

# SOME ELASIPODID HOLOTHURIANS OF ANTARCTIC AND SUBANTARCTIC SEAS<sup>1</sup>

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*Abstract.* More than 1,000 specimens of elaspodid holothurians collected in antarctic and subantarctic seas between August 1962 and October 1964 are reported. The study includes the following taxa: Order Elaspodida, Family Elpidiidae—*Peniagone* Théel; *P. incondita*, n. sp.; *P. lacinora*, n. sp.; *Scotoplanes* Théel; *S. globosa* Théel; *S. facetus*, n. sp.; *S. angelicus*, n. sp.; *Elpidia* Théel; *E. glacialis* Théel; Family Laetmogonidae—*Laetmogone* Théel; *L. wyvillethomsoni* Théel; Family Deimatidae—*Oneirophanta* Théel; *O. mutabilis* Théel; Family Psychropotidae—*Psychropotes* Théel; *P. longicauda* Théel.

## INTRODUCTION

Elaspodid holothurians have frequently been collected by the USNS *Eltanin* in antarctic and subantarctic seas. This paper is a systematic account of this group based on the specimens collected between August 1962 and October 1964. The collections include more than 1000 specimens representing 1 or more genera in each of 4 families of the order Elaspodida. All stations referred to by number were made as a part of the University of Southern California's Antarctic program during *Eltanin* Cruises 1-15, 1962-1964. A complete listing, with available data, position, date, depth, and the species of elaspodid holothurians taken at each, concludes this paper. The pertinent data are repeated with each of the holotypes of the 4 new species herein described.

## MATERIAL AND METHODS

Specimens of the order Elaspodida were collected from 42 stations by USNS *Eltanin*. These stations

cover an area bounded by 25°W. longitude and 159°W. longitude with more than 95% of the stations below 55°S. latitude (Plate 1). Samples which contained the specimens that are described were taken with a 5- or 10-foot Blake Trawl, or a rock dredge.

Spicule analyses were made from preparations of portions of skin taken from different parts of the body and sometimes from internal organs. The tissues were placed in a 100% ethyl alcohol for several minutes then transferred to cedarwood oil or toluene until they became transparent, and finally were mounted on a microslide with Permount. This procedure was not successful when the skin of the animal was thick or heavily pigmented, for instance dark violet or dark brown. These were cleared using Clorox or a liquid detergent, a technique kindly recommended by Dr. Elizabeth Deichmann.

As these animals contract (or expand?) greatly with the use of the usual preservatives, body length of preserved material is not an accurate measure of the size of living animals.

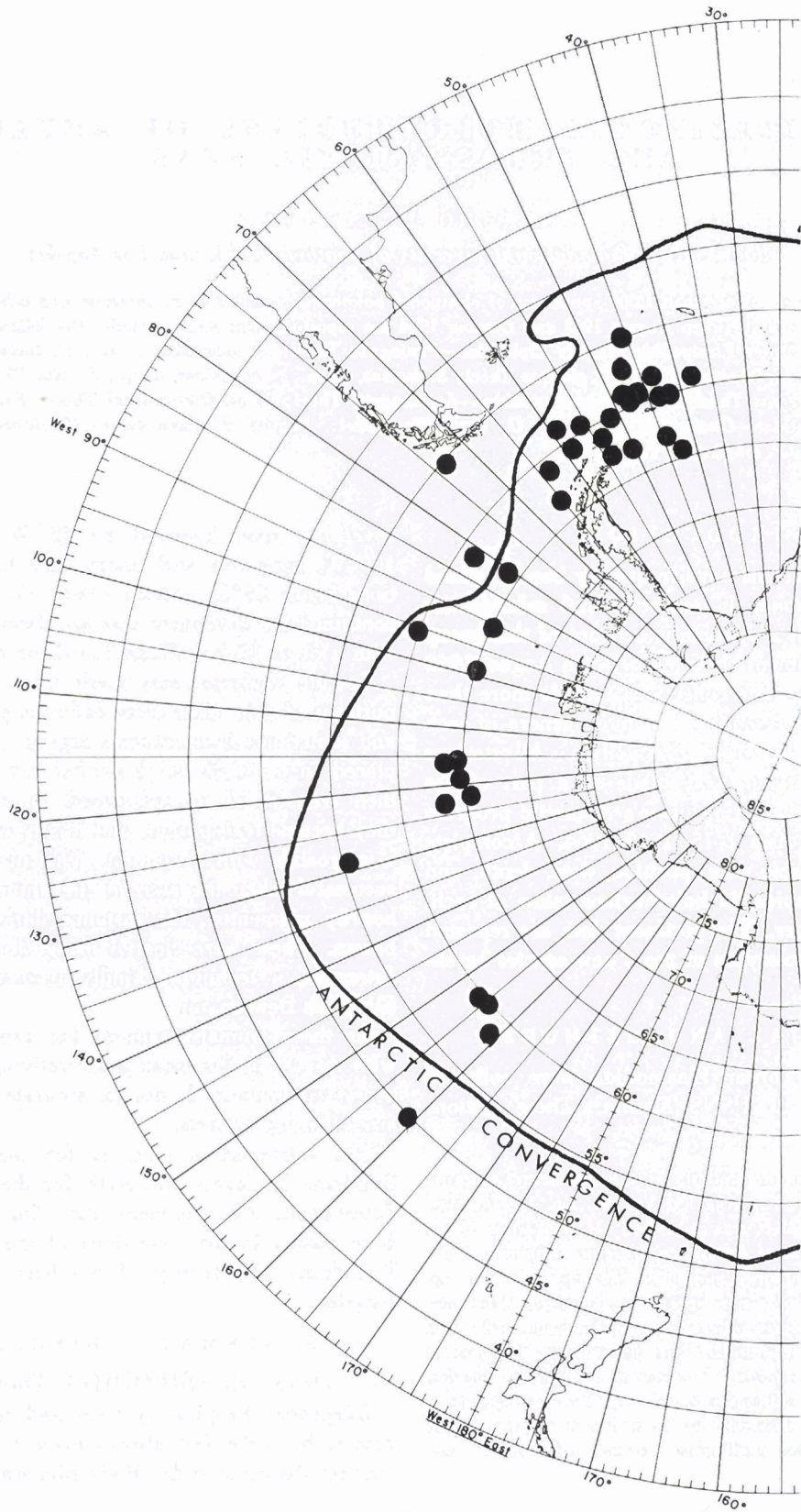
The abbreviation USC is for the University of Southern California and AHF for the Allan Hancock Foundation. All specimens, including holotypes, have been placed in the collections of the Allan Hancock Foundation, University of Southern California, Los Angeles.

## SYSTEMATIC DISCUSSION

### Order ELASIPODIDA Théel, 1882

*Diagnosis:* Respiratory trees and retractor muscles absent, but tube feet always present. Tentacles with circular discoidal ends. Body bilaterally symmetrical.

<sup>1</sup> *Editorial Note:* In the Bulletin of the Southern California Academy of Sciences, Los Angeles, Vol. 66, No. 1, Jan.-Mar. 1967, pp. 54-68, figs. 1-6, was published a brief review of the "Elaspod Holothurians of Antarctica, I. Genus *Amperima* Pawson 1965" by the author, Candido P. Agatep, in which appeared a description of a new species, *A. velacula*. Four new species belonging to three other genera in the same order and family (Elaspodida, Elpidiidae) are described in the present paper: *Peniagone incondita*, *P. lacinora*, *Scotoplanes facetus*, and *S. angelicus*. In addition to the above, "Two new species of *Peniagone* have been described by the author in a paper due to be published in the Philippine Journal of Science and Technology."



Calcareous deposits include cross-shaped, 4-armed and 3-armed bodies, as well as wheels and rods.

*Remarks:* The order Elaspodida embraces 5 families, as follows: Pelagothuriidae Ludwig, 1894; Deimatidae Théel, 1882; Laetmogonidae Ekman, 1925; Elpidiidae Théel, 1882; and Psychropotidae Théel, 1882. Representatives of all but the first one are discussed and/or described in this paper.

#### Family ELPIDIIDAE Théel

*Diagnosis:* Tentacles usually 10. Tube feet distributed in a single row along ventral sides or limited to only posterior half of body. Dorsal papillae few and usually located on anterior part. Calcareous deposits composed mostly of C-shaped bodies; 3-armed and 4-armed spicules; and curved, straight, and branched rods.

*Remarks:* Three genera of the family are reported in this paper. Early reports show that species of the family have been found at depths of about 500 m. However, Hansen [1956] reported them from depths to 10,000 m.

#### Genus *Peniagone* Théel, 1882

*Diagnosis:* Body more or less elongated; near anterior end body usually narrowed to form a "neck." Tentacles 10. Anterior part of dorsal surface with few large or small papillae. Ventrolateral radii with tube feet throughout or restricted to posterior half of body. Calcareous deposits including 4-armed bodies with 1 to 5 short or long processes and straight, curved, and branched spicules.

*Type-species:* *Peniagone wyvillii* Théel.

#### *Peniagone incondita*, new species

Plate II, Fig. 1-14

#### *Material examined:*

Holotype: 30 mm (AHF 803), Sta. 474, Scotia Sea.

Paratypes: 2 specimens, 45 and 60 mm (AHF 803), Sta. 591; 1 specimen, 35 mm (AHF 803), Sta. 913.

Additional material: 6 specimens, 28-50 mm, Sta. 474; 85 specimens, 10-25 mm, Sta. 591; 14 specimens, 20-40 mm, Sta. 913; 6 specimens, 18-25 mm, Sta. 1148.

#### Plate I

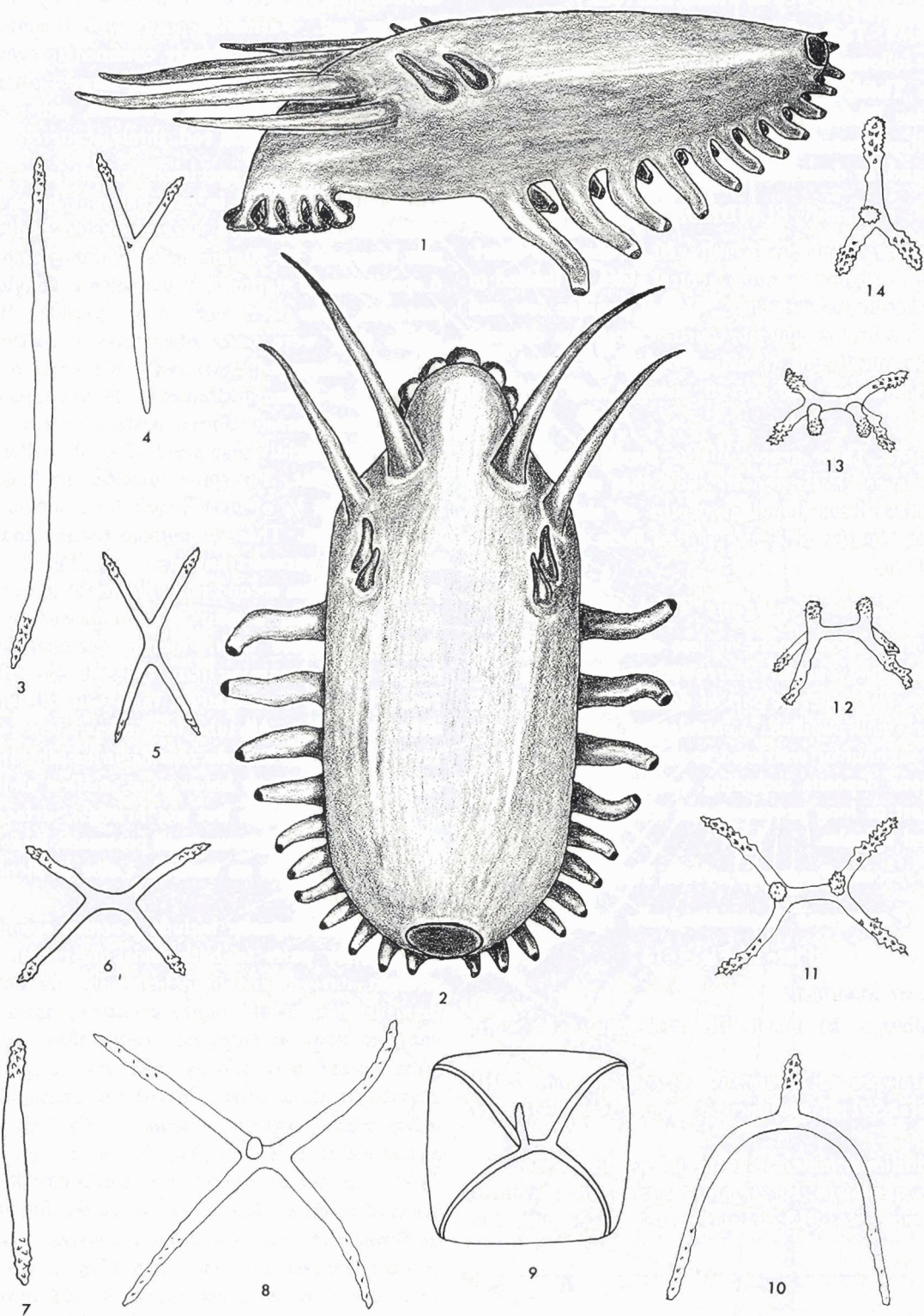
Map showing stations where elaspodid holothurians were collected by the USNS *Eltanin*.

