JOURNAL OF

THE TRANSACTIONS

OF

The Victoria Institute,

OR,

Philosophical Society of Great Britain.

EDITED BY THE HONORARY SECRETARY,
CAPTAIN FRANCIS W. H. PETRIE, F.G.S., &c.

VOL. XXVII.

LONDON:
(Published by the Institute.)
INDIA: W. THACKER & Co. UNITED STATES: G. T. PUTNAM'S SONS, *N.Y.*
AUSTRALIA AND NEW ZEALAND: G. ROBERTSON & Co., LIM.
CANADA: DAWSON BROS., *Montreal.*
S. AFRICA: JUTA & Co., *Cape Town.*
PARIS: GALIGNANI.
1894.

ORDINARY MEETING.*

PROF. E. HULL, LL.D., F.R.S., IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed, and the following elections were announced :—

MEMBERS :—The Rt. Rev. A. Clifford, D.D., Bishop Designate of Lucknow ; C. F. Dowsett, Esq., London ; R. H. Fremlin, Esq., Kent.

LIFE ASSOCIATES :—W. Bodkin, Esq., M.D., Essex ; Rev. G. H. Butt, B.A., Camb., Lincolnshire.

ASSOCIATES :—The Rt. Rev. the Bishop of Down and Connor, Ireland ; General the Rt. Hon. Sir John Clayton Cowell, P.C., K.C.B., Master of the Queen's Household ; the Rev. T. S. Bacon, D.D., United States ; H. W. Bush, Esq., Kent ; the Rev. C. D. Bradlee, D.D., Ph.D., United States ; Major-General A. W. Drayson, F.R.A.S., &c., Hants ; C. H. S. Davis, Esq., M.D., Ph.D., United States ; R. M. Eyton, Salop ; Major H. J. Elverson, 2nd Queen's Regiment ; A. H. Harris, Esq., China ; Principal A. H. Hildesley, M.A., Punjab, India ; Rev. J. Moulson, M.A., Oxon, Punjab, India ; Rev. F. G. Le P. McClintock, A.B., Ireland ; A. Mueller, Esq., M.D., Ch.D., Australia ; Rev. J. M. P. Otts, D.D., LL.D., United States ; Rev. J. M. H. du Pontet de la Harpe, M.A., B.D., London ; Martyn J. Smith, Esq., Worcester ; C. A. Sherring, Esq., B.C.S., India ; L. W. Thrupp, Esq., B.A., London ; Rev. H. M. Walter, M.A., Oxon, Berks ; Rev. R. H. Weakley, Egypt ; Rev. H. F. Wright, M.A., Oxon, India ; Rev. T. Wood, F.E.S., Herts.

The following Paper was then read by the Rev. R. F. McLeod, in the Author's unavoidable absence :—

PRINCIPLES OF RANK AMONG ANIMALS. By Professor HENRY WEBSTER PARKER, United States.

A SYNOPSIS of recognised principles of rank in the animal kingdom is a desideratum. No separate head is made of these principles as applied to organs, *e.g.*, those of locomotion, reproduction, circulation, etc., with one exception—brain, for reasons connected with the last two heads. The outline here given is made to bear incidentally on man's position in nature, but without reference to his physical origin.

1. A rise above vegetal characters is a rise in grade. Plants have a general plan of structure, similar parts radiating from an axis. Several grand divisions of the animal kingdom would conform to this plan ; and some of the organisms are plant-like in appearance, in budding, and otherwise. Moreover, plants have digestion, circulation, respiration, and reproduction ; hence these functions (which, indeed, are all that some animals seem to possess, besides

* December 5, 1892.

sensation) are known as vegetal, and are so recognised even in popular language, as when we say that a person of inactive mind "simply vegetates." But the same might be said of every animal below man, because its distinctively animal endowments, nerve and muscle (or their equivalents), are subordinated to nutrition and reproduction, whereas in completely developed man all functions are subordinated to mind. Thus he stands alone.

2. Fundamental plan, in animals above radiate structure, is a criterion of rank chiefly as it has to do with the presence or absence of an internal skeleton. The nervous system will be referred to later. Vertebrates are, as a branch, superior to invertebrates in the profound modification of the whole structure and its powers by an endoskeleton. For this reason the splendid wing of a Morpho butterfly falls below the fin-like wing of a penguin. In respect to man, in him alone the vertebrate plan rises to its high ideal—the spinal column indeed a column, lifting his large brain and liberating and supporting the fore limbs for all the uses of that brain. Thus he stands high and apart.

