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A new deep-sea lobster of the genus *Thymopides* (Crustacea: Decapoda: Nephropidae) collected near the hydrothermal vent Snake Pit, Mid-Atlantic Ridge

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Abstract: A second species of the genus *Thymopides*, *T. laurentae* sp. nov., is described from a specimen trapped at 3505 m depth in the Mid-Atlantic Ridge, near the Snake Pit hydrothermal area. This new species is easily distinguishable from the type species *T. grobovi*, collected off the subantarctic islands Heard and Kerguelen, at depth between 525 and 1220 m, by its smooth carapace, the abdomen without longitudinal median carina and the palm of the first pereopod distinctly longer than wide.

Résumé : *Description d'une nouvelle espèce de langoustine du genre* Thymopides *(Crustacea: Decapoda: Nephropidae), récoltée près du site hydrothermal Snake Pit (ride médio-atlantique).* Une deuxième espèce du genre *Thymopides*, *T. laurentae* sp. nov., est décrite à partir d'un spécimen récolté à 3505 m de profondeur sur la ride médio-atlantique, près du champ hydrothermal Snake Pit. La nouvelle espèce diffère nettement de l'espèce type *T. grobovi*, décrite du plateau des îles subantarctiques Heard et Kerguelen, entre 525 et 1220 m de profondeur, par sa carapace lisse, l'abdomen sans carène médiane longitudinale, et la main du premier péréiopode nettement plus longue que large.

Keywords: Thymopides, Nephropidae, deep-sea, hydrothermal vent, Mid-Atlantic Ridge

Introduction

Since 1985, numerous submarine expeditions carried out along the Mid-Atlantic Ridge (MAR) lead to the description of eight hydrothermally active sites between 37°51'N and 13°N, at 850-4100 m depth (see Van Dover, 1995 for review; Beltenev et al., 2003). During the Hydrosnake cruise in June 1988, the Snake Pit hydrothermal area (23°22.94'N - 44°56.09'W, 3480 m depth) was explored and sampled (Mével et al., 1989), and the associated fauna inventoried (Segonzac, 1992). As in other deep MAR vent sites, the animal community associated with these ecosystems includes numerous decapod crustaceans, the most abundant of which are the shrimps of the family Alvinocarididae (Segonzac et al., 1993). Other decapod species present on this vent site include the bythograeid crab *Segonzacia mesatlantica* Williams, 1988 and the galatheid crab *Munidopsis crassa* Smith, 1885.

Although most samples were collected at the active sites, one sample was taken outside the active site on the slope of the Snake Pit mount. A baited trap (PT 01) was settled at the base of black smokers of the site "Les Ruches" (3480 m depth). The trap, recovered the following day by the submarine, contained bythograeid crabs, one macrourid fish *Coryphaenoides armatus* (Hector, 1875) and one zoarcid fish *Pachycara thermophilum* Geistdoerfer, 1994. However,

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the trap was lost before the ascent of the submarine, but fortunately it was found again five days later, at 100 m north of the site "Les Ruches", near an American beacon (23°22.15'N - 44°57.15'W, at 3505 m depth). This time the trap contained three bythograeid crabs, one *Coryphaenoides armatus*, one galatheid crab and an undescribed nephropid lobster. This lobster, fixed in formaline before being preserved in ethanol 70°, was later identified by our late colleague M. de Saint-Laurent (Muséum national d'Histoire naturelle, Paris), as belonging to the genus *Thymopides* Burukovsky & Averin, 1977.

In this paper, we describe this lobster specimen as a new species *Thymopides laurentae* sp. nov. The new species contrasts with the only other species, the type species *Thymopides grobovi* (Burukovsky & Averin, 1976), known only from the subantarctic Islands Heard and Kerguelen, at depths between 525 and 1220 m (Burukovsky & Averin, 1976; Ledoyer, 1979). Numerous specimens of *T. grobovi*, deposited in the Muséum in Paris, have been used for comparison. The holotype of *T. laurentae* sp. nov. is deposited in the Muséum national d'Histoire naturelle, Paris (MNHN). In the description, the terminology used follows Holthuis (1974, 1991).

