out the diseases which have been caused by these visits."

Pages 30–34 are taken up with notes on the Tinneh tribe of Nicola Valley, now extinct, whose language Dr. Boas shows "was much more closely related to the Tinneh languages of British Columbia than to those farther south, although it would seem to have differed from the former also considerably." A noteworthy addition to our knowledge of British Columbian peoples is the sketch of the Ts'ets'ā'ut, first scientifically studied by Dr. Boas (pp. 34–48) and of the Nîskâ (pp. 49–62), details of whose sociology and folk-lore, etc., are given. The linguistics of the report (pp. 62–71), though not extensive, are new and valuable. Taken all together this excellent report fitly crowns the work of the committee under whose auspices these investigations were inaugurated. It is sincerely to be hoped that some way will be found to continue researches that have been productive of such great results and added so much to American anthropology and linguistics.

ALEX. F. CHAMBERLAIN.

Solution and Electrolysis. By W. C. D. WETHAM, M. A. Macmillan & Co., London and New York. Price $1.90.

This book forms one of the physical series of the Cambridge Natural Science Manuals. It gives a summary of the work which has been done up to the present time, but particularly during the last twenty years, on the physical properties of solutions. This subject forms a branch of physical chemistry which has, within the last few years, attracted towards it a number of eminent investigators, who have obtained results of great interest and importance. To the student of the properties of matter it is difficult to conceive of any more fascinating branch of study than that of diffusion, osmotic pressure, the influence of dissolved substances on the freezing point, boiling point and vapor pressure of solvents, and the very curious difference between electrolytic and non-electrolytic solutions. The subject is only beginning to crystallize and few systematic treatises, and these mostly German, are devoted to it. The present work will therefore be welcomed by readers who prefer works written in the English language. It gives in brief form an account of the results so far arrived at and the theories towards which they point. This summary will no doubt prove of great service to students and also to physicists and chemists who have not followed the investigations in the publications of scientific societies and the journals.

The treatment of the subject is perhaps rather too brief, but outside of that the presentation of the subject is good and the printing is, as usual, very satisfactory. A few instances of somewhat careless statement exist as, for instance, the statement of the thermodynamic cycle on p. 26, which is incomplete. This is unfortunate, because everything with regard to the second law of thermodynamics seems to be a source of difficulty to students. Again, the references are occasionally misleading. Take, for example, that to Jahn's work on the Peltier effect given on p. 117. Most students would interpret it to mean that the idea of testing contact difference of potential through Peltier's effect originated with Jahn, whereas it has been in the minds of physicists and has given rise to discussion for forty years or more.

The paragraph on p. 204 on the explanation of the possible effect of specific inductive capacity on ionization power seems unsatisfactory. To any one who requires an explanation that given is probably useless.

Fitzpatrick's tables on the 'electro-chemical properties of solutions,' originally printed in the British Association proceedings, are given in an appendix and will no doubt be welcomed by many.

The book is well worth perusal and is a valuable addition to our works on physics and chemistry.

THOMAS GRAY.

Critical Periods in the History of the Earth. By JOSEPH LE CONTE. Bulletin Dept. Geology, University of California. Vol. I., No. 11, pp. 313–336. Berkeley, August, 1895. (Reprinted.)

This is, in a somewhat condensed form, the address which opened the discussion, by the Congress of Geologists at Chicago, August, 1893, on the question "Are there any natural divisions of the geological record which are of world-wide extent?" The author begins with a brief refer-

ence to the cataclysmic and supernatural origin ideas of the early geologists and with tributes to Lyell and Darwin as the exponents of uniformitarianism and evolution. The present status of thought is defined to be 'that of gradual evolution both of the earth and of organic forms, but *not at a uniform rate.*' In other words, we now recognize that the laws and forces of nature work not as along a rigid line but so that the effects are cyclical, and the questions to be solved are how far the changes produced, or some of them have been general, instead of local, and may they or any of them be used to determine the division or subdivision of geological history for the whole earth? The adaptation of the European standards of classification were found difficult or impossible for other parts of the world, which led to the idea, against which the author raises a warning voice, that *all* changes are local. The author claims that there have been 'critical periods' in the earth's history—physical changes so great as to affect the climates of the earth as a whole and to cause marked changes in organic forms. The physical changes compel organic changes largely by inducing or compelling migration of species, thus bringing about new environments and new struggles for existence between faunas and floras.

Amongst the signs of such critical periods are mentioned widespread unconformities; sudden changes in organic forms, affecting not only species but sometimes genera and families; the introduction of new and higher dominant classes; the birth of great mountain ranges. Of these the most general and important are considered to be represented by changes in organic forms. This is, therefore, adopted for determining the primary divisions of geologic time. Secondary divisions are based on less general changes and are more local in their application.

Even the greatest changes are not to be considered as catastrophic. They were not instantaneous or simultaneous, but probably extended through hundreds of thousands of years and were propagated gradually from place to place.

