geologists, that the section of gneiss along the left bank of the Schuylkill in the Park is not a fair representation of the stratigraphy of the measures. The structure here does not agree with that on the other side of the river for long distances within the limits of the Park, nor with that exposed by the cuts made for streets, etc., at short distances back from the river on this bank. Nor is it exact to say that the measures here dip 'at high angles;' since with the exception of a few hundred feet north of Lemon Hill, where one dip of 60° occurs, the dips for three miles are usually 30°, and never over 40°.

Under the caption of 'Primal sandstone,' it is the perpetuation of an error to call the 'sagging' of rocks standing at high angles '*creep*.' This term is employed by glacialists and mining engineers in two senses quite different from that which Professor Lewis intends to convey, and different from each other. Again: 'hydro-mica slates' is a contradiction in terms, though not infrequently used. If the rocks are *slates*, they cannot contain hydro-micas, except as adventitious components. The last paragraph of this little pamphlet is very neat and well put; but we may be allowed to dissent from Professor Lewis in the statement that the marble of our doorsteps 'tells of an ocean inhabited by no fishes:' at least, mine does not tell me what were *not* in the ocean in which it was formed.

The blemishes in the main work are both few and superficial. Thus (p. 9), it is a little too hasty to infer, merely from the absence of shells or organic remains in a brick clay deposited on a gravel, that the water 'had a temperature too low to support life;' p. 11, the colors of the red and yellow gravels are not satisfactorily accounted for by the 'presence of a large body of water;' there is a slightly subjective trace in the assertion on the same page, that "there is no trace of glacial action in Pennsylvania south of the terminal moraine, *notwithstanding* all statements to the contrary hitherto made by other geologists," — which is in contrast with the modest style of other parts of the work; p. 14, 'Bryn Mawr age' is not a perfectly clear designation for the time or times when the gravels called by this name were being deposited, especially as there are crystalline rocks exposed at Bryn Mawr.

Notwithstanding these trivial faults (as the writer conceives them to be), the memoir will serve not only to teach our young students of geology to reason from these facts, but will live long, if not permanently, in our literature.

June 25, 1883. Persifor Frazer.

THE IROQUOIS BOOK OF RITES.

The Iroquois book of rites. Edited by Horatio Hale. Philadelphia, *Brinton*, 1883. (Brinton's Libr. Amer. lit., no ii.) 222 p. 8°.

Those who still hold in remembrance the valuable contributions to linguistics made by Mr. Horatio Hale while connected with the 'Wilkes exploring expedition' will be pleased to know that from his retirement in Canada he now sends forth this most interesting work. The reputation of the author, added to this fascinating title, will insure its favorable reception not only by ethnologists, but also the reading public. This aboriginal 'Iroquois Veda,' which furnishes the title, and which may be considered a remarkable discovery and indisputably of great ethnological value, is presented in its original Mohawk, with the English translation. An introduction of ten chapters precedes the Book of rites. These are devoted to the general history of the Iroquois, their league and its founders, condolence council, clans and classes, laws of the league, historical traditions, and their character, policy, and language. Portions of these chapters are deductions from the book which follows them.

The boundary-line between either folk-lore or myths, and actual history, is always so vague, that, even in the relation of facts, it is no easy task in their details to so discriminate as to keep truth clear from the brilliant coloring of tradition and conjecture. Especially is this the case when an author with inherited literary taste and vivid imagination enters a realm where the temptation to allow them full scope is as great as in the early history of the Iroquois. Accordingly, we find among these chapters, many of which indicate immense research and are of great value both ethnologically and philologically, those (such as the 'league and its founders') wherein the characters are portrayed in so exalted a manner that the sceptical reader will be disposed to assign the story of Hiawatha, as given in all its minute details, not to the realm of mythology even, but to that of classic historical romance. Much less will they be willing to accept it as sober Indian history five hundred years behind its present semi-civilized condition. The chapter on the 'Iroquois language' may be considered one of the most important, scientifically, of those in the introduction; and it is probably one of the best outlines of their formation and structure ever published in English, concerning any one of the Iroquois dialects. This fact quite throws the doubt on Mr. Hale's statement that no one except Father Cuoq would

