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Hysterothylacium winteri sp. n. (Nematoda: Anisakidae), a parasite of Chilean rock cod, *Eleginops maclovinus* (Perciformes: Eleginopidae), from South Chile

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Key words: Nematoda, parasite, *Hysterothylacium*, fish, Chile

Abstract. *Hysterothylacium winteri* sp. n. (Nematoda: Anisakidae) was collected from the intestine of a marine-estuarine fish, *Eleginops maclovinus* (Valenciennes) (Perciformes: Eleginopsidae), from Abtao in the Gulf of Ancud, Chile. Sixteen (51.6%) out of 31 fish were infected; the intensity was 1–10 (mean 4) worms/host. The new species belongs to the group of congeners possessing one double pair of postanal papillae. By possessing a lateral pair of phasmids situated near the tip of tail, *H. winteri* most closely resembles *Hysterothylacium habena*. The new species can be distinguished by the lip flanges forming broadly rounded points and the equal, short spicules (320–400 μm long) representing 0.9–1.7% of body length.

The genus *Hysterothylacium* Ward et Magath, 1917 includes some 59 species which are found at the adult stage in the gut of fishes (Bruce et al. 1994, Torres et al. 1998, Moravec and Nagasawa 2000). In Chile, two species of *Hysterothylacium* have been identified: *Hysterothylacium aduncum* (Rudolphi, 1802) in introduced salmonids, *Oncorhynchus mykiss* (Walbaum) and *Oncorhynchus kisutch* (Walbaum) cultured at Chiloé Archipelago, and in wild marine fishes, such as *Merluccius australis* (Hutton) (Carvajal et al. 1995). The other species, *Hysterothylacium geschei* Torres, Andrade et Silva, 1998 was described from a freshwater-estuarine fish, *Cauque mauleanum* (Steindachner) from Lake Panguipulli in the south of Chile (Torres et al. 1998).

This paper describes a new species of *Hysterothylacium*. It was found in the intestine of the Chilean rock cod, *Eleginops maclovinus* (Valenciennes) from the locality of Abtao (41º49'S, 73º21'W), Gulf of Ancud, Chile. *Eleginops maclovinus* is a marine and estuarine fish distributed in Chile between Valparaiso (33ºS) and Tierra del Fuego (54ºS). Along the coast of Argentina it reaches up to the province of Buenos Aires (Pequeño and Moreno 1979).

MATERIALS AND METHODS

In January to February 1997, 31 adult Chilean rock cods (*E. maclovinus*) were caught with 1.5 inch mesh gillnets in the locality of Abtao, Gulf of Ancud, Chile. Nematodes were removed from the intestine of fish and rinsed in saline, fixed in cold 10% buffered formalin and cleared in lactophenol for morphological study in a light microscope. Paraffin-embedded 8 μm thick cross-sections were made using standard procedures and stained with haematoxylin and eosin. Some specimens were postfixed in ethanol, dehydrated in a graded series of ethanol and treated with acetone-ether, dried, coated with approximately 60Å gold/palladium and examined with a LEO 420 scanning electron microscope (Leo Electron Microscopy, Cambridge, UK). Drawings were made with the aid of a Nikon microscope drawing tube. Unless otherwise stated, measurements are given in μm (range followed by the mean in parentheses).

RESULTS

Hysterothylacium winteri sp. n. Figs. 1–17

Description. Body with maximum width near its middle, tapering anteriorly and posteriorly. Lips similar in shape and size, slightly wider than long. Dorsal lip with two double papillae, subventral lips each with one double papilla, a single lateral papilla and one amphid. Lips with cuticular flanges on lateral margins forming broadly rounded points, being widest at level of papillae. Interlabia triangular, with base wider than length. Alae run from cervical region to tail about 100–200 from mouth; maximum thickness 26–32 at level of oesophagus and narrower (3–7) to level of tail. Excretory pore slightly posterior to nerve ring. Tail ventrally flexed, with conical tip covered by numerous spines. Pair of phasmids present in lateral portion of tail near tip.

