TWO NEW SPECIES OF OPHIDIASTERID SEA-STARS FROM THE VICINITY OF DIAOYUDAO, EAST CHINA SEA*

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Abstract

Two new species of the asteroid family Ophidiasteridae are described from two specimens collected by commercial fishery vessels of Qingdao from the vicinity of Diaoyudao (25°45′ N, 123°15′ E), East China Sea. *Hacelia tuberculata* sp. nov. shows affinities with *H. tyloplax* (H. L. Clark, 1914) and *Linckia gracilis* sp. nov. is related to *L. laevigata* (Linnaeus).

INTRODUCTION

Two specimens of sea-star collected by commercial fishery vessels of Qingdao, from the vicinity of Diaoyudao (25°45′ N, 123°15′ E), East China Sea, were forwarded to me by the Marine Products Museum of Qingdao for study. It is surprising that these two specimens happen to represent two new species of the family Ophidiasteridae. The descriptions of new species are given below.

SYSTEMATIC DESCRIPTION

Family OPHIDIASTERIDAE Verrill, 1869

Hacelia tuberculata sp. nov. (Pl. I; Fig. 1)

Holotype IOAS-E00974, from the vicinity of Diaoyudao (25°45′ N, 123°15′ E), East China Sea, dredged from about 100—200 m, sand bottom, April 21, 1980.

Description Rays 5, one is regenerating. R = 80—84 mm; r = 17—18 mm; br at the base = 16—18 mm; at half R = 14 mm; at 10 mm from the tip = 8 mm; at the very tip = 5 mm; R = 4.4—5 r. Vertical diameter of disk about 13 mm.

Disk somewhat large and elevated. Rays wide and somewhat trigonal at base, tapering to a blunt point. Abactinal plates arranged in regular longitudinal series; primary, carinal, abactinolateral, superomarginal and inferomarginal plates distinct, connected transversely to adjacent row of plates by small, irregular secondary plates.

Central-dorsal oval, 3.6×3 mm, distinctly convex. Five inner radial plates low, round

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or trigonal, maximum diameter = 2.6 mm, spaced from each other and from central-dorsal plate by papular areas. Five interradial plates more or less pentagonal, about 4.5 mm across; one interradial plate carries madreporite. First carinal plate (i.e., outer radial) also pentagonal, about 5 mm across, distinctly convex.

Carinal plates number 27 to 30 in each series, made up of alternating larger, swollen and smaller flatter plates, the alternation not perfect, distal seven or eight plates small and contiguous. Nearly all larger plates have an extensive central naked area and swollen into rounded or blunt-topped knobs, 3—4 mm in diameter and 1.5—1.8 mm in height. Abactinolateral plate number about 30 in each series, small and low, their surface covered by granules, only a few of which are naked.

Superomarginals 27 to 28 on each side of a ray, more or less convex or swollen, but never to the same extent as the carinals. Proximal superomarginal plates somewhat tetragonal, 3.5—3.8 mm in transverse diameter. Nearly all superomarginal plates have a central naked area. Inferomarginals of about same number but less distinctly knobbed; majority covered with granules, with only several distal ones bare.

Whole abactinal surface, except madreporite, swollen carinals, superomarginals and terminal plates, covered by a very close, hexagonal granulation, about 60 to a square millimeter, coarser around the papulae and at the center of each plate. Papular areas in 10 series on each ray, nearly circular, 3 to 4 mm across, markedly depressed, with 12 to 30 papulae. Madreporite circular, 4.5 mm in diameter. A few of the proximal abactinolateral and superomarginal plates carry a small alveolar pedicellaria, the alveolae of pedicellariae found on the abactinolateral plates narrow and straight (Fig. 1, a), that on the superomarginal plates strongly curved and forming a semi-circle (Fig. 1, b).

Actinal plates in three series: the outer series of 13—16 plates extending to the sixth inferomarginal plate, the mid series of 34—36 plates extending to the seventeenth inferomarginal plate, the inner series of 58—60 plates adjoining the adambulacral plates very long, reaching nearly to the arm tip. Whole actinal surface covered with hexagonal granules slightly coarser

