

THE
PHILOSOPHY
OF
NATURAL HISTORY,

BY
WILLIAM SMELLIE,
MEMBER OF THE ANTIQUARIAN AND ROYAL SOCIETIES OF EDINBURGH.

WITH AN
INTRODUCTION
AND
VARIOUS ADDITIONS AND ALTERATIONS,
INTENDED TO ADAPT IT TO
THE PRESENT STATE OF KNOWLEDGE.

BY JOHN WARE, M. D.

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They are easily tamed, and become attached to those who feed them. Their head somewhat resembles that of the dog. They live together in large herds or families, and are valuable as objects of trade on account of their skins and oil.

IV. *Rodentia*, the Gnawers, are distinguished by the possession of two large incisive teeth in the centre of each jaw, and by the absence of canine teeth. There is a wide space between the incisors and the molares, which last are broad and evidently calculated for the mastication of vegetable food. This arrangement of their teeth remarkably qualifies them for gnawing, and enables them to penetrate very solid substances; and frequently they feed upon woody fibres and the bark of roots and trees. There is an additional circumstance in the structure of their incisive teeth, which adapts them to the use for which they are intended. They are furnished with enamel only upon their front surface, so that the back part, being merely bone, is by gnawing worn away faster than that in front, and of course the front edge is kept sharp and fit for cutting. To remedy the loss of substance which necessarily takes place, there is a provision by which a constant growth takes place from the root; so that if one of these teeth is lost by accident, that which corresponds to it in the opposite jaw, being no longer worn away by use, increases to a great length. Their feet are furnished with toes and nails, and their hind legs are stronger and longer than their fore legs, so that frequently they leap better than they run. Of this order, among others, are the beaver, the squirrel, the dormouse, the marmot, the hamster, the mouse and rat, the jerboa, the various species of hare and rabbit, and the porcupine.

The Beavers (*Castor fiber*) have been long celebrated for the value of their skins as an article of commerce, and for the wonderful sagacity and forethought which they exhibit in the construction of their dwellings. Their cutting teeth are very strong and sharp, and they are able, with them, to fell lofty trees.* They are possessed of a large, long, and broad

* In felling a tree, several beavers are engaged at once around its trunk, and they gnaw it carefully in such a part of the circumference, as will cause it to fall in a direction convenient for their purposes. An observer of them relates, that he witnessed three beavers occupied in cutting round a tree; that, after a certain period, one of them left the two others, and went to a considerable distance, where he quietly watched their operations; and that, when the trunk was nearly divided, so that the weight of the branches was sufficient to bring down the tree, and the inclination was obvious on looking at its summit, he gave a smart stroke with his tail upon the water, as a signal to his companions, who immediately ran off with great expedition to escape the impending danger.—*Long's Expedition.*

tail, almost oval in its shape, and covered with scales. It has been supposed that they used this as a kind of trowel, to lay on the mud and clay of which their dikes are partly built. But it has also been sometimes asserted that the tail was only of use as an instrument for swimming. They are aquatic animals, and construct themselves habitations upon waters which are sufficiently deep never to be frozen to the bottom, preferring running streams upon which the trees they cut can float down to whatever spot they have chosen. Here they build a dam for the purpose of preserving the water always of a convenient depth, and construct their huts or cabins. Of their skill, sagacity, and intelligence, a more particular account will be given hereafter. But, although so wonderful in these respects when united in a society, they are, for the most part, helpless and timorous animals when living separately; a beaver, although pretty large and strong, and armed with powerful teeth, if he meets a man alone upon the shore, sets himself down upon his haunches and cries like a child.

The Jerboa is a little animal of about the size of a rat, with a tail ten inches long, and legs of very unequal size, the hind legs being six inches, whilst the fore legs are but one inch in length. It cannot of course use them all at once without great difficulty, and moves principally by leaps, which are sometimes of five or six feet in extent, or by a hopping motion on its two hind legs, which resembles that of birds. Its fore legs it employs only as hands for the purpose of holding its food. It has been asserted that the ancient coney, mentioned in the Old Testament, was the jerboa, which inhabits Palestine to this day.

