

used in the scheme, except by an unintended blunder, by which the wave-length of ultramarine is given as .4250, which would bring the standard blue designated into the clear violet of the spectrum and not distinguishable from the violet of my standards. The wave-length of ultramarine is not far from .4500. With no pure red or violet in a scheme of standard colors it is quite impossible to obtain or to represent accurately a very large line of important hues. The author of the article has been obliged, because of this defect in the standards he has selected, in many of the analyses of popular colors given in the table accompanying the article, to use three or four standards to represent the color he has analyzed where two pure spectrum colors are all that are needed. It is to be regretted that a publication like this should have added anything to the confusion which we are seeking to remedy. And this is still more to be regretted because the publishers of the Dictionary asked for and received from me the measurements and explanations of the plan upon which I had been working with the professed purpose of furthering the extension of the plan. This will not be as serious a matter, however, as it otherwise would have been, since the rapid introduction of the Bradley papers into the public schools gives an opportunity for the correct teaching of color to an enormous number of children.

J. H. PILLSBURY.

STONEHAM, MASS., June, '97.

PLEISTOCENE FOSSILS FROM BAFFINLAND
AND GREENLAND.

THE existence of Pleistocene deposits in Labrador,* in several of the islands of the Arctic archipelago,† and in northern Greenland,‡ has been made known by several

* Mem. Bost. Soc. Nat. Hist., Vol. 1, pp. 229-230.

† Jour. Geol. Soc., Vol. 9, p. 317.

‡ Jour. Geol. Soc., Vol. 3, p. 100.

observers, but, so far as the writer is aware, none have previously been reported from Baffinland. The discovery of Pleistocene shells during the past summer on the south coast of Baffinland is, therefore, of interest as showing that at least a part of this island, which is the largest of the Arctic archipelago, was also affected by the subsidence which lowered the lands to the north and the south of it beneath the sea during the Pleistocene.

Short trips were made into the interior by members of the Cornell University party from two points on the coast north of Hudson Strait. The first of these excursions was from a point opposite Big Island, in about long. 70 W., and the second some ten or twelve miles east of the first. At both localities Pleistocene shells were found in small lake basins a short distance from the coast at elevations from 100 to 200 feet above sea level. At two localities the shells were found in abundance, occurring in a fine blue clay mixed with some sand. These fossiliferous deposits do not occur in all of the basins and valleys, which are very numerous in this region. In most of them they appear to be absent.

The following is a list of the species arranged in the order of their abundance, which were obtained from a deposit of blue clay about 150 feet above sea level: * *Saxicava arctica*, *Mya truncata*, *Rhynchonella psittacea*, *Astarte compressa*? *Balanus crenatus*, *Pecten icelandicus*, *Lepeta caeca*.

In the interior of Big Island, Mr. T. L. Watson found Pleistocene shells at an elevation of 270 feet. The species which he obtained are *Mya truncata* and *Macoma subulosa*.

The Greenland shells are especially interesting because of the peculiar manner of

* The writer is indebted to Professor H. S. Williams for the use of specimens for comparison, and to Miss Katharine J. Bush for assistance in the determination of species.

their occurrence. All of them were obtained from the moraine fringing the margin of the ice cap along the base of the Nugsuak peninsula. The peninsula is a narrow mountainous tongue of land extending a little south of west from the mainland. Glaciers extend down to the fjords from the ice cap on either side of the Nugsuak peninsula, while along its eastern base the ice cap terminates generally in a gently sloping margin, but sometimes in vertical cliffs forty to eighty feet high, which face small ponded lakes. From the Cornell glacier the margin of the ice cap rises gradually for a distance of four or five miles until it reaches an elevation of about six hundred feet, and then gradually descends again toward the glacier entering the fjord to the north. The morainal material, which occurs everywhere except at the lakes, just at the edge of the ice, was found to contain shells or fragments of shells up to the highest elevation which it attains, about 590 feet, at a distance of about four or five miles from the coast. At some of the small lakes the ice cliffs show distinctly stratified ice which carries an abundance of débris in the lower layers. Shell fragments were observed in the face of one of these cliffs at an elevation of 390 feet above sea level. Broken shells were also observed in the morainal material which has been dumped on the surface of the ice at a few points, owing to the sharp dip of the ice strata which brings the lower débris-carrying layers to the surface before they reach the outer margin of the melting ice.

The following species have been identified in the material collected from the moraine: *Saxicava arctica*, *Mya truncata*, *Macoma subulosa*, *Balanus crenatus*, *Yoldia (Portlandica) arctica*, *Cardium ciliatum*.

