

the nomenclatural muck-rakers exhume the fossil names of a past age. We shall always be at the mercy of forgotten names tucked away in stray volumes unless there be some "statutes of limitation"—the bugbears of code makers. Let the upturning of the names of obscure writers be stopped and the remodeling of codes with fresh interpretations of their canons be prevented. It is not justice for the dead zoologist that we need so much as justice for the living, and even now the dead get no recognition if they violate the rules of a game unknown in their day. The "statute of limitation" needed at the point where codes break down is a responsible body of men whose rulings will be respected by every scientific man who cares more for stability in names than he does for his own preferences.

In my opinion, the nomenclature of the future is likely to be eclectic and the names fiat, the final court of appeal being an international committee. Such a committee, with the flood of evidence available nowadays, could soon put an end to all the tiresome quibblings over the fixing of generic types, the preoccupation of names, the spelling of words and all the other academic questions over which the most spirited disputes have arisen. It should publish authoritative lists of genera and species; for zoologists want names as handles for use, not toys to be played with according to this rule or that canon. If zoological names are ever to be put on a stable basis, first of all a stable committee is needed—and it is to be hoped the Nomenclatural Commission of the International Zoological Congress may prove to be such a committee—and then it should publish lists that would spike the canon of priority and obliterate individual opinion. Details may not be worked out in a day, but the thing can be done and once done it would not have to be done again unless nomenclature should evolve into something very different from what it now is. Probably zoologists have followed beaten paths too long to allow of any radical changes in the methods of determining names, but it is little short of ridiculous to bicker over the comparatively few names that rules do not fix. It is for these names that a

majority vote of a committee is needed. Subcommittees in the different branches of zoology could furnish the international committee with approved lists of names for final revision and publication, and the zoological world should turn its back upon others than those of the international list. In theory, at least, the cure for nomenclatural instability is very simple and the two essential elements for success are a permanent, working committee and funds for publication. We should be the masters not the slaves of codes, remembering that "zoological nomenclature is a means, not an end, of zoological science."

JONATHAN DWIGHT, JR.

SCIENTIFIC BOOKS

A HALF CENTURY OF DARWINISM¹

OF the many gatherings, large and small, to commemorate the hundredth anniversary of the birth of Charles Darwin, or the fiftieth anniversary of the "Origin of Species," the two most notable were the one held at Baltimore in January, and the one held at Cambridge in June of the present year.

At the Baltimore meeting, ten addresses were spoken, all relating to the lines of progress in our knowledge of evolution, and the relation of Darwin to this knowledge.

In connection with the meeting at Cambridge, essays were presented covering the relation of our knowledge of evolution to various phases of modern thought.

Except in brevity, the two volumes in question are essentially similar. The same motive is present in both. At Baltimore, all the speakers save one were American. At Cam-

¹"Darwin and Modern Science," essays in commemoration of the centenary of the birth of Charles Darwin, and of the fiftieth anniversary of the publication of the "Origin of Species." Edited by A. C. Seward, Cambridge University Press (twenty-nine essays).

"Fifty Years of Darwinism," "Modern Aspects of Evolution," centennial addresses in honor of Charles Darwin, before the American Association for the Advancement of Science, Baltimore, Friday, January 1, 1909. New York, Henry Holt & Company (ten addresses, with an introductory chapter).

bridge, eleven were British, two American, six German, one French, one Danish and one Dutch. But this is merely an incident. Science takes no cognizance of state or racial boundaries, nor of sex, for it is only in passing that we need notice that one of the English essayists is a woman.

Among characteristics of these essays and addresses as a whole, we may note the broad tolerance and friendly tone shown by all the writers, without exception. All recognize the intellectual supremacy of Darwin, although most of them have made some addition, large or small, to the mass of fact and theory gathered by the master. Each one is gently insistent on his own point of view. We may compare Darwin to an explorer of a great region, to whom fell the making of the first map. While in many ways details have been added to this map, not much of the original scheme has been altered or taken away. While many shrill voices from time to time have been raised in criticism of one feature or another of "Darwinism," yet the common sense of the body of biologists has steadily maintained the integrity of the original chart. Natural selection very likely is not "all-mächtig." Darwin never claimed that it was. But it is potent for all that, and the other factors in evolution work with it, and not in place of it. The scheme of the evolution of species, through variation and heredity on the one hand, and the selective influence of the environment on the other, has not greatly changed since the date of the "Origin of Species." The method, degree and to some extent the causes of variation, have been critically and successfully studied. The meaning and the machinery of heredity have been the subject of most fruitful investigation and experiment. Natural selection has been subjected to the most searching analysis, and the fact that its effects vary under varying conditions has been clearly brought out. But it still remains the only general cause of the universal phenomena of adaptation of life to environment. Isolation has been separated from selection as a factor theoretically distinct, but practically coexistent. The supposed Lamarckian factors have disappeared, to