*Diagnosis:* Dorsal surface with 4 extremely long individual papillae placed about  $\frac{1}{4}$  of body length from anterior end. 4-armed deposits with 2 spinous processes on central rod, thickly confined to ventral side, while in dorsal surface extremely large 4-armed bodies with 1 process, rarely two processes, either on center or near ends of central rod, thinly scattered.

*Description:* The specimens in stations 474, 591, 913, and 1148 differ in external morphology. Specimens from station 474 have elongated bodies, 28-50 mm long and 12-20 mm wide. Although none of the 6 specimens in station 474 possesses a complete set of tentacles, tube feet, and dorsal papillae, the bases where they were once attached are clearly visible. Tentacles damaged, apparently 10; ends of tentacles discoidal, 2-3 mm in diameter. Mouth anteroventral; anus posterodorsal. Dorsal surface convex with posterior part slightly depressed (Fig. 1). Ventral surface almost flat. Two pairs of extremely long papillae located about  $\frac{1}{4}$  of body length from anterior part of dorsal surface. These 4 papillae independent, placed in a slightly curved transverse row (Fig. 2); anterior pair longer than second pair. Posterior to second pair, about 2-4 mm, 2 pairs of comparatively smaller, shorter processes with anterior members somewhat longer than remaining pair (Fig. 1, 2). Midventral radius naked. Ventrolateral radii with 20 long, cylindrical tube feet. All tube feet independent, with anterior pairs longer and decreasing in length toward posterior end. Last pair below anus smallest and shortest.

Skin tough, rough but not brittle. Surface of skin provided with numerous small processes, larger on dorsal side than those on ventral. Color in alcohol violet to light violet.

Calcareous deposits include 4-armed spicules, arms attached by pairs to both ends of central rod, and straight, curved, and branched rods. In dorsal skin, deposits (Fig. 8-10) thinly scattered, about twice or more as large as those on ventral side. Arms long, often curved toward body, with minute spines thinly distributed along sides. Central rod broad, short, provided with 1 spinous process, rarely two processes, placed either on center (Fig. 10) or on one end (Fig. 8, 9). Spicules in ventral skin thickly distributed, central rod distinctly longer and more slender than those in dorsal skin, with 2 spinous processes, rarely only 1 process, located near each end (Fig. 11-13). Arms spinous and more or less curved inward toward body. Very rarely branched rods (Fig. 14) and 3-armed spicule with 1 process present in body. Deposits in



tentacles (Fig. 5) and tube feet (Fig. 6) generally similar to those in body but smaller, and lacking processes. Spicules at ends of tentacles and tube feet include slightly spinous, straight, curved, and branched rods, those of tube feet (Fig. 7) smaller than those in tentacles (Fig. 3, 4).

Genital organ consists of elongated flattened tubes each with groups of short branching caeca. Intestine a single loop occupying body, supported by many small, independent mesenteric strands attached to lateral inter-radii. Rectum connected by numerous bands to both left and right sides of ventral surface. Longitudinal muscles yellowish to orange; intestine dark brown to violet; genital caeca yellow.

Specimens from stations 913 and 1148 generally smaller in size, 15–35 mm long and about 12–17 mm wide. Dorsal surface extremely convex, ventral side slightly vaulted. Tube feet distributed in single row along each ventrolateral radius. Color in alcohol light brown to white. Skin slightly rough in some specimens, in others very soft, pliable, thin, and transparent. Surface of body of rough-skinned specimens covered with numerous pyramid-like processes, those on dorsal side conspicuously larger than those on ventral side. Dorsal pyramidal processes each contain one 4-armed spicule with 1 process, rarely 2 processes, on central rod (Fig. 9).

Specimens from station 591 differ from those described above in having thick and soft skin, ends of tentacles with thin, large, yellowish discs, ranging in diameter from 6 to 8 mm, few and small processes on surface of skin.

*Remarks:* All specimens from the above 4 stations share similar numbers of tube feet, number and arrangement of dorsal papillae, and types and shapes of spicules.

*Elpidia verrucosa* Théel, 1882, is another species which shows some resemblance to the species described here, but differs in that *E. verrucosa* has only 2 pairs of dorsal papillae, a brittle skin, and 20 tube feet which are limited to the posterior half of the body.

*Peniagone lacinora*, new species

Plate III, Fig. 1–9

*Material examined:*

Holotype: 45 mm (AHF 804), Sta. 1018, North Weddell Sea.

Paratypes: 1 specimen, 30 mm (AHF 804), Sta. 1018; 3 specimens, 30–45 mm (AHF 804), Sta. 1150.

Additional material: 2 specimens, 20 and 35 mm, Sta. 942; 3 specimens, 20–30 mm, Sta. 1018; 2 specimens, each 35 mm, Sta. 1135; 1 specimen, 35 mm, Sta. 1145; 2 specimens, 20 and 25 mm, Sta. 1146.

*Diagnosis:* Two small pairs of papillae placed on anterior surface and 2 very long pairs of papillae located on extended and broadened end of anterior skin. First pair of tube feet placed near midventral radius, distinctly separated from second pair by wide space. Second pair located near or around base of brim. These first 2 pairs of tube feet peculiarly large. Remaining tube feet become part of brim, appearing only on upper margin around posterior end.

*Description:* Total length 20–45 mm, width 7–18 mm. Mouth anterior, ventral, encircled by moderately long tentacles. Terminal discs of tentacles with numerous minute processes on both surfaces and margins. Dorsal surface slightly convex; ventral surface flat. Body broad, depressed toward posterior end with soft, thin, flat lateral brim (Fig. 9). Anterior end of brim extends forward and provided with a pair of papillae (Fig. 1, 9) 7–15 mm in length, 2–3 mm posterior to which lies a pair of shorter papillae. All 4 papillae project outward in preserved material but they may be movable in life. On anterior part of dorsal surface (Fig. 1) about a quarter of total length of body from anterior end lie 2 (seldom 3) pairs of small discrete processes. Anterior pair larger and longer than posterior pair; both pairs lying close together. Midventral radius naked; each ventrolateral radius with a single row of 16 cylindrical tube feet placed only on posterior half of body. First pair of tube feet located near midventral part of body and separated from second pair by wide space; second pair placed more laterally, lying near brim; third pair issuing at about margin of brim, while remaining tube feet around posterior end appear on upper margin (Fig. 9). Posterior

Plate II. *Peniagone incondita*, n. sp.

Fig. 1. Lateral view of entire animal,  $\times 1.7$ .

Fig. 2. Dorsal view of same,  $\times 1.7$ .

Fig. 3, 4. Deposits from the ends of tentacles,  $\times 6.7$ .

Fig. 5–7. Deposits from the ends of tube feet,  $\times 6.7$ .

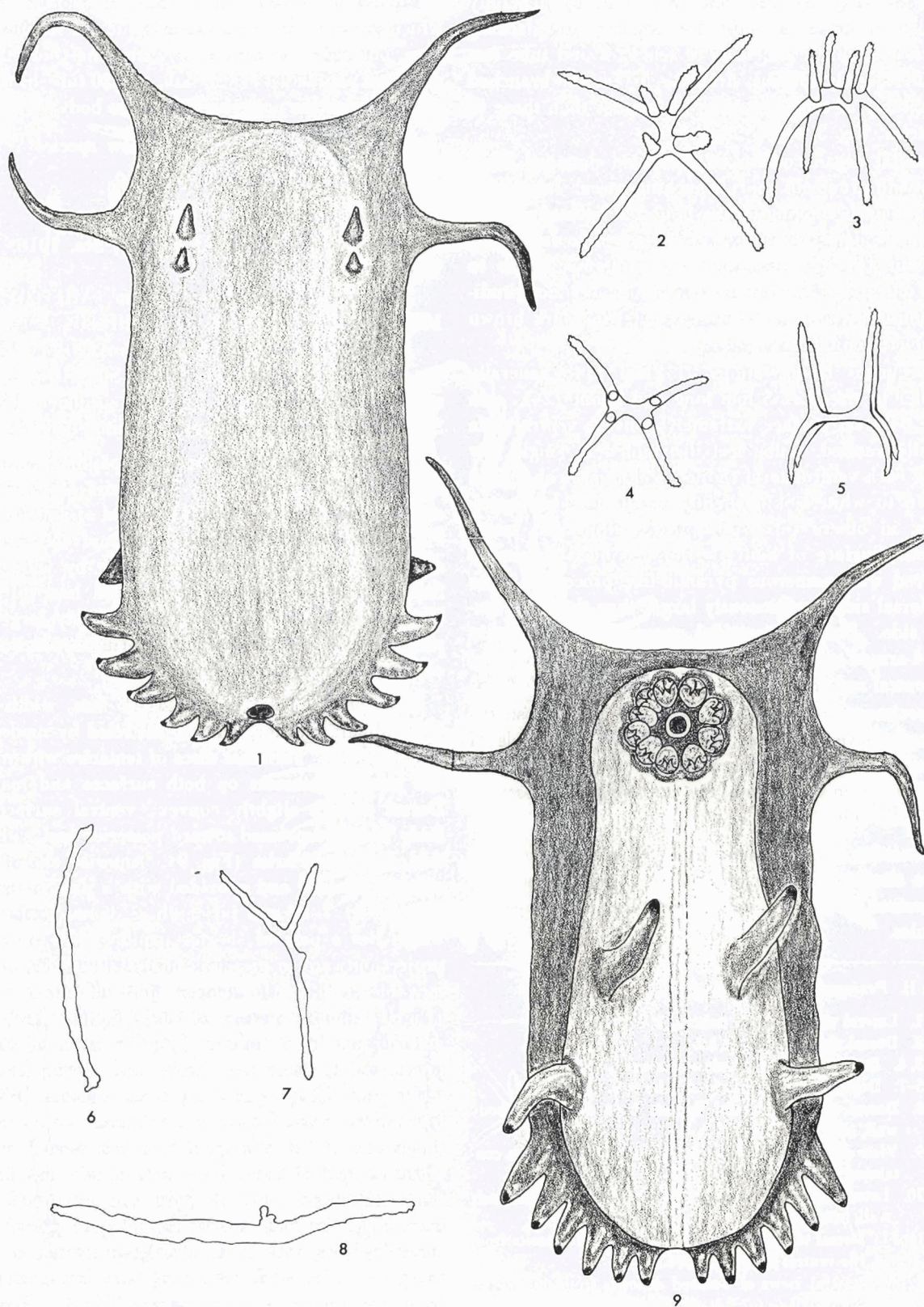
Fig. 8. Dorsal view of 4-armed deposit from the dorsal body wall,  $\times 6.7$ .

Fig. 9. View of a pyramidal process of the dorsal surface containing a single deposit,  $\times 3.3$ .

Fig. 10. Lateral view of four-armed deposit from the body wall,  $\times 6.7$ .

Fig. 11, 14. Dorsal view of 4-armed and branched deposits from the ventral body wall,  $\times 6.7$ .

