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THE DESCENT OF MAN

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PART I.
THE DESCENT OR ORIGIN OF MAN.

CHAPTER I.

THE EVIDENCE OF THE DESCENT
OF MAN FROM SOME LOWER FORM.

Nature of the evidence bearing on the origin of man—Homologous structures in man and the lower animals—Miscellaneous points of correspondence—Development—Rudimentary structures, muscles, sense-organs, hair, bones, reproductive organs, etc.—The bearing of these three great classes of facts on the origin of man.

He who wishes to decide whether man is the modified descendant of some pre-existing form, would probably first enquire whether man varies, however slightly, in bodily structure and in mental faculties; and if so, whether the variations are transmitted to his offspring in accordance with the laws which prevail with the lower animals. Again, are the variations the result, as far as our ignorance permits us to judge, of the same general causes, and are they governed by the same general laws, as in the case of other organisms; for instance, by correlation, the inherited effects of use and disuse, etc.? Is man subject to similar malconformations, the result of arrested development, of reduplication of parts, etc., and does he display in any of his anomalies reversion to some former and ancient type of structure? It might also naturally be enquired whether man, like so many other animals, has given rise to varieties and sub-races, differing but slightly from

each other, or to races differing so much that they must be classed as doubtful species? How are such races distributed over the world; and how, when crossed, do they react on each other in the first and succeeding generations? And so with many other points.

The enquirer would next come to the important point, whether man tends to increase at so rapid a rate, as to lead to occasional severe struggles for existence; and consequently to beneficial variations, whether in body or mind, being preserved, and injurious ones eliminated. Do the races or species of men, whichever term may be applied, encroach on and replace one another, so that some finally become extinct? We shall see that all these questions, as indeed is obvious in respect to most of them, must be answered in the affirmative, in the same manner as with the lower animals. But the several considerations just referred to may be conveniently deferred for a time: and we will first see how far the bodily structure of man shews traces, more or less plain, of his descent from some lower form. In succeeding chapters the mental powers of man, in comparison with those of the lower animals, will be considered.

THE BODILY STRUCTURE OF MAN.

It is notorious that man is constructed on the same general type or model as other mammals. All the bones in his skeleton can be compared with corresponding bones in a monkey, bat, or seal. So it is with his muscles, nerves, blood-vessels and internal viscera. The brain, the most important of all the organs, follows the same law, as shewn by Huxley and other anatomists. Bischoff (1. 'Grosshirnwindungen des Menschen,' 1868, s. 96. The conclusions of this author, as well as those of Gratiolet and Aeby, concerning the brain, will be discussed by Prof. Huxley in the Appendix alluded to in the Preface to this edition.), who is a hostile witness, admits that every chief fissure and fold in the brain of man has its analogy in that of the orang; but he adds that at no period of development do their brains perfectly agree; nor could perfect agreement

be expected, for otherwise their mental powers would have been the same. Vulpian (2. 'Lec. sur la Phys.' 1866, page 890, as quoted by M. Dally, 'L'Ordre des Primates et le Transformisme,' 1868, page 29.), remarks: "Les differences reelles qui existent entre l'encephale de l'homme et celui des singes superieurs, sont bien minimales. Il ne faut pas se faire d'illusions a cet egard. L'homme est bien plus pres des singes anthropomorphes par les caracteres anatomiques de son cerveau que ceux-ci ne le sont non seulement des autres mammiferes, mais meme de certains quadrumanes, des guenons et des macaques." But it would be superfluous here to give further details on the correspondence between man and the higher mammals in the structure of the brain and all other parts of the body.

It may, however, be worth while to specify a few points, not directly or obviously connected with structure, by which this correspondence or relationship is well shewn.

