where vol (**ABC**) denotes the volume of the parallelopiped of which **ABC** are three adjacent edges. The only objection to this name lies in its suggesting that **A**, **B**, **C** are *linear* vectors.

Here appears the defect in the author's *cos* and *sin* notation, in that it cannot be applied to the products of three vectors, or at least that the special reason for its use has disappeared, and the author does not suggest so applying it.

But there is a certain perspicuity attained by this very limitation of the *cos* and *sin* notation to the products of only two vectors, inasmuch as there can be no ambiguity in the meaning of an expression in which they occur, even if brackets are omitted or placed differently. Indeed, instead of cos (Sin **AB**. **C**) the author writes cos (Sin **AB**)**C**, which seems a curious use of the bracket. But cos Sin **AB**. **C**, or preferably cos **C** Sin **AB**, is just as explicit, and even cos Sin **ABC**, though wrong to write as being puzzling, can only have the same meaning.

The author concludes with short sections on dyads and matrices, on scalar- and vector-differentiation, including scalar-differentiation of a quaternion. On the last page are a series of propositions relating to the addition of scalar and vector quantities situate at, or passing through, specified points.

The pamphlet is confined solely to statements of principles and the section devoted to dyads and matrices is very condensed, so that it is not in any sense a text-book for students. It is rather a synopsis of the subject, with the introduction of a special notation which the author has found useful. A text-book of vector algebra, with examples showing its application to problems in geometry, mechanics, and general physics, and contrasting the method with the Cartesian method of treating the same problems, is much needed, as many physicists are becoming interested in the new algebra, owing in great measure to Mr. O. Heaviside's able exposition of its principles and applications in the *Electrician* and elsewhere.

THE LAKE OF GENEVA.

Le Léman: Monographie Limnologique. F. A. Forel. Tome Premier. (Lausanne: F. Rouge, 189..)

PROF. FOREL has been for some years occupied in studying the Lake of Geneva, and has now published the first instalment of the fruits of his labours. The work, when finished, is intended to be a complete monograph of the history of a single lake, and will be a most important contribution to an interesting branch of physical geography. In the present volume the geography, the hydrography, the geology, the climatology, and the hydrology of Lake Léman are discussed, after some introductory matter relating to the instruments employed in sounding with other preliminaries. But, though only a single volume, the work embraces so many questions that we must, for want of space, confine our notice mainly to one, which, of late years, has attracted the most attention, at any rate in this country, viz. What has been the origin of the lake basin? Was it formed by the old Rhone glacier or in some other way? The especial value of Prof. Forel's memoir is the number of new facts which it brings to bear on the problem thus propounded.

The Lake of Geneva, however it may have been caused, is more modern than the middle of the Miocene period: "Le lac n'existait pas encore, la vallée du Léman n'était pas même indiquée quand la mer helvétienne déposait les mollasses d'Epalinges et du Mont." Its slopes, and almost certainly its bed, are covered with glacial deposits, of later date than the formation of its basin. Terraces around its shore indicate that its waters once reached a higher level, the greatest elevation which can be identified with certainty, being about 30m. above the present surface. The next pause was at 10m.; after that the lake sank (the fall always being rapid) to its present level. Traces of still higher terraces are to be found on the north shore, but as these neither can be identified on the opposite side, nor correspond with any natural barrier in the course of the Rhone below the lake. Prof. Forel doubts whether they indicate old levels of its waters.

Lake Léman consists of two basins. The first and larger extends from the embouchure of the Rhone to the narrow of Promenthoux. At the east end the slope of the cone of alluvium deposited by the Rhone in no part exceeds 25°. First comes a zone of very shallow water off the actual shore line; to this succeeds a more rapid slope, which gradually eases off as it descends. The current of the Rhone has made and maintains a well-marked channel in this mass of detritus, and the contour lines are affected down to 250m. At the embouchure of the Dranse, on the south shore, another alluvial cone has been deposited. This, however, is rather steeper, but it is much smaller, and does not perceptibly affect the course of the subaqueous contour lines below about 200m. On the north side of the basin the slope varies. Under the walls of Chillon the descent is rapid, amounting to 137 in 100; it is nearly the same near St. Gingolph on the opposite shore, doubtless indicating submerged crags; but it is generally more moderate. West of Vevay it is about one in four, whence it changes gradually to one in ten opposite to Ouchy.

West of this port the descent is still more gentle, and so it continues round the western end of the basin, the lip of the latter being 75m. below the surface. The contours of the south side correspond generally with those of the north, and the form of the basin is evidently related to the geology of the district, being narrower and steeper among the harder rocks at the eastern end. The deepest part is a large rudely triangular area, the apex pointing towards the west, and the base lying roughly north and south, extending from almost opposite to the embouchure of the Dranse to near Lutry. All this area is an almost level plain, for it is wholly below the 300m. contour line, but the greatest depth obtained was only 309·7m.

The Petit Lac may be described as a comparatively narrow and shallow trough, rising very slowly from a depth of about 70 to 50 metres, and then gradually mounting to the embouchure of the Rhone, its bed being slightly interrupted by five small shallow basins, which roughly speaking, have a linear arrangement, but their floors only sink four or six yards at most below the general level.

The lake to some extent is still held up by the huge mass of gravel brought down by the Arve, through which the two rivers have now cut their channels on either side of the plateau of La Bâtie below Geneva. But it is

in the main a true rock basin, though its bed no doubt is concealed beneath glacial deposits and the finer mud brought down by rivers. This alluvium has been studied by Prof. Forel, but into the matter we are unable to enter.

