

# Studies on Eumalacostraca: a homage to Masatsune Takeda

*By*

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(Editors)

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*THYMOPS TAKEDAI*, A NEW SPECIES OF DEEPWATER LOBSTER  
FROM THE SOUTHWEST ATLANTIC OCEAN WITH ADDITIONAL  
RECORDS OF ‘THYMOPINE’ LOBSTERS  
(DECAPODA, NEPHROPIDAE)

BY

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ABSTRACT

A new species of deep-water clawed lobster, *Thymops takedai*, is described from the Scotia Sea, near South Georgia, representing the second species of the genus. The new species differs from *Thymops birsteini* (Zarenkov & Semenov, 1972) in having a ventrally spinose or serrated rostrum (versus smooth or finely granular), a non-flagellate maxilliped 3 exopod (versus exopod with flagellum), and a longer branchiocardiac groove that reaches to the posterior quarter of the carapace (versus slightly beyond midlength). We also report additional specimens of *T. birsteini* and *Thymopsis nilenta* Holthuis, 1974, and document considerable variation in the condition of the exopods on maxillipeds 2 and 3 of *Thymopsis*. This variation in the maxillipedal exopods in *Thymopsis* overlaps with that of *Thymops*, rendering the two genera otherwise almost indistinguishable apart from subtle distinctions in carapace groove patterns. Thus, the taxonomic utility of recognising both genera as separate is questionable and further study may show that the two genera should be synonymised.

INTRODUCTION

Nephropidae Dana, 1852 currently includes 54 species and 14 genera of clawed lobsters (Chan, 2010). Whereas the best known nephropids are the edible shallow water species of *Homarus* Weber, 1795 and *Nephrops* Leach,

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1814, most nephropids live in deep-water on the outer continental shelf and slope. The higher taxonomy of the clawed lobsters has undergone several important changes in the past three decades. Holthuis (1974, 1991) recognised three subfamilies within the Nephropidae: Nephropinae, Neophoberinae and Thymopinae. Recent morphological and molecular phylogenetic studies, however, have not corroborated Holthuis' subfamily divisions, and at present, subfamilies are not formally recognised within Nephropidae (Chan, 2010). Within the former Thymopinae, two morphologically similar and phylogenetically allied genera, *Thymops* Holthuis, 1974 and *Thymopsis* Holthuis, 1974, are known only from the southwestern Atlantic, each represented by a single species, *Thymops birsteini* (Zarenkov & Semenov, 1972) and *Thymopsis nilenta* Holthuis, 1974 (Ahyong, 2006). Both occur in deep, subantarctic waters around the southern part of South America including the Falkland Islands (Malvinas) and South Georgia. *Thymops birsteini* appears to be relatively common, although *Thymopsis nilenta* is seldom reported (Holthuis, 1991). Among unstudied material collected by the USS "Eltanin" in waters around the Falkland Islands in 1963 were specimens of *Thymops birsteini*, *Thymopsis nilenta* and an undescribed species of *Thymops*. The new species is described herein and additional 'thymopine' records reported.

## MATERIALS AND METHODS

Descriptive terminology generally follows Holthuis (1974) and Ahyong et al. (2007). Carapace length (cl) is measured along the dorsal midline and includes the rostrum. Postorbital carapace length (pcl) is measured from the posterior margin of the orbit to the posterior margin of the carapace. Specimens are deposited in the Australian Museum, Sydney (AM), Museum of New Zealand Te Papa Tongarewa (NMNZ) and the National Museum of Natural History, Smithsonian Institution, Washington D.C. (USNM).

## TAXONOMY

Family NEPHROPIDAE Dana, 1852

Genus *Thymops* Holthuis, 1974

***Thymops takedai* sp. nov.**

(figs. 1-4)

Type material. — Holotype: USNM 1156923, female (cl 58.8 mm, pcl 38.3 mm), Burdwood Bank, Scotia Sea, 54°03.6'S 56°04.9'W, 940-950 ftm [1720-1739 m], "Eltanin" 376-29, rock

dredge, 20-21 Dec. 1962. Paratypes: USNM 1156927, 1 male (pcl 47.8 mm), 1 female (pcl 51.2 mm), Scotia Sea, N of South Georgia, 53°36'S 36°51-54'W, 220-265 m, "Eltanin" 732-35, 10' Blake trawl, 12 Sep. 1963.

