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THE
PHILOSOPHY
OF
ZOOLOGY;

OR
A GENERAL VIEW OF THE
STRUCTURE, FUNCTIONS, AND CLASSIFICATION
OF ANIMALS.

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Vertebral Animals with cold blood.

The cold-blooded vertebral animals, and indeed those belonging to the remaining divisions of the system, have their temperature, in a great measure, regulated by external circumstances. The skin is either naked, or protected by scales, and never exhibits either hair or feathers. In all the tribes, the brain does not fill entirely the cavity of the skull destined for its reception. Organs of sight and hearing, more or less perfectly developed, may be detected. The circulating system is not so perfect as in the warm-blooded classes, as there is always some deficiency either in the systemic or pulmonic vessels. This condition of the circulating vessels gives rise to the following division into Reptiles and Fishes.

REPTILES,

Furnished with a systemic heart.

The skin of reptiles is either naked, or fortified with scales or plates. Among many of the tribes it is periodically renewed. The cuticular secretions are few in number; and they seldom serve to lubricate the skin.

The bones, unless in the larger kinds, scarcely ever attain the same degree of firmness as those of quadrupeds and birds. Their number and connection vary exceedingly in the different tribes. The organs of motion are fit to perform almost every kind of progression. Some are found with two or four feet, either divided or palmated, and fitted for walking, climbing, or swimming. Others move by what is peculiarly termed a serpentine motion. Many species inhabit the land, and not a few live in the water. To fit them for residing in the latter element, some of the groups, wanting feet, have their bodies compressed behind, while others are furnished with fins, destitute, however, of carti-

laminous, or osseous filaments, for their support, as in fishes. Their teeth, in general, are fitted for retaining their food, rather than for masticating, and the gullet is usually dilatable. The food, in a few genera, is derived from the vegetable kingdom, but, in the greater number, animal food is exclusively employed. A considerable quantity is consumed at a time, but the intervals between the meals are remote.

The circulation of this group may be considered as imperfect, since a part only of the blood is aerated, which issues from the heart, and that portion, instead of proceeding directly to the different organs, is again mixed with the circulating fluid. The aerating organs consist, in general, of lungs situate in the common cavity of the abdomen. There is an imperfect larynx at the commencement of the trachea, incapable of producing a distinct voice. The lobes of the lungs are of unequal size, and the cells are of much larger dimensions than in the warm-blooded animals.

The kidneys are always present, either united into one mass, or variously subdivided. The ureters either pour their contents into a bladder of urine, which empties itself into the cloaca, or they terminate directly in the cloaca, the urine passing into a lateral pouch until voided. The urine itself varies much in quality and appearance in the different tribes. In some it is pure uric acid, in others very diluted urea.

Although reptiles can secrete a limited quantity of heat or cold, for their preservation in extraordinary circumstances, they usually remain nearly of the same temperature with the surrounding medium. They are remarkable, however, for the facility with which they become torpid, when the temperature sinks towards the freezing point. So necessary, indeed, does a high temperature appear to be, to the comfortable exercise of their several functions, that we find them chiefly inhabiting the warmer regions of the earth.

The reproductive system of reptiles exhibits few peculiarities. The sexes are distinct, on separate individuals. In some tribes, the male has external organs, while in others these are wanting. Impregnation is either external or internal, according to the tribes: the females are either oviparous or ovo-viviparous. The young of some of the genera undergo remarkable changes of form, before reaching maturity.

HEART WITH TWO AURICLES.

In addition to this well marked internal character, an external character may be given of more easy detection. The skin is never naked, being either protected by scales, knobs, or an osseous shield.

CHELONEA.

Body protected by a corneous shield. Body furnished with feet.

The reptiles of this group, denominated by the French naturalists *Cheloniens*, were included in the genus *Tes- tudo* of LINNÆUS. The body is protected dorsally and ventrally, by a hollow shield, open at each end for the issuing of the head and fore-feet at one time, and the tail and hind-feet at another. This shield is named *back-plate* or *breast-plate*, according to its position. It is covered by numerous pieces, nearly resembling horn in texture and composition, exhibiting various forms and modes of union with one another. In some cases, however, the external covering is a continuous skin. The lateral line of junction between the two plates, is more or less obviously marked by the peculiar forms of the marginal plates.

