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NOMIMOSCOLEX TOUZETI N. SP. (CESTODA), A PARASITE OF *CERATOPHRYS CORNUTA* (L.): FIRST RECORD OF A MONTICELLIDAE IN AN AMPHIBIAN HOST

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Nomimoscolex touzeti *n. sp. is described from one* Ceratophrys cornuta *(L.) caught in Amazonian Ecuador. Its taxonomic relationships to others species are discussed. This new species is characterized by a cortical position of vitellaria; by the presence in the uteroduct of conglomerates of 20-40 eggs; by a weak ovary width/proglottis width ratio; by ventral excretory canals anastomosed; by a powerful vaginal sphincter and by a long cirrus.* N. touzeti *is the first record of a Monticellidae in an amphibian host.*

Key words: *Nomimoscolex touzeti* n. sp. – *Ceratophrys cornuta* – Monticellid cestode – Amphibian – Ecuador

The invertebrate section of the Geneva Museum of Natural History is studying since several years parasitic helminths from Ecuadorian vertebrates in cooperation with the Ecuadorian Museum of Natural History. During these investigations, Jean-Marc Touzet has collected in March 1986 one specimen of *Ceratophrys cornuta* (L., 1758) in San Pablo de Kantesiya (Prov. Napo) which harbored two fully adult specimens of a tapeworm we are describing in the present paper, that proved to belong to a new species.

MATERIALS AND METHODS

The host has been dissected in the field and the entirely split digestive tract fixed in hot 4% formaldehyde solution. The parasites were sorted in the laboratory and stained with Mayer's hydrochloric carmin solution, differentiated in acid alcohol, deshydrated in ethanol, cleared in Eugenol (clove oil) and mounted in Canada balsam. Transverse sections of fifteen µm were stained with Weigert's haematoxylin and counterstained with eosine. All drawings were made with a camera lucida. The host and the parasites are stored in the Geneva Museum collections.

Nomimoscolex touzeti n. sp.

Material studied

Holotype: No MHNG: Inve 15814, 2 whole-mount slides and 4 slides of transverse sections.

Paratype: NoMHNG: Inve 15815, 1 whole-mount slide.

Host: *Ceratophrys cornuta* (Linnaeus, 1758). No MHNG 2252/063.

Locality and date: San Pablo de Kantesiya (Rio Aguarico), 6 March 1986, Napo Province, Ecuador.

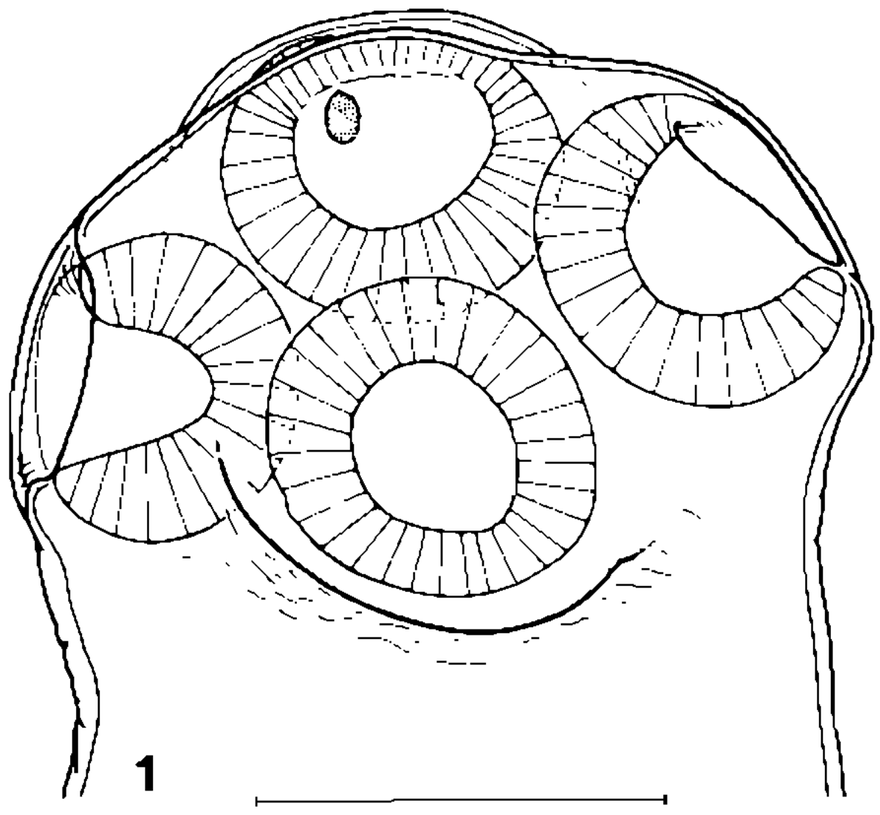
Site of infection: Intestine

DESCRIPTION

Measurements are in µm unless otherwise stated. Abbreviations: m = mean, n = number, h = holotype.

