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NEW SPECIES OF *ANDRYA* AND *PARANOPOLOCEPHALA* (CESTOIDEA: ANOPOLOCEPHALIDAE) FROM VOLES AND MOLE-RATS IN ISRAEL AND SYRIA

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ABSTRACT: *Andrya rauschi* n. sp. from *Microtus guentheri* differs from all other species in testes number (22–40) and distribution. *Andrya rauschi* is superficially similar to *Paranoplocephala omphalodes* but differs in the development of the uterus. *Paranoplocephala nevoi* n. sp. from *Spalax ehrenbergi*, is most similar to *Paranoplocephala gundii* and *Paranoplocephala janickii* but differs in the number of testes (26–44). *Paranoplocephala nevoi* differs from the remaining species in the distribution of testes and in having unilateral genital pores.

In a previous publication (Wertheim et al., 1986) survey data on cestodes of small mammals from Israel and the Sinai peninsula were presented. In that paper *Andrya* sp. and *Paranoplocephala* sp. were reported with the comment that they may be new. The present report describes these species. The specimens were fixed in warm AFA, stained with Semichon's carmine, and mounted by conventional technique. Measurements are in μm unless otherwise indicated. Classification follows Schmidt (1986).

DESCRIPTIONS

Andrya rauschi n. sp. (Figs. 1–5)

Two gravid specimens collected from a vole, *Microtus guentheri*, in Israel represent a previously undescribed species.

General: Strobila 12–14 cm long, 2.5–3.0 mm greatest width at posterior end ($n = 2$). Scolex (Fig. 1) about 1.4 mm long, 1.45 mm greatest width ($n = 1$). Suckers rounded, 488 wide ($n = 4$). Neck about 2 mm long.

Proglottids (Fig. 2) acraspedote. Mature proglottids 120–408 long, 520–800 wide ($n = 20$). Gravid proglottids 1,035–1,610 long, and 1,150–3,000 wide ($n = 20$). Genital pores irregularly alternating, about equatorial. Genital ducts (Fig. 3) pass dorsal to osmoregulatory canals. Genital atrium 40–60 deep, 40–50 long ($n = 5$). Ventral osmoregulatory canals about 20 wide, with simple anastomosis near posterior end of each proglottid; dorsal canals not clearly seen. Male reproductive system matures before female system.

Male genitalia: Testes, 22–40, in single field aporal to ovary ($n = 20$); each 22–66 wide in mature segments ($n = 50$). Cirrus pouch (Fig. 3) elongate, oval, 240–480 long, 88–128 greatest width ($n = 20$). Cirrus small, covered with small spines. Vas deferens expanded into external seminal vesicle.

Female genitalia (Fig. 3): Ovary lobulated, mostly poral, 312–472 wide, 160–282 long ($n = 20$). Vitellarium horseshoe-shaped, posterior to ovary, 280–480 wide, 138–206 long ($n = 20$). Vagina sometimes anterior, usually posterior to cirrus pouch. Seminal receptacle 160–240 long, 64–112 wide ($n = 20$). Uterus (Fig. 4) first forms as a reticulum, then rapidly fills to form a transverse, irregular sac, overlapping osmoregulatory canals (as described by Rausch, 1976). Eggs (Fig. 5) 24–42 wide ($n = 25$). Oncospheres about 14 wide; oncosphere hooks 6–10 long ($n = 20$).

Taxonomic summary

Type host: Vole, *Microtus guentheri* (Danford et Alston, 1880).

Type locality: Mishmar Ha'Emek, Israel.

Habitat: Small intestine.

Etymology: Named in honor of Dr. R. L. Rausch, University of Washington, Seattle, Washington, who contributed much to our knowledge of the family Anoplocephalidae.

Type specimens: Hebrew University, Jerusalem, Parasitological Collection: holotype number 92, paratype number 105.

