

**Three New Species of Cestodes, *Sobolevitaenia turdi*,
Sobolevitaenia oitaensis, and *Neyraia turdi*, from a Ground Thrush,
Turdus sibiricus at Oita Prefecture, Southern Japan**

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(Accepted March 19, 1996)*

Abstract

Sixty six cestode specimens were obtained from the small intestine of a ground thrush, *Turdus sibiricus*, at Beppu City, Oita Prefecture, Southern Japan, on February 3, 1995. The specimens could be morphologically divided into 3 groups; the first group consisting of 35 specimens was identified as *Sobolevitaenia turdi* n. sp., the second of 26 specimens as *S. oitaensis* n. sp. and the third of 3 specimens as *Neyraia turdi* n. sp. *S. turdi* n. sp. closely resembles *S. moldavica* Shumilo and Spasskaja, 1975 but differs from it in the larger rostellum, the smaller number of rostellar hooks and the larger rostellar sac. *S. oitaensis* n. sp. closely resembles *S. moldavica* Shumilo and Spasskaja, 1975 but differs from it in the larger number and size of the rostellar hooks, the larger size of the rostellar sac, the smaller size of the testes, and situation of the genital pores. *Neyraia turdi* n. sp. differs from all the known 7 species of the genus in absence of the neck, the cirrus pouch and cirrus armed with spines, and shape of the rostellar hooks.

Key words: avian cestodes; *Sobolevitaenia turdi*; *Sobolevitaenia oitaensis*; *Neyraia turdi*; *Turdus sibiricus*; morphology.

Introduction

Ten species of the genus *Sobolevitaenia* Spasskaja and Makarenko, 1965 have been recorded from birds: *S. anthusi* Spasskaja, 1958, *S. borealis* Krabbe, 1868, *S. iola* Lincicome, 1939, *S. korochirei* Voser et Vaucher, 1988, *S. moldavica* Shumilo et Spasskaja, 1975, *S. orientalis* Spasskii et Konovalov, 1971, *S. similis* Spassky et Konovalov, 1969, *S. sobolevi* Spasskaja et Makarenko, 1965, *S. spinoscapite* Joyeux et Baer, 1955, and *S. verulamii* Mettrick, 1958. *Sobolevitaenia* species have not been recorded in Japan.

Seven species of the genus *Neyraia* Joyeux et Timon-David, 1934 have been recorded only birds of the family Upupidae in various areas of the world, however, no *Neyraia* species have been recorded in Japan.

The present paper deals with the morphology of the three new cestode species from a ground thrush

in Japan.

Materials and Methods

Sixty six cestode specimens were obtained from the small intestine of a ground thrush, *Turdus sibiricus* immediately after it died, on February 3, 1995. All specimens were fixed in 30% acetic alcohol and then expanding in 45% acetic acid. The specimens divided into 3 groups; group 1 of 35 specimens, group 2 of 28 specimens and group 3 of 3 specimens. Expanding 10 specimens of group 1 and 2, and 3 specimens of group 3 were used for study. Specimens were pressed between two slides and fixed in 70% ethanol, stained with Heidenhain's hematoxylin, dehydrated in an alcohol series, cleared in xylene, and mounted with Canada balsam.

Other 10 specimens of group 1 and 2 respectively were used for histological examination. Section of 4 μ m thick were stained with hematoxylin and eosin and mounted with Canada balsam. All histological specimens were observed with oil immersion equip-

ment. All measurement are given in millimeter.

Sobolevitaenia Spasskaja and Makarenko, 1965
Sobolevitaenia turdi n. sp.

