

A Report on Occurrence of Larval Forms of *Hydatigera* (Cestoda: Taeniidae) from Rats in Garhwal Himalaya

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(Received for publication: November 22, 1983)

Key words: Strobilocercus larva, *Hydatigera*, *Rattus rattus*, Garhwal Himalaya

Introduction

The occurrence of strobilocercus larvae of the genus *Hydatigera* in rats has been discussed in detail by Southwell (1930), Wardle and McLeod (1952) and Yamaguti (1959). Hitherto unreported larval forms of *H. balaniceps* (Hall, 1911), and *H. parva* (Baer, 1926) have been described and figured. Strobilocercus of *H. laticollis* has been reported from an unusual habitat in natural infections.

Materials and Methods

The right and left liver lobes of ten infected roof rats, *Rattus rattus* at 1600-1800 meter above the sea in Garhwal Himalaya, India, harboured 28 and 15 larval specimens of *H. balaniceps* and *H. parva*, respectively, while the small intestines of two *R. rattus* harboured 36 larvae of *H. laticollis*. The specimens were fixed in aqueous Bouin's solution for 24 hours; stained in Meyer's Haemalum; dehydrated; cleared in xylene and mounted in canada balsam. Drawing were made with the aid of camera lucida. Measurements have been expressed as length by width and included the mean \pm standard deviation/standard error followed by the given range in parentheses. All measurements

are in millimeters.

Results

Larva of *H. balaniceps* (Figs. 1-4)

Description (based on 28 whole mounts; all measured): Medium sized worms measuring $100 \pm 10.62/6.13$ (86-112) in length. Scolex characteristically acorn shaped, measuring $0.868 \pm 0.02/0.01$ (0.843-0.893) \times $1.442 \pm 0.28/0.16$ (0.89-1.523). Rostellum prominent muscular, $0.601 \pm 0.12/0.07$ (0.409-0.694) \times $0.811 \pm 0.09/0.06$ (0.62-0.832) bearing two rows of $30 \pm 0.94/0.54$ (28-30) unequal rostellar hooks, each row bearing $14 \pm 0.47/0.27$ (14-15). Anterior row of $12 \pm 0.94/0.54$ (10-12) large hooks $0.325 \pm 0.01/0.007$ (0.305-0.333) long with blade, $0.155 \pm 0.01/0.007$ (0.131-0.16), handle, $0.168 \pm 0.01/0.007$ (0.146-0.173) and guard, $0.038 \pm 0.002/0.001$ (0.035-0.039) in length. Posterior row also consists of $12 \pm 0.76/0.48$ (10-12), small rostellar hooks measuring $0.222 \pm 0.2/0.009$ (0.199-0.238) in length with a blade, $0.115 \pm 0.01/0.007$ (0.098-0.126), handle, $0.10 \pm 0.02/0.01$ (0.069-0.112) and guard, $0.041 \pm 0.003/0.002$ (0.036-0.044) in length. Neck distinct measuring $0.487 \pm 0.06/0.03$ (0.391-0.526) \times $1.731 \pm 0.38/0.22$ (1.637-2.492). Suckers unarmed with weak musculature, $0.408 \pm 0.09/0.05$ (0.301-0.521) \times $0.466 \pm 0.12/0.07$ (0.3-0.583). Proglottides in the middle of the strobila measuring $0.353 \pm 0.02/0.009$ (0.33-0.372) \times $2.325 \pm 0.08/0.04$ (2.232-2.418), while hinder proglottides prior to bladder are much smaller, measuring $0.375 \pm 0.15/0.09$ (0.211-0.587) \times $0.522 \pm 0.17/0.01$ (0.307-0.732) in size. Early and middle proglottides showing marginal serrations. The bladder at

Supported in part by grant code no. 11, 386 from University Grants Commission, New Delhi, India.

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hinder end measuring $2.213 \pm 0.37/0.21$ (1.761–2.666) $\times 1.358 \pm 0.11/0.06$ (1.228–1.488). Proglottides with uterus or eggs could not be observed. Excretory vessels two pairs; ventral excretory vessel wider, 0.12 ± 0.03 (0.02–0.123) in diameter and dorsal excretory vessel narrower, $0.031 \pm 0.01/0.009$ (0.01–0.052) in diameter.