reappear again in unknown and perhaps unknowable forms. Theories of elemental species, unit characters and the like, have arisen to meet the facts and guesses involved in the investigations of mutation and the rediscovery of Mendelism, taking their place alongside of Darwin's bold hypothesis of pangenesis, and, like pangenesis, to pass away when the hypotheses are no longer needed. With all this, on the whole, the scheme of organic evolution, as presented in the "Origin of Species," still holds as an outline. The work of fifty years has intensified the main features of the sketch, and has constantly added to the work of the master, without obliteration of any essential details.

The instruments of precision in biological research have taught us many things. They have shown a physical basis of heredity, and by this means have made a theory of heredity possible. Scientific experiment has added many details, as to the development of cells, as to the behavior of hybrids, as to the processes of selection, as to the effects, direct and indirect, of many sorts of environments. Embryology has shown the method of development of each type of animal and plant. Our knowledge of extinct forms has grown by leaps and bounds. Even the lower ancestors of man have appeared in the rocks and in the forms the great morphologists have expected them to assume. Systematic geologists have gathered together the lessons of morphology, embryology and paleontology, to be applied to the construction of ancestral trees, while our knowledge of geographical zoology and botany has kept pace with the most rapid increase of knowledge in any other field. With all this, the entire face of philosophy, social science and even of theology, has been altered by the idea of descent, with modification, through natural causes, the most noteworthy being that of the survival of the fittest in the varied conditions of life.

In the American volume, Professor Thomas C. Chamberlin contributes the introductory chapter on the continuation of the Darwin impetus, admitting, if necessary, that "if the atom shall show an authenticated pedigree," it will "take its place in the procession of the

derived, with the plant, the animal, the earth and the stars." Professor Edward B. Poulton discusses the progress of biology in the "Fifty Years of Darwinism." Professor John M. Coulter discusses natural selection from the standpoint of the botanist, with an ingenious treatment of the "non-adaptive adaptations" that natural selection does not readily explain. Professor David S. Jordan discusses isolation as a factor in species making, taking the ground, as stated by Dr. Ortmann, that "the four factors, variation, inheritance, selection and separation (isolation) must work together to form different species. It is impossible that one of these should be by itself, or that one could be left aside."

The cell, in relation to heredity and evolution, is discussed as by one having authority, by Professor Edmund B. Wilson. Professor D. T. MacDougal speaks of the "Direct Influence of Environment"; Professor W. E. Castle of "The Behavior of Unit Characters in Heredity." Professor Charles B. Davenport treats of "Mutation," finding "certain evident elements of truth" in the speculations arising from the experiments of de Vries. Dr. Carl H. Eigenmann discusses "Adaptations," recognizing the fact stated by Weismann, that they "arise whenever needed if they are possible," considering the question of their origin as "the problem of problems," and giving to the whole a suggestion of a "Lamarckian" trend.

Professor Henry F. Osborn discusses Darwin and paleontology, with a leaning toward orthogenesis, a theory which needs only to be defined to receive general acceptance. Evolution and psychology are treated by Professor G. Stanley Hall, who finds that the psychic powers of man are but "new dispensations" of those of the lower animals, and that the debt of psychology to Darwinism is not one whit less than that of zoology or botany. Without the idea of descent through natural processes, all biological sciences are without meaning.

The Cambridge volume covers a wider range of subjects, including the influence of Darwinism on astronomy, philology, philosophy and theology, which last subject is taken more seriously in England than in America.

The veteran botanist, Sir Joseph Dalton Hooker, furnishes an introductory letter to the editor, Professor A. C. Seward. Professor J. Arthur Thomson discusses Darwin's predecessors and their relation to evolution. Professor August Weismann discusses the selection theory, which is fundamental to "Weismannism," as to Darwinism. Professor Hugo de Vries discusses variation from a point of view of experimental botany. "Heredity and Variation in Modern Lights" are treated by Professor W. Bateson. In this able essay is a footnote on "the isolation of the systematists" as "the one most melancholy sequela of Darwinism." "Should there not be something disquieting in the fact that among the workers who come most in contact with specific differences are to be found the only men who have failed to be persuaded of the unreality of these differences?" This strikes the writer as not at all just. Those systematic workers worthy of the name, in all countries, were among the first converts of Darwin. Not that Darwin's arguments persuaded them, but that their own studies showed that species can not be permanently separated as categories from races and varieties. But to the systematists is entrusted the bookkeeping of zoology and botany. Without the rules and the minute discriminations of taxonomy, all biological science would be lost in a maze. However impertinent the distinction between a variety and a species, a difference is a difference, and each term represents a degree of variation which has become hereditary and relatively permanent, and hence to be discriminated by those who deal with the details of organic being, from individual variation, and from alterations due to mutation or environment. The supposition that systematic zoologists and botanists are essentially dullards who do not know what is going on outside, and do not know what species are, is one frequently made by theorists or experimenters, who do not appreciate the methods of precision necessary in this particular field.

