

## Short notes

# Cestodes of the genus *Tetrabothrius* (Tetrabothriidea: Tetrabothriidae) from Antarctic flying seabirds

Anna Rocka

W. Stefański Institute of Parasitology, Polish Academy of Sciences, ul. Twarda 51/55, 00-818 Warszawa, Poland; e-mail: abroczy@poczta.onet.pl

**ABSTRACT.** Four species of the genus *Tetrabothrius* were reported from three species of Antarctic flying seabirds. There were: *Tetrabothrius* (*Culmenamniculus*) *gracilis* Nybelin, 1916 and *Tetrabothrius* (*Oriana*) *minutus* Szpotańska, 1917 from *Macronectes giganteus* (Gmelin, 1789); *Tetrabothrius* (*Oriana*) *filiformis* Nybelin, 1916 from *Larus dominicanus* Lichtenstein, 1823 and *Tetrabothrius* (*Culmenamniculus*) *cylindraceus* Rudolphi, 1849 from *Stercorarius antarcticus lonnbergi* (Mathews, 1912). *M. giganteus* is a new host for *T. (Culmenamniculus) gracilis* and *T. (Oriana) minutus*, and *L. dominicanus* is a new host for *T. (Oriana) filiformis*. The South Shetland Islands are a new locality for *T. (Oriana) minutus* and *T. (Culmenamniculus) gracilis*.

**Keywords:** *Tetrabothrius*, cestodes, seabirds, Antarctica

## Introduction

Cestodes of the family Tetrabothriidae Linton, 1891 are cosmopolitan parasites of marine homoeotherms: seabirds, pinnipeds and cetaceans [1]. Their life cycles are poorly known but are considered to involve crustaceans, cephalopods and/or teleosts as intermediate or paratenic hosts. Knowledge about parasites of Antarctic birds is limited and fragmentary, even in the case penguins, which are the most studied birds in this region [2]. According to Rocka [3] over 16 species of the genus *Tetrabothrius* were found in penguins and flying birds in Antarctica. They represented four subgenera: *Tetrabothrius* Rudolphi, 1819; *Oriana* Leiper and Atkinson, 1914 (= *Biamniculus* Muravijova, 1975); *Neotetrabothrius* Nybelin, 1929 (= *Uniamniculus* Muravijova, 1975); *Culmenamniculus* Muravijova, 1975. It should be noted that recognition of four subgenera of the genus *Tetrabothrius* was based on apparent structural differences in the genital atrium, presence or absence of genital papillae within the atrium, and the relationships of the male canal and atrial region of the vagina [4].

## Materials and Methods

Cestodes were collected from the alimentary

tract of three bird species: southern giant petrel, *Macronectes giganteus* (Gmelin, 1789); kelp gull, *Larus dominicanus* Lichtenstein, 1823, and subantarctic skua, *Stercorarius antarcticus lonnbergi* (Mathews, 1912). Birds were shot down near the H. Arctowski Station at the King George Island, South Shetlands (62°09'34"S 58°28'15"W) in years: 1977 (February, March, October) and 1978 (December). The alimentary tracts were divided into separately examined parts: oesophagus, stomach, duodenum (anterior I and posterior II part), jejunum (I and II), ileum (I, II), rectum, caeca and cloaca. Cestodes were fixed in 75% ethanol, stained in lactocarmin or acid carmine, dehydrated in a graded ethanol series, cleared in creosote and mounted in Canada balsam. All measurements are in millimeters. Nomenclature of cestode species is according to [5].

## Results

Four cestode species were recorded: *Tetrabothrius* (*Culmenamniculus*) *gracilis* Nybelin, 1916; *Tetrabothrius* (*Oriana*) *minutus* Szpotańska, 1917; *Tetrabothrius* (*Oriana*) *filiformis* Nybelin, 1916 and *Tetrabothrius* (*Culmenamniculus*) *cylindraceus* Rudolphi, 1849.