The description is based on the holotype and one paratype. Strobila acraspedote, flattened dorsoventrally, 73 mm (h) and 64 mm long. 70 (h = 75) proglottid before the apparition of spermatozoides in vas deferens and about 73 (h = 77) proglottids before first eggs appear in uterus. Strobila with a relatively fast growth.

Neck 1400-1600 long. Immature proglottid 830-1665 long by 1540-2170 wide. Proglottid width to length ratio 1: 0.46-1.16. Mature proglottids 1340-1830 long by 1480-1830 wide. Proglottid width to length ratio 1: 0.73-0.93. Gravid proglottids 1950-3105 long by 1300-1645 wide. Proglottid width to length ratio 1: 0.65-2.40.



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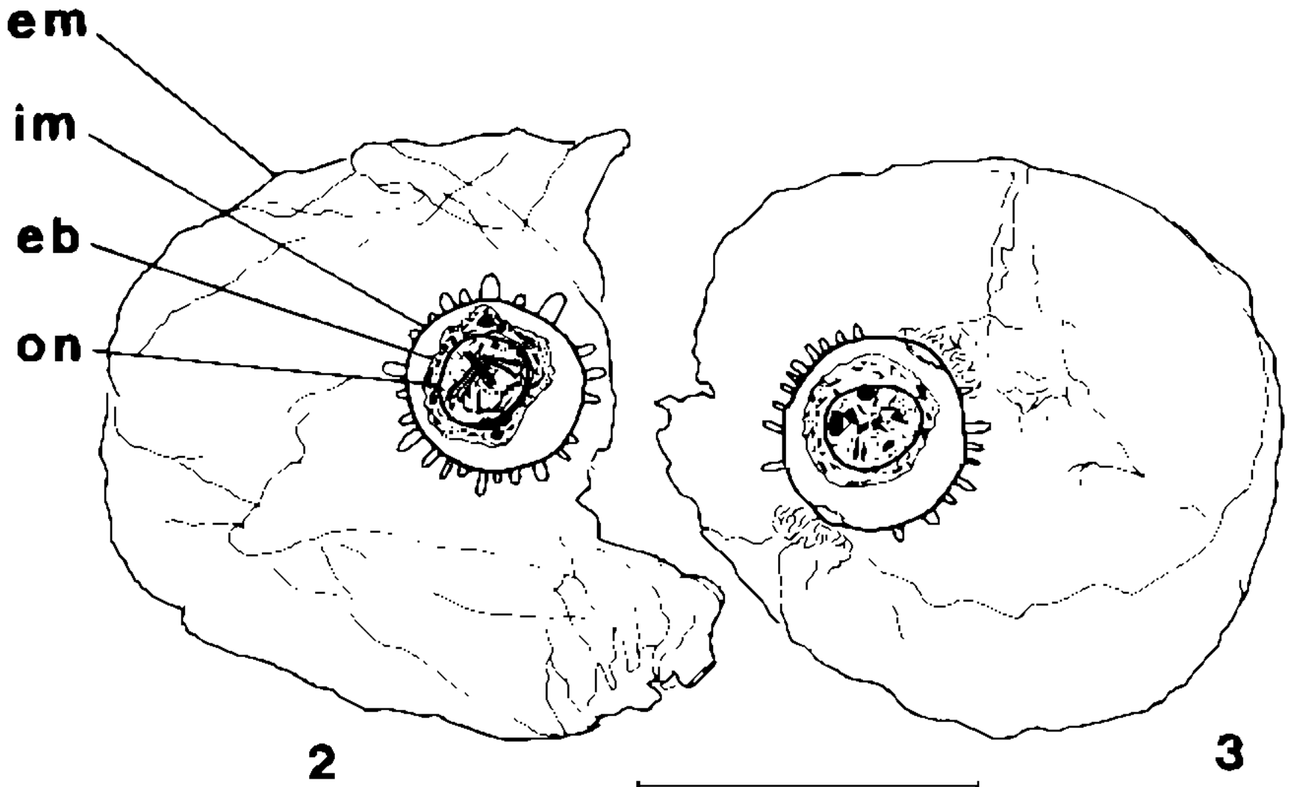