3. Type may be mentioned next, not in the above sense of plan, but as referring to forms that embody the most characteristic features of their group, whether or not they are more highly endowed in every point. Not the raptorial dragonfly, nor Hercules beetle, nor the sylph-like butterfly, but the bee and ant lead their sub-order, because they best realise its ideal, namely, in compactness, mouth-parts, activity, remarkable instincts, and other points. Teliosts are inferior to sharks and ganoids in some respects, but are the most fishy of fish. The singing birds are now placed first in their class because they are the ideal birds, though not the most splendid, nor so kingly as the raptores that once usurped their place.

Of departures from type, something will be said under another head. A remark comes in here that, if man be claimed as the typical "primate" in a group with anthropoids, their departure from his ideal type sets him apart more than any identity of parts can bring him near in kind. That their so-called families, including lemurs, have as great or even greater visible differences among themselves does not bridge the chasm between him and the gorilla and chimpanzee, on this zoological principle of rank. They, too, are a type, and of something very different from him. Ordinal values are not always equal, nor the same in every class, but it may

be noted that among birds the order Grallatores, for example, is of a pronounced type, but depends on nakedness of leg and proportion of parts; "it does not appear susceptible," says the leading American ornithologist (Dr. Coues), "of further, or any very exact definition." Indeed, he speaks of the great primary division of birds into Aerial, Terrestrial, and Aquatic, as "a broad generalization upon the sum total of all the exhibitions that recent birds make in their modes of life"; the three sub-classes are "insusceptible of definition by characters of more than the slightest morphological importance." Why, then, the effort to abolish the classificatory gulf between man and the apes, unless it be a fashion and preconception that will not take all the facts and principles into view? He may even agree with them "bone for bone and muscle for muscle," but his plan of life, use of organs, and ideal of type, are as diverse as a thrush from an auk, to say the least. It does not hinder, but rather helps the argument, that savages live a brute life. The naturalist must take the best representatives of a species and as they are, howsoever they reached their degree of physical or other perfection. Origin is a matter aside, and no theory of it, unless it be weak, requires a confusion of distinctions. It may be added, incidentally, that the *ideal*, as in typical bird, fish or insect, is recognized in classification just as much as thirty or a hundred years ago.

4. Variety and development of tissues and organs are plainly among the prime criteria of rank. Differentiation is a great law of progress,—with the qualification here that, if the total individual, man or honey-bee, is specialized for the sake of the community, "the individual withers and the world is more and more." As it concerns man's place in nature, his great mass of brain is measurable, and his delicacy of feature and hand, adapted to human functions, is observable. There has been an effort to refer his superiority almost wholly to the acquirement of articulate speech. But, taking natural science on its own ground, there must be in the organic as in the inorganic a vast amount of structure beyond the reach of microscope; and, taking materialism on its own ground, there must be some great differences of occult organization to account for non-attainment by the anthropoids of that mighty instrument of progress, language proper, and the rationality it implies. The crypto-anatomy, if matter be all, must have peculiarities of more importance than likeness in the gross or the micro-anatomy. If matter

be all, of course the difference is all *there*, in matter, though it be beyond discovery.

5. Opposed to variety, should be mentioned in particular a degrading repetition of like parts of structure. Bilateral symmetry is not included here, for it has its own utilitarian and æsthetic reasons; nor is such specialization included as the number of mammalian digits. The radiate arrangement in plants and the lower animals has been noticed. In the higher organisms the centipedes are low land-arthropods; fish, with very many vertebræ and digits, among vertebrates; serpents, for similar reason, among reptiles. The principle is familiar as illustrated in repetitious rhetoric, and in the superiority of free styles of architecture over those with a formal multiplication of like parts. The principle has a limited but important application to man in his relation to creatures physically nearest him; namely, the old distinction between bimanous and quadrumanous, which no new classification can efface. Here, however, it is not so much a matter of elemental structure as of a great range of function in the human hand, and also of plan of life, which in man is non-arboreal.

6. A special point may be made of prolonged repetitious structure posteriorly. A dragon-fly, with its gauzy wings, swift flight, and falcon habits, would seem more noble than a beetle, but its lengthened abdominal segments and other reasons reduce it to near the foot of its sub-class. As the principle bears on man's zoological place, it may be noticed that, as a group, the quadrumana are tailed, long-tailed; and if the highest have essentially the human coccyx, it is equally true that some of the lower monkeys have other striking, though no more important, correspondencies to man, *e.g.*, in the special arrangement and length of hair on crown, jaw, and chin. There are all degrees of caudal development, distributed variously from the human embryo down throughout vertebrates, including the adult frog in which the tail wholly disappears; so that the phrase "tailless anthropoid" may express a literal, but is not a logical conclusion.