**Taxonomic summary**

*Tetrabothrius (Culmenamniculus) gracilis* Nybelin, 1916 (Fig. 1,2)

Host: *Macronectes giganteus* (7 examined, 2 infected with 2 and 3 cestodes)

Location: duodenum II; ileum II

Description is based on one strobila 140 length,

Testes spherical, 12–15 in number, 0.055–0.085 in diameter. Cirrus sac spherical or slightly oval, 0.055–0.060 in diameter. Genital atrium with prominent genital papilla. Apertures of male canal and vagina located on apex of ventrally curved papilla. Male canal, 0.050–0.060 long, lies dorsally to vagina. Ovary bilobed with secondary lobation, in middle part of proglottid. Vitelline gland compact,

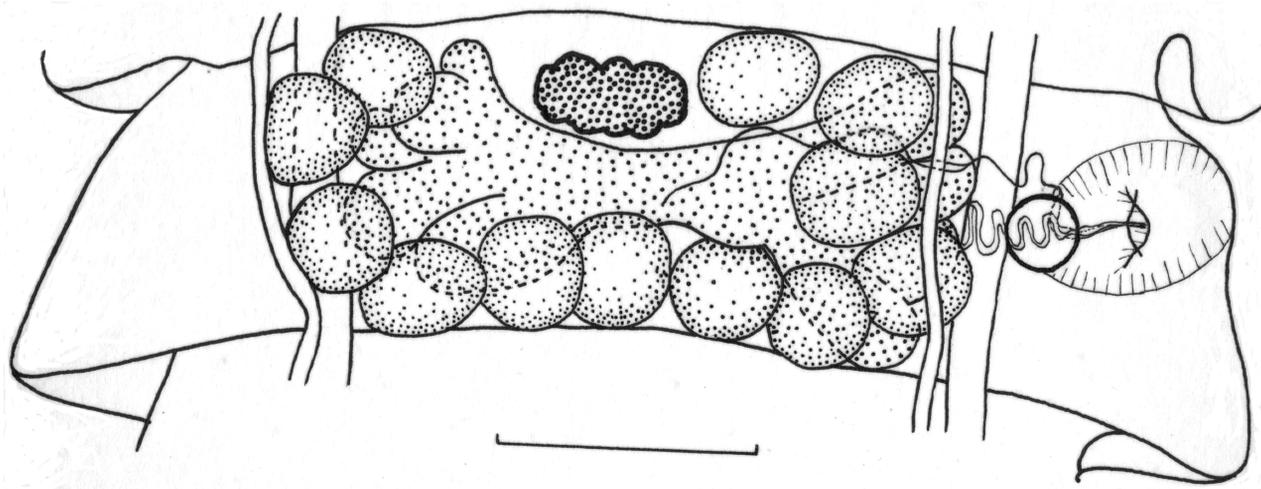


Fig. 1. *T. (C.) gracilis*. Hermaphroditic proglottid. Scale bar: 200  $\mu$ m

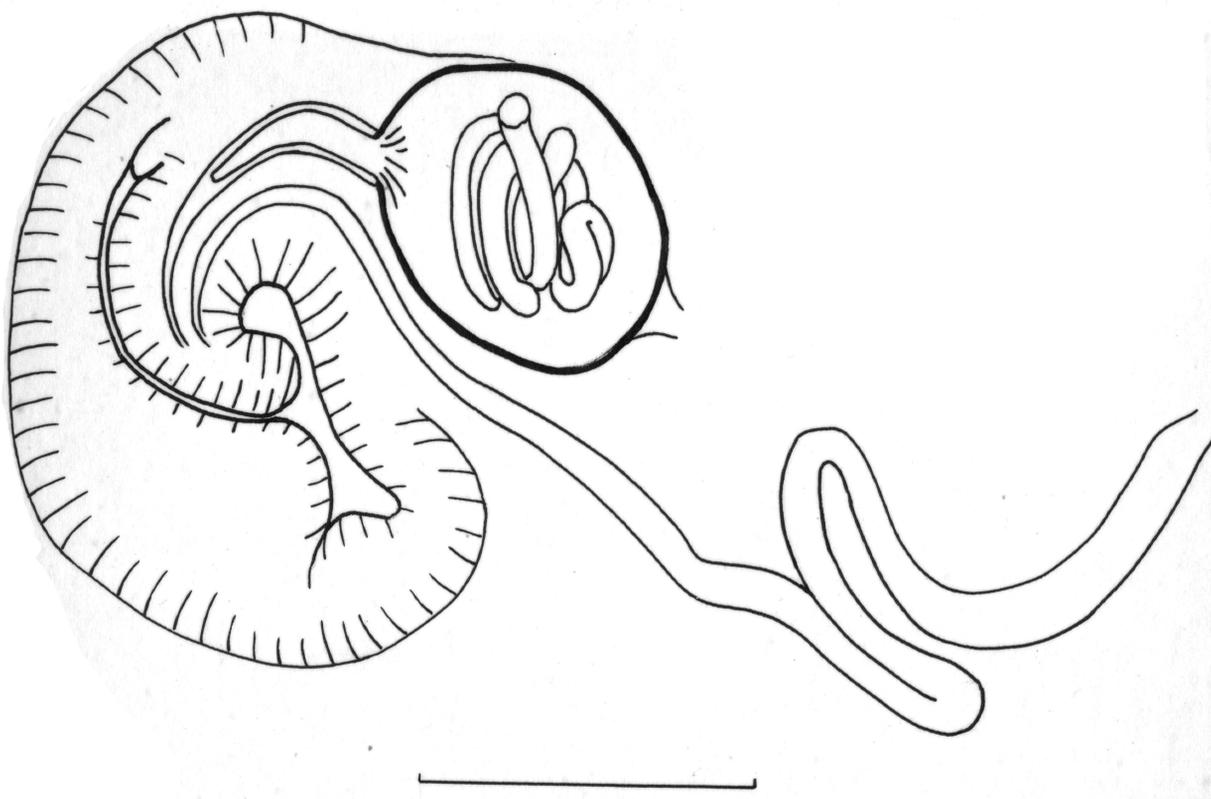


Fig. 2. *T. (C.) gracilis*. Genital atrium. Scale bar: 50  $\mu$ m

ended with mature proglottids, and some other fragments of strobilas. All cestodes without scolices.

preovarian. Vagina thin-walled with numerous loops. Dilatations of vagina near longitudinal excretory

canals and distal end of cirrus sac may be present.

