

From the lowest animals, he has gradually extended his investigations up to the highest, and even to man. His earlier labours were, for the most part, occupied with the lower marine animals, especially with the pelagic organisms swimming at the surface of the open sea. He availed himself of an excellent opportunity for the study of these, when on board H.M.S. *Rattlesnake* on a voyage of circumnavigation, which took him to many most interesting parts of tropical oceans little investigated, previously, by the zoologist; especially the coasts of Australia. Here he was able to observe, in their living state, a host of lower pelagic animals, some of which had not at all been studied, others but imperfectly. In the Protozoa, he was the first to lead us to satisfactory conclusions concerning the nature of the puzzling Thalassicollidæ and Sphærozoida. Our knowledge of Zoophytes has been greatly extended by his splendid work on "Oceanic Hydrozoa," in which, chiefly, the remarkable Siphonophora, with their largely developed polymorphism and the instructive division of labour in their individual organs, are described with very great accuracy.

Already in his first work "On the Anatomy and the Affinities of the Medusæ," 1849, he directed attention to the very important point, that the body of these animals is constructed of two cell layers—of the Ectoderm and the Endoderm—and that these, physiologically and morphologically, may be compared to the two germinal layers of the higher animals. He has made us better acquainted with several interesting members of the class Vermes, Sagitta, Lacinularia, some lower Annulosa, &c. He was the first to point out the affinities of Echinodermata with Vermes. In opposition to the old view, that the Echinodermata belong to the Radiata, and, on account of their radial type, are to be classed with corals, medusæ, &c., Huxley showed that the whole organisation of the former is essentially different from that of the latter, and that the Echinoderms are more nearly related, morphologically, to worms. Further he has essentially enlarged our knowledge of the important group of Tunicata by his researches on the Ascidians, Appendicularia, Pyrosoma, Doliolum, Salpa, &c.

Many important advances in the morphology of the Mollusca and Arthropoda are also due to him. Thus, *e.g.*, he has greatly elucidated the controverted subject of the homology of regions of the body in the various classes of Mollusca. He has considered the generation of vine-fretters from quite a new point of view, based on his "genealogical conception of animal Individuality." But it is the comparative anatomy and classification of the Vertebrata which, during the last ten years, he has especially studied and advanced. His excellent "Lectures on the Elements of Comparative Anatomy" afford abundant proof of this, to say nothing of his numerous important monographs, especially those on living and extinct fish, amphibians, reptiles, birds, and mammals.

Huxley's works on the comparative anatomy of the Vertebrata are the only ones which can be compared with the otherwise incomparable investigations of Carl Gegenbaur. These two inquirers exhibit, particularly in their peculiar scientific development, many points of relationship. They both belong to that small circle of morphologists which is marked by the names of Caspar Friedrich Wolff, George

Cuvier, Wolfgang Goethe, Johannes Müller, and Carl Ernst von Baer.

More important than any of the individual discoveries which are contained in Huxley's numerous less and greater researches on the most widely different animals are the profound and truly philosophical conceptions which have guided him in his inquiries, have always enabled him to distinguish the essential from the unessential, and to value special empirical facts chiefly as a means of arriving at general ideas. Those views of the two germinal layers of animals which were published as early as 1849 belong to the most important generalisations of comparative anatomy; they already contain in germ, the idea of the "perfect homology of the two primary germinal layers through the whole series of animals (except protozoa)," which first found its complete expression, a short time since, in the "Gastræa theory;" also his researches on animal individuality, his treatment of the celebrated vertebral theory of the skull, in which he first opened out the right track, following which Carl Gegenbaur has recently solved in so brilliant a manner this important problem, and above all his exposition of the Theory of Descent and its consequences, belong to this class. After Charles Darwin had, in 1859, reconstructed this most important biological theory, and by his epoch-making theory of Natural Selection placed it on an entirely new foundation, Huxley was the first who extended it to man, and in 1863, in his celebrated three Lectures on "Man's Place in Nature," admirably worked out its most important developments. With luminous clearness, and convincing certainty, he has here established the fundamental law, that, in every respect, the anatomical differences between man and the highest apes are of less value than those between the highest and the lowest apes. Especially weighty is the evidence adduced, for this law, in the most important of all organs, the brain; and by this, the objections of Prof. Richard Owen are, at the same time, thoroughly refuted. Not only has the Evolution Theory received from Prof. Huxley a complete demonstration of its immense importance, not only has it been largely advanced by his valuable comparative researches, but its spread among the general public has been largely due to his well-known popular writings. In these he has accomplished the difficult task of rendering most fully and clearly intelligible, to an educated public of very various ranks, the highest problems of philosophical Biology. From the lowest to the highest organisms, from Bathybius up to man, he has elucidated the connecting law of development.

In these several ways he has, in the struggle for truth, rendered Science a service which must ever rank as one of the highest of his many and great scientific merits.

ERNST HAECKEL

#### ZOOLOGICAL NOMENCLATURE

*The Object and Method of Zoological Nomenclature.* By David Sharp. (E. W. Janson and Williams and Norgate, 1873.) Pp. 39.