7. A connected criterion of importance is James D. Dana's, termed by him cephalization; it is head domination in the animal structure. Species rise in grade as the anterior part of the body is relatively more developed; the head is more compacted, the jaws less projecting; there is, it may be, an elevation of the forward extremity: and the fore limbs render more service to the head. Professor Dana illustrates the last

point by the greater numerical proportion of limbs set off from head-service to locomotion, from man down to crustaceans. In the same way there is a descent of grade from the vertical face of man, first by a leap to the prognathous anthropoids, then through the typical short-jawed carnivores and the long-jawed herbivores, reaching an extreme in whales and the hairy ant-eaters. It is obvious that man stands alone in perfect cephalization.

8. Rank has a relation to food. The limbs of the true flesh-eaters must assist the jaws in securing and holding prey, notably in the typical feline family. Further, the nervous system and active muscles must be more developed, for the capture of prey. Moreover, animal food is more stimulating, more concentrated; there is none of the constant low work of feeding on vegetation, nor a corresponding predominance of the digestive system and work, consumptive of energy. Fruits, except the pulpy, are also concentrated food, but in a less degree. The quadrumana are frugivorous, and they use their fore-hands in eating; but so do squirrels, more deftly, and sitting erect. Man as omnivorous, is quite apart from the creatures next below him. At first glance he might seem to sink to a parallelism with omnivorous rats and swine; but he rises above all in the scale, not only as the "cooking animal," but as one with a sovereign mind to intellectualize all flavours and savours, while his body royally appropriates all edible good.

9. Comparative hugeness of size, an accompaniment usually of huge eating, has been remarked as a sign of low grade, with more or less exception; it is rather a frequent concomitant than strictly a criterion. The Paradoxical frog of South America in its larval stage is five times the size of the adult; and some marked decrease is not uncommon in passing from the lower larval condition. The enormous monsters of the prime were not high in the scale; and the bulkiest creature of the deep, now, is a degraded mammal. The giants of tradition were gross. Even the huge crystal is coarse and impure. In art the Herculean human figure is represented with no great cephalic development. Man's compactness and delicacy of organization agree with his mental supremacy, and remove him far from that ogre of big bony ridges and all-crushing muscle, the highest ape.

10. Rate of growth comes in here, both prenatal and postnatal, and as connected with the amount of parental skill and care required. Ill weeds grow apace; solid wood

is long in maturing; and choice fruits and flowers demand patient culture. The noblest animals are born the most helpless, and are long in developing, for they have much to develop. Further, the parental instinct correlated with this dependent condition implies some superiority in the species. Lacépede devised a curious scale of eight ranks for birds: first, those that build no nests; next, those that build rudely; and so on until, finally, those that form a community-roof. Charles Lucien Bonaparte divided birds into two series—Altrices, that feed their young; and Præcoces, that feed themselves from the first. Man, as compared with even the creatures nearest to him, certainly is unique in long postnatal development, physical and mental.

11. A principle of great importance is drawn from metamorphosis in general and embryology in particular, namely, that what is a transition stage in one organism is the last and permanent one in another, which, not progressing, is ranked lower. The fact is found in various branches and classes, and, among batrachians, is familiar to all. Incidentally here, it is enough to say that the metamorphosis of the higher anthropoids is well known to be from a more human-like conformation in the young to less in the adult. Yet the adult, considered in the light of marked type, is not a retrograde form, but the ideal caricature (in the gorilla the utmost exaggeration of the horribly brutal) to which the simians tend. The adult properly represents the species, which is thus the very antithesis of man, who tends to the precisely opposite pole—the symmetrical, the admirable, the intellectual, the godlike. All things considered, the term "anthropoid" is, even on zoological principles, a crudeness and a jest.

12. Retrograde metamorphosis proper, along with any degeneration, strikingly illustrated in the life-history of barnacles and the worm-like entomostracans, mostly accompanies a parasitic or sedentary condition of the adult. Among men, it seems to have followed unfavourable conditions, or else some unknown process of variation. The difference between the comparatively brutal features of some degenerate human races and the noble beauty of other races, especially as embodied in the more perfect individuals, only goes to show how high is the ideal physical man above whatever is beastly.