Remarks. *T. (Culmenamniculus) gracilis* was reported as a parasite of seabirds from south-western Africa. *M. giganteus* is a new host, and the South Shetland Islands are a new locality for this species. However, Prudhoe [6] described *Tetrabothrius* sp. 3 from *M. giganteus* at the Heard Island, Subantarctica, which has similar number of testes (14–17).

*Tetrabothrius (Oriana) minutus* Szpotańska, 1917 (Fig. 3,4)

Host: *M. giganteus* (2 infected with one and 12 cestodes)

Location: duodenum II, jejunum I and II

Description based on one specimen 27 long without scolex, ended with preovarian proglottids, and fragments of other strobilas. Scolex 280 in

maximal wide, bothridia 200×140. Neck 13 long. Testes spherical, 6–9 in number, 0.060 in diameter. Cirrus sac spherical, 0.060–0.100 in diameter. Genital atrium 0.11–0.13 in diameter with prominent genital papilla. Aperture of male canal on apex of papilla, vaginal aperture separate, ventral at base of papilla. Male canal 0.060 long. Ovary bilobed in posterior part of proglottid. Vitelline gland compact, preovarian. Vagina thin-walled without loops. Along the whole length of vagina hair-like structure visible. Eggs 0.027–0.037 × 0.025–0.033.

Remarks. So far, *T. (Oriana) minutus* was reported from *Thalassoica antarctica* and *Pagodroma nivea* from eastern part of Antarctica. *M. giganteus* is a new host and South Shetland Islands are new locality for this cestode.