be competent to prepare a grammar of these dialects. With due respect for the great erudition of Father Cuoq, whose special studies have been in Algonquin, although a missionary to both tribes, we would say that the materials from which the reverend father prepared both his Lexique and the Iroquois portion of his Langues sauvages are through the courtesy of the Rev. Fathers Antoine and Burtin, of the order Oblat, now in the temporary possession of our Bureau of ethnology at Washington, where, already nearly translated, they will in time be published in connection with the other Iroquois dialects. We allude to the works of that greatest of all Mohawk scholars, the Rev. Father Marcoux. That the rules, the result of so much time and labor, can be clearly and distinctly presented to us in our own tongue, Mr. Hale has exemplified in the few which he presents in this chapter. The 'forms' and 'particles' which he has given are all from the Mohawk dialect, although he follows the example of all the Canadian authors, who dignify one dialect with the title which others contend belongs properly to a group. The examples he gives will many of them not apply to some of the other dialects, more especially to the Onondaga and Tuscarora.

In following too closely the rules of the French missionaries, great discrimination must naturally be exercised.

We do not agree, for example, with Mr. Hale, in the illustration given with his remarks upon the duplicative form, on p. 111.

The prefix of this form is *te;* the verb selected, *ikiaks*, — the same verb as given by Father Cuoq to illustrate this form.

I-kĭăks, I cut, in the act of cutting; *te-kĭăks*, I it cut in two, or divide; *hwisk* is the Mohawk numeral *five; hwisk té-kĭăks*, I cut it into five pieces: hence *te*, the prefix, cannot be a synonyme of, or a literal translation of, the Latin *bi* in *bisecto* (I cut in two), but a sign that the act of cutting is or may be repeated as often as necessary.

Again, concerning gender (p. 106): the old French missionary idea of a 'noble' and 'ignoble' gender — the former of which included 'man and deities,' and the latter 'woman, evil spirits and objects' — is explained away very satisfactorily by Mr. Hale, until he admits with them the absence of any neuter form. This leads him into the error (p. 108) of following their form of conjugation.

The model containing the verbs 'to love' and 'to see' are as given originally by Father Marcoux, and presented to the public by Father Cuoq. Here the French form of conjugation is used, which lacks the neuter pronoun 'it,' but which is supplied with the indeterminate pronoun '*on*.' The neuter pronoun, however, does exist in these dialects as presented in five different chrestomathies already prepared.

The translation of the third person neuter (p. 108), *wat-kah-tos*, by 'she sees,' should be rendered by '*it* sees;' and the third person singular, translated as indeterminate 'one sees,' is, in fact, the third person feminine; and the same mistakes occur with the verb 'to love.'

These few exceptions are simply advanced to show how much study is yet to be given to these dialects, and that we cannot accept unreservedly the opinions of even the best acknowleged authority upon languages, which, we are learning, cannot be made amenable to the grammatical rules of any known tongue.

The author's opinions concerning clans are deserving of great attention; although many will be unwilling to agree with his conclusion, that, before the division of the Iroquois into tribes, there existed but the three presented in the Book of rites. It may be true that clans in some instances have been added, but we know of many more in our own day which have died out. The last male representative of the Rhut-kun-yah clan now occupies its chieftain's seat without a single constituent, upon the Tuscarora reservation, while among the same tribe the female remnants of the snipe clan have been passed over into that of the turtle. The examples of the added Onondaga and Oneida (p. 52) among the Iroquois of eastern Canada bear directly upon some remarks from a correspondent of SCIENCE in relation to the extra clans found among those Mohawks. This subject is referred to by our correspondent as 'an interesting field of inquiry.' Mr. Hale's remarks, while suggesting a clew, are not free from objections. The clans are not called by the above names. One is termed the 'calumet,' and has the pipe as its symbol, which it was the province of one chosen from this clan to present in solemn assemblies; and the chief of this clan also named the deputies, ambassadors, etc.: hence its title of '*Ro-te-sen-na-kéh-te*,' from which name Mr. Hale evidently christens it 'Onondaga,' whose council, not tribal name, is the same, signifying 'name-bearers.' The council name of the Cayuga tribe translates literally the 'great-pipe people' (p. 79): so might there not be as feasible a foundation for naming it the Cayuga clan? Moreover, would the same reasoning hold good concerning the rock clan, as the council