Habitat: Right and left lobes of liver of *Rattus rattus* of Garhwal Hills (1600–1800 meter above the sea), India.

Type specimens: Holotype slide no. PCLS 073/81 and paratype slide no. PCLS 074/81 deposited in Parasitological Laboratory, Department of Zoology, University of Garhwal, Pauri Campus, Pauri (Garhwal) 246 001, U. P.

Larva of *H. laticollis* (Figs. 5–8)

Description (based on 36 whole mounts; all measured): Worms measuring $74 \pm 16.68/9.63$ (42–80) $\times 2.612 \pm 0.84/0.94$ (0.834–2.629) and possess a bladder at the posterior extremity measuring $3.745 \pm 0.13/0.07$ (3.521–3.82) $\times 2.356 \pm 0.13/0.08$ (2.111–2.413) in size. Proglottization starting at a distance of $0.688 \pm 0.03/0.02$ (0.687–0.743) from the posterior end of the scolex. Neck, $0.683 \pm 0.04/0.02$ (0.621–0.713) $\times 1.356 \pm 0.22/0.13$ (0.989–1.524). Scolex, $0.682 \pm 0.05/0.03$ (0.605–0.713) $\times 0.893 \pm 0.27/0.16$ (0.784–1.402) with a broad base. Suckers muscular, unarmed, measuring $0.239 \pm 0.02/0.01$ (0.202–0.245) $\times 0.289 \pm 0.02/0.009$ (0.258–0.297) in size. Rostellum, $0.496 \pm 0.06/0.03$ (0.381–0.512) $\times 0.719 \pm 0.12/0.07$ (0.557–0.848) with two rows of $34 \pm 0.94/0.54$ (32–34) prominent unequal rostellar hooks; each row possessing $17 \pm 0.74/0.27$ (16–17) hooks. Smaller hooks of anterior row $0.242 \pm 0.007/0.004$ (0.23–0.248) long with a handle, $0.084 \pm 0.007/0.004$ (0.071–0.087); a sharply curved blade, $0.158 \pm 0.002/0.001$ (0.155–0.161) and a bifid guard, $0.034 \pm 0.01/0.008$ (0.031–0.064) long. Larger hooks of posterior row $0.384 \pm 0.03/0.02$ (0.332–0.397) long and possess a long handle, $0.191 \pm 0.01/0.007$ (0.169–0.198) long; blade, $0.192 \pm 0.01/0.008$ (0.165–0.199) and a bifid guard, $0.068 \pm 0.01/0.008$ (0.042–0.074) in length. Proglottides imbricate, the anterior much wider than long, $0.227 \pm 0.11/0.06$ (0.124–0.398) $\times 2.612 \pm 0.74/$