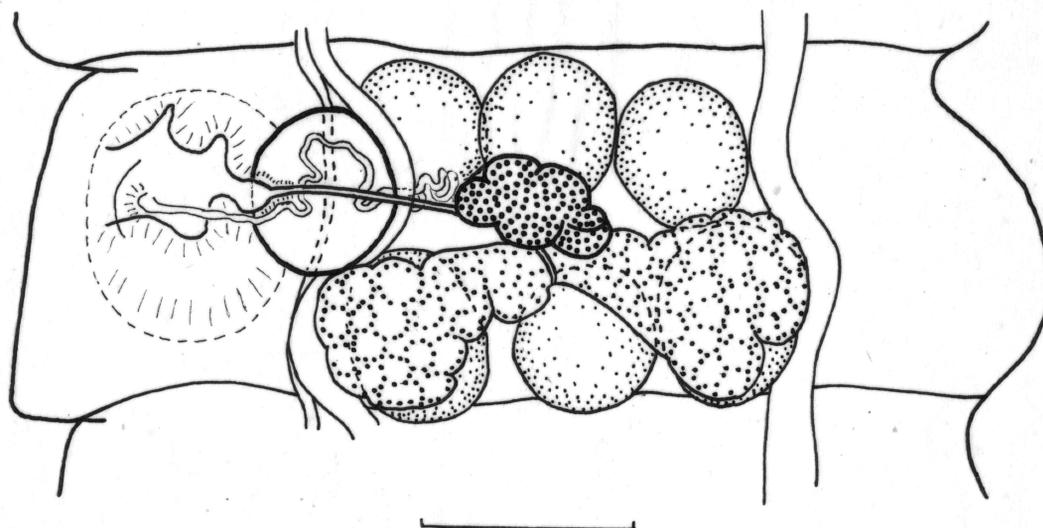


Fig. 3. *T. (O.) minutus*. Hermaphroditic proglottid. Scale bar: 100 µm

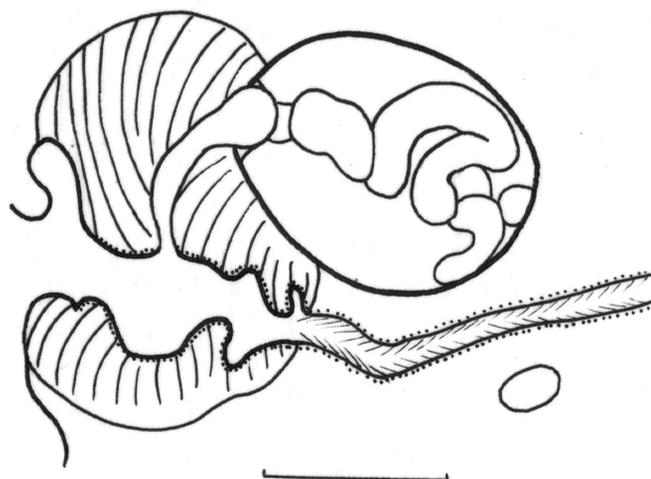


Fig. 4. *T. (O.) minutus*. Genital atrium. Scale bar: 50 µm

*Tetrabothrius (Oriana) filiformis* Nybelin, 1916 (Fig. 5)

Host: *Larus dominicanus* (17 examined, one infected with 4 cestodes)

Location: jejunum

Description based on one strobila, 6×0.3, ended with postmature proglottid. Undifferentiated male and female organs occur in 6–8 proglottid. Testes, 8–10 in number, 0.042–0.050 in diameter. Cirrus sac 0.042–0.050 in diameter. Genital atrium 0.067 in diameter. Apertures of male canal and vagina situated separately. Male canal 0.018–0.200 long. Vagina with loops without dilatations. Ovary bilobed in middle part of proglottid.

Remarks. According to Temirova and Skrjabin [4] Laridae are infected with four species of

