sion. Only an insignificant addition to the estimate of 7000 years can therefore be required by the diversion of the waters of the upper lakes.

The view held by Taylor, Spencer, and Lawson, that the high shore lines around the great Laurentian lakes are of marine formation, seems to be inconsistent with the total absence of marine fossiliferous beds overlying the glacial drift in all that region. So far as the sea did extend, after the further recession of the ice-sheet permitted it to come into the St. Lawrence and Ottawa valleys and into the basin of lake Champlain, marine fossils abound; but none are found above the Thousand Islands at the mouth of lake Ontario. We may therefore confidently accept the Niagara gorge as a measure of all the time since the departure of the ice-sheet from the northern United States.

In a recent paper in the *Journal of Geology* (vol. ii. p. 142, February-March, 1894) Mr. Andrew M. Hansen, of Norway, notes the approximate concurrence of about thirty independent measurements and estimates of the duration of the Post-glacial period, which have been made in North America and in Europe, all coming within the limits of 5000 and 12,000 years. He accordingly says: "With full regard to a legitimate calculation of probabilities, it may be predicated that the number of 7000 to 10,000 years is as nearly an exact estimate of the duration of Post-glacial time as can ever be expected."

Minneapolis, Minn., June 9.

WARREN UPHAM.

The Teeth and Civilisation.

NONE of the writers of the interesting letters which have appeared upon this subject seem to have kept before them a distinction which is of the utmost importance in its investigation, and which I should like to state, in order that the attention of those who, like Mr. Wenyon, have opportunities of observation of any segregated community, may be drawn to it.

Dental caries is very prevalent, and its increase seems to be very rapid, so that the last few generations show a marked increase; at least so it is generally believed.

But its victims may be divided into two groups, namely, those whose teeth are apparently perfect in their construction, but nevertheless fall a prey to caries, and those whose teeth show, to the trained eye, clear evidence of structural weakness.

As the latter class present a problem in heredity, and for various reasons are likely to be more interesting to the readers of NATURE than the former, I will dismiss these with a very few words.

There is good reason for supposing that the proximate cause is to be found in vitiation of the oral secretions, as caries often occurs in an extreme degree after diseases of the digestive tract, and examples such as those quoted by Mr. Wenyon are probably to be explained as due to dyspepsia induced by the unhealthy way of feeding.

To the explanation that the enamel may be cracked by alternations of temperature which could be borne in the mouth, I am not inclined to attach importance. In the first place, as a matter of experiment, I have failed to crack enamel by plunging teeth alternately into boiling and ice-cold water, and, as a matter of clinical experience, teeth do not decay along the cracks which from some cause are common in the enamel, but in natural pits of larger size, or on surfaces of contact; the cause is to be sought either in decreased power of resistance, or in the intensification of deleterious influences.

Abnormal conditions of life are known to deleteriously affect the teeth of animals; for example, stall-fed beasts are more liable to diseased conditions in the mouth than those which are fed up in rich pastures; and it has been pointed out by Mr. Bland Sutton, that some animals in the Zoological Gardens suffer in this way, notably the Lemurs, whose teeth frequently loosen and fall out.

It is rare to meet with good teeth in children whose parents have had bad teeth, and peculiarities of form in the teeth and jaws are often inherited with curious exactitude. But it is quite common to meet with instances of healthy parents with good teeth bearing a family of children, also apparently healthy and well-grown, whose teeth, although to the casual observer normal in shape, size, and general aspect, are to the eye of the dentist doomed to early destruction, and speedily undergo it.

These teeth have an appearance somewhat difficult to describe; they have a glassy look, are more translucent than they should be, are softer, and are believed, though the proof is not com-

plete, to be somewhat deficient in their proper proportion of lime salts. This kind of tooth is very apt to run through a whole family, and its causes must be sought either in some condition of inheritance, or if it be due to anything acting upon the individual, it must be something which commences to act immediately after birth. Comparative anatomy teaches us that the teeth are less variable than the jaws. In long-muzzled dogs the teeth are spaced; in short-muzzled dogs they are crowded, reduction in size having gone on faster in the bones than in the teeth; and the same thing is observed in the human subject.

Moreover in animals, whilst some variability is often observable in the teeth, that variability does not take the form of structural difference, but only of differences of size and shape.

Again, in rickets, where the bones are starved of lime salts, the teeth contrive to get more than their share; it is therefore not a little remarkable that we should find the teeth, and apparently the teeth alone, to have deteriorated in one generation.

On the other hand, it is equally difficult to find any cause which shall have operated alike upon all the children of a family if we reject inheritance as being at the bottom of it; it does not appear to be determined by the greater frequency of hand-feeding, as I know of instances in the same family where some children were nursed and others were not, and yet their teeth were alike of the poor structure to which I have alluded.

Upon the whole, I am rather inclined to attribute it to some causes operating shortly after birth, rather than before it, for the milk teeth, which are well started in utero, are far less liable to structural variation than are the permanent teeth, whose calcification is mainly effected after birth; but I need hardly say that the period of occurrence does not by any means exclude inheritance.

However the question, interesting and important as it is, is not so simple as some of your correspondents imagine, and there is a considerable amount of literature upon the subject which seems to have escaped them, some of it accurate and valuable, some of it quite the reverse.

CHARLES S. TOMES.

Electrical Theory of Vision.

IN my letter to Prof. Lodge, published in your last issue, I notice a printer's error, which I think should be corrected, as it gives an entirely wrong meaning to the sentence in which it occurs. As it stands it reads as follows: "The energy thus lost by the tissues was then *suppressed* from without by the vibrating fingers," whereas I said the energy was *supplied* from without by the fingers, the idea being that the shaking back of the eyes to their normal state of rest, evinced by the sensation of darkness, is perfectly analogous to the tapping back of Prof. Lodge's "Coherer" to its normal position, evinced by the return of the galvanometer needle to zero.

E. OBACH.

Old Charlton, Kent, June 23.

CLIMBING AND EXPLORATION IN THE KARAKORAM-HIMALAYAS.¹

THE mountain district explored by Mr. Conway lies on the southern side of the watershed of the Karakoram chain, and is drained by tributaries of the Upper Indus. For most of the time he was in Baltistan, but ended his journey by a visit to Leh. Here, at about 11,500 feet above sea-level, is a small meteorological observatory, which enabled Mr. Conway to check his observations by a comparison of barometers. Besides himself, the party consisted of the Hon. C. G. Bruce, Mr. McCormick, the artist, Messrs. Eckenstein and Roudebush, Matthias Zurbriggen, the well-known guide from Macugnà, four Gurkas, who took readily to ice work, and one or two other native attendants, with, of course, a considerable but variable party of coolies.

As the author states, the party spent in all eighty-four days on snow or glacier. They were often encamped at

¹ "Climbing and Exploration in the Karakoram-Himalayas." By William Martin Conway, M.A., F.S.A., &c. With 300 illustrations by A. P. McCormick, and a Map. (London: T. Fisher Unwin, 1894.)