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Dacryomica plana, gen. et sp. nov., a Prochaetodermatid Aplacophora from a Pacific Seamount

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Abstract. ***Dacryomica,*** gen. nov., a monotypic genus of prochaetodermatid Aplacophora, is markedly different in sclerite morphology from the other five genera in Prochaetodermatidae. Description of the type species, ***D. plaua,*** sp. nov. is based on a single individual collected at 1300 m from Kammu Seamount in the northwest Pacific. The great difference in sclerite morphology and the likelihood of endemism on the seamount are reasons for erecting a monotypic genus based on a single individual from this poorly sampled part of the deep-sea benthos.

INTRODUCTION

A single specimen of a morphologically unique prochaetodermatid aplacophoran was collected during the deep-sea explorations by Soviet research vessels in the Indian and Pacific Ocean between 1959 and 1976 (e.g., Ivanov & Scheltema, 2002). The geographic coverage of the Pacific soft-bottom benthos by the Soviets using dredges and grabs remains unmatched, and exploratory collecting of the deep, soft-bottom benthos throughout the Pacific is now at a standstill, except for the efforts of the Paris Museum in French Polynesia at depths of less than 2000 m. Thus, this single specimen of ***Dacryomica plana*** enlarges the knowledge of the biogeographic distribution of Prochaetodermatidae. It is described here from body shape and the morphology of the sclerites.

METHODS

Standard methods for describing sclerite morphology were used (see Scheltema, 1985; Scheltema & Ivanov, 2000, in press). Frontal view is of the side facing away from the body; abfrontal, toward the body.

SYSTEMATICS

Family Prochaetodermatidae Salvini-Plawen, 1972

Diagnosis: Mollusca belonging to the burrowing aplacophoran taxon with cuticle entire (Caudofoveata or Chaetodermomorpha), most < 5 mm in length, with a divided oral shield, a usually narrow tail-like posterium, a pair of large cuticular jaws, and a small radula with several rows of two mirror-image teeth and a central plate.

Geographic distribution: Species of Prochaetodermatidae are common in the deep-sea benthos of the world oceans from the continental shelf to hadal depths in trenches, except they apparently do not occur in polar regions. Particular species are a numerically dominant part of the macrofauna at some localities (Scheltema, 1997).

Dacryomica Ivanov & Scheltema, gen. nov.

Type species: ***Dacryomica plana,*** sp. nov.

Diagnosis: Tear-drop shaped; sclerites without keel, base closely adpressed, with plane of base rotated around longitudinal axis relative to the blade (Figure 3C), axis of base straight to slightly curved; waist distinct, edges of base straight to convex, edges of blade straight. Isochromes asymmetrical, many sclerites with troughlike medial depression on abfrontal side (Figures 1B sclerite 10, 3A). Number of oral shield sclerite rows undetermined.

Etymology: *dacro-*, from Gr. *dacryon,* tear, drop; *-mica,* L. fem., bit; a small, teardrop-shaped thing.

Dacryomica plana Ivanov & Scheltema, sp. nov. (Figures 1–3)

Holotype: Zoological Museum Moscow State University no. Le1–112.

Type locality: Slope of Kammu Seamount, Milwaukee Group, Empire Seamounts, 32°09′N, 172°56′E, 1300 m, VITYAZ stn 6260, 21 May 1970.

