brown iron ore, and yielded on analysis 63.51 per cent of metallic iron.

Accompanying the report is a "Horizontal geological section on the main road from Durban to Van Reenen's pass, by Dr. P. C. Sutherland." This, in so far as it covers the same ground, differs considerably from that published by C. L. Griesbach in 1871. The Table Mountain sandstone, referred by Griesbach to the carboniferous, is by Sutherland considered Silurian. The mesozoic eruptive rocks are joined together under the name of basaltic, and are apparently represented as dikes, and not as interstratified flows of melaphyr, amygdaloid, and aphanitic diorite, as by Griesbach.

Mr. North gives the following geological order of succession in the rocks of Natal: —

1. Basaltic trap rocks, often penetrating between stratified rocks or shales of the coal-measures, and forming horizontal beds.

2. Triassic horizontal coal-measures, containing coal-seams correlating with the Stormberg coal-field of Cape Colony.

3. Pietermaritzburg shales, probably corresponding with the upper Karroo beds of Cape Colony.

4. Conglomerate or bowlder clays, in all probability the Dwyka conglomerate of Cape Colony.

5. Sandstones, horizontal and massive, of the Inanda location, Table Mountains, and Bothas Hill, etc., probably of Silurian age.

6. Primary rocks, — granite, gneiss, marble, etc.

Mr. North seems to have overlooked the cretaceous series, from the lower greensand up to the white chalk described by C. L. Griesbach in south-eastern Natal; and no evidence is given for assigning the Table Mountain sandstone to the Silurian instead of the carboniferous: in fact, no notice whatever is taken of Mr. Griesbach's able work on the geology of Natal.

At the Insiswa Mountains, in the Amaponda territory, the line of demarcation between a vast eruption of igneous rock and the triassic contains various ores of copper containing traces of gold. Mr. Griesbach also mentions the occurrence of copper ores along the line of the eruption of melaphyrs. We have here, in another portion of the world, another instance of the occurrence of cupriferous traps in the trias.

The bowlder clay consists of a bluish gray base, so fine that its constituents are not resolvable except under high magnifying power, and then no crystals are disclosed. It appears to be a very fine indurated mud, containing bowlders, pebbles, angular fragments, and grains of a great variety of rocks varying in size from masses weighing over 5 tons to pieces smaller than a pea. In mechanical composition it greatly resembles the great Scandinavian drift. It stretches for hundreds of miles, and has been found 1,200 feet thick. Some of the larger angular bowlders seem to have been brought from a distance of at least 70 miles. It seems difficult to account for such a formation otherwise than by glacial action at the close of the dyassic period.

THE BIBLIOGRAPHY OF ANGLING.

Bibliotheca piscatoria. A catalogue of books on angling, the fisheries, and fish-culture, with bibliographical notes and an appendix of citations touching on angling and fishing from old English authors. By T. WESTWOOD and T. SATCHELL. London, *Satchell*, 1883. 397 p. 8°.

THE possibilities of the future in the formation of libraries on special subjects, at present rates and ratio of increase in book-making, are brought forward in a striking manner by examination of a list like that before us. Here is a work devoted to angling, fisheries, and fish-culture, in which 2,148 distinct publications are registered under 3,158 entries, inclusive of new editions and reprints. Angling occupies 245, fisheries 83, and fish-culture 23 pages. Roughly estimated, nearly ten per cent of the publications, including reprints, etc., have appeared since 1870. Fish-culture alone claims an increase of nearly one-third in the same time. It is hardly to be expected that a work of this character should be entirely exhaustive or complete. The authors deserve great credit for the nearness of their approximation to completeness, for the amount and quality of information given, and for general accuracy.

An example or two will indicate respects in which the book may be improved in future editions.

"*Gesner* (Conrad). Aqvatilivm animantivm nomina Germanica et Anglica, serie literarum digesta, authore Conrado Gesnero. [1530?] 8°. Appended to an edition 'P. Ovidii Nasonis Halieuticon, etc.' Tigvri apud Gesneros fratres, pp. vi+ 280, and extending from page 12 to 280. . ."

This should read, —

Gesner (Conrad). De piscibvs et aqvatilibvs omnibys libelli III. Noui. Avthore CONRADO GESNERO Medico et philosophiae naturalis interprete in Schola Tigurina.

I. Scholia et emendationes in Halieuticon P. Ouidii Nasonis. [pp. 1–11.]
[Second title.] P. Ovidii Nasonis Halievticon liber.

