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Observations and experiments on the migrations of *Filaria* *rhytipleurites*, a parasite of cockroaches and rats

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I give this remarkable Nemertean the name of *Avenardia Priei*, dedicating it at once to M. J. Prié, a zealous naturalist of Pouliguen, and to M. Avenard, Assistant to the mayor of Pouliguen, who furnished me with the materials of this investigation, and facilitated these sufficiently troublesome researches with a kindness for which I am glad to thank him publicly.—*Comptes Rendus*, July 8, 1878, p. 72.

Observations and Experiments on the Migrations of Filaria rhytipleurites, a Parasite of Cockroaches and Rats. By M. OSMAN GALEB.

In 1824 Deslongchamps discovered, in the fatty body of the common cockroach (*Periplaneta orientalis*), a great number of small lenticular bodies visible to the naked eye, in which he found a small Nematoid worm to which he gave the name of *Filaria rhytipleurites*. This encysted worm merely represents the asexual state of a Nematoid, the migrations of which have hitherto remained unknown.

The cyst forming the cell of this animal is composed of two membranes: the external, which is fibrous, is easily coloured by carmine; the inner one, on the contrary, which is structureless and sometimes presents a granular appearance, does not fix the colouring matter. The larva, whose movements may easily be followed through the wall of the cyst, is folded several times upon itself and surrounded by a whitish granular matter.

These Nematoids cannot quit their prison so long as the *Periplaneta*, of which they are parasites, continues alive. If by dissection we separate the cysts and then place them in a suitable liquid, the little worms soon pierce their cells; half an hour of submersion gives them all their liberty; and their vitality is such that they can remain alive for three days, or even more.

It is by chance that I have discovered the course of the migrations. The baker with whom I was lodging, knowing that I was interested in natural history, placed at my disposal all the rats caught in his traps. On opening the stomach of one of these animals (*Mus decumanus*), which I killed in order to make some histological preparations, I found a Nematoid in the sexual state, and easily established its identity with that which I had met with in the adipose tissue of the cockroach: a cutaneous fold which exists in the body of the larva at but a short distance from the anterior extremity occurs also in the adult animal at the same part; and it was this characteristic fold that suggested the name *rhytipleurites*, given by Deslongchamps to the encysted worm.

The Nematoid when set free grows rapidly; for the larva contained in the cyst does not measure more than 11–16 millims., while the adult worm often attains a length of more than 2 centims., the male being, as usual, smaller than the female.

The cuticle is thick, regularly annulated; in the larva it contains numerous porous canals. The muscular system forms a continuous

layer, which places this worm among the Holomyaria. Within this muscular layer the cavity of the body is occupied in the centre by the digestive tube, and in the interval by a spongy tissue formed by intercrossed fibres, the meshes of which are filled with large, round, nucleated and nucleolated cells.

The single ovary is straight, and formed by a tube with a central rhachis, to which the ova are attached laterally like the barbs of a feather. The vulva opens not far from the mouth. The male possesses a simple spicule; his posterior extremity is twisted like a crozier.

The specific identity of the encysted larva and the free adult appeared to me to be sufficiently proved by the anatomical characters; but in order to arrive at more absolute certainty, I undertook some experiments in artificial migration. As I found it difficult to manage the rats caught in traps, in which these migrations would naturally take place, I made use of white rats (*Mus rattus*), which I fed with cockroaches infested by these parasites. The three rats experimented on were killed in a week, when I found in the anfractuosités of the mucous membrane of the stomach the Nematoid in question, alive and freed from its envelopes. In one of the rats I found three females and a male, all of which had acquired their reproductive organs.

Thus the last period of evolution is accomplished. The copulation takes place in the digestive tube of the rat; and soon afterwards the deposited ova are ejected with the fæcal matters. I do not know whether these ova contain a ready-formed embryo. However this may be, these ova are swallowed by the cockroaches, whose voracity drives them to devour the excrement of the rats; the embryos are then hatched in the digestive tube of those Orthoptera, pierce its wall, and go to encyst themselves in the adipose body, to wait there until the *Periplaneta* is in its turn eaten by the Rodent, in which the evolution-cycle will be completed. A very simple observation also enables us to demonstrate how the migration of *Filaria rhytipleurites* is effected. Having examined the matters contained in the intestine of *Periplaneta orientalis*, I found there a great quantity of rat's hairs. Now the rats, as indeed all the Mammalia, by licking themselves, introduce into their digestive tube a considerable mass of hairs, which are got rid of with the fæcal matter. It is therefore certain that the hairs which are met with in the alimentary canal of the cockroaches have been brought there with the fæces of the rat, and that the ova of the Nematoids were ingested at the same time.

The observations and experiments just detailed seem to me to be of some interest, as hitherto only a single case of the peregrination of a Nematoid from an insect to a mammal, and *vice versa*, was known*.—*Comptes Rendus*, July 8, 1878, p. 75.

* Leuckart has discovered that *Spiroptera obtusa*, encysted in the larva of *Tenebrio molitor*, completes its development in the digestive canal of the mouse.