at the end of the ungulate sequence. The Tillodontia are shifted from a position following the rodents to the end of the Insectivora sequence. In the Ungulata we note the disappearance of the artificial Diplarthran group, and an arrangement modified from that of Schlosser, into five orders (1) Subungulata (Hyracoids, Arsinoitheres, Proboscideans and Sirenians), (2) Notoungulata (Toxodonts, Typotheres, Entelonychia and Astrapotheres), (3) Pyrotheria, (4) Artiodaclyta and (5) Mesaxonia (Protungulata = Condylarthra, Perissodactyls, Ancylopoda = Chalicotheriidae, Amblypoda and Litopterna). Numerous changes and additions within each of these larger groups have been occasioned by the paleontological contributions of the last twenty-five years, and with most of them paleontologists in this country will be in agreement, at least as to relative position, although many will be disposed to assign higher rank to some of the groups.

This reviewer is much in sympathy with Weber's conservative attitude as to the scope of taxonomic groups, but would not be disposed to go so far in reducing their rank in several instances. The Multituberculates might at least be granted ordinal rank if indeed they should not be raised to higher standing. A forthcoming article by Granger and Simpson will discuss the evidence on this point. On the other hand, Chalicotheriidae are now generally regarded as a family of Perissodactyla, although Abel has adduced some plausible arguments for maintaining their separate ordinal rank. The substitution of Protungulata for the customary term of Condylarthra is open to criticism, as also the association of Amblypoda with the Mesaxonia group instead of with the Subungulata.

The new edition of *Die Saeugethiere* is cordially commended as a very thorough and up-to-date revision of this most useful text-book.

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Der Sauerstoff im Eutrophen und Oligotrophen See. By AUGUST THIENEMANN. Bd. IV of Thienemann's "Die Binnengewässer," E. Schweizerbart'sche Verlags-buchhandlung, Stuttgart, 1928. 175 pages, 41 figures.

LIMNOLOGISTS have been making quantitative studies of the dissolved oxygen in lakes for more than three decades, because it is such an important factor in the environment of aquatic organisms. These investigations have yielded an extensive literature on the subject, and the present volume gives a summary and general discussion of the more important results that have been obtained.

Two types of lakes are considered, namely, eutrophic and oligotrophic. Eutrophic lakes are characterized by a marked decrease in the quantity of dissolved oxygen in the lower water (hypolimnion) during the summer period of stagnation; in many lakes belonging to this class only a trace of oxygen or none at all is found in this stratum in late summer. Oligotrophic lakes possess an abundance of oxygen in the lower stratum throughout the summer.

One of the outstanding features of the volume is the development of a formula for the computation of the total oxygen deficiency in eutrophic lakes; the author has made computations for several well-known lakes in order to illustrate his formula. The second chapter deals with the variations that take place in the dissolved oxygen content of lakes during the different seasons of the year; special emphasis is placed upon the changes that take place in the lower water in eutrophic lakes during the summer period of stratification. The variations which are found in the oxygen content of lakes in different years are considered in the third chapter; these annual variations are attributed chiefly to variations in the climatic factor.

In the fourth chapter the author presents the results that have been obtained on lakes that are broken up into bays and separate basins; in several instances cited the different basins of lakes differ very widely in character. The oxygen relations that have been found in the thermocline (mesolimnion) of eutrophic and oligotrophic lakes are discussed in the fifth chapter. In eutrophic lakes there is usually a marked decrease in the quantity of oxygen in the thermocline, but in oligotrophic lakes there is usually very little change in the amount in this stratum.

In the sixth and final chapter the author discusses the causes for the differences in the oxygen relations between eutrophic and oligotrophic lakes. These differences are dependent upon such factors as differences in mean depth, the ratio of the volume of the epilimnion to that of the hypolimnion, the shape of the lake basin and the quantity of organic matter produced by the lake. The bibliography includes fifty-eight titles.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A PHOTOGRAPHIC METHOD OF MEASURING PITCH*

HISTORICALLY there have been five methods used in psycho-physics and physics for determining the frequency of vibration of sound waves in speech and music: (1) Measurements made from graphic or photographic records of sound waves, involving the use of tambours, or such light levers as the Miller

* The term "pitch" is here used in the physical sense.