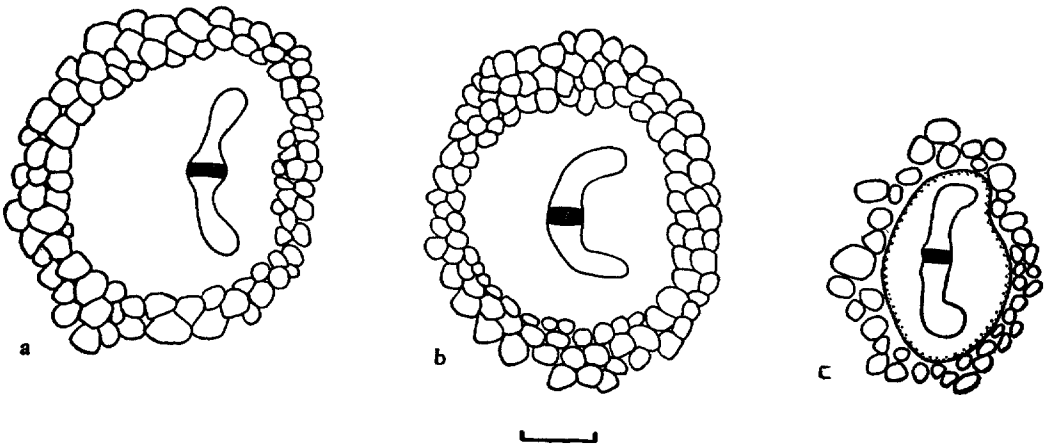

Fig. 1 Pedicellariae of *Hacelia tuberculata* sp. nov.
a. From an abactinolateral plate; b. From a superomarginal plate;
c. From an actinal plate adjacent to adambulacrals. The scale equals 0.5 mm.

than those on the abactinal surface. Two series of papular areas on the actinal surface clearly evident, inner series adjoining adambulacrals with 12—14 papular areas, 2—12 papulae; outer series with 14—20 papular areas, 2—24 papulae. No papulae on the actinal interradial areas.

Adambulacral plates small; armature typically Hacelian; each plate with two short, thick, and blunt furrow spines of unequal width, adoral slightly wider. Each plate with a large tubercle-like and very regular subambulacral spine, proximally about 2 mm long, 1 mm wide. A few pedicellariae on the proximal actinal plates and adjacent to the subambulacral spines, attached to an elliptical base above the surface of the actinal plate (Fig. 1, c). Armature of oral plates similar and equal to that of two adambulacrals.

Colour in formalin is light yellowish, with very faint reddish blotches on the upper surface.

Remarks This sea-star is another addition to the genus *Hacelia*, established by Ludwig in 1897, which up to now includes five species, namely *H. attenuata* Gray, 1840 from the Mediterranean, *H. capensis* Mortensen, 1925 from southern Africa, *H. inarmata* (Koehler, 1895) from the East Indies, *H. superba* H. L. Clark, 1921 from the West Indies and *H. tyloplax* (H. L. Clark, 1914) from western Australia. This new species is very close to *H. tyloplax* in general appearance, but differs from it in having more regularly arranged abactinal plates, swollen carinal and superomarginal plates with an extensive central naked area, and in having pedicellariae.

Linckia gracilis sp. nov. (Pl. II; Fig. 2)

Holotype IOAS-E00975, from the vicinity of Diaoyudao (25°45′ N, 123°15′ E), East China Sea, dredged from about 100—200 m, sand bottom, April 21, 1980.

Description Rays 5, unequal in length. R = 65—100 mm; r = 9—12 mm; br at the base = 8—11 mm; at one third of R = 13 mm and at the very tip = 3 mm. R = 5.4—11 r.

Disk small, more or less elevated. Rays long, slender and cylindrical, at the base slightly constricted, at one third of R distinctly widened, beyond the wide part tapering to a point. Abactinal plates irregularly arranged, but at the base of rays more or less in five longitudinal series. Where the ray begins to widen, the plates become irregularly arranged. Entire surface covered by minute polygonal granules, about 100 to a square millimeter; the granules around the papular areas are smaller than those near center of plates. Papular areas irregularly distributed among the abactinal plates; each area with 4—12 papulae. Madreporite single, tetragonal, 2.6 mm in transverse diameter. No pedicellariae anywhere.

Superomarginals distinct, squarish or rectangular, arranged in regular series, in three fully-grown rays the number of superomarginals is about 60 on each side of a ray. Above the superomarginals there is a somewhat regular row of plates which may be referred to as abactinolateral plates. Inferomarginals correspond in number and position with superomarginals. Intermarginal papular areas well-developed, arranged in longitudinal series, extending nearly to the tip of ray.

Actinal plates in four series on each side, only the first series adjacent to adambulacrals extends nearly to the tip of ray. No actinal papulae areas. Actinal plates covered with polygonal granules, gradually increasing in size toward the furrow.

Adambulacral plates small; armature typical Linckian; each plate bears two short furrow spines, inserted into the furrow so that only their tips emerge on the ventral surface backed by fine granulation in which the usually single very short almost granuliform subambulacral spines are isolated (Fig. 2, a). There are three or four scale-like granules sandwiched between each pair of furrow spines (Fig. 2, b). Colour in formalin is reddish above and white below.