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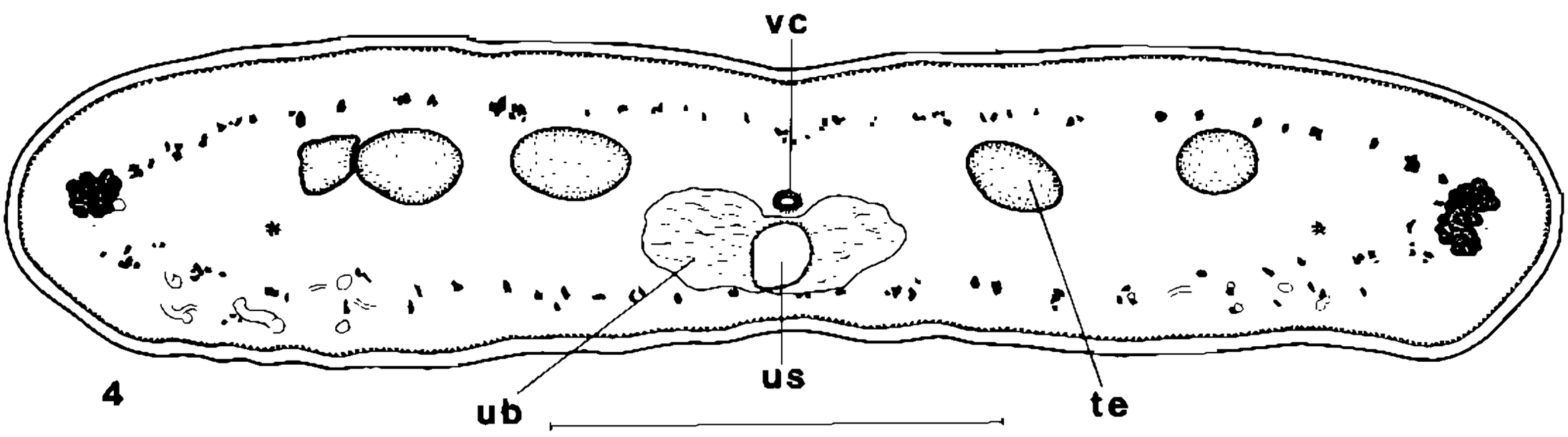

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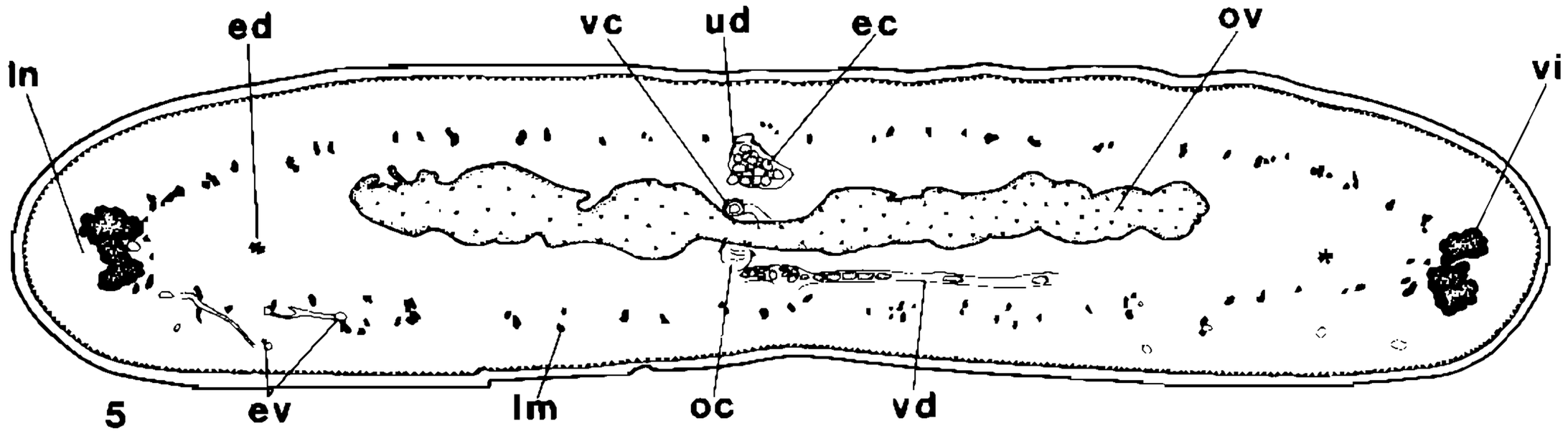

