A new species of *Pseudotanais* (Crustacea, Tanaidacea) from cold seeps in the deep Caribbean, collected by the French submersible *Nautile*

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ABSTRACT
During the French expedition BARESNAUT to the deep Caribbean Sea (Barbados Accretionary Prism), tanaidaceans were collected by scientists in the submersible *Nautile* at a depth of nearly 5 000 metres. These small benthic peracarids belonged to a new species of *Pseudotonais* G. O. Sars, which is described. *Pseudotanais baresnauti*, n. sp. resembles *Pseudotonais lilljeborgi* and *P. macrocheles* G.O. Sars, from northern Atlantic waters, but is distinguished primarily by the shape and setation of the antennae, uropods and pereopods. It is suggested that other small crustacean groups are relatively overlooked in deep-sea studies of hydrothermal vents and similarly active cold seep areas, where large chemosynthetic vestimentiferan worms or vesicomyid bivalves are often the most highly visible organisms present. The ecology of deep-sea tanaidaceans is largely unknown but it is likely that most species are detritivores.

KEY WORDS
Caribbean,
deep-sea,
cold seeps,
Tanaidacea,
Pseudotanaidae,
submersible.

RÉSUMÉ

Une nouvelle espèce de Pseudotanais *(Crustacea, Tanaidacea) de zones de suintements froids des eaux profondes de la mer Caraïbe, récoltée par le submersible français* Nautile.

Au cours de l'expédition française BARESNAUT dans les eaux profondes de la mer Caraïbe (Prisme d'Accrétion des Barbades), des tanaïdacés ont été récoltés à une profondeur de presque 5 000 m par les scientifiques du submersible *Nautile*. Ces petits péracarides benthiques appartiennent à une espèce nouvelle de *Pseudotanais* G. O. Sars, qui est décrite ici. *Pseudotanais baresnauti* n. sp. ressemble à *Pseudotonais lilljeborgi* et *P. macrocheles* G. O. Sars, des eaux de l'Atlantique Nord, mais s'en distingue essentiellement par la forme et la sétation des antennes, des uropodes et des péréiopodes. Il est suggéré que d'autres groupes de petits crustacés sont relativement négligés dans les études des sources hydrothermales et des zones de suintements froids actifs profonds, où les grands vestimentifères chimiosynthétiques ou les bivalves vesicomyides sont souvent les organismes présents les plus visibles. L'écologie des tanaïdacés profonds est inconnue mais il est probable que la plupart des espèces sont détritivores.

MOTS CLÉS
Mer des Caraïbes,
mer profonde,
suintements de fluides froids,
Tanaidacea,
Pseudotanaidae,
submersible.

INTRODUCTION

Deep-sea hydrothermal vents and related phenomena, such as cold seeps and mud volcanoes, have been a rich source of novel, and occasionally highly unusual, benthic organisms (Grassle 1986; Gage & Tyler 1991). Whilst many of these are large and conspicuous forms such as chemosynthetic vestimentiferan tubeworms and bivalve molluscs, smaller-sized macrofaunal groups, including peracarid crustaceans, may have been relatively overlooked. Among that particular group, the quite regular occurrence of lysianassid and phoxocephalid amphipods has been recognised in these communities (Sibuet & Olu 1998).

During the French deep-sea expedition BARESNAUT to the southern Caribbean Sea in 1987, benthic biological samples were obtained by scientists operating the submersible *Nautile* at a depth of nearly 5 000 metres. The Baresnaut project had the aim of characterising hydrogeological activity of sediments associated with the Barbados Accretionary Prism, where the subduction of the Atlantic Plate beneath the Caribbean Plate leads to methane-rich fluid expulsion through mud volcanoes and related features (Le Pichon *et al.* 1990). In this area, benthic communities dominated by vesicomyid bivalves were discovered associated with methane-rich cold seeps (Olu *et al.* 1997). Apart from the chemosynthetic fauna (which included sponges), extensive areas of filter-feeding polychaetes and high densities of meiofauna, two specimens of an undescribed species of tanaidacean belonging to the genus *Pseudotanais* G.O. Sars were recorded. This is the first time that a new tanaidacean has been reported from material collected by a submersible.