Remarks

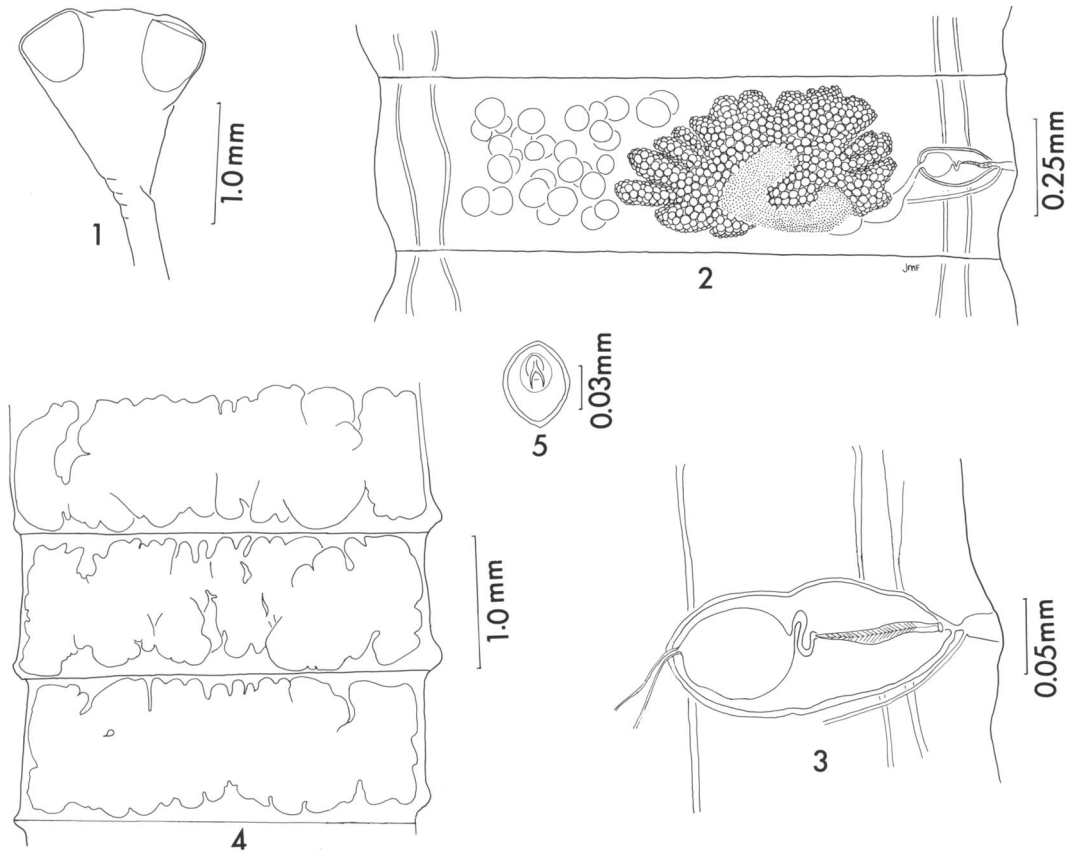
Andrya Railliet, 1893, was established for the species *Andrya rhopalocephala* and *Andrya cuniculi*. The main characteristic distinguishing the genus was thought to be the presence of a prostate gland. Kirschenblat (1938) proposed that the species of the genus *Andrya* in which no prostate gland was found be put into the subgenus *Aprostataandrya*. Rausch (1976) stated that the tapeworms of the genus *Andrya* have no prostate gland and that the structure is synonymous with the vesicula seminalis externa. He came to the conclusion that the genus *Aprostataandrya* is a synonym of the genus *Paranoplocephala*. The dominant characteristic distinguishing the 2 genera is a primarily reticulate uterus in *Andrya* (Rausch, 1976).

Andrya rauschi is similar in the number of testes to *Andrya primordialis* Douthitt, 1915, *Andrya montana* (Kirschenblat, 1941), and *Andrya kalelai* Tenora, 1985. Those differ in that the testes are distributed anteriorly and aporal to the ovary, whereas the testes of *A. rauschi* are only aporal to the ovary. The species of *Paranoplocephala* (which is easily confused with *Andrya*) that are similar in the number and distribution of the testes

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FIGURES 1–5. *Andrya rauschi* n. sp. from a vole in Israel. 1. Scolex. 2. Mature proglottid. 3. Terminal genital ducts. 4. Gravid proglottids. 5. Egg.

are *Paranoplocephala omphalodes*, *Paranoplocephala blanchardi*, and *Paranoplocephala bairdi*. *Andrya rauschi* is most similar to *P. omphalodes* but differs in the development of the uterus. *Paranoplocephala omphalodes* first develops an aggregation of cells extending transversely across the segment near the ventral surface, this cell mass gradually becomes reticulate, then an irregular sac (see Rausch, 1976). In *A. rauschi*, it first forms a reticulum that rapidly becomes an irregular sac.