Both the origin of lake basins in general and of that of Léman in particular are carefully discussed by Prof. Forel. He examines, only to reject as attended by insuperable difficulties, the hypothesis that it was excavated by the old glacier of the Rhone. He shows that the subaqueous portion corresponds in its general features with a river valley, and is only a prolongation of that of the Rhone. This valley was first defined at a very early period in the uprising of the Alps ; its excavation progressed with their growth ; it was practically completed at a time when they were higher, perhaps by some 1000 m., than at present. Then the lake was formed by a general subsidence of the mountain region, the lowland remaining comparatively unaffected. The movements of the parts depressed may have been to some extent differential ; but this, in Prof. Forel's opinion, is not a necessary assumption. To us, however, it appears that it would be very difficult to explain the rock barrier at St. Maurice between the upper and lower plains without some amount of differential movement. Prof. Forel's view, of course, is not novel ; for it has been long maintained in England as a general explanation of the greater Alpine lakes by a few geologists, who never bowed the knee to the glacial Baal With their writings, however, Prof. Forel does not appear to be acquainted, though they appeared in publications generally accessible.

The remainder of the present volume is occupied by a discussion of the temperature, rainfall, and general hydrology of the Lake Léman region. It is full of interesting facts and discussions, which we would gladly notice did space permit. The book is well printed, and contains many illustrations, together with a large map of the lake on which the subaqueous contours are depicted. If the book were less diffuse its scientific value would have been greater, but Prof. Forel pleads in excuse that he aimed at writing a volume which would be also acceptable to the general public, or in other words, would combine meat for men with milk for babes. As a comprehensive history of a lake is a great desideratum, it would be ungracious to find fault with Prof. Forel's very natural desire to secure a large number of readers and of purchasers. T. G. BONNEY.

OUR BOOK SHELF.

Horn Measurements and Weights of the Great Game of the World, being a Record for the use of Sportsmen and Naturalists. By Rowland Ward, F.Z.S. (London : Published by the Author, 1892.)

IN these days, when every one is striving to "beat the record," it is only right that sportsmen should have clearly put before them the results already arrived at as regards the size of the trophies and the weight of game-animals already obtained by their brother Nimrods. No one is in so good a position to do this as Mr. Rowland Ward, to whose well-known "jungle" in Piccadilly all the leading shooters of the present day send their "heads" to be mounted and their "skins" to be stuffed. It is, however, much to be regretted that Mr. Ward did not take into his councils some brother "F.Z.S." more versed in scientific knowledge than himself when he prepared this volume, or at any rate did not have the proof-sheets revised by some zoologist with a good knowledge of the Mammalia. The consequence of this want of foresight is that the nomenclature and localities upon which the importance of the records entirely depends are in a very confused state, and in many cases quite erroneous.

Take the Deer (Cervidæ), for instance. Of this family a very correct and accessible list, drawn up by the late Sir Victor Brooke, has been published in the "Proceedings" of the Zoological Society for 1878, which Mr. Ward would have done well to follow. But we find under the Sambur (*Cervus aristotelis*) a head from "Java," where this species certainly does not occur, recorded in the list. Next to this (p. 10) comes the "Central and South Indian Sambur, *Rusa hippelaphus*" (whatever this may be), but three out of the four specimens assigned to it are from Nepal! On the other hand, several heads from Java are attributed (p. 22) to *Cervus rusa*, which is merely a synonym of *Cervus hippelaphus*.

The heads of the large Deer of the Caucasus obtained by Mr. St. George Littledale are assigned (p. 28) to the Red Deer (*Cervus elaphus*). But we have good reason to know that they really belong to the Persian Deer (*C. maral*), quite a different species.

Looking over the list of Antelopes, we find similar errors prevalent, though perhaps not quite to so great an extent. The specimens of the Chiru (*Panthalops hodgsoni*) are assigned to "India," whereas this Antelope is only met with in the snow-fields of Ladakh and Tibet. Nor can the "Takin" (*Budorcas taxicolor*) be properly stated to be from "India." It occurs only in the Mishmi Hills on the frontiers of Assam.

These and many like mistakes are the more serious as Mr. Ward's volume is well got up, nicely illustrated, and likely to be frequently used by the sporting naturalist. But the statements contained in it cannot be relied upon for scientific accuracy.

Der Peloponnes. Versuch einer Landeskunde auf geologischer Grundlage. Von Dr. Alfred Philippson. (Berlin : R. Friedländer and Son, 1891-1892.)

GREECE has hitherto been interesting mainly to scholars, archæologists, and lovers of art ; and no doubt it is from their various points of view that the country will always be most eagerly studied. The subject, however, has also elements of attraction for students of natural science, and it is to these elements, so far as the Peloponnese is concerned, that Dr. Philippson has sought to do justice in the present work. His results have been obtained by direct personal observation, and are set forth with admirable clearness. The book is divided into two parts, the first of which is called "special," the second "general." In the "special" part the author deals with particular regions of the Peloponnese ; in the "general" part he presents an account of the peninsula as a whole. Dr. Philippson is a careful and accomplished geologist, and has been remarkably successful not only in throwing fresh light on the geological phenomena of the country, but in showing their relation to the various orders of facts which come more especially within the province of the geographer. He has also excellent chapters on the forms and phenomena of the surface, on climate, on vegetation, on the animal world, and on the population. In dealing with the last of these subjects he has much that is valuable to say about productive industry, means of communication, density of population, and towns, villages, and other settlements. The interest of the work is greatly increased by maps and profile-sketches.

Traité Encyclopédique de Photographie. By Charles Fabre. (Paris : Gautier-Villars and Sons, 1892.)

IN a previous number of NATURE (vol. xlvi. p. 464) we noticed the first part of the supplement which M. Fabre