MATERIALS AND METHODS

Two tanaidacean specimens were loaned by Michel Segonzac of the Centre national de tri d'océanographie biologique (IFREMER, EP-CENTOB, Brest). These were from sediment samples collected from the submersible *Nautile* (observers: Xavier Le Pichon and Felix Avedik) on the 22nd and 24th of September 1987.

All drawings were made using a *camera lucida*. Terminology follows Bird & Holdich (1989) and the term "spine" is used as an abbreviation for "spiniform seta".

The two specimens have been deposited as types in the Muséum national d'Histoire naturelle (MNHN), Paris.

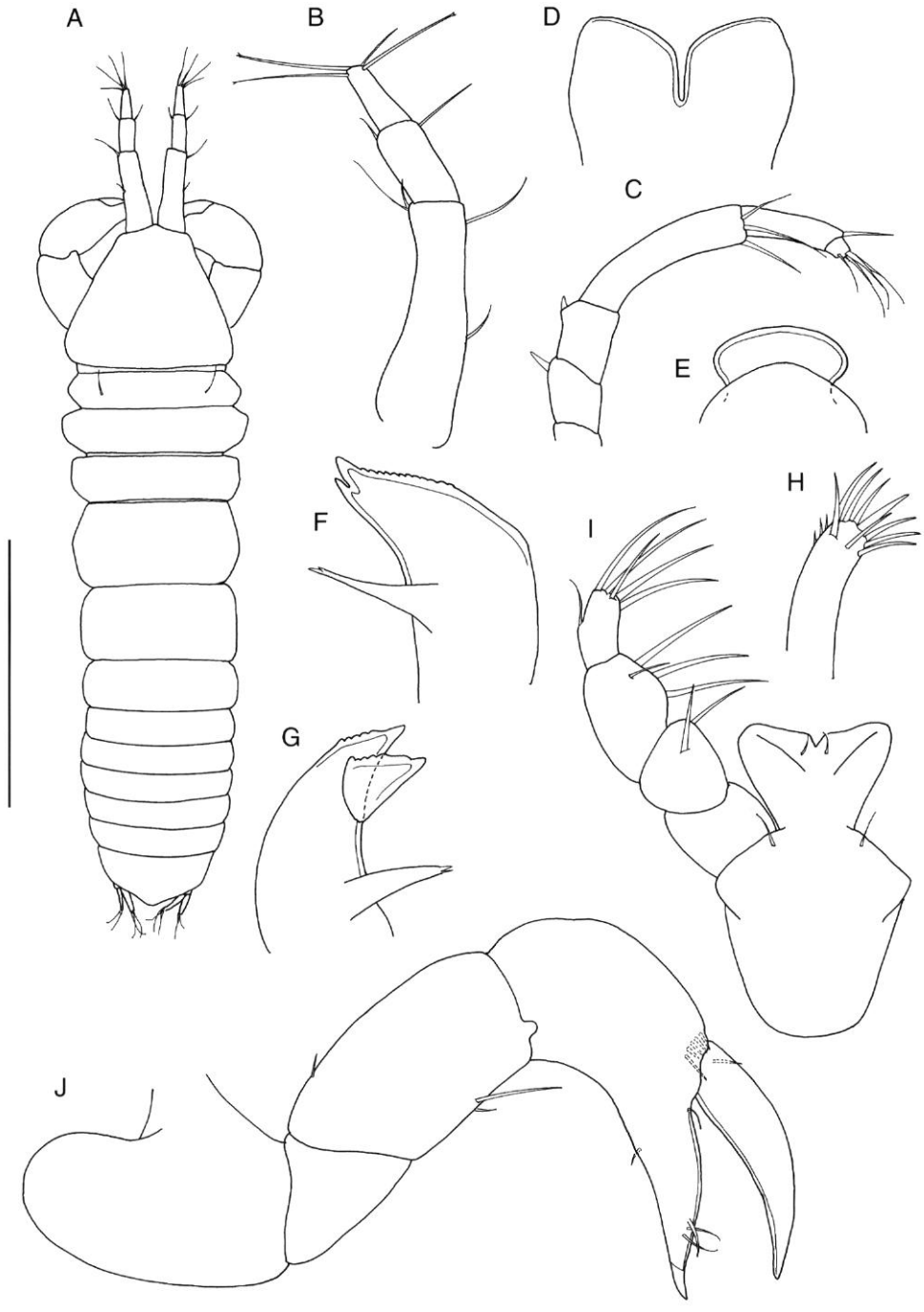

FIG. 1. — *Pseudotanais baresnauti* n. sp.; **A**, dorsal aspect of ♀ holotype. B-J, manca-II paratype; **B**, antennule; **C**, antenna; **D**, labrum; **F**, **G**, right and left mandibles, respectively; **H**, distal part of maxillule endite; **I**, maxillipeds; **J**, right cheliped. Scale bar: A, 0.5 mm.