**Diagnosis.** — Rostrum ventrally serrated to spinose along distal half. Maxilliped 3 exopod reaching slightly beyond midlength of ischium; flagellum absent. Branchiocardiac grooves reaching posteriorly to about the posterior quarter of the carapace. Sternal ridges between pereopod 4 coxae in males separated by hour-glass shaped sinus, minimum gap narrower than one-fifth maximum distance between ridges.

**Description.** — Rostrum slender, 0.55 pcl in holotype (rostra damaged in paratypes), cross-section triangular; dorsal surface with pair of granulose or spinose carinae extending posteriorly from posterior third of rostrum onto carapace proper, near level of base of supraorbital spines; dorsal median groove of rostrum extending posteriorly to posterior margin of carapace; lateral margins with 6 or 7 lateral spines or spinules, 2 prominent; apex acute, slightly upturned; ventral margin serrated to spinose along distal half.

Carapace granular over entire surface, finest laterally, largest anterodorsally; surface minutely setose; supraorbital spine with short granular carinae; antennal spine without carinae, but slightly swollen basally; orbital fossa rounded, concave; pterygostomial and anterolateral margin broadly convex evenly merging; ventral branchiostegal margin unarmed. Postcervical groove distinct, meeting sellar groove (indistinct) dorsally, ventrally continuous with cervical, hepatic and antennal grooves. Urogastric groove short. Branchiocardiac groove faintly indicated, extending onto posterior quarter of carapace, slightly oblique to midline; parabranchial groove faintly indicated; cervical groove extending dorsally slightly above  $\alpha$  point; gastro-orbital groove faintly indicated; marginal carina flanked by distinct groove, extending anteriorly to incisura clavicularis.

Abdomen subcylindrical; somites with smooth articular surfaces, demarcated from non-articular surfaces by setose, transverse groove. Somite 1 surface with short median tubercle, and shallow, setose pits, posterior surface of somite smooth; pleuron subquadrate, sparsely pitted, anteriorly blunt, overlapping posterior carapace margin. Somites 2-5 with low blunt median carina, extending almost to posterior somite margins, smooth dorsally, margins with irregular setose pits; with broad, shallow, transverse setose groove on either side of median carina, extending onto pleura; midlateral surfaces almost glabrous, rugose and pitted, more pronounced in paratypes than in holotype; posterior margin smooth, glabrous; pleura broad, with blunt, angular terminations, sur-