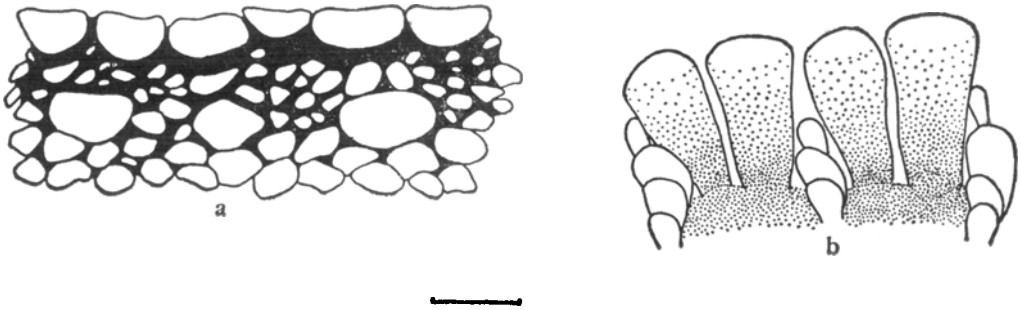

Fig. 2 Adambulacral armament of *Linckia gracilis* sp. nov.
a. From the actinal surface; b. From the furrow surface. The scale equals 0.5 mm.

Remarks The genus *Linckia* is a very conspicuous and common component of the reef fauna and very few species are known outside the reef areas. The present specimen was dredged from about 100—200 m, its armature of adambulacral plate is similar to that of *L. laevigata*, which is one of the very common species in reef areas. But in other respects they are totally different. *L. gracilis* differs from *L. laevigata* in having 1) slender rays, more regularly arranged abactinal plates on the basal part of ray, 2) a distinct series of abactinolateral plates, 3) fewer granules sandwiched between each pair of furrow spines.