Male (23 specimens). Body 21.6–41.3 (31.3) mm long by 352–596 (462) maximum wide. Dorsal lip 65–110 (86) long by 70–115 (98) maximum wide; subventral lips 70–109 (90) long by 70–112 (93) wide. Interlabia 20–46 (32) long by 40–56 (48) wide. Nerve ring 350–493 (421) from anterior end. Excretory pore

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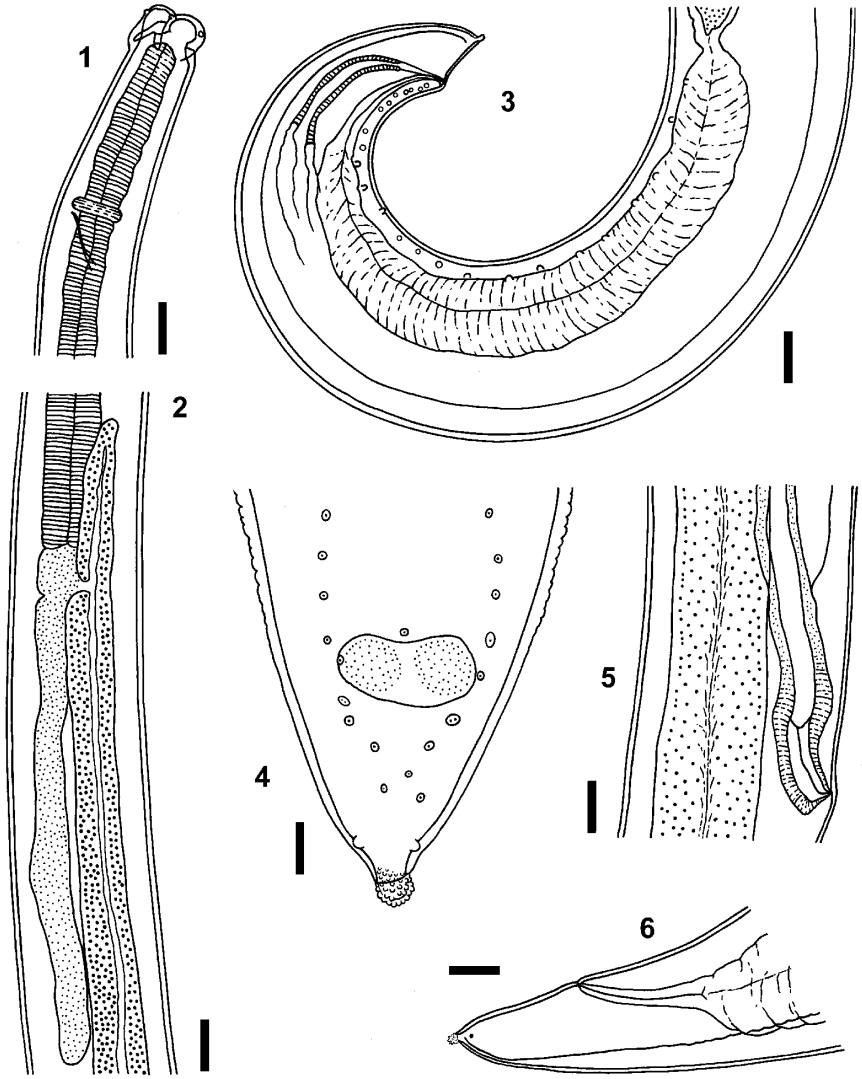
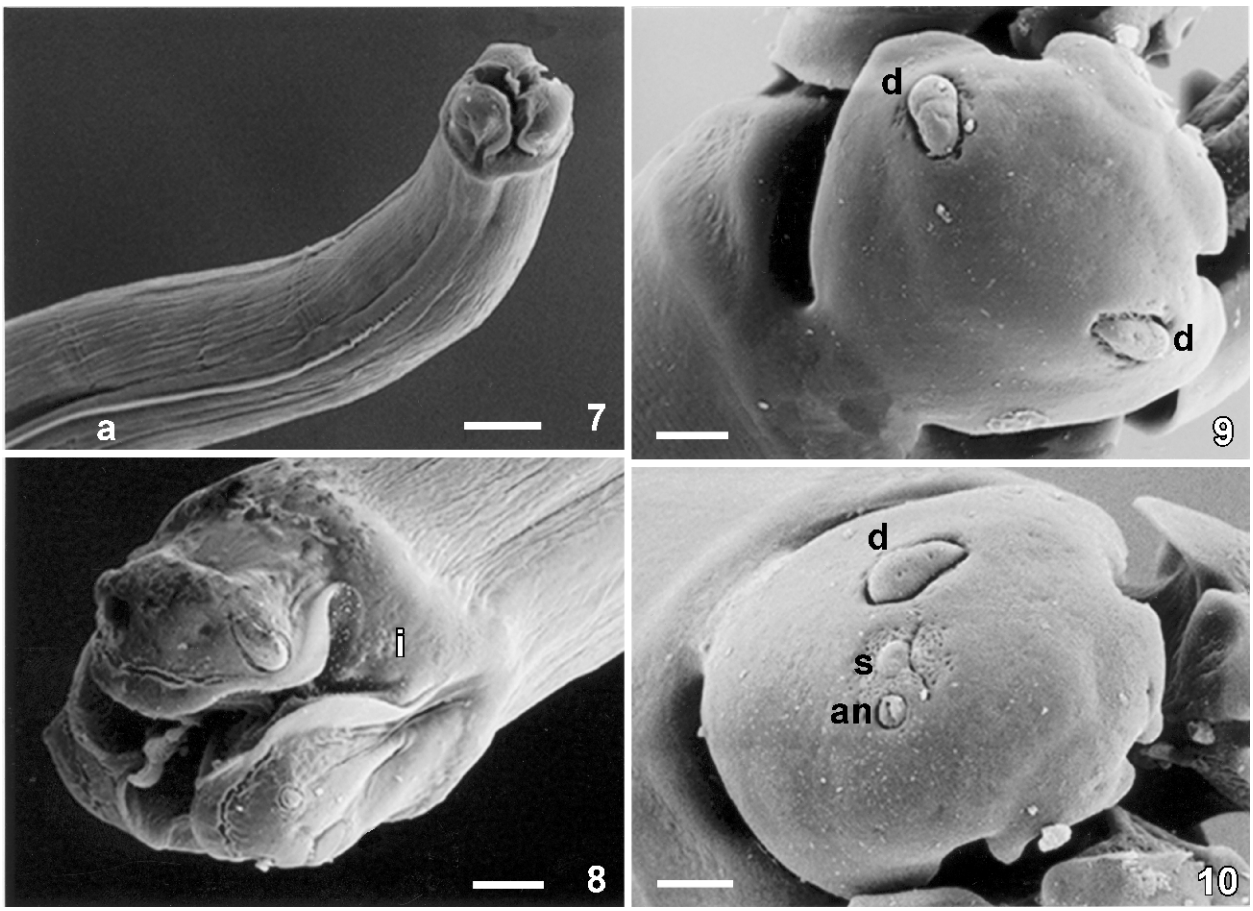


