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STORTHYNGURA TORBENI, A NEW SPECIES OF HADAL ISOPOD FROM THE PUERTO RICO TRENCH AND AN HYPOTHESIS ON ITS ORIGIN (CRUSTACEA: EURYCOPIDAE)

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Abstract.—A new species of deep-sea isopod crustacean, *Storthyngura torbeni,* is described from the floor of the Puerto Rico Trench at depths between 6800 and 8045 meters. Analysis of the diagnostic characters for this ultra-abyssal isopod indicates that the most closely related species occurs in the Antarctic abyss near the South Sandwich Islands. This Antarctic isopod, *S. eltaniae* George and Menzies, 1968b, has a similar pleotelson configuration. On the basis of similarities between these two species, an hypothesis is postulated to derive the origin of the Puerto Rico Trench species from its progenitor *S. eltaniae* from the Antarctic Abyss. Both species inhabit regions of Antarctic bottom water that originates in the Weddell Sea.

Our knowledge of the distribution pattern of animals inhabiting the deep sea is fragmentary because of the lack of adequate sampling in different abyssal regions. Nevertheless, certain groups of organisms are better known, particularly at the generic level. One such example is the deep sea isopod genus *Storthyngura* which is at present known to contain forty species occurring in all oceans except the Mediterranean and the Arctic Ocean (George and Menzies 1968a, b). This study revealed the global distribution pattern of this deep sea genus and also suggested, on the basis of morphological characters, that this isopod genus possibly originated in the Antarctic Ocean.

The question of centers of origin for deep sea animals has been discussed in recent years by several investigators (Madsen 1961, Kussakin 1973, Hessler and Thistle 1975, Thistle and Hessler 1976, Hessler et al. 1979, George 1980). Due to the absence of fossil evidence it is extremely difficult to trace the origin of crustaceans through any given geological scale. However, it is possible to determine the center of origin of the genus from present day species distribution. This paper takes the latter approach and reports upon a genus which shows evidence for possible origin in the Antarctic Ocean.

This study was initiated largely by the excellent collections made in the extreme depths of the Puerto Rico Trench. We encountered the new species of *Storthyngura* for the first time at the Gilliss Deep (George and Higgins 1979). Subsequently, the same species was also captured during the University of Miami expedition to the Milwaukee Deep at the western extremity of the Puerto Rico Trench. In addition, a recent Russian expedition aboard Akad. *Kurchatov* also collected 38 specimens of this ultra-abyssal species from the Brownson Deep of the Puerto Rico Trench. In this paper, I present a diagnosis and description of the new species with illustrations of important taxonomic features. I also postulate that the movement of the Antarctic Bottom Water