Systematics

Family Nephropidae Dana, 1852
Subfamily Nephropinae Dana, 1852
Genus *Thymopides* Burukovsky & Averin, 1977
Thymopides laurentae sp. nov.
(Figs 1-3A)

Type material: Holotype, female, Hydrosnake Cruise, dive HS 08, 26 June 1988, MNHN-As-547.
Type locality: Mid-Atlantic Ridge, area adjacent to the hydrothermal vent area Snake Pit, 23°22.15'N - 44°57.15'W, 3505 m depth.

Description

Holotype measurements
Carapace length: 44.8 mm from tip of rostrum to midpoint of postero-dorsal margin of carapace, i.e. 35.2 mm from level of postero-orbital margin to midpoint of postero-dorsal margin of carapace. Total length: 96.5 mm from tip of rostrum to posterior margin of telson, i.e. 86.9 mm from postero-orbital margin to posterior margin of telson. First pereopod (left), total length 68 mm, palm length 16 mm, movable finger 18 mm; second pereopod (left), total length 43 mm, palm length 13 mm; third pereopod (left), total length 43 mm, palm length 15 mm (see Chan, 1998, for technical measurements).

Rostrum slender, nearly 0.3 carapace length (measured along dorsal border), overreaching antennular and antennal peduncles; triangular in dorsal view, with 3 lateral rostral spines on each side; dorsal surface with median groove along entire length; shallowly depressed smooth linear area extending medially from base of rostrum to posterior border of carapace (Fig. 1A-D).

Carapace with two subdorsal sparsely granulose carinae, starting at middle of rostrum, diverging posteriorly and reaching beyond supraorbital spine; carapace surface finely granulated, with very short median scales on posterior part of carapace near linear area, with scattered short simple setae; one supraorbital and one antennal spine on each side; supraorbital spine larger than antennal; low supraorbital carina posterior to each spine; each antennal spine with short low carina; postcervical groove distinct, crossing dorsum, curving down and meeting hepatic groove; hepatic groove curving posteriorly, connecting postcervical and cervical grooves; urogastric groove not distinct. Marginal carina distinct throughout its length, marginal groove wider near posterior part of marginal carina (Fig. 1A, B).

First abdominal somite smooth, anteroventral border of pleura convex; abdominal somites 2-5 smooth, without grooves and distinct longitudinal median carina; a rudimentary median carina on somite 5; a minute transverse stria on each side of posterior half of each somite; pleura of second somite large, trapezoid, with distinct posteriorly directed distal tooth; pleura of somites 3-5 more triangular than those of second somite, ending in acute point; anterior margin of pleura of second somite distinctly convex, margin of somites 3-5 slightly convex; sixth somite with rounded longitudinal carina, without distinct grooves; pleura of somite 6 short, broadly triangular; dorsal surface of all somites with few short setae, more abundant on pleurae (Fig. 1E, F).

Telson 1.7 times longer than wide and longer than abdominal somite 6; lateral margins slightly convex, with well-developed postero-lateral spine on each side; posterior margin slightly narrower than anterior margin, convex and slightly exceeding postero-lateral spines; dorsal surface with few short setae and two low blunt carinae (Fig. IF).

Eyes small, unpigmented; cornea as wide as ocular peduncle.

Basal antennular segment with statocyst on dorsal side; ultimate segment not overreaching rostrum; antennal peduncle with scaphocerite well developed, ovate, ending in spine, nearly reaching end of penultimate segment of antennal peduncle; lateral margin nearly straight; mesial margin distinctly convex, with long setae throughout; one well-developed spine on lateral side of base of scaphocerite (Fig. IB, C).

Third maxilliped exceeding distal end of rostrum by 0.3 of propodus; ischium as long as merus, flexor border serrate, mesial margin with strong dentate ridge; merus longer than carpus, flexor border with some granules and one well-developed distal spine, lateral side with some