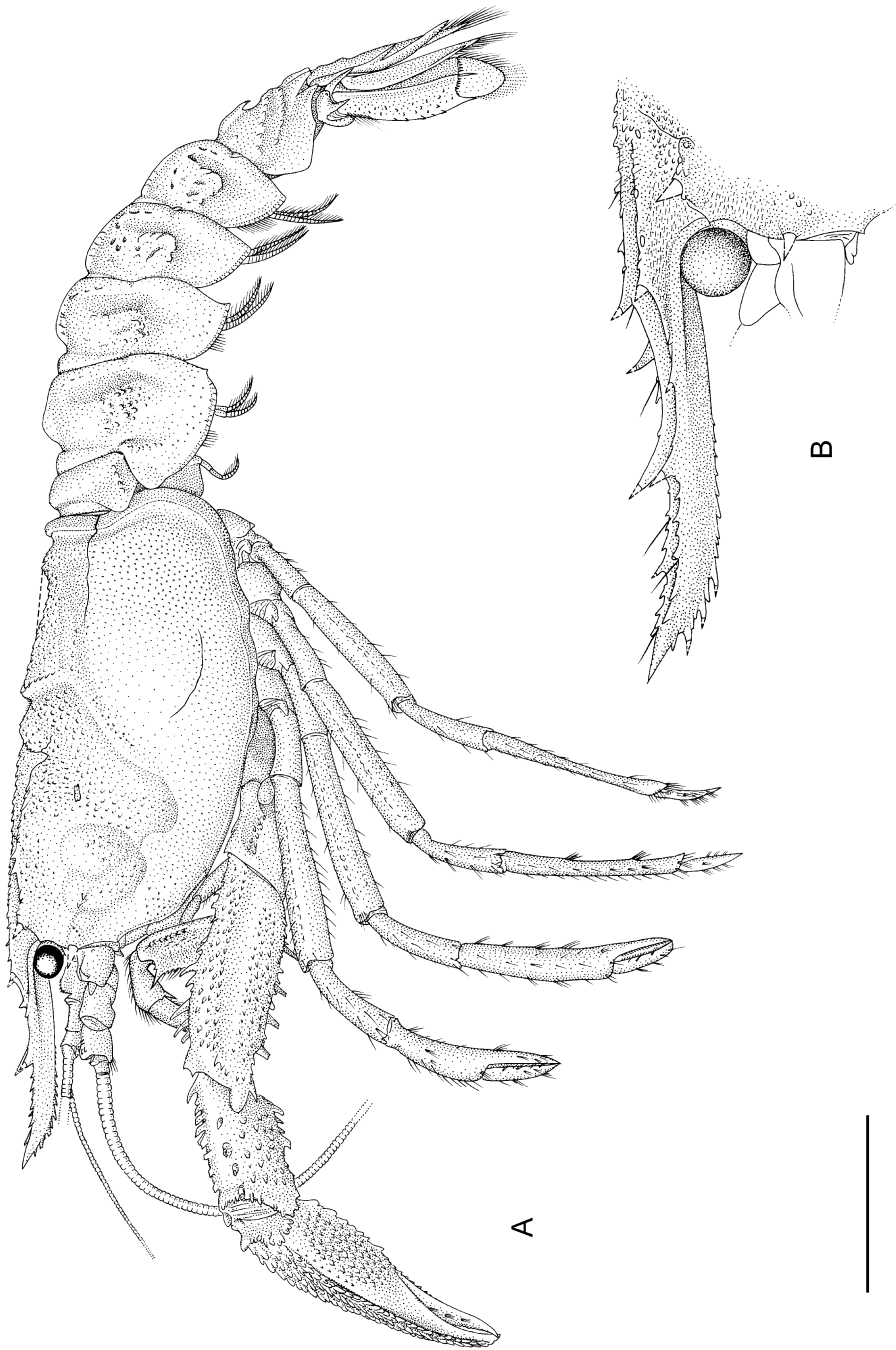


Fig. 1. *Thymops takedai* sp. nov., holotype female, cl 58.8 mm, pcl 37.3 mm (USNM 1156923):  
A, habitus, lateral view; B, rostrum, lateral view. Scale: A = 16 mm, B = 8 mm.



faces finely granular, sparsely setose. Somite 6 surface uneven, sparsely pitted; median carina more slender than that of preceding somite, extending to midlength of somite, margins irregular, sparsely setose, with posterior spine; with 2 arcuate, oblique rows of sparsely setose tubercles on either side of midline; posterior margin slightly concave, with median and posterolateral spines; pleuron broad, triangular.

Telson longer than wide, widest posteriorly; surface sparsely granular and sparsely setose; posterior margin evenly convex; with prominent posterolateral and midlateral spines. Uropodal protopod with 2 prominent spines, 1 each above endopod and exopod articulations, respectively. Endopod with prominent posterolateral spine; surface with single longitudinal carina; posterior margin evenly convex. Exopod with diaeresis; proximal segment with longitudinal carina; lateral margin with 2 or 3 low spines; posterior margin with 18-20 spinules and strong posterolateral spine; distal segment half as long as wide, broadly rounded.

Eyes small, movable, cornea subglobular, not wider than stalk.

Antennular peduncle extending anteriorly to midlength of rostrum. Articles unarmed.

Antennal peduncle extending anteriorly to midlength of rostrum. Basal article with minute distoventral spinule on margin anterior to antennal pore. Article 3 with small distoventral spinule. Scaphocerite reduced to blunt sclerite.

Epistome surface smooth, unarmed; posterior margin with blunt clavicular ridge; anterior margin adjacent to antennular articulations forming rounded, thickened ridge.

Maxilliped 2 exopod extending to distal quarter of the merus; flagellum absent.

Maxilliped 3 endopod with unarmed dactylus and propodus; carpus with 1 or 2 distal flexor spines; merus distal margin with small extensor and large flexor spine flanked on either side by small spine; ischium flexor margin dentate. Exopod slender, reaching slightly beyond midlength of ischium of endopod; flagellum absent.

Sternites of pereopods 1-3 each with paired, posteriorly divergent ridges between coxae, increasing in size posteriorly. Sternite of pereopod 5 unarmed.