Fig. 12, 13. Lateral views of 4-armed deposits from the ventral body wall,  $\times 6.7$ .



part of brim becomes common base of posterior tube feet. Anterior pairs of tube feet longer than others; last pair on posterior end shortest and smallest. Anus posterodorsal.

Calcareous deposits include numerous small 4-armed spicules and more or less straight and curved rods. Arms of spicules arising from both ends of short central rod heavily spinous toward ends; each arm, near central rod, with single slightly spinous processes projecting upward. These processes vary in length. Dorsal (Fig. 2, 3) and ventral (Fig. 4, 5) deposits similar, differing only in size, with former larger. Straight, branched, and curved, slightly spinous, rods (Fig. 6-8) present in ends of tentacles and tube feet with former a little larger and longer.

Integument very soft, thin, and translucent. Color in alcohol dark violet with ventral surface slightly lighter. Some specimens have torn tentacles and tube feet, others have lacerations on either ventral or dorsal sides, but most are intact.

Calcareous ring similar to that in other species of the genus, a delicate network. Gonad composed of 2 bundles, each bundle a mass of small tufts. Efferent duct pierces body wall near crown of tentacles on anterior part of dorsal surface. Large intestine describes a single loop limited to posterior half of body. Loop attached to lateral interradii by strong discrete thread-like mesenteries. Rectum supported by tiny bands connected to both left and right sides of venter.

*Remarks:* Deposits found in *Peniagone purpurea* (Théel), 1882, and *Peniagone ambigua* (Théel), 1882, are somewhat similar in shape to spicules in the specimens described here. The 3 species differ in the number and arrangement of the dorsal papillae and processes, and number, size, and distribution of the tube feet. *P. purpurea* has only 2 pairs of papillae on the anterior end of the body, with no processes elsewhere; *P. ambigua* has only 1 pair of papillae on its anterior end and 2 or 3 processes immediately behind them; and *P. lacinora* has 2 pairs of papillae on the distal end of the anterior part and 2 pairs of processes on

the anterior surface about 10 mm or more from the end of the body. Although the tube feet of these 3 species are limited to only the posterior half of the ventral surface, the tube feet of *P. purpurea* and *P. ambigua* are extremely small, more or less evenly arranged, and all emerge from a brim, while in *P. lacinora* the anterior tube feet are not only peculiarly large but they are isolated by a wide space, with the first pair located near the midventral radius, the second pair near the side, and the rest emerging from the posterior brim.

*Peniagone incondita* has spicules somewhat similar to those found in *P. lacinora*. These species differ greatly, however, in the number and arrangement of processes in the deposits, the number and distribution of tube feet, the position and arrangement of the large, anterior-most pairs of dorsal papillae, and in the lack of processes on the surface of the skin.

#### Genus *Scotoplanes* Théel, 1882

*Ellipinion* Herouard, 1923, p. 82.

*Diagnosis:* Body globular or slightly elongated. Tentacles 10. Dorsally, a number of papillae placed on either anterior or posterior or both, individually distributed or in a transverse row of 3 or 4, sometimes closely set and sometimes webbed at base. Ventrally, a single row of tube feet along lateral edge. Calcareous deposits include curved, straight rods, with thin or thick spines and C-shaped bodies.

#### *Scotoplanes globosa* Théel, 1882

Plate IV, Fig. 1-13

*Scotoplanes globosa* Théel, 1882, pp. 29-31, pl. 4-5, fig. 8-9; pl. 44, fig. 12.—Vaney, 1908, pp. 409-410, pl. 3, fig. 25-28.—Hansen, 1956, pp. 40-41.

*Scotoplanes thééli* Oshima, 1915, pp. 242-243.

*Material examined:* 1 specimen, Sta. 136; 5 specimens, Sta. 413; 2 specimens, Sta. 428; 10 specimens, Sta. 474; 1 specimen, Sta. 487; 9 specimens, Sta. 489; 11 specimens, Sta. 514; 1 specimen, Sta. 529; 1 specimen, Sta. 534; 1 specimen, Sta. 853; 7 specimens, Sta. 913; 5 specimens, Sta. 991; 14 specimens, Sta. 995; 1 specimen, Sta. 1014; 14 specimens, Sta. 1018; 1 specimen, Sta. 1070; 6 specimens, Sta. 1078; 3 specimens, Sta. 1079; 1 specimen, Sta. 1127; 1 specimen, Sta. 1135; 6 specimens, Sta. 1146; 2 specimens, Sta. 1148; 1 specimen, Sta. 1150.

*Description:* Specimens 17 to 100 mm long and about 5 to 35 mm wide. Mouth terminal, sometimes slightly subventral; anus subventral. Dorsal surface extremely

Plate III. *Peniagone lacinora*, n. sp.

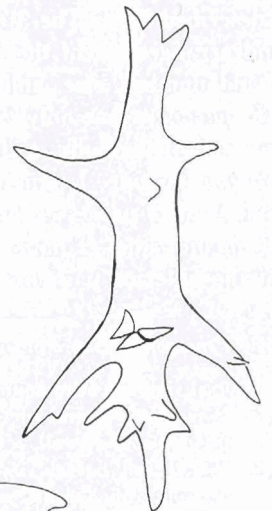
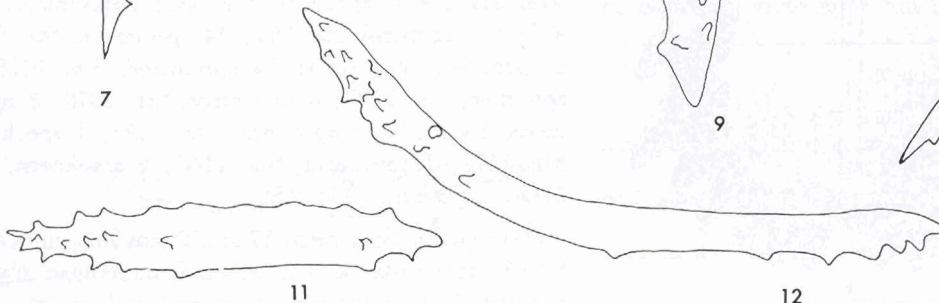
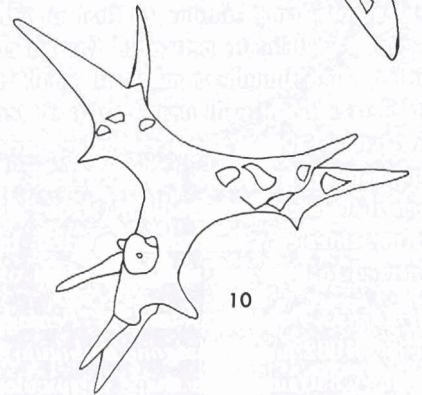
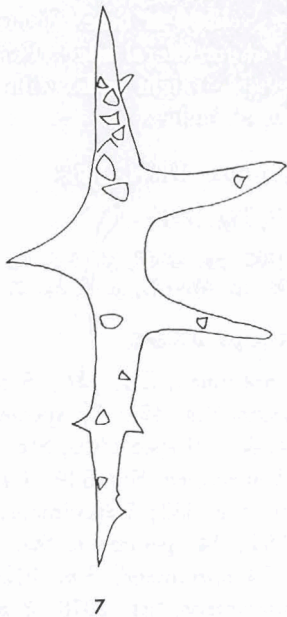
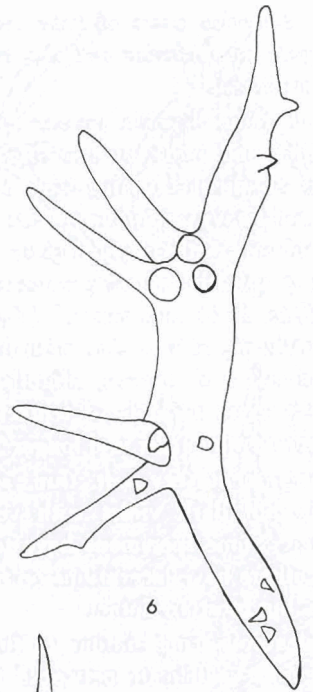
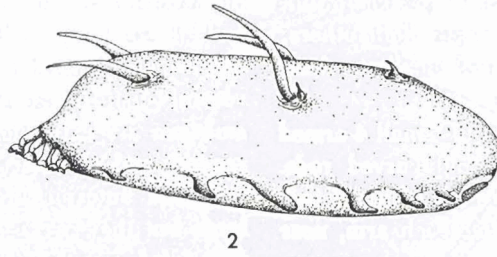
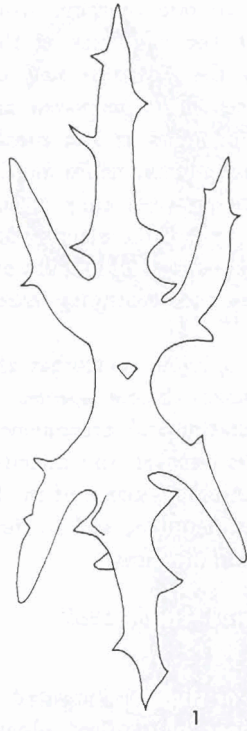
Fig. 1. Dorsal view of entire animal,  $\times 2$ .

Fig. 2, 3. Dorsal and lateral views of 4-armed deposits from the dorsal body wall,  $\times 13.3$ .

Fig. 4, 5. Dorsal and lateral views of 4-armed deposits from the ventral body wall,  $\times 13.3$ .

Fig. 6-8. Deposits from the ends of tube feet and tentacles,  $\times 40$ .

Fig. 9. Ventral view of entire animal,  $\times 2$ .



convex with 3 pairs of papillae; first pair located on anterior, second pair on posterior, and third pair lateral to or directly behind second pair. Third pair smallest, first and second pairs long and slender. Midventral radius naked. Ventrolateral radii have cylindrical tube feet which vary in number from 6 to 8 (Fig. 8) pairs. Number of tube feet on each side of ventral surface varies from 3 to 7 on one side and 6 to 8 on other side. One specimen has an extra dorsal papilla placed on middle of posterior surface of body (Fig. 2, 3). Tentacles about equal in size with enlarged terminal discs; margins of discs with small unbranched processes.

Skin soft and thin. Color in alcohol mainly yellowish white to light grey, some light brown.

Deposits in integument in 2 forms—C-shaped bodies and straight or slightly curved rods. C-shaped spicules numerous and thickly scattered all over body. Rods in dorsal and ventral sides more straight and spinous and thinly scattered, those in tube feet and tentacles less spinous and more curved. Specimens from stations 138 and 413 have spicules with 4 large, long processes or arms, arising in pairs from both sides of a long central rod (Fig. 1, 6). These deposits more scattered in body. Also present in the dorsal and ventral skin are thinly scattered, broad, spinous 3-armed deposits (Fig. 10), numerous C-shaped deposits (Fig. 4) with a variable degree of curvature, and rare Y-shaped spicules (Fig. 5). Straight and curved rods, some with irregular arms (Fig. 7, 13), occur in ends of tube feet and tentacles (Fig. 9, 11, 12).

A single, elongated Polian vesicle present. Gonad a small cluster of caeca. Calcareous ring a very fine network of spicules.

*Distribution:* *Scotoplanes globosa* is known from the Indian, Pacific, and Atlantic oceans. It is found in depths ranging from 500 to about 10,000 m.

Plate IV. *Scotoplanes globosa* Théel

- Fig. 1. Ventral view of 4-armed deposit from the body wall,  $\times 1.7$ .  
 Fig. 2. Lateral view of entire animal,  $\frac{1}{3}$  natural size.  
 Fig. 3. Dorsal view of same,  $\frac{1}{3}$  natural size.  
 Fig. 4, 5. C-shaped and Y-shaped deposits from the body wall,  $\times 1.7$ .  
 Fig. 6. Lateral view of 4-armed deposit from the body wall,  $\times 1.7$ .  
 Fig. 7, 10, 13. Deposits from near the ends of tentacles and tube feet,  $\times 1.7$ .  
 Fig. 8. Ventral view of entire animal,  $\frac{1}{3}$  natural size.  
 Fig. 9, 11, 12. Deposits from the ends of tentacles and tube feet,  $\times 1.7$ .