Figs. 1–6. *Hysterothylacium winteri* sp. n. **Figs. 1, 2.** Anterior end of female. **Figs. 3, 4.** Posterior region of male, lateral and ventral views. **Fig. 5.** Vulvar region of female. **Fig. 6.** Caudal region of female, lateral view. Scale bars: Fig. 1 = 125 μm; Fig. 2 = 175 μm; Fig. 3 = 152 μm; Fig. 4 = 40 μm; Fig. 5 = 155 μm; Fig. 6 = 110 μm.

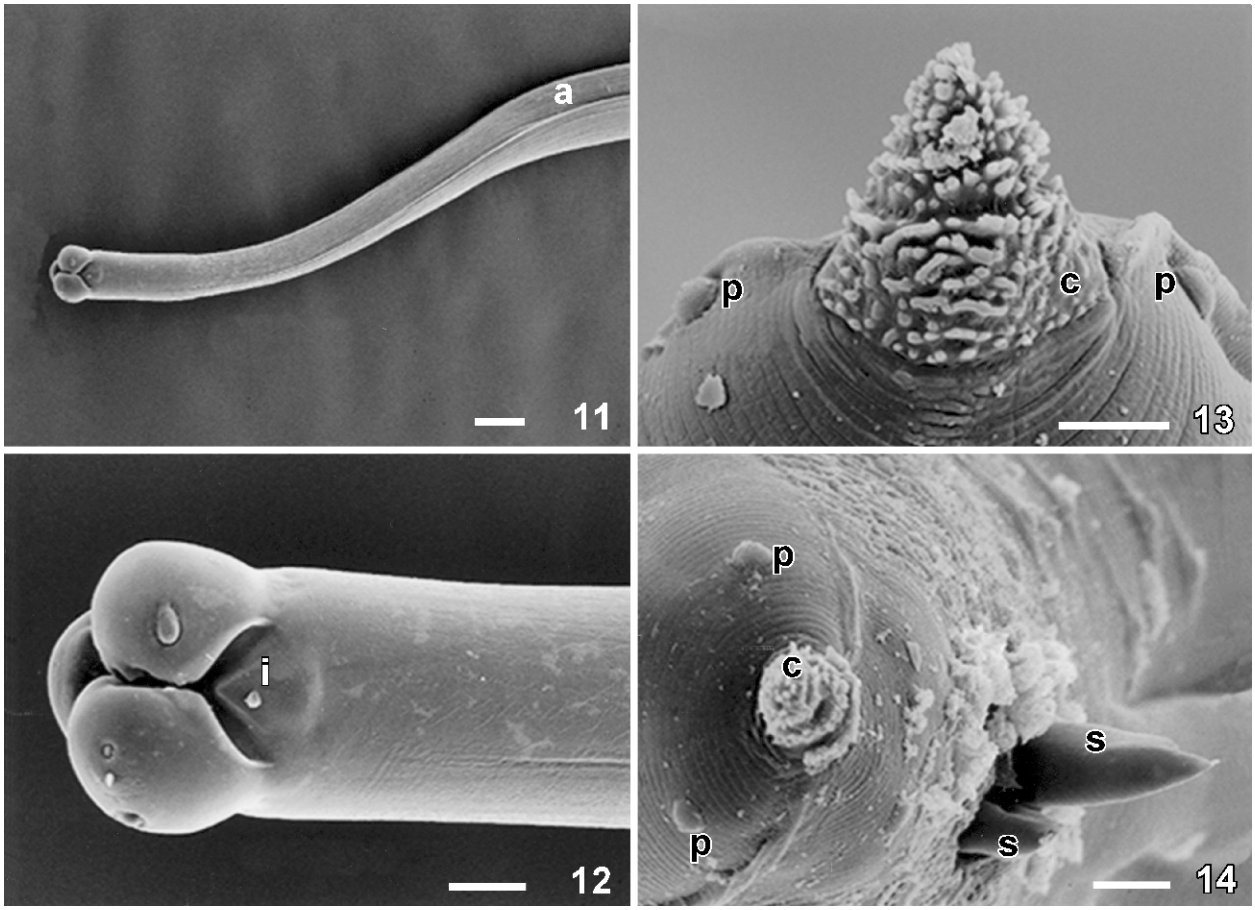
410–676 (549) from anterior end. Oesophagus 3.9–6.6 (4.8) mm long by 152–179 (156) maximum wide at posterior third. Oesophagus 12.9–21.3 (15.5)% length of body. Ventriculus 90–166 (134) long by 97–179 (148) wide. Ventricular appendix 1.0–1.7 (1.4) mm long by 170–352 (210) maximum wide; intestinal caecum 268–386 (332) long by 72–88 (83) maximum wide; length of ventricular appendix representing 18.6–35.7 (28.9)% of oesophagus length; length ratio of intestinal caecum to ventricular appendix 1 : 2.9–5.3 (1 : 4.1); intestinal caecum 5–9.8 (7.4)% length of oesophagus. Ejaculatory duct 1.2–2.1 (1.6) mm long by 166–276 (222) wide, 3.6–7.4 (5.1)% length of body. Spicules equal, slightly curved, with membranous wings, 320–400 (380) long by 20–40 (30) maximum wide, 16.8–33.6 (24.7)% of ejaculatory duct and 0.9–1.7 (1.3)% of body length. Tail conical, 128–203 (166) long, with tip 34–40 (37.1) long, covered by numerous spines. Caudal papillae: 24–32 pairs of subventral preanal papillae, one pair adanal papillae; four pairs of postanal papillae, first pair was doubled and in some specimens one papilla, left or right, of the second pair, also was doubled; one median papilla located on anterior cloacal lip. Phasmids 13–25 (19) from anterior border of tip.



