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A NEW LICHOMOLGID (CRUSTACEA: COPEPODA: POECILOSTOMATOIDA) ASSOCIATED WITH THE ASTEROID *CELERINA HEFFERNANI* IN NORTHEASTERN BORNEO

Arthur G. Humes and **David J. W. Lane**

ABSTRACT. - *Sipadania celerinae*, new genus, new species, is associated with the asteroid echinoderm *Celerina heffernani* in northeastern Borneo. The female of this lichomolgid copepod may be distinguished from the related genera *Paredromolgus* and *Plesiomolgus* by the genital double somite being expanded posteriorly with the genital areas located at the posterior corners. The formula II,I,5 on the third segment of the exopod of leg 4 further separates the new genus from *Paredromolgus* and the distally directed tooth on the mandible from *Plesiomolgus*.

INTRODUCTION

In the Indo-Pacific many species of copepods are associated with asteroid echinoderms. From that region Humes (1986) listed 36 such copepods from 32 species of host sea stars. In addition, Nair & Pillai (1985) described *Stellicola stebbingi* from *Pentaceraster regulus* (Müller & Troschel) from southeastern India. From Korea, Kim (1992) described *Synstellicola paracarens* from *Luidia quinaria* (von Martens) and recorded *Scottomyzon gibberum* (T. and A. Scott, 1894) from *Aphelasterias japonica* (Bell), *Asterias amurensis* Lütken, *Distolasterias nipon* (Döderlein), *Distolasterias stichantha* (Sladen), and *Lysastrosoma anthostictha* (Fisher). Copepods have now been reported from 39 of the 231 species of sea stars living in shallow water in the Indo-Pacific (see Clark & Rowe, 1971).

In this paper, a new copepod from the relatively uncommon asteroid *Celerina heffernani* (Livingstone) is described, based on females only. The ophidiasterid host has been found only a few times and then in very small numbers: at Santa Cruz Island, north of the New Hebrides, in 2 m, one specimen (Livingstone, 1931); at Macclesfield Bank, in the South China Sea, in 40-50 m, one specimen (Clark, 1967); Denges Passage, southwest of Koror Island, Palau Islands, in 16 m, one specimen (Marsh, 1977); at Morela, Amboina, Indonesia, rocky beach, coral flat, one specimen (Guille & Jangoux, 1978); on Gesodokkuru Reef, off Arumonogui, Babelthuap Island, Palau Islands, intertidal, one specimen (Oguro, 1983); and at Boheydulong South Point reef, Pulau Bodgaya, Sabah, two specimens (George & George, 1987). Since the host echinoderm is apparently rare and future collections are uncertain, we believe it worthwhile to describe its copepod associate, even though the male is unknown.

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POECILOSTOMATOIDA THORELL, 1859

LICHOMOLGIDAE KOSSMANN, 1877

Sipadania, new genus

Diagnosis. - (based on female).- Body with broad flattened prosome. Somite bearing first pair of legs separated from cephalosome by dorsal suture. Urosome 5-segmented. Caudal ramus with 6 setae. Antennule 7-segmented. Antenna 4-segmented, with 2 terminal claws.

Mandible with convex side bearing small hyaline toothlike process directed distally; inner side having row of spinules on weakly developed base; lash long. Maxillule with 3 setae. Maxilla with 1 of 2 setae on second segment unusually long. Maxilliped 3-segmented.

Legs 1-4 with 3-segmented rami, except 2-segmented endopod in leg 4. Leg 4 endopod with formula 0-1; II. Leg 5 with free segment bearing 2 setae.

Other features as in species described below.

Associated with Asteroidea.

Type-species.- *Sipadania celerinae*, new species.

Etymology.- The name is formed from Pulau Sipadan, the island where the sea stars were found. Gender feminine.

Sipadania celerinae, new species

(Figs. 1 - 4)

Type material.- 2 females from 3 sea stars, *Celerina heffernani* (Livingstone), on the reef wall in 28 m, on the southeast side of the island reef system at Pulau Sipadan, off the northeastern coast of Borneo, approximately 04°10'N, 118°40'E, 12 May 1992. Holotype (intact) deposited in the Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore. Paratype (dissected) in the National Museum of Natural History (USNM 259626), Smithsonian Institution, Washington, D.C..