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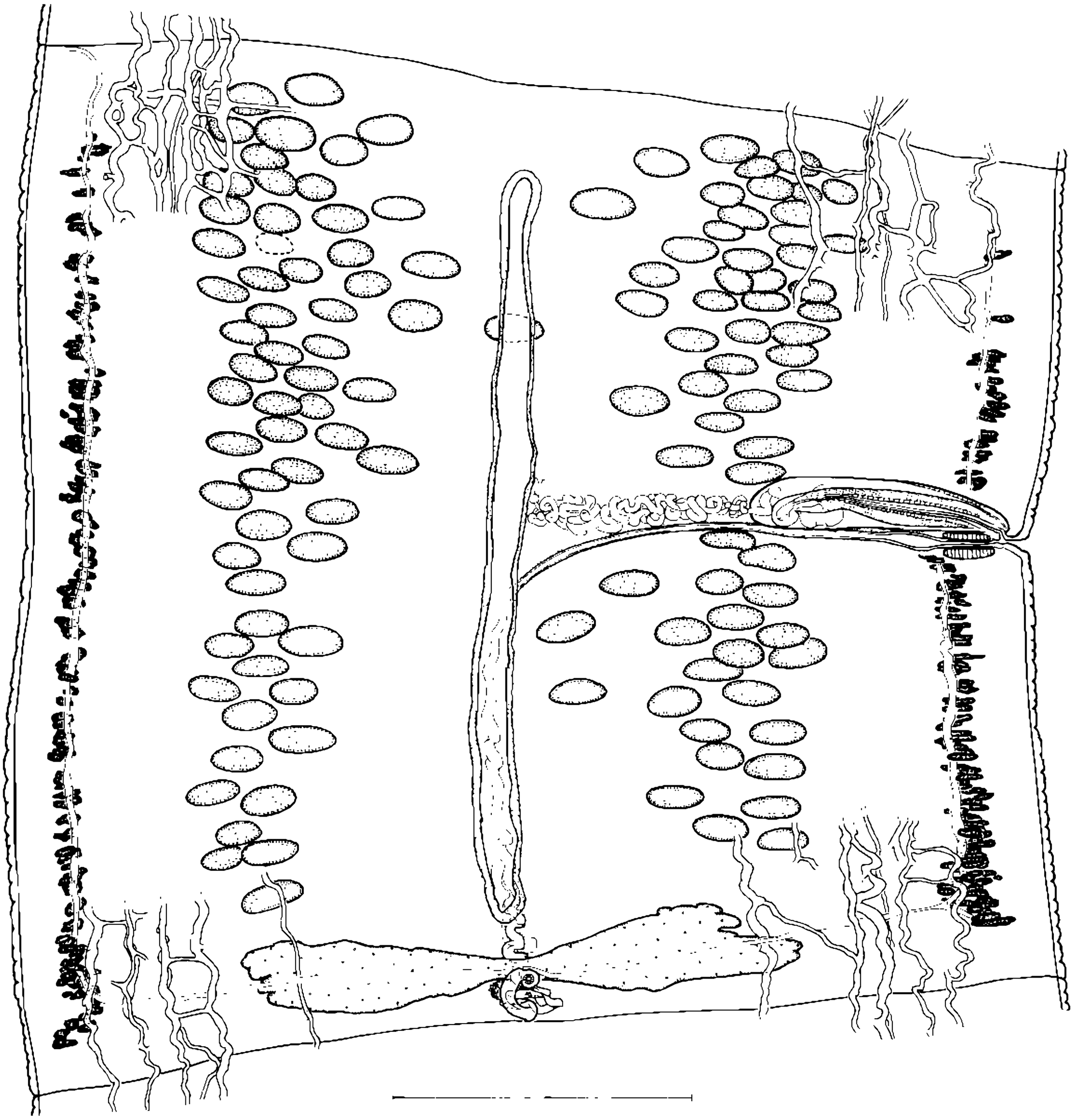
Nomimoscolex touzeti n. sp., holotype – Fig. 1: scolex. Figs 2, 3: eggs mounted in water. Fig. 4: transverse section in posterior part of a gravid proglottid. Eggs in uterus are not figured. Fig. 5: transverse section in ovary area of a gravid proglottid. Scale-bar: 1 = 250 µm; 2, 3 = 50 µm; 4, 5 = 500 µm.
Abbreviations: eb = embryophore; ec = egg clusters; ed = dorsal excretory canal; em = external membrane; ev = ventral excretory canal; im = intermediate membrane; lm = internal longitudinal musculature; ln = longitudinal lateral nerve; mg = Mehlis gland; oc = oocapt; od = oviduct; on = oncosphere; ov = ovary; rs = seminal receptacle; te = testes; ub = uterine branches; ud = uteroduct; us = uterine stem; vc = vaginal canal; vd = vitelloduct; vi = vitellaria; vt = vitelline cell.

Scolex 480-530 wide by 365-380 long, with indistinct apical organ 30 in diameter (Fig. 1). No spine-like structures were detected neither on scolex nor on suckers. Four lateral suckers opening sligthly forwards, 195-210 (m = 205, n = 8) in diameter.

Internal longitudinal musculature weakly developed, about 40 dorsal and 40 ventral parallel bundles of muscular fibres, occasionally anastomosed (Figs 4, 5).

97-137 (m = 113, n = 32) oval testes in two lateral fields, sligtly convergent anteriorely (Figs 6, 7). 22-44 (m = 30, n = 32) preporal testes, 16-29 (m = 23, n = 32) postporal testes, 49-72 (m = 60, n = 32) antiporal testicles; 67-112 long by 28-61 wide (m = 87 x 43, n = 50) in mature proglottids, 81-140 long by 30-59 wide (m = 102 x 42, n = 53) in gravid proglottids. Elongated thick-walled cirrus pouch, 360-500 long by 70-143 wide (m = 415 x 105, n = 33). Cirrus sac length to proglottid width ratio 20-28% (m = 23%, n = 35). Genital ducts passing between the osmoregulatory canals. Invaginated cirrus elongated 240-380 long by 51-95 wide (m = 335 x 65, n = 35). Cirrus