(Figs. 1–6)

Strobila 10–12 in length, 0.5 in maximum width, with 44 proglottides, which wider than long, but young gravid proglottides equal in length and width, trapezoidal. Neck absent. Scolex 0.40–0.42 long by 0.55 wide, deeply demarcated from proglottid. Rostellar apparatus muscular. Rostellum 0.24–0.27 long by 0.09 wide, armed with 2 rows of 16 hooks; anterior hooks 0.045, posterior ones 0.042 in length. Rostellar sac 0.34 long by 0.15 wide, extending posteriorly beyond posterior margin of suckers. Suckers 4 in number, 0.18 in diameter, their atrium surrounded by lip-like membrane, covered with tiny scales on surface and armed with minute spines, 0.0023–0.0025 long, on border. Genital pores irregularly alternate and located at anterior one-fourth of proglottid lateral margin. Cirrus pouch elongated, 0.075–0.080 long by 0.015–0.018 wide, armed with small and stout spines, arranged in anterior half of cirrus pouch and crossing longitudinal osmoregulatory canal. Cirrus 0.063 long by 0.005 wide, armed with minute spines. Vas deferens coiled once in posterior half of cirrus pouch and coiled many times in anterior part of proglottid along midline.

Testes 17–18 in number, 0.08–0.1 in diameter, arranged mainly posterior to ovary and rarely, a few of them situated beside ovary but not extending anterior to ovary. Vagina opening just posterior to male aperture, having no poral sphincter, crossing longitudinal osmoregulatory canal and being dilated in distal end to become seminal receptacle, 0.05–0.07 by 0.055 in size, which situated anterior to ovary. Ovary bilobed, 0.12 across. Vitelline gland compact, 0.02–0.025 in diameter, located just behind ovary. Young gravid proglottid 0.5 long by 0.5 wide, old gravid ones not found.

Host: Ground thrush, *Turdus sibiricus*

Habitat: Small intestine

Locality and date: Beppu City; February 3, 1995

Type specimens: Holotype and paratype deposited in Meguro Parasitological Museum, MPM Col. No. 19673