13. Inferior features of structure are sometimes present in animals of otherwise superior grade, and so depreciate rank;

and *vice versâ*. The great kangaroo distances in speed a greyhound, but in its brain, larynx, sacrum, etc., partakes of the reptilian. The inferior character may be admirable in itself; biconcave vertebræ have their advantage, but are characteristic of fish, and therefore are a low mark in some batrachians and reptiles, and a cretaceous bird. On the other hand a patrician element may exalt a plebeian animal, as notably, the bill and eyes of a cuttle-fish. The teeth of the hoofed Anoplotheria were in some respects nearer to the human than those of the higher apes, but man is no less apart from all.

14. Intermediate, mixed, and generalized organisms may be here grouped under one head of remark, not referring, as in the preceding paragraph, to pronounced types with one or more seemingly borrowed features. They rank high or low according as they approximate to a class (or order) above or below that which is on the whole their own—the extinct reptilian birds being an obvious example of low grade. The term "generalized type" should be confined to forms that, without any very specialized features (as regarded in the light of now existing animals) were or are as if *fusions* of characters now more developed and distinctly separated; such, for example, were the first herbivores, and such now, on a low plane, the worms; as but little specialized they stand below their more distinguished kindred. Man, as alone specialized to the highest conceivable ends, is not of the same order with simians, nor, in this light, of the same kingdom except as its king.

15. The absence or abortion of an element of structure belonging to a group is, with exceptions, a sign of inferiority—exceptions such as the reduced number of digits for advanced function, *e.g.*, speed in the horse. Whales are low-caste mammals, not only as fish-like, but as lacking some normal parts of their class—less lacking in seals. Aquatic mammals have been classed by some as Mutilates, as if mutilated.* In respect to man this principle has no application, so far as it concerns internal structure. But, there is the important absence of a superficial feature com-

* Aquatic plants are generally inferior to those of the land, not needing rigid supporting tissues, nor conditioned for floral display. So in respect to aquatic animals, the buoyancy of water and the ready ingulfing of swimming prey or floating food, render unnecessary a high organization for locomotion and prehension.

mon to mammals (with partial exceptions), namely, a protective covering of hair, which is even a part of the general definition of the class. As this absence is related to man's proper life, both as an inventive being and as one susceptible of a noble shame,—related also to his distinctive beauty,—it becomes a sign of superiority that removes him far from other animals.

16. Brain has its place among other organs in estimating grade, increasing in size and the cerebrum becoming relatively larger, from fish upward. Size and complexity of the brain are now regarded as having relation to all the activities of its possessor, physical as well as mental; so that any halfway approximation of the simian to the human brain in the size and convolutions is not necessarily an approximation either in amount or kind of intelligence. The vast difference is admitted. For the rest, among invertebrates, the supra-œsophageal ganglion is but one among others apparently similar, until, in the ascending scale, it is modified in direct visible relation to organs of special sense.

17. Instinct hardly comes into zoological rank, except it be in the case of the higher insects. Its striking manifestations are distributed with little reference to structural grade, and therefore, it may be added, with as little relation to any capacity for "experience." There is good reason to subscribe to Herbert Spencer's view, that instincts fall among reflex processes; and this, notwithstanding that its results often far surpass the ordinary ones of reason proper in man, which is quite another process from anything demonstrable in animals below him, as proved both by experiment and philosophy. The attempts of late years to confuse all well established distinctions on this subject, by resolving something into nothing of its own definable kind are among the curiosities of literature. It is just as true as ever that man stands alone as rational, however many instincts may be attributed to him, and however many of his acts are on the animal plane of sense association and its connected automatic impulses.

18. Mind is as truly an attribute of animals as flesh and bone,—at least in all that have a brain proper there is an animal mind; but it is remarkable that it has never come into classification, except in respect to man; and now it is not considered "zoological" to take it into account even in his case. There are good reasons that may justify the general exclusion; namely, below man it is a distinctively animal mind, animal "intelligence," so termed, or even

animal "reason," if it is well to use that word in two very different senses; and, though differing in degrees according to animal conditions and amount of various endowments, it is really the same in all,—quite other than reason proper with its implied abstractions and generalizations in every man. Moreover, it is difficult, if not impossible to substantiate even a general rise in this kind of "intelligence" in the animal scale upward (though this is loosely asserted), for quite as remarkable instances of animal "reasoning" are given in one grade or group as another, and among the lowest. Besides, it is difficult, if not impossible to separate an instance, a fact of this kind, from our anthropomorphic interpretation of it, and still more difficult, if not impossible, as the writer has shown elsewhere,* to separate such assumed reasoning from the certainly predominating, pervading and diversified instincts, and from sense associations with their impulses, which may be mistaken often for reasoning in man himself, and no less often in domestic animals possessing them as both original and in some way abundantly acquired. One thing is certain that no better instances of mind are observed in quadrumana than in dogs and elephants; and thus man is removed as far from his nearest zoological neighbours as from the more remote. The invisible gulf is right at his side in museum arrangement. It is a museum matter to locate him by his skeleton only. It is neither logical nor zoological to put him among the group of "Primates" as now formed, but rather to acknowledge his unique position as shown by *every* principle of rank in zoological classification.

