

## TRANSACTIONS.

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ART. I.—A GEOLOGICAL RECREATION IN MASSACHUSETTS CENTRE, U. S. A. BY REV. D. HONEYMAN, D. C. L., F. R. S. C., F. S. Sc., F. G. S. A., &c. *Curator of the Provincial Museum.*

(*Read Nov. 12, 1888.*)

We left Halifax *en route* to Boston on the 1st of September. We reached Boston on the 3rd. On the same day we proceeded by the Central Massachusetts R. R. and arrived at our destination, Barrie Plains, 62 miles from Boston, or rather on the high ground above the station, Belledune.

The house is of red brick made from a clay deposit, just beyond the border of the farm. The steps are of granitic gneiss from a quarry on Rocky Hill which is on the east of the "old brick yard". The dykes which intersect the farm are largely constructed of gneisses and schists which once cumbered the fields. The solid rocks are not visible. All are covered and clothed with vegetation.

There can be little doubt however that these stones represent the underlying rocks.

Ascending to Rocky Hill I found in the rear beautiful sections of granitic gneisses, and in the front the same were seen exposed so as to reveal their granitic character and constitution. This is the so-called quarry whence the slabs were taken which we have already noticed. Out of the bands we collected fine specimens of oligoclase with attached quartz. The best specimen was picked up in a potatoe field.

These rocks were at once recognised as Laurentian—Archæan Gneisses.

In the cairns of rocks gathered from the fields I found abundance of boulders of Micaceous Schists thickly set with garnets. Finer specimens were collected from the dykes or fences.

Going from Barre Plains to New Braintree we found the garnetiferous schists, in fine outcrops on the roadside. A rock specimen collected has several garnets having an amethystine-like colour.

On the heights of Barre and around, and on the rocks which we traversed for miles we found every where rocks of allied character and considered to be of similar age.

From Rocky Hill and Barre Heights we beheld Wachussett Mountain.

This is said to be the highest mountain in Massachusetts. Its height being only conjectured by our informant, we leave it. A summer hotel on the top of it is also visible. We infer that this is the highest house in Massachusetts. As the distance from Barre is said to be only 14 miles, we propose an excursion. In anticipation we indulge in a sort of forecast. On a railway map "Pathfinder" which Mr. Matthews the Barre Plains station master kindly gave us, we note the White Mountains in New Hampshire and other lofty mountains and connect them with a hypothetical line. This extended southwards, connects Wachussett Mountain and penetrates our field. We thus infer Mount Alban or Archæan age. This is so far satisfactory.

We set out on our excursion from Barre Plains with Wachussetts in view. We descend into the valleys, lose sight of it, and lose our way. We come to station after station of the Mass. Central R. R. and consequently are on the way to Boston. Geologically our way is not lost, as we find a long succession of drift elevation sections; these are composed of boulders, sands, etc., debris of the Archæan rocks; we collect specimens of this material. Reaching the station we make enquiries after the way to Wachussett, and proceed according to directions. We come to West Rutland. In this town we observe frequent rock exposures. These appear different from any that we have heretofore observed. They are found however to be mica schists crystalline rocks—of the same Archæan series. We collect specimens. We come to Princeton height. Here we have a good exposure of granites. We examine them. They are much quarried for building. Being on the side of the public road or

street, we desiderate quiet for a satisfactory examination, the more so, as a great Agricultural and Industrial Exhibition is being held and our road seems also to be a race course. Our excursion terminates. Our party after partaking of the feast in the Town Hall proceeds to examine and admire the beautiful, extensive and interesting display of the productions of Princeton and the regions around.

In admiring the extensive prospect from this commanding height, we observe Wachussett Mountain to be enveloped in mist, and our further progress terminates, to be resumed at some subsequent time. We proceed homewards, and again wander from the straight road, getting a further observation of the Archæan rocks. It is dark before we reach Barre Plains. We examine also the drift sections opposite the Barre Plains station. These are a westward continuation of those observed along the line on our way to Wachussett. We would now take a trip westward on the Central R. R. as far as Ware. Our course is nearly coincident with that of Ware river, which flows through Barre Plains. Away on the left are the heights of New Braintree, with their garnetiferous rocks already examined. On the line of railway are recurring drift accumulations exposed in sections. Reaching the Ware station we are at our destination. We look at the heights on the left. These still extend beyond Ware and then seem to terminate. The day is very hot. We only look at them and assume that these rocks are of the same character as those of Barre Plains and New Braintree. We proceed to an examination of the geology of Ware. The only rocks that are seen are in a ledge that crosses the Ware at the Cotton Mills. It is inaccessible. We go round about the town without finding any outcrop of rocks. On the south-west we climb the elevations and find that they are of drift. A sheet of water is on the opposite side. At our feet lie two portable and characteristic boulders—gneissic—distinctly banded. One is syenitic; the other granitic. They remind of boulders in the Museum, Labrador collection, and shew that the Archæan rocks of the region include both Granitic and Syenitic gneisses. In rounding the sheet of water we pass through the beautiful Cemetery, which is a continuation

of the drift elevation. While the drift of Ware and the railway may be regarded as the product of glacial action, its present appearance reminds of the accumulations of the Annapolis Valley and the Boar's Back of Cumberland, which we regard as glacial drift redistributed by the action of melting ice and disastrous floods. I searched in vain for glaciation on the exposed-rock outcrops.

Still further comparison will be interesting. The rocks of Princeton and Rocky Hill, with the boulders of the Ware drift, while exhibiting differences, show at the same time sufficient points of resemblance as to establish a relationship between the Massachusetts Archæan and our own, as occurring at Arisaig and the Cobequid Mountain. In the latter especially where we have syenitic gneisses associated with granitic rocks. Vide my Papers on the Geology of the I. C. R. and the Cobequids. Trans. Vol. III, pp. 345-393.

The garnetiferous schists of Barre Plains and New Braintree have their undoubted equivalents in the Labrador rocks, as we know from the frequent occurrence of garnets and garnetiferous schists brought to our Museum by fishermen and others who have occasion to visit Labrador.

The only rocks with which I can compare them in Nova Scotia are associated with rocks of a later age in the County of Yarmouth. I have pointed out interesting micaceous schists at George's Lake and Chegoggin Point. Vide Geology of Digby and Yarmouth Counties. Trans., Vol. V., pp. 236-243. From their association with the Lower Cambrian rocks of our gold fields. I was led to refer them to a corresponding age. It is, however, possible that their proper associates are the granites rather than the quartzites and argillites. With Dana and others I am disposed to refer these also to the Archæan Period. This would bring the garnetiferous schists of Massachusetts Centre and the like schists of Yarmouth into close relationship. In paper "Geological Notes," Trans., Vol. V., 335. These garnetiferous and auriferous schists as compared with the Medicine Bow Range, are regarded by Arnold Hague as having a "strong resemblance" to "characteristic beds of the Huronian (Archæan) formation,

Canada." Descrip. Geology.\* I would also observe that in going and returning from Barre Plains I noticed the frequent occurrence of rocks on the railroad sections which seemed to correspond with the Lower Cambrian formation of Nova Scotia. I have since found that others regard them in this light, and that fossils have been found at Braintree which might establish such a relationship and at the same time confirm the views which I have established in reference to the relations of the St. John, New Brunswick, and the Halifax, Nova Scotia, series of rocks. *Vide* Hitchcock's Map in the Bulletin of the Blake Expedition and Shaler's memoir on the fossils of Braintree. Museum of Comparative Zoology, Cambridge, Mass.

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\*Page 109, Clarence King, Geologist in charge.