

acid group which are required in large amounts for cell repair, and that it is only the commoner amino-acids which are not required in the amount usually taken, and which are consequently so rapidly discharged from the body.

This example of the manner in which the puzzles of metabolism are grappled with will be sufficient to show the character of the book, and one hopes that those interested in these fundamental questions will themselves study in full what a reviewer is only able to state imperfectly in barest outline or in samples.

W. D. H.

OUR BOOK SHELF.

Poverty and Hereditary Genius; a Criticism of Mr. Francis Galton's Theory of Hereditary Genius. By F. C. Constable. Pp. xvi+149. (London: Arthur C. Fifield, 1905.) Price 2s. net.

THE criticism which Mr. Constable brings forward in this book is that reputation is not a test of ability, and as Galton's theory of hereditary genius is based on this assumption, it has to be discarded. The statistical evidence given in "Hereditary Genius" has to be explained away, and Mr. Constable attempts to do this by what he calls the "swamping effect of poverty." We quite agree with Mr. Constable that it is harder for a poor man with unimportant parents to achieve success as a judge than for a rich one with influence, but this does not seem to us to justify Mr. Constable in discarding the conclusions of "Hereditary Genius," for if the social conditions of both parents and offspring are relatively about the same, it seems as if the omission of the ability in poverty-stricken parents and their children is rather like leaving out of account the addition of numbers to both the numerator and denominator of a fraction. The omission may therefore not affect the result at all, and whether fuller statistical evidence should modify Mr. Galton's conclusions is a matter which can only be decided by statistics other than those which Mr. Constable discusses. He appears, however, to have overlooked altogether in his argument that other statistics exist and tend to show that psychical and physical characteristics are inherited in the same way, a point which seems to us to upset a good deal of Mr. Constable's criticism.

Mr. Constable does not refer to Mr. Galton's other books, and apparently quotes from the 1869 edition of "Hereditary Genius." It is a pity that Mr. Constable does not always succeed in expressing himself very clearly, and his habit of putting his arguments in the form of questions becomes somewhat tiresome, and makes the book seem a rather disjointed composition.

Modern Cosmogonies. By Agnes M. Clerke. Pp. vi+287. (London: A. and C. Black.) Price 3s. 6d. net.

THIS popular account of the structure of the universe, so far as it can be understood with the means of inquiry now at the disposal of astronomers, should serve a useful purpose in directing attention to the position of the most difficult problem of celestial science. To early philosophers it was sufficient to regard the heavens as a solid and crystalline firmament in which the stars are fixed; facts of observation were not considered essential for the metaphysical foundation upon which the great minds of antiquity sought to support their universe. The ingenious framework of solid concentric spheres and epicyclic motions was shown to be a baseless fabric by Tycho Brahe's con-

siderations of the orbits of comets, and was finally discredited by the law of gravitation.

What may be regarded as the modern era of scientific cosmogony, in which serious attempts were made to explain what is seen on the background of space, opened about a century and a half ago with Wright's "cloven disc" theory of the Milky Way and Lambert's view of it as a sidereal ecliptic. These considerations of the nature of the universe are related to those of its origin adumbrated by Swedenborg and Kant as the nebular hypothesis, and afterwards worked out in mathematical detail by Laplace. During the past few years several objections of a mathematical and physical nature have been raised to this hypothesis, which has proved to be vulnerable at many points. In Miss Clerke's words, "It has, indeed, become abundantly clear that the series of operations described by Laplace could scarcely, under the most favourable circumstances, have been accomplished, and in a thin nebulous medium would have been entirely impossible. The nebular cosmogony has not, then, stood 'Foursquare to all the winds that blew.' Its towers and battlements have crumbled before the storms of adverse criticism. It survives only as a wreck, its distinctive features obliterated, although with the old flag still flying on the keep."

Tidal evolution, the meteoritic hypothesis, and other views developed in recent years to satisfy the demand for a cosmogony consistent with existing knowledge of the heavens, particularly with spectroscopic observations, are described by Miss Clerke. While we cannot subscribe to all her judgments and interpretations, her work contains a large amount of material, both observational and speculative, and general readers will find much to interest them in it.

R. A. G.

The Geometry of the Screw Propeller. By W. J. Goudie. Pp. 47. (London and Glasgow: Blackie and Son, Ltd.) Price 1s. 6d. net.

THIS is a small book presenting "a simple exposition of the geometrical principles connected with the screw propeller, and illustrating the various ways in which these may be applied to obtain a correct delineation of the propeller on paper, in the drawing office, and in the foundry." It is intended principally for the use of engineering students in technical schools, but is likely to prove useful in other directions, since it contains a clear and admirably illustrated account of the geometry of screw propellers.

The writer is a lecturer on mechanical engineering in Paisley Technical College, and possesses a good knowledge of workshop practice in addition to thorough familiarity with the geometry of his subject. He does not attempt any discussion of the design of a screw propeller most suitable for a new ship, but restricts attention to the preparation of drawings, patterns, and moulds required in the manufacture of propellers for which the dimensions and forms have been determined. This is a wise discretion, for while the geometry of screw propellers admits of exact treatment, the selection of the most efficient propeller for an individual steamship is even now a matter not admitting of exact scientific treatment when precedent has to be departed from; experiments alone can be trusted.

Mr. Goudie describes in clear and simple language the methods by which helical surfaces of uniform or variable pitch may be constructed, and illustrates in detail the practical methods of moulding the blades in the foundry. For the benefit of students who may not have the opportunity of actual work in the foundry the author indicates how, with the aid of a few simple tools and materials, skeleton models of the various