

lobule; but a rudiment of it is found in the gorilla, and it is often absent in the negro.

The nictitating membrane, or third eyelid, with its accessory muscles and other appendages, is well developed in birds, reptiles, amphibians, and some fishes. It is fairly developed in the two lower divisions of the mammalian series; but in man, the *quadrumano*, and most other mammals it exists, as all anatomists admit, as a mere rudiment, called the semilunar fold. The hairs scattered over man's body are, beyond doubt, the rudiments of the uniform hairy coat of the lower animals; it is known that fine, short, and pale-colored hairs on the limbs and other parts of the body, sometimes become developed into thick-set, long, and rather coarse dark hairs, when abnormally nourished near old-standing inflamed surfaces. In man, the vermiform appendage of the caecum, or blind intestine, is a mere rudiment, though in the orang long and convoluted. It is not only useless to man, but is sometimes the cause of his death. There are a vast number of muscular variations in man,—abnormal developments,—which resemble normal structures in the lower animals; those resembling those regularly present in the *quadrumana* are too numerous to be here specified. In a single male subject no less than seven muscular variations were observed, all of which plainly represented muscles proper to various kinds of apes. It is quite incredible that a man should through mere accident abnormally resemble certain apes in no less than seven of their muscles, if there had been no genetic connection between them. Community of descent is clearly indicated by the foregoing facts; to take any other view, is to admit that our own structure, and that of all the animals around us, is a mere snare laid to entrap our judgment.

THE HUMAN TAIL.—According to a popular impression, the absence of a tail is eminently distinctive of man; but as those apes which come nearest to him are likewise destitute of that organ, its disappearance does not relate exclusively to man. A tail, though not externally visible, is, however, really present in man and the anthropomorphic apes, and is constructed on precisely the same pattern in both; and, as we have seen, it is quite prominent in man's embryonic development, and even after birth, in certain cases, a small external rudiment of a tail has been found.

BRAIN OF MAN AND LOWER ANIMALS.—Every chief fold and fissure in the brain of man has its analogy in that of the orang, admits Bischoff, a hostile witness. "The brains of man," said he, "the orang, the chimpanzee, the gorilla, come very close to one another."

So far as cerebral structure goes, it is clear that man differs less from the chimpanzee or the orang, than these do even from the monkeys; and that the difference between the brain of man and of the chimpanzee is almost insignificant, when compared with that between the chimpanzee brain and that of a lemur (one of the lower *quadrumana*). There is a fundamental agreement in the development of the brain in men and apes. The brain of the human fetus, at the fifth month, may correctly be said to be the brain of an ape.

The brain of man, at an early period in its fetal development, is only a simple fold of nervous matter, with difficulty distinguishable into three parts, while a little tail-like prolongation towards the hinder parts, and which had been the first to appear, is the only representation of a spinal marrow. Now, in this state, it perfectly resembles the brain of an adult fish, thus assuming *in transitu* the form that in the fish is permanent. In a short time, however, the structure is become more complex, the parts more distinct, the spinal marrow better marked; it is now the brain of a reptile. The change continues; by a singular motion certain parts which had hitherto appeared on the upper surface now pass toward the lower; the former is their permanent situation in fishes and reptiles, the latter in birds and mammalia. The complication of the organ increases; ventricles are formed, which do not exist in fishes, reptiles, or birds; curiously organized parts, such as the *corpora striata*, are added; it is now the brain of the mammalia. Its last and final stage alone seems wanting, that which will render it the brain of man. And this change in time takes place.

MENTAL POWERS OF MAN AND THE LOWER ANIMALS.—The cranial capacity of the modern Englishman surpasses that of the aboriginal non-Aryan Hindia by a difference of sixty-eight cubic inches, while between this Hindu skull and the skull of the gorilla the difference in capacity, is but eleven cubic inches! That is to say, the difference in volume of brain between the highest and the lowest man is at least six times as great as the difference between the lowest man and the highest ape. Contrast the intelligence of a Newton or a Herschell with that of the Australian who is able to count only up to five or six, and cannot tell us the number of fingers on his two hands, since so large a number as ten excites in him only an indefinite impression of plurality, or with that of the Damaras who find it difficult to calculate beyond four! Are not the latter much nearer to the higher apes than they are to the enlightened Tenton or Briton? We must also admit that there is a much wider interval in mental power between one of the lowest fishes and one of the higher apes, than between an ape and man; yet this interval is filled up by numberless gradations.