Female.- Body (Fig. 1a) with broad flattened prosome. Length 1.31 mm (1.24-1.38 mm) and greatest width 0.89 mm (0.89-0.90 mm), based on 2 specimens in lactic acid. Greatest dorsoventral thickness 0.37 mm. Somite bearing first pair of legs separated from cephalosome by weak transverse dorsal furrow and having pointed epimera (Fig. 1b). Somites bearing legs 2 and 3 with rounded epimera expanded laterally and bearing several small marginal lobules. Somite bearing leg 4 short and narrow, with small hooklike epimera. Ratio of length to width of prosome 1.14:1. Ratio of length of prosome to that of urosome 2.43:1.

Somite bearing leg 5 (Fig. 1c) 88 x 220 µm. Genital double somite 200 x 275 µm, much broader than long, ratio 1:1.36 (using greatest length). Length of somite in midline 165 µm. Genital areas located at expanded posterolateral corners of somite. Both areas bearing 2 minute

setae 8 µm (Fig. 1d). Three postgenital somites from anterior to posterior 47 x 104, 37 x 95, and 54 x 89 µm.

Caudal ramus (Fig. 2a) short, 42 x 34 µm, little longer than wide, ratio 1.24:1, with 6 setae but some broken in type specimens. Outer lateral seta 111 µm, dorsal seta 56 µm.

Body surface without visible ornamentation.