Figs. 7–10. *Hysterothylacium winteri* sp. n. **Figs. 7, 8.** Anterior end of male. **Fig. 9.** Dorsal lip of male. **Fig. 10.** Subventral lip of male. a – ala; an – amphid; d – double papilla; i – interlabium; s – single papilla. Scale bars: Fig. 7 = 30 μm; Figs. 8–10 = 10 μm.

Female (19 gravid specimens). Body 29–48.3 (39) mm long, 466–828 (627) maximum wide. Dorsal lip 85–158 (118) long by 89–160 (124) maximum wide; subventral lips 84–156 (116) long by 98–160 (127) wide. Interlabia 30–58 (44) long by 60–110 (81) wide. Nerve ring 427–745 (568) from anterior end. Excretory pore 510–841 (657) from anterior end. Oesophagus 4.3–7.0 (5.5) mm long by 124–179 (151) maximum wide at posterior third. Oesophagus 10–18.2 (14.1)% length of body. Ventriculus 138–195 (159) long by 97–205 (161) maximum wide; ventricular appendix 1–1.8 (1.5) mm long by 140–295 (230) maximum wide; intestinal caecum 303–540 (408) long by 83–111 (94) maximum wide; length of ventricular appendix representing 19.1–36 (27.1)% of oesophagus length; length ratio of intestinal caecum to ventricular appendix 1 : 2.5–5.7 (1 : 3.6); intestinal caecum 4.9–10.2 (7.6)% length of oesophagus. Vulva preequatorial 11–17.8 (15.3) mm from anterior end. Vagina muscular, directed posteriorly. Uteri opposed. Tail conical, 290–427 (343) long, with tip 20–32 (26.3) long, covered by numerous spines. Phasmids 14–29 (22) from anterior border of tip. Eggs spherical, thin-walled, smooth. Eggs (n = 30) in anterior part of uteri 60–70 (67) in diameter.

Fourth-stage larva (11 specimens). Body 11.7–17.1 (14.0) mm long by 207–311 (259) maximum wide. Dorsal lip 44–89 (54) long by 40–76 (53) wide; subventral lips 40–80 (58) long by 40–60 (49) wide. Interlabia 18–30 (24) long. Nerve ring 317–428 (365) from anterior end. Excretory pore 386–497 (435) from anterior end. Oesophagus 1.7–3.3 (2.4) mm long by 148–320 (195) wide at posterior third. Oesophagus 12.1–20.5 (17.4)% length of body. Ventriculus 69–82 (79) long by 73–103 (85) wide; ventricular appendix 786–952 (846) long by 65–192 (120) maximum wide; intestinal caecum 193–290 (250) long by 69–193 (121) maximum wide; length of ventricular appendix representing 24.7–49.9 (37.4)% of oesophagus length; length ratio of intestinal caecum to ventricular appendix 1 : 2.7–4.5 (1 : 3.5); intestinal caecum 7.3–12.8 (10.4)% length of oesophagus. Tail 104–180 (151) long with tip covered by numerous spines.