Systematists are not deceived in the matter of the despised species of British brambles but it is as legitimate and it may be as fruit-

ful a study to work out the effects of isolation, hybridization and climate on brambles as to test the effects of various alkaline salts on the eggs of a starfish. Good work counts, whatever its subject matter.

Professor Edward Strassburger discusses the "Minute Structure of Cells in Relation to Heredity," claiming with Darwin that "invisible gemmules are the carriers of hereditary characters, and that they multiply by division." This hypothesis he implies might have been developed by Darwin, had not his genius been "confined by finite boundaries by the state of science in his day." The "Descent of Man" is discussed by Professor G. Schwalbe. In this regard, he considers that Darwin's work is unsurpassed. "The more we immerse ourselves in the study of the structural relationship between apes and man, the more is our path illumined by the clear light radiating from him."

Professor Ernst Haeckel treats of "Darwin as an Anthropologist," in like sympathetic fashion.

Mr. J. G. Frazer discusses "Primitive Theories of the Origin of Man." Professor Adam Sedgwick discusses the "Influence of Darwin on the Study of Animal Embryology." Professor W. B. Scott treats of the "Paleontological Record as Regards Animals," and Mr. D. H. Scott, as regards plants. Professor George Klebs treats of the "Influence of Environment on the Forms of Plants," and Professor Jacques Loeb on the "Experimental Study of the Influence of Environment on Animals." Professor Edward B. Poulton emphasizes the value of color in the struggle of life. Sir William Thistleton Dyer treats of the "Geographical Distribution of Plants," and Dr. Hans Gadow of the "Geographical Distribution of Animals." Mr. J. W. Judd discusses "Darwin and Geology," and Mr. Francis Darwin, "Darwin on the Movement of Plants." Professor K. Goebel has an essay on the "Biology of Flowers," Professor C. Lloyd Morgan one on "Mental Factors in Evolution," and Professor Harald Höffding one on the "Influence of the Conception of Evolution on Modern Philosophy." Professor C. Bouglé discusses "Darwinism and Sociology," Rev. P.

N. Waggett, the "Influence of Darwin on Religious Thought." This influence Mr. Waggett finds "from a Christian point of view, satisfactory," as all movements toward truth ought to be. It may be an "advance of theology" when theologians retreat. Mr. Waggett thinks that a "bolder theism" is now needed, and now justified.

Dr. Jane Ellen Harrison treats of the "Influences of Darwinism on the Study of Religions." The scientific study of religions begins with the Darwinian conceptions. Dr. P. Giles discusses "Evolution and the Science of Language." Professor J. Bury writes luminously on "Darwinism and History"; Sir George Darwin on the "Genesis of Double Stars," and Mr. W. C. D. Whetham has the final essay on the "Evolution of Matter." He doubts whether such cases of atomic disintegration as we now know can be characterized as "Evolution," and the question whether primeval matter was more or less complex, or both, than the matter of to-day, is still unsettled.

Through all these essays and addresses runs the vein of veneration for Darwin the man. The words used by the present writer in 1882, he still finds pertinent:

Darwin lies in Westminster Abbey, by the side of Isaac Newton, one of the noblest of the long line of men of science whose lives have made his own life possible. For every truth that is won for humanity takes the life of a man. Among all who have written or spoken of Darwin since he died, by no one has an unkind word been said. His was a gentle, patient and reverent spirit, and by his life has not only science, but our conception of Christianity, been advanced and ennobled.

DAVID STARR JORDAN

THE FAUNA OF CHILE

PROFESSOR CARLOS E. PORTER, C.M.Z.S., director of the Natural History Museum of Valparaiso and of the "Revista Chilena de Historia Natural," is about to publish the first volume of a new work which bears the title of "Fauna de Chile," being a methodical and descriptive catalogue of the animals living in the Republic of Chile.

This work has been in preparation for a