It hardly need be said that no one principle or character determines an animal's place, or that of a group; all must be taken into account so far as applicable. And this, too, enforces our lesson. Man must be taken for all that he is, in all his characters and relations.

In concluding, it needs to be emphasized that there should be a marked distinction between the anatomical and the zoological classification of man. Books and papers on zoology do not fail to take into their scope the various phenomena of animal life; only when they come to classify man do they exclude everything but his anatomy. Birds and bees have been mentioned. The six pairs of minute muscles in the syrinx of singing birds (in place of these as

* *Spirit of Beauty*, 12mo., New York. 1888.

diminished or massed in Clamatores, or reduced to fewer pairs in lower groups) would not be thought of as entitling their possessors to the first place but for the power of song connected with the more complicated apparatus. The social instincts of the Hymenoptera are among the characters that determine grade. Certainly, the naturalist who is strictly naturalistic should look upon all developments of man as having weight in a natural system—human architecture as no less to be considered than honey-comb, human music no less than avian, human society no less than that of an ant-hill; he should place man apart according to the totality of his peculiar manifestations. The strained likeness to the ape's habits is shown in trying to make something of the brute's bed, sleeping position, and use of sticks and stones; how lucky it would have been if monkey or ape had made such constructive use of material as the tailor-bird, the bower-bird, the turret-building species of tarantula, or the case-building caddis worm! The materialist, *a fortiori*, cannot consistently shut out the human mind and its developments, since in his view these are animal wholly.

Concerning man, this paper has said nothing of soul, of spirit. Yet even here the tables may be turned. Aside from any idea of spiritual substance or immortal essence, the spiritual, as a writer has explained, is the moral, in all its height and breadth. If, then, there are in animals the germs of everything human, as now claimed apparently half in earnest and half in jest,—if monkeys have an "indefinite morality," and dogs a religion, and a scientific book can query whether ants are "moral and accountable,"—why, in considering man's place in nature, exclude his crowning glory as the only creature with full-orbed moral perception and responsibility, as far from apes as from dogs or even ants. The truth is that in everything except the "Primate" classification, the new science takes into account every slightest thing that is, and a vast deal that has no existence.

Man, it has been well said, begins a new series. He stands alone, erect, godlike, not so much in the pyramid of life as on its summit. And as every lofty summit of earth is overhung by shining clouds, as if the soul of the hills had risen high above, so to the vision of reasonable faith there is another series of life, the spiritual, the glorified, of which man is the beginning.

The CHAIRMAN (Professor E. HULL, LL.D., F.R.S.)—I am sure you will all wish to accord a vote of thanks to the Author of this Paper (applause) and to its reader (hear, hear).

Captain F. PETRIE, F.G.S., the Hon. Secretary.—We had hoped for the presence of the United States Minister Plenipotentiary* this evening, but a letter of regret just received from the Legation announces his departure for America. With regard to the Paper just read, a letter mentions that "Professor James D. Dana, LL.D., F.R.S., has signified his approval of the Author's description of his views, and in other respects, and on zoological grounds, he considers man 'the only primate;' "—a statement reminding one of the opinion given by Professor Virchow in a late Address (Volume xxiv, p. 262 of the Institute's Journal), in which, speaking of the question as to whether it was possible for the most degraded savages to have descended from apes, he says: "No one can answer with an absolute *No.* Why should it not be possible? But from possibility to reality there is a very long step; even all else that constitutes an ape. For it is not merely the process of the temporal bone, the catarrhine nose, and the prognathic jaw, that make an ape, but many other characteristics are necessary to constitute him. *First of all we can demonstrate an ape from every strip of hide*: No anatomist, I suppose, has ever doubted the fact. Indeed, the distinctions between Man and Ape reach so far, that almost every fragment suffices for a diagnosis." It will be remembered that Professor Virchow long ago mentioned that the further his investigations went the greater seemed the gulf between Man and Ape.†

Some important communications have been received in regard to Professor Parker's valued Paper.