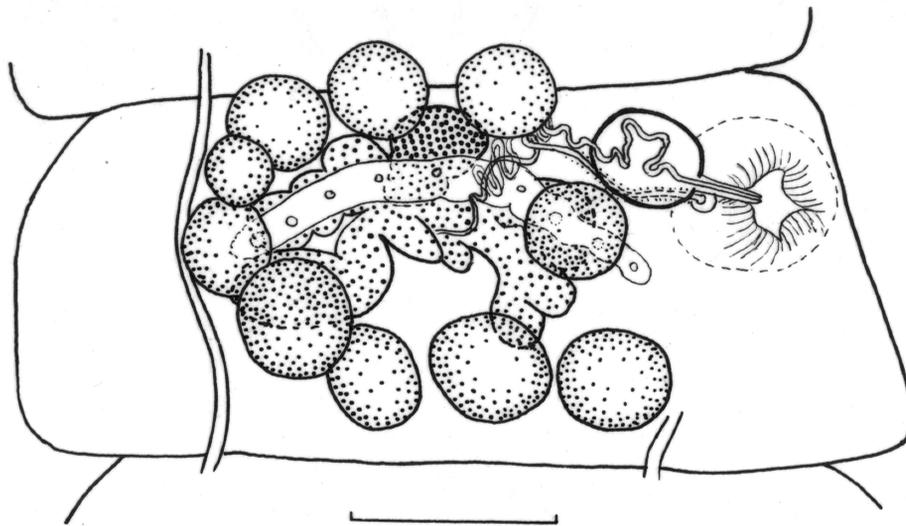


Fig. 5. *T. (O.) filiformis*. Hermaphroditic proglottid. Scale bar: 100  $\mu$ m

Tetrabotheiidae, but all these cestodes have more than 15 testes in each proglottid. Description of cestodes from present material agree with description of *T. filiformis* made by Baer [7] recorded from white-chinned petrel, *Procellaria aequinoctialis*.

*Tetrabotheirus (Culmenamniculus) cylindraceus* Rudolphi, 1819

Host: *Stercorarius antarcticus lonnbergi* (12 examined, one infected with one immature specimen)

Location: ileum II

Strobila, 45 long, ended with immature proglottids. Scolex 0.33 $\times$ 0.31. Testes spherical, 22–30 in number.

Remarks. After Temirova and Skrjabin [4] *Tetrabotheirus (Culmenamniculus) cylindraceus* occurs only in northern hemisphere, and three species of Tetrabotheiidae parasitizing Stercorariidae from southern hemisphere. All three species have more number of testes than *T. cylindraceus*. However, Odening [8] found *Tetrabotheirus (Culmenamniculus) cylindraceus* in the *S. antarcticus lonnbergi* from the King George Island. Number of testes, structure and distribution of genital glands in the present material and Odening's are very similar.

## References

- [1] Hoberg E.P. 1994. Order Tetrabotheiida Baer, 1954. In: *Keys to the cestode parasites of vertebrates* (Eds. L.F. Khalil, A. Jones, R.A. Bray). CABI Wallingford: 295-304.
- [2] Diaz J.I., Fusaro B., Longarzo L., Coria N.R., Vidal V., D'Amico V., Barbosa A. 2016. Gastrointestinal helminths of Adelle penguins from Antarctica. *Polar Research* 35. doi:10.3402/polar.v35.28516
- [3] Rocka A 2017. Cestodes and nematodes of Antarctic fishes and birds. In: *Biodiversity and evolution of parasitic life in the Southern Ocean* (Eds. S. Klimpel, T. Kuhn, H. Mehlhorn). Parasitology Research Monographs 9. Springer, Switzerland: 83-91. doi:10.1007/978-3-319-46343-8\_6
- [4] Temirova S.I., Skrjabin A.S. 1978. Tetrabotheiata i mezocestoidaty – lentocnyje gel'minty ptic i mlekopitajuscich [Tetrabotheiata and Mesocestoidata – cestodes of birds and mammals]. In: *Osnovy cestodologii* 9 (Ed. K.M. Ryzikov). Izdatiel'stvo Nauka, Moscow: 5-112 (in Russian). <http://lekmed.ru/info/arhivy/tetrabotheiata-i-mezocestoidaty-4>
- [5] WoRMS. 2019. *Tetrabotheirus* Rudolphi, 1819. [http://www.marinespecies.org/aphia.php?p=taxon\\_details&id=105031](http://www.marinespecies.org/aphia.php?p=taxon_details&id=105031)
- [6] Prudhoe S. 1969. Cestodes from fish, birds and whales. B.A.N.Z. Antarctic Research Expedition, Ser. B, Zoology 8: 171-193.
- [7] Baer J. 1954. Revision taxonomique et etude biologique des Cestodes de la famille des Tetrabotheiidae, parasites d'Oiseaux de haute mer et de Mammiferes marins. *Memoires de Universite de Neuchatel* Ser. 1: 4-122 (in French).
- [8] Odening K. 1982. Cestodes from flying birds of the South Shetlands (Antarctica) and the Falkland Islands (Malvinas). *Angewandte Parasitologie* 23: 202-223.

Received 04 September 2019

Accepted 18 November 2019