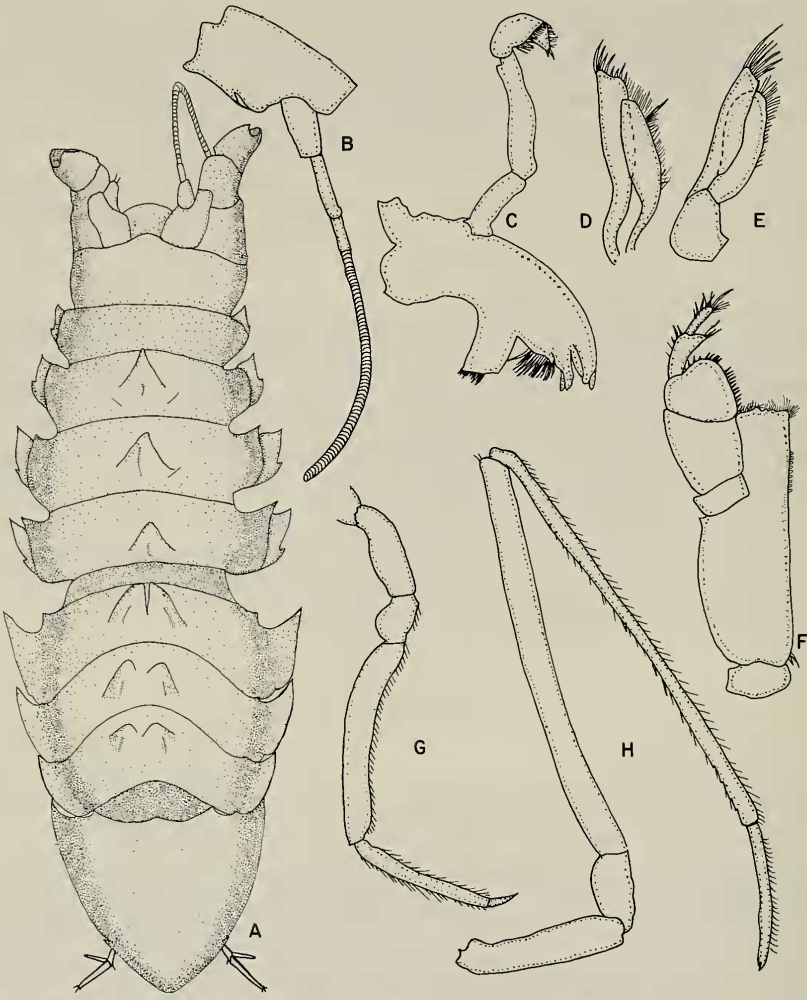

Fig. 1. *Storthyngura torbeni,* holotype male, length 19 mm: A, Dorsal view; B, First antenna; C, Mandible; D, Maxillule; E, Maxilla; F, Maxilliped; G, First peraeopod; H, Second peraeopod.

has significantly contributed to the evolution of this genus from its origin in the Antarctic Ocean.

Storthyngura torbeni, new species
Figs. 1, 2

Material.—Holotype male: length 19 mm, width 8 mm. Allotype female: length 22 mm, width 9 mm.

Type locality.—Milwaukee Deep of the Puerto Rico Trench. *Pillsbury* sta 1406, 19°31.8′N, 68°07.5′W, 7850–7810 m, 17 Jul 1971. Holotype male USNM 231361, allotype female USNM 231362. In addition to the *Pillsbury* collection, *S. torbeni* was also collected from the Gilliss Deep of the Puerto Rico Trench: *Gilliss* sta 24, 19°24.5′N, 66°19.7′W, 8045 m, 18 Jul 1976, 2 male specimens 20 mm long. During the Soviet expedition to the Puerto Rico Trench, *S. torbeni* was collected from Akad. *Kurchatov* sta 1182, 42 specimens (27 males, 12 females, 3 juveniles and 4 fragments), 19°53′N, 68°11′W, 6400 m, 3 Feb 1973, and Akad. *Kurchatov* sta 1194, 19°49′N, 68°08′W, 6800–7030 m, 9 Feb 1973, 11 specimens (3 males, 7 females and 1 juve-

Fig. 2. *Storthyngura torbeni,* holotype male, length 19 mm: A, Third peraeopod; B, Fifth peraeopod (dactyl broken); C, Sixth peraeopod; D, Seventh peraeopod; E-1, Male first pleopod; E-2, Distal edge of first pleopod; F, Second pleopod; G, Uropod.

nile). The *Kurchatov* specimens are deposited in the Universitets Zoologiske Museum in Copehagen, Denmark.

Diagnosis.—*Storthyngura* with cephalon totally devoid of any spines on dorsal surface. First peraeonal somite lacking dorsal spines; somites 2 to 4 each with single dorsal spine; somites 5 to 7 each with pair of median dorsal spines. Pleonal somite present, without dorsal spine. Pleotelson lacking lateral spines, apex somewhat rounded. Pleotelson with smooth dorsal surface, lacking spines or tubercles. Basis of uropod longer than endopod; exopod about one-half length and width of endopod.

Etymology.—This new species is named in honor of the isopodologist, Dr. Torben Wolff, who graciously loaned me the *Kurchatov* collections of this species for study.

Description.—General body shape oval, about 2 times longer than wide. Cephalon smooth, lateral margin slightly concave, frontal margin not truncated.

First pereonal somite lacking spines. Anterolateral margin rounded, coxal plate small and bilobed. Second pereonal somite with prominent median spine, anterolateral margin rounded. Coxal plates well developed, bilobed with anterior lobe produced. Third and fourth somites each with large median spine; anterolateral margin acutely produced, coxal plates prominent and bilobed. Somites 5 to 7 with paired median spines; anterolateral margin with minute tubercles. Anterolateral margin acutely produced, coxal plates lacking.

Pleon with short, flat anterior pleonal somite which smooth and lacking spines; pleotelson shieldlike. Anterolateral angle of pleotelson produced into sharp spine exhibiting minute tubercle at anterolateral angle. Lateral margin entire with indication of fused posterior lateral spine; telsonic apex slightly rounded. Pleotelson smooth, devoid of spines or tubercles.