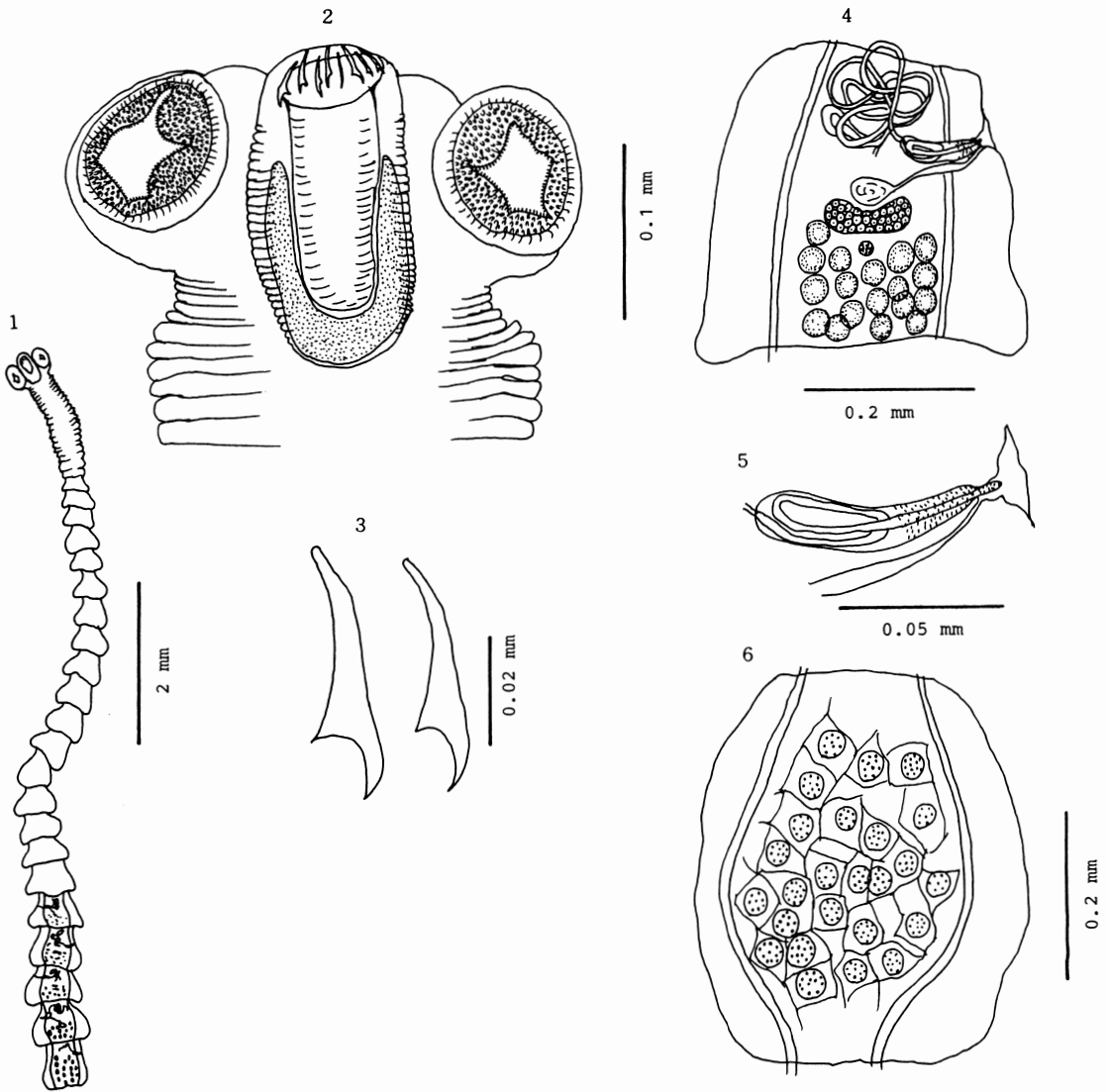
Discussion

Bona (1994) transferred all the species of the genus *Anomotaenia* parasitic in the avian family Turdidae to any of the genera *monopylidium*, *Sobolevitaenia* and *Spasspasskya* and considered the genus *Sobolevitaenia*, being synonymous with the genus *Choanotaenia* by Schmidt (1986), as a distinct genus.

The members of the genus *Sobolevitaenia* has the most discriminative morphological features such as 2 rows of rostellar hooks, the suckers covered with spines, the vagina without pre-atrial sphincter and the reticulated uterus. The *Anomotaenia* Cohn, 1900 has the suckers without spines, and the vagina with poral sphincter (Bona, 1994). The genus *Spasspasskya* Spasskaja and Makarenko, 1965 has the suckers without spines, regularly alternate genital pores, and the vagina without a pre-atrial sphincter. The genus *Monopylidium* Fuhrmann, 1899 has the suckers without spines, and the vagina without poral sphincter, the reticulated uterus (Spasskii, 1993; Bona, 1994), thus specimens of group 1 and 2 were assigned to the genus *Sobolevitaenia*.

The genus *Sobolevitaenia* Spasskaja and Makarenko, 1965 included 10 species; *S. anthusi* Spasskaja, 1958 (Syn. *Choanotaenia anthusi* (Spasskaja, 1958) Schmidt, 1986, *Anomotaenia anthusi* (Spasskaja, 1958) Mathevossian, 1963), *S. borealis* Krabbe, 1868 (Syn. *Taenia borealis* Krabbe, 1868, *Anomotaenia borealis* (Krabbe, 1868) Clerc, 1901, *Anomotaenia borealis* (Krabbe, 1868) Fuhrmann, 1908), *S. iola* Lincicome, 1939 (Syn. *Choanotaenia iola* (Lincicome, 1934), *S. korochirei* Voser and Vaucher, 1988 (Syn. *Anomotaenia korochirei* Voser and Vaucher, 1988), *S. moldavica* Shumilo and Spasskaja, 1975 (Syn. *Monopylidium moldavica* Shumilo and Spasskaja, 1975), *S. orientalis* Spasskii and Konovalov, 1971, *S. similis* Spasskaja and Makarenko, 1969, *S. sobolevi* Spasskaja and Makarenko, 1965, *S. spinosocapite* (Joyeux and Baer, 1955) Mathevossian, 1963) and *S. verulamii* Mettrick, 1958 (Syn. *Anomotaenia verulamii* Mettrick, 1958).

