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Strongyloides ophiusensis sp. n. (Nematoda: Strongyloididae), parasite of an insular lizard, *Podarcis pityusensis* (Sauria: Lacertidae)

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Abstract. The parasitic female of the nematode *Strongyloides ophiusensis* sp. n., found in the intestine of lizard *Podarcis pityusensis* (Boscá, 1883) from Balearic Islands (West Mediterranean), is described. This species differs from other similar *Strongyloides* species in the body size, the morphology of the stoma, the structure of the ovaries and in the stage of development of the eggs, and also in some ecological and chorological characters.

The helminthological researches carried out on one of the endemic lizards of Balearic Islands (West Mediterranean), *Podarcis pityusensis* (Boscá, 1883) (Sauria: Lacertidae), enabled the discovery of a new nematode from the family Strongyloididae Chitwood et McIntosh, 1934. This is the first report on the occurrence of a nematode of the genus *Strongyloides* in lacertids in Europe.

MATERIALS AND METHODS

A total of 564 specimens of *Podarcis pityusensis* were caught in different places on Eivissa and Formentera islands (see Hornero 1991, Roca and Hornero 1991). After the autopsy, living nematodes were washed in saline solution (0.9 %), fixed in 70 % hot ethanol, preserved in 70 % ethanol, mounted on slides in Amman lactophenol and studied under the microscope.

RESULTS

Strongyloides ophiusensis sp. n. was found in 7 of the 564 examined lizards (prevalence = 1.2 %). In all, 68 parasitic females were found. The mean intensity was 9.7.

Strongyloides ophiusensis sp. n. Fig. 1, Table 1

Definitive host: *Podarcis pityusensis* (Boscá, 1883)
Localization: intestine
Terra typica: Formentera (Balearic Islands, Spain)
Other localities: S'Espardell, Es Penjats (islets near Eivissa and Formentera islands)

Deposition of types: Holotype (♀) and paratypes (♀♀) are deposited in Institute of Parasitology, Czechoslovak Academy of Sciences, České Budějovice, Czechoslovakia, Coll. No. N – 593.

Description (holotype): Parasitic female (Fig. 1). Body slender, elongate with both ends tapering, 1264 μm long, 28 μm wide. Cuticle finely striated. Stoma complex, Y-shaped in apical view when it is closed and keyhole-shaped when it is opened (Fig. 1A), surrounded by 6 small inconspicuous lobes bearing one pair of subdorsal papillae, one pair of subventral papillae and two lateral amphids larger than the papillae. Oesophagus long (548 μm) and filariform. The intestine forms a narrow tube ending at the anus through a short rectum. Anus located 56 μm from tail end. Nerve ring 43 μm from the cephalic end. Excretory pore opens 52 μm from anterior end.

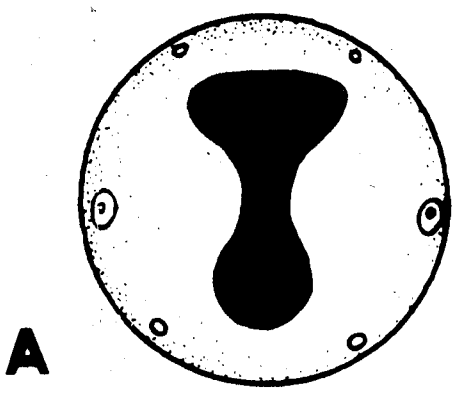
The reproductive system is composed of two sets of opposed ovaries (Fig. 1B). The anterior ovary extends anteriorly close to the junction of the oesophagus with intestine and forms one spiral around the intestine. The posterior ovary does not reach the level of anus; it lies parallel to the intestine. The uteri contain two eggs in early cleavage arranged in a single row, each measuring 57 × 25 μm (Fig. 1C). Vulva, in form of a transverse opening surrounded by prominent lips, is situated at about three-fourth of the body length from mouth, 924 μm from the cephalic end (Fig. 1B).

Table 1. Body measurements of parasitic females of *Strongyloides ophiusensis* sp. n. Measurements, based on 26 specimens, are given in μm

Measurement	Range	Mean	Standard deviation
Body length	880–1456	1139.8	127.3
Body width	23–34	28.0	2.9
Oesophagus length	372–592	479.0	50.5
Vulva (from ant. tip)	652–956	806.1	75.9
Anus (from post. tip)	42–58	51.3	3.9
Egg length	48–68	55.3	5.1
Egg width	18–26	22.7	2.3

DISCUSSION

The genus *Strongyloides* Grassi, 1879 includes a great number of species parasitizing different amphibians, reptiles, birds and mammals. All species of *Strongyloides* are heterogonic forms, with the parasitic females differing clearly from free