Sternite of pereopod 4 in male with paired ridges, fused anteriorly, divergent posteriorly, forming hood-like structure; each ridge posteriorly with rounded, mesially inclined lobe, together forming hour-glass shaped median sinus; minimum gap between posterior lobes less than one-fifth maximum width of

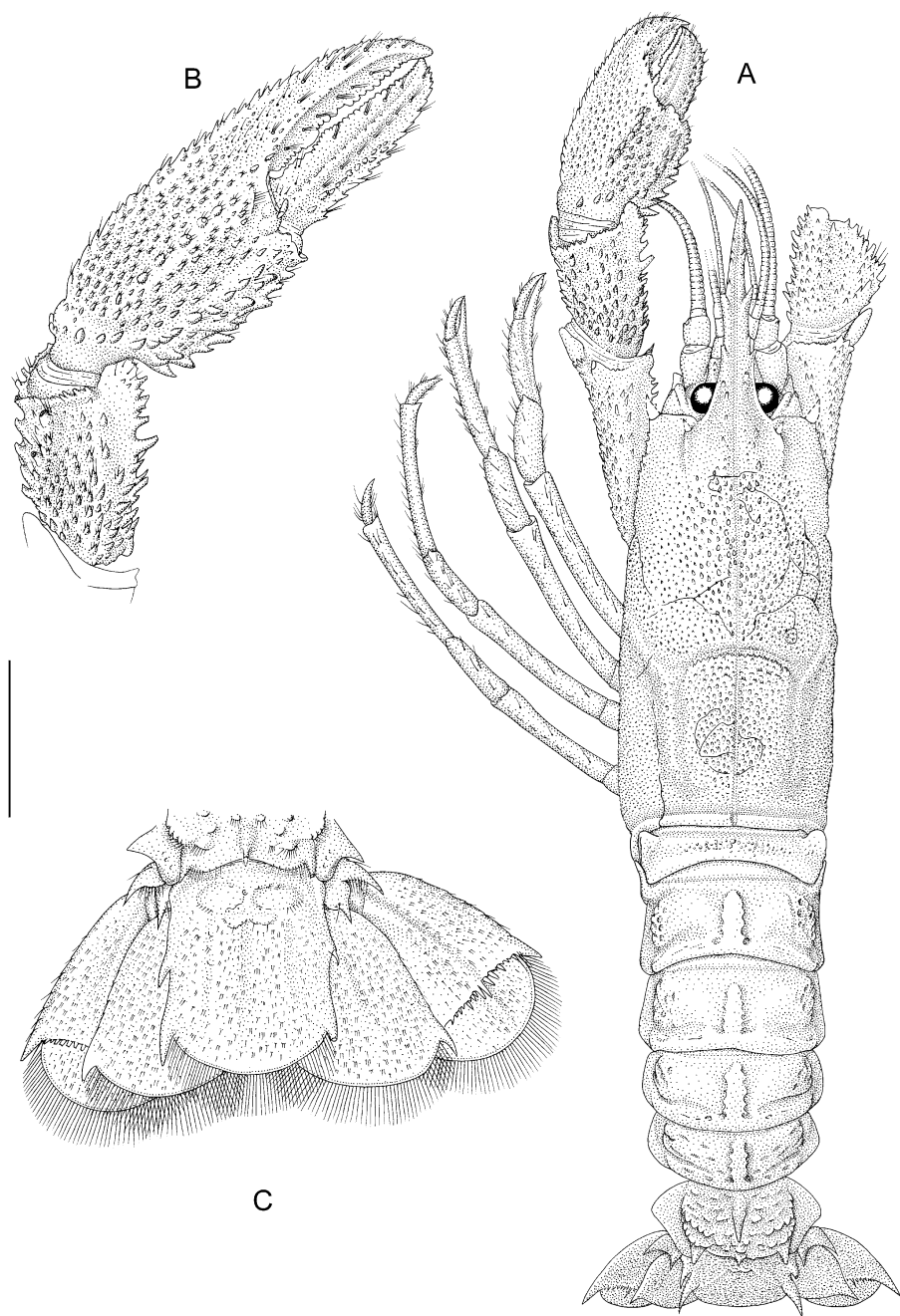


Fig. 2. *Thymops takedai* sp. nov., holotype female, cl 58.8 mm, pcl 37.3 mm (USNM 1156923): A, habitus, dorsal view; B, left cheliped 1, dorsal view; C, telson, dorsal view. Scale: A = 15 mm, B = 12.5 mm, C = 10 mm.

