

like and masterful views of women's powers and privileges. Women, he thought, ought to have every thing provided for them, and every trouble taken off their hands: so the less they meddled with business in any form, the better. But these very young notions gave way, as he saw more of life, to wiser and more practical ones. He found that women were not utterly helpless; and his love of justice, combined with his better opinion of their powers, made him quite willing to concede to them as much as he would have desired for himself; namely, full scope and opportunity for the exercise of all their faculties. This was shown by his giving lectures gratuitously in the Ladies' college for the first year after its foundation, and by the interest he felt in the success of those brave women who first attempted the study of medicine."

De Morgan's letters are of a kind which it is very interesting to receive at the natural intervals at which they are written. When taken *en masse*, the logico-mathematical language in which they are couched, amusing in small doses, and their wit, excellent but monotonous, become wearisome. It is too much like sitting down to a continuous reading of the Budget of paradoxes.

In regard to his ideas on religion, De Morgan was always extremely reticent; but in spite of the disastrous effect of his early training, and in spite of his strong aversion to unfounded beliefs, he preserved a deeply religious tone of mind, and a firm faith in the Christian religion. At the same time, nothing could be more frank and uncompromising than the way in which he meets the renewed insistence of his mother, upon the occasion of the death of a sister to whom he was much attached, that he should renounce his freedom of opinion. His letter, if somewhat severe and untender, is still a splendid example of that strong rectitude of mind which was characteristic of him, and which did not permit him to gain any thing, even family harmony, at the cost of concealment.

The last years of De Morgan's life were years of disappointment and grief. The university in which he had labored with untiring energy until the age of sixty became once more impossible to him. The reiterated pledges of its founders and subsequent directors, that the essence of its being should be absolute and complete religious equality in every portion of its organization, were broken; and De Morgan could not lend his countenance to a less liberal or a more worldly line of policy. Upon the refusal of the council to appoint to the

chair of mental philosophy and logic the Rev. James Martineau, who had been recommended by the senate on account of his wide reputation as a preacher of an unpopular sect, De Morgan once more handed in his resignation. A year later occurred the death of his second son, George, a young man of great mathematical promise, and one of the two first projectors of the present Mathematical society. From this time De Morgan's health and vigor were not what they had been; and after an attack of congestion of the brain, from which his recovery was slow, he died in 1871 of nervous prostration.

WHITE'S FOSSIL MOLLUSKS OF NORTH AMERICA.

A review of the non-marine fossil Mollusca of North America. By C. A. WHITE. Washington, Government printing-office, 1883. 1, 144, 3 p., 32 pl. sm. 8°. [Annual report U. S. geological survey, 1881-82, separately pagged.]

No work is more useful to the biologist, whether his studies relate to recent or to fossil forms, than the collection and careful illustration of scattered material. In the book under consideration, Dr. White has produced for the student of mollusks, in either their recent or their paleontological relations, a much-needed and permanently valuable work of reference. Owing to their wide range, fecundity and accessibility, the class of mollusks included under his title are, all over the world, better known, more thoroughly studied, and more easily collected, than those of the sea. Hence it is to be expected that the material for learning what lessons they have to teach will be available for students much sooner with the land and fresh-water mollusks than with the marine species considered as a class. Publications such as this, perhaps more than any other single means, will serve to shorten the time which must elapse before such a condition of the science is reached. Stratigraphical paleontology will not be so much the gainer as biology in a wider sense, since the uniformity of lacustrine and fluvial conditions interferes with that differentiation which makes of some groups of marine mollusks valuable indices of geological time.

Dr. White has brought together excellent figures of nearly all the species of the groups under consideration belonging to North American paleontology, from the oldest strata in which they are known, to and including the miocene tertiary. One doubtfully pliocene species is mentioned; but the fossils of the later marls, and such deposits as that of the Colorado

desert, are not considered. Most of these are known as recent shells also; but we think it would have been a useful addition to the collection if such extinct forms as Tryonia had been included.