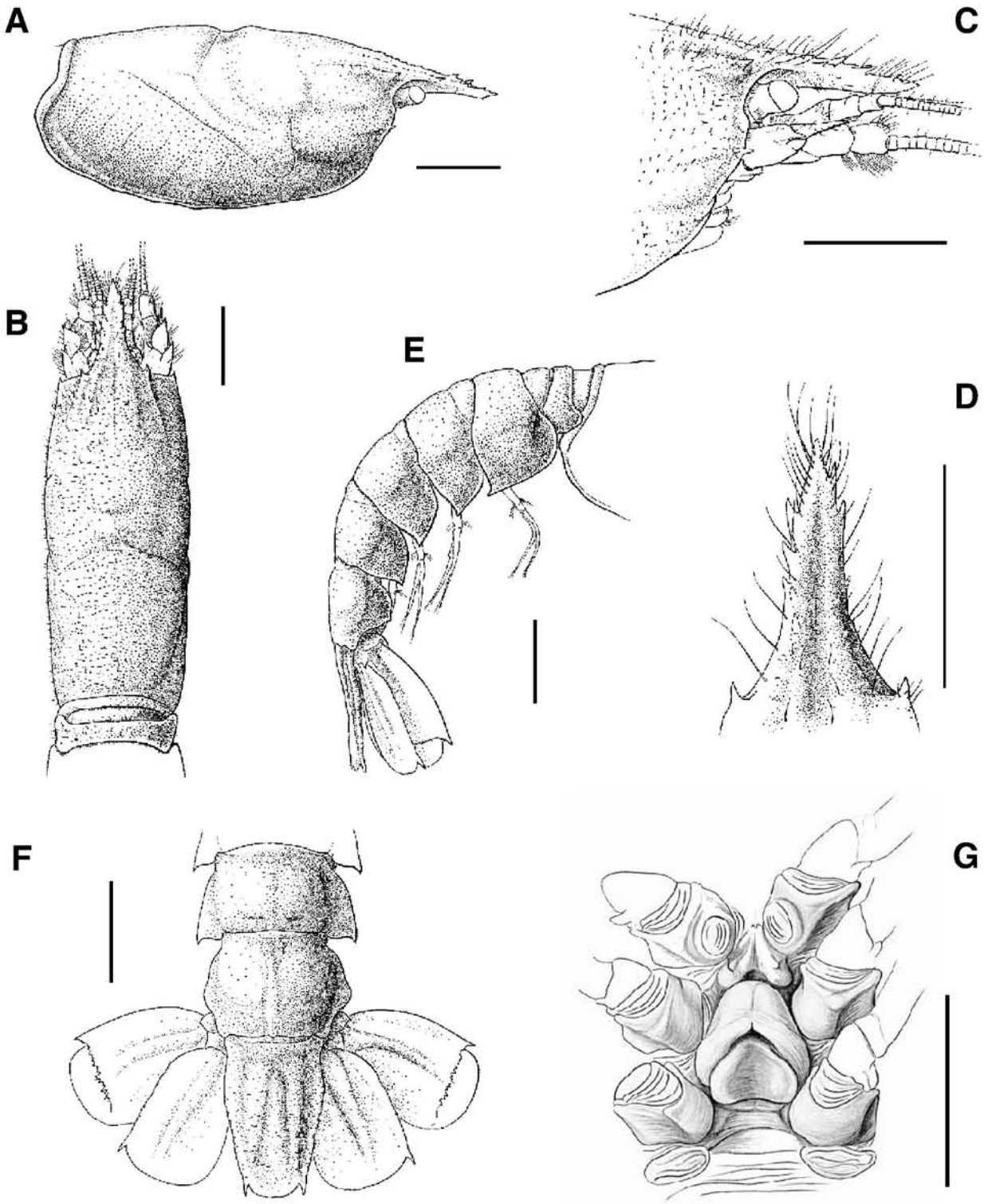

Figure 1. *Thymopides laurentae* sp. nov. Holotype (MNHN As-547). **A.** Carapace, lateral view. **B.** Carapace, dorsal view. **C.** Carapace, anterior part and cephalic appendages, lateral view. **D.** Rostrum, dorsal view. **E.** Abdomen, lateral view. **F.** Fifth and sixth abdominal somites and tail fan with telson, dorsal view. **G.** Thelycum, ventral view. Scale bar = 1 cm.

Figure 1. *Thymopides laurentae* sp. nov. Holotype (MNHN As-547). **A.** Carapace, vue latérale. **B.** Carapace, vue dorsale. **C.** Partie antérieure de la carapace et appendices céphaliques, vue latérale. **D.** Rostre, vue dorsale. **E.** Abdomen, vue latérale. **F.** 5^{e} et 6^{e} somites abdominaux, nageoire caudale et telson, vue dorsale. **G.** Thelycum, vue ventrale. Echelle = 1 cm.