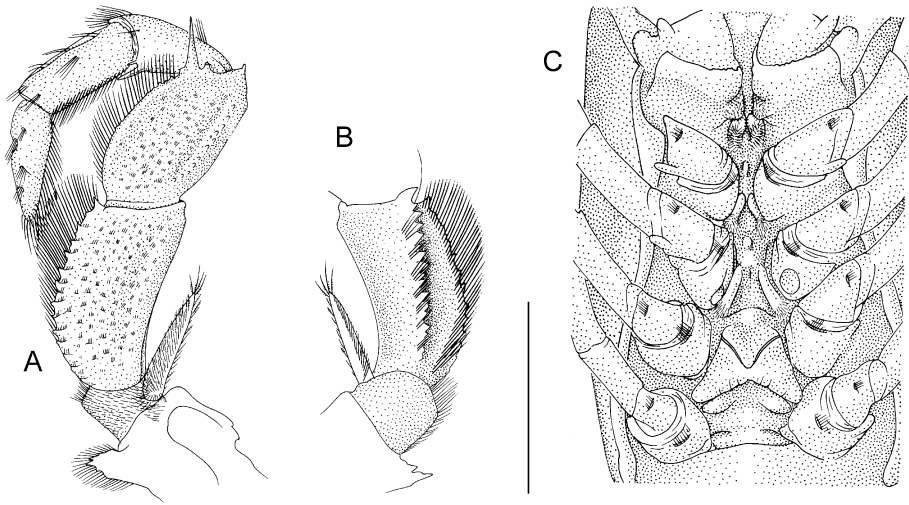


Fig. 3. *Thymops takedai* sp. nov., holotype female, cl 58.8 mm, pcl 37.3 mm (USNM 1156923): A, left maxilliped 3, posterior (external) view; B, left maxilliped 3 basis and ischium, anterior (internal) view; C, sternum. Scale: A–B = 8 mm, C = 12.5 mm.

‘hood’; ‘hood’ partially overhanging pereopod 5 coxae and anterior half of first pleopods.

Sternite of pereopod 4 in females with swollen, triangular thelycum. Thelycum anteriorly with small, blunt triangular anterior median lobe abutting pair of large, swollen, posterolaterally directed triangular lobes, separated by median fissure and forming broad V-shape posteriorly.

Pereopod 1 chelate, left–right equal and symmetrical; sparsely setose; surfaces covered with granules and acute tubercles and spines along margins; dactylus and pollex longer than palm; occlusal margins dentate; lateral and mesial surfaces with smooth, slender longitudinal carina; carpus about as long as palm, spinose and tuberculate; merus compressed proximally, distally trigonal in cross-section, spinose along distal, dorsal and ventral margins; ischium compressed, ventral margin spinose; coxa ventral margin denticulate.

Pereopods 2–3 chelate, reaching anteriorly slightly beyond rostrum; surfaces with few sparse setae; coxa with small weakly serrate or crenulated ventral margin, otherwise segments unarmed; pollex and dactylus with finely serrate occlusal margins; pereopod 2 dactylus two-thirds as long as palm; pereopod 3 dactylus slightly shorter than half palm length.

Pereopod 4 non-chelate, reaching anteriorly to rostral apex; segments unarmed.

Pereopod 5 sub-chelate in females, non-chelate in males reaching anteriorly to end of antennal peduncle; segments unarmed; propodus with short, setose pollex, about one-third as long as dactylus.

Abdominal sternites unarmed. Pleopod 1 uniramous. Pleopods 2-5 biramous.

Male pleopod 1 with distal and proximal segments fused, forming copulatory organ in form of spatulate, twisted plate with plane of distal segment approximately perpendicular to plain of proximal segment. Distal segment with blunt, subtruncate apex. Proximal segment with sparsely setose mesial surface, mesial edge with long setae.

Male pleopod 2 biramous; basis with posterior setal field extending to inner distal margin; exopod and endopod elongate-ovate with setose margins; exopod longer than endopod, appendix masculina present.

Etymology. — We are pleased to name the new species in honour of Prof. Masatsune Takeda, for his major contributions to carcinology. Although focussed primarily on Brachyura, Prof. Takeda published on a wide range of decapods, including clawed lobsters (e.g., Takeda & Hatanaka, 1984; Takeda, 1986; Takeda & Nagai, 2004).