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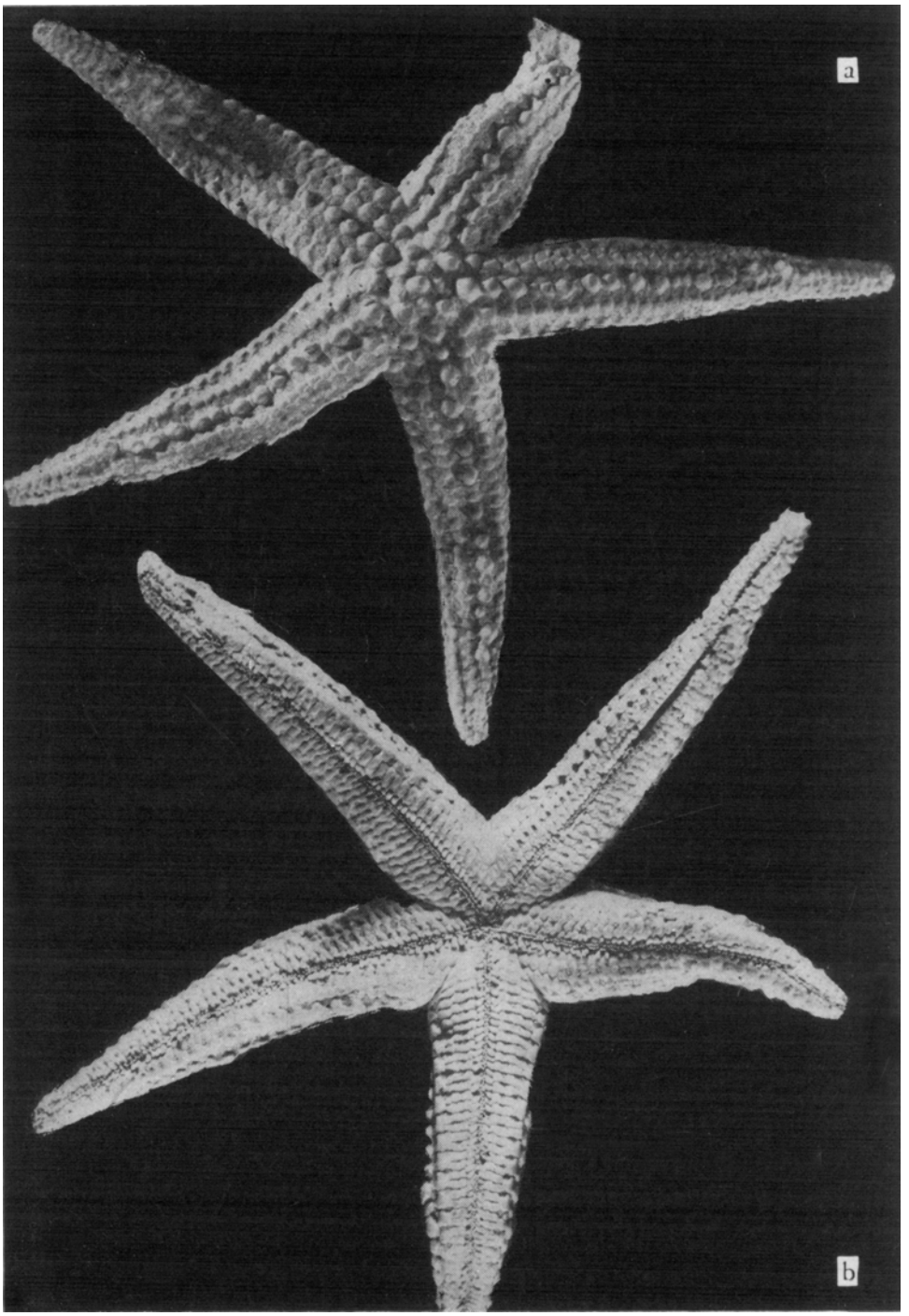
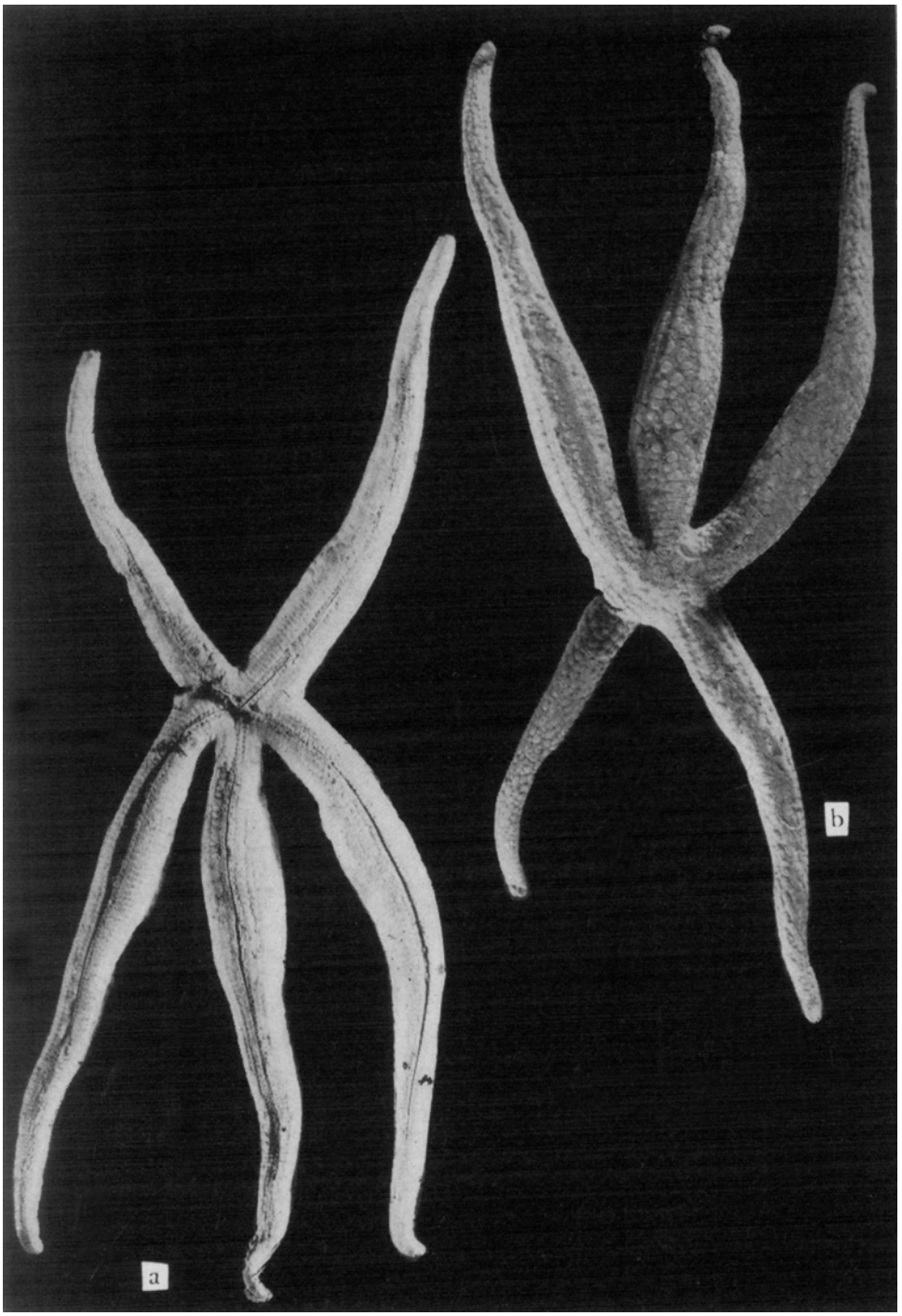


Hacelia tuberculata sp. nov. (a) dorsal and (b) ventral view of holotype, slightly reduced.



Linckia gracilis sp. nov. (a) ventral and (b) dorsal view of holotype. slightly reduced.