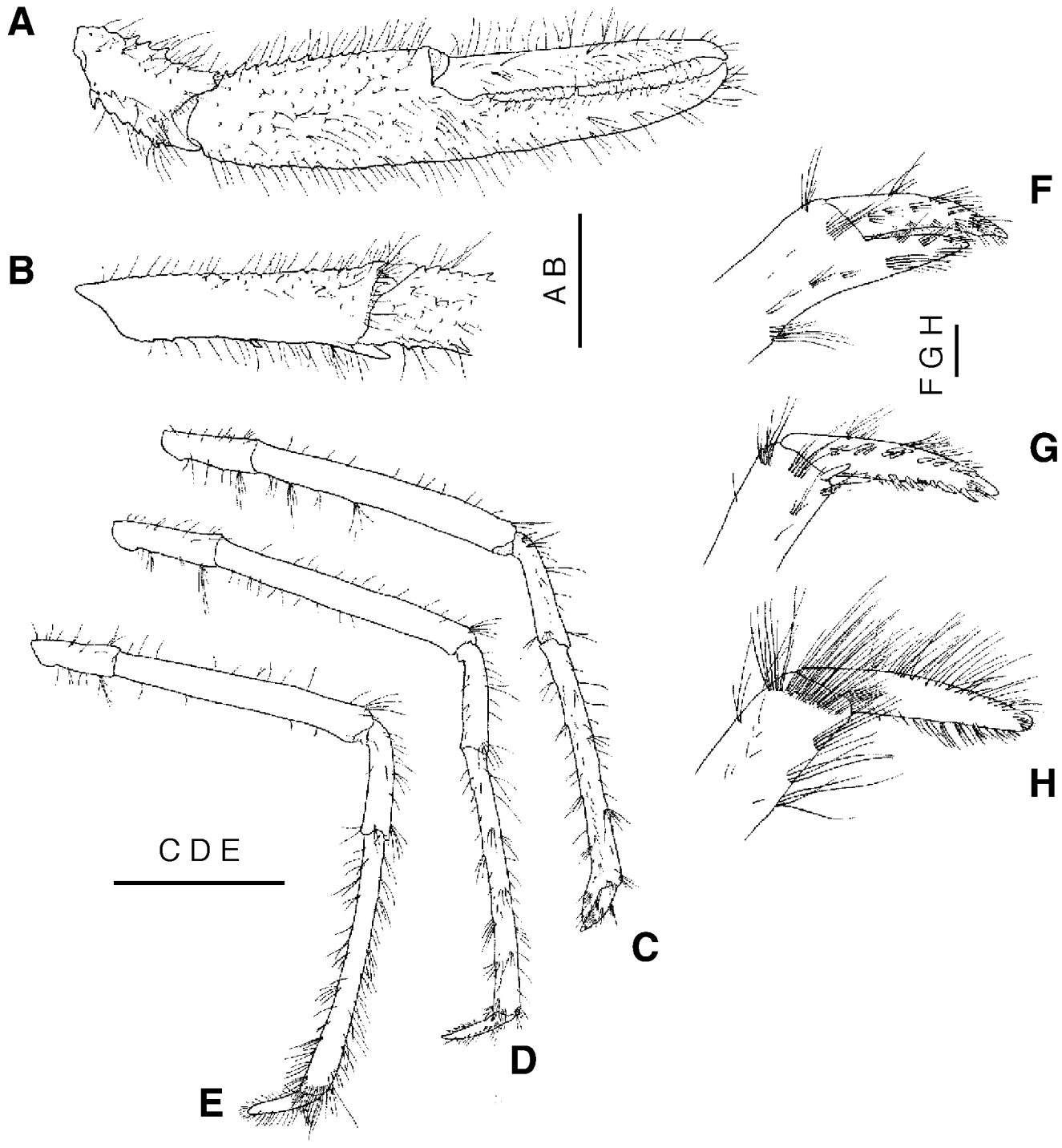

Figure 2. *Thymopides laurentae* sp. nov. Holotype (MNHN As-547). Right pereopods. **A.** First pereopod (cheliped), carpus and chela. **B.** First pereopod, merus. **C.** Third pereopod. **D.** Fourth pereopod. **E.** Fifth pereopod. **F.** Third pereopod, fingers. **G.** Fourth pereopod, dactylus and distal part of propodus. **H.** Fifth pereopod, dactylus and distal part of propodus. Scale bars: A**B**, CDE = 1 cm; FGH = 1 mm.