Remarks. — *Thymops takedai* sp. nov. differs from its only congener, *T. birsteini*, in the following features: the ventral margin of the rostrum is spinose or serrated; the maxilliped 3 exopod lacks a flagellum and reaches only slightly beyond the midlength of the ischium; the branchiocardiac groove on the carapace reaches posteriorly to about the posterior quarter of the carapace, rather than not extending much beyond the midlength; and the sternal ridges between the pereopod 4 coxae in males are separated by an hour-glass shaped sinus. In contrast, the rostrum of *T. birsteini* is ventrally smooth or granular; the maxilliped 3 exopod bears a multiarticulate flagellum that reaches beyond the midlength of the merus; the branchiocardiac groove extends posteriorly scarcely beyond the postcervical groove; and the sinus separating the sternal ridges between the pereopod 4 coxae in males are separated by a wide U-shaped sinus.

Unfortunately, all specimens of *T. takedai* were damaged during collection and the paratypes, both larger than the holotype, have broken rostra. Although the original rostral lengths cannot be determined, the conformation of the intact portions indicates that the proportional rostral length decreases with increasing body size as in other nephropids.

The holotype of *T. takedai* is a subadult female as indicated by the smaller gonopores on the pereopod 3 coxae and development of the sternal thelycum, being considerably less swollen than that of the female paratype.