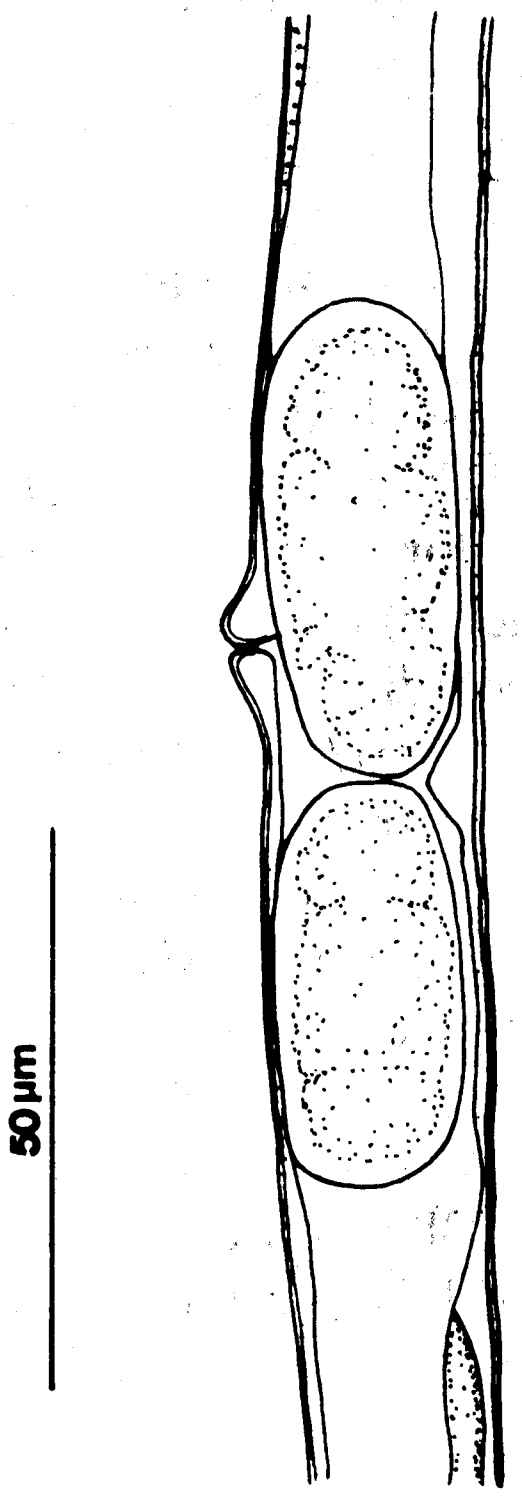


Fig. 1. – *Strongyloides ophiusensis* n. sp., holotype. A: cephalic end, apical view; B: gravid specimen, lateral view; C: vulva and eggs in uterus, lateral view.

living forms (Anderson and Bain 1982). In our case we only had the opportunity to examine parasitic females. These worms generally show such a great structural simplicity that the taxonomic differentiation of similar species is difficult. For this reason Rodrigues et al. (1985) indicated as differential characteristics for *Strongyloides* spp. (in addition to morphoanatomic characters) the host and the distribution of the parasite.

Several morphoanatomic characters have been indicated for the separation of *Strongyloides* species. Sandground (1925) observed that the stage of the parasite passed in the feces and the shape of the ovaries in parasitic females were relatively constant. Little (1966a) found three characteristics in parasitic female useful for the identification of species: a) the form of the stoma; b) the form of the ovaries; c) the stages passed in the feces.

According to the characteristics mentioned above, our specimens differ from all the *Strongyloides* species. *S. serpentis* Little, 1966 and *S. gulae* Little, 1966, described from snakes in Louisiana, USA (Little 1966b), differ from our worms in the morphology of the stoma; oval in the former ones, keyhole-shaped in ours. *Strongyloides* sp. (Kagei and Kifune 1977) from snakes in Japan differs from *S. ophiusensis* in the morphology of the anterior ovary, straight in the Japanese specimens, spiraling in ours, and having a longer body 2850–3590 µm vs., 880–1456 µm. *S. mirzai* Singh, 1954, found in Indian snakes, also has a longer body (2670–3890 µm long) (Singh 1954). *S. cruzi* Rodrigues, 1968, has a longer body (1630–3220 µm long), shorter and wider eggs, and different shaped ovaries (Rodrigues 1968, 1970). *S. ophidiae* Pereira, 1929, described from a snake in Brazil, differs in the shape of the ovaries (Pereira 1929, Yamaguti 1961). All species mentioned parasitize tropical or semitropical snakes (except *S. cruzi* parasitizing gekkonids); so it is useful to add these ecological and chorological viewpoints which increase the differences among these other species and *S. ophiusensis* sp. n.

From a chorological viewpoint the most similar species is *S. mascomai* Navarro, Lluch et Izquierdo, 1989 described on the basis of specimens from *Rana perezi* Seoane, 1985 (Amphibia: Ranidae) from East Iberian Peninsula near to the islands where our specimens were found. *S. mascomai* differs from *S. ophiusensis* sp. n. in the morphology of the stoma and having larvated eggs in the uterus and in living in the cloaca of a frog (Navarro et al. 1989) rather than in the intestine of a lizard as in the case of *S. ophiusensis*. Also *Strongyloides* sp. cited by García-Adell et al. (1987) in the viperin snake from the Pirineos Mountains (Iberian Peninsula) must be considered for comparison, because these specimens are longer (3400 µm) than ours, have spiral ovaries and the eggs in the uterus contain a larva.

Our specimens differ from all known *Strongyloides* species, and *Podarcis pityusensis* is reported as a new host for *Strongyloides*. Consequently, we conclude that the described specimens belong to a new species for which we propose the name *Strongyloides ophiusensis* alluding to the ancient name (Ophiusa) of one of the islands (Formentera) where the species was found.

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