Four such critical periods or revolutions are mentioned. I. The Glacial, in which the physical cause was the great change in climate and the attendant oscillations of level, leading to wide migrations and extinctions of organic forms and the appearance of man. II. The Post-Cretaceous, or Rocky Mountain, which resulted in the obliteration of the interior cretaceous sea and the unification of the American continent, during which mammalian life was evolved, and of which the Laramie may be considered as the transition period. III. The Post-Palæozoic, or Appalachian, of which the Permian may be considered the transition period, and which brought about the greatest change in life-forms that is recorded in geologic history. Amongst the physical changes which brought these about are mentioned the evident *oscillations* of temperature, including even well defined and extensive periods of glaciation. IV. The Pre-Cambrian. This is marked principally in the rock system by universal unconformity, as the life system was such an inconspicuous element in those early times.

We should therefore have practically the divisions as now recognized, beginning with the earliest. Eozoic, up to the Cambrian period; Paleozoic, up to the Triassic, with the Permian as a transition epoch; Mesozoic, up to the Tertiary, with the Laramie as a transition epoch; Neozoic, up to the advent of the Ice age, and finally all time from them to the present.

The author notes that these critical periods have become gradually shorter and shorter, the changes in physical geography less and less, and in consequence the changes in organic forms less and less. The shortest in duration, the least in geographical changes, and the least complete and sweeping in changes of organic forms is the last; but the effect of the introduction of new dominant types in producing changes has been steadily increasing, as witness the appearance of man. Also the oscillations of temperature at critical periods have increased with time.

The subject closes with a discussion of the laws of evolution of the organic world and the suddenness of changes and variety of transitional forms. As a type in this latter connection is quoted the change which occurred between Paleozoic and Mesozoic times, which is accounted for partly by loss of the record and

partly by probable exceptional rapidity of evolution, the more rapid extinction of old forms and the comparative paucity of newly evolved forms, hence the poverty of fossils.

In a brief review of a confessedly concentrated dissertation it is not possible to do more than merely outline its scope. The paper is one the the principal importance of which lies in the significance of its hints rather than in its finished conclusions. ARTHUR HOLLICK.

The Practice of Massage: Its Physiological Effects and Therapeutic Uses. By A. SYMONS ECCLES, M. B. ABERD., M. R. C. S., England. London, Macmillan & Co. 1895. 8vo. Price $2.50.

It is evident at a glance that the author is a man who can see and think as well as rub. He deals largely with the philosophy of massage and presents his observations in a very plain and comprehensive manner. The book is not a manual for the manipulator so much as a physiological treatise suggesting to the reader the wide scope for the employment of massage and the precise manner in which it acts in given cases.

The text is enriched by ample references to the best and latest literature in which full credit is given to American authors. Among other affections massage is strongly advocated for the treatment of "Golf-hip" an accident which the author was the first to describe. It is a condition of gluteal strain occurring as the result of over-vigorous employment of the 'driving stroke,' and perhaps associated with a lack of skill in neophytes. One of Mr. Eccles' patients had within ten days of his accident been learning to play golf and had devoted the greater part of an afternoon to the practice of a stroke involving an attitude and a rapid muscular effort; desiring to pose, while driving a 'tee'd ball,' in the most finished style, he felt a violent pain in the upper and outer part of the buttock and over the right lumbar region, so that on leaving the ground he was unable to walk without much suffering and could not stand erect. Massage cured him, as it will sufferers from a sprained ankle, the lawn tennis elbow and similar accidents. The author claims that massage is a great but neglected adjuvant in the treatment of fractures but he goes too far when he says: "Excellent results have been obtained without muscular atrophy in fractures of the patella and leg bones, locomotion without support, save from a stick, being acquired in a fortnight."

In applying massage in medical cases, on the other hand, he wisely says that "Impatience is the stumbling-block most readily impeding recovery, and unless this can be curbed success will not attend the methods advocated." "Unfortunately no method of treatment can be vaunted as a cure for deficiency of moral courage." Massage, however, is a great help in the treatment of the morphia and alcohol habits. It is also advocated by the writer for the 'strychnia habit,' a condition not observed, so far as we know, in America.

As Great Britain has signified her acceptance of the metric system, we hope that future editions of this valuable work will discard the use of 'stones,' with pounds in favor of something more intelligible for readers the world over.

GUY HINSDALE.

NEW BOOKS.

Neue Versuche zum Saison —Dimorphismus der Schmetterlinge. AUGUST WEISMANN. Jena, Gustav Fischer. 1895. Pp. 74. M. 1.50.

Neue Gedanken zur Vererbungsfrage eine Antwort an Herbert Spencer. AUGUST WEISMANN. Jena, Gustav Fischer. 1895. Pp. 72. M. I.50.

Anleitung zur Mikrochemischen Analyse. H. BEHRENS. Hamburg and Leipzig, Leopold Voss. 1895. Pp. viii + 64.

Elektricität und Licht. O. LEHMANN. Braunschweig, Vieweg und Sohn. 1895. Pp. xv. + 390. M. 7.00.

Atlas d'Ostéologie. CH. DEBIERRE. Paris, Félix Alcan. 1895. Pp. viii+92. 12 fr.

Missouri Geological Survey. Vol. III. CHARLES R. KEYES. Jefferson City. 1895. Pp. 405.

Anarchy or Government. WILLIAM MACKINTIRE SALLER. New York & Boston, Thomas T. Crowell & Co. Pp. viii+177. 75 cents.

Etidorhpa, The End of the Earth. JOHN URI LLOYD. Pp. 376.