*Remarks:* The specimens show characteristics of *Scotoplanes globosa* as described by Théel [1882], although in some animals the number and arrangement of the dorsal papillae and number and distribution of tube feet differ from those of Théel's specimens. The single specimen with an extra dorsal papilla and another one with 3 tube feet on one side and 7 on the other probably are abnormal. The variation in the number of tube feet in the specimens is of little importance and cannot be taken as the basis for creating new varieties of *S. globosa*. However, the variation in the number of tube feet supports the idea [Vaney, 1912] that the above species can undergo reduction as well as increase in the number of tube feet.

*Scotoplanes théeli* Oshima [Oshima 1915] is considered synonymous with *S. globosa*. Oshima's description of this species and the basis on which he differentiates it from Théel's specimens do not give a clear-cut distinction between the two species. The variation in the location of the third pair of dorsal papillae is not unusual and is present in the *Eltanin* collections and in the *Galathea* specimens [Hansen, 1956] which are considered to be *S. globosa*.

*Scotoplanes facetus*, new species

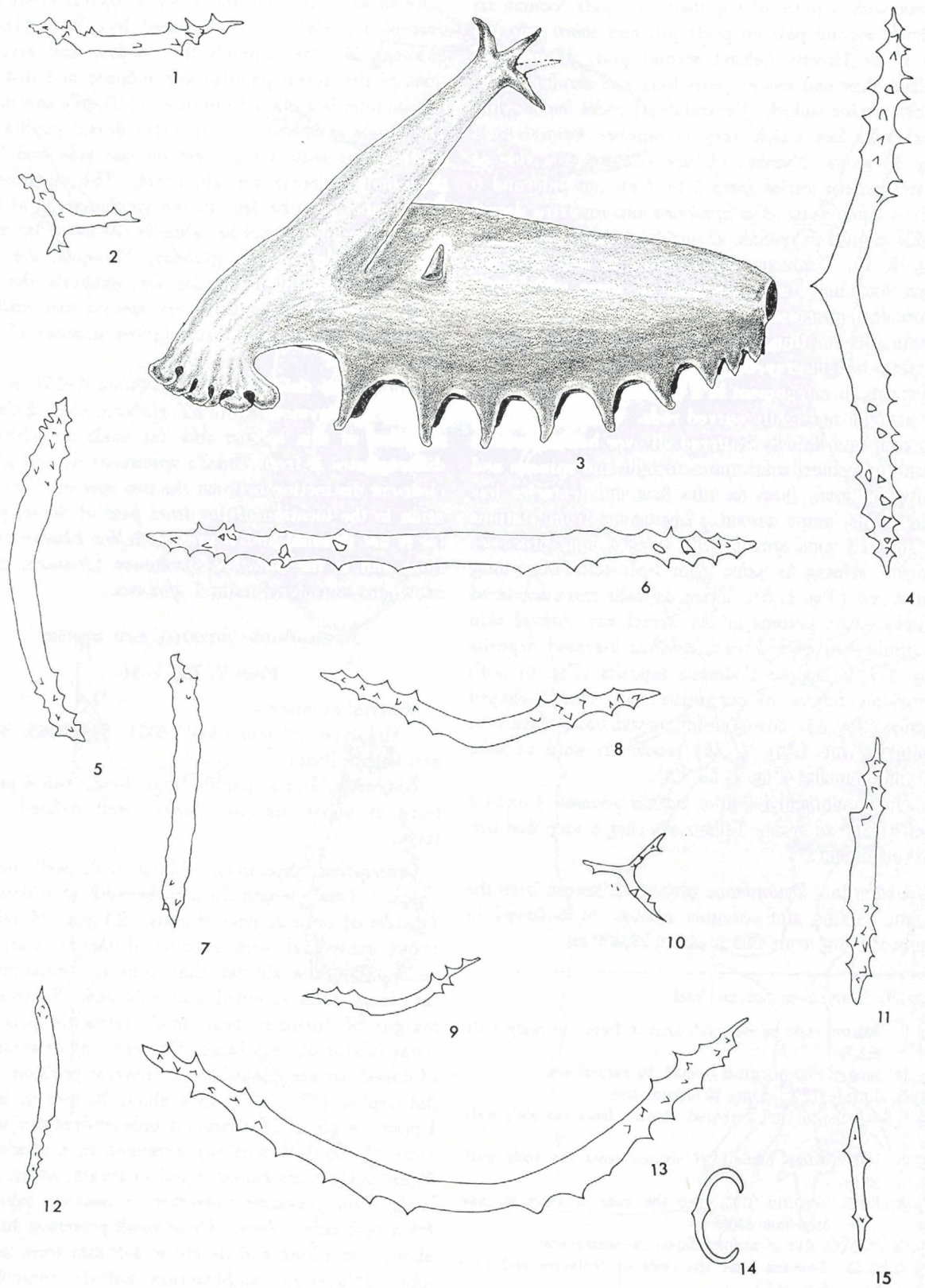
Plate V, Fig. 1-14

*Material examined:*

Holotype: 50 mm (AHF 805), Sta. 1145, Southeast Pacific Basin.

*Diagnosis:* Dorsal papilla large, long, with 4 projections at upper margin; "neck" well defined; anus large.

*Description:* Specimen oblong with well defined "neck." Total length 50 mm, breadth at widest part (middle of anterior part of body) 20 mm. Mouth terminal, subventral, with tentacles of unequal size; most ventral tentacles shorter than others. Tentacles 4-6 mm long, ends rounded and enlarged. Surface and margin of tentacles bear small retractile processes. Anus subdorsal, very large. On center of anterior part of dorsal surface, placed in a transverse position, large, flat papilla (Fig. 3) or lobe about 20 mm in length. Upper margin of lobe bears 4 independent projections (one of which is missing) arranged in a single row. These projections almost equal in length, about 3 mm long. Two processes posterior to base of lobe, one from each side of lobe. These small processes measure about 1 mm long and lie about 2-3 mm from base of lobe. Midventral ambulacrum naked; ventrolateral



radii each with 10 cylindrical tube feet (Fig. 3). Anterior tube feet separated by wide space, those around posterior end considerably smaller, closely set, and united at their bases.

Body wall thin, firm, and soft. Color in alcohol greyish to light brown.

Calcareous deposits include two types—C-shaped and rod-shaped bodies. C-shaped spicules (Fig. 14) infrequent in body, rods numerous dorsally (Fig. 1, 2, 4, 6) and thinly scattered ventrally (Fig. 8, 11, 15). Rods with spines mostly toward their ends. Spicules in tentacles (Fig. 9, 13) and tube feet (Fig. 5, 7, 12) similar; rods in tentacles more curved and with irregular spines; rods in tube feet almost straight.

C-shaped spicules lacking from ends of both tentacles and tube feet. Small, branched (Fig. 10) bodies also present in body. Rods 0.11–0.69 mm in length, C-shaped spicules 0.03–0.08 mm in length.

Calcareous ring made up of tiny, delicate spicules. Intestine a single loop occupying most of body cavity, this loop attached to dorsal radius and dorsolateral radii by individual mesenteric bands. Single, slightly elongated Polian vesicle present. Gonad represented by a single fascicle with numerous minute caeca.

*Remarks:* The single specimen has a large laceration on the anterior part of the ventral surface which caused the loss of a part of the skin and small portion of the intestine.

The deposits of *Scotoplanes facetus* resemble those in other species in the genus, but *S. facetus* differs distinctly in possessing the long dorsal lobe with a crown-like process on its upper margin.

#### *Scotoplanes angelicus*, new species

Plate VI, Fig. 1–21

##### *Material examined:*

Holotype: 25 mm long (AHF 806), Sta. 1140, Southeast Pacific Basin.

Paratypes: 2 specimens, 23 and 25 mm (AHF 806), Sta. 1140.

*Diagnosis:* Four small anterior dorsal papillae arranged in a transverse row; 2 rudimentary processes directly behind most lateral papillae.

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##### Plate V. *Scotoplanes facetus*, n. sp.

Fig. 1, 2, 4, 6. Deposits from the dorsal body wall,  $\times 1.7$ .

Fig. 3. Lateral view of entire animal,  $\times 1.3$ .

Fig. 5, 7, 12. Deposits from the ends of tube feet,  $\times 1.7$ .

Fig. 9, 13. Deposits from the ends of tentacles,  $\times 1.7$ .

Fig. 8, 10, 11, 15. Deposits from the ventral body wall,  $\times 1.7$ .

Fig. 14. C-shaped deposit from the body wall,  $\times 1.7$ .

*Description:* Body ovate; largest specimen about 25 mm long and about 18 mm broad. Mouth anteroventral, tentacles of almost equal size. Ends of tentacles with discs averaging 2.5 mm in diameter. There are numerous minute, retractile processes around edges and on surfaces of discs.

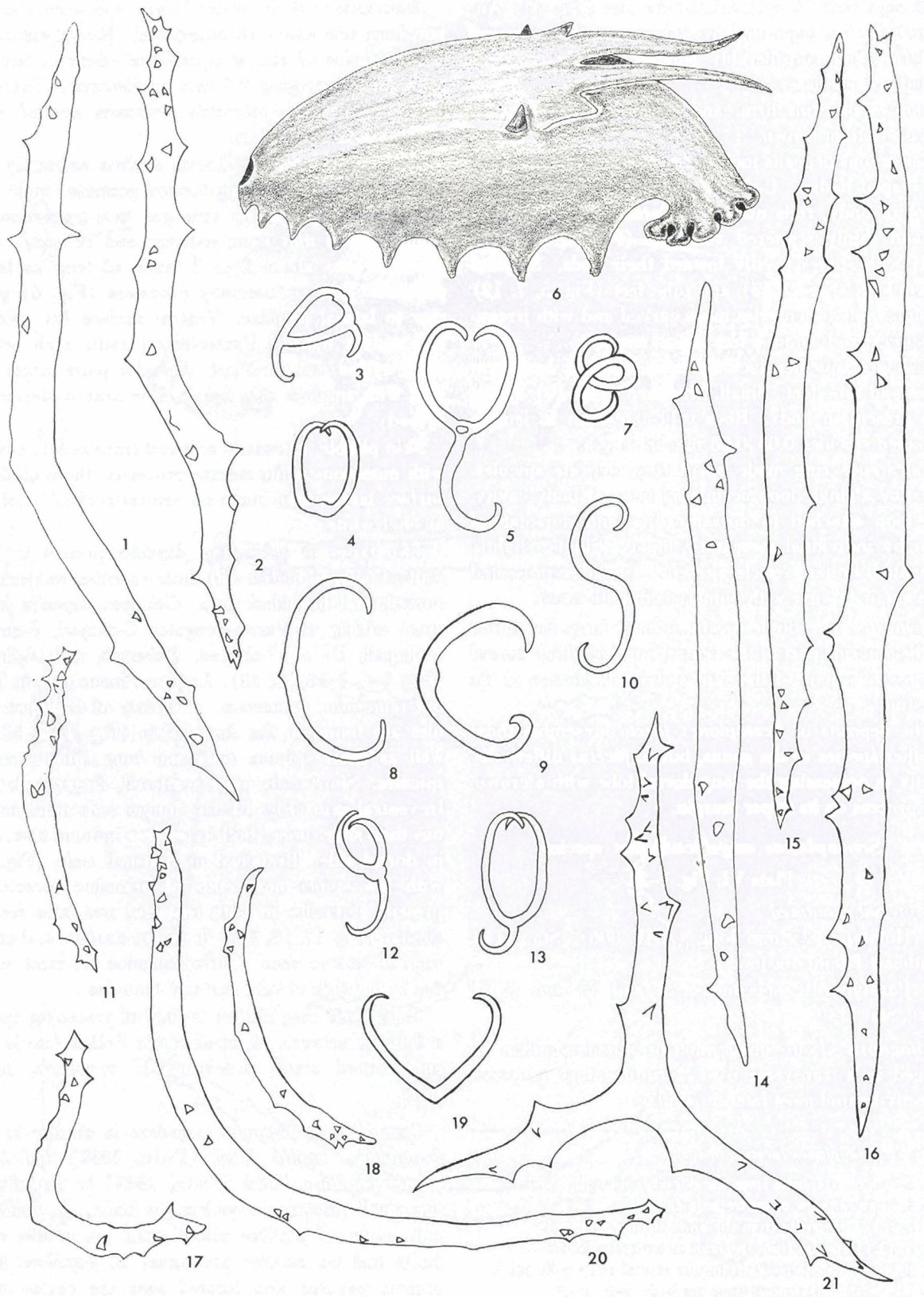
Anus posterodorsal. Dorsal surface extremely convex anteriorly, decreasing toward posterior end. Four dorsal papillae (Fig. 6) arranged in a transverse row about 4 to 6 mm from anterior end of body. Most anterior ones about 2 to 3 times as long as lateral papillae. Two rudimentary processes (Fig. 6) posterior to lateral papillae. Ventral surface flat, midventral radius naked. Ventrolateral radii each with 8 small cylindrical tube feet. Anterior pairs larger than rest, with smallest pair below anus near posterior end of body.