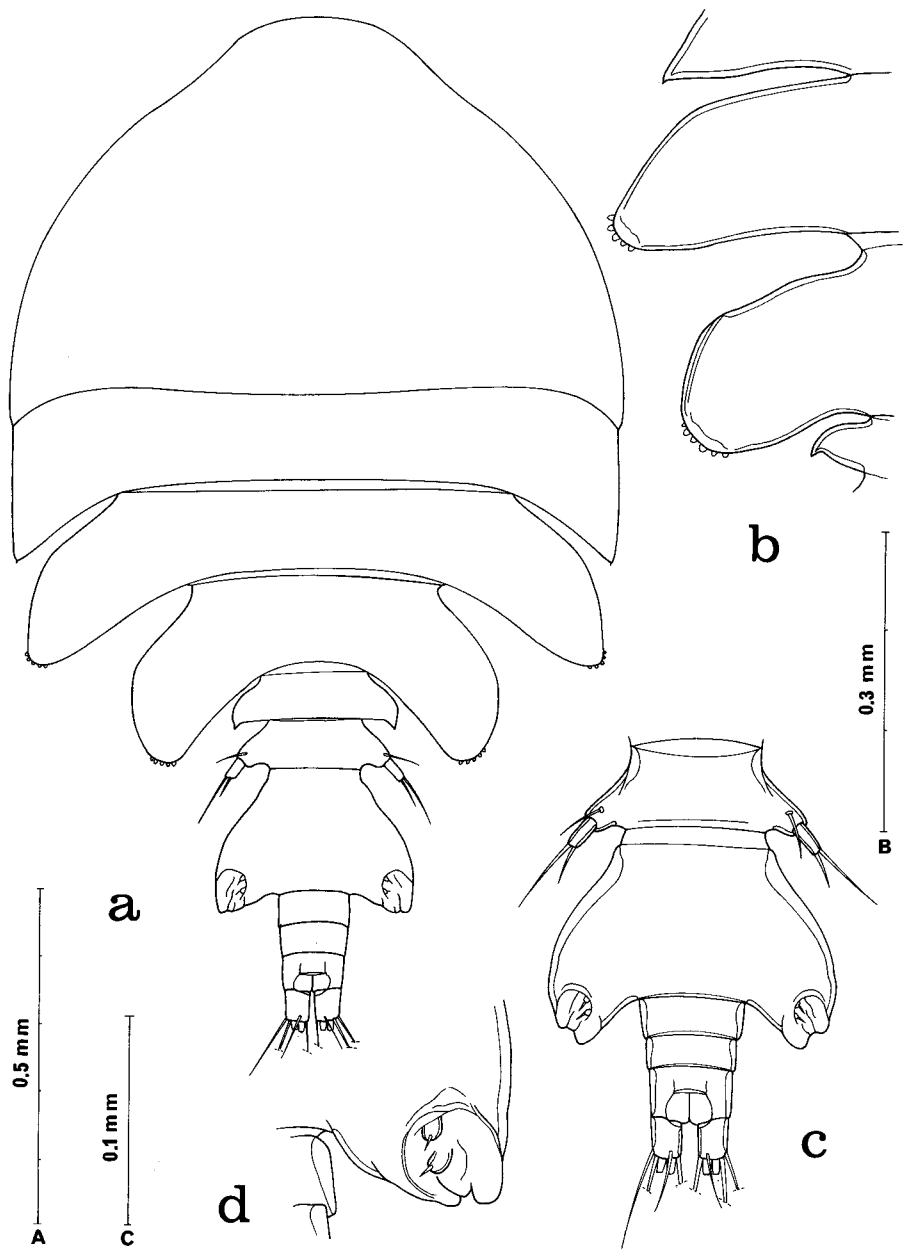

Fig. 1. *Sipadania celerinae*, new genus, new species. Female (paratype USNM). a, dorsal (scale A); b, epimera of somites bearing legs 1-4 (B); c, urosome, dorsal (B); d, genital area, dorsal (C)

Egg sacs broken in both females, but egg diameter 49-55 μm.

Rostrum (Fig. 2b) broad, rounded posteroventrally. Antennule (Fig. 2c) 350 μm long, 7-segmented. Lengths of segments (measured along their posterior nonsetiferous margins): 73 (55 μm along anterior margin), 122, 44, 47, 36, 15.5, and 15.5 μm, respectively. Last 2 segments relatively short. Armature: 0, 13, 6, 3, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. All setae smooth. No setae seen on first segment.