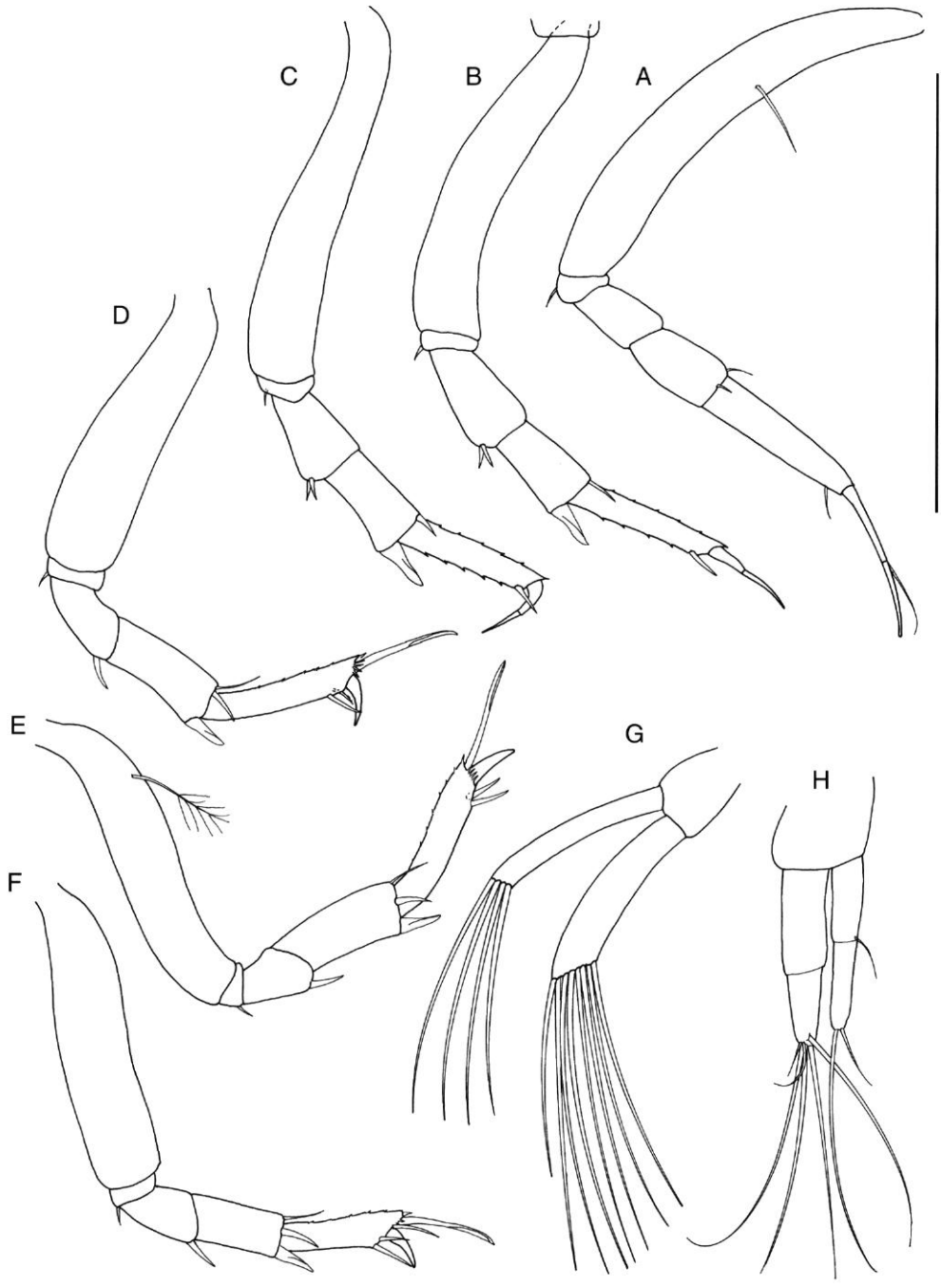

FIG. 2. — *Pseudotanais baresnauti* n. sp.; A-H, ♀ and manca-II; **A**-**F**, pereopods 1-6, respectively; **G**, pleopod; **H**, right uropod. Scale bar: 0.1 mm.

SYSTEMATIC

Family PSEUDOTANAIDAE Sieg, 1976
Subfamily PSEUDOTANAINAE Sieg, 1976
Genus *Pseudotanais* G. O Sars, 1882
Subgenus *Pseudotanais* G. O. Sars, 1882
Pseudotanais* (*Pseudotanais*) *baresnauti n. sp.
(Figs 1; 2)

TYPE LOCALITY. — Seaward of the Barbados Trench, 13°49'N, 57°37'W, 4 935 m.

MATERIAL. — Holotype, non-ovigerous ♀ (ref. No. MNHN-Ta882) and paratype, manca II (ref. No. MNHN-Ta883).

ETYMOLOGY. — Named in honour of the expedition during which this species was collected.

DIAGNOSIS. — Pereonites 1-3 almost equally long. Antennal articles 2 and 3 with strong superior spine. Molar process acuminate with minutely bifid tip. Maxilliped endites almost completely fused. Pereopods 2 and 3 with propodal inferodistal spine as long as dactylus. Chela not forcipate. Pereopods 2-6 with blade-like carpal spine about one third length of propodus. Pleopods present. Uropod rami both 2-articled, exopod almost as long as endopod.

DESCRIPTION OF HOLOTYPE

Non-ovigerous female: small and compact, 3.5 times longer than broad; length 1.3 mm. Cephalothorax almost as long as pereonites 1-3 combined. Pereonite 1 shortest, with two superior setae. Pereonites 1-6 about 5, 4, 3.5, 2, 2, and 3 times wider than long. Pleon almost as long as pereonites 4-6 combined. Pleotelson about as long as the two preceding pleonites.