Figure 2. *Thymopides laurentae* sp. nov. Holotype (MNHN As-547). Péréiopodes droits. **A.** Premier péréiopode, carpe et main. **B.** Premier péréiopode, merus **C.** Troisième péréiopode. **D.** Quatrième péréiopode. **E.** Cinquième péréiopode. **F.** Doigts du troisième péréiopode. **G.** Dactyle et partie distale du propodus du quatrième péréiopode. **H.** Dactyle et partie distale du propodus du cinquième péréiopode. Echelles : A**B**, CDE = 1 cm ; FGH = 1 mm.

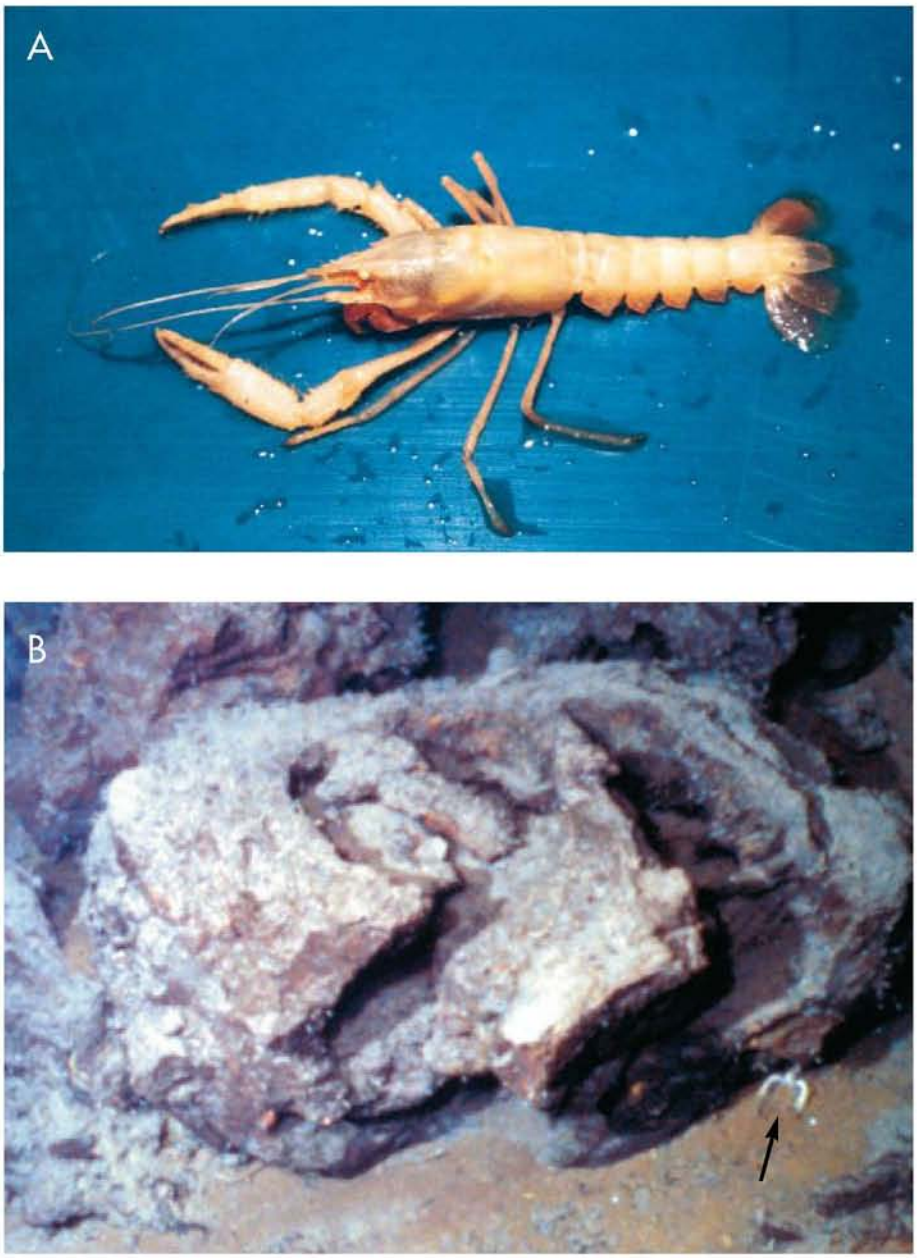

Figure 3. A. *Thymopides laurentae* sp. nov. Holotype (MNHN As-547). Photograph taken on board, after sampling (copyright Ifremer/Hydrosnake). **B.** In situ photograph of a lobster, probably *T. laurentae* (arrow), taken from the submersible (HYDROSNAKE, PL 01) at a depth of 3474 m, close to the site "Le Clou", at about 400 m west of the site "Les Ruches" (copyright Ifremer/Hydrosnake).

Figure 3. A. *Thymopides laurentae* sp. nov. Holotype (MNHN As 547). Photographie prise à bord, après la récolte (copyright Ifremer/Hydrosnake). **B.** Photographie in situ d'une langoustine, probablement *T. laurentae* (flèche), prise du sous-marin (HYDROSNAKE, PL 01) à 3474 m de profondeur, près du site "Le Clou", à environ 400 m à l'ouest du site "Les Ruches" (copyright Ifremer/Hydrosnake).

granules and one small distal spine; carpus slightly longer than propodus, with one distal spine on flexor margin; dactylus slightly shorter than propodus; exopod with multi-articulate flagellum, nearly reaching end of merus.

First pereopods (chelipeds) slender, subequal, twice longer than carapace (excluding rostrum); exceeding rostrum by 0.3 of merus; merus nearly 3 times length of carpus; longer than palm (measured on lateral side), with rows of small spines and tubercles; carpus 4 times shorter than chela (measured dorsally), with rows of tubercles and spines on each side, two strong spines on mesial side; palm twice as broad as fingers, and slightly shorter in length; palm nearly twice as long as high, with granules on dorsal, lateral, ventral and mesial sides; granules on dorsal border acute, and situated on a rounded carina; fingers unarmed, cutting edges with some larger teeth and small tubercles (Fig. 2A, B).

Second pereopod extending beyond rostrum by 0.7 of chela; merus reaching level of orbit, 1.5 times palm length and twice carpus length; carpus nearly twice as long as fingers; fingers about 0.25 palm length.