The present specimens of group 1 closely resemble *S. moldavica* Shumilo and Spasskaja, 1975 but differ from it in the larger strobila (10–12 by 0.5 vs. 4–5 by 0.56), absence of the neck (from section

(Figs. 1–6 *Sobolevitaenia turdi* n. sp.)

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|--------|-----------------|--------|--------------------------|
| Fig. 1 | Strobila. | Fig. 4 | Mature proglottid. |
| Fig. 2 | Scolex. | Fig. 5 | Cirrus pouch. |
| Fig. 3 | Rostellar hook. | Fig. 6 | Young gravid proglottid. |

specimens, absent vs. 0.168), the smaller number of rostellar hooks (16 vs. 20), the smaller cirrus pouch (0.075–0.08 by 0.015–0.018 vs. 0.16–0.195 by 0.017–0.022), and the lobation of ovary (bilobate vs. multi lobate).

Sobolevitaenia Spasskaja and Makarenko, 1965
Sobolevitaenia oitaensis n. sp.

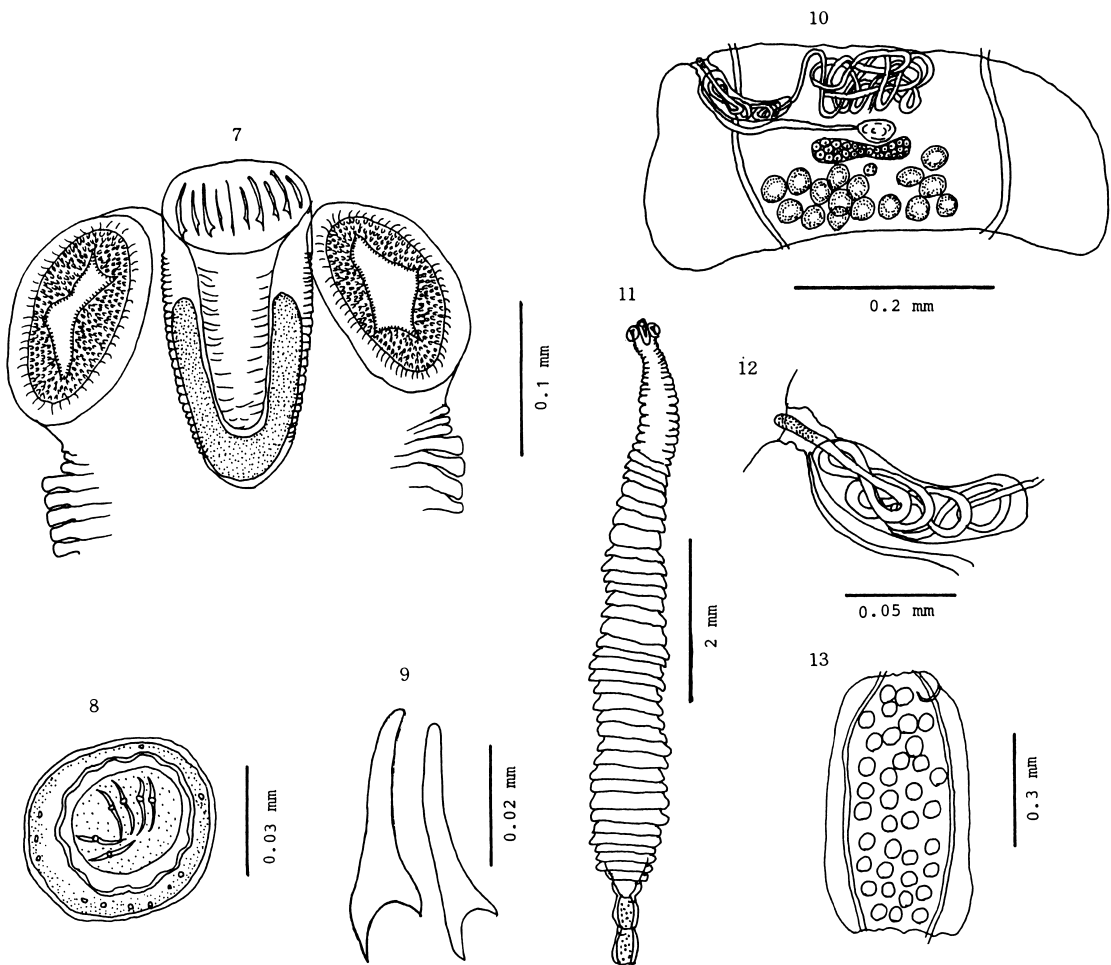
(Figs. 7–13)