Skin pliable, extremely soft and translucent; covered with numerous white minute processes, those on dorsal surface larger than those on ventral surface. Color in alcohol white.

Two types of calcareous deposits present in body wall—C-shaped bodies with their varieties, and straight, curved, and branched rods. C-shaped deposits take a great variety of forms—regular C-shaped, S-shaped, Y-shaped, U- or V-shaped, E-shaped, and A-shaped (Fig. 3–5, 7–10, 12, 13). Last two forms rare in body, but remainder numerous. A variety of C-shaped spicules are found in the dorsal skin (Fig. 1, 2, 11), as well as short spinous rods and long spinous curved spicules. Short rods more scattered, larger rods rare. In ventral skin (Fig. 14–16) longer rods more numerous than short ones; both types less spinous than those in dorsal side. Branched or 3-armed rods (Fig. 21) with few spines near ends of branches occasionally present. Spicules in both tentacles and tube feet are similar (Fig. 17, 18, 20); there are straight and curved rods of various sizes. Curved spicules are most numerous in the ends of tube feet and tentacles.

Calcareous ring similar to that of preceding species, a delicate network. A small single Polian vesicle present. Gonad small, consisting of numerous, minute tufts.

*Remarks:* *Scotoplanes angelicus* is similar to both *Scotoplanes mollis* Théel [Théel, 1882] and *Scotoplanes papillosa* Théel [Théel, 1882] in deposits and the small processes covering the body. *S. mollis* has only 4 dorsal papillae placed near the middle of the body and no smaller processes; *S. papillosa* has 6 minute papillae also located near the center of the



body, with 4 indistinct ones appearing on upper margin of a small transverse bridge and another 2 posterior to base of this bridge. *S. angelicus* has 6 papillae on the anterior part of the body, 4 of them arranged in a transverse row, the center pair of which is very much longer than the lateral ones; posterior to lateral ones are 2 smaller ones. Both of Théel's species lack the great variation of the C-shaped spicules which are typical of the new species. In *S. mollis* the tentacles each possess 2 distinct rounded lobes on the ends, while in *S. angelicus* these lobes are lacking.

Genus *Elpidia* Théel, 1876

*Diagnosis:* Body oval or oblong. Ten tentacles. Dorsal surface with small individual papillae ranging from 6 to 16, usually distributed in pairs both anterior and posterior. Calcareous deposits composed of 4 straight or curved arms arising from a long, common central base. Usually 8 tube feet, 4 on each ventrolateral radius.

*Type-species:* *Elpidia glacialis* Théel.

*Remarks:* Although the type species was originally discovered in the Arctic region, it is now also known from the Pacific and Indian Oceans.

*Elpidia glacialis* Théel, 1876

Plate VII, Fig. 1-4

*Elpidia glacialis* Théel, 1876, pp. 1-30; 1882, pp. 18-19.—Danielssen and Koren, 1882, pp. 16-19, fig. 16-30.—Perrier, 1902, pp. 423-424.—Mortensen, 1932, pp. 41-43, pl. I, fig. 4-5.—Heding, 1940, pp. 370-371; 1942, pp. 16-17, fig. 16-17.—Hansen, 1956, pp. 34-38, fig. 1-6.

*Material examined:* 4 specimens, Sta. 413; 26 specimens, Sta. 698; 42 specimens, Sta. 913; 40 specimens, Sta. 1148.

*Description:* Specimens oblong, a little more than twice as long as broad. Mouth anterior subventral, surrounded by 10 small tentacles with circular ends provided with minute retractile processes. Anus posterodorsal. Dorsal surface convex with 3-6 pairs of papillae distributed on both anterior and posterior.

Plate VI. *Scotoplanes angelicus*, n. sp.

- Fig. 1, 2, 11. Deposits from the dorsal body wall,  $\times 13.3$ .  
 Fig. 3-5, 7-10, 12, 13, 19. Various types of C-shaped deposits from the body wall,  $\times 13.3$ .  
 Fig. 6. Lateral view of entire animal,  $\times 2.7$ .  
 Fig. 14-16. Deposits from the ventral body wall,  $\times 13.3$ .  
 Fig. 17, 18, 20. Deposits from the ends of both tentacles and tube feet,  $\times 13.3$ .  
 Fig. 21. Deposit from the body wall,  $\times 13.3$ .

Papillae about 2-5 mm long. Ventral surface flat, with 8 tube feet, 4 along each ventrolateral radius.

Skin of most specimens soft, in others slightly hard and rough, but always thin and transparent. Color in alcohol white. Calcareous ring composed of tiny spicules arranged in stellate (Fig. 2) form. Calcareous deposits as described by Théel [1876, 1882].

*Remarks:* Specimens of *Elpidia glacialis* have been collected from both shallow and deep waters. The Swedish expedition collected specimens of the genus from depths of 70 to 230 m in the Kara Sea, Arctic Ocean [Théel, 1876], the USNS *Eltanin* from depths of 1153-4850 m in Antarctic waters, and the *Galathæa* Expedition from depths of about 8940 m in the New Britain Trench [Hansen, 1956]. Although there is a difference in depths, extreme cold-water temperatures are somewhat similar. Bottom temperature ranges from 1.2° to 2.8°C in the deep sea trenches and from 1.0° to 1.5°C in the Norwegian and Kara Seas [Dr. Bent Hansen, personal communication], to between 0°C and 1°C where specimens were collected by the *Eltanin*.

The poor condition of most of the specimens and their limited number do not allow a complete study of geographical variation within the species. The intact specimens possess 3 pairs of dorsal papillae (Fig. 3), 1 pair on the middle and a pair each near the anterior and posterior ends of the body. These animals are similar to the single specimen taken between Australia and Antarctica by the *Challenger* Expedition [Théel, 1876 and 1882]. These specimens belong to *Elpidia glacialis glacialis*, based on Hansen's [1956] 5 geographical subspecies.

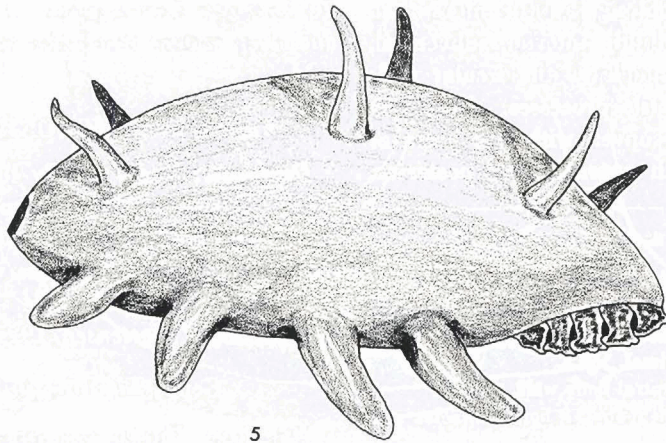
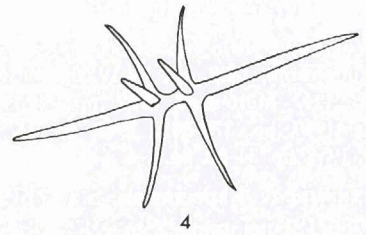
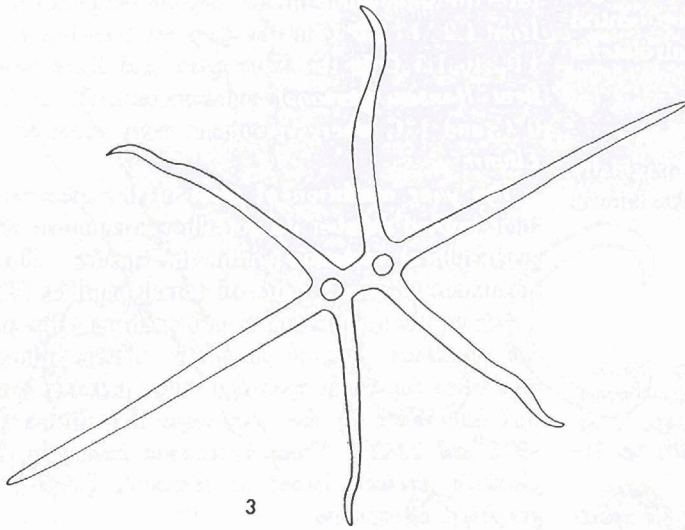
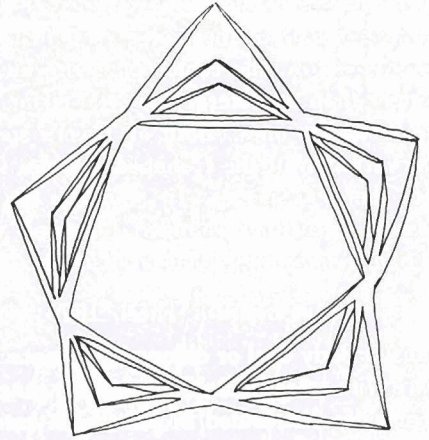
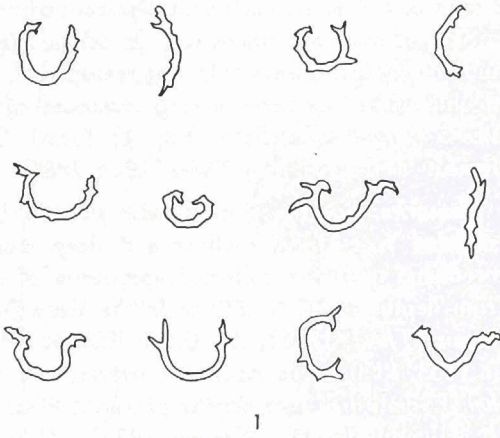
*Distribution:* *Elpidia glacialis* is known from waters of the Atlantic, Indian, and Pacific oceans to within the Antarctic Convergence. It is found in both shallow and deep waters where the temperature is commonly cold.

Family LAETMOGONIDAE Ekman, 1925

*Diagnosis:* Body usually long; more or less cylindrical. Elongated flexible papillae arranged along the dorsal radii. Midventral ambulacrum naked. Along ventrolateral radii numerous well developed tube feet. Calcareous deposits include various wheels and rods [Théel, 1882; Mortensen, 1927].

Genus *Laetmogone* Théel, 1882

*Diagnosis:* Fifteen non-retractile tentacles with large discs at ends. Long, flexible papillae arranged in a



single row (7-11) along each dorsal radius; each ventrolateral radius with a row (21-33) of well developed tube feet. Deposits composed of wheels and rods.

*Type-species: Laetmogone wyvillethomsoni* Théel.

***Laetmogone wyvillethomsoni* Théel, 1882**

Plate VIII, Fig. 1-11; Plate IX, Fig. 1-10

*Laetmogone wyvillethomsoni* Théel 1882, pp. 73-78, pl. XI, fig. 1; pl. XII, fig. 1-2; pl. XXXI, fig. 14-16; pl. XXXIV, fig. 1; pl. XXXVI, fig. 3; pl. XXXVII, fig. 5, 7, 11; pl. XXXVIII, fig. 9; pl. XXXIX, fig. 4; pl. XLII, fig. 1-2; pl. XLIII, fig. 4; pl. XLIV, fig. 14; pl. XLVI, fig. 2-3.

*Material examined:* 1 specimen, Sta. 356; 5 specimens, Sta. 474; 1 specimen, Sta. 991.

*Description:* Body cylindrical and elongated. Total length about 75-110 mm, width 20-30 mm. Mouth subventral, surrounded by moderately long, non-retractile tentacles with large, thick, distal discs, their surface naked. Anus terminal. Dorsal surface convex, with 7-18 long, flexible, non-retractile papillae distributed along each ambulacrum; their length varies. Midventral radius naked; ventrolateral radii with varying number of non-retractile tube feet; from 21 to 33 on each side. Table 1 shows degree of variation in number of dorsal papillae and tube feet.