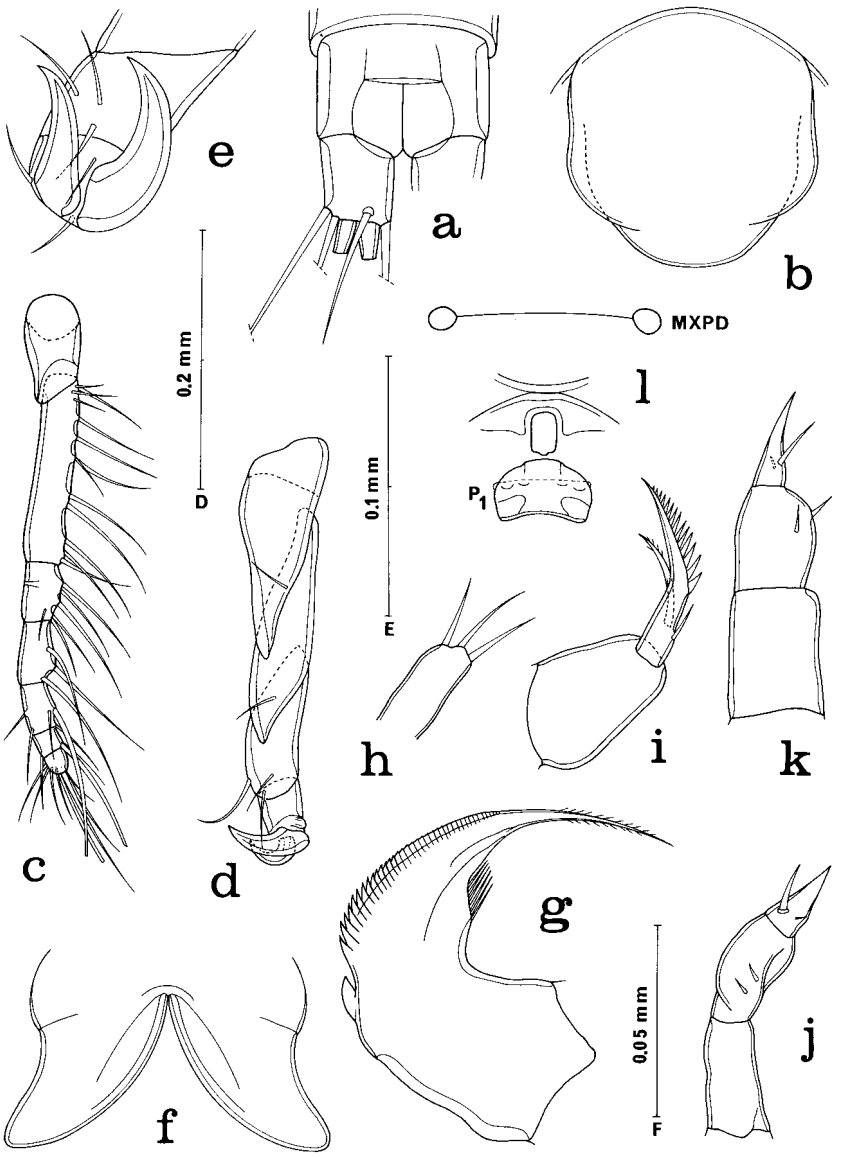

Fig.2. *Sipadania celerinae*, new genus, new species. Female (paratype USNM). a, anal somite and caudal ramus, dorsal (scale C); b, rostrum, ventral (B); c, antennule, dorsal (D); d, antenna, ventro-inner (D); e, tip of antenna, ventroterminal (E); f, labrum, ventral (C); g, mandible, posterior (E); h, maxillule, posterior (F); i, maxilla, anterior (C); j, maxilliped, inner (C); k, maxilliped, anterior (C); l, area between maxillipeds and first pair of legs, ventral (B).

Antenna (Fig. 2d) 310 μm long, 4-segmented. Armature: 1, 1, 3, and 2 claws and 3 setae (Fig. 2e). Larger stout claw 65 μm, smaller somewhat more slender claw 55 μm. Small knob near base of larger claw.

Labrum (Fig. 2f) having widely diverging slender posteroventral lobes. Mandible (Fig. 2g) with outer convex margin having small hyaline dentiform process directed distally. Inner margin just distal to concave portion of base with row of setules. Outer margin distal to dentiform