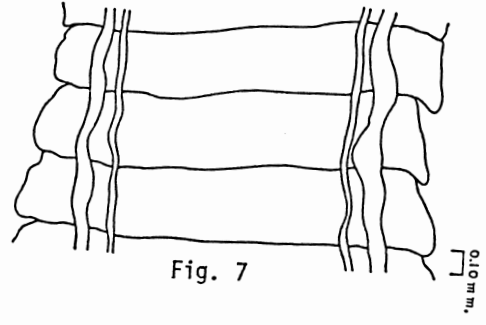
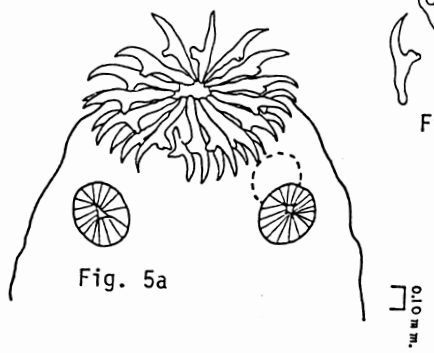
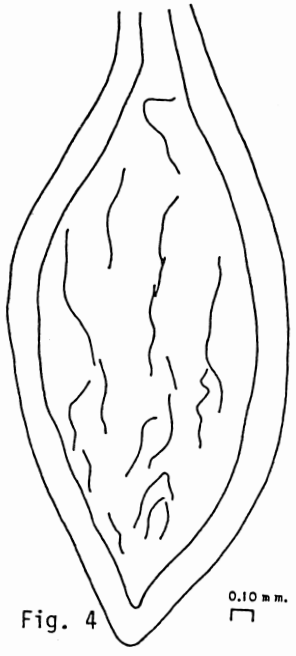
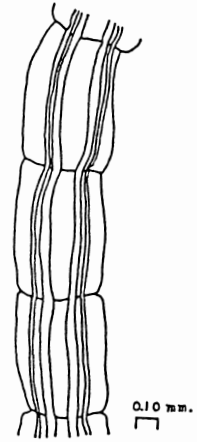
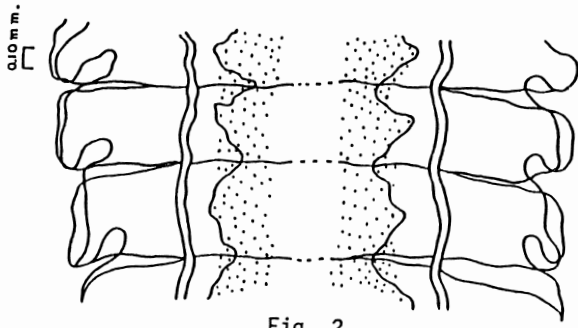
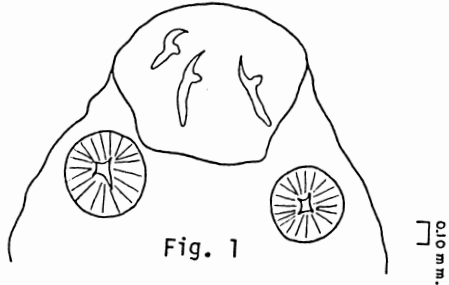
0.43 (1.057–2.629) and the posterior proglottides approximately square, $0.523 \pm 0.02/0.01$ (0.508–0.558) $\times 0.834 \pm 0.07/0.04$ (0.756–0.918). Proglottides without reproductive organs. A pair of distinct excretory vessels run throughout the whole length of strobila. One pair of dorsal excretory vessels measuring $0.029 \pm 0.009/0.005$ (0.013–0.035) and the other pair of ventral excretory vessel measuring $0.089 \pm 0.03/0.01$ (0.039–0.097) in diameter.

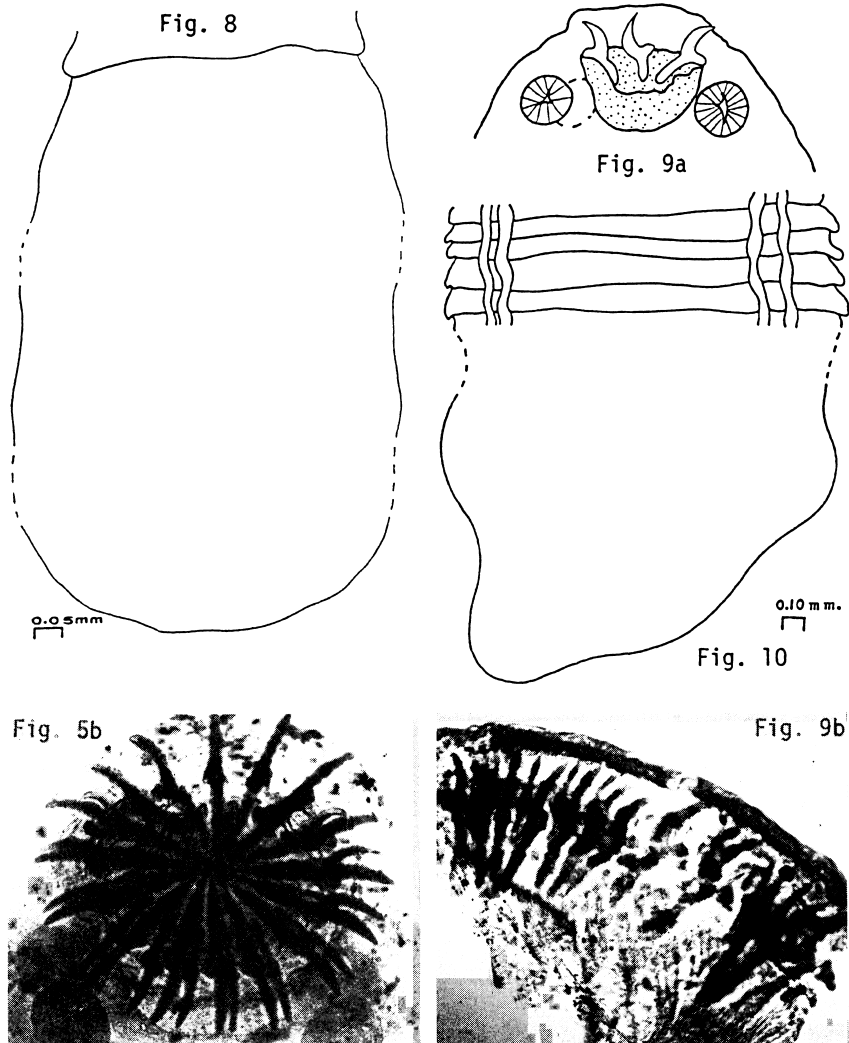
Habitat: Small intestine of *Rattus rattus* of Grahwal Hills (1600–1800 meter above the sea), India.