Strobila 8.0–9.2 in length, 0.9–1.2 in maximum width, craspedote, proglottides 42–45 in number, wider than long except in old gravid proglottides. Mature proglottids 0.35 by 0.95–1.2 wide and old gravid ones 0.77 long by 0.57 wide. Scolex 0.35–0.40 long by 0.48–0.55 wide. Rostellar apparatus muscular. Rostellum 0.19 long by 0.16 wide, armed

with 2 rows of 22 hooks; anterior hooks 0.053 long and posterior ones 0.043 long. Rostellar sac 0.37 long by 0.16 wide, extending posteriorly beyond posterior margin of suckers. Suckers 4 in number, 0.2–0.25 in diameter, their atrium lined with lip-like membrane, and covered with tiny scales on surface and armed with minute spines on border, 0.003–0.0035 long. Genital pores irregularly alternate, located on anterior extremity of proglottid lateral margin. Neck absent. Cirrus pouch unarmed, filled with coiled vas deferens, 0.1–0.12 long by 0.025

wide, crossing longitudinal osmoregulatory canal. Cirrus 0.18 long by 0.01 wide, armed with minute spines all over the surface. Vas deferens much coiled, 0.018 in diameter, located around midline of proglottid. Testes 16–17 in number, 0.038–0.043 by 0.03 in size, arranged posterior to ovary along posterior margin of proglottid.

Vagina without poral sphincter, opening posterior to male genital orifice and running inward and dilated in distal end to form seminal receptacle, 0.07–0.09 by 0.038–0.05 in size, located anterior to



(Figs. 7–13 *Sobolevitaenia oitaensis* n. sp.)

- Fig. 7 Scolex.
 Fig. 8 Egg.
 Fig. 9 Rostellar hook.
 Fig. 10 Mature proglottid.

- Fig. 11 Strobila.
 Fig. 12 Cirrus pouch.
 Fig. 13 Gravid proglottid.

ovary. Ovary bilobated, 0.2 across. Vitelline gland, compact, 0.005 in diameter, located just posterior to ovary. Gravid proglottid filled with eggs in area between both longitudinal osmoregulatory canals. Uterus reticulate. Eggs ovoid, 0.055 by 0.043 in outer sheath, 0.038 by 0.035 in inner undulating membrane. Onchosphere 0.035 by 0.03; embryonic hooks 0.015 long.

Host: Ground thrush, *Turdus sibiricus*

Habitat: Small intestine

Locality and date: Beppu City; February 3, 1995

Type specimens: Holotype and paratype deposited in Meguro Parasitological Museum, MPM Coll. No. 19674

Discussion

The genus *Sobolevitaenia* Spasskaja and Makarenko, 1965 included 10 species; *S. anthusi* Spasskaja, 1958 (Syn. *Choanotaenia anthusi* (Spasskaja, 1958) Schmidt, 1986, *Anomotaenia anthusi* (Spasskaja, 1958) Mathevossian, 1963), *S. borealis* Krabbe, 1868 (Syn. *Taenia borealis* Krabbe, 1868, *Anomotaenia borealis* (Krabbe, 1868) Clerc, 1901, *Anomotaenia borealis* (Krabbe, 1866) Fuhrmann, 1908), *S. iola* Lincicome, 1939 (Syn. *Choanotaenia iola* Lincicome, 1934), *S. korochirei* Voser and Vaucher, 1988 (Syn. *Anomotaenia korochirei* Voser and Vaucher, 1988), *S. moldavica* Shumilo and Spasskaja, 1975 (Syn. *Monopylidium moldavica* Shumilo and Spasskaja, 1975), *S. orientalis* Spasskii and Konovalov, 1971, *S. similis* Spasskaja and Makarenko, 1969, *S. sobolevi* Spasskaja and Makarenko, 1965, *S. spinoscapite* (Joyeux and Baer, 1955) Galkin, 1979 (Syn. *Choanotaenia spinoscapite* Joyeux and Baer, 1955, *Anomotaenia spinoscapite* (Joyeux and Baer, 1955) Mathevossian, 1963) and *S. verulamii* Mettrick, 1958 (Syn. *Anomotaenia verulamii* Mettrick, 1958).