II. Aqvatilivm Animantium Enumeratio iuxta Plinium, emendata et explicata serie literarum. [pp. 12–92.]
[Running titles.] Catalogvs Aqvatilivm, and Divisio Aqvatilivm.

III. Eorvndem Nomenclator Germanicus longe copiosissimus. Et alia quaedam ad Piscium historiam pertinentia. [pp. 93–280.]
[Running title.] Teütsche namen der Fische vnd Wasserthieren.
Tigvri apud Andream Gesnerum F.
[Date of Prefaces 1556.]

In consequence of the foregoing, after *Ovidius Naso* (Publius), "Halieuticon: hoc est, de piscibus libellus, mute quam ante hac emendatior et scholiis illustratus . . . per Conradum Gesnerum. Tiguri apud Gesneros fratres [1530?] 8°" should give place to the following: Part I. of Gesner's De piscibvs et Aqvatilibvs, "Scholia et emendationes in Halieuticon P. Ovidii Nasonis." "P. Ovidii Nasonis Halieuticon liber." pp. 1–11. Tigvri apud Andream Gesnerum F. [1556.]

The date for the first Frankfort edition of Aldrovandi is 1623 instead of 1629; and Gronow gives that of the second as 1640 instead of 1645. That given by the latter as Venice, 1616, is omitted. Three editions of Aelian (1556, 1611, and 1616), given by some authorities, do not appear. Future revision of the work will probably introduce the names of such works as those of Schomburgk's Fishes of British Guiana (1852), and Spix and Agassiz' Fishes of Brazil (1829), both of which give information on angling. The latter figures on plates A to G the various methods of capture in use among the natives.

Our authors have given us a work of great importance to all interested in the subjects of which it treats.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Mass of a planet from observation of two satellites. — M. Struve recommends measurement of the positive angle and distance of a satellite from another satellite, and not from the primary planet. A series of such measurements on satellites of Jupiter has been begun at Pulkova. The observations occupy one-third the time, and are considered two or three times as accurate as those by direct reference to the centre of the planet. They are free, moreover, from the unknown constant errors inseparable from the latter, — an advantage which Prof. A. Hall, in this paper, considers cheaply purchased at the price of greater difficulties in computation. He shows, that, while the solution of six normal equations requires seventy-seven auxiliary quantities, that of twelve (the elements of both orbits being involved by the new method) requires four hundred and forty-two, and therefore nearly six times the labor. But these twelve equations give the period and mean distance of each satellite, and hence two values of the planet's mass. Mr. W. B. Taylor objected to such special designations as 'peri-Saturnian,' 'apo-Jovian,' for the apsides of satellites' orbits when general names were needed. He suggested 'peri-apsis' and 'apo-apsis.' — (*Phil. soc. Wash., math. sect.; meeting* April 26.) [919

Periodicity of auroras. — Professor Sophus Tromholt has discussed the observations of auroras made by Prof. S. Kleinschmidt at Gotthaab, in Greenland, from 1865 to 1880, together with other observations in northern latitudes, and finds that for polar regions the maximum of auroras corresponds with the minimum sun-spot period, the reverse of what has been noted in temperate zones. The yearly maximum is at the winter solstice, while, in lower latitudes, maxima occur at the equinoxes. Weyprecht has shown that the yearly maximum is due to an oscillation of the auroral zone toward the south at the equinoxes, and toward the north at the solstices. The same explanation is given of the eleven-year period, corresponding with the sun-spot period. Prof. Lemström's production of an artificial aurora is mentioned. — (*Observ.*, April, 1883.) M. MCN. [920

Report of work of the Royal observatory, Cape of Good Hope. — In the report for 1882, Dr. Gill states that the observations for the difference of longitude between the observatory and Aden are completed. The great comet was observed on every clear night from Sept. 7, and photographs were obtained on six nights The heliometer measures for the parallax of certain southern stars are nearly concluded. In connection with observations in the northern hemisphere, *Victoria* and *Sappho* have been observed for determining the solar parallax by Galle's method. Time of contact at the transit of Venus was noted by six observers, and heliometer measures were made during the transit. — (*Monthly not.*, March, 1883.) M. MCN. [921

MATHEMATICS.

Infinitesimals. — Mr. M. H. Doolittle looks on infinitesimals, differentials, and zero as having the same denotation, but different connotations. He proposes, in cases where the value of a function becomes indeterminate, to call that value which is continuous with those for preceding and succeeding values of the variable the *serial* value. The differential coefficent, in this view, is the serial value of the ratio of two increments when those increments become zero. — (*Phil. soc. Wash., math. sect.; meeting* May 9.) [922