Figs. 11–14. *Hysterothylacium winteri* sp. n. **Figs. 11, 12.** Anterior end of fourth-stage larva. **Fig. 13.** Caudal end of adult female, ventral view. **Fig. 14.** Caudal end of male, apical view. a – ala; c – conical tip of tail; i – interlabium; p – phasmid; s – spicule. Scale bars: Fig. 11 = 100 µm; Fig. 12 = 30 µm; Figs. 13, 14 = 10 µm.

T y p e h o s t : *Eleginops maclovinus* (Valenciennes) (Perciformes: Eleginopidae).

S i t e o f i n f e c t i o n : Intestine.

T y p e l o c a l i t y : Abtao (41º49'S, 73°21'W), Gulf of Ancud, Chile (collected in January and February 1997). The salinity of the water in the area where the fish were caught is about 27–28‰ in summer.

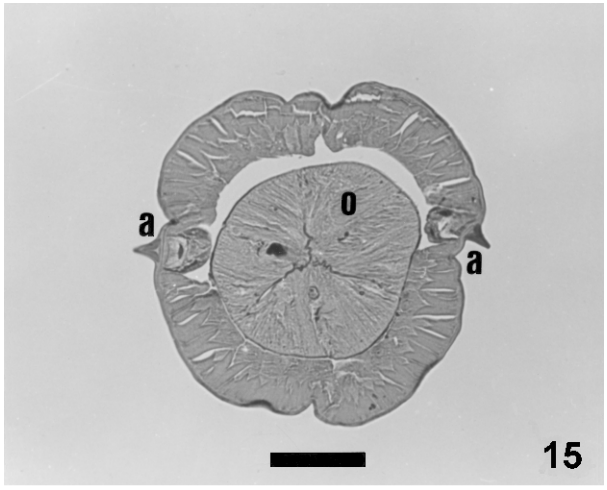
P r e v a l e n c e a n d i n t e n s i t y : 51.6% (16 fish infected / 31 examined); 1–10 (4) specimens per fish.

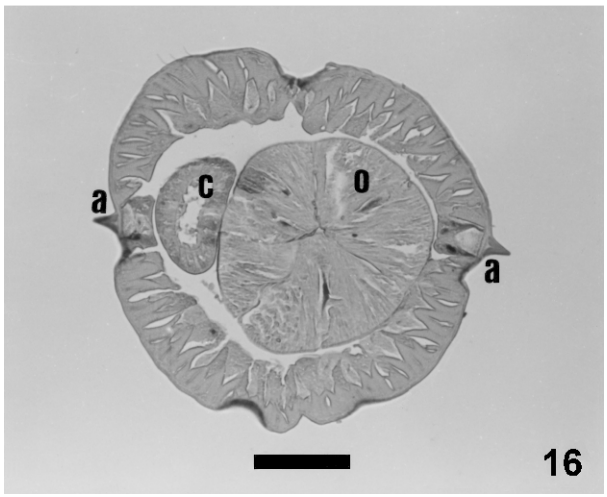
S p e c i m e n s d e p o s i t e d : Colección del Instituto de Parasitología, Universidad Austral de Chile (IPUAC), Valdivia, Chile: Male holotype No. 273, allotype No. 274 and paratypes Nos. 275–278; Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice: two paratypes (N-803).

E t y m o l o g y : The species is named in honour of Dr. Jürgen Winter, founder director of the School of Marine Biology, Universidad Austral de Chile.