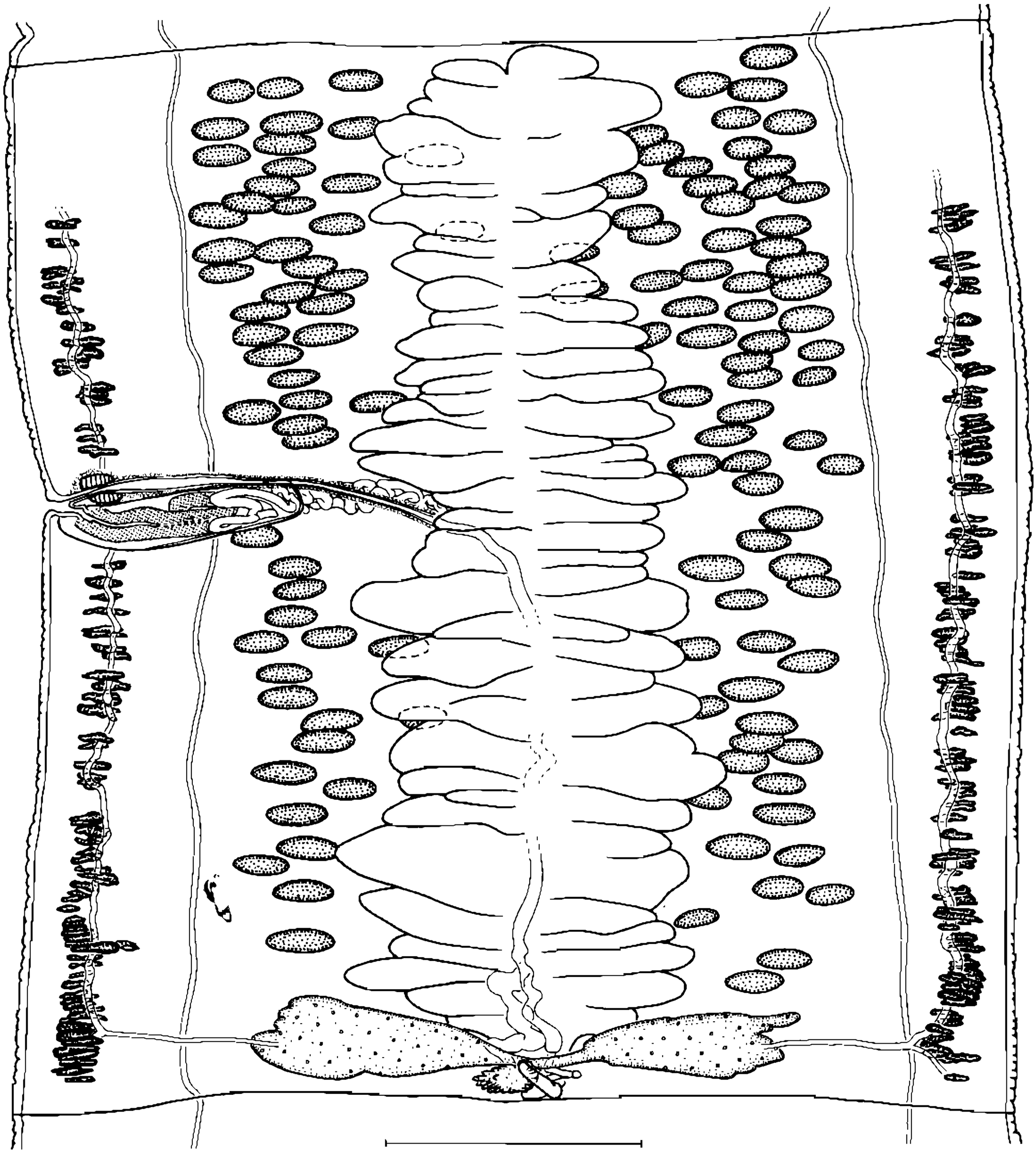


Nomimoscolex touzeti n. sp., holotype – Fig. 6: mature proglottid, ventral view. Scale-bar = 500 μm.

occupying 72-91% (m = 82%, n = 33) of cirrus sac length (fig. 8). Ejaculatory duct very long and coiled, 28-30 in diameter. Vas deferens coiled, occupying a transversal elongated field between proximal part of cirrus pouch and median part of uterus, 25-130 wide by 95-450 long. Genital atrium 10-40 wide by 45-90 deep. Genital pores irregulary alternating, situated between 33% and 47% (m = 39%, n = 39) or proglottid length.

Ovary relatively small, flattened, with two elongated lobes connected by a narrow isthmus, situated ventrally to seminal receptacle and uteroducte. Ovary 665-1110 (m = 960, n = 33) wide by 95-255 (m = 160, n = 32) long. Ovary occupying 51-57% (m = 54%, n = 33) of proglotid width (Figs 6, 7).