Type specimens: Holotyps slide no. PCLS 075/81 and paratype slide no. PCLS 076/81 deposited in the parasitological Laboratory, University of Garhwal, Pauri Campus, Pauri (Garhwal) 246 001, U. P.

Larva of *H. parva* (Figs. 9–10)

Description (based on 15 whole mounts; all measured): Worms small, measuring $14.2 \pm 2.52/1.46$ (9–14.5) $\times 2.1 \pm 0.73/0.42$ (0.856–2.582). Proglottization starting at a distance of 1.116 from the posterior end of scolex. Scolex measuring $0.814 \pm 0.08/0.05$ (0.694–0.893) $\times 1.01 \pm 0.19$ (0.868–1.316). Suckers small, unarmed with weak musculature, $0.192 \pm 0.05/0.03$ (0.106–0.236) $\times 0.204 \pm 0.04/0.02$ (0.139–0.223). Rostellum muscular, $0.386 \pm 0.03/0.01$ (0.337–0.401) $\times 0.541 \pm 0.03/0.01$ (0.493–0.564). Rostellar hooks $42 \pm 0.94/0.54$ (42–44) in double rows with longer blade than handle. Curvature of hooks not very pronounced. Hooks in posterior row smaller, measuring $0.242 \pm 0.03/0.01$ (0.236–0.297) in length and possess a handle, $0.099 \pm 0.002/0.001$ (0.098–0.103); blade, $0.177 \pm 0.02/0.009$ (0.153–0.194) and guard, $0.058 \pm 0.005/0.003$ (0.052–0.065) long. Hooks in posterior row longer, measuring $0.329 \pm 0.01/0.008$ (0.311–0.346) with a handle, $0.155 \pm 0.004/0.002$ (0.148–0.157); blade, $0.177 \pm 0.01/0.007$ (0.158–0.189); and guard, $0.066 \pm 0.31/0.18$ (0.047–0.709) long. Neck distinct and broad, $0.279 \pm 0.02/0.01$ (0.243–0.284) $\times 1.65 \pm 0.36/0.21$ (0.953–1.78). Proglottides imbricate with distinct marginal serrations, measuring $0.041 \pm 0.02/0.01$ (0.011–0.052) $\times 0.421 \pm 0.03/0.02$ (0.378–0.452). Mature and gravid proglottides absent. The strobilo-





Figs. 1-4 *Strobilocercus* of *Hydatigera balaniceps*

1. Scolex ($\times 60$) 2. Middle proglottides of strobila ($\times 60$)
3. Later proglottides of strobila ($\times 60$) 4. Terminal bladder ($\times 60$)

Figs. 5-8 *Strobilocercus* of *Hydatigera laticollis*

- 5a. Scolex ($\times 60$) 5b. Micrograph of scolex ($\times 15.75$) 6. Rostellar hooks ($\times 60$)
7. Proglottides ($\times 60$) 8. Terminal bladder ($\times 60$)

Figs. 9-10 *Strobilocercus* of *Hydatigera parva*

- 9a. Scolex ($\times 60$) 9b. Micrograph of rostellar hooks ($\times 17.75$)
10. Middle and last proglottides ($\times 60$)

cercus larva possesses two pairs of longitudinal excretory vessels. Ventral excretory vessels wider, $0.068 \pm 0.02/0.009$ (0.039-0.077) and dorsal vessels narrower, $0.049 \pm 0.01/0.006$ (0.026-0.052) in diameter. The larva, however, does not show a distinct terminal bladder but in its

place bears a relatively larger last proglottid.

