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LAUROSTRONGYLUS HOINEFFAE N. GEN., N. SP., A RELICT TRICHOSTRONGYLID FROM AN ENDEMIC MADAGASCAN RODENT

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A new nematode, the type of a new genus and a new species Laurostrongylus hoineffae, *parasitic in the cricetid rodent* Gymnuromys roberti *in Madagascar, is described. The species belongs to the Graphidiinae subfamily of Trichostrongylidae but some features point to its affinity to certain Libyostrongylinae, especially to two monospecific genera endemic in Madagascar* Pararhabdonema *and* Cnizostrongylus. *This ensemble of relict species seems thus to support the concept of a common ancestor for the Libyostrongylinae and Graphidiinae. The two subfamilies were supposed to originate in the Ethiopian region. The presence of the three genera in Madagascar could either indicate their Madagascan origin or, more likely, a continental origin with an insular niche allowing the preservation of the species.*

Key words: *Laurostrongylus hoineffae* n. gen., n. sp. – Trichostrongylidae – Graphidiinae – Libyostrongylinae – endemic species – relict species – Madagascar – *Gymnuromys* – cricetid rodent

The host *Gymnuromys roberti* Major, 1896 is a cricetid rodent endemic in Madagascar and rather difficult to find nowadays. The nematodes described herein were recovered from the stomach of a single host specimen trapped by the famous naturalist Guillaume Grandidier in the "Tanala forest" in 1898. In 1912 the specimen was catalogued as number 140 in the collection of the Laboratoire de Mammologie in the Muséum National d'Histoire Naturelle and preserved in alcohol. The digestive systeme was removed and dissected in 1982 by Dr Jean-Pierre Hugot.

These nematodes are of a special interest because they represent a transitional form between two primitive subfamilies in the family Trichostrongylidae.

DESCRIPTION

Type material: 1 male holotype MNHN 309 KHa, 2 males and 5 females paratypes MNHN 309 KHb.

Host: Gymnuromys roberti Major, 1896.

Localization: Stomach

Type locality: "Tanala Forest" Madagascar.

Nematodes 1-2 cm long, arched along the ventral surface, without synlophe and cephalic vesicle. Male body diameter relatively uniform. In the female body diameter enlarges progressively in the antero-posterior direction till it doubles in the region of the uterus as compared to the diameter at the level of the oesophago-intestinal junction. At the level of the anus the body shrinks considerably (Fig. 4). Excretory pore situates in the middle of oesophagus length. Rounded deirids slightly posterior to excretory pore (Fig. 10) Oesophagus strongly swollen distally.

Head: In *en face* vue one observes 4 papillae of the internal labial circle, 6 papillae of the external labial circle, 4 cephalic papillae and the 2 amphids. Oral opening surrounded by a thick buccal ring. A dorsal oesophageal tooth present (Figs 1, 2, 11).

Male holotype: Body 11,100 µm long with a maximum width of 200 µm in its middle. Nerve ring, excretory pore and deirids at a distance of, respectively, 250 µm, 300 µm and 350 µm from the anterior end. Oesophagus 530 µm long (Fig. 3).

Caudal bursa subsymmetrical with bursal rays arranged fanlike. Rays 2 and 3 not connected, but following a relatively parallel path;

rays 3 longer than rays 2. Dorsal ray relatively short divided at its distal end into 3 branches, rays 9 being the most developed. The thick rays 8 originate at the base of the dorsal ray and are almost just as long (Fig. 6).

Spicules subequal, winged, 270 µm long. At the thirds of their length they divide into 3 branches: a thick externo-lateral branch rounded distally and enclosed in a membrane 2 internal branches with pointed tips, one ventral and one dorsal, twice as short as the externo-lateral (Figs 7, 8). Gubernaculum 130 µm long and 32 µm wide at its proximal end. Seen sideways it appears bent ventrally. *En face* it is spoon-shaped, with the handle attached distally (Fig. 9). Genital cone with papillae zero highly developed; tiny papillae 7, situated on the posterior tip. (Fig. 7).

Female: In a female 20400 µm long, the body enlarges progressively from a width of 250 µm at the level of the oesophagus to 450 µm at the level of the uterus; nerve ring, excretory pore and deirids situate respectively at 200 µm, 270 µm and 290 µm from the anterior extremity. Oesophagus 650 µm long. Didelphic. Vulva at a distance of 6300 µm from the posterior end, i. e. in the posterior third of body. *Vagina vera* thick, 250 µm long. It divides the vestibule, 420 µm long, into 2 equal parts. Sphincters 70 µm long and 120 µm wide (Fig. 5). Anterior infundibulum strongly coiled, 220 µm long, posterior infundibulum 280 µm long. Uterine branches very short in relation to body length (approximately one sixtieth), but filling out almost the entire body width. Anterior uterine branch 3100 µm long, the posterior 3300 µm. Each branch contains over 200 eggs not embryonated, 115 µm long x 60 µm wide. Tail rounded posteriorly, 250 µm long, bent along the ventral surface (fig. 4).

