been added. These two defects will seriously hinder the service of the "Outlines," as they have of the "Elements." The facts which the beginner in psychology and the general reader alike need and desire, are the chief facts of modern scientific psychology in all its various departments. What is here termed "physiological psychology" is but a somewhat arbitrarily selected portion of that general body of knowledge. And within the field covered we find the same disproportion among the topics. The preliminary portion on the nervous system and the functions of the brain certainly occupies too much space for so elementary a work.

There is, too, a lack of vitality in certain portions of the work,—something that gives the student the impression that he is dealing with reports of papers and personal news, and not with facts and their interpretation. This defect is less marked in the newer work. It, too, has the advantage of benefiting by the more recent studies and the criticisms directed against the "Elements." While regretting these defects, we may none the less cordially recommend these volumes as an important and interesting means of approach to an important and interesting subject.

Animal Life and Intelligence. By C. LLOYD MORGAN, F.G.S. Boston, Ginn.

ONE of the dominant characteristics of modern English science is the attention devoted to the study of mental phenomena from a general biological point of view; the application of the comparative method, under the guidance of the principle of evolution, to the various activities contributing to and conditioning life, both bodily and mental. In so far as there exists a school of scientific psychologists in England, this is the common principle of their unity. A majority of the best known of modern English psychologists are men with a thorough and generally a professional biological training, who view the study of mind as a factor, and a most important and intricate one, in the general series of actions and re-actions of which life consists. It need hardly be said that in so doing they are continuing along the path so splendidly opened out by Darwin. It is to this school of thinkers that Mr. Morgan belongs; it is to this phase of psychology, or, if you prefer, biology, that the present work is devoted. The cardinal position of the work maintains the necessity of studying mind as a part of life, of studying it comparatively, of explaining, classifying, and studying mental phenomena by their purpose and significance in the natural, the biological world.

As the title implies, the work is divided into two portions, — the one setting forth the phenomena of animal life, the other dealing more particularly with those functions of life in which intelligence is involved; and it is extremely convenient to have so able a treatment of both topics between the same covers. For the student or the general reader whose aim it is to secure by the reading of a single book some insight into those central problems of biology, life, and intelligence, Mr. Morgan's is the book to be recommended. It is not an exhaustive treatment, but the selection of topics is according to the centres of most vital interest; and the treatment is always judicious, many-sided, interesting, and clear. After a general description of the qualities by which the organic is differentiated from the inorganic, and of the more important of the processes by which an individual life is maintained, runs the cycle of its life-history, and leaves its offspring to perpetuate the species, we are introduced to the kernel of modern biology, the relation of life to the environment. This portion of the work is considered under the heads of "Variation and Natural Selection," "Heredity and the Origin of Variations," and "Organic Evolution." While much of the contents of these chapters is mainly expository, and thus admits of originality or peculiarity mainly in the mode of treatment, the disputed points in modern biology are by no means avoided, and both sides of the case are always given. Chief among these disputed points is the one over which the biological camps are so sharply divided,— the inheritance of acquired characteristics. Mr. Morgan admirably states the importance of this issue, and returns to the problem again and again. He instructively as well as amusingly discusses the issue by considering whether "the hen produces the egg" or "the egg produces the hen." The Weismann view, which denies the inheritance of the influences of individual environment, would hold that "the egg produces the hen," and the parent egg is connected with the young egg, each developing to maturity under its own conditions; while, under the opposite view, "the hen produces the egg," that is, the egg is the offspring of the mature hen, modified since birth by a host of environmental accidents and conditions. Mr. Morgan's final position, reached by dint of much balancing and consideration, may be gathered from the following words: "Now, although I value highly Professor Weismann's luminous researches, and read with interest his ingenious speculations, I cannot but regard his doctrine of the continuity of germ-plasm as a distinctly retrograde step." So, too, in the mental world Mr. Morgan regards the hypothesis of the non-inheritance of acquired characteristics as untenable, though he fully admits the absence of crucial cases, and the possibility of interpretation of many facts from both points of view. In his final chapter he deduces from Professor Weismann's views the conclusion that education, "though it may raise the level of each generation, can have no cumulative effect;" that the diffusion of knowledge brings more grist to the mill but doesn't improve the mill, increases the store of food but not the powers of the digestive apparatus; and, in opposition to this view, it is held that the rise in the intellectual level of Englishmen of to-day, as compared with those of the days of the Tudors, has been in part due to the inheritance of individually acquired faculty."