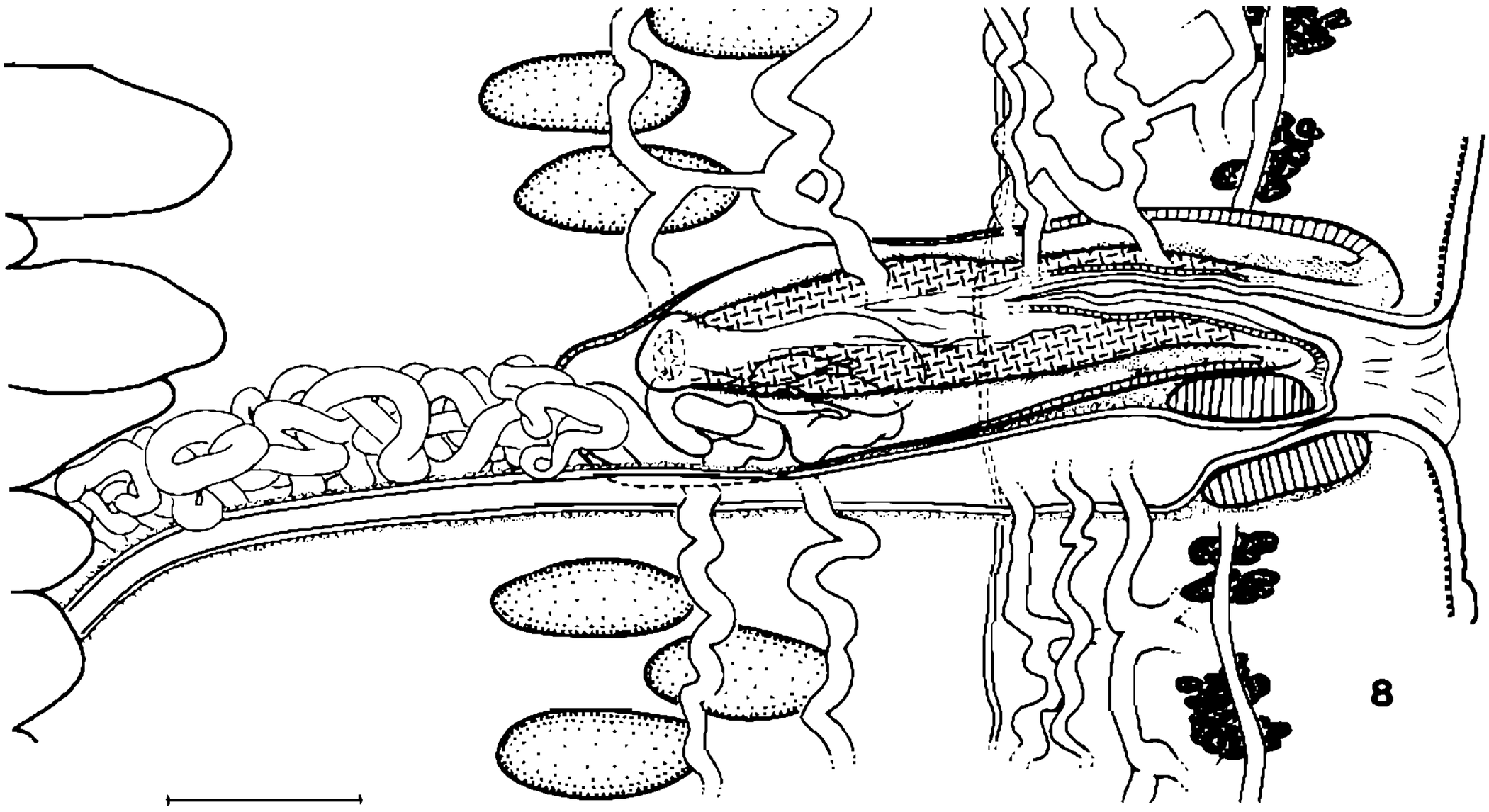
Vagina posterior (58%) or anterior (42%) to cirrus sac, with a powerful vaginal sphincter 30-70 wide by 50-80 long (m = 45 x 65, n = 35). Vaginal duct 12-30 in diameter, dorsal to uterus. Seminal receptacle present. Mehlis' gland small, transversely elongated 100-150 wide by 40-85 long (m = 125 x 55, n = 33).



Nomimoscolex touzeti n. sp., holotype – Fig. 7: gravid proglottid, ventral view. Eggs in uterus and ventral excretory canal are not figured. Scale-bar = 500 µm.

Uterus performed, already visible in immature proglottids, as a medial longitudinal tube possessing a thick wall of chromophil cells (Fig. 6). Uterus swelling on the whole length in the following proglottids. Eggs appearing simultaneously with the formation of uterine branches. Four to six conglomerates of 20-40 eggs each lacking any apparent membrane, accumulating in the uteroduct (Fig. 9). Eggs entering uterus individually where they remain separated in lateral branches. 24-35 (m = 31, n = 26) narrow uterine branches on each side (Fig. 7) occupying, in gravid proglottid, 85-97% of proglottid width. Uterus tube wall getting thinner, in terminal gravid proglottids. Up to three posterior openings observed on the tegumental surface. Terminal proglottids almost empty.