There is an American species called the Canadian Jerboa, which does not exceed two and a half or three inches in length. It has the same general characteristics as the animal before mentioned, and even exceeds it in the length of its leaps, which extend, if we may credit the accounts given of them, to the enormous distance of three or four yards, or nearly fifty times the length of its body.

The Hamster is an animal larger and thicker than the Jerboa, and nearly allied to the common rat. It is distinguished by cheek pouches, which are capable of containing a very large quantity of food. When empty, they are so contracted as not to appear externally visible, but when filled, they are stretched to an enormous extent, and are capable of containing a gill of grain. A hamster has been caught and dissect-

ed, that had stored in its pouches a quantity of beans, which, when taken out and laid in a heap, appeared to exceed the bulk of its whole body. The Canada rat is almost equally remarkable for the size of these receptacles.

Of the Alpine Marmot some account will be given hereafter. There is another species, however, which deserves a short notice. This is the Louisiana Marmot, usually known by the name of the prairie dog, from a slight resemblance of its cry to the barking of a small dog. It is a sprightly and interesting little animal, inhabiting the country around the Missouri and Arkansas rivers, and is found in villages from a few acres to several miles in extent, which are called by the hunters, prairie dog villages. It lives in burrows, the entrance to which is in the summit or side of a small mound of earth, somewhat elevated, but rarely to the height of eighteen inches. This mound, particularly around the entrance, is trodden down like a pathway. They delight, in pleasant weather, to sport about the entrance of their burrows, and five or six individuals may be seen sitting on a single mound. When alarmed, if the object of terror be near at hand, they retreat immediately into their holes; but if at a distance, they remain for some time barking and flourishing their tails, or sitting erect to reconnoitre.

The Porcupine is covered with hard and sharp spines, which afford it a natural protection against the attacks of other animals. In this respect it resembles the hedgehog, and were external appearance alone regarded, would be arranged with it; but both its structure and its habits of life are different, and it is obviously intended for subsisting upon vegetable food.

V. *Edentata*, Toothless animals, so called from the absence of the incisive, and sometimes also of the canine and grinding teeth. Their toes are terminated by very large, thick, and strong claws, which approach in some degree to the nature of hoofs. The animals of this order are likewise remarkable for a great degree of torpor, listlessness, and indisposition to motion; but some more than others. The sloth, the ant-eater, and armadillo, are among them; and of each of these there are several species.

The Three-toed Sloth is an animal whose very aspect is painful and disgusting from its excessive ugliness and deformity. The expression of its countenance and its whole attitude, indeed, convey to the beholder the impression, that its very existence is a burden. It is about the size of a cat. Its

necessary to the preservation of animal life than food itself; for, in numberless instances, animals can live, not for days or weeks, but for months, without supplies of nourishment. None of them, however, are capable of existing nearly so long without having some communication with the air.

With regard to the snails that live in fresh waters, or in the ocean, the species of which are numerous, their manner of respiring is singular. All of them have an aperture on the right side of the neck, through which they respire. They are frequently observed to straiten the orifice of this aperture, to stretch it out in the form of an oblong tube, and, in this state, they rise to the surface, in order to expel the former air, and take in a new supply.

But, though air seems to be an indispensable principle of animal life, yet many animals can live longer without the use of this element, or at least with smaller quantities of it, than others. Those animals which lie torpid during the winter, as the hedgehog, the dormouse, the marmot, &c., though perhaps not entirely deprived of all communication with the air, exist, with only an occasional and interrupted respiration till the heat of the spring restores their wonted powers of life, when a full respiration becomes again equally necessary as before their torpor commenced. The toad, like all the frog kind, is torpid in winter. At the approach of winter, it retires to the hollow root of a tree, to the cleft of a rock, and sometimes to the bottom of a ditch, or pond, where it remains for months in a state of seeming insensibility. In this last situation it can have very little communication with the air. But still the principle of life is continued, and the animal revives in the spring. What is more wonderful, toads have been found, in a hundred places on the globe, inclosed in the heart of solid rocks, and in the bodies of trees, where they must probably have existed for centuries, without any apparent access either to nourishment or air; and yet they were alive and vigorous.