DISCUSSION

The following species of *Hysterothylacium* have been recorded in fishes from marine regions in South America: *H. aduncum* in Chile (Carvajal et al. 1995) and Argentina (Sardella et al. 1998); *H. fortalezae* (Klein, 1973) and *H. reliquens* (Norris et Overstreet, 1975) at the coast of Brazil (Deardorff and Overstreet 1981, Vicente et al. 1985), being also reported for Guyana and Colombia; and *H. corrugatum* Deardorff et Overstreet, 1981 in Ecuador (Deardorff and Overstreet 1981). *Hysterothylacium rhamdiae* Brizzola et Tanzola, 1995 and *H. patagonense* Moravec, Urawa et Coria, 1997 in Argentina and *H. geschei* in Chile (Brizzola and Tanzola 1995, Moravec et al. 1997, Moravec 1998, Torres et al. 1998) have been described in fishes from freshwater ecosystems of South America. Other species reported from marine and/or estuarine fishes from the South Pacific Ocean include *H. murrayense* (Johnston et





Figs. 15, 16. *Hysterothylacium winteri* sp. n., transversal sections at level of anterior and posterior parts of oesophagus. a – ala; c – intestinal caecum; o – oesophagus. Scale bars: Figs. 15, 16 = 104 μm.

Mawson, 1940), *H. pelagicum* Deardorff et Overstreet, 1982, *H. scomberoidei* Bruce et Cannon, 1989, *H. scomberomori* (Yamaguti, 1941), *H. leptaspi* Bruce, 1990, *H. chrysostomi* Bruce, 1990, *H. sebae* Bruce, 1990 and *H. thalassini* Bruce, 1990 in Australia and *H. tasmaniense* (Johnston et Mawson, 1945) and *H. zenis* (Baylis, 1929) in New Zealand (Deardorff and Overstreet 1982, Bruce and Cannon 1989, Bruce 1990a, b, Bruce et al. 1994).

Hysterothylacium winteri belongs to the group of species possessing one double pair of postanal papillae, namely *H. habena* (Linton, 1901), *H. geschei*, *H. tasmaniense*, *H. reliquens*, *H. ogcocephali* (Olsen, 1952), *H. chaunaxi* (Olsen, 1952), and *H. zenis* (Norris and Overstreet 1975, Deardorff and Overstreet 1981, Bruce 1990b, Torres et al. 1998). By possessing a lateral pair of phasmids situated near the tip of tail, *H. winteri*

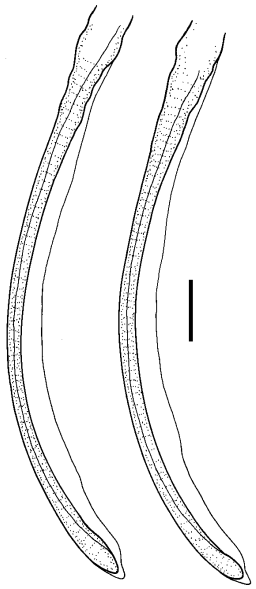


Fig. 17. *Hysterothylacium winteri* sp. n., spicules. Scale bar = 40 μm.

most closely resembles *H. habena*. The last characteristic has not been found in some other species (Soleim and Berland 1981, Deardorff and Overstreet 1981, 1982, Bruce and Cannon 1989, Bruce 1990a, b, Bruce et al. 1994, Moravec 1994, 1998, Moravec and Nagasawa 2000). Cuticular flanges of *H. winteri* are different from *H. habena*, *H. ogcocephali* and *H. reliquens* (indented), *H. zenis* (approximately rectangular), and *H. geschei* (wider beneath of lip papillae). *Hysterothylacium winteri* differs clearly from *H habena*, *H geschei*, *H zenis*, *H. tasmaniense*, *H. reliquens* and *H. chaunaxi* in having short spicules and smaller percentage of spicules length with respect to the body length; it is also distinguished from *H. ogcocephali* by its equal spicules and tip of the tail covered by numerous spines. Numbers of pairs of postanal papillae are greater in *H. zenis* (6 to 7 pairs) and *H. chaunaxi* (7 pairs), than in *H. winteri* (4 pairs).

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