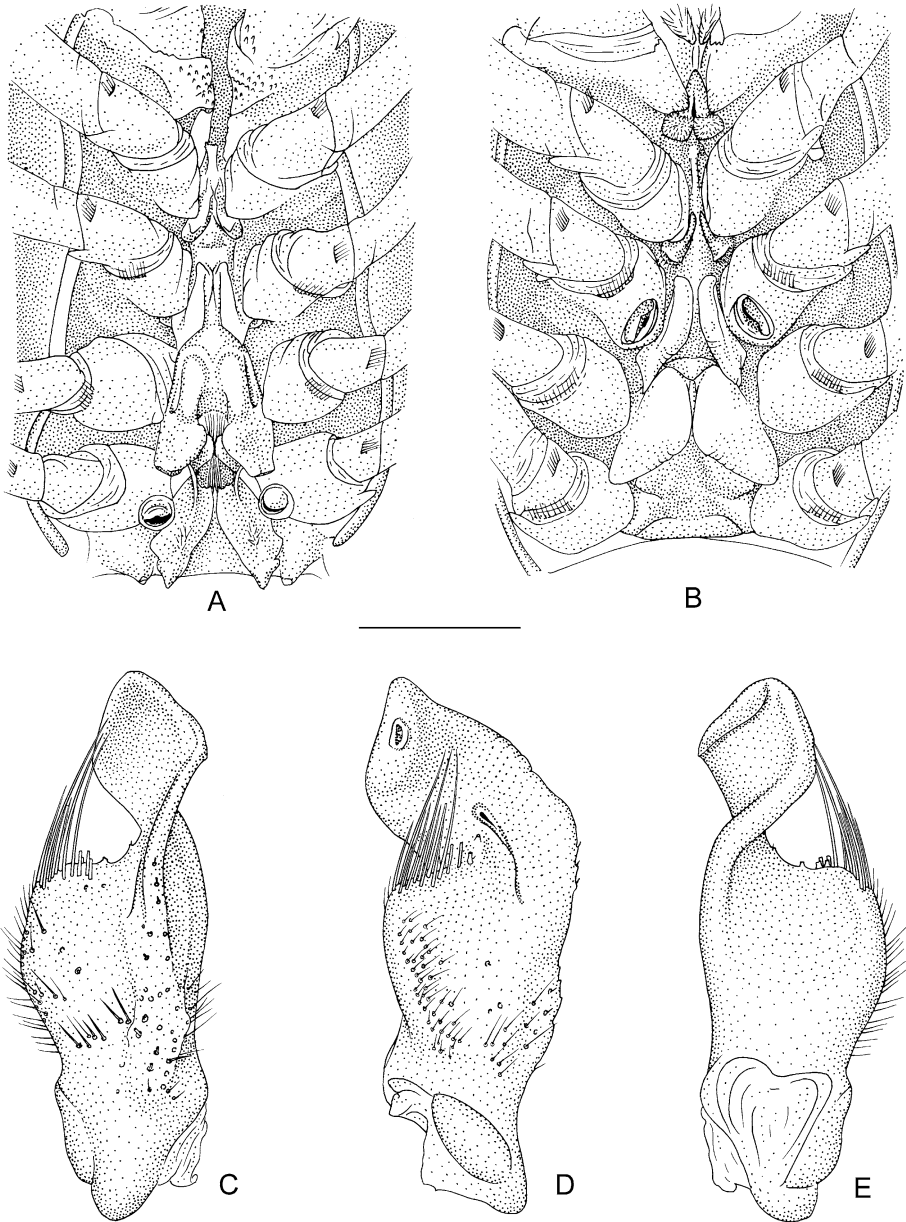


Fig. 4. *Thymops takedai* sp. nov. Paratype male, pcl 47.8 mm (USNM 1156927): A, sternum; C–E, left pleopod 1, C, posterior (external) view, D, mesial view, E, anterior (internal) view. Paratype female, pcl 51.2 mm (USNM 1156927): B, sternum. Scale: A–B = 10 mm, C–E = 2.8 mm.

It is somewhat unexpected that a new species of *Thymops* should be discovered in such close geographic proximity to the respective type localities of *Thymops birsteini* and *Thymopsis nilenta*, especially given the significant level of fishery activity in the region. *Thymopsis nilenta* and both species of *Thymops*, however, are all superficially similar and could be misidentified in the field. In particular, *T. takedai* could easily be mistaken for *Thymopsis nilenta*, especially given that the two species can be sympatric and both have a ventrally spinose rostrum. Whether *T. takedai* is naturally rare or has been overlooked requires further research.

Distribution. — Scotia Sea in the vicinity of the Falkland (Malvinas) Islands and South Georgia; 220-1739 m.

### **Thymops birsteini** (Zarenkov & Semenov, 1972)

*Nephropides birsteini* Zarenkov & Semenov, 1972: 599-601, figs. 1-6.

*Thymops birsteini*. — Holthuis, 1974: 764-772, figs. 13, 14; Arnaud, 1981: 37-38; Takeda & Hatanaka, 1984: 11; Takeda, 1986: 328, fig. 136; Holthuis, 1991: 48, figs. 45, 86, 87; Arntz et al., 1999: 309, tabs. 1, 2; Laptikhovsky & Reyes, 2009: 35.

Material examined. — USNM 1156925, 2 males (cl 32.2 mm, pcl 23.7 mm; cl 34.6 mm, pcl 25.2 mm), Scotia Sea, Falkland Islands (Malvinas), 51°58.2'-52°01.0'S 56°38'W, 462-353 ftm [845.5-646 m], "Eltanin" 558-35, 14 Mar. 1963.

Remarks. — The specimens conform extremely well to the type description (Zarenkov & Semenov, 1972) and the full account of adults provided by Holthuis (1974).

Distribution. — Continental shelf off southern South America ranging from the Pacific coast off Chile eastwards to the vicinity of the Falkland Islands (Malvinas) and South Georgia; 122-2516 m (Holthuis, 1991; Laptikhovsky & Reyes, 2009).

### Genus *Thymopsis* Holthuis, 1974

#### **Thymopsis nilenta** Holthuis, 1974

(fig. 5)

*Thymopsis nilenta* Holthuis, 1974: 756-763, figs. 10-12; 1991: 49-50, figs. 44, 88, 89.

Material examined. — USNM 1156929, 2 males (cl 49.2 mm, pcl 38.7 mm; cl 56.0 mm, pcl 43.9 mm), 2 females (cl 52.6 mm, pcl 43.6 mm; pcl 49.1 mm), N of South Georgia, 53°36'S 36°51-54'W, 220-265 m, 10' Blake trawl, "Eltanin" 732-35, 12 Sep. 1963; USNM 1156924, 1 female (pcl 35.1 mm), 53°06.0-05.5'S 44°54.5-49.5'W, 1215-1136 ftm [2223.5-2078.9 m], "Eltanin" 458-35, with few arthropods and tunicates, rock dredge, 9 Feb. 1963; AM P87157, 1 male (cl 51.0 mm, pcl 41.0 mm), Scotia Sea, N of South Georgia Island, 53°22.7-23.4'S 37°11.1-20.9'W, 765-710 ftm [1400-1299 m], gravel with snails and gorgonians, 5' Blake