Many of the shells from the moraine near the fjord, which have evidently been carried but a short distance, have been handled in a surprisingly delicate manner by the

ice. The *Macomias*, which are so fragile as scarcely to allow removal from the soft clay without crushing, have in many cases escaped from the ice without the slightest injury. The only specimen of *Yoldia* found still retained the epidermis, and the valves remained attached. In following the moraine back from the fjord toward the higher land which separates the Cornell and the Wyckoff glacial basins, the shells in the moraine become more and more fragmentary and broken as the irregularity of the land topography underlying the ice, and the distance which they have been transported, increases.

The occurrence of these shells in the moraine and in the ice makes it clear that they have been picked up by the ice from an old sea bottom which is now occupied by the ice cap. From the position of the shells and the direction of the ice flow which has transported them, the sea must have extended up the fjord when the shells were living at least four or five miles beyond the present face of the glacier. There seems to be only two possible interpretations of the relation of these shells to the ice. They either belong to a time previous to the beginning of extensive glaciation when the sea extended up the fjords as far as their slopes would permit, or they represent a retreat of the ice which allowed the sea to extend some miles up the fjord beyond its present limit, followed by a re-advance of the ice. If the former supposition be correct, the removal of shells must have been in progress from the beginning of glaciation in the region to the present time. It would seem that so long a period of excavation by the ice would have exhausted the material from so limited a supply. According to this theory, morainal material formed at an earlier period, when the ice extended beyond its present position, ought to contain shells as well as that now forming. I care-

fully examined such material for shells, but found no traces of them. These shells do not then belong to a preglacial fauna. The true interpretation of their history seems to be that there has been a retreat of the ice front some miles beyond its present position and a re-advance.

The remaining problem is, to what was the retreat and re-advance due, and when did it occur? The retreat was probably caused by the general subsidence in the north which is indicated by elevated deposits of recent shells in Baffinland, Grinnell Land and Labrador. A depression which amounted to 1,000 feet in Grinnell Land, and affected all or nearly all of the Arctic archipelago and probably Greenland, must have greatly increased the water area in the north and caused a corresponding rise of temperature. This rise of temperature would undoubtedly cause a retreat of the glaciers, permitting the sea to extend much farther up the fjords than at present, and in the shells which the ice cap is now carrying from the valleys of the interior we have proof that such a retreat occurred. With the elevation of the land in the north again, a lower temperature prevailed and the ice recovered some of its former territory.

E. M. KINDLE.

YALE UNIVERSITY, December 8, 1896.

CURRENT NOTES ON PHYSIOGRAPHY.

THE SIERRA NEVADA.

'FURTHER Contributions to the Geology of the Sierra Nevada,' by H. W. Turner (17th Ann. Rept. U. S. G. S., 1896, 521-1076) contain many geographical items. Oroville table mountain is illustrated in an excellent plate. The deep, steep-sided canyons that have been cut into the uplifted mass of the range often have benches on their slopes, caused by landslides; these, with the falls in the streams and the inaccessible character of the canyons, may be

taken as features of a youthful stage of geographical development. Associated with them as indications of recent uplift are occasional fault scarps, still steep and bare; one of these being shown in a plate. Of a little greater age are the fault-block lake basins, now drained by filling with sediments and cutting down at the outlet; Meadow valley being of this class. Mohawk valley, first holding a Pliocene lake in a fault basin, was afterwards obstructed in Pleistocene time by fragmental andesite flows. Much of the volcanic material, once broadly spread over the Sierra area and now greatly dissected since its regional uplift, is shown to be fragmental, coarse and fine, less or more stratified; it is compared in origin to the mud flows of modern volcanoes. The flows came from the crest of the range, and ran for fifty miles on the comparatively gentle slope of the then low-lying region. The 'hog-wallow' mounds on the valley plain and margin of the foothills are described and illustrated, but not definitely explained; they are one or two feet high, four to ten feet in diameter, and of the same pebbly soil as that on the intervening spaces.

NORTH CAROLINA AND ITS RESOURCES.

'NORTH CAROLINA and its Resources' is the title of a volume published by the State Board of Agriculture (Raleigh, 1896, 413 p., many plates), to which the geographer may refer with profit. The mountains, with their minerals, mines, forests, and attractive 'resorts;' the piedmont belt, with rich fields and great water powers, the coastal plain with its growing interests in truck farms and orchards, and the sounds with their fisheries, are all duly set forth. This report forms a fitting companion to a volume on 'South Carolina, resources and population, institutions and industries,' published some years ago by the State Board of Agriculture (Charleston, 1882).