

(3) Especial stress is laid on the fact that home tasks are not to be increased; that the bulk of the work should be performed in school; and that, with this object in view, an alteration in the present method of teaching is absolutely necessary.

(4) For the teacher, more thorough pedagogic education and a higher social status are insisted on.

(5) Teachers should not be specialists, but form masters, and should realize their responsibility for the physical as well as the intellectual development of their pupils. Greater attention should be paid to the health of the boys, and to the demands of hygiene in the schools.

(6) The final school examination (which serves as entrance examination to the university) should be regarded as the "remove" examination out of the oberprima, and consequently should be restricted to work done in this class. The Latin essay is henceforth to be abolished, and the examination in other respects made considerably easier.

In order to meet the probable growing demand for höhere bürgerschulen and realschulen, the conference passed a number of resolutions, the most important of which were that gymnasia or realgymnasia, where only a small proportion of the pupils pass into the upper classes, should be turned into realschulen; that in towns where there are several gymnasia or realgymnasia, if possible, one of these should be turned into a realschule. In the establishment of new schools, preference is to be given to realschulen, but at the same time the interests of the minority of the inhabitants of small towns without gymnasia are to be considered by having Latin instruction given where desired in the three lowest classes, so that pupils who are intended for a gymnasium may be prepared for it without leaving their homes at too early an age.

The salaries of the teachers in the realschulen are to be on the same scale as those in the gymnasia.

It is thought likely that the demand for realschulen will increase, now that a leaving-certificate from a realschule qualifies for all the lower government posts, and for the one year's military service. There is to be a special examination for this privilege in the gymnasia at the end of the year in the unter secunda.

Another reform is the putting of gymnasia and realschulen on an equal footing with regard to the right of study for all degrees in the university and technical high schools (these are of the nature of technico-scientific universities). The only condition for realschule students is the completion of their leaving-certificate by certificates of their proficiency in classics, while gymnasium students must obtain certificates of proficiency in drawing and mathematics. Moreover, the school authorities have the right to excuse good pupils from the gymnasium or realschule this supplementary examination; also every candidate who has passed the final examination of a nine-class high-school shall be admitted to all state examinations, if, during his term of study, he passes the necessary special examination which he has omitted during his school career. It is these reforms which are really the most important, for they make it possible to carry out the proposed changes without injuring the interests of many classes.

The committee for the carrying-out of the reforms resolved upon in the conference held its first meeting in Berlin on Jan. 6. The committee consists of Geheimrath Hinzpeter as chairman; Dr. Schrader, curator of the Halle University, as vice-chairman; Dr. Fiedler of Breslau; Dr. Graf of Elberfeld; Dr. Kropatscheck of Berlin; Dr. Schlee, director of the Realgymnasium of Altona; and Dr. Uhlhorn of Hannover. The members of the Council for Education are not on the reform committee, but several of them are appointed to draw up the report. The committee agreed as to the reforms necessary for raising the social standing of the teacher, and on the conditions for the right to one year's military service. The next general meeting is to be held in February, and meanwhile the work of reform is to be furthered by private consultations.

Reforms have already been initiated in Württemberg gymnasia. They are divided into ten classes, of which Class I. is the lowest. The chief alteration is that Latin is to be begun in Class II. instead of Class I., in which the average age is eight. In the lowest class the time is to be spent in mastering reading, writing, and

the elements of arithmetic; also Greek is to be begun in the fifth, instead of the fourth, the average age of which is eleven. Then the time devoted to classics is to be curtailed in all classes, so that from the second to the sixth not more than ten hours, from the seventh to the tenth not more than eight hours, are given to classics in the week. This means a reduction from 102 hours to 82 hours in all the classes reckoned together. The number of school-hours is not to be diminished, but the time saved is to be given to other subjects. German is to have 28 hours as against 26, French 18 instead of 16, mathematics 39 instead of 37, physiography 16 instead of 10, and obligatory drawing in Classes IV. to VI. 7 hours, whereas before no time was devoted to this subject.

The chief feature of the reform programme is the emphasis laid on making grammar the handmaid of literature, on mastering the text, and gaining a knowledge of grammar by study of it rather than making grammar an aim in itself. The official publications point out the fact that these alterations are comparatively insignificant, and that the Württemberg educational authorities consider the time not yet ripe for extensive reforms, more especially as the resolutions passed by the Berlin School Conference really tend to make the gymnasia of Prussia more nearly resemble those of Württemberg. For instance: the gymnasium in Württemberg has no Latin essay, and the division of secondary schools into gymnasia and non-classical realschulen is already carried out.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Discovery of Fish-Remains in Lower Silurian Rocks.

AT a meeting of the Biological Society of Washington on Feb. 7, 1891, Mr. Charles D. Walcott of the United States Geological Survey announced the discovery of vertebrate life in the Lower Silurian (Ordovician) strata. He stated that "the remains were found in a sandstone resting on the pre-paleozoic rocks of the eastern front of the Rocky Mountains, near Cañon City, Col. They consist of an immense number of separate plates of placogonoid fishes and many fragments of the calcified covering of the notochord, of a form provisionally referred to the *Elasmobranchii*. The accompanying invertebrate fauna has the facies of the Trenton fauna of New York and the Mississippi valley. It extends upward into the superjacent limestone and at an horizon 180 feet above the fish-beds. Seventeen out of thirty-three species that have been distinguished are identical with species occurring in the Trenton limestone of Wisconsin and New York.

"Great interest centres about this discovery from the fact that we now have some of the ancestors of the great group of placoderm fishes which appear so suddenly at the close of the Upper Silurian and in the lower portion of the Devonian groups. It also carries the vertebrate fauna far back into the Silurian, and indicates that the differentiation between the invertebrate and vertebrate types probably occurred in Cambrian time."

Mr. Walcott is preparing a full description of the stratigraphic section, mode of occurrence, and character of the invertebrate and vertebrate faunas, for presentation at the meeting of the Geological Society of America in August, 1891.

L. A.

Washington, Feb. 10.

Was Lake Iroquois an Arm of the Sea?

IN *Science* recently Professor Davis stated several reasons leading to the belief that the Iroquois beach was formed by a lake instead of being formed by the sea, as held by Professor Spencer. It is possible that both theories are partly right, and that there was once a lake overflowing the divide at Rome, while later the basin of Lake Ontario or its eastern portion was occupied by the sea. It is not my present purpose to enter into a general discussion of the question, but to call attention to a class of deposits

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