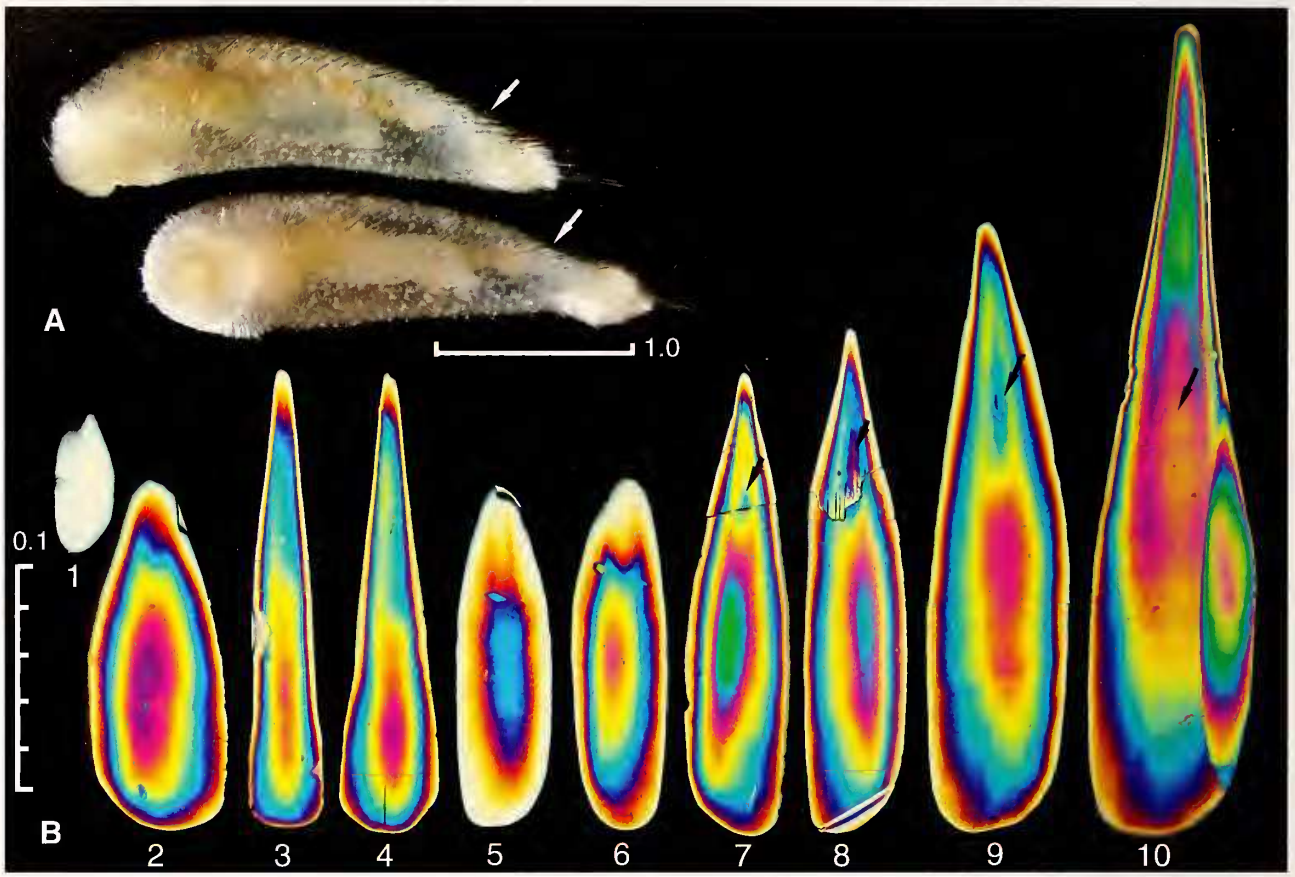

Figure 1. A. Holotype of ***Dacryomica plana*** Ivanov & Scheltema, gen. et sp. nov. photographed with transmitted light, lateral above, ventral below; division between trunk and shank mainly visible in ventral view (arrows). B1–10. Sclerites of ***Dacryomica plana*** Ivanov & Scheltema, gen. et sp. nov. photographed under cross-polarized light (see Figure 2 for body regions): 1, 2 from region C; 3, 4 from region D; 5, 6 from region E; 7, 8 from region F; 9, 10 from region G. Note depressed areas (arrows) and asymmetrical isochromes of several sclerites. Only SEMs show that the depressions are abfrontal (Figure 3A) and that the transverse curvature of the base is S-shaped (Figure 3B). Sclerites 7 and 8 broken, pieced together on computer from their two parts. The right side of sclerite 10 is covered by part of an overlying sclerite.

Material examined: Holotype.

Geographic range: Known only from type locality.