Man is liable to receive from the lower animals, and to communicate to them, certain diseases, as hydrophobia, variola, the glanders, syphilis, cholera, herpes, etc. (3. Dr. W. Lauder Lindsay has treated this subject at some length in the 'Journal of Mental Science,' July 1871; and in the 'Edinburgh Veterinary Review,' July 1858.); and this fact proves the close similarity (4. A Reviewer has criticised ('British Quarterly Review,' Oct. 1st, 1871, page 472) what I have here said with much severity and contempt; but as I do not use the term identity, I cannot see that I am greatly in error. There appears to me a strong analogy between the same infection or contagion producing the same result, or one closely similar, in two distinct animals, and the testing of two distinct fluids by the same chemical reagent.) of their tissues and blood, both in minute structure and composition, far more plainly than does their comparison under the best microscope, or by the aid of the best chemical analysis. Monkeys are liable to many of the same non-contagious diseases as we are; thus Rengger (5. 'Naturgeschichte der Säugethiere von Paraguay,' 1830, s. 50.), who carefully observed for a long time the *Cebus Azarae* in its native land, found it liable to catarrh, with the usual symptoms, and which,

when often recurrent, led to consumption. These monkeys suffered also from apoplexy, inflammation of the bowels, and cataract in the eye. The younger ones when shedding their milk-teeth often died from fever. Medicines produced the same effect on them as on us. Many kinds of monkeys have a strong taste for tea, coffee, and spiritous liquors: they will also, as I have myself seen, smoke tobacco with pleasure. (6. The same tastes are common to some animals much lower in the scale. Mr. A. Nichols informs me that he kept in Queensland, in Australia, three individuals of the *Phaseolarctus cinereus*; and that, without having been taught in any way, they acquired a strong taste for rum, and for smoking tobacco.) Brehm asserts that the natives of north-eastern Africa catch the wild baboons by exposing vessels with strong beer, by which they are made drunk. He has seen some of these animals, which he kept in confinement, in this state; and he gives a laughable account of their behaviour and strange grimaces. On the following morning they were very cross and dismal; they held their aching heads with both hands, and wore a most pitiable expression: when beer or wine was offered them, they turned away with disgust, but relished the juice of lemons. (7. Brehm, 'Thierleben,' B. i. 1864, s. 75, 86. On the *Ateles*, s. 105. For other analogous statements, see s. 25, 107.) An American monkey, an *Ateles*, after getting drunk on brandy, would never touch it again, and thus was wiser than many men. These trifling facts prove how similar the nerves of taste must be in monkeys and man, and how similarly their whole nervous system is affected.

Man is infested with internal parasites, sometimes causing fatal effects; and is plagued by external parasites, all of which belong to the same genera or families as those infesting other mammals, and in the case of scabies to the same species. (8. Dr. W. Lauder Lindsay, 'Edinburgh Vet. Review,' July 1858, page 13.) Man is subject, like other mammals, birds, and even insects (9. With respect to insects see Dr. Laycock, "On a General Law of Vital Periodicity," 'British Association,' 1842. Dr. Macculloch, 'Silliman's North American Journal of Science,' vol. XVII. page 305, has seen a

dog suffering from tertian ague. Hereafter I shall return to this subject.), to that mysterious law, which causes certain normal processes, such as gestation, as well as the maturation and duration of various diseases, to follow lunar periods. His wounds are repaired by the same process of healing; and the stumps left after the amputation of his limbs, especially during an early embryonic period, occasionally possess some power of regeneration, as in the lowest animals. (10. I have given the evidence on this head in my 'Variation of Animals and Plants under Domestication,' vol. ii. page 15, and more could be added.)