Third pereopod extending beyond rostrum with distal half of chela; merus about 2.5 times carpus, fingers 0.25 palm length and half carpus length (Fig. 2C, F).

Fourth and fifth pereopods subequal in length, extending beyond rostrum by distal 0.3 of dactylus; merus more than twice as long as carpus; length of merus and propodus subequal in length; propodus more than 3 times as long as dactylus; propodus of fourth pereopod with two distal movable spines on flexor margin; dactylus with rows of spinules; propodus and dactylus of fifth pereopod unarmed, without extensions on flexor borders (Fig. 2D, E, G, H).

Thelycum as illustrated (Fig. 1G).

Colour

Uniform pale orange, darker on anterior portion of carapace (Fig. 3A).

Etymology

The species is dedicated to our late colleague Michèle de Saint Laurent in recognition of her exceptional contribution to the knowledge of Decapoda.

Remarks

Burukovsky & Averin (1976) described a new genus (*Bellator*) to include a new nephropid species collected off the subantarctic Islands, Heard and Kerguelen Islands. The new genus was preoccupied, so that Burukovsky & Averin (1977) proposed the new name, *Thymopides*, to include the only species *T. grobovi*. Numerous specimens of *T. grobovi* were also reported by Ledoyer (1979) in the deep-waters (525-1220 m) around the Kerguelen Islands, providing interesting information about the variation of several characters.

The genus *Thymopides* belongs to the subfamily Nephropinae Dana, 1852 of the family Nephropidae Dana, 1852. This subfamily contains six genera: *Eunephrops* S.I. Smith, 1885, *Homarinus* Kornfield, Williams & Steneck, 1995, *Homarus* Weber, 1795, *Metanephrops* Jenkins, 1972, *Nephrops* Leach, 1814 and *Thymopides* (see Holthuis, 1974, 1991, Kornfield et al., 1995). The genus, as defined by Burukovsky & Averin (1977), differs from *Homarinus, Homarus* and *Nephrops* by the first pair of pereopods (chelipeds) similar in size and shape, and from *Eunephrops* and *Metanephrops* by the absence of a strong carina posterior to the antennal spine, the much smaller size of the supraorbital and antennal spines, the smaller and unpigmented eyes, the abdominal somites bearing a blunt median carina, and the palm of the cheliped as wide as long (see also Holthuis, 1974).