These facts are supported by authorities so numerous and so respectable, that it is unnecessary to quote them. Many abortive attempts have been made to account for an animal's growing and living very long in the situations above described, without the possibility of receiving nourishment or air; especially as, like all other animals, when put into an exhausted receiver, it is soon destroyed. No satisfactory explanation however, has ever been offered; and solitary exceptions like these do not invalidate the general principle, that the respi-

or suffer a temporary death. These annual changes in trees, &c., have some resemblance to those of animals, which produce at certain stated seasons only.

The distribution of life to an immensity of successive individuals, seems to be another intention of Nature in changing forms, and in the dissolution of her productions. Were the existence of individuals perpetual, or were it prolonged for ten times the periods now established, life would be denied to myriads of animated beings, which enjoy their present limited portion of happiness.

CHAPTER VIII.

OF THE HABITATIONS OF ANIMALS.

MANY animals, beside those of the human species, have the faculty of constructing proper habitations for concealing themselves, for defending themselves against the attacks of their enemies, for sheltering and cherishing their young, and for protecting them from the injuries of the weather. All those of the same species, when not restrained by accidental causes, uniformly build in the same style, and use the same materials. From this general rule man is to be excepted. Possessed of superior faculties and understanding, he can build in any style, and employ such materials as his taste, his fancy, or the purposes for which the fabric is intended, shall direct him. A cottage and a palace are equally within the reach of his powers. In treating of this subject, we mean not to trace the progress of human architecture, which, in the earlier stages of society, is extremely rude, but to confine ourselves to that of the inferior tribes of animated beings.

With regard to Quadrupeds, many of them employ no kind of architecture, but live continually, and bring forth their young, in the open air. When not under the immediate protection of man, these species, in rough or stormy weather, shelter themselves among trees or bushes, retire under the coverture of projecting rocks, or the sides of hills opposite to those from which the wind proceeds. Beside these arts of defense, to which they are prompted by instinct and experience, nature furnishes them, during the winter months, with a

double portion of long hair, which protects them from cold, and other assaults of the weather.

Of the quadrupeds that make or choose habitations for themselves, some dig holes in the earth, some take refuge in the cavities of decayed trees, and in the clefts of rocks, and some actually construct cabins, or houses. But the artifices they employ, the materials they use, and the situations they select, are so various and so numerous, that our plan necessarily limits us to a few of the more curious examples.

The Alpine Marmot is a quadruped about sixteen inches in length, and has a short tail. In figure, the marmots have some resemblance both to the rat and to the bear. When tamed, they eat everything presented to them, as flesh, bread, fruit, roots, pot-herbs, insects, &c. They delight in the regions of frost and of snow, and are only to be found on the tops of the highest mountains. These animals remain in a torpid state during winter. About the end of September, or the beginning of October, they retire into their holes, and never come abroad again till the beginning of April. Their retreats are formed with much art and precaution. With their feet and claws, which are admirably adapted to the purpose, they dig the earth with amazing quickness, and throw it behind them. They do not make a simple hole, or a straight or winding tube, but a kind of gallery in the form of a Y, each branch of which has an aperture, and both terminate in a capacious apartment. As the whole operation is performed on the declivity of a mountain, this innermost apartment alone is horizontal. Both branches of the Y are inclined. One of the branches descends under the apartment, and follows the declivity of the mountain. This branch is a kind of aqueduct, and receives and carries off the filth of their habitations; and the other, which rises above the principal apartment, is used for coming in and going out. The place of their abode is well lined with moss and hay, of which they lay up great store during the summer. They are social animals. Several of them live together, and work in common when forming their habitations. Thither they retire during rain, or upon the approach of danger. One of them stands sentinel upon a rock, while the others gambol upon the grass, or are employed in cutting it, in order to make hay. If the sentinel perceives a man, an eagle, a dog, or other dangerous animal, he alarms his companions by a loud whistle, and is himself the last that enters the hole. They continue torpid during the winter, and as if they foresaw that they would then have no occasion for

