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M. Jules de Guerne

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cisely the same characters as in the preceding species. I abstain for the moment from giving a name to this parasite, since my observations do not permit me to decide with a sufficient degree of certainty whether it is necessary to distinguish it specifically from the parasite of *Caranx*, or whether the two organisms are to be united under the same name.

Lastly, I have found in the kidney, the spleen, and the liver of the tench a *Coccidium* of very small size, for which I propose the name *C. minutum*. The cyst measures no more than 9 to 10 μ (in sections). I was able to follow the various phases of the development, and, among others, to recognize in this form the karyokinetic division of the nucleus which I had previously reported in *C. gasterosteii*. There are four fusiform spores, each enclosing two nucleate falciform bodies.

In concluding this note I desire to draw attention to some very singular little bodies which I have met with for a long time in the tissues of different fishes.

They are oval in form, occasionally a little irregular, and are provided with a thick envelope with a very sharp double contour. In the interior a nucleus is observed, usually situated at one of the extremities; the remainder of the cavity is filled by a large number of very delicate little rods, which appear to converge towards a point, most frequently lying opposite to the nucleus. Their dimensions seem to vary in the different fishes. I have found them 6 to 9 μ in length by 4 to 6 μ in breadth in the epithelium of the intestine of the perch; 10 to 12 μ by 5 to 8 μ in the kidney of the stickleback; 15 μ by 10 to 12 μ in the connective tissue of the ovary of the minnow; and 12 to 15 μ by 6 to 9 μ in the epithelium of the gills of the tench. I have also found them in the bleak, the carp, &c. My excellent friend, Dr. Laguesse, in the course of his beautiful researches into the histology of fishes, has had occasion to observe the same bodies, especially in *Crenilabrus*.

Unfortunately I can do nothing but state the existence of these singular forms. Their parasitic nature appears to me to be almost beyond doubt; but their characters are so peculiar that I have been unable to discover any affinity between them and the parasites at present known.—*Comptes Rendus hebdomadaires des séances de la Société de Biologie* (Séance du 9 janvier, 1892): from a separate impression communicated by the Author.

On the Dissemination of Hirudinea by the Palmipeds.

By M. JULES DE GUERNE.

MM. Raphaël Blanchard and Mégnin have recently published, in the '*Comptes Rendus des séances de la Société de Biologie*'*, several

* Raphaël Blanchard, "Sur la Sangsue de Cheval du Nord de l'Afrique" (séance du 17 octobre, 1891); P. Mégnin, "Sangsues de l'Algérie et de Tunisie ayant séjourné plus d'un mois dans la bouche de Bœufs et de Chevaux" (séance du 24 octobre, 1891).

remarkable cases of the carriage of living leeches by Mammals. The facts mentioned below will show that the aquatic birds, and especially the migratory Palmipeds, can also become very active agents in the dissemination of Hirudinea.

Being installed in the spring of 1888 in the neighbourhood of a large marsh-shooting in the Department of the Marne*, for the purpose of investigating at that spot various points in the freshwater fauna, my attention was attracted for the first time on the 5th of April by a little leech. It was lying dead (but still fresh and sufficiently well preserved for study) on a stone table upon which the sportsmen were in the habit of depositing their game. That day the bag comprised, as the result of the morning's work alone, some fifteen wild duck, teal, and pintails. From that time I examined all the birds killed, with the special object of discovering leeches. It was only on the 8th of April that a second leech was obtained upon a wigeon (*Mareca penelope*, L.) among the ventral feathers. This soon died. The same day, having deposited upon my work-table a teal (*Querquedula crecca*, L.), shot flying a few moments previously, great was my satisfaction on seeing emerge from the plumage of the anterior part of the breast a worm similar to the foregoing (6 millim. in length).

This specimen, which was very active, was at once isolated, and two days afterwards brought alive to Paris. I was unable to study this Hirudinéan, owing to being engaged at the time upon the preparations for the fourth scientific expedition of the 'Hirondelle,' on which I was to accompany the Prince of Monaco. Various efforts which were made to feed it were without result; it never touched the living Batrachians or Mollusks which were offered it. Attached by its posterior sucker, the creature swayed incessantly to and fro with a rhythmic motion or moved about on the walls of the jar with the well-known geometric gait (*démarche géométrique*) of the looper caterpillars†.

At the moment of setting out for the Azores, on the 16th of June, I decided to entrust my little Hirudinean to Prof. Moniez, who has the management of splendidly arranged aquaria at the Laboratory

* Arrondissement de Vitry. In order to give an idea of the importance of this shooting, I will simply mention that the pools there occupy an extent of more than 500 acres (200 hectares). On four of these pools only, shooting is done from a hut, and in good seasons a skilful duck-shot can kill about *nine hundred* wild duck (*Anas boschas*, L.) there, without speaking of the rest. The number of head killed has sometimes exceeded *two thousand*.

† It is curious to observe these two peculiarities, because each of them has been the cause of a name actually applied to worms formerly confounded with this:—*Hirudo oscillatoria*, Saint-Amans, 1824, and *Hirudo geometra*, Brightwell, 1842. This, moreover, is what O. F. Müller says of the young:—"*Raro quiescunt, Geometrarum instar progrediuntur et quidem festinante gressu*" (Verm. terrest. et fluv. . . . hist. vol. i. part 2, p. 45).

of Natural History of the Faculty of Medicine of Lille. Here it lived, always very active and never feeding, until November 6th, 1888.