The shield is strengthened dorsally, by its intimate connection with the vertebræ of the back, ventrally, by the sternum, and laterally by the ribs. The vertebræ

of the head and tail are alone moveable. The scapular and clavicular bones are united with both plates, and form an osseous ring for the passage of the trachea and gullet. The legs vary remarkably in form. Some of the species swim, others walk, or rather crawl; and all of them are slow in their motions.

The testudinal animals are destitute of teeth; but their jaws, with few exceptions, are provided with a corneous covering, like the bill of birds, in some cases, variously notched. The upper jaw is fixed, and the under jaw has a cavity for the reception of the temporal condyle. The tongue is small. The gullet is frequently beset with hard conical processes, having a cardiac direction, and considered as destined to prevent the return of the food. Many of the species are phytivorous, others live on fish. The liver is, in general, divided into two lobes, sometimes a little removed from each other. The auricles are large in proportion, with thin walls; and, at their opening into the ventricle, are furnished with valves. Walls of the ventricle covered with fleshy eminences. The lungs are double, and nearly of equal size. The windpipe divides near the larynx; and, in some species, each branch makes a turn before reaching the lungs.

The kidneys are rather diminutive in size. The bladder of urine, however, is of extraordinary dimensions. The urine itself is transparent and watery, and, besides a little mucous and common salt, contains uric acid*.

In the reproductive system, the sexes are observed to be on separate individuals. The external male organ is cylindrical and pointed, with a groove along its whole length. The oviducts have each an enlargement, or uterus. The eggs, which are fecundated internally, resemble those of birds, in being covered with a calcareous shell. These are deposited by the females in the sand, and left to be hatched by the

* Dr J. DAVY. Phil. Trans. 1818, p. 306.

heat of the sun. The young are perfect at birth. The testudinal reptiles furnish the navigators of the tropical seas with wholesome and refreshing food, and are held in high estimation by epicures in general.

A. Lips corneous.

Entrance to the cavity formed by the two plates closed by a lid.

1. CISTUDA. Box tortoise. Back-plate emarginate in front, with two notches behind.

The lid is formed by a plate, having a cartilaginous joint, and gives full protection to the members of the animal, when withdrawn into the cavity. CUVIER subdivides this genus into such as have two lids, one to each aperture of the shield, and such as have only one at the opening for the head.

Entrance without a lid.

a. Breast-plate continuously solid.

Head and feet capable of being withdrawn into the shield. The back-plate is rounded, and divided into compartments by large scales. Fore feet with five, and the hind feet with four, toes. Those of the first genus live on the land, those of the second frequent fresh water.

2. TESTUDO. Toes united and covered with a common scaly skin. *T. Graeca*.

3. EMYS. Toes webbed. Claws long. *Testudo Europæa*.

Extremities incapable of being withdrawn into the shield.

4. CHELONURA. Tail about the length of the shield. Back-plate carinated, with sharp processes behind. *Testudo serpentina*.

b. Breast-plate interrupted by intervening cartilaginous spaces. The extremities are incapable of being withdrawn in-

to the shield. The fore legs are remarkably produced, with the toes united, to serve as a fin. The species of this group live in the sea.

5. CHELONIA. Back-plate covered with corneous scales
Testuda Mydas.

6. CORIUDO. Back-plate destitute of scales. *Testudo coriacea.*

B. Lips fleshy, with a produced snout. Toes webbed.

7. CHELYS. Back-plate scaly.

There is a protuberance to the hind feet occupying the place of a web, but destitute of a claw. The toes before, and the four behind, are armed with claws. The tail terminates, as in many of the other genera, in a hard point. *Testudo fimbria*, Bruguiere, Journ. d'Hist. Nat. vol. i. p. 253. tab. xiii. f. 1. 2.

8. TRIONIX. Back-plate destitute of scales, but covered with a coriaceous skin, studded near each extremity with hard knobs.

Three toes on each foot only having claws. Inhabiting fresh water. *Testudo ferox*. Pennant, Phil. Trans. 1771, p. 268. Tab. x. fig. 1, 2, 3.

SAURIA.

Body covered with scales.

This group, including the genera *Draco* and *Lacerta* of LINNÆUS, and denominated Sauriens by the French naturalists, includes animals which have usually a lengthened body, ending in a long tail. The skin is protected by scales, which, in some of the genera, assume the form of plates. The vertebral column is complete, and capable of motion. The ribs are united with the sternum, and, by their motions, assist respiration. The feet are widely placed, so that walking is performed in an irregular manner. Some