Differential features of the new species

The new species is easily distinguished from *T. grobovi* by the characters of the carapace, of the second and fifth abdominal somites and of the chelipeds and fifth pereopods.

The subdorsal carinae of the carapace have numerous acute granules in *T. grobovi*, whereas these granules are clearly flattened and less numerous in *T. laurentae* sp. nov.

In *T. grobovi* the second to fifth abdominal segments have a median longitudinal carina, while the first to sixth somites have distinct lateral carinae; these carinae are absent in the new species. However, examination of MNHN material of *T. grobovi* showed that these carinae are not distinct in specimens of size similar to that of our specimen, although they are conspicuous in larger individuals. Therefore, this difference must be used with caution until additional material of *T. laurentae* is available.

The chelipeds are clearly more slender in the new species than in *T. grobovi*. The palm is as long as wide in *T. grobovi*, whereas it is twice as long as wide in the new species. The dorsal and ventral carinae of the palm are sharp in *T. grobovi*, with numerous well-developed spines. These carinae are absent, except a blunt dorsal carina, with acute granules, in *T. laurentae*.

The flexor margin of the propodus of the fifth pereopod has a distal extension, and the dactylus has a proximal tooth in the flexor border in *T. grobovi*. These extension and tooth are absent in the new species.

Furthermore, the telson is narrower and its posterior border is less protruding in the new species than in *T. grobovi*.

Because of the shape of the chela of the first pereopod in *T. laurentae*, the diagnosis of the genus *Thymopides* needs an emendation to accommodate this new species. At the moment, the main generic character what differentiates *Thymopides* from the closest genera *Metanephrops* and *Eunephrops* is the absence of a strong carina behind the antennal spine.

Habitat and distribution

The capture of *Thymopides laurentae* sp. nov. occurred on the slope of the neovolcanic ridge of Snake Pit at 100 m north of the black smokers "Les Ruches" (see above for location). The substrate is composed of sulphide rocks colonized by the hydroid *Candelabrum serpentarii* Segonzac & Vervoort, 1995 and numerous hexacorallia Zoantharia. Sedentary tube-worm polychaetes of the family Chaetopteridae and a few specimens of the galatheid crab *Munidopsis crassa* were observed during the dive on the oxidized ochre hydrothermal sediments.

Another lobster that, after the analysis of the video document, very probably belongs to *Thymopides laurentae* was observed from the submersible at about 400 m west of "les Ruches", close to another active site, called "Le Clou", of the same hydrothermal field (Mével et al., 1989) (Fig. 3B). Although the presence of two specimens near active hydrothermal sites is not an evidence of a permanent association of *T. laurentae* sp. nov. with hydrothermal discharges, we suggest that the species somehow benefits from the biological activity sensu lato of the vent animal community.

The finding of *Thymopides laurentae* sp. nov. extends considerably the bathymetric range of the genus and of the subfamily Nephropinae up to a depth of 3505 m. *Thymopides grobovi* was collected between 525 and 1220 m depths on the plate of Kerguelen and Heard Islands (Ledoyer, 1979) and other species belonging to the same subfamily (genera *Eunephrops, Homarinus, Homarus, Metanephrops* and *Nephrops*) are usually found shallower than 1000 m (Holthuis, 1974, 1991; Chan, 1998). Other subfamilies in the family Nephropidae (e.g. Neophoberinae Glaessner, 1969, Thymopinae Holthuis, 1974) have also some deep representatives, e.g. *Acanthacaris tenuimana* Bate, 1888, from 600 to 2161 m depth, *Nephropsis agassizii* A. Milne Edwards, 1880 from 878 and 2560 m depths, *N. suhmi* Bate, 1888 between 786 and 2029 m depths, and

Thymopsis nilenta Holthuis 1974, between 1976 and 3040 m depths (Holthuis, 1991; Tshudy, 2000).

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