Skin soft and thin. Color in alcohol light to dark violet.

Calcareous deposits include large and small wheels with 8-12 spokes and unbranched, straight and curved rods.

In both dorsal (Fig. 1-3, 5) and ventral (Fig. 8-9) surfaces wheels of great variation in size are abundant; diameter of wheels ranges from 0.04 to about 0.16 mm. The less numerous large ones usually have 8-10 spokes, while small ones have 11-12. Large central hole of wheels with 4-6 short curved rods projecting from its margin. Rods in dorsal skin (Fig. 4, 6) long and smooth, ventral ones (Fig. 10) short and broad. Smooth 3-armed bodies (Fig. 7) and X-shaped (Fig. 11) elements occasionally present in ventral skin. Deposits in tentacles (Fig. 1-5) include large and small slightly spinous straight, curved, or branched rods. Deposits in tube feet (Fig. 6, 8-10) similar to those in tentacles but smaller and less spinous. Smooth rods and small wheels occasionally present and also perforated plates (Fig. 7) in ends of tube feet.

TABLE 1. Degree of Variation in Certain Characters of *Laetmogone wyvillethomsoni* Théel

Station	No. of tube feet (ventral surface)		No. of dorsal papillae	
	Left side	Right side	Left side	Right side
356	23	23	8	8
474	31	33	18	16
	22	21	11	11
	24	25	7	7
	23	23	8	8
	24	27	7	8
991	25	25	7	8

Calcareous ring a delicate network. Polian vesicle long; gonad composed of 2 bundles with numerous small, slightly elongated caeca.

*Remarks:* Our specimens are considerably contracted and vary greatly from their live length.

*Distribution:* *Laetmogone wyvillethomsoni* is known from the Pacific and Indian Oceans. It is possible that this particular species will be found in the Atlantic Ocean too, since other species of the genus are known in the area.

Family DEIMATIDAE Théel, 1882

*Diagnosis:* Body more or less elongated. Tentacles 14-20. Tube feet distributed along ventral sides either in single or double rows. Long dorsal papillae arranged in 1 or more rows along each radius. Calcareous deposits include cross-shaped bodies, perforated plates, and branched spicules.

*Remarks:* Only 1 genus of the family occurs in the collections. Although the Deimatidae are considered to be cosmopolitan, none have been discovered in the New Zealand region [Pawson, 1965].

Genus ***Oneiropanta*** Théel, 1882

*Diagnosis:* Body elongated; 20 large tentacles. Tube feet in double rows along ventrolateral radii; midventral radius sometimes with few rudimentary tube feet. Dorsal papillae in a single row, usually large and small, both along ventral sides of body and on each dorsal ambulacrum. Calcareous deposits include perforated plates and branched spicules.

*Type-species: Oneiropanta mutabilis* Théel.

***Oneiropanta mutabilis* Théel, 1882**

Plate X, Fig. 1-7

*Oneiropanta mutabilis* Théel, 1882, pp. 62-68, pl. XXI, fig. 2; pl. XXII, fig. 1-3; pl. XXXI, fig. 1-3.—Ludwig, 1894, pp. 70-

Plate VII. *Elpidia glacialis* Théel

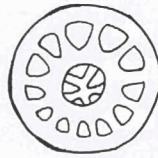
Fig. 1. Calcareous ring,  $\times 1.7$ .

Fig. 2, 3. Deposits from the body wall,  $\times 1.7$ .

Fig. 4. Lateral view of entire animal,  $\times 2.7$ .



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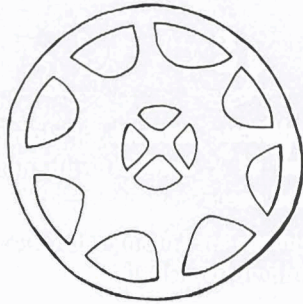
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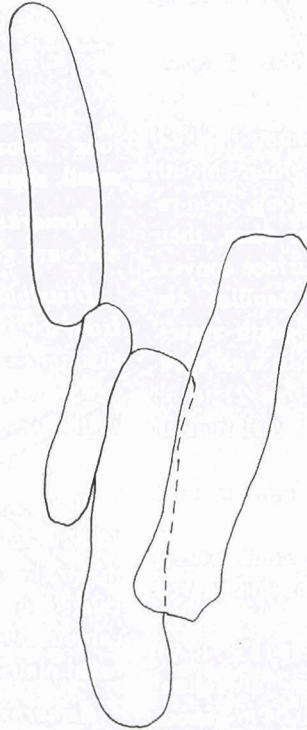
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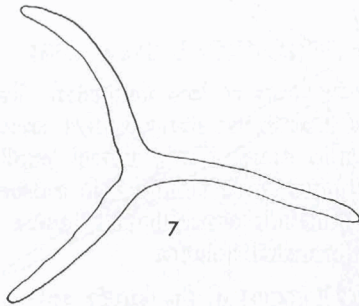
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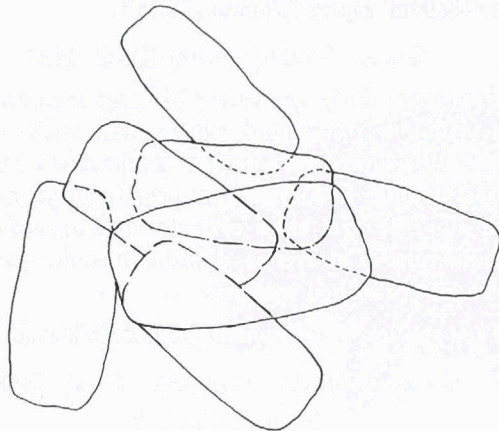
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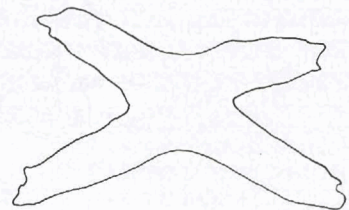
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10



11

72, pl. VII, fig. 5.—Herouard, 1923, pp. 39-40, pl. IV, fig. 10; pl. V, fig. 2-4.—Perrier, 1902, pp. 374-380, pl. XVIII, fig. 10-15.—Clark, 1920, pp. 136-137.—Ekman, 1927, pp. 364-366, fig. 1-2.

*Material examined:* 3 specimens, Sta. 474; 1 specimen, Sta. 614; 4 specimens, Sta. 722; 1 specimen, Sta. 791; 1 specimen, Sta. 913; 2 specimens, Sta. 948; 10 specimens, Sta. 991; 1 specimen, Sta. 1063; 2 specimens, Sta. 1127; 1 specimen, Sta. 1135; 1 specimen, Sta. 1154; 2 specimens, Sta. 1158; 1 specimen, Sta. 1179; 2 specimens, Sta. 1192; 1 specimen, Sta. 1292.

*Description:* Largest specimen 160 mm long and about 60 mm broad; smallest specimen about 40 mm long and 10 mm broad. Mouth anteroventral, surrounded by 20 unequal tentacles, their ends usually with 8 distinct processes around margins. Anus subventral. Tube feet distributed on both ventral ambulacra and dorsal ambulacra with each side varying in number as shown in Table 2. Papillae vary from 2 mm to about 50 mm in length and have no order of distribution in relation to size, although smaller ones more common on dorsal ambulacra. Tube feet, like dorsal papillae, also vary greatly in number: from 9 on each side of ventral surface to about 36. Midventral radius usually with very few small tube feet. These tube feet more pronounced toward ends of ventral surface; sometimes in single row, sometimes irregularly distributed.

Color in alcohol usually from light brown to white, others dark brown. Skin rough to brittle, slightly thin to transparent.

Dorsal and ventral calcareous deposits include irregular perforated circular plates (Fig. 1-2, 4) of varying size and spinous 4-armed spicules (Fig. 6-7) with or without perforated ends. Deposits at ends of tentacles and tube feet of variable length, straight or slightly curved rods with their distal ends either perforated or branched (Fig. 3, 5).

Polian vesicle about half as long as body cavity. Gonad 2 small fascicles made up of numerous unbranched small caeca. Intestine a long single loop occupying almost entire length of body. Calcareous ring 5 radial and interradial fragile spicules.

*Remarks:* The author agrees with *Deichmann* [1930]

Plate VIII. *Laetmogone wyvillethomsoni* Théel

Fig. 1-3, 5. Large and small wheels from the dorsal body wall,  $\times 13.3$ .

Fig. 4, 6. Deposits from the dorsal body wall,  $\times 6.7$ .

Fig. 7. Deposit from the ventral body wall,  $\times 6.7$ .

Fig. 8, 9. Wheels from the ventral body wall,  $\times 13.3$ .

Fig. 10, 11. Deposits from the ventral body wall,  $\times 6.7$ .

TABLE 2. Degree of Variation in Certain Characters of *Oneirophanta mutabilis* Théel

Station	Length of body, mm	No. of tube feet (ventral surface)		No. of dorsal papillae	
		Left side	Right side	Left side	Right side
474	110	26	24	25	22
	140	30	32	29	28
	120	26	30	37	32
614	130	23	23	30	30
	722	150	23	25	31
	140	20	20	28	25
	170	36	37	25	18
	120		24	20	20
791	85	24	17	8	10
913	95	19	17	9	10
	35	..... Damaged.....			
948	85	12	12	16	16
	60	17	17	10	8
991	100	29	29	19	19
	100	27	26	24	24
	120	33	30	20	20
	100	29	29	30	32
	120	26	24	27	27
	85	25	27	30	30
	150	27	28	27	26
	70	26	24	18	19
	80	27	27	22	23
	90	19	19	30	31
75	..... Damaged.....		17	17	
35	9	9	8	9	
1063	95	..... Damaged.....			
1127	110	29	18	17	16
	95	..... Damaged.....			
1135	125	19	19	8	11
1154	110	18	19	..... Damaged.....	
1158	110	18	20	8	8
	95	26	30	8	8
1179	80	18	18	15	17
1192	70	..... Damaged.....		8	10
	75	19	19	14	14
1292	120	19	19	19	18