First antenna with broad basal article with prominent spine on inner margin. Peduncle composed of 1 broad basal article; 3 narrow and elongate terminal articles; flagellum annulated, composed of more than 50 minute articles. Second antenna with basal article broad and lacking marginal spines. Mandible with well developed palp of 3 articles; second article twice as long as first; third article deflected upward into cuplike configuration, inner margin furnished with dense row of setae. Cutting face well developed with prominent truncate molar and middle row of approximately 21 movable spines. Incisor process tridentate; lacinia mobilis robust and bidentate.

Maxillule with inner lobe broad and setose, outer lobe narrow with terminal spines. Inner lobe of first maxilla with dense setae. Maxilliped with 9 coupling hooks on endite; palp with short and broad basal article, second and third articles somewhat enlarged; fourth article distally produced, terminal article narrow with tuft of apical setae.

First peraeopod with short dactylus; propodus narrow and shorter than carpus; merus short and broad; ischium about twice as long as merus.

Second and third peraeopods twice as long as first; dactylus long. Both propodus and carpus elongate. Merus short; ischium more than twice as long as merus. Peraeopods 5–7 very similar with propodus and carpus expanded into paddle-like configuration with dense marginal plumose setae. Dactylus relatively long and narrow.

First male pleopod broadening distally into somewhat truncated apex with distinct left and right divisions; each division showing 3 discrete lobes, with exterior lobes having triangular spine. Second male pleopod with well developed copulatory organ.

Uropod with basis longer than endopod; exopod one-half length and width of endopod.

Affinities.—In general shape, *S. novaezelandiae* (Beddard 1885), from 2012 meters in the southwest Pacific is somewhat similar but has a conspicuous process on the exterior margin of the second segment of antenna 1 and lacks dorsal spines on peraeonal somites 3–5. Amongst all known species of *Storthyngura,* only *S. eltaniae* and *S. intermedia* have a simple pleotelson configuration that resembles the general shape of the pleotelson in species of the confamilial genus *Eurycope. Storthyngura intermedia* was originally described by Beddard (1885) on the basis of deepsea specimens captured during the expedition from 5011 meters in the North Pacific. *Storthyngura eltaniae* was described originally by George and Menzies (1968a) from specimens captured off the South Sandwich Islands in the Antarctic ocean at 5449 meters. The new species, *S. torbeni,* also has a simple pleonal configuration without any well developed lateral spines as found in all other *Storthyngura* species. However, this new species differs from *S. intermedia* in that *S. torbeni* lacks the spines both on the cephalon and the first peraeonal somite that are found in *S. intermedia.* These two species have a smooth pleotelson without any dorsal spines or tubercles. However, the most closely related species to *S. torbeni* is *S. eltaniae.* These two species are also related by the absence of dorsal spines on the first peraeonal somite. The major morphological difference is that *S. torbeni* does not have any spines on the cephalon while *S. eltaniae* has a pronounced spine on the cephalon. In addition, *S. eltaniae* has an anterior spine and a pair of posterior tubercles on the pleotelson; these characters are not found in the Puerto Rico Trench species, *S. torbeni.*

Hypothesis on the Origin of *Storthyngura torbeni*

The genus *Storthyngura* belongs to the family Eurycopidae which includes both shallow and deepsea species. However, most of the eurycopid shallow-water species tend to occur in the cold waters of the high latitudes. Species belonging to the genus *Storthyngura* are exclusively found in the deep sea and in trenches at ultra-abyssal depth. George and Menzies (1968b) presented evidenced that the Antarctic Ocean is the center of origin for *Storthyngura.* This conclusion was based on the prolific presence of species belonging to the five morphological clusters that are represented in the Antarctic Ocean. This genus has also successfully colonized the major trenches of the Northwest Pacific Ocean (Birstein 1963) and also the Peru-Chile Trench of the Southeast Pacific Ocean (Menzies and George 1972). This paper reports that the genus *Storthyngura* has colonized depths exceeding 8000 meters in the Puerto Rico Trench, North Atlantic Ocean. I believe that this evolutionary process of colonization into the Puerto Rico Trench was somehow associated with the flow of the Antarctic Bottom Water into the trench. The Antarctic Bottom Water possibly originated during the miocene glaciation in the Antarctic Ocean. This hypothesis is further supported by the fact that the most closely related species to *S. torbeni, S. eltaniae* is found in the Antarctic Ocean; both species also possess a primitive plesiomorphic pleotelson configuration. From an evolutionary point of view, the question of colonization of the deepsea environment, particularly the ultra-abyssal trenches, is certainly an intriguing problem that calls for further studies.

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