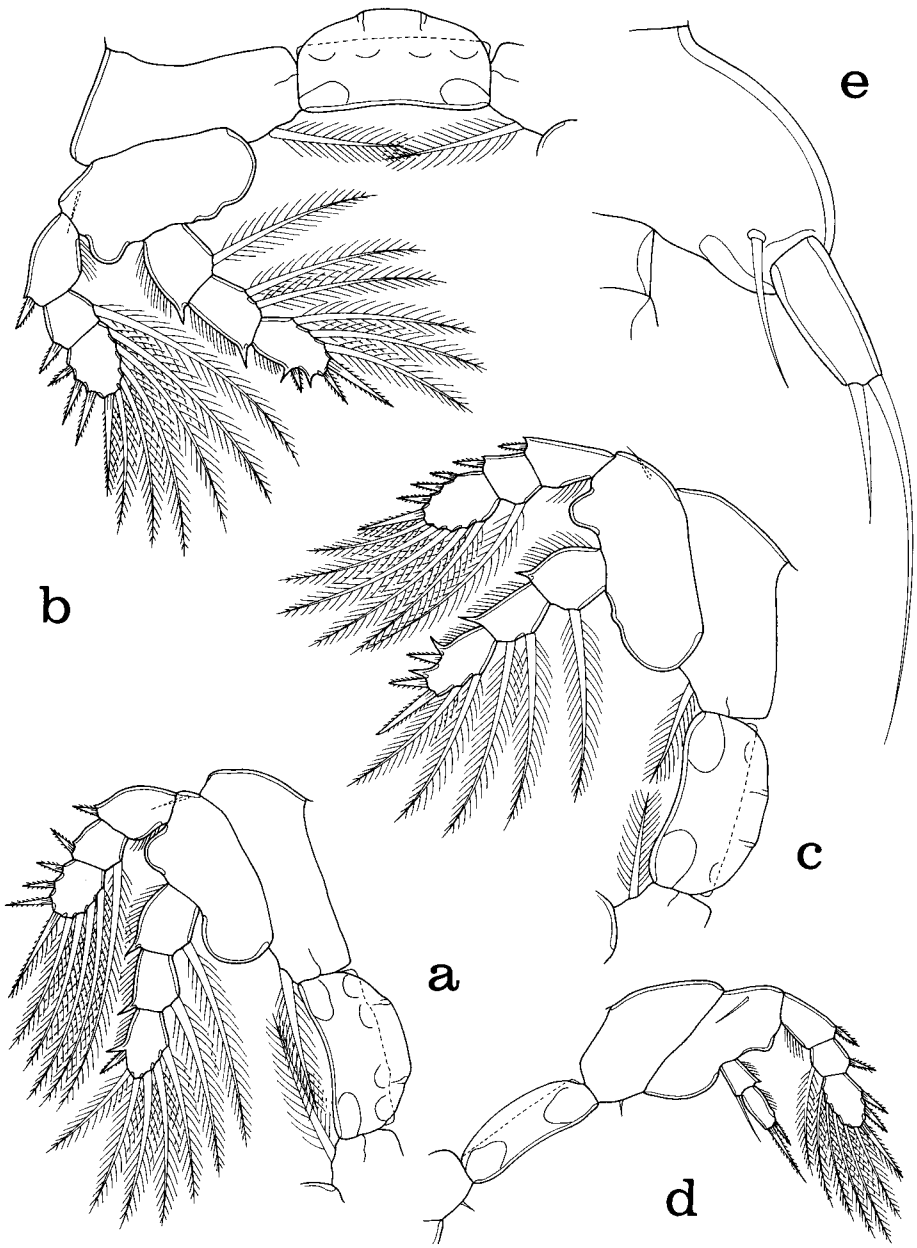

Fig.3. *Sipadania celerinae*, new genus, new species. Female (paratype USNM). a, leg 1 and intercoxal plate, anterior (scale D); b, leg 2 and intercoxal plate, anterior (D); c, leg 3 and intercoxal plate, anterior (D); d, leg 4 and intercoxal plate, posterior (D); e, leg 5, dorsal (F).

process serrate. Lash long and slender with very delicate setules. Maxillule (Fig. 2h) with 3 setae. Maxilla (Fig. 2i) 2-segmented. First segment unarmed. Second segment bearing 2 setae and extended as lash bearing row of graduated spines along one side. Maxilliped 3-segmented, in inner view slender (Fig. 2j), in anterior view stouter (Fig. 2k). Second segment with 2 inner setae. Third segment with 2 very unequal setae and drawn out in setiform tip.

Ventral area between maxillipeds and first pair of legs as in Fig. 2l, not protuberant.

Legs 1-4 (Figs. 3a-d) with 3-segmented rami, except 2-segmented endopod in leg 4. Spines and setae arranged as follows (Roman numerals indicating spines, Arabic numerals representing setae):

P_1	coxa 0-1	basis 1-0	exp I-0;	I-1;	III,I,4
			enp 0-1;	0-1;	1,5
P_2	coxa 0-1	basis 1-0	exp I-0;	I-1;	III,I,5
			enp 0-1;	0-2;	I,II,3
P_3	coxa 0-1	basis 1-0	exp I-0;	I-1;	III,I,5
			enp 0-1;	0-2;	I,II,2
P_4	coxa 0-1	basis 1-0	exp I-0;	I-1;	II,I,5
			enp 0-1;	II	

Segments of endopods of legs 1-3 with unusually long slender outer distal spiniform processes. Coxa of leg 4 with small inner seta 7 µm. Exopod of leg 4 (Fig. 3d) 100 µm long. Endopod with first segment 23 x 21 µm, its inner distal seta 26 µm; second segment 31 x 16 µm, its 2 terminal spines 45 µm and 21 µm.

Leg 5 (Fig. 3e) with unornamented free segment 34 x 13 µm, ratio 2.6:1. Two terminal setae 104 µm and 30 µm. Adjacent seta on body 34 µm.

Leg 6 represented by 2 small setae on genital area (Fig. 1d).

Colour of living specimens red, with crusader-like red cross on prosome (Fig. 4).

Male.- Unknown.

Etymology.- The name of the species is formed from the generic name of the host.

Remarks.- *Sipadania* resembles other lichomolgid genera such as *Plesiomolgus* Humes & Stock, 1972, and *Paredromolgus* Humes & Stock, 1972, in that the antenna bears two terminal claws. However, the new genus differs from these two genera in several respects. In *Paredromolgus* the formula for the third segment of the exopod of leg 4 is III,I,5 (see Humes & Frost, 1964). In *Plesiomolgus* the tooth on the mandible is directed proximally (see Humes & Ho, 1967). *Sipadania* differs from both *Plesiomolgus* and *Paredromolgus* in having the distal two segments of the antennule relatively much shortened in relation to the preceding segments. In both *Plesiomolgus* and *Paredromolgus* the genital openings are located approximately on the midregion of the female double somite, rather than on the expanded posterolateral corners of the double somite as in *Sipadania*.