***Paranoplocephala nevoi* n. sp.**
(Figs. 6–9)

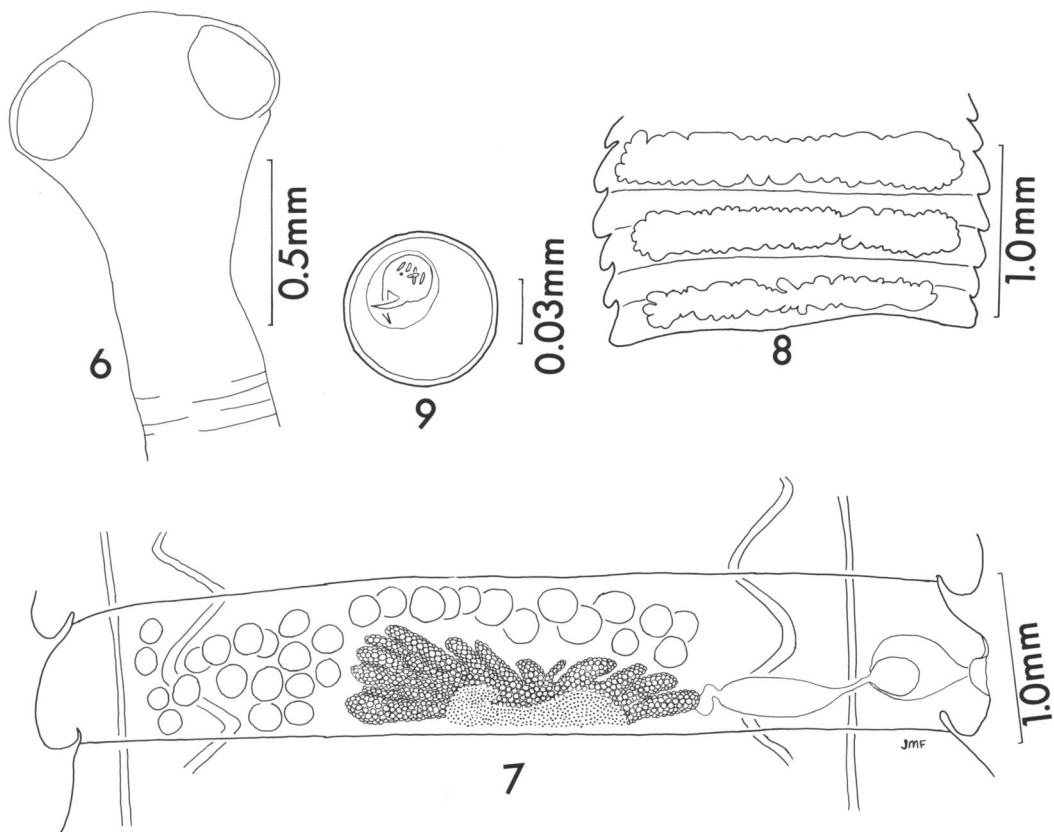
Six gravid specimens collected from a single mole-rat, *Spalax ehrenbergi*, of 153 specimens examined, in Israel, represent a previously undescribed species.

General: Strobila about 4–5 cm long, 2.1 mm greatest width at posterior end (n = 4). Scolex (Fig. 7) 200–500 long, 424–688 greatest width (n = 9). Suckers rounded, 140–232 wide (n = 25). Neck 264–776 (n = 3), measured from posterior ends of suckers to first indication of segmentation.

Proglottids craspedote. Mature proglottids 80–208 long, 897–1,472 wide (n = 20). Gravid proglottids 304–408 long, and 1,610–2,100 wide (n = 20). Genital pores unilateral, about equatorial. Ventral osmoregulatory canals about 10 wide, with simple anastomosis near posterior end of each proglottid.

Male genitalia (Fig. 7): Testes 26–44 in single field, mostly aporal to ovary with some reaching anterior and poral fields (n = 20); each 20–60 (n = 50) wide in mature segments. Aporal testes extend dorsal to osmoregulatory canals. Cirrus pouch elongate, oval, 118–160 long, 62–84 wide (n = 15). Cirrus small and unspined, 40–70 long (n = 15). Vas deferens expanded into external seminal vesicle.

Female genitalia (Fig. 7): Ovary lobulated, slightly poral, 122–200 wide, 20–40 long (n = 20). Vitellarium posterior to ovary, 148–204 wide, 20–60 long (n = 20). Seminal receptacle 120–224 long, 56–120 wide (n = 20). Uterus (Fig. 8) first develops into a transverse aggregation of cells, which gradually becomes reticulate and then an irregular sac. Eggs (Fig. 9) 34–50 wide and oval shaped (n = 25). Oncospheres 10–20 wide (n = 15); oncosphere hooks 6–8 (n = 10).



FIGURES 6–9. *Paranoplocephala nevoi* n. sp. from a mole-rat in Israel. 6. Scolex. 7. Mature proglottid. 8. Gravid proglottids. 9. Egg.

Taxonomic summary

Type host: The mole-rat, *Spalax ehrenbergi* (Nehring, 1898); chromosomal form $2N = 54$ (Wertheim and Nevo, 1971).

Type locality: Mas'ada (Golan Heights), Syria.

Habitat: Small intestine.

Etymology: Named in honor of Dr. E. Nevo, Institute of Evolution, Haifa University, Haifa 31999, Israel.

Type specimens: Hebrew University Parasitological Collection, Jerusalem: holotype no. N 24; paratype nos. N 24a, b, c, d, e.

Remarks

Lühe (1910) established the genus *Paranoplocephala* for the species *P. omphalodes*. Baer (1927) synonymized the genus *Anoplocephaloides* with *Paranoplocephala*. Rausch (1976) transferred several *Paranoplocephala* species to *Anoplocephaloides* and redescribed the uterus as "first rod-like, transverse, becoming reticulate and developing anterior and posterior sacculations." Tenora et al. (1985) verified the difference in the process of uterus formation between the two.

Paranoplocephala nevoi n. sp. is most similar to

Paranoplocephala gundii (Joyeux, 1923) and *Paranoplocephala janickii* Tenora, 1985, but it differs in the number of testes; *P. gundii* has 40–55, *P. janickii* has 50–55. The genital pores and cirrus sac of *P. nevoi* are different than *Paranoplocephala gracilis* Tenora et Murai, 1980, because the cirrus sac overlaps the ventral excretory canal in *P. nevoi*. *Paranoplocephala nevoi* differs from the rest of the *Paranoplocephala* species in testes distribution and in having unilateral genital pores. It is also similar to several *Andrya* species but differs in the development of the uterus.

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