Mr. Morgan's views on other of the factors and processes of organic evolution possess many points of interest and individuality, but it is impossible to do more than mention their existence in this connection. Some of the points which he emphasizes may be inferred from the following citation: "First, we should be careful not to use the phrase 'of advantage to the species' vaguely and indefinitely, but should in all cases endeavor clearly to indicate wherein lies the particular advantage, and how its possession enables the organism to escape elimination; next, we must remember that the advantage must be immediate and present, prospective advantage being, of course, inoperative; then we must endeavor to show that the advantage is really sufficient to decide the question of elimination or non-elimination; lastly, we must distinguish between indiscriminate and differential destruction, between mere numerical reduction by death or otherwise and selective elimination."

Entering now upon the more strictly psychological portion of the work, we meet first with a very clear and interesting account of the realm of sensation in the animal world. The keynote of the exposition is that the activity of a sense-organ must be accounted for by the utility of this mode of response to the environment in the struggle for existence. The fallacy of insisting upon an exact parallelism between human senses and those of animals is also strongly stated. The ground covered in the chapter upon "Mental Processes in Man" is familiar. It consists in the main of the description of the various processes involved in sensation, perception, inference, and the like. The two points most strongly insisted upon are that the relation to our environment involves the two factors of subject and object, of the mind that perceives and the things perceived; and that we must distinguish between the perceptual and the conceptual powers, the latter involving analysis and to some extent abstraction and consciousness. In attempting to study the resemblances and differences between human and animal intelligence, we must beware of endowing the animal with human points of view. The similarity of sense data is no guaranty for a similarity of mental perception and elaboration. In illustration of our tendency to neglect the ignorance of animals, there is cited Mr. Hamerton's story of the cow which was quieted by having the stuffed body of her dead calf to lick, and which, when accidentally tearing open the skin and seeing the hay inside, devoured the unexpected provender without showing the slightest surprise. But the surprise is only for us acquainted with anatomy: it is no incongruity to the cow, which indeed, having experience of "putting hay inside," not illogically expects to find hay there. We each construct our world, and how different the constructive powers in the two cases! In the description of instances of animal intelligence, which naturally find considerable place in the work, the analysis proceeds along a psychological basis, the degree of mental power being measured by

the degree of elaboration of the sense data. The same act may be accomplished by practical insight and by reasoned inference, but the grade of the processes be markedly different. The monkey that unscrews the hearth-brush from its handle doesn't discover the principle of the screw, but simply observes that certain actions lead to certain ends. This higher conceptual form of reason Mr. Morgan denies to animals; but, while "contending that intelligence is not reason, I [do not] wish in any way to disparage intelligence. Nine-tenths, at least, of the actions of average men are intelligent and not rational. Do we not all of us know hundreds of practical men who are in the highest degree intelligent, but in whom the rational analytic faculty is but little developed? Is it any injustice to the brutes to contend that their inferences are of the same order as those of these excellent practical folk?"

But intelligence is not the only factor in life, and indeed is always dependent upon some sensible, some emotional state; while its existence is evidenced only by some expression, some exercise of a motor activity. The origin and function of pleasure and pain, the relation between the emotions and their expression, the difficulty of appreciating how far and in what way animals are sensitive to pain (and many striking examples of apparent insensibility are given), the relative dignity and distribution of various typical emotions, to what extent the more intellectual and moral emotions may be present, — these are the points most fully considered. So, too, on the motor side are considered the various forms and grades of response to stimuli by which intelligence is manifested. What on the intellectual side is formulated as the distinction between intelligence and reason, on the motor side becomes instinct and rational habit. The far greater share which frequently repeated acts occupy in the lower animals, the earlier age at which in the lower animals these instincts emerge, the persistency with which they seek expression even under ridiculously inappropriate conditions, are some of the traits of importance in this regard. If there is one problem in comparative psychology upon which there are as many minds as there are men, it is that of instinct; and Mr. Morgan very naturally devotes some space in bringing out his own views and criticising those of others, more particularly in showing his agreement and points of dissension from Mr. Romanes. The final chapter of the volume deals with mental evolution as a whole, and with a philosophical expression of the relation of the subject to the object, of the act of intelligence to the objective source of sentience. Under the former head we have a clear and common-sense statement of the value and difficulties of appreciating the various and graded forms of mind, the continuous hierarchy of psychological stages. Under the latter Mr. Morgan states his monistic philosophy, his belief that there is one something showing two aspects, the physical and the psychological. The one deals with the physical forms of energy (kinesis); the forms exhibited by the other may then be called "metakinesis;" and, "according to the monistic hypothesis, kinesis and metakinesis are co-ordinate. The physiologist may explain all the activities of men and animals in terms of kinesis. The psychologist may explain all the thoughts and emotions of man in terms of metakinesis. They are studying the different phenomenal aspects of the same noumenal sequences."

