords a good example of the case in point. The rocks are soft gneisses and hornblende schists. They strike nearly north and south and dip about vertically, or, in other words, stand on edge. Their very attitude, combined with the local variation in mineralogical composition and texture, due to the banding in the gneiss, has enabled the process of weathering to work at its maximum rate. As a result, the surface of the rock, wherever exposed, is corroded to extreme roughness, and often longitudinally pitted, so that on the rock itself about all trace of striæ has vanished. Also the approximate coincidence of direction between the striæ and the strike or banding in the gneiss renders any trace of weathered striæ which may remain not only difficult of detection, but unsatisfactory to the geologist, even when found.

There is, however, a means of determining the direction of ice-movement in this region. Happily the rocks are traversed here and there by quartz veins of moderate size. These veins being more resistant, often stand out in bold relief above the enclosing rocks now weathered down at their sides. They have retained not only their ice-polished surface, but this surface is often found to be well marked by sharply defined striæ and very fine parallel scratches, concerning whose origin the lens leaves no doubt.

These scratches sometimes occur in such delicacy as to render detection by the unaided eye difficult in ordinary light. By chance it was observed that in reflected sunlight the most delicate become readily visible, even at several yards distant. The distinctness with which the striæ are brought out is due to the marked contrast produced by difference of reflection between the unstriated part of the ice-polished surface, which strongly reflects the light, and the striæ themselves, which do not reflect, but appear as opaque or dark lines in a bright shining background.

Further observation seems to show that this means of detecting striæ can in many cases be used to advantage, especially where the surface to be examined is of considerable extent, the task of observation being materially facilitated without impairment of reliability. The striæ show best when observed in the direction of their drift trend, and with the angle of reflection large, forty-five or more degrees.

The above observations were made early in April in connection with a visit to Mount Monadnock, in New Hampshire; a covering of snow and ice preventing the taking of similar observations on the mountain at the time. It has since been learned, however, from Mr. C. L. Whittle, who has made a specialty of ice-movement over this mountain, that, as in the region of Orange, the striæ are now chiefly limited to the exposed edges of quartz veins traversing the granitic gneisses and other rocks which constitute the mountain.

F. C. Schrader.

Cambridge, Mass., May 2, 1896.

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*OCCURRENCE OF UINTAITE IN UTAH.**

The name Uintaite was given to the hard asphaltic substance to be discussed, by Prof. W. P. Blake in 1885. Subsequently it acquired the name Gilsonite, after a Mr. S. W. Gilson, of Salt Lake.

In appearance Uintaite is jet black, of

* Read by Mr. George H. Eldridge before the Geological Society of Washington, January 8, 1896, and reported with the author's approval by Dr. W. F. Morsell.

brilliant lustre, with powder and streak chocolate brown. It is brittle, with fracture conchoidal and hardness between 2 and 3; specific gravity, 1.07. The mineral is, like many others of the asphalt series, undoubtedly composed of a number of hydrocarbon compounds. Its position, from a physical standpoint, is at one end of the hydrocarbon series, petroleum, naphtha, and the gaseous substances being at the other, with the viscous malthas between.

Deposits of this hydrocarbon compound are, so far as present known, confined to the Uncompahgre Indian Reservation and its immediate vicinity in eastern Utah. The allied compound, Grahamite, occurs in West Virginia, and again in the Huasteca in the northwest part of the State of Vera Cruz, Mexico. Albertite, another near relation, has long been known in New Brunswick. It is quite possible also that many of the solid asphalts of other areas will, upon a more extended knowledge of their composition, be found to belong to one or another of these species.

The largest deposits of Uintaite are located along the Colorado-Utah line, 30 to 50 miles north of the Rio Grande Western Railway; others of workable width lie 40 to 50 miles west near the western edge of the Uncompahgre Reserve.

The deposits lie in the Uinta Basin, originally a structural basin, bordered by the Uinta Mountains and the Yampa Plateau on the north, the Wasatch Range on the west, the White River Plateau on the east, and the Roan or Book Plateau on the south. Erosion has greatly modified the surface appearance of the basin, the streams having cut cañons in some instances 3,000 feet in depth.

The geological formations of the basin proper are of Eocene Tertiary age and include the Laramie, Wasatch, Green River, Bridger, Washakie (?) and Uinta, the whole constituting a grand terrane of sandstones, shales and thin inconspicuous limestones.