The whole process of that most important function, the reproduction of the species, is strikingly the same in all mammals, from the first act of courtship by the male (11. *Mares e diversis generibus Quadrumanorum sine dubio dignoscunt feminas humanas a maribus. Primum, credo, odoratu, postea aspectu.* Mr. Youatt, qui diu in Hortis Zoologicis (Bestiariis) medicus animalium erat, vir in rebus observandis cautus et sagax, hoc mihi certissime probavit, et curatores ejusdem loci et alii e ministris confirmaverunt. Sir Andrew Smith et Brehm notabant idem in Cynocephalo. Illustrissimus Cuvier etiam narrat multa de hac re, qua ut opinor, nihil turpius potest indicari inter omnia hominibus et Quadrumanis communia. Narrat enim Cynocephalum quendam in furorem incidere aspectu feminarum aliquare, sed nequaquam accendi tanto furore ab omnibus. Semper eligebat juniores, et dignoscebat in turba, et advocabat voce gestuque.), to the birth and nurturing of the young. Monkeys are born in almost as helpless a condition as our own infants; and in certain genera the young differ fully as much in appearance from the adults, as do our children from their full-grown parents. (12. This remark is made with respect to Cynocephalus and the anthropomorphous apes by Geoffroy Saint-Hilaire and F. Cuvier, 'Histoire Nat. des Mammiferes,' tom. i. 1824.) It has been urged by some writers, as an important distinction, that with man the young arrive at maturity at a much later age than with any other animal: but if we look to the races of mankind which inhabit tropical countries the difference is not great, for the orang is believed not to

be adult till the age of from ten to fifteen years. (13. Huxley, 'Man's Place in Nature,' 1863, p. 34.) Man differs from woman in size, bodily strength, hairiness, etc., as well as in mind, in the same manner as do the two sexes of many mammals. So that the correspondence in general structure, in the minute structure of the tissues, in chemical composition and in constitution, between man and the higher animals, especially the anthropomorphous apes, is extremely close.

EMBRYONIC DEVELOPMENT.

[Fig. 1. Shows a human embryo, from Ecker, and a dog embryo, from Bischoff. Labelled in each are:

- a. Fore-brain, cerebral hemispheres, etc.
- b. Mid-brain, corpora quadrigemina.
- c. Hind-brain, cerebellum, medulla oblongata.
- d. Eye.
- e. Ear.
- f. First visceral arch.
- g. Second visceral arch.
- H. Vertebral columns and muscles in process of development.
- i. Anterior extremities.
- K. Posterior extremities.
- L. Tail or os coccyx.]

Man is developed from an ovule, about the 125th of an inch in diameter, which differs in no respect from the ovules of other animals. The embryo itself at a very early period can hardly be distinguished from that of other members of the vertebrate kingdom. At this period the arteries run in arch-like branches, as if to carry the blood to branchiae which are not present in the higher Vertebrata, though the slits on the sides of the neck still remain (see f, g, fig. 1), marking their former position. At a somewhat

later period, when the extremities are developed, “the feet of lizards and mammals,” as the illustrious Von Baer remarks, “the wings and feet of birds, no less than the hands and feet of man, all arise from the same fundamental form.” It is, says Prof. Huxley (14. ‘Man’s Place in Nature,’ 1863, p. 67.), “quite in the later stages of development that the young human being presents marked differences from the young ape, while the latter departs as much from the dog in its developments, as the man does. Startling as this last assertion may appear to be, it is demonstrably true.”

As some of my readers may never have seen a drawing of an embryo, I have given one of man and another of a dog, at about the same early stage of development, carefully copied from two works of undoubted accuracy. (15. The human embryo (upper fig.) is from Ecker, ‘Icones Phys.’ 1851-1859, tab. xxx. fig. 2. This embryo was ten lines in length, so that the drawing is much magnified. The embryo of the dog is from Bischoff, ‘Entwicklungsgeschichte des Hunde-Eies,’ 1845, tab. xi. fig. 42B. This drawing is five times magnified, the embryo being twenty-five days old. The internal viscera have been omitted, and the uterine appendages in both drawings removed. I was directed to these figures by Prof. Huxley, from whose work, ‘Man’s Place in Nature,’ the idea of giving them was taken. Haeckel has also given analogous drawings in his ‘Schopfungsgeschichte.’)