Habitat: Right and left liver lobes of *Rattus rattus* of Garhwal Hills (1600-1900 meter above the sea), India.

Type specimens: Holotype no. PCLS 077/81 and paratype slide no. PCLS 078/81 depo-

sited in the Parasitological Laboratory, Department of Zoology, University of Garhwal, Pauri Campus, Pauri (Garhwal), 246 001, U. P..

Discussion

Larva of *H. balaniceps* :

Hall (1911) described the adult specimens of *H. balaniceps* from lynxes in natural infection and these were later reported from a dog by Wardle and McLeod (1952). Neither the description of larva of this cestode nor an information on its possible intermediate host is available in literature. The presence of a bladder at posterior extremity and absence of genitalia in our specimens justify their recognition as strobilocercus larval stages. The acorn-shaped scolex, nature of rostellar hooks and presence of neck distinguish it from *H. taeniaeformis* (Batsch, 1786), the worm which was considered to be more closer to *H. balaniceps* by Wardle and McLeod (1952). However, the account of rows of rostellar hooks has not been given by earlier authors in the adult specimens of *H. laticollis*. The present form distinctly possesses two rows of unequal rostellar hooks, of which the posterior ones are longer than the anterior ones.

Hence, our specimens are recognized as larval form of *H. balaniceps* occurring in the intermediate host, roof rat, *R. rattus*. This is the first report from India.

Larva of *H. laticollis* :

The present form differs from all other species of the genus *Hydatigera* (Lamarck, 1816), except *H. laticollis*, in possessing a bifid guard in both the larger and smaller rostellar hooks. Besides, it resembles *H. laticollis* in bearing double rostellar hooks, a distinct and prominent rostellum, suckers and neck. The strobilocercus larval form differs from adult *H. laticollis* in presence of a rostellum.

Though Joyeux and Baer (1936) recorded the presence of strobilocercus larva in experimental infections in the liver of mice, the present form represents the strobilocercus larval stage from the small intestine of the Indian roof rat, *R. rattus* in natural infections. The occurrence of larva within the small intestine

instead of the liver, as reported by Joyeux and Baer (1936), suggests that the roof rat possibly acts as intermediate host as well as the final host for *H. laticollis*. This is the first report on occurrence of larvae of this cestode in an unusual habitat from India.

Larva of *H. parva*

Wardle and McLeod (1952), Yamaguti (1959) and the other workers have not included the morphological characteristics of the larva of *H. parva*. However, the present strobilocercus larva closely resembles the adult specimens of *H. parva* in size of suckers, in possession of two rows of identical number of rostellar hooks without a pronounced curvature and in presence of a neck.

Hence, the authors are convinced that the present form is the strobilocercus larva of *H. parva* recorded from its intermediate host, an Indian roof rat, *R. rattus*. This is the first report from India.

Summary

Strobilocercus larval forms of *Hydatigera balaniceps* (Hall, 1911), *H. laticollis* (Rudolphi, 1819) and *H. parva* (Baer, 1926) with a rostellum armed with 28-30, 32-34 and 42-44 rostellar hooks, respectively, have been reported from the Indian roof rats, *Rattus rattus* at 1600-1800 meter above the sea. The occurrence of the larvae of *H. laticollis* in an unusual habitat viz. the small intestine has been reported.

Acknowledgments

The first author (SKM) is thankful to University Grants Commission, India for a research project code no. 11, 386.

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ガホールヒマラヤの住家性鼠に寄生していた *Hydatigera* 属
条虫 (条虫科) の幼生型について

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Hydatigera balaniceps (Hall, 1911), *H. laticollis* (Rudolphi, 1819) および *H. parva* (Baer, 1926) の *Strobilocercus* 幼生がガホールヒマラヤ (海拔1600~1800メートル) に生息する住家性鼠 *Rattus rattus* に寄生していた。これらの幼生は頭節にある額嚙に、そ

れぞれ28~30本, 32~34本, 42~44本の額嚙鉤を具えている。これら3種の虫体の形態を詳しく記述した。さらに *H. laticollis* の幼生は通常の寄生部位である肝臓には寄生しないで、小腸内に寄生していた。