The present specimens of group 2 closely resemble *S. moldavica* Shumilo and Spasskaja, 1975 but differ from it in the larger strobila (8–9.2 by 0.9–1.2 vs. 4–5 by 0.56), larger number of the rostellar hooks (22 vs. 20), the absence of neck (from section specimens, absent vs. 0.168), the larger suckers (0.2–0.25 in dia. vs. 0.145 by 0.129), the smaller size of testes (0.038–0.043 by 0.03 vs. 0.056 by 0.072), and bilobate ovary (bilobated vs. multi lobated).

Neyraia Joyeux and Timon-David, 1907

Neyraia turdi n. sp.

(Figs. 14–25)

Three specimens of the genus *Neyraia* were obtained; two with the scolex and one without it.

Strobila spindle-like in contour, 6.0–9.6 in length, 2.1–2.2 in maximum width; proglottid about twenty times wider than long, craspedote. Scolex 0.3 long by 0.55 wide. Suckers unarmed, 0.15 in diameter. Rostellum 0.23 long by 0.22 wide, armed with 4 rows of about 80 wrench-like hooks although the accurate total number of them could not be determined. The first row hooks 0.1 long, 0.02 wide, the second row hooks 0.075 long, 0.013 wide, the third row hooks 0.053 long, 0.013 wide, and the fourth row hooks 0.03 long, 0.013 wide. Neck absent.

Mature proglottid 0.1–0.12 long by 2.2 wide. Genital pores irregularly alternate, situated anterior to the anterior first quarter of proglottid margin. Testes 5–6 in number, 0.035–0.038 in diameter, divided in two groups: 2–3 poral and 3 aporal. Cirrus pouch club-shaped, 0.12–0.14 long by 0.03–0.038 wide, armed with minute spines in the posterior half, not reached longitudinal osmoregulatory canal. Vas deferens not coiled but twisted, running along anterior margin of proglottid. Cirrus long, 0.18–0.2 long by 0.013 wide, armed with minute spines. Seminal vesicle oval, 0.05 by 0.055–0.063.

Vagina opening posterior to male genital orifice, dilated in proximal portion to form seminal receptacle, situated between ovary and vitelline gland, 0.04 by 0.03. Ovary bilobed, 0.1–0.14 across. Vitelline gland 0.02–0.025 in diameter, located just behind seminal receptacle.

No gravid proglottid detected.

