

wart-hog (*Phacochoerus*), with complicated teeth like the elephant, from a pig (*Sus*), with simple ones, and therefore regarded that as a settled point. My infirmities not allowing me to go beyond the walls of the Museum, I must leave this question to be settled by those who can examine the animal. Can it be the female of the wild boar of Kordofan and Soudan, called "Quadruk" by the Arabs, or of the wild boar seen by Dr. Murie in Africa? See 'Catalogue of Carnivorous and Pachydermatous Mammalia in the British Museum,' p. 338.

On the Circulation of the Oligochaeta of the Nais-group.

By M. E. PERRIER.

In his anatomical investigation of the Oligochaetal Annelides, M. Claparède entirely passed over the *Nais*-group; and no important work has since been published upon those animals. A tolerably extensive investigation of *Dero obtusa*, an animal nearly allied to *Nais*, enables us to make known some new facts as to the circulatory apparatus of those animals, which has not hitherto been studied.

Dero scarcely differs from *Nais* except by its possession of a branchial apparatus composed of four simple retractile digitations inserted upon a sort of lobe (*pavillon*), which spreads out at the posterior extremity of the body, and of which a figure, incorrect in some respects, has been given by D'Udekem in the 'Bulletins de l'Académie Royale de Belgique.'

The circulatory apparatus of *Dero obtusa* consists essentially of a ventral and a dorsal vessel, both lying in the median line. The dorsal vessel is contractile. These two principal trunks are united in a very complex manner, which must be studied in the head, in the anterior segments, the middle segments, and the caudal respiratory apparatus.

In the five segments which follow the head the two median vessels are united by an infinity of lateral branches, forming a very complicated network, which surrounds the buccal apparatus and the œsophagus; these two vessels are considerably diminished when they reach the cephalic region. Beneath the mouth the ventral vessel emits two branches, which penetrate into the cephalic cavity; the dorsal vessel is prolonged above the brain to the anterior extremity of the cephalic cavity, and then it divides into two branches, which bend back on each side and become again subdivided; into these the two branches of the ventral vessel open.

In segments 6, 7, and 8, there are three contractile hearts, each formed by two floating, perivisceral, vascular loops.

In the middle segments three or four vascular rings originate from the dorsal vessel and embrace the intestine very closely; they surround this without communicating with the ventral vessel. These rings are united by a great number of longitudinal vessels, placed at regular intervals, and forming with the rings a very elegant trellis with rectangular openings. Small vessels originate from this trellis, and divide upon the surface of the intestine. From one of the

longitudinal vessels, situated near the plane of horizontal symmetry of the intestine, springs a vascular branch, which sometimes bifurcates and opens into the ventral vessel, so that the blood starting from the dorsal vessel is obliged to traverse the whole network before entering the ventral vessel.

These arrangements are partly masked by the hepatic cells in the living animal. They seem to indicate that the intestine of the *Naiades*, which is clothed with vibratile cilia, plays an important part in respiration.

The ventral vessel is prolonged to the posterior extremity of the caudal lobe. There it bifurcates, giving origin to two branches, which run along the margins of the triangular lobe, cutting off at its lateral angles two equilateral triangles. From each of these branches, opposite to each respiratory digitation, springs a branchlet which penetrates to the apex of the digitation, where it is recurved in a loop, and is then connected with the vascular loop of the digitation of the same side. From this two lateral vessels are produced, which unite with the prolongation of the two parent branches to form the dorsal vessel.

Suppressing the special contrivance of the respiratory lobe of *Dero* we arrive at the type of the vascular apparatus of *Nais* proper.—*Comptes Rendus*, June 6, 1870, tome lxx. pp. 1226–1228.

Observations on the Natural History of the Crayfish.

By M. CHANTRAN.

Copulation.—The copulation of the crayfish takes place during a period which includes the months of November, December, and January. The male seizes the female with his large nippers, turns her over, and whilst he holds her lying on her back, places himself in such a manner as to pour out the fecundating material upon the two outer lamellæ of the tail. After this first operation, which lasts some minutes, he conveys her rapidly beneath his abdomen in order to effect a second deposition of semen upon the plastron round the external opening of the oviducts, by means of the curious mechanism so accurately described by M. Coste.

Oviposition.—According to the degree of maturity of the ova at the time of the union of the sexes, oviposition takes place at a period varying from two to forty-five days after copulation. At the moment when this function is about to be performed, the female lies upon her back and brings up her tail upon her plastron, in such a manner as to form with her abdomen a chamber enclosing the aperture of the oviducts, and the wall of which secretes a viscous fluid intended to fasten the eggs to the abdominal appendages during incubation. When things are in this state, the laying of the eggs takes place. It is effected at once, usually during the night, rarely during the day. Incubation lasts about six months; and the hatching takes place in May, June, or July.

Moults.—The first moult takes place ten days after exclusion; the second, third, fourth, and fifth at intervals of from twenty to



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