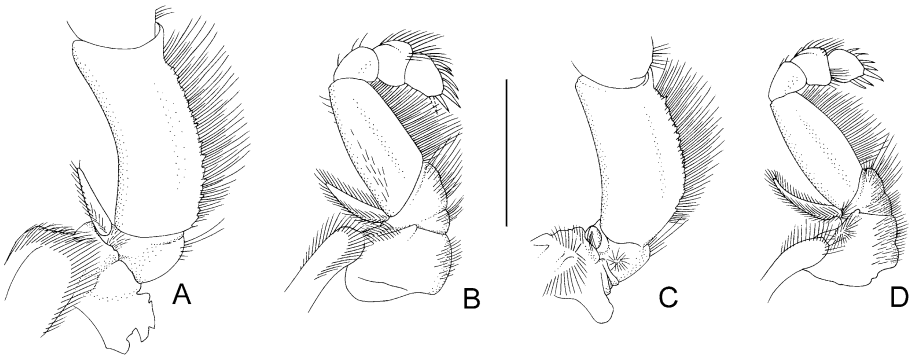


Fig. 5. *Thymopsis nilenta* Holthuis, 1974, right maxilliped 3 exopod and proximal endopod articles (coxa-basis, ischium, merus), external view (A, C) and maxilliped 2, external view (B, D). A–B, female, pcl 49.1 mm (USNM 1156929); C–D, female, pcl 45.1 mm (NMNZ CR.22921). Scale = 8 mm.

trawl, “Eltanin” 734-35, 12 Sep. 1963; NMNZ Cr.22192, 1 female (pcl 45.1 mm), South Georgia, FV “San Aspiring”.

Remarks. — The specimens are in poor condition but exhibit some important variation not documented by Holthuis (1974, 1991). *Thymopsis nilenta* was originally distinguished from *Thymops* on the basis of a spinose rather than unarmed ventral rostral margin, vestigial rather than well-developed exopods on maxillipeds 2 and 3, an unarmed posterior margin of abdominal somite 6 and slightly different expression of the postcervical groove (Holthuis, 1974). The ventrally spinose rostrum of *Thymops takedai* invalidates the first mentioned generic distinction. The second ‘diagnostic’ feature of *Thymopsis*, vestigial maxilliped 2 and 3 exopods, is not consistent in four specimens of *T. nilenta*: two (AM P87157; NMNZ Cr.22192, fig. 5C, D) have a vestigial exopod on maxilliped 3 as expected, but on maxilliped 2, have a short, non-flagellate exopod; the third has short exopods on maxillipeds 2 and 3 (USNM 1156929, male, pcl 38.7 mm); and the fourth (USNM 1156929, female, pcl 49.1 mm, fig. 5A, B) has a small non-flagellate exopod on left and right maxilliped 2 and the right side maxilliped 3, but none on the left maxilliped 3. Likewise, the spination of the posterior margin of abdominal somite 6 overlaps between *Thymops* and *Thymopsis*, with a median and posterolateral spines variously present or absent in the latter. Thus, three of four diagnostic characters putatively separating *Thymops* and *Thymopsis* are unreliable. The two genera are otherwise almost indistinguishable apart from subtle distinctions in carapace groove patterns, the most important being slightly different arrangements of the postcervical and sellar grooves. In *Thymops*, the postcervical groove

reaches the dorsal midline of the carapace where it meets the sellar groove. In *Thymopsis*, however, the postcervical groove does not reach the carapace dorsum; the postcervical and sellar grooves do not meet and only the latter crosses the dorsal midline. This single remaining distinction between *Thymops* and *Thymopsis* is slight, undermining the taxonomic utility of recognising both genera as separate, especially for a clade of only three species. Further study may show that the two genera should be synonymised.

*Thymopsis nilenta* was previously known only from the type material collected off the Falkland Islands and South Georgia at depths between 2886-3040 m and 1976-2068 m (Holthuis, 1974). The specimen from “Eltanin” stn 734-35 was noted as “very light salmon” in colour. Capture depths of previous records of *Thymopsis nilenta* all exceed 1900 m, so the specimens taken at 220-265 m (together with two paratypes of *Thymops takedai*) represent a significant bathymetric range extension into shallower water.

Distribution. — South-western Atlantic from the vicinity of the Falkland Islands (Malvinas) and South Georgia; between 220 and 2886-3040 m.

#### ACKNOWLEDGMENTS

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