Diagnosis: Small, broad anterior end tapering evenly to narrow posterior end; sclerites large relative to body size; both base and blade of trunk sclerites broad, basal end rounded, distal end bluntly pointed.

Appearance (Figures 1A, 2A, B): Translucent except anteriorly, tapering evenly from broad anterior end to narrow knob, shank extremely short and indistinguishable from trunk except in ventral view or by internal anatomy in transmitted light; sclerites long except anteriorly and ventrally, shank sclerites overlapping knob, fringing sclerites extending well beyond knob; oral shield partly withdrawn, oral shield sclerites not seen.

Body measurements: Length 2.8 mm, greatest height 0.8 mm, knob height 0.3 mm; oral shield ~ 0.1 mm high.

Sclerites (Figures 1B, 2C-H, 3; dimensions given as length × greatest width × thickness unless otherwise noted): Finely ridged (Figure 3D); asymmetrical in cross-section (Figure 3B). Abfrontal depressions distal on anterior sclerites from body regions D-F (Figure 3A); from region G farther posteriorly, depressions on sclerite base (Figure 1B sclerite 10). Sclerites thickest on base except thickest on blade from posterior region H (Figure 2H). From region C, anterium and anteriormost trunk (Figure 1B 1, 2; Figure 2C), smallest sclerites rounded with point, 30 × 15 × 1 μm, or pointed elongate (not figured), 60 × 18 × 3 μm; larger sclerites oval, 115 × 50 × 7 μm, or broadly triangular with rounded base, 155 × 60 × 8 μm, the latter merging in region D (Figure 1B 3, 4; Figure 2D) to sclerites up to 200 μm long, 8 μm thick, with distinct base and blade, some with long, broad base 100 × 55 μm and short blade 75 × 30 μm, others with narrower, shorter base, 65 × 45 μm, and longer blade, 135