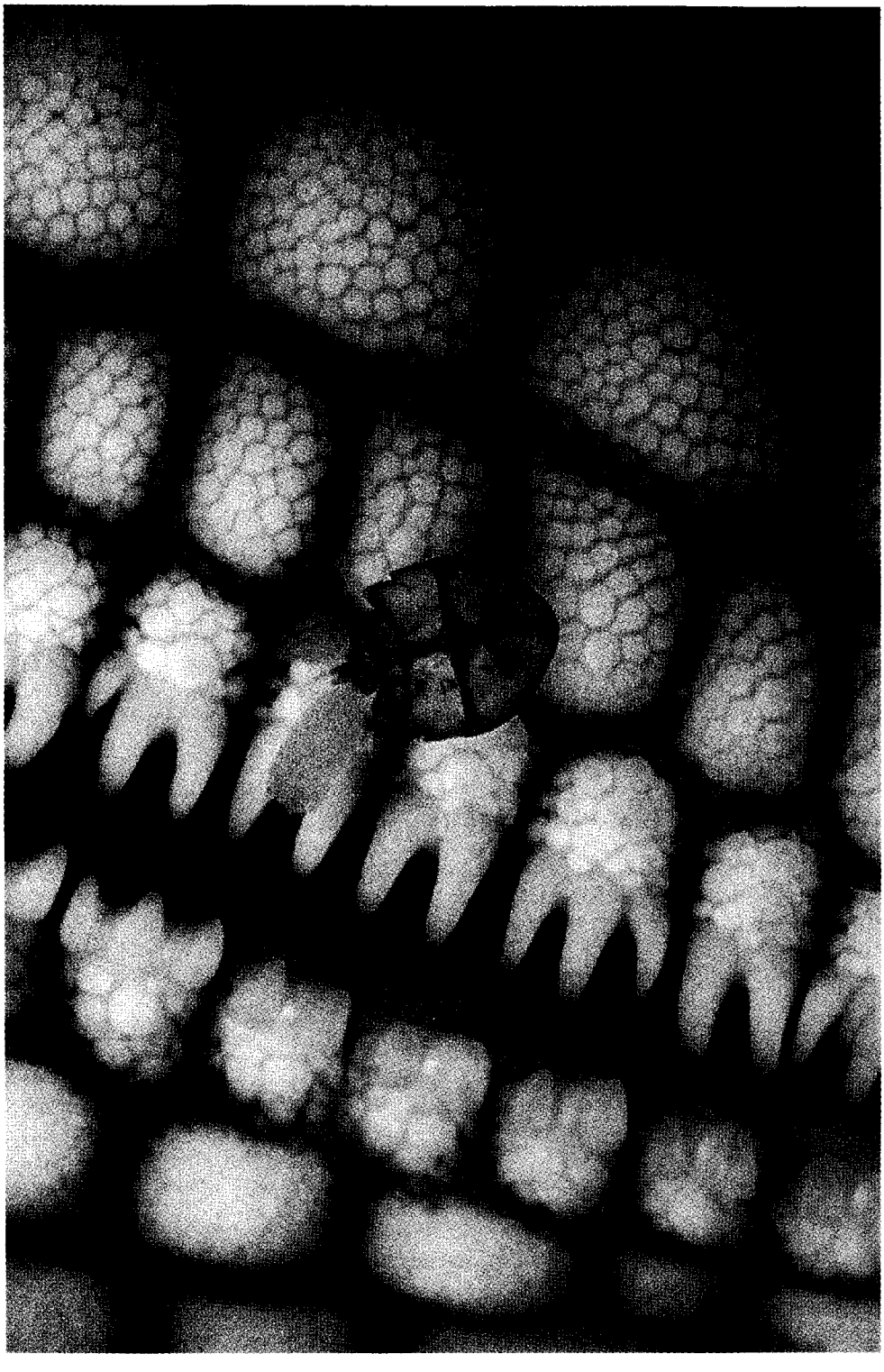

Fig.4. Female of *Sipadania celerinae*, new genus, new species, in situ on arm of *Celerina heffernani* (Livingstone) at Pulau Sipadan, northeastern Borneo, showing the striking red markings. Photograph by D. J. W. Lane.

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