etry. But the possibility of solving such problems has nothing to do with the logical sequence of the theorems." This is a fundamental blunder.

The construction so glibly assumed, to pass a circle through any three non-co-straight points, is equivalent to the assumption of the world-renowned parallel postulate, and thus has everything in the world to do with the sequence of the theorems. The assumed construction of a triangular from three sects which are to be its sides, by the method of Beman and Smith, p. 76, is equivalent to the assumption of the Archimedes postulate, which again has everything to do with the logical sequence of the theorems. In fact just this assumption makes ephemeral the beautiful method of Saccheri used in the book we are reviewing.

Hence we can appreciate that astounding achievement of Bolyai's young genius, his § 34, where he solves for his universe, Eu., I., 31. To draw a straight line through a given point parallel to a given straight line. His brilliant lead was followed more than half a century later by Gerard, but it is Barbarin who has ended the matter by deducing from certain very simple constructions of the trirectangular quadrilateral all the fundamental plane constructions.

In Chapter VIII. (La géométrie physique,' § 30 'La forme géométrique de notre univers') our author stresses the idea, that even if our universe were exactly Euclidean, it would be forever impossible for us to demonstrate this. As I said in my 'Non-Euclidean Geometry for Teachers,' p. 14, "If in the mechanics of the world independent of man we were absolutely certain that all therein is Euclidean and only Euclidean, then Darwinism would be disproved by the reductio ad absurdum. All our measurements are finite and approximate only. The mechanics of actual bodies in what Cayley called the external space of our experience, might conceivably be shown by merely approximate measurements to be non-Euclidean, just as a body might be shown to weigh more than two grams or less than two grams, though it never could be shown to weigh precisely, absolutely two grams."

Our author suggests the following experiment for proving our space non-Euclidean: From a point trace six rays sixty degrees apart. On them successively mark off the sects OA_0, OA_1, OA_2, $\cdots$, OA_n, of which each is the projection of the following. If we finish by finding between OA_n and 2^nOA_0 a difference of constant sense and greater than imputable to error of procedure, our universe is non-Euclidean.

In conclusion this beautiful little book has the advantage of being the production of an active and fertile original worker in the domain of which it treats. His 'Géométrie général des espaces' (1898), his 'Sur le paramètre de l'univers' and 'Sur la géométrie des êtres plans' (1901), 'Le cinquième livre de la métagéometrie,' (1901), 'Les cosegments et les volumes en géométrie non euclidienne' (1902), and his 'Poligones réguliers spheriques et non-euclidiens,' shortly to appear in that virile young monthly *Le Matematiche,* and which I had the advantage of reading in manuscript, show that Bordeaux is honored by a worthy successor of Hoüel, so universally beloved.

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Lamarck, The Founder of Evolution, His Life and Work, with Translations of His Writings on Organic Evolution. By Alpheus S. Packard, M.D., LL.D. New York, London and Bombay, Longmans, Green & Co. 1901. Pp. xii+451.

This appears to the reviewer to be a noteworthy book; he has read it from cover to cover with so much pleasure that he ventures to predict that it will prove a source of satisfaction to that large body of readers who are interested in the rise of evolutionary thought.

Larmarck lived in advance of his age and died comparatively unappreciated.

Although quiet and uneventful, his life was a busy one, and, as sketched by Dr. Packard, his noble character, his generous disposition and his deep intellectuality are well brought out.

His devoted and loyal daughter, Cornelie, without whose assistance his later works could

not have been prepared, encouraged her father in the days of his blindness and neglect, by saying 'La postérité vous honorera.' And this has come true. Lamarck, who struggled with poverty and other depressing conditions, whose views were laughed to scorn by Cuvier, and neglected by the intellectual leaders of his time, is now receiving honor and recognition. His original and philosophical mind dealt with some of the burning questions of our day, and he is now placed above Cuvier as a thinker, and heralded, by many, as the most colossal figure in the history of the philosophy of organic nature, between Aristotle and Darwin. This fresh interest in Lamarck's views makes Dr. Packard's book especially timely.

A number of new biographical facts are added to the few that have been generally known, and the book is illustrated with four portraits of Lamarck, pictures of his birthplace, the house in which he lived in Paris, etc. In reference to the analysis of his writings the author says: 'As regards the account of Lamarck's speculative and theoretical views, I have, so far as possible, preferred, by abstracts and translations, to let him tell his own story, rather than to comment at much length myself on points about which the ablest thinkers and students differ so much.' This part of the author's task has been especially well done. Nowhere else can one find in a single volume such a comprehensive survey of Lamarck's theoretical writings.

The growth and essential features of his theory of organic evolution are shown by ample quotations. This theory was unfolded in 1800 and fully expounded in 1809 in the well-known 'Philosophie Zoologique.' The various expressions of his views in 1800, 1802, 1803 and 1806, as leading up to the latter work, are well illustrated, and seventy-six pages are devoted to quotations from the 'Philosophie Zoologique.'

Several current misconceptions are corrected, as for example—the earliest expression of Lamarck's views, as far as his published writings show, was in 1800, in the introductory lecture to his course on the invertebrates, not, as commonly believed, in his 'Recherches sur l'Organisation des Corps Vivans,' published in 1802. Incidentally, also, in reference to Buffon, it is shown that his opinions on the variability of species were not separated into three periods, but that from the time he began to express his views on that matter, to the end of his life, he was an advocate of the mutability of species.

Lamarck's work is treated from all sides; in addition to the exposition of his views on organic evolution, there are chapters on his work in botany, geology, invertebrate paleontology, general physiology and biology, zoology, his thoughts on morals and on the relation of science and religion, and on the relation of his evolutionary views to those of Buffon, St. Hilaire and Erasmus Darwin. There is also a fine chapter on Neolamarckism.

Thoroughness and breadth are notable features in this account of Lamarck and his life work.

WILLIAM A. LOCY.

SOCIETIES AND ACADEMIES.

EIGHTH REGULAR MEETING OF THE BOTANICAL SOCIETY OF WASHINGTON.

THE eighth regular meeting of the Botanical Society of Washington was held at the Portner Hotel, May 24, 1902, with President A. F. Woods in the chair. At the conclusion of the business meeting, Dr. B. M. Duggar, chairman of program for the evening, was called upon to preside.

Mr. E. L. Morris called attention to specimens of *Trillium* found near Great Falls of the Potomac River which produced long-petioled simple leaves from the rootstock. While recent manuals state that this is occasionally true for the genus, the speaker had failed to find specimens in any herbaria examined which exhibited this character.

Mr. M. B. Waite stated that the ordinary two weeks' interval had proved too long in spraying apple trees for bitter rot. In experiments the present season in Virginia, the third treatment was made just after the petals had fallen and while the trees were moderately covered with foliage. Two weeks from this time the trees were found to have made