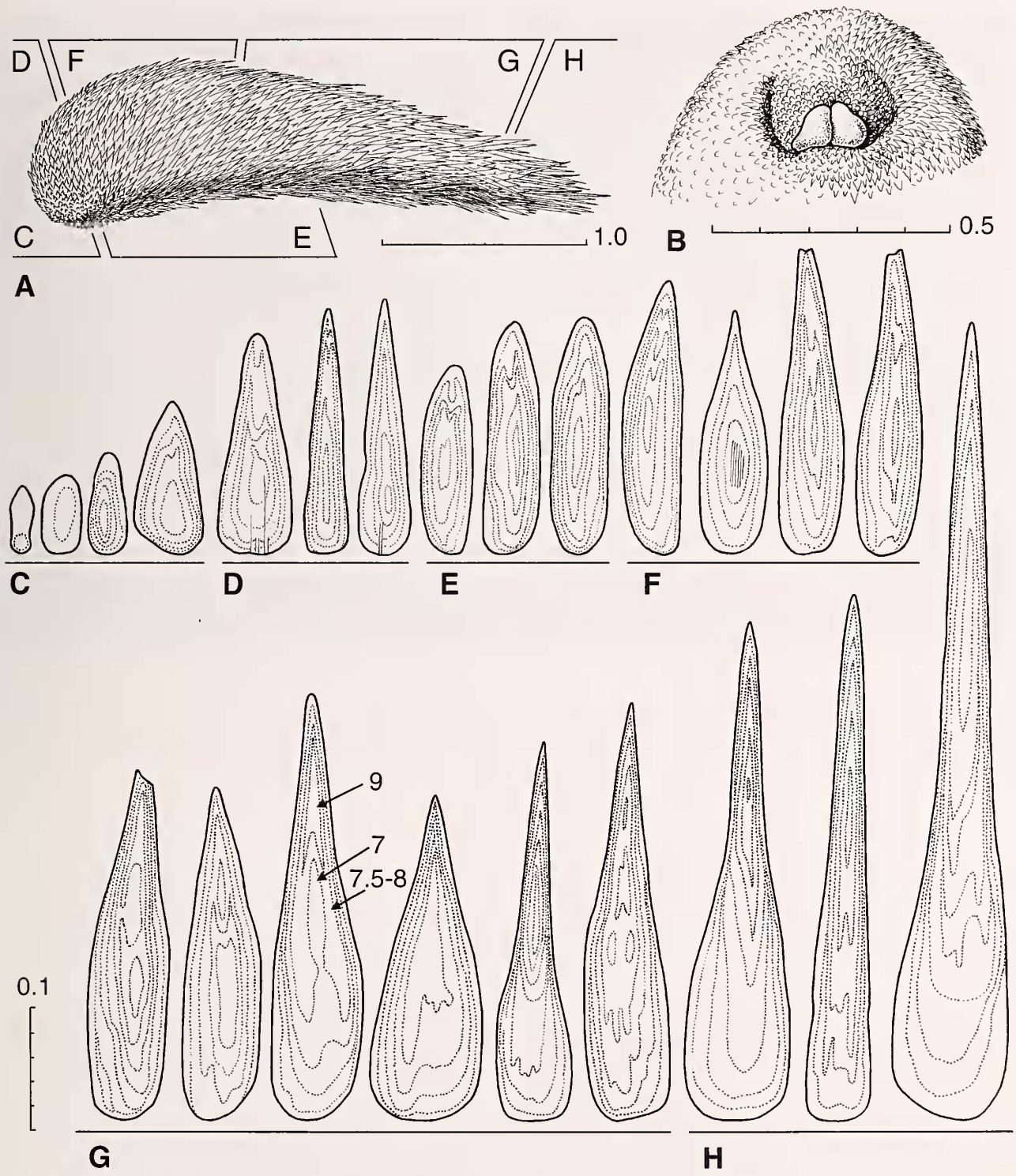

Figure 2. ***Dacryomica plana*** Ivanov & Scheltema, gen. et sp. nov., holotype. A. Entire, anterior to left. B. Partially withdrawn oral shield. C–H. Sclerites from body regions indicated in A. See text for descriptions.