Antennule (A1) as long as cephalothorax, article 1 about half of the total length; setation typical of genus. Antenna (A2) as long as A1, articles 2 and 3 each with a stout superior spine; article 4 4 times longer than broad; articles 5 and 6 typical of genus. Labrum and labium typical. Mandibles typical, molar process acuminate but minutely bifid. Maxillule endite typical, with nine unequal terminal spines. Maxilliped endites fused except for short distal section, each with a small median seta; palps typical, article 2 with two setae, article 3 with one small and three large setae; article 4 with one subterminal seta, one medium and four long terminal setae.

Cheliped typical, carpus just less than twice as long as broad with two unequal inferior setae. Chela non-forcipate, longer than carpus, dactylus just over half of the total length, hand with an anterior comb of five short spines; fixed finger with a very small inferior seta and an equally small seta near the articulation with the dactylus.

Pereopod 1 slender, basis 7 times longer than broad, slightly arched and longer that of pereopods 2-3; merus as long as carpus with one small seta; carpus 1.5 time longer than broad, with two small superior setae; propodus 1.8 time longer than carpus, with one inferodistal seta; dactylus and terminal spine about as long as propodus.

Pereopod 2 basis 9 times longer than broad; ischium with a small stout seta; merus just longer than carpus, with two inferior spines; carpus broader distally, with a superior seta and an inferior blade-like spine that is a third of the length of the propodus; propodus 5 times longer than broad, with superior and inferior setules and a bayonet-like inferodistal spine that does not reach to the dactylus-terminal spine articulation (cf. *P. affinis* species group); dactylus and terminal spine together just over half length of propodus.

Pereopod 3 similar to P2, but propodus somewhat shorter and stouter.