victuals, they lay up no provisions in their apartments. But when they feel the first approaches of the sleeping season, they shut up both passages to their habitation; and this operation they perform with such labor and solidity, that it is more easy to dig the earth anywhere else, than in such parts as they have thus fortified. At this time they are very fat, weighing sometimes twenty pounds. They continue to be plump for three months; but afterwards they gradually decline, and, at the end of winter, they are extremely emaciated. When seized in their retreats, they appear rolled up in the form of a ball, and covered with hay. In this state they are so torpid, that they may be killed without seeming to feel pain. The hunters select the fattest for eating, and keep the young ones for taming. Like the dormice, and all the other animals which sleep during winter, the marmots are revived by a gradual and gentle heat; and it is remarkable, that those which are fed in houses, and kept warm, never become torpid, but are equally active and lively during the whole year.

The beaver is about three feet in length, and its tail, which is of an oval figure, and covered with scales, is eleven inches long. He uses his tail as a rudder to direct his course in the water. In places much frequented by man, the beavers neither associate nor build habitations. But in the northern regions of both continents, they assemble in the month of June or July, for the purpose of uniting into society, and of building a city. From all quarters they arrive in numbers, and soon form a troop of two or three hundred. The operations and architecture of the beavers are so well described by the Count de Buffon, that we shall lay it before our readers nearly in his own words. The place of rendezvous, he remarks, is generally the situation fixed upon for their establishment, and it is always on the banks of waters. If the waters be flat, and seldom rise above their ordinary level, as in lakes, the beavers make no bank or dam. But in rivers or brooks, where the water is subject to risings and fallings, they build a bank, which traverses the river from one side to the other, like a sluice, and is often from eighty to a hundred feet long, by ten or twelve broad at the base. This pile, for animals of so small a size, (the largest beavers weighing only fifty or sixty pounds) appears to be enormous, and presupposes an incredible labor. But the solidity with which the work is constructed, is still more astonishing than its magnitude. The part of the river where they erect this bank is generally shallow. If they find on the margin a large tree,

villagés, but content themselves with digging holes in the earth. Like men under the oppression of despotic governments, the spirit of the European beavers is depressed, and their genius is extinguished by terror, and by a perpetual and necessary attention to individual safety. The northern parts of Europe are now so populous, and the animals there are so perpetually hunted for the sake of their furs, that they have no opportunity of associating; of course, those wonderful marks of their sagacity, which they exhibit in the remote and uninhabited regions of North America, are no longer to be found. The society of beavers is a society of peace and of affection. They never quarrel or injure one another, but live together in different numbers, according to the dimensions of particular cabins, in the most perfect harmony. The principle of their union is neither monarchical nor despotic; for the inhabitants of the different cabins, as well as those of the whole village, seem to acknowledge no chief or leader whatever. Their association presents to our observation a model of a pure and perfect republic, the only basis of which is mutual and unequivocal attachment. They have no law but the law of love and of parental affection. Humanity prompts us to wish that it were possible to establish republics of this kind among mankind. But the dispositions of men have little affinity to those of the beavers.

The hamster, or German marmot, and some other quadrupeds of this kind, live in society, and assist each other in digging and rendering commodious their subterraneous habitations. The operations of the marmots have already been described; and the nature of their society, as they continue during the winter in a torpid state, is either less known, or does not excite so much admiration, as that of the beavers.

Pairing birds, in some measure may be considered as forming proper societies; because, in general, the males and females mutually assist each other in building nests and feeding their young. But this society, except in the eagle tribes, commonly continues no longer than their mutual offspring are fully able to provide for themselves. None of the feathered tribes, as far as we know, unite in bodies, in order to carry on any operation common to the whole.

Neither do we learn from history that fishes ever associate for the purpose of executing any common operation. Many of them, as herrings, salmon, &c., assemble in multitudes at particular seasons of the year; but this association, to which they are impelled by instinct, has no common object; for