

independent of prior conditions, in which case it is removed from the sphere of law altogether, and becomes miraculous; or it may mean a distinct tendency to variation inherent in the offspring, and impressed upon it by the parent. In the latter case, however, spontaneity is really hereditary; and only appears to be spontaneous because it is the disclosure of a previously hidden power. M. Ribot fails, so far as I can find, to discriminate these meanings. He rejects the notion of spontaneity as wholly unscientific, but does not observe that the original life-germ must have contained inexplicable powers enabling it to develop into many forms. The seven hundred or more crystalline forms in which calcite is said to be found, must be explained partly by the intimate constitution of a molecule of carbonate of lime, partly by the environment in which it became crystallised. So we must attribute the almost infinitely varied forms of animal life partly to environment, but partly to the inexplicable powers of development impressed upon certain particles of protoplasm.

M. Ribot's reasoning is of doubtful soundness, again, when he speaks of heredity as the *cause* of decline in nations, or the cause of the production of new instincts. So far as the child is like its ancestors, there cannot on the average be either progress or decline. If certain individuals have, from unexplained causes, deviated from the previous type, it is impossible that their offspring should resemble completely both the previous and the new type. The contradictory features of different ancestors cannot possibly be made manifest in the same child; therefore the law of heredity must appear to fail in one way or the other. When a superior race intermarries with an inferior one, and becomes degraded, heredity simply perpetuates the inferior type by what Mr. Darwin calls *prepotency*; a term, by the bye, which M. Ribot should have adopted.

It cannot be said that M. Ribot is alone responsible for the want of consistency in his views of heredity. There are still some who believe in spontaneous generation; there are others who would have us believe that ordinary chemical agencies have developed a lifeless particle of protoplasm into a living particle, which became the germ of the animal and vegetable kingdoms. Mr. Darwin, so far as I remember, nowhere goes back to such insoluble questions. Sir W. Thomson suggests that the germ came from other parts of space. How far Mr. Herbert Spencer's philosophy affords a real solution of the question it must probably remain for another generation to decide. All that I wish to point out is, that so highly intelligent and careful a student of all that has been written on the philosophy of evolution as M. Ribot has certainly failed to acquire clear notions concerning the relations of heredity, spontaneity, and the influence of environment.

The most important result of M. Ribot's arguments is perhaps the support which he brings to Mr. Spencer's views of the origin of moral sentiments and rules. The last few chapters in which he treats of the moral consequences of heredity are particularly interesting. It becomes evidently impossible to uphold any longer the views of the older utilitarians, from Locke down to the two Mills and Buckle. As M. Ribot remarks, it is surprising to find a writer such as Buckle attributing little importance to psychological heredity. It is impossible

any longer to look upon the mind and moral nature of the child as a *tabula rasa*, which can be marked by education at our will. If so, Mill's views of the philosophy of morals fall to the ground, and the doctrine of the moral sense in a modified form must be again taken in hand.

As a general rule, M. Ribot appears to acknowledge with sufficient candour his indebtedness to various authors. An exception is to be found in the case of Mr. Galton. It is true that Mr. Galton is quoted from time to time, but sometimes in a slighting manner; whereas the extensive obligations under which M. Ribot lies towards Mr. Galton will be apparent to anyone who is acquainted with the work on "Hereditary Genius" of the latter author.

W. STANLEY JEVONS

#### OUR BOOK SHELF

*Animal Physiology.* By John Cleland, M.D., F.R.S. Advanced Science Series. (Wm. Collins, Sons, and Co.)

HUMAN Physiology being in a great measure based upon investigations conducted on the lower Vertebrata, all works on the subject may, in a certain sense, be considered to be on "animal" physiology. The small treatise before us agrees, as far as the nature of the points treated of, very much with most works of the same size on human physiology. Incidental mention is no doubt made of the most important peculiarities of the nervous, circulatory, digestive, and other systems in the lower Vertebrata, but these are incomplete, and sometimes inaccurate. As an introduction to physiology, Dr. Cleland's work, however, possesses many advantages. It is written for readers previously unacquainted with anatomical details, and this class of students is daily becoming more numerous, although it is generally felt that no considerable progress can ever be made in the subject except on an anatomical basis. The illustrations are also numerous, whilst many are original and excellent. The manner of expression is particularly simple and clear, all the technical terms employed being carefully explained. In the earlier part of the work, in the chapter on alimentation, there is an argument on which particular stress is laid, which is, that as animals have no power of manufacturing organic matter from the materials found in organic nature, but feed either directly on the vegetable world or on other animals which have fed on vegetables; and as in plants the power of building organic matter is confined to the green parts, "the statement may therefore be ventured on that, so far as observation has yet proceeded, it would appear that the presence of chlorophyll is as necessary for the production of organic matter in organisms as the presence of protoplasm is necessary for growth." The full bearing of this fact is, no doubt, not yet fully understood. On the whole, we think that the author has fully succeeded in producing a work which, from the grouping of its facts, is decidedly more than a mere collection of details.

*Fifth Annual Report of the Association for the Improvement of Geometrical Teaching.* (January 1875.)

THE Association, it may be remarked, is almost coeval with this journal, for it was in the early numbers of NATURE that a correspondence was started on the subject of Geometrical Teaching. This resulted, as our readers are aware, in the formation of the Association. After four years of continuous work, two of which have been devoted to the difficult subject of Proportion (as we learn from the Report), the Syllabus of Plane Geometry is now complete; and, after a few verbal alterations