Pereopod 4 basis 4 times longer than broad; ischium with a short seta; merus shorter than carpus, with a single inferior spine; carpus slightly expanded distally, 2.3 times longer than broad, with a superior seta, a posterior-superior spine and a blade-like inferior spine; propodus 1.3 time longer than carpus, with superior setules, two unequal infero-distal spines and a long supero-terminal spine; dactylus and terminal spine short and fused.

Pereopod 5 similar to P4 but basis with a broom seta; merus and carpus also slightly shorter.

Pereopod 6 similar to P4 and P5 but carpus and propodus shortest of the three; propodus with an additional terminal spine articulating next to the large supero-terminal spine.

Pleopod typical, rami both slender; endopod with four setae; exopod with eight setae; setae about 1.25 time length of rami.

Uropod biramous, both rami 2-articled, exopod just shorter than the endopod, articles about equally long; endopod article 1 0.6 time total length; setation typical.

DESCRIPTION OF PARATYPE

Manca-II: generally as above but pereonite 6 with rudimentary pereopods; pleopods absent; length 0.9 mm.

REMARKS

Rather nondescript, *Pseudotanais baresnauti* shares a general morphology and mandible/maxilliped configuration with *P. macrocheles* G. O. Sars, 1882 and *P. lilljeborg*i G. O. Sars, 1882, both from northern Atlantic waters around Iceland and the Faroe Islands (Sieg 1977). Females of the latter species lack pleopods and it differs from *P. baresnauti* by having shorter uropod exopods and thinner spiniform setae on the antennal articles 2 and 3. The new species differs from *P. macrocheles* by the form of the uropods, smaller pereopodal carpal blade-like spines, in addition to other details of cheliped, pereopod and pleopod structure and setation.

DISCUSSION

Apart from the Gulf of Mexico, relatively few records of tanaidaceans from the Caribbean region have been published, and most relate to shallow waters, i.e. < 200 metres (e.g. Bacescu & Gutu 1975; Bamber 1993; Gardiner 1973; Gutu 1984, 1991; Gutu & Gomez 1975). Abyssal and hadal records are even more scarce but some are relevant to the present study. A group of stations (No. 1201, 1202, 1207, 1209, just to the north-east of the BARESNAUT study area) from the 16th cruise of the Soviet RV *Akademik Kurchatov* in 1973 (Kudinova-Pasternak & Pasternak 1978) yielded five species at depths from 1 067-3 000 metres: *Leviapseudes sibogae* (Nierstrasz, 1913), *L. zenkevitchi* (Kudinova-Pasternak, 1966), *Neotanais vemae* Gardiner, 1975, *Tanaella forcifera* (Lang, 1968) and *Typhlotanais kussakini* Kudinova-Pasternak, 1970. A hadal species, *Neotanais persephone* Messing, 1977 has also been described from the Puerto Rico Trench at depths from 7622-8381 metres (Messing 1977).

A few pseudotanaid species have been recorded from the Caribbean, including one from the previously-mentioned Soviet cruise: *Pseudotanais kurchatovi* Kudinova-Pasternak & Pasternak, 1978. This species appears to have some similarities to *P. corallatus* (= *P. affinis*: Sieg, 1977, *non P. affinis* G.O. Sars; Bird & Holdich 1988). Other species include *Iungitanais primitivus* (Sieg, 1973) and *Pseudotanais mortenseni* (Sieg, 1973), both from shallow waters (< 28 metres) around the Virgin Islands (Sieg 1977). Further north-west, other species such as *Pseudotanais mexicolpos* have been found in the Gulf of Mexico (Sieg & Heard 1988).

Evidence from studies of relatively small areas of the deep North East Atlantic (Holdich & Bird 1985) and the Gulf of Mexico (Ogle *et al.* 1982; Seig & Heard 1983, 1989) would suggest that a greater tanaidacean species richness awaits discovery in the deep Caribbean Sea. Whether large (even gigantic) tanaidaceans are associated with highly productive hydrothermal vents and cold seeps also remains to be seen. The role of the very small *Pseudotanais baresnauti* in the highly productive seep communities is unclear, although it is likely to be a detritivore. Being lightly built and with well-developed pleopods would appear to make pseudotanaids rapid colonisers of recently deposited or disturbed sediment (Bird & Holdich 1989), a distinct advantage in some dynamic deep-sea environments.

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