The Rev. Professor DUNS, D.D., F.R.S.E., New College, Edinburgh, writes:—

"I have read and re-read Professor Parker's Paper, 'Principles of Rank among Animals.' The subject is one of much interest both from the Natural Science and the Natural Theology points of

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* Now an Ambassador.

† His arguments at the "Moscow Anthropological Congress," 1892, were to the same effect.—ED.

view. There is order in Nature. Scientific classification is the expression of this. It is not a mere arbitrary help to memory. It is, as Agassiz puts it, God's thoughts rendered into human language. Thus the basis and the function of plant and animal classification. 'There are gradations of likeness in animal structures.' The systematist does not determine these, he only interprets them, and his interpretation is the discovery to others of order in the gradation. He deals with both elements of structure and form (*κατασκευὴ και μορφή*), but rather with structure than with form and functions. The structural marks of gradation suggest community of organization among widely separated forms. Here the question of grade arises. What warrants it? What determines it? Is it complexity of type or concentration of type? Is it complexity of structure and organs or concentration of structure and organs? And, withal, what place is to be assigned to psychical qualities in the gradations of likeness and structure? These are vital questions. They are dealt with by Spencer in his *Data of Biology*, under the heads,—Vitality of Organisms, Environments of Organisms, and Individuality of Organisms. Corresponding aspects of thought lead to the discussion of the subject of Professor Parker's paper. He holds that 'A synopsis of recognized principles of rank in the animal kingdom is a desideratum.' It seems to me that the desideratum is to be supplied by collating the schemes of systematists rather than by the method followed by the Author. There are abundant materials at hand for this purpose in the schemes of Aristotle, Linnæus, Lamarck, Cuvier, Oken, Owen and Quaterfages. The summary of these in the work of Agassiz on 'Classification,' taken along with Huxley's 'Introduction,' brings the materials within reach for the deductions sought for in this Paper. I feel, however, that it would not be fair to say more by way of criticism, because justice could not be done to the Paper without a discussion which would occupy more space than the Paper itself."

The Rev. G. F. Whidborne, M.A., F.G.S., writes:—

"It seems to me that in questions of rank in animals we ought to argue from the general to the particular rather than from the particular to the general.

Each animal fills its exact niche in nature and from that takes its actual rank. To discover or rightly to estimate this, it may be needful to consider its separate elements, and their consideration

may often correct false impressions or mistakes; but the animal really depends for its rank on its intrinsic position in nature, and not on the summation of different zoological characters. Thus, in actual fact, man's place in nature is altogether apart, and on a higher level from that of all other beings. This is our real axiom. To explain it, or measure it, we may then proceed to take into consideration his different characters in comparison with those of other animals; but these are in themselves explanatory, not dominant. Some individual characters may approximate, but because they do, we have no right to argue that the animals themselves are equally approximate in rank, or necessarily approximate at all. Even if we found that the sum of all acknowledged characters were approximate in any two animals, we should not have proved that those animals as animals were necessarily close in rank, unless we had confirmatory evidence that they were so *per se;* for some characters might have escaped observation, which would have made all the difference. This point may be abundantly illustrated from the comparative zoology of the lower animals, and still more so from palæontology, where species have constantly to be decided from very imperfect data. May I take an instance from the Brachiopoda, which I have been recently studying. Palæozoic Atrypas and Rhynchonellas have frequently been classed together, because the sums of their external characters are almost exactl the same; but when their internal characters are discovered a wide difference is at once discernible. So again some fossils of the genera Terebratula, Glassia, Centronella, and Athyris while totally differing in internal structure, are externally so similar that they have been apparently all accounted a single species, that is, of one rank, before their interiors were discovered. That is to say, the summation of all known characters in two animals may be the same, and yet their real rank be very different. We may now apply these principles to the animals. We see some which are closely approximate in all acknowledged zoological characters, but which are yet in themselves of very different rank in the true order of nature. Why is this? Because other sets of characters must have escaped our summation. That is to say, there is a vacancy for other characters besides those of ordinary zoological calculation in deciding an animal's rank. Thus, turning to the difference between the rank of man, and of the authropoids, we find it actually very far greater than can be accounted for by mere zoological characters. Hence there is a vacancy for an 'unknown

quantity' from a zoological point of view; there must exist another set of important characters which have not been taken into account. In short 'actual rank' in nature is not necessarily synonymous with 'zoological rank.' They can only be harmonized by giving due systematic value to such characters as reason, mind, soul, and above all spirit."