Host: Ground thrush, *Turdus sibiricus*

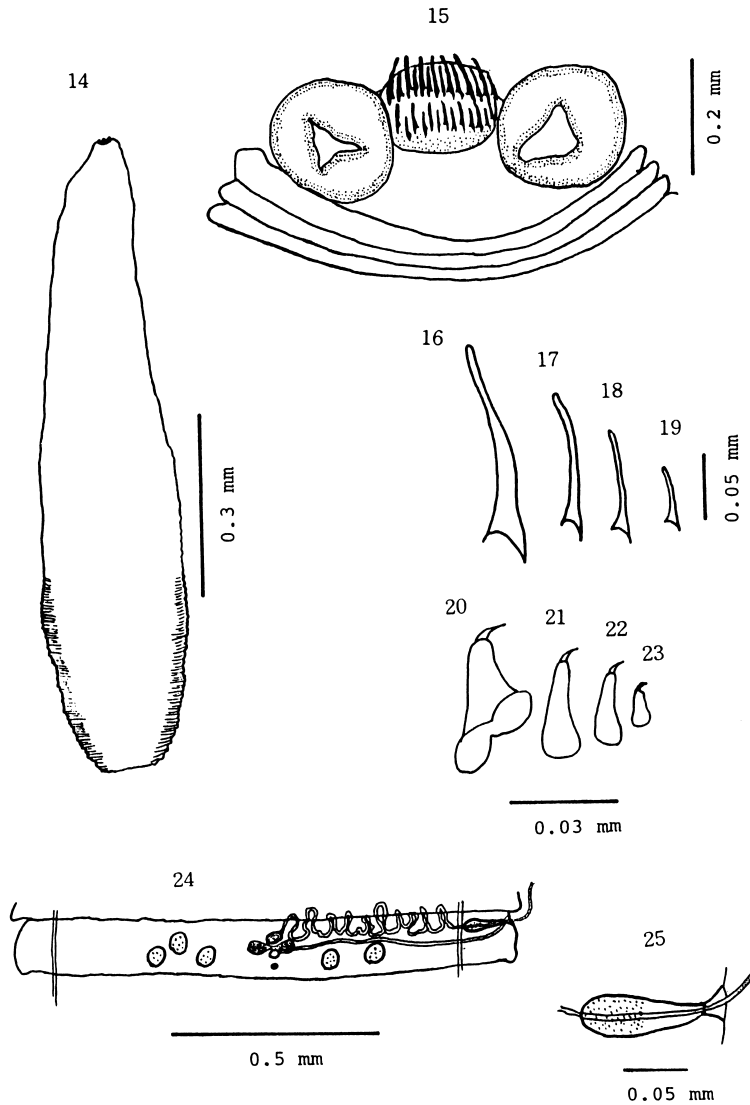
Habitat: Small intestine

Locality and date: Beppu City; February 3, 1995

Type specimens: Holotype and paratype deposited in Meguro Parasitological Museum, MPM Coll. No. 19675

Discussion

The genus *Neyraia* Joyeux and Timon-David, 1934 includes 7 species: *N. intricata* (Krabbe, 1878) Joyeux and Timon-David, 1934, *N. aegypti* Omran, El-Naffar and Mandour, 1981, *N. hookensis*



(Figs. 14–25 *Neyraia turdi* n. sp. and *N. intricata*)

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|---------|-----------------------------------|---------|--|
| Fig. 14 | Strobila. | Fig. 20 | Rostellar hook of <i>N. intricata</i> in the first row. |
| Fig. 15 | Scolex. | Fig. 21 | Rostellar hook of <i>N. intricata</i> in the second row. |
| Fig. 16 | Rostellar hook in the first row. | Fig. 22 | Rostellar hook of <i>N. intricata</i> in the third row. |
| Fig. 17 | Rostellar hook in the second row. | Fig. 23 | Rostellar hook of <i>N. intricata</i> in the fourth row. |
| Fig. 18 | Rostellar hook in the third row. | Fig. 24 | Mature proglottid. |
| Fig. 19 | Rostellar hook in the fourth row. | Fig. 25 | Cirrus pouch. |

Chbichenko, 1974, *N. krabbei* Kalyankar and Palladwar, 1977, *N. moghei* Shinde, 1972, *N. parva* Mahon, 1958 and *N. sultanpurensis* Srivastav, 1980 which have been reported from Europe, India, Egypt,

South Africa and Russia (Schmidt, 1986). In Japan, however, no species of the genus has been recorded.

The present new species was identified as a species of the genus *Neyraia* by the following char-

acters: 4 circles of the rostellar hooks of varying sizes, genital pores alternating irregularly, and testes small in number; however, it differs from all the known 7 species of the genus in absence of the neck (absent vs. long), the proglottid extremely wider than long (twenty times wider), and the armed cirrus pouch and cirrus (armed with spines vs. unarmed).

Acknowledgment

The author wishes to thank Dr. Hiroshi Itagaki for valuable advices.

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