ZOOLOGISTS and botanists universally adopt what is termed the binomial system of nomenclature invented by Linnaeus. The essential principle of this system is, that every species of animal or plant is to have a name made up of two words, the second word—which is

called the specific or trivial name, having exclusive reference to the species itself, the first word—which is called the generic name, indicating the genus, or small natural group, which comprises the species in question along with others. Thus the cat, the tiger, and the lion, belonging to one genus or small natural group of closely-allied animals, are called respectively, *Felis catus*, *Felis tigris*, and *Felis leo*. The name of each species, therefore, shows us what group it belongs to, and thus gives us a clue to its affinities; and the system of nomenclature is to this extent classificatory. But, as the true natural grouping of species has not yet been agreed upon by naturalists, and genera have been in a state of incessant change from the time of Linnæus to the present hour (or for about a century), the names of an immense number of species have been repeatedly altered; and one of the first requisites of a good system of nomenclature—that the same object shall always be known by the same name—has been lost, in the attempt to make the name a guide to classification, while the classification itself has ever been fluctuating and still remains unsettled. As an example let us take the Snowy Owl. This has been placed by different ornithological authors in the genera *Bubo*, *Strix*, *Noctua*, *Nyctea*, *Syrnium*, and *Surnia*; and at the same time, owing to carelessness or error, a number of different specific or trivial names have also been used, such as *scandiaca*, *artica*, *nivea*, *erminea*, *candida*, and *nyctea*; and the various combinations of these two sets of names have led to the use of about twenty distinct appellations for this single species of bird. This example is by no means a very extreme one; and it represents what occurs over and over again, in varying degrees, in every department of zoology and botany.

In order to determine in every case which of the names which are or have been in use is the right name, and so arrive at uniformity of nomenclature, certain rules have been pretty generally agreed upon, the most important of which is that of "priority." This means that the first name given to a species is to be the name used, even when it has never come into general use, but is now discovered in some scarce volume dated 80 or 100 years ago. But this absolute law of priority only applies to the specific or trivial name; in the case of the generic name no such absolute priority has been thought possible, because the genera of the old authors were very extensive groups, which have now been divided, in some cases into hundreds of genera. This process of division has, however, gone on step by step, one author dividing an old genus into three or four new ones, with new names; another dividing some of these still further, with more new names; another perhaps discovering that these genera were not natural, and grouping the species into genera on altogether different principles, and again giving new names. Genera have been thus subdivided to such an extent that the owls, for example, which Linnæus classed as one genus, now number more than fifty; and the ten British owls have to be placed in nine distinct genera.

In the very ingenious and careful essay which has led to these remarks, Mr. David Sharp, a well-known entomologist, advocates a mode of attaining the great desideratum of naturalists—a fixed and uniform nomenclature of species—which has not, so far as we are aware, been suggested before, although it is at once simple and

logical. He proposes that, not merely one-half, but the entire name of every species once given, should be inviolable, until by general consent some permanent classificatory system of naming species, analogous to that used in chemistry, is arrived at. The insect named by Linnæus *Papilio dido* should, for example, retain that name, although it must find its classificatory place in the genus *Colœnis* and the family *Nymphalidæ*; while the glossy starling of the East should retain the name *Turdus cantor*, given to it by Gmelin, although it is no thrush, and belongs to the genus *Calornis*. The name would thus remain fixed, however the place of the species in our classifications might be changed; and the very errors of the original describers might help us to remember the object referred to by directing our attention to the cause of their error in classifying it. A beginner might, it is true, be misled, but the mistake once pointed out, the very inappropriateness of the name would serve us an aid to memory, as in the well-known "*lucus a non lucendo*." It is also pointed out that the value of the binomial nomenclature as a guide to the affinities of a species is now almost lost, owing to the minute subdivision of the old well-marked groups and the consequent multiplication of genera. No one can remember the names of all the genera of beetles now that they exceed ten thousand, unless he devotes his life to their study; and even then the fixity of the names of all the old and well-known species would be a great help in the study of new classifications, or the use of modern catalogues.

A great evil of the present system is, that while professing to keep the specific or trivial name inviolable, it often compels an entire change of name. This happens whenever, by a new arrangement, a species has to be placed in a genus which already contains the same trivial name. Two species thus come to have the same name, and one of these must be wholly changed. The evil of this system of perpetually changing names is not so much the trouble it gives us to find out what object a name really refers to (though that is serious) as the enormous waste of labour involved in the elaborate working out of synonymy, rendered many fold more difficult by the complication of changes in both the generic and specific names, from a variety of causes. These difficulties are much greater in the case of genera than in that of species; and this portion of synonymy would be almost got rid of if it were decided that the first binomial name given to a species should never be changed. We should then avoid the absurdity of having hundreds of familiar names abolished, because a mere compiler of an early catalogue, who had perhaps never seen the objects themselves, divided them up almost at random into a number of named groups, or because some modern student thinks it advisable to split up every large genus into dozens of smaller ones.