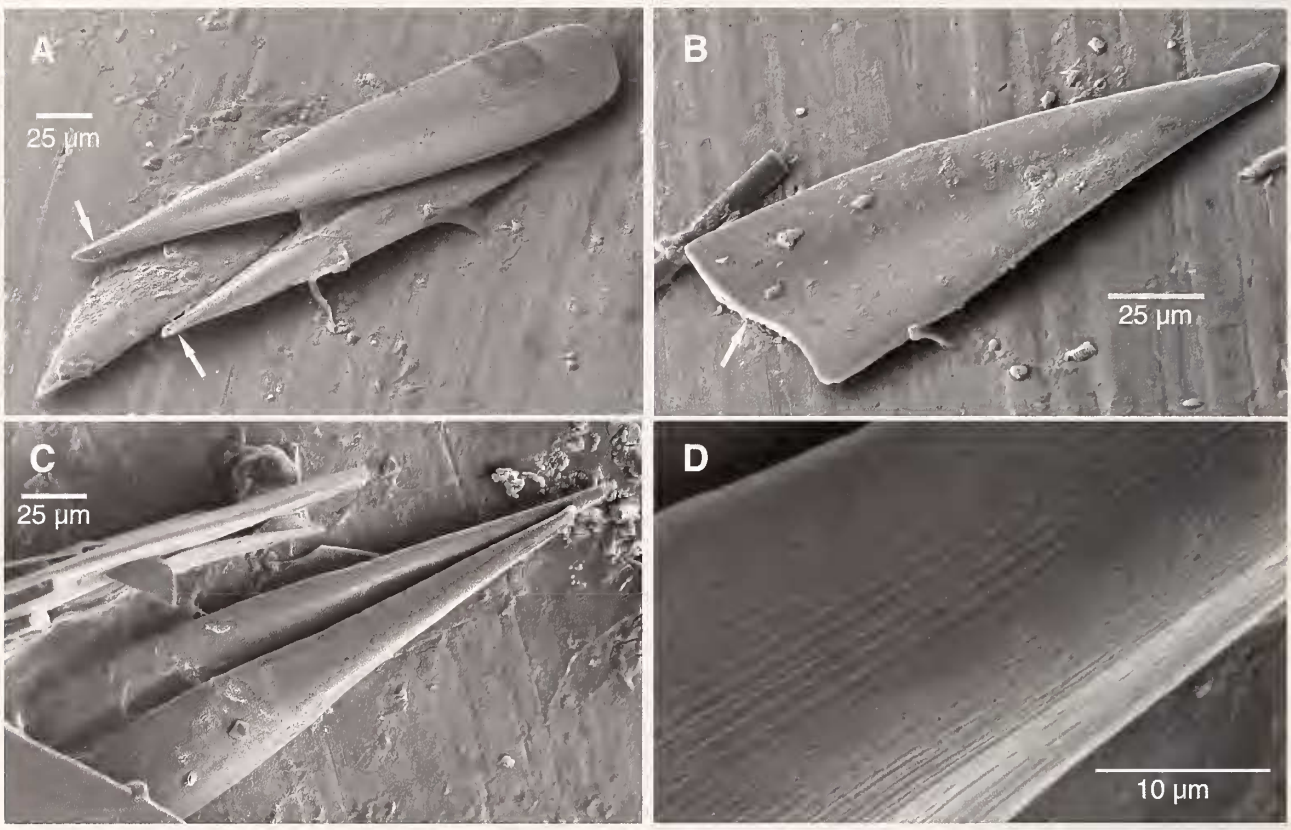

Figure 3. Trunk sclerites of ***Dacryomica plana*** Ivanov & Scheltema, gen. et sp. nov., SEM. A. Uppermost sclerite in abfrontal view showing troughlike depression and slight distal ridge (arrow). Lower sclerite in frontal view showing raised medial area and slight distal groove (arrow), the latter not seen in transmitted light. B. Broken sclerite in abfrontal view, arrow indicating thin medial area of troughlike depression. The transverse S-shaped curve variously thickened accounts for the asymmetry seen under polarized light. C. Sclerites in frontal view, plane of blade somewhat rotated relative to base around long axis. D. Enlargement of lower sclerite in C showing sculpturing of fine ridges; the downward bent lateral edge on right can be compared with the upper (left) edge of B in abfrontal view.

× 35 µm. From region E, ventral to ventrolateral (Figure 1B 5, 6; Figure 2E), somewhat curved, ovate, from 135 × 35 × 7 µm to 200 × 55 × 8 µm, merging dorsally into region F, anterior trunk sclerites (Figures 1B 7, 8; Figure 2F), with base and blade distinct, total length to 250 µm, base 150 × 10 µm, blade 100 × 30 µm, thickness 9–10 µm. From region G, posterior trunk (Figures 1B 9, 10; Figure 2G), length to 350 µm long, 9–10 µm thick, base length and width 200 × 75–100 µm, blade to 150 × 35–50 µm, edges of base convex to straight. From region H, shank (Figure 2H), sclerites ranging from 400 to 650 µm with greatest thickness > 10 µm; base width broad with convex edges, 100 µm, or narrow with straight edges, 50 µm.

Radula: Unknown; presence of jaws distinguishable with transmitted light.

Remarks: The sclerites of ***D. plana*** are unique among Prochaetodermatidae. They have a broad base and blade, asymmetrical thickening shown by isochromes and SEM image of cross-section, base rotated around the longitudinal axis relative to the blade (Figure 3C), and medial, abfrontal, troughlike depressions. Rotation of the large bases about the longitudinal axis enables sclerites to remain closely adpressed despite their large size relative to body size. Unfortunately, other diagnostic characters are unknown: oral shield sclerites, radula and jaws, and population variability in body and sclerite morphology.

In addition to the uniqueness of the sclerite morphology of this species is its presumably isolated location at 1300 m from the slope of Kammu Seamount. High endemism is not unusual for benthic species at the summits of seamounts (e.g., Scheltema, 2001; see also Seamounts web page, http://seamounts.sdsc.edu), and we are assuming that slope species well above the abyssal floor lying at ~ 4000 m at the base of seamounts are isolated from the deep benthos and thus may be endemic.

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