DISCUSSION

This nematode, although having some distinct features, is a Trichostrongylidae as defined by the classification of Durette-Desset (1983): didelphic female without caudal spine, absence of synlophe and cephalic vesicle.

Likewise, within the Trichostrongylidae its basic characters indicate without ambiguity that it belongs to the subfamily Graphidiinae: ventral rays subequal, close to each other and almost parallel, dorsal ray thick at the base and divided only as its distal end, buccal capsule reduced to a ring. The Graphidiinae comprise only four genera:

Graphidium Railliet and Henry, 1909, parasite of Palearctic Leporidae. The dorsal bursal lobe is hypertrophied and the distal ends of the ventral rays are close to each other.

Parostertagia Schwartz and Alicata, 1933, a parasite of American Suidae. Caudal bursa similar to that of *Graphidium;* spicules short.

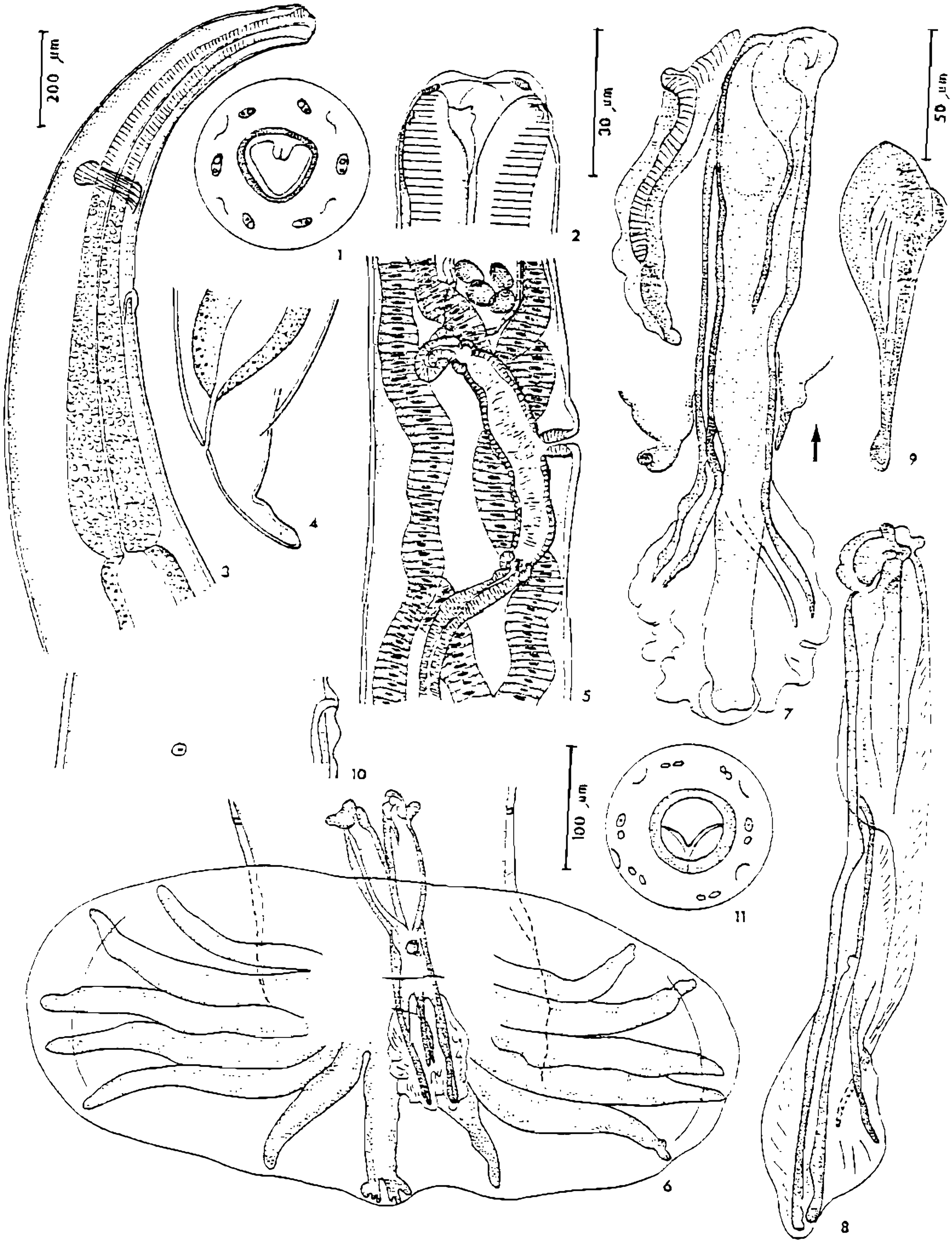
Hyostrongylus Hall, 1921 and *Cervicaprastrongylus* Gibbons and Khalil, 1982, two closely related genera, parasitize the domestic pig, neotropical Suidae, Leporidae, Tragulidae and the Okapi in the Ethiopian region and *Antilocapra cervicapra* in China. The caudal bursa is similar to our specimens but these show also unique characters not knqwn in other Graphidiinae, in particular two archaic features: the presence of a well developed dorsal oesophageal tooth and the absence of a synlophe. One may also include the rounded deirids, not in the form of a hook, like other Graphidiinae.