To the catalogue in tabular form and the explanation of the plates are prefixed a statement of the object and method of the work, a *résumé* of the subject by zoological families, and some general considerations. In these last the author, we think, is the first to enunciate certain propositions, which, though simple, constitute an important advance over previous statements of the general topic. In brief, he points out the high probability that lacustrine, at first brackish-water forms, were derived from marine species by imprisonment due to rising seashores, forming, first estuaries, then lakes; afterward differentiated so as to become inured to water without salt, or, in other cases, exterminated by water too fresh, or in lakes without an outlet, by concentration of saline matters. This view is not wholly novel; but the author goes on to supplement it by pointing out how, from the gradual conversion of lakes into rivers, and the persistence of the latter through epochs of geological change, the remarkable persistency of fluviatile types is accounted for, and problems of present geographical distribution may be solved.

Too much space would be required for an analysis of the work in detail: a few points have been noted for mention. It seems a little startling to have oysters, Anomiae, and mussels presented as non-marine, until we learn that they were of the peculiar brackish-water beds in the Laramie group, and were doubtless accustomed to almost lacustrine conditions. The oldest forms treated of are Naiadites and certain supposed Anodontae from the Devonian (the latter much suggesting in appearance Lithodomus and its allies); but if these were not, as is supposed, true fresh-water folk, then the earliest of the latter date from the trias. Six families of Conchifera, in all, and sixteen of Gastropoda, are represented in the catalogue. It might be suggested that an analogue of Unio belliplicatus may, perhaps, be found living in Nicaragua, and that Cerithidea lives rather abundantly on the Californian coast.

The proof-reading of this volume is not up to the usual standard of the Government printing-office, and the index is disappointingly meagre. The arrangement of the numbers to figures on the plates is confused and puzzling: it can hardly fail to cause a serious loss of time to those who consult them. On the other hand, the paper and press-work are above the average, and the execution of the figures unusually good.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

GEODESY.

Geodetic night-signals.—Mr. C. O. Boutelle, of the U. S. coast-survey, finds that the magnesium light as used by the survey may be used for distances as great as forty-five to seventy miles, and that the ordinary student-lamp with a parabolic reflector may be seen as far as forty miles. A report on night-signals was published by the coast-survey last year. The advantages stated in the report, as derived from greater steadiness of the atmosphere, and comparative freedom from lateral refraction upon long lines of sight during night observations, have been signally verified during the seasons of 1881 and 1882.—(*Rep. U. S. coast geod. surv.*, 1880.) [859]

MATHEMATICS.

A definite integral.—In a brief note, M. Korkine gives a simple proof of a theorem due to M. Tchébychef. The theorem relates to the integral $\int_0^1 \phi(x) \psi(x) dx$, where ϕ and ψ must satisfy one of the two conditions: 1°, they simultaneously increase or simultaneously decrease for all values of x lying between zero and unity; 2°, or one of them must increase and the other decrease for the same values of x . In the first case, M. Tchébychef's theorem is

$$\int_0^1 \phi(x) \psi(x) dx > \int_0^1 \phi(x) dx \int_0^1 \psi(x) dx;$$

in the second case,

$$\int_0^1 \phi(x) \psi(x) dx < \int_0^1 \phi(x) dx \int_0^1 \psi(x) dx.$$

M. Korkine makes these theorems the immediate consequence of a simple identity.—(*Comptes rendus*, Jan. 29.) T. C. [860]

Linear differential equations.—In a previous communication to the academy, M. Goursat has solved, for a special class of equations, the problem to find the entire number of substitutions to which a system of fundamental integrals of a given equation may be subjected, corresponding to all the different closed paths which the variable may describe. The general integral in that case was shown to be expressed by hypergeometric series of higher orders. In the present paper, M. Goursat develops more fully his method, and applies it to the equation of the third order, remarking that the method followed is identically the same for equations of any order.—(*Comptes rendus*, Jan. 29.) T. C. [861]

Functions of two independent variables.—M. Picard has given a series of notes upon this subject, determining the functions of two independent variables, u and v , which remain invariable when we effect upon u and v any of the infinite number of substitutions of a linear discontinuous group. In the present paper M. Picard considers, in a general