Mr. H. F. Kirby (F.L.S.).—I am sorry to say that I have not had much time to consider the Paper beforehand, dealing as it does with a large subject. Still I may say that I find that many naturalists of the most opposite schools of thought agree in considering that man ought to form a separate kingdom by himself. On the other hand I think that the Author of the interesting Paper we have had to-night should not include social insects in his account at all, because they stand entirely apart from man in the conditions of their lives and deserve to be treated independently. I see nothing unreasonable in the idea that there may be several totally different classes of reasoning beings in the same world, separated in the same manner as we are from domesticated bees. In the case of ants I very much doubt whether animals much larger in proportion as we are removed from ants would judge of our proceedings as being any more rational than those of ants appear to us, in addition to which it is believed that ants have an extension of the sense of sight, at all events, which no other higher animal possesses. Sir John Lubbock considers the range of their sight, by analysis of the spectrum, as quite equivalent to ours, and they can see further than we can on the violet side. Whether that has to do with the simple eyes or *ocelli* which ants and many other insects possess I do not know; but it is stated that the rudiments of these *ocelli* exist in some animals, notably in some lizards, and apparently in some of the fossil vertebrates they were more highly developed. It may be that the chemical action of the sun was greater than at present, and therefore there was more visible chemical action to be taken into account.

Dr. H. W. Hubbard.—The subject is one that I have not considered much, but there is one point that I might allude to in which man stands apart from all other organisms, namely, in his articulate speech. It has been somewhat recently discovered, and is now very clearly marked out by all naturalists and philosophers, that in the human brain there is a space that is

allotted particularly to speech* which does not occur in any other organized brain whatever; but the human brain is now clearly and definitely marked out, and that portion of which speech is its particular function.

The CHAIRMAN.—Not having any claim whatever to be considered an authority upon zoological matters you will not expect me to say very much on this question. We are glad to have had the views of an American naturalist on what we may call the great question of the day. We have an abundance of literature and of scientific views enunciated from time to time of what you may call the two schools—one, tending to demonstrate that man is nothing but a very superior kind of ape—the other, that he is closely connected with God. We recollect in the celebrated debate in Parliament, what Lord Beaconsfield said on that subject, "As for me, I am on the side of the angels." (!) Well, I daresay most of us prefer to be ranked in that position ourselves. The Author, however, has shown what we are all pretty well familiar with—that there is a vast gulf between ourselves and the apes, or any other order or genus in the whole range of animated creation; and, I think he has brought out one or two points with special vividness from his own point of view. He goes, in fact, very much beyond what most naturalists will in the present state of the subject, though Mr. Kirby has informed us that the view is held that man is not only a distinct order, but that he belongs to a distinct kingdom. Did I understand Mr. Kirby to say that?

Mr. KIRBY.—Yes; among others I believe it is held by Professor St. George Mivart, and was also held by the late Mr. J. W. Jackson —men at the opposite poles of opinion!

The CHAIRMAN.—It is very satisfactory to have men of such opposite views agree on that point. Of course the question will depend on what this individuality is—this special feature. The differences between mind and instinct and structure undoubtedly go a very long way, and, as the Author of the Paper has pointed out, the quadrumanous and bimanous are very distinct in their structure and their necessary mode of progression, and the uses to which the fore limbs are applied; but, after all, it is the brain, as

* See Sir F. Bateman's *Recent Researches in Language, Transactions of the Victoria Institute*, Vol. vii.—ED.

representing the organ of thought, and speech, as the outcome of the characteristics of the brain, that will have the greatest weight with reasoning creatures as ourselves. On that point none of us can have any doubt.

Whatever be the amount of sagacity—of marvellous instinct as we call it—exhibited by animals other than ourselves, we all know that it is limited in its amount or development. The birds that sing so sweetly to-day sang equally well 50,000 years ago, if they were then existing. The beaver constructs habitations which dam up the rivers, and its ancestors did the same many thousand years ago; but it has not yet done anything more; and the ape, no doubt, in the forests of Africa lives exactly as its ancestors did also many thousand years ago. In fact, all the powers of these animals are limited and incapable of development. But with man, his mental powers, that are capable of almost unlimited development, as far as the elements of nature or his environments permit, enable him to assume a position in nature which is infinitely superior to that of any other created being.

I am not prepared to go into this subject further to-night, but I must repeat that we are all indebted to the Author for his Paper.

The Meeting was then adjourned.

REMARKS ON THE FOREGOING PAPER.