The Uintaite is confined to no particular formation. It occurs as veins filling vertical cracks from $\frac{1}{4}$ inch to 18 ft. wide and from a few hundred feet to 5 or 10 miles in length. They have a general northwest-southeast trend. They cut shales, sandstones and limestones alike, and no displacement of the strata on either side of these cracks has ever been observed. The veins themselves, however, are faulted from 2 or 3 inches to 2 ft. Lateral cracks of wafer thinness are, in some instances, given off from the main vein, all filled with the asphaltic substance. The strata for a foot or two from the vein are often strongly impregnated with the Uintaite. Horses of the wall rock also occur, completely enveloped in Uintaite. The estimated contents of the veins to a depth of 1000 ft. is 20,000,000 tons.

Dr. Wm. C. Day (Journ. Franklin Institute, Sept., '95) has found Uintaite to consist of 56.46 % volatile matter, which is nearly or quite all condensable, 43.43 % fixed residue and 0.10 % ash; and that its percentage composition is

Carbon	88.30
Hydrogen	9.96
Sulphur	1.32
Ash	0.10
Oxygen and Nitrogen undetermined	0.32
	100.00

He speaks of it as comprising a number of radically different series of hydrocarbons, among which the paraffin series is one, and probably also the naphthene. No aromatic hydrocarbon appears to be present, or at most only in small quantity.

Uintaite is used in the manufacture of the cheaper black varnishes ($1.25 and down) and of japans, being especially prized on account of its elastic properties. It is in common use throughout the United States.

Within a region of 150 x 50 miles, in which the Uintaite all occurs in the eastern part, is found nearly all of the native asphalt series. The nearest neighbor is the Mineral Caoutchouc, Elaterite, or Wurtzilite, which in turn has at no great distance from it a substance with which it is said to have most intimate relations, Ozocerite, or Mineral Wax, and but a short distance from the latter is probably the highest grade asphaltic limestone in the United States. Maltha also occurs in the region; petroleum springs are also known, and the shales and limestones of the Green River formation are frequently found heavily impregnated with bitumen.

The region as a whole, therefore, offers a most advantageous opportunity for the study of the field relations of hydrocarbons.

RUINS OF QUIRIGUÁ.

The village of Quiriguá is about 20 miles to the west of Izabal, in Lat. N. 15° 15′ and W. Long. 89°. Nine miles away are the ruins situated on the left bank of the Motagua. Dense tropical forests cover the hills and valleys for miles around, and the only means of approach is through narrow mule paths till within some two miles from the ruins, when a passageway has to be cut by the 'mozos,' or Indian guides, with their machetes. The trees are of immense size, mahogany, ebony and lignum-vitæ being plentiful. Creepers and vines of all kinds hang down from these trees, making travel both dangerous and difficult in a tropical region where venomous insects and reptiles abound.

The first one sees on reaching the ruins is a small lake which the Indians have named 'Lake of the Idols.' An artificial mound built of small stones is within a stone's throw of the lake. As many of these rocks are of very fine marble, they probably came from the bed of the Montagua river, two or three miles away. At the base of this mound there are three obelisks 16 to 18 feet high. Each has a human face sculptured on its south side. The features of these faces are generally flattened about the forehead, the under lip large and hanging, the upper quite short, flat nosed and very large eyes with a staring look. The mouth is open in most cases and there appears to be a slight growth of beard. The other sides of these obelisks are covered with hieroglyphics enclosed in squares, many representing animals, trees, etc.

In a southerly direction we find the largest of the six obelisks, this one being 26 feet high, 5 feet wide and 4 feet thick. It is 12½ feet out of the perpendicular. It is quite probable that fully 6 or 8 feet of these shafts are buried in the soil. All the sculptured parts of the inclined obelisk of Quiriguá are certainly finer and more elaborate than on the others, the features are more regular; the nose, which is a foot long, is much sharper and the lips are not so full. The mouth is eight inches wide and the left side is broader than the right. The ears are square and are adorned with rings. The head is covered with a species of helmet shaped like a human face; the south side is similar to the north side already described, whilst the east and west have each a double row of squares containing hieroglyphics to the number of forty.

A few feet away lies an obelisk which was standing a very few years ago, according to the guides. The face on this one is different from the others; for instance, the ears are round instead of square and are formed of three concentric circles. This shaft is 18 feet high, 4 feet wide and 3 feet thick. The present condition of the sixth obelisk is not as good as some of the others. The face, which is 2 feet long by 1½ feet, has lost the nose, and the mouth is almost obliterated also; the ears are square and have no rings. Diagonally across the