External egg envelope very thin, hyaline, collapsed, 70-120 in diameter; embryophore thick with irregular outline, 19-24 in diameter; oncosphere 13-14 in diameter with 3 pairs of hooks 7-8 long. Between external envelope and



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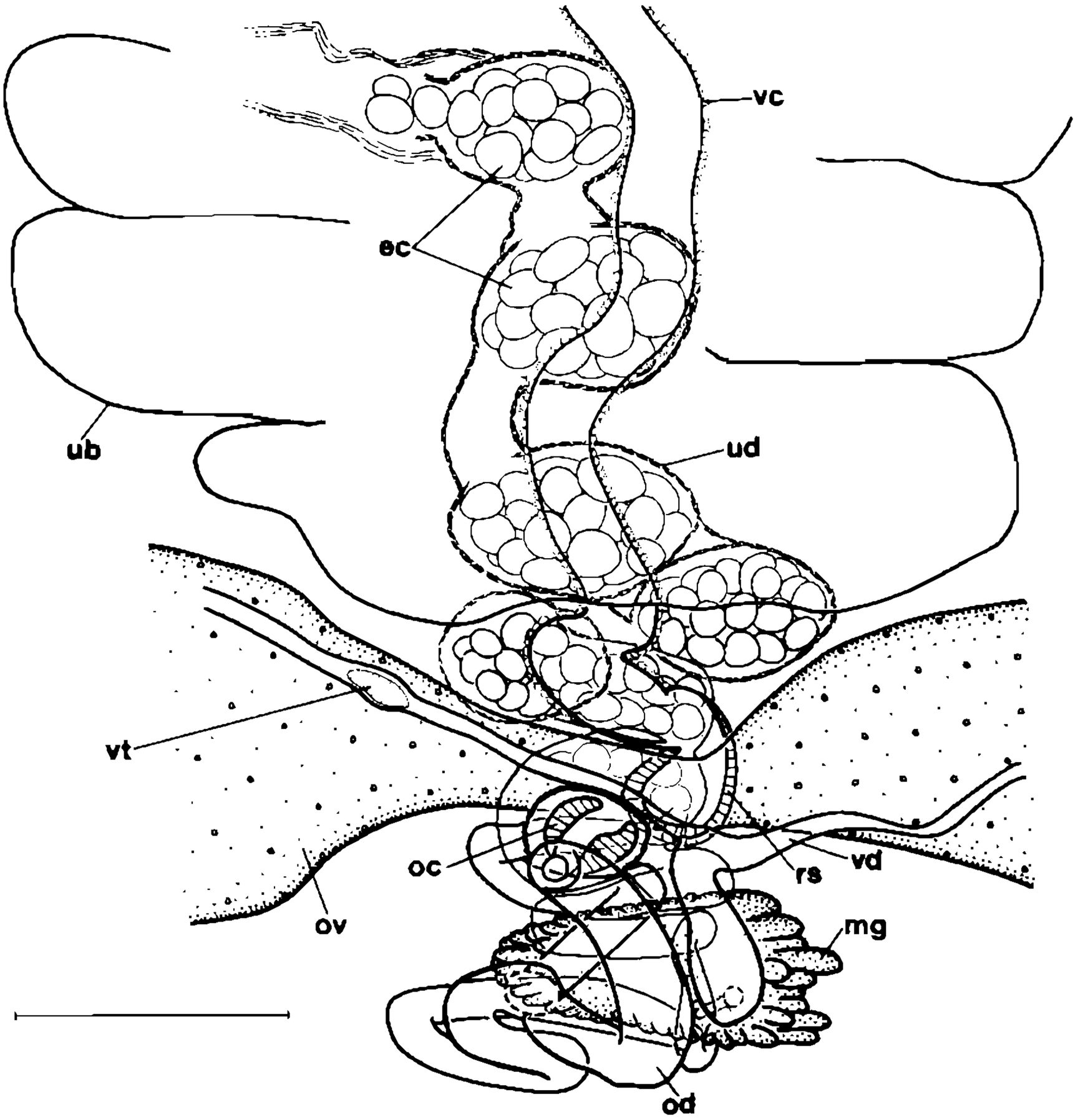

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Nomimoscolex touzeti n. sp., holotype – Fig. 8: cirrus pouch and vagina, ventral view. Fig. 9: ootype region, ventral view. Scale-bar = 100 μm.
Abbreviations: eb = embryophore; ec = egg clusters; ed = dorsal excretory canal; em = external membrane; ev = ventral excretory canal; im = intermediate membrane; lm = internal longitudinal musculature; ln = longitudinal lateral nerve; mg = Mehlis gland; oc = oocapt; od = oviduct; on = oncosphere; ov = ovary; rs = seminal receptacle; te = testes; ub = uterine branches; ud = uteroduct; us = uterine stem; vc = vaginal canal; vd = vitelloduct; vi = vitellaria; vt = vitelline cell.

oncosphere, an intermediate envelope, refractive, 26-29 in diameter, with numerous outgrowth on its surface and two small polar lense-shaped swellings (Figs 2, 3). Vitellaria cortical (Figs 4, 5), in two lateral bands, distinctly shorter than total length of the proglottid, situated in its posterior part with tendency to becoming thicker posteriorly (Figs 6, 7). Aporal vitellaria occupying 72-94% (m = 84%, n= 29) of proglottid length. Vitelloducts extending anteriorly further than vitellaria (Figs 6, 7), exceptionally crossing from one proglottid to another. Ventral excretory canals anastomosed and composed by about 5 main canals on each side, 5-20 in diameter (fig. 6). Dorsal excretory canals thick-walled, about 5 in diameter, without anastomoses and situated in medio-lateral part of proglottid. Longitudinal nerves situated cortically, exteriorely to the vitelline follicles.