Dr. W. Bodkin writes :—

I think the paper shows that man stands at the top of the animal kingdom, not because he has better sight, hearing, taste, smell, or feeling, nor yet from his power of running, but because he has fairly good averages of all these powers; and that the part where he does excel all the animal kingdom is the rational part. The reasoning power together with imagination has enabled man not only to compare things and draw conclusions as to likeness and difference, and make fresh combinations or inventions, but he is also possessed of the hand to carry out these inventions. Man has added to his eye power by the microscope and telescope, so that no other animal can at all approach him in seeing power. So again with the power of hearing, the telephone and phonograph enable man to out-distance all competitors. Then again, though man is not equal in the sense of smell to many animals, yet by his knowledge of chemistry he detects the presence or absence, of ozone,

carbonic acid, ammonia, and microbes in the air. It would seem that man armed with these instruments of precision, is likely to somewhat neglect the proper use of his organs, so that the civilized man is thought to be behind the savage in the acuteness of his sense organs.

The fact that man stands at the top of the animal pyramid I think no one will dispute.

Mr. J. W. SLATER, F.C.S., F.E.S., writes:—

The little time at my disposal does not permit me to enter upon a thorough critique of the difficult subject taken up by Professor Parker. I am very glad that the Author does not adopt the view of Professor Minot, who considers an animal the higher, the more widely its skull departs from the embryonic form. Were he to follow out consistently this principle he would assign the highest rank among the mammalia to the ant-eaters.

The Author of the Paper before us lays down certain principles for estimating the relative rank of an animal. These principles it must be admitted are clearly expressed, and are, in the main, trustworthy. But he does not clear the way by a preliminary explanation whether he would arrange the animal world on a single ascending line, or on a number of ramifications like the branches of a tree. The former plan, now generally abandoned, is fallaciously easy.

Professor Parker says, "That their so-called families, including lemurs, have as great or even greater visible differences among themselves does not bridge the chasm between him and the gorilla and chimpanzee on this zoological principle of rank." On this point differences of opinion exist.

Sec. 5. It is hard to see how the old Cuvierian distinction between "bimana" and "quadrumana" can be maintained. The hind extremities of the gorilla, etc., have heel-bones as decided as our own, and the man who can talk of a hand with a heel-bone seems to be playing with the intelligence of his hearers.

Sec. 7. The predominance of the head in an animal structure spoken of here as "James D. Dana's criterion," was, I believe, first noticed by Professor Carus, and is in full contradiction to the error of Minot.

The remark, however, that squirrels use their fore-hand in eating *more dextrously* than do monkeys must surprise anyone who has seen a monkey tie knots, or unscrew and screw the handle of a brush!

Sec. 10. How can it well be said that "Man, as compared with even the creatures nearest to him, certainly is unique in long post-natal development, physical and mental." On referring to Dr. A. R. Wallace's *Eastern Archipelago* we shall find an account of the babyhood of a Mias, which shows a striking parallelism with the infancy of our own species.

The fact that an infant gorilla is very like a human child, but that the resemblance fades as both approach maturity is a most instructive fact, and admits of being generalized, proving that the animal series is not linear. The embryonic dog (not to speak of the apes) is vastly more like the earlier pre-natal stages of man than are the mature individuals. We may even remark that up to the age of adolescence the negro, the Australian black fellow, etc., seem quite equal to our own race, but afterwards fall more and more into the background.

We shall, perhaps, best understand the position of man with relation to the anthropoids if we consider him as the head of a distinct ascending series.

THE AUTHOR'S REPLY.

The discussion has interested me much. I am aware that I left abundant room for the additional suggestions, for I had confined myself most strictly to the topic announced, and condensed all to the utmost—not touching, for example, on the many past or present schemes of classification, genealogical or other, except in some reference to man's place in any scheme—and man was not brought into the paper until its close—in fact, it was the intellectual interest of the principles themselves that first prompted the essay, not a desire to seek and expound practical rules (which are not to be confounded with general principles) for tabulating the animal kingdom; indeed, this is not a matter of mere rules, but of the complete study of organisms.

Mr. Slater's valuable remarks are of the nature of *corrigenda*. In reply I would say that a linear arrangement of all animals is too obsolete to need disavowal, especially in a paper that deals with principles only, not tabulations. In regard to the word "quadrumana," it may be granted that it is not the best in the light of Anatomy; it remains as true as ever that the extremities of all the simian limbs are hand-like. As to squirrels, I grant that instead of the words "more deftly," it would have been clearer and more correct to say "as deftly in manipulating food." The last criticism by Mr. Slater seems to overlook the complete phrase used—"physical and mental"; also the long development of man, his mental development, under favourable circumstances, extending to old age.