These appear to be weighty arguments in favour of Mr. Sharp's proposal, yet we are far from thinking that it will be adopted. For, after all, the changed names are but few in comparison with those which remain unchanged for considerable periods; and the charm of a nomenclature which is to a considerable extent classificatory is so great, that most naturalists will strongly object to giving it up. So long as the old name keeps within the bounds of the modern family (which is in most cases a

stable and well-defined group) there might be little objection to retaining it; but when it leads to the use of a name indicating a distinct and often quite unrelated family—as *Silpha scabra* for one of the Lamellicornes, (*Trox scabra*) in the example given by Mr. Sharp—the system will, we apprehend, be almost unanimously rejected.

Many minor details of nomenclature are discussed in the essay before us, and on some of these the author's views are more likely to meet ultimately with general acceptance. He objects strongly, for example, to the common practice among classical purists of altering all names which they consider to be not properly spelt or not constructed on true classical principles. For, as he justly remarks, the emenders can give no guarantee that their alterations will be permanently accepted, since others may come after them who will have different views as to classical orthography and propriety of nomenclature. He points in particular to the inconvenience of placing an H before many names which were originally spelt with a vowel, thus altering their places in an alphabetical arrangement, and creating a synonym for no useful purpose whatever.

Although it appears to us pretty certain that the plan of returning to the first generic name given to a species will not be adopted, the proposal to do so may lead to a reconsideration of the practice of applying the law of priority to generic names, as all are agreed it must be applied to specific or trivial names. If the generic part of the name may be altered any number of times in accordance with altered views as to classification, the principle of priority in the mere name is so totally given up, that it seems absurd to use it for the purpose of resuscitating the obsolete appellations of early writers. When an author is admitted to have defined a natural genus, he should have full power to give a name to that genus, because it is really a new thing; and it is both illogical and inconvenient to reject his name because some former writer has given another name to a group, not the same, but which merely happened to contain some one or more of the same species. Again, we think Mr. Sharp's arguments suggest the advisability of opposing the splitting up of large genera into many smaller ones otherwise than provisionally; the old generic name continuing to be used till there is a concurrence of opinion as to the necessity of adopting the new ones. The older authors were often modest enough to do this; indicating natural divisions of large genera, but not naming them; whereas modern naturalists, as a rule, feel bound to give a new name to every fragment they can split off an established genus.

It appears, then, to the present writer, that the plan best adapted to lead speedily to a fixed nomenclature, and at the same time one that will least offend the prejudices of zoologists, is as follows:—

1. To adopt, absolutely and without exception, the principle of priority as regards specific or trivial names.
2. To adopt the same principle for genera only so long as the generic character or definition of the genus remains unaltered; but whenever an original investigator defines a genus more completely than has been done before, he is to be left free to name it as he pleases. Every consideration of utility and common sense will of

course lead him to retain a name already in use when the new genus does not materially differ from an older one; but of that he is alone the judge, and it should be absolutely forbidden to any third party to say that a name so given must be changed.

3. Whenever genera which are widely recognised are split up into a number of proposed smaller ones, the old generic name should continue in use till further investigation determines whether the new groups are sufficiently well defined and natural to supplant the old one.

In conclusion, it may be suggested that if zoologists who have paid attention to this subject would, after a careful consideration of Mr. Sharp's paper, state their own conclusions in the form of short propositions, accompanied by their reasons for them, a notion might be obtained, not only as to which system is intrinsically the best, but, what is of equal or perhaps greater importance, which is most likely to command general assent.

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#### RESULTS OF THE FRENCH SCIENTIFIC MISSION TO MEXICO

*Mission Scientifique au Mexique et dans l'Amerique Centrale.* Recherches Zoologiques publiées sous la direction de M. Milne-Edwards. Livraisons 4. (Paris: 1870-72.)

THE ill-fated attempt of the Second Empire to establish Imperialism in Mexico has had at least one good result in the work now before us, in which the labours of a Scientific Mission originally sent out under the shadow of the French Army are given to the world. The materials accumulated by M. Bocourt and his Fellow-Naturalists, were deposited in the National Museum of the Jardin des Plantes, and the elaboration of them entrusted to special workers in the different branches of science. In 1870 three livraisons were issued, each forming the commencement of a separate section of the work, as planned out under the direction of M. Milne-Edwards. These relate to the terrestrial and fluviatile Molluscs, by MM. Fischer and Crosse; to the Orthopterous Insects and Myriapods, by M. Henri de Saussure; and to the Reptiles and Batrachians, by MM. Auguste Duméril and Bocourt. The fall of the Empire and German occupation stopped the immediate progress of the work, but we are glad to see it has now been resumed. A second livraison of the section devoted to the Myriapods, prepared by MM. H. de Saussure and Humbert, has been lately issued, and we believe it is fully intended to bring the work to a conclusion. It will be observed that authors engaged on the various sections are all well-known authorities on the subjects of which they treat, and that the figures and illustrations are of an elaborate character. We are the more glad to call the attention of our readers to the revival of this work, because it does not appear to be very generally known to naturalists, and because it has lately been the subject of a most unjustifiable attack in an English scientific periodical.\* After a general condemnation of the work we are there informed that it is "a lamentable exhibition of the very backward state of zoological science in

\* Ann. Nat. Hist. for August 1873.