

which appear not to have heretofore been described in connection with this question.

For instance: in the town of Schroepel, Oswego County, N. Y., and extending across the Oneida River (outlet of Oneida Lake) for several miles into Clay, Onondaga County, there is a plain of much rolled and rounded boulderets, cobbles, pebbles, gravel, and sand. Many of the stones, especially the larger ones, are composed of crystalline rocks from Canada. In the midst of the plain are numerous depressions, some of them containing one hundred acres or more. The deeper depressions are occupied by lakes without visible outlets, usually bordered by steep banks of sand or gravel up to seventy-five feet high. The smaller hollows present the well-known phenomenon of kettle-holes surrounded by reticulated kames, some of which are shown by excavations to have an anticlinal stratification. The coarser material is more abundant toward the north, and the sediments become finer in composition as we go south and south-eastward. At the same time the hollows become shallower, and the deposit expands somewhat in fan shape. Many of the shallower hollows contain swamps, once ponds, now peated over or filled with humus and silt often containing fresh-water shells. The plains of sand and gravel are bordered by broad plains of clay or silt. Some of the clays contain fresh-water shells; but my observations were made some years ago, and are not detailed enough to determine whether any of the fossiliferous clays are contemporaneous with the sand and gravel plains. Some of them are plainly later.

In Maine I have had opportunity to study scores of the deltas dropped by glacial rivers near where they entered the sea at a time it stood above its present level. They present the same proofs of a gradual stopping of the currents as are shown in the plain above described. The coarser fragments were first dropped as the rivers entered still water, and the assortment proceeded as their rate became slower, until at last the finest clay and rock-flour settled on the bottom of the water. The plain at the Oneida River has substantially the same structure as the deposits which I have described in Maine as deltas of glacial sediments: I therefore regard the plain as having been deposited by glacial rivers in still water in front of the ice, but not far from the ice-front. The assortment is more systematic, and takes place within less distance than is found in the frontal plain deposited in front of the ice on land sloping away from the glacier. This I regard as proof that the slopes of the land at that place were northward in glacial time, as they are at present. According to this interpretation, certain conclusions follow: 1. At a certain time the central part of the basin of Lake Ontario was still occupied by land-ice, which extended south to near the present Oneida River; 2. At this time south of the ice-front there was a body of open water, which at this place was fifteen or more miles wide; 3. The broad and deep sheets of gravel, sand, and clay which now cover the site of this open water are composed chiefly of the sediments of glacial rivers pouring from the north into still water, and dropping their burden.

If it be claimed that these sediments represent a sheet of glacial till which was eroded by the waves and re-deposited as aqueous sediment, then the material should grow finer as we go northward away from the Iroquois beach, whereas at the Oneida River we have the opposite arrangement. If it be claimed that these sediments were the result of wave-erosion of the solid rock, we have a right to demand that the system of beach-cliffs adequate to furnish so great a mass shall be pointed out to us. There are hundreds of square miles covered with sediments which in many places are known to be eighty or a hundred feet thick. The small amount of wave-erosion required to form the beach is in remarkable contrast with the scarp of erosion required by this theory. Moreover, any erosion hypothesis must assume a much greater erosion of the till than even the Atlantic was able to accomplish on the coast of Maine during its elevation in late glacial and post-glacial time. And if we suppose this drift to have its origin in any form of floating ice, how shall we account for the deep kettle-holes and reticulated ridges, or for the attrition which rounded the cobbles and boulderets in tracts extending at right angles to the beach, or for the horizontal assortment of the sediments, they growing finer as we go south? I see no admissible theory except that above stated.

It would appear that any hypothesis of the marine origin of the Iroquois beach must concede that the central part of the basin of Lake Ontario was still covered by land-ice at the time when a body of water ten to thirty miles broad lay to the south of the ice-front. Into this body of water great glacial rivers flowed, so that it was practically a body of fresh water, even if at sea-level.

In addition to the delta plain above described, there are in the region other deposits that are probably glacial sediments, but I have not examined the country lying east of the plain in question so systematically as to be certain. If a line of frontal deltas can be traced eastward and westward, it will enable us to map the ice-front of that period. The relation of such a series to the Iroquois beach, especially in the country situated north and north-east of Watertown, would greatly help to decide the question whether the body of water that lay south of the ice was a lake or an arm of the sea.

G. H. STONE.

Colorado Springs, Col., Feb. 5.

Rain-Formation.

IN your issue of Feb. 6 Professor Hazen has produced a table whereby it is intended to show that "on an average more than half the rain at Pike's Peak occurs with a falling temperature;" and from subsequent remarks in his letter it appears that the professor hereby means to say that the surface air grew gradually colder while this rain was falling, at which, to him, extraordinary result he expresses his surprise.

To an ordinary individual it may not seem surprising if rainfall should have the effect of lowering the temperature of the surface-air, when it is considered that the raindrops descend from colder upper regions, and in all probability generally first appear as snow-flakes, and also, though not so much, that the clouds prevent the sun from keeping up the temperature of the surface-air; but I shall allow myself to point out that whether the downpour has the effect of changing the temperature of the surface-air or not, cannot possibly be ascertained from observations at Pike's Peak or any other isolated station.

Let us take the case before us of rain having fallen at Pike's Peak for ten hours with a falling thermometer, and that the wind was blowing during that time at a rate of about twenty miles an hour. The surface-air which during the ten hours passes the station at Pike's Peak will then represent a body of air two hundred miles long; and when the rain set in it may have been located on lower land. The eleven readings of the thermometer give us, therefore, the temperature of air-bodies located at distances of twenty miles from one another, and taken, not all at the same moment, but at eleven different hours; and I should feel obliged to Professor Hazen if he would explain how it is possible to deduce from these readings whether the surface-air as such grew colder or warmer during the fall of rain.

It is probably from drawing inferences of this nature that the professor arrives at such apparent anomalies as when he makes the following amazing statement: "While it might be thought that a falling temperature in a saturated air would tend to produce rainfall, such is by no means the fact. There are many cases in which a fall of from ten to fifteen degrees of Fahrenheit has occurred in saturated air without any corresponding rainfall." Here is really no anomaly. The air which passed the place of observation was all saturated, and the air which came first had a temperature ten to fifteen degrees higher than the temperature of the air which afterwards passed by; but Professor Hazen infers that it was the same air he was examining all the time, and consequently wonders why it wouldn't rain when saturated air "got chilled."

FRANZ A. VELSCHOW, C.E.

Brooklyn, N. Y., Feb. 13.

BOOK-REVIEWS.

Social Diseases and Worse Remedies. By T. H. HUXLEY. New York, Macmillan. 16°. 30 cents.

THIS pamphlet contains a series of letters published a few weeks since in the London *Times*, criticising quite severely the scheme for relieving poverty devised by Mr. Booth, the "general" of the Salvation Army. In his first letter Mr. Huxley condemned the