The new species is mainly characterized by following features: vitellaria cortical; eggs agglomerated in uteroduct, but not in uterus; low ovary width/proglottis width ratio; testes field sligtly convergent anteriorely; ventral excretory canals anastomosed; powerful vaginal sphincter; long cirrus, occupying about 80% of cirrus pouch length; surface of egg intermediate membrane with numerous outgrowth on its surface.

REMARKS

The cortical situation of vitellaria places the new species in the Monticellidae (Schmidt 1986), and the medullary position of ovary, uterus and testicles, as well as suckers without any lobulation in the genus *Nomimoscolex* (Woodland, 1934).

The latter comprises ten species: *Nomimoscolex alovarius* Brooks & Deardorff, 1980, from *Pimelodus clarias; N. arandasregoi* Fortes, 1981, from *Tachysurus* sp. and *Genidens genidens; N. dorad* (Woodland, 1934), from *Brachyplatystoma rousseauxi; N. lenha* (Woodland, 1933), from *Platystomatichthys sturio; N. lopesi* Rego, 1989, from *Pseudoplatystoma fasciatum; N. magna* Rego, Santo and Silva, 1974, from *Pimelodus clarias; N. matogrossensis* Rego & Pavanelli, 1990, from *Hoplias malabaricus; N. piracatinga* Woodland, 1935, from *Luciopimelodus pati; N. piraeeba* Woodland, 1934, from *Brachyplatystoma filamentosum; N. sudobim* Woodland, 1934, from *Pseudoplatystoma fasciatum* (Brooks & Deardorff, 1980; Fortes, 1981; Freze, 1965; Rego, 1989; Rego & Pavanelli, 1990; Rego, Santo & Silva 1974; Woodland, 1933; 1934a; 1934b; 1935).

Nomimoscolex dorad and *N. piraeeba* share the presence of the apical organ with *N. touzeti;* they differ in the testes being arranged in one field and by the bigger ovary width/ proglottis width ratio. *N. piraeeba* has, in addition, a bigger length of cirrus sac/width of proglottid ratio. Furthermore, the presence of egg clusters in the uteroduct is not recorded from other species.

The Australian *Ophiotaenia hylae* Johnston, 1912, a parasite of *Hyla aurea,* is otherwise the only species of Proteocephalidea from Amphibians known to possess cortical vitellaria (Johnston, 1912). The examination of the original material showed, however, that the vitelline follicles are situated in the medulla. Furthermore, the surface of its scolex is covered with minute spine-like structures, and the apical organ has numerous small hooklets. *O. hylae* is consequently different from the Ecuadorian material.

The position of vitellaria which defines both Monticellidae and Proteocephalidae is sometimes difficult to observe. Consequently, we have compared also our material with seven species of Proteocephalidae recorded from South American amphibians: *Proteocephalus bufonis* Vigueras, 1942 from *Bufo peltacephalus; Ophiotaenia ceratophryos* (Parodi & Widakowich, 1916), from *Ceratophrys ornata; O. bonariensis* Szidat & Soria, 1954, from *Leptodactylus ocellatus; O. ecuadorensis* Dyer, 1986, from *Hyla geographica; Proteocephalus hernandezi* Flores-Barroeta, 1955, from *Rana sp.; O. noei* Wolffhügel, 1948, from *Calyptocephalus gayi; O. olseni* Dyer & Altig, 1977, from *Hyla geographica* (Dyer, 1986; Dyer & Altig, 1977; Flores-Barroeta, 1955; Parodi & Widakowich, 1916; Szidat & Soria, 1954; Vigueras, 1942; Wolffhügel, 1948). Only *O. bonariensis* and *O. ecuadorensis* possess, as in our material, an apical organ, but both species are easily distinguished by having a bigger ovary width/proglottis width ratio. Furthermore, in *O. bonariensis,* the diameter of the apical organ is much larger than the one of the true suckers. In *O. ecuadorensis,* the vitellaria do not extend beyond the ovarian anterior lobes. Therefore, the Ecuadorian material is proposed as a new species, named in honour of Jean-

Marc Touzet, Quito, who has collected the material: *Nomimoscolex touzeti* n. sp.

Freze (1963) erected *Kapsulotaenia* to include species of *Acanthotaenia* where the egg clusters are surrounded by a membrane. Schmidt (1986) followed this classification. In Proteocephalidae, this kind of capsules is formed, according to Freze (1965), in the fertilization duct. In *N. touzeti*, we never observed any apparent membrane surrounding the egg conglomerate. The eggs enter the uterus individually where they remain separated. This observation has never been recorded in the litterature about Proteocephalidea.

Nomimoscolex touzeti is the first member of Monticellidae found in an amphibian host and the the second one, with *Vaucheriella bicheti* (de Chambrier, 1987) which parasitize a terrestrial vertebrate.

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