After the foregoing statements made by such high authorities, it would be superfluous on my part to give a number of borrowed details, shewing that the embryo of man closely resembles that of other mammals. It may, however, be added, that the human embryo likewise resembles certain low forms when adult in various points of structure. For instance, the heart at first exists as a simple pulsating vessel; the excreta are voided through a cloacal passage; and the os coccyx projects like a true tail, “extending considerably beyond the rudimentary legs.” (16. Prof. Wyman in ‘Proceedings of the American Academy of Sciences,’ vol. iv. 1860, p. 17.) In the embryos of all air-breathing vertebrates, certain glands, called the corpora Wolffiana, correspond with, and act like the kidneys of

mature fishes. (17. Owen, 'Anatomy of Vertebrates,' vol. i. p. 533.) Even at a later embryonic period, some striking resemblances between man and the lower animals may be observed. Bischoff says that "the convolutions of the brain in a human foetus at the end of the seventh month reach about the same stage of development as in a baboon when adult." (18. 'Die Grosshirnwindungen des Menschen,' 1868, s. 95.) The great toe, as Professor Owen remarks (19. 'Anatomy of Vertebrates,' vol. ii. p. 553.), "which forms the fulcrum when standing or walking, is perhaps the most characteristic peculiarity in the human structure;" but in an embryo, about an inch in length, Prof. Wyman (20. 'Proc. Soc. Nat. Hist.' Boston, 1863, vol. ix. p. 185.) found "that the great toe was shorter than the others; and, instead of being parallel to them, projected at an angle from the side of the foot, thus corresponding with the permanent condition of this part in the quadrumana." I will conclude with a quotation from Huxley (21. 'Man's Place in Nature,' p. 65.) who after asking, does man originate in a different way from a dog, bird, frog or fish? says, "the reply is not doubtful for a moment; without question, the mode of origin, and the early stages of the development of man, are identical with those of the animals immediately below him in the scale: without a doubt in these respects, he is far nearer to apes than the apes are to the dog."

RUDIMENTS.

This subject, though not intrinsically more important than the two last, will for several reasons be treated here more fully. (22. I had written a rough copy of this chapter before reading a valuable paper, "Caratteri rudimentali in ordine all' origine dell' uomo" ('Annuario della Soc. d. Naturalisti,' Modena, 1867, p. 81), by G. Canestrini, to which paper I am considerably indebted. Haeckel has given admirable discussions on this whole subject, under the title of Dysteleology, in his 'Generelle Morphologie' and 'Schopfungsgeschichte.') Not one of the higher animals can be named which does not bear some part in a rudimentary

condition; and man forms no exception to the rule. Rudimentary organs must be distinguished from those that are nascent; though in some cases the distinction is not easy. The former are either absolutely useless, such as the mammae of male quadrupeds, or the incisor teeth of ruminants which never cut through the gums; or they are of such slight service to their present possessors, that we can hardly suppose that they were developed under the conditions which now exist. Organs in this latter state are not strictly rudimentary, but they are tending in this direction. Nascent organs, on the other hand, though not fully developed, are of high service to their possessors, and are capable of further development. Rudimentary organs are eminently variable; and this is partly intelligible, as they are useless, or nearly useless, and consequently are no longer subjected to natural selection. They often become wholly suppressed. When this occurs, they are nevertheless liable to occasional reappearance through reversion—a circumstance well worthy of attention.

The chief agents in causing organs to become rudimentary seem to have been disuse at that period of life when the organ is chiefly used (and this is generally during maturity), and also inheritance at a corresponding period of life. The term “disuse” does not relate merely to the lessened action of muscles, but includes a diminished flow of blood to a part or organ, from being subjected to fewer alternations of pressure, or from becoming in any way less habitually active. Rudiments, however, may occur in one sex of those parts which are normally present in the other sex; and such rudiments, as we shall hereafter see, have often originated in a way distinct from those here referred to. In some cases, organs have been reduced by means of natural selection, from having become injurious to the species under changed habits of life. The process of reduction is probably often aided through the two principles of compensation and economy of growth; but the later stages of reduction, after disuse has done all that can fairly be attributed to it, and when the saving to be effected by the economy of growth would be very small (23. Some good criticisms on this subject have been given by Messrs. Murie and