There is no fundamental difference between man and the higher mammals in their mental faculties. The difference in mind between them is one of degree and not of kind. As man possesses the same senses as the lower animals, his fundamental intuitions must be the same. Man has also instincts in common with animals, as that of self-preservation, sexual love, the love of the mother for her new-born offspring, the desire possessed by the latter to suck, and so forth. The lower animals, like man, manifestly feel pleasure and pain, happiness and misery, and are excited by the same emotions as ourselves. Terror acts with them as with us, causing the muscles to tremble, the heart to palpitate, the sphincters to be relaxed, and the hair to stand on end. Courage and timidity are ex-

tremely variable qualities in individuals of the same species, as in case of dogs. Animals are liable to furious rage, and easily show it. Many anecdotes are published of the long-delayed and artful revenge of many animals. Maternal affection is exhibited in the most trifling details. Orphan monkeys are adopted and carefully guarded by the other monkeys, male and female.

Most of the more complex emotions are common to the higher animals and ourselves. The jealousy exhibited by dogs and monkeys shows that they not only love, but have desire to be loved. Animals manifestly feel emulation. They love approbation or praise, and a dog carrying his master's basket exhibits in a high degree self-complacency or pride. A dog also feels shame, and something, also, very like modesty when begging too often for food. They also often display magnanimity to smaller dogs. Animals enjoy excitement, and suffer from *ennui*; all animals feel wonder, and many exhibit curiosity. Imitation of others is also strongly marked in man and animal; while the power of attention is clearly manifest in animals, as when a cat watches by a hole for its prey. It is almost superfluous to state that animals have excellent memories for persons and places; and as dogs, cats, horses, and probably all the higher animals, even birds, have vivid dreams, we must admit that they possess some power of imagination.

Animals also possess rudimentary moral qualities. Many kinds are social, even distinct species often living together. Many animals, likewise, sympathize with each other's distress or danger; and besides love and sympathy, animals exhibit other qualities connected with the social instincts, which in us would be called moral: Agassiz was of the opinion that dogs possess something very like a conscience.

Only a few persons now dispute that animals possess some power of reasoning. They may constantly be seen to pause, deliberate, and resolve. It is a significant fact, that the more the habits of any particular animal are studied by a naturalist, the more he attributes to reason and the less to unlearned instincts. Some animals extremely low in the scale apparently display a certain amount of reason. It is difficult to understand how anybody who has ever kept a dog or seen an elephant, can have any doubts of an animal's power of performing the essential processes of reasoning. Animals also are capable of progressive improvement. Our domestic dogs are descended from wolves and jackals; they have certainly progressed in certain moral qualities, such as in affection, trustworthiness, temper, and probably in general intelligence. It has been often said that no animal uses a tool; but the chimpanzee in a state of nature cracks a native fruit, somewhat like a walnut, with a stone. Roget easily taught an American monkey thus to break open hard palm-nuts, and afterwards of its own accord, it used stones to open other kinds of nuts, as well as boxes. A young orang has been seen to put a stick into a crevice, slip his hand to the other end, and use it in the proper manner as a lever. The tamed elephants in India are well known to break off branches of trees and drive away flies with them; and the same act has been observed in an elephant in a state of nature. Sticks and stones are, likewise, used as weapons by monkeys, baboons, etc. The sense of beauty is not peculiar to man. The pleasure given by certain colors, forms, and sounds, is shared with man by the lower animals. Obviously no animal would be capable of admiring the heavens at night, a beautiful landscape, or refined music; but neither could they be enjoyed by barbarians or by uneducated persons. There is some approach, even, to a feeling of religious devotion in the deep love of a dog for his master, associated with complete submission, some fear, and perhaps other feelings. Professor Blumenbach goes so far as to maintain that a dog looks on his master as a god.

It is palpably manifest that man and the higher animals, especially the *quadrumana*, have some instincts in common; that all have the same senses, intuitions, and sensations,—similar passions, affections, and emotions, even the more complex ones, such as jealousy, suspicion, emulation, gratitude, and magnanimity; that they practice deceit and are revengeful; that they are susceptible to ridicule, and have even a sense of humor; that they feel wonder and curiosity, that they possess the same faculties of imitation, attention, deliberation, choice, memory, imagination, the association of ideas, and reason, though in very different degrees. The individuals of the same species graduate in intellect from absolute imbecility to high excellence. They are also liable to insanity, though far less often than in the case of man.

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This faith in Christ, this system which builds on the Christ, call it by what name you will, call it Protestantism, call it Romanism, call it Christianity, is passing away. * * * It has lost its hold on the cultivated classes of society. The chief men of letters, the widest scholars, the recognized leaders in science, the chiefs of reform, have quietly dropped it. The men who occupy to-day the highest seats in philosophy reason about it, classify it, put it where it belongs, render it the honor that belongs to it as a phenomenon in history and a significant phase of the world's thought; but they do not submit their minds to it. * * * They look elsewhere for the light that is to be their guidance, for the laws that is to be their strength.—O. B. Frothingham.