name of the Oneida tribe differs on pp. 52 and 78? Before leaving this interesting subject, we would call attention to note 5 on p. 147: "It is deserving of notice, that the titles of clanship used in the language of ceremony are not derived from the ordinary names of the animals which give the clans their designations. *Okwaho* is 'wolf;' but a man of the wolf clan is called '*Tahionni.*'" The simple explanation is, that, in both the Seneca and Oneida, '*Tai-hyo-ni*' is the name of that animal. One might be tempted to theorize upon this; but so much is yet to be learned regarding this intermingling, retention, and coining of words, that for the present we have but to collate facts which can only be clearly explained or understood by a more full and complete comparison of the Iroquois dialects than has heretofore been obtainable.

The chapter entitled the 'Book of rites' explains its origin and character, the manner of its discovery by Mr. Hale, and the character of the Indians in whose possession it was found. That it is a genuine Indian production there can be no manner of doubt; and Mr. Hale's conclusions concerning its age are in all probability correct.

The Book of rites comprises the speeches, songs, and other ceremonies, which, from the earliest period of the confederacy, are supposed to have composed the proceedings of their council when a deceased chief was lamented, and his successor installed into office. The fundamental laws of the league, a list of their ancient towns, and the names of the chiefs who constituted their first council, all chanted in a kind of litany, are also comprised in the collection. These contents are said to have been preserved in the memory for many generations, and were written down by desire of the chiefs when their language was first reduced to writing. This manuscript, the original of which had been lost, Mr. Hale has, with the most competent Mohawk assistants, translated into English, and drawn from it most interesting conclusions regarding the character and policy of the Iroquois tribes, quite dissimilar from those generally accepted. The translation, notes, and glossary exhibit the work of a careful student. In the free translation rendered by Mr. Hale to the songs, he has given them a metre almost suggesting the peculiar melody, which, in the original Mohawk, was produced by intonations; for it must be remembered, that it is one orator who must untiringly continue to sing and chant, sometimes for twenty-four hours; and only by varying his key-note is he able to accomplish this feat.

A book which is as suggestive as this must bear good fruit. We have called the attention of our readers to many disputed points in the hope of awakening a spirit of inquiry upon subjects of such vital importance, many of which are here presented for the first time. We feel assured that the hopes of the author regarding it will be fully realized, and that students of history and of the science of man will here find new material of permanent interest and value.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The evidence for evolution in the history of the extinct Mammalia.[1]

BY E. D. COPE OF PHILADELPHIA.

THE subject to which I wish to call your attention this morning requires neither preface nor apology, as it is one with the discussion of which you are perfectly familiar. My object in bringing it before the general session of the association was in view of the fact that you were all familiar with it in a general way, and that it probably interests the members of sections which do not pursue the special branch to which it refers, as well as those which do; also, since it has been brought before us in various public addresses for many years, during the meetings of this association, I thought it might be well to be introduced at this meeting of this association, in order that we might not omit to have all the sides of this interesting question presented.

The interests which are involved in it are large: they are chiefly, however, of a mental and metaphysical character; they do not refer so much to industrial and practical interests, nor do they involve questions of applied science. They involve, however, questions of opinion, questions of belief, questions which affect human happiness, I venture to say, even more than questions of applied science; certainly, which affect the happiness of the higher grades of men and women more than food or clothing, because they relate to the states of our mind, explaining as they do the reasons of our relations to our fellow-beings, and to all things by which we are surrounded, and the general system of the forces by which we are surrounded. So it has always appeared to me: hence I have selected the department of biology, and have taken a great interest in this aspect of it.

[1] A lecture given in general session, Aug. 20, 1883. Stenographically reported for SCIENCE.