The large body, the cuticle without longitudinal ridges, the dilatation of the distal end of the oesophagus, the oesophageal tooth, localization in the stomach are all characters seen occasionally in certain genera of Libyostrongylinae, namely the two Madagascan endemic monospecific genera *Pararhabdonema* Kreis, 1945 and *Cnizostrongylus* Chabaud, Durette-Desset et Houin, 1967.

Pararhabdonema (female described by Kreis and male described by Chabaud & Choquet, 1955) parasitizes lemurs. The ventral rays are those of Libyostrongylinae and the synlophe is typical but the posterior part of the caudal bursa, the large size, the uteri short and thick are characters common with our species.

Cnizostrongylus is a parasite of the endemic rodent *Hypogeomys* (close to the host of our species). Here again one sees a coexistence of very specialized elements like the cuticular pincer of the 4th bursal ray, and primitive elements like the large size, the oesophagus with a well developed bulb, absence of synlophe and presence of oesophageal teeth.

No genus described todate is similar to our material and there is a need to establish a new



Laurostrongylus hoineffae – Fig. 1: *en-face* view of head, female. Fig. 2: right lateral view of head, female. Fig. 3: right lateral view of anterior end, male. Fig. 4: left lateral view of tail, female. Fig. 5: right lateral view of ovejector. Fig. 6: ventral view of caudal bursa. Fig. 7: right externo-lateral view of gubernaculum and right spicule *in situ*. Fig. 8: ventral view of dissected right spicule. Fig. 9: ventral view of gubernaculum. Fig. 10: right lateral view of deirid and excretory pore. Fig. 11: *en-face* view of head, male. Bars – Figs 1, 2, 11 = 30 µm. Figs 3, 4, 5 = 200 µ. Fig. 6 = 100 µ. Figs 7, 8, 9, 10 = 50 µm.

genus which we dedicate to the memory of Professor Lauro Travassos by naming it *Laurostrongylus*. The specific name *hoineffae* is in honour of his successor Professor Anna Kohn-Hoineff.

Definition: Graphidiinae. Body large; no synlophe nor cephalic vesicle. Cephalic sensory complex complete. Buccal capsule reduced to a chitinoid ring. Dorsal oesophagal tooth well developed. Oesophagus strongly dilated posteriorly. Deirids rounded. Caudal bursa small, regular with rays arranged fan-like. Gubernaculum spoon-shaped. Spicules ending in three points. Female didelphic with uteri short and thick. Tail short, conical. Type species: *Laurostrongylus hoineffae* n. gen. n. sp., parasitic in the stomach of Cricetidae rodents endemic in Madagascar.

Phylogenetic consideration

The three genera *Laurostrongylus, Cnizostrongylus* and *Pararhabdonema,* parasites of mammals endemic in Madagascar, are remarkable by an ensemble of primitive and synthetic characters at times associated with specialized features (an association typical for relict species). Two of the genera belong to the Libyostrongylinae and the third to the Graphidiinae. They should therefore be considered common ancestors of these two subfamilies themselves primitive since according to Durette-Desset (1985) the first gave rise to the Cooperiinae and the second to the Ostertagiinae.

Durette-Desset places the origin of Libyostrongylinae and Graphidiinae in the Ethiopian region. One could therefore consider the evolution of this complex in Madagascar but in fact the connection Africa-Madagascar was very tight till the Oligocene and it seems to us more plausible to suppose a continental ancestor whose relict species could survive only thanks to the Madagascar insularity.

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