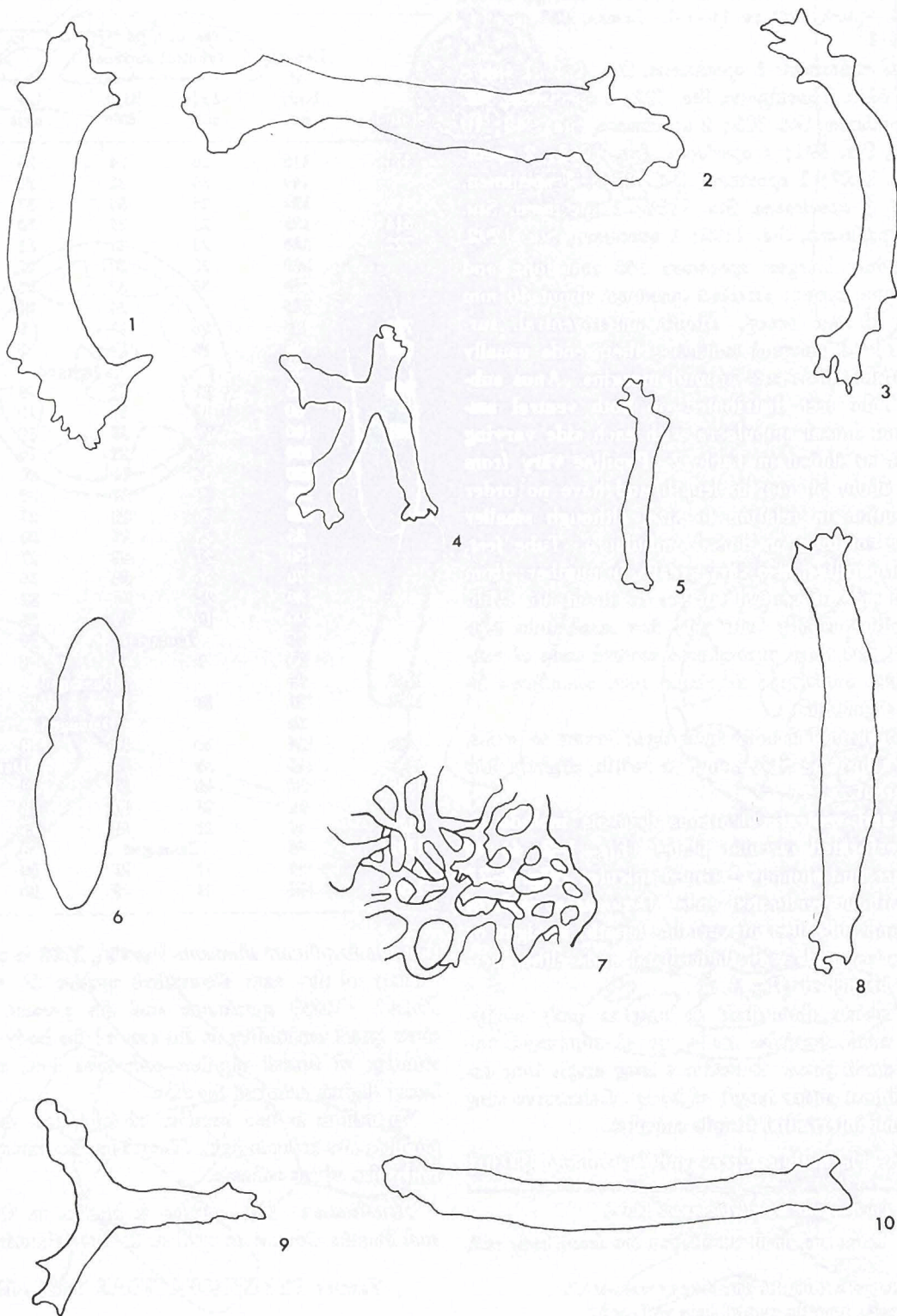
that *Oneirophanta alternata* Perrier, 1902 is possibly a variety of the very diversified species *O. mutabilis*. Théel's [1882] specimens and the present material show great variability in the size of the body, size and number of dorsal papillae and tube feet, and, to a lesser degree, color of the skin.

Variations in the number of tube feet and dorsal papillae are independent. They have no relation to the body size of the animals.

*Distribution:* This species is known in the Indian and Pacific Oceans as well as in the Atlantic Ocean.

Family PSYCHROPOTIDAE Théel, 1882

*Diagnosis:* Body elongate, anterior part of dorsal surface depressed; often large posterior appendage



present. Tentacles 10–20. Ventrolateral radii each with a single row of many small tube feet. Dorsal surface either naked or provided with small processes. Calcareous deposits usually 4-armed spicules with arms projecting inward with a single central process projecting outward. Calcareous ring incomplete and with 5 independent parts [Théel, 1882; Ekman, 1925].

*Remarks:* This family is represented by 4 genera of which one, *Psychropotes*, is in the *Eltanin* collection.

#### Genus *Psychropotes* Théel, 1882

*Diagnosis:* Anterior part of dorsal surface depressed or flat, increasing in height posteriorly. Near posterior end of dorsal surface a large tail-like prolongation. Both mouth and anus ventral. Tentacles 10–18. Small tube feet in double row along midventral radius and larger tube feet in a single row along ventrolateral radii. Deposits include cross-shaped spicules of variable size.

*Type-species:* *Psychropotes longicauda* Théel.

#### *Psychropotes longicauda* Théel, 1882

Plate XI, Fig. 1–7

*Psychropotes longicauda* Théel, 1882, pp. 96–98, pl. XXVII, fig. 1; pl. XXVIII, fig. 1–2; pl. XXXV, fig. 13–17; pl. XXXVII, fig. 10.

*Psychropotes longicauda* var. *monstrosa* Théel, 1882, pp. 98–99, pl. XXIX, fig. 2; pl. XXX, fig. 1; pl. XXXIX, fig. 1.

*Psychropotes longicauda* var. *fuscopurpurea* Théel, 1882, p. 99, pl. XXIX, fig. 1; pl. XXXV, fig. 11.

*Material examined:* 2 specimens, Sta. 469; 3 specimens, Sta. 474; 1 specimen, Sta. 484; 1 specimen, Sta. 514; 1 specimen, Sta. 723; 4 specimens, Sta. 913; 1 specimen, Sta. 1018; 1 specimen, Sta. 1063.

*Description:* Body elongate, broadest anteriorly. Total length (including posterodorsal appendage) 140–315 mm, breadth near anterior end 30–85 mm. Mouth anteroventral; anus posteroventral. Tentacles 18, short and almost equal in size, their large terminal discs thick and leathery with variable number of retractile processes located around margin. Anteriorly, dorsal surface depressed. One specimen with 14 rudimentary processes, 7 on each ambulacrum, remainder with 8–10 processes, 4–5 on each ambulacrum. Posteriorly, dorsal surface convex especially at base of extremely

large, single, tail-like prolongation located near end of body (Fig. 3). Distal extremity of appendage either pointed or with 2 small processes, one larger than the other. Length of appendage 10 mm in smallest animal and 120 mm in largest animal. Base of appendage rounded, 5–43 mm in diameter. Midventral radius with numerous, minute, round, retractile processes distributed in double row. On margin of brim surrounding both anterior and posterior ends of ventral surface, small retractile tube feet arranged in a single row with anterior ones numbering 45–95, which communicate with dorsal ambulacra having 15–36.

Skin of some specimens soft and pliable; color in alcohol brown or dark violet.

Calcareous deposits include large and small spinous cross-shaped bodies and straight, curved rods. Elements in dorsal skin (Fig. 2, 4, 6) larger, with arms slightly curved downward, carrying strong, short spines. These deposits thinly distributed in outer layer of skin while inner layer carries spicules (Fig. 1) with long and slender spinous arms. Elements in ventral skin (Fig. 5–7) similar to those in dorsal side but smaller and more thickly distributed. In tentacles and tube feet, deposits include straight, long and short, curved rods.

Calcareous ring incomplete. A very long cylindrical Polian vesicle present. Gonad consisting of 2 long, broad tubes; each tube carries small number of large, oblong tufts on posterior portion.

*Remarks:* The very long posterodorsal appendage is typical of the species. Because of the extreme individual variation in *Psychropotes longicauda*, the varieties *monstrosa* and *fuscopurpurea*, both of Théel [1882], are regarded here as identical with the typical form.

*Distribution:* *Psychropotes longicauda* is known from the Pacific and Indian oceans.

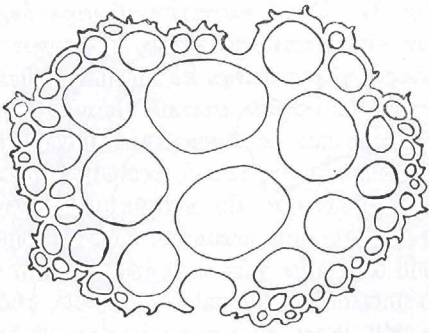
*Acknowledgments.* I am grateful to Dr. Jay M. Savage, University of Southern California, for access to *Eltanin* collections. I wish to thank and express my deep appreciation to Dr. Bent Hansen, Zoological Museum, Copenhagen, Denmark, and especially Dr. David L. Pawson, Curator of Echinoderms in the U. S. National Museum, who guided me in the preparation and organization of this paper. Thanks are due also to Dr. Thomas Hopkins, University of Southern California, to Dr. David K. Caldwell, Los Angeles County Museum of Natural History, and to Mr. Stephen Geiger and Mrs. Melba C. Caldwell for their help and advice. Mr. Henry Genthe kindly helped in the preparation of the drawings and Mrs. Naomi Zinkow gave technical assistance and typed the manuscript. Laboratory facilities were provided by Department of Biological Science and Allan Hancock Foundation, University of Southern California.

Plate IX. *Laetmogone wyvillethomsoni* Théel

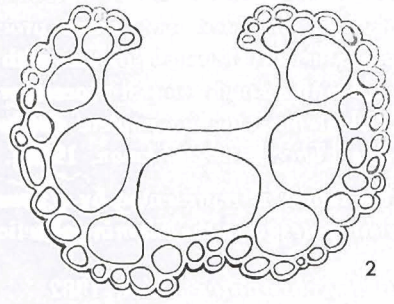
Fig. 1–5. Deposits from the ends of tentacles,  $\times 6.7$ .

Fig. 6, 8–10. Deposits from the ends of tube feet,  $\times 6.7$ .

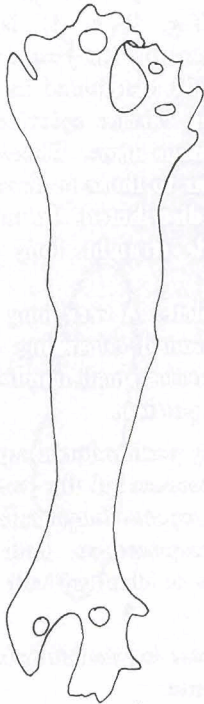
Fig. 7. Perforated plate from the ends of tube feet,  $\times 6.7$ .



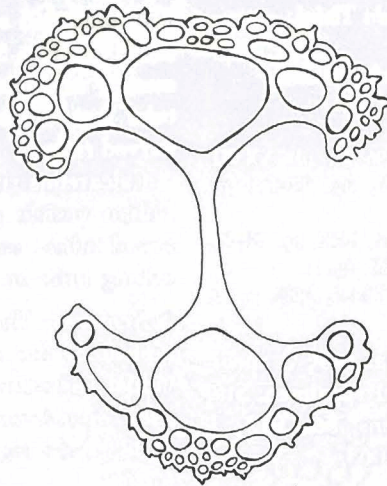
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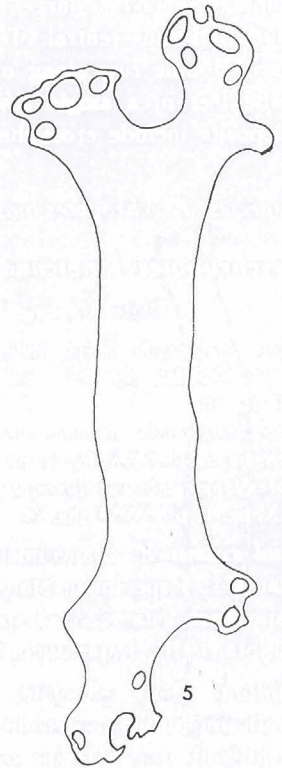
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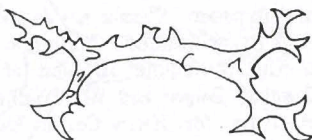
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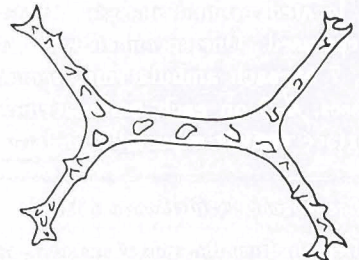
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Work was supported by the National Science Foundation (G 19497).