The thermometer was low on the day when I obtained this leech; it had snowed the night before, and the temperature of the water of the marshes scarcely exceeded 3° or 4° C. This did not prevent it from supporting the heat of the summer in a vessel of limited dimensions, in which it had seemed desirable to leave it in order to avoid losing it. The ability of the animal to resist striking changes of temperature is therefore established, and the feature is worthy of remark when it is a question of dissemination into waters situated at distant latitudes.

The foregoing notes, extracted almost word for word from my note-book of observations, had been taken a long time when I had the opportunity of entrusting the Hirudineans with which we are dealing to Dr. Raphaël Blanchard for the purpose of systematic study. This, as we shall see, furnishes some curious results.

To begin with, the three specimens belong to the same species—*Glossiphonia tessellata*, discovered in Denmark and described by O. F. Müller in 1774. Its geographical distribution, as at present known, extends in Europe from the Arctic Circle, within which it has been found in the Kola Peninsula (Russian Lapland), as far as Budapest. Nevertheless it had not previously been reported in France, and it is sufficiently peculiar that it should be met with there for the first time upon Palmipeds. Dr. Raphaël Blanchard has since obtained, in August 1890, two specimens only of the species in the Erdre, near Nantes.

This form is moreover everywhere regarded as rare, and the naturalists who have observed it most carefully point out a peculiarity in its mode of life which is worthy of mention here. *Gl. tessellata* crawls as it were upside down at the surface of the water in the open spaces, as do the Planarians and certain Mollusks. The animal is thus favourably situated for attaching itself to the migratory Palmipeds, which *pitch (tombent)*, to use the technical expression, and at times in numerous flocks, on the clear waters of the marshes.

Furthermore, an observation by Dr. Weltner* shows that Palmipeds are readily attacked by *Gl. tessellata*. At a farm in the village of Wanzénau, near Strassburg, a flock of geese and ducks was almost destroyed by this leech. The birds were emaciated and restless and carried a certain number of these worms firmly fixed in the oesophagus. Dr. Weltner believes that the leeches were searched for by the birds as food, and, not having been swallowed sufficiently quickly, had attached themselves in passing down the gullet. I have never met with Hirudineans in the digestive tracts of the numerous aquatic birds which I have examined for the purpose of

* Weltner, "*Clepsine tessellata*, O. F. Müll., aus dem Tegelsee bei Berlin," Sitzungsberichte der Gesellsch. naturforsch. Freunde zu Berlin, 17 mai, 1887.

studying their food. It therefore appears to me to be more in conformity with the truth to suppose that the worms had attached themselves of their own accord to the mucous membranes of the ducks or geese as they were engaged in seeking their food *.

I would add that the call-ducks employed in shooting, which remain attached to cords for hours at a time out in the water in front of the huts, are sometimes attacked by little leeches. The keepers, however, by whom I was informed of the fact, never procured me any specimens.

Be that as it may, the possibility of the dissemination of leeches by Palmipeds appears to be placed absolutely beyond doubt. In damp weather a leech, sheltered beneath the compact plumage of a duck, can be transported a very long distance in a very few hours †, especially if the flight is further accelerated by some atmospheric disturbance. I may be permitted to quote a final instance, which will serve to clear up the subject.

In the only case with which I am acquainted in which a leech (*Lophobdella Quatrefagesi*, Poir. & Rocheb.) was reported as having accidentally attached itself to birds, the creature was actually found upon migratory Palmipeds, on the internal wall of the pouch of pelicans (*Pelecanus crispus*, Bruch., and *P. onocrotalus*, L.). From the special point of view of dissemination it is curious to compare this fact with the following, mentioned by Caspari, the hydrographic engineer, and which I tender, without further comment, to all those who are interested in the grand phenomena of Nature :—

“Another less formidable but very curious effect of the tornados is their influence on the fauna of the regions visited by them. That of 1865 acclimatized pelicans in Guadeloupe; these birds, according to the old fishermen, were formerly unknown in the island, and to-day they abound in the whole of the north-west portion, near the Grand Cul-de-Sac” ‡.—*Comptes Rendus hebdomadaires des séances de la Société de Biologie* (Séance du 30 janvier, 1892): from a separate impression communicated by the Author.

* I would mention, as being closely connected with this, a case observed in Ireland, and reported in ‘The Veterinarian,’ ser. 4, vol. viii. Jan. 1862, p. 19 (“Worms in the Eyes of Geese”). I am indebted to Prof. Railliet for bringing it to my notice.

The case was one of geese being rendered blind by leeches (?). On the eyeball of one of the birds being divided “a small black worm, just like a young leech, came out.” The creature in question was kept alive for some time in a veterinary hospital in Dublin. The affected geese had access to a stream where there were numbers of leeches. It remains to be discovered how the worms were able to penetrate the eye. The species was not determined.

† I may here remind the reader that a wild duck flies in ordinary weather at a speed of 40 to 45 miles (66 à 72 kilomètres) an hour. *Vide* J. de Guerne, ‘Excursions zoologiques dans les îles de Fayal et de San Miguel (Açores),’ Paris, 1888, p. 89.

‡ Caspari, “Une Mission à la Guadeloupe. Notes de géographie physique” (‘Revue maritime et coloniale,’ Oct. 1871, p. 412).