When leaving the book, we do so with the conviction that it will take an important place in the literature of biology and psychology, by reason of the timeliness and good perspective of its chapters, by the clearness and many-sidedness of its expositions, by the suggestiveness and stimulus of its main position. Though containing much that is sure to require modification in the near future, and also considerable that is personal opinion rather than demonstrated truth, the volume may be cordially recommended as a most satisfactory way of approach to modern biological psychology.

IN the *New England Magazine* for May, 1891, appear, among other matter, "The Notes of Some New England Birds," by Simeon Pease Cheney; "The Alaskan Fur Trade," by Charles Hallock; and "The Oldest House in Washington" (illustrated), by Milton T. Adkins.

AMONG THE PUBLISHERS.

THE eleventh part of Edwards's "Butterflies of North America," just issued, is in every way equal to its predecessors. For the first time in this third series, each of the three large quarto plates, with the accompanying text, is given up to a single and relatively little known species of butterfly; two of them to species of *Satyrinæ*, a group which nowhere in the world has found so complete a treatment as in America, at the hands of our author. Excepting for the intermediate larval stages of *Satyrus meadii*, every single stage of the creature's life is represented, usually by more than a single figure, and all in that exquisite and finely exact style we have become accustomed to in this work, but which can never be too highly praised or too fully appreciated. Such illustrations lie at the very foundation of the exact knowledge of butterflies, and are the key to any proper understanding of their real relationships. The butterflies treated of are *Apatura flora*, *Satyrus meadii*, and *Chionobas chryxus*, all of them living from five hundred to a thousand or two miles from Mr. Edwards's home, where they were bred and studied. This shows at once the opportunities to be overtaken by any zealous student, and renders possible thorough acquaintance with our entire fauna. Mr. Edwards hints here and there at some of the difficulties of the work, to have overcome which, even partially, in the case of such distant and secluded insects as this *Satyrus* and this *Chionobas*, is a high merit indeed. *Apatura flora* is an inhabitant of our extreme southern border; *Satyrus meadii* lives at moderate altitudes in restricted localities in Colorado, New Mexico, Arizona, and Montana; and *Chionobas Chryxus* at higher elevations in the Rocky Mountains from Colorado to British America, and, if with Mr. Edwards we include *calais* in the species, also across the continent in the higher north. In all three species the caterpillars hibernate in early life; but the history of the species as given here presents nothing of unusual interest, and closely resembles that of their nearest allies. Eighty-one figures, most of them colored and many much magnified, are given on the three plates.

— Julius Bien & Co., New York City, announce that they will publish an "Atlas of the State of New York," provided sufficient encouragement is secured to warrant so costly an undertaking. Among the proposed features of the work are these: a general map of the State, exhibiting county and town boundaries, etc., railroads, canals, and all important cities and towns; temperature and rainfall maps; detailed maps of the counties, sixty in number, showing public roads, rivers, lakes, city and township boundaries, etc.; railroad lines and stations; street maps, on a large scale, of the principal cities; lines of original land patents; an alphabetical list of counties, townships, cities, and villages, with population from last census, and an enumeration of all post-offices.

— Professor F. M. Taylor of Michigan University will shortly publish in the "Proceedings of the American Academy of Political and Social Science" an article on "Natural Law," which deserves the attention of every one interested in political questions. The author joins issue with the current notions on that subject, and attempts to show how true the popular instinct is which prompts a man to defend his elementary rights, if need be, by force.

— There is announced to appear soon the first number of the *Pantobiblion*, a monthly international bibliographical review of the world's scientific literature. In the words of the prospectus, "The purpose of this new monthly is to help the literary men of any department concerned with the applied sciences generally, and particularly those devoted to any technical studies of any specialty, to be promptly, exactly, and completely informed of the correspondent branch of current scientific literature, and to keep pace with the times as regards the advancement of applied sciences, and especially of technics and engineering of every sort." The editor of the *Pantobiblion* is A. Kersha, civil engineer, Fontanka 64, St. Petersburg, Russia. American subscription orders may be addressed to Messrs. D. Appleton & Co, New York.

— The Johns Hopkins Press, Baltimore, announces for early publication "American Oyster-Culture with Special Reference to the Past and Future of the Oyster Interest of Maryland," a popular