## STATION LIST

List of *Eltanin* Stations, Cruises 4-15, 1962-64, and species collected<sup>2</sup>:

- Sta. 136; Lat. 62°40'S, Long. 64°06'W; Lat. 62°37'S, Long. 63°57'W; Aug. 6, 1962, 3715-3752 m. *Scotoplanes globosa*.
- Sta. 356; Lat. 56°14'S, Long. 58°43'W; Lat. 56°15'S, Long. 58°27'W; Dec. 6, 1962; 4136-3678 m. *Laetmogone wyville-thomsoni*.
- Sta. 413; Lat. 62°07'S, Long. 55°58'W; Lat. 62°08'S, Long. 56°05'W; Jan. 1, 1963, 1113-ca.1153 m. *Elpidia glacialis*, *Scotoplanes globosa*.
- Sta. 428; Lat. 62°41'S, Long. 57°51'W; Lat. 62°39'S, Long. 57°46'W; Jan. 5, 1963, 662-1120 m. *Scotoplanes globosa*.
- Sta. 469; Lat. 55°02'S, Long. 44°21'W; Lat. 55°11'S, Long. 44°23'W; Feb. 12, 1963; 3623-3714 m. *Psychropotes longicauda*.
- Sta. 474; Lat. 55°56'S, Long. 44°43'W; Lat. 56°25'S, Long. 44°52'W; Feb. 13-14, 1963; 3486-3537 m. *Laetmogone wyvillethomsoni*, *Oneirophanta mutabilis*, *Peniagone incondita*, *Psychropotes longicauda*, *Scotoplanes globosa*.
- Sta. 484; Lat. 58°44'S, Long. 44°36'W; Lat. 58°54'S, Long. 44°31'W; Feb. 16-17, 1963; 952 (2498-1394) m. *Psychropotes longicauda*.
- Sta. 487; Lat. 60°09'S, Long. 45°05'W; Lat. 60°08'S, Long. 45°07'W; Feb. 17, 1963; 5289-5289 m. *Scotoplanes globosa*.
- Sta. 489; Lat. 60°03'S, Long. 45°25'W; Lat. 60°01'S, Long. 45°18'W; Feb. 18, 1963; 5259-5274 m. *Scotoplanes globosa*.
- Sta. 514; Lat. 63°21'S, Long. 44°51'W; Lat. 63°28'S, Long. 44°57'W; Feb. 24, 1963; 3587-3660 m. *Psychropotes longicauda*, *Scotoplanes globosa*.
- Sta. 529; Lat. 63°03'S, Long. 49°11'W; Lat. 63°00'S, Long. 49°20'W; Mar. 3-4, 1963, 2653-2941 m. *Scotoplanes globosa*.
- Sta. 534; Lat. 61°08'S, Long. 48°42'W; Lat. 61°01'S, Long. 48°26'W; Mar. 5, 1963; 2540-2580 m. *Scotoplanes globosa*.
- Sta. 591; Lat. 55°07'S, Long. 25°29'W; Lat. 55°10'S, Long. 25°55'W; Apr. 29, 1963; 5435-5453 m. *Peniagone incondita*.
- Sta. 614; Lat. 61°05'S, Long. 26°02'W; Lat. 61°04'S, Long. 26°03'W; May 10, 1963; 3770-3633 m. *Oneirophanta mutabilis*.
- Sta. 698; Lat. 58°02'S, Long. 37°57'W; Lat. 58°04'S, Long. 37°51'W; Aug. 30, 1963; 3197-3239 m. *Elpidia glacialis*.
- Sta. 722; Lat. 56°04'S, Long. 33°59'W; Lat. 56°00'S, Long. 33°57'W; Sept. 8, 1963, 3138-3239 m. *Oneirophanta mutabilis*.
- Sta. 723; Lat. 54°00'S, Long. 33°40'W; Lat. 54°05'S, Long. 33°43'W; Sept. 9, 1963; 2663-2718 m. *Psychropotes longicauda*.
- Sta. 791; Lat. 63°54'S, Long. 83°03'W; Lat. 63°54'S, Long. 82°49'W; Oct. 25, 1963; 4531 m. *Oneirophanta mutabilis*.
- Sta. 853; Lat. 64°03'S, Long. 79°15'W; Lat. 63°58'S, Long. 79°16'W; Nov. 16, 1963; 4264-4264 m. *Scotoplanes globosa*.
- Sta. 913; Lat. 65°48'S, Long. 115°00'W; Lat. 65°39'S, Long. 114°55'W; Jan. 13, 1964; 4773-4763 m. *Elpidia glacialis*, *Oneirophanta mutabilis*, *Peniagone incondita*, *Psychropotes longicauda*, *Scotoplanes globosa*.
- Sta. 942; Lat. 69°24'S, Long. 95°12'W; Lat. 69°17'S, Long. 94°50'W; Jan. 24, 1964; 4227-4149 m. *Peniagone lacinora*.
- Sta. 948; Lat. 65°50'S, Long. 88°56'W; Lat. 65°47'S, Long. 88°48'W; Jan. 28, 1964, 4502 m. *Oneirophanta mutabilis*.
- Sta. 991; Lat. 60°57'S, Long. 56°52'W; Lat. 60°54'S, Long. 56°58'W; Mar. 13, 1964, 2672-3020 m. *Laetmogone wyvillethomsoni*, *Oneirophanta mutabilis*, *Scotoplanes globosa*.
- Sta. 995; Lat. 61°57'S, Long. 55°53'W; Lat. 61°53'S, Long. 55°47'W; Mar. 14, 1964, 2119-2562 m. *Scotoplanes globosa*.
- Sta. 1014; Lat. 65°08'S, Long. 47°45'W; Lat. 65°01'S, Long. 48°16'W; Mar. 19, 1964; 1025-1153 m. *Scotoplanes globosa*.
- Sta. 1018; Lat. 64°07'S, Long. 40°48'W; Lat. 64°09'S, Long. 41°00'W; Mar. 21, 1964, 4465-4557 m. *Peniagone lacinora*, *Psychropotes longicauda*, *Scotoplanes globosa*.
- Sta. 1063; Lat. 61°38'S, Long. 34°35'W; Lat. 61°31'S, Long. 34°44'W; Apr. 6-7, 1964, 3495-3514 m. *Oneirophanta mutabilis*, *Psychropotes longicauda*.
- Sta. 1070; Lat. 59°08'S, Long. 36°57'W; Lat. 59°01'S, Long. 36°50'W; Apr. 9-10, 1964, 2815-2818 m. *Scotoplanes globosa*.
- Sta. 1078; Lat. 61°27'S, Long. 41°55'W; Lat. 61°26'S, Long. 41°55'W; Apr. 12, 1964, 604 m. *Scotoplanes globosa*.
- Sta. 1079; Lat. 61°26'S, Long. 41°55'W; Lat. 61°24'S, Long. 41°55'W; Apr. 13, 1964, 593-598 m. *Scotoplanes globosa*.
- Sta. 1127; Lat. 66°22'S, Long. 90°16'W; Lat. 66°21'S, Long. 89°52'W; June 4-5, 1964; 4429-4410 m. *Oneirophanta mutabilis*, *Scotoplanes globosa*.
- Sta. 1135; Lat. 66°17'S, Long. 98°26'W; Lat. 66°19'S, Long. 98°38'W; June 9, 1964, 4630 m at start. *Oneirophanta mutabilis*, *Peniagone lacinora*, *Scotoplanes globosa*.
- Sta. 1140; Lat. 66°11'S, Long. 102°28'W; Lat. 66°14'S, Long. 102°36'W; June 10, 1964; 4731-4731 m. *Scotoplanes angelicus*.
- Sta. 1145; Lat. 65°51'S, Long. 112°23'W; Lat. 65°56'S, Long. 112°30'W; June 14, 1964; 4789 m at start. *Peniagone lacinora*, *Scotoplanes facetus*.
- Sta. 1146; Lat. 65°56'S, Long. 112°30'W; Lat. 65°54'S, Long. 112°56'W; June 14, 1964, 4789-4795 m. *Peniagone lacinora*, *Scotoplanes globosa*.
- Sta. 1148; Lat. 65°14'S, Long. 117°30'W; Lat. 65°25'S, Long. 117°29'W; June 15, 1964; 4850-4840 m. *Elpidia glacialis*, *Peniagone incondita*, *Scotoplanes globosa*.
- Sta. 1150; Lat. 65°37'S, Long. 121°06'W; Lat. 65°37'S, Long.

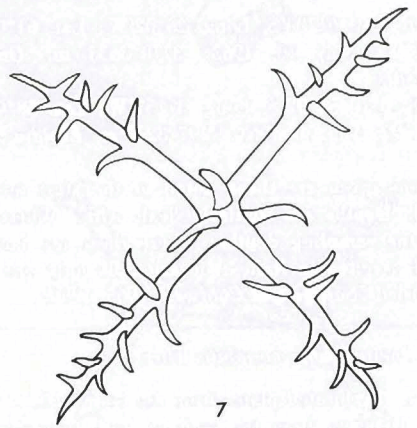
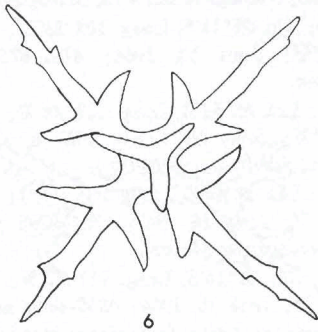
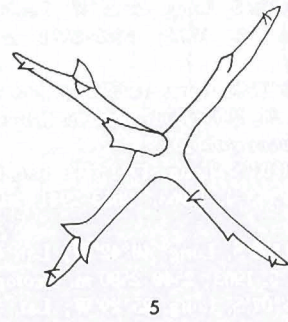
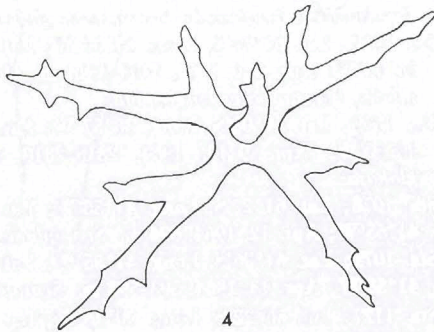
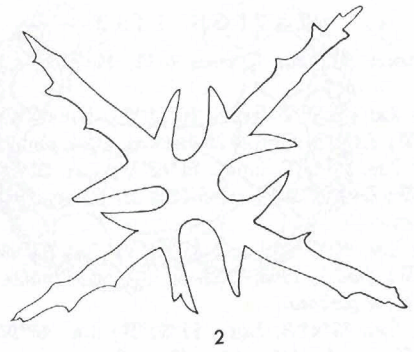
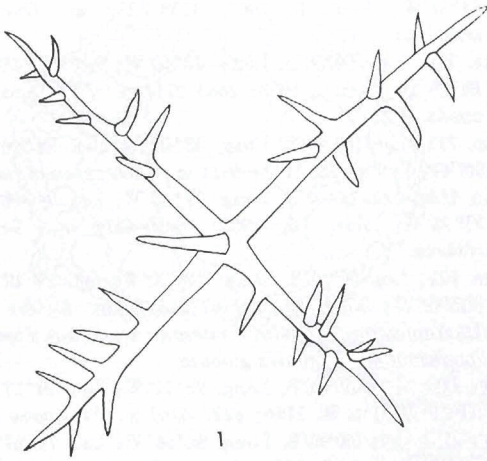
<sup>2</sup> Positions given are those noted at the start and finish of each haul. Depths are similarly dealt with. Where available, they are the sampling depths; where these are lacking, position depth is cited in italics; occasionally only one depth has been recorded [Savage and Caldwell, 1965, 1966].

Plate X. *Oneirophanta mutabilis* Théel

Fig. 1, 2, 4. Perforated plates from the body wall,  $\times 3.3$ .

Fig. 3, 5. Deposits from the ends of both tentacles and tube feet,  $\times 6.7$ .

Fig. 6, 7. Deposits from the body wall,  $\times 3.3$ .



- 120°37'W; June 17, 1964; 4758–4804 m. *Peniagone lacinora*, *Scotoplanes globosa*.  
 Sta. 1154; Lat. 65°37'S, Long. 123°55'W; Lat. 65°32'S, Long. 123°20'W; June 18, 1964; 4709 m at start. *Oneirophanta mutabilis*.  
 Sta. 1158; Lat. 64°15'S, Long. 130°13'W; Lat. 64°19'S, Long. 130°05'W; June 22, 1964, 4575–4813 m. *Oneirophanta mutabilis*.  
 Sta. 1179; Lat. 50°07'S, Long. 159°24'W; Lat. 50°07'S, Long. 159°24'W; Aug. 2, 1964; surface. *Oneirophanta mutabilis*.  
 Sta. 1192; Lat. 54°55'S, Long. 159°52'W; Lat. 54°47'S, Long. 159°50'W; Aug. 6, 1964, 4187–4209 m. *Oneirophanta mutabilis*.  
 Sta. 1292; Lat. 61°02'S, Long. 95°02'W; Lat. 60°59'S, Long. 94°54'W; Oct. 11, 1964; 4941–4941 m. *Oneirophanta mutabilis*.

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Plate XI. *Psychropotes longicauda* Théel

Fig. 1, 2, 4, 6. Deposits from the dorsal body wall,  $\times 6.7$ .

Fig. 3. Lateral of entire animal,  $\frac{1}{2}$  natural size.

Fig. 5, 7. Deposits from the ventral body wall,  $\times 6.7$ .