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SOME FURTHER NOTES ON SPECIES OF *TAMARIA* (ASTEROIDEA).

By

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(Plates xl-xlii and Figures 1-2.)

A further study of the complex species of the genus *Tamaria* Gray has resulted in the discovery of two species believed to be undescribed and a new and surprising record for *T. megaloplax* (Bell). I am indebted to Mr. C. C. A. Monro, of the British Museum (Natural History), for the interest he has taken on my behalf and for the preparation of photographs of the specimens referred to in this contribution. As the rules of the British Museum prevent the loan of specimens for examination, I am not able to study the actual material, yet, in view of the fact that the photographs before me show all that is necessary, I am of the opinion that the action taken herein to describe the specimens is fully justified. As a measure of precaution, however, I sent the manuscript to the British Museum in order to have the descriptions compared with the actual specimens and the various points verified.

The three specimens referred to in this paper were examined by Bell and labelled "*Linckia megaloplax*". The two described as new are the specimens upon which Bell¹ founded the records of *megaloplax* from Dammer Island, Banda Sea, and Parry Shoal, off Cape Van Dieman, Melville Island, North Australia. These two records have accordingly been sunk as synonyms under the new species. As to the Holothuria Bank record we know that some of Bell's material from that locality, labelled *L. megaloplax* by Bell himself, was referred to by Clark (1921) under the heading of *Tamaria fusca*, but I have pointed out elsewhere that the record applied neither to *megaloplax* nor *fusca* but to Koehler's two species *ornata* and *hirsuta*. With this present specimen, labelled by Bell himself, and coming from Holothuria Bank, it is clear that Bell had at least one of his many specimens from that locality correctly determined.

From available information one concludes that the genus *Tamaria* embraces a greater number of species within a small area than was hitherto thought probable. The merging of Koehler's two species *ornata* and *hirsuta* under *fusca* Gray has been pointed out in an earlier paper to be erroneous, so that within the area formed by Cape Jaubert, near Broome, in the west, Gladstone in the east, and Dammer, Aru and Kei Islands, Banda Sea in the north, we find the following species: *T. pusilla* (M. and Tr.), *T. fusca* Gray, *T. megaloplax* (Bell) =

¹ Bell.—Proc. Zool. Soc., London, 1894, p. 395.

tuberifera (Sladen), *T. ornata* Koehler, *T. hirsuta* Koehler, *T. tumescens* Koehler, *T. propetumescens* sp. nov., *T. ajax* sp. nov., and a *Tamaria* sp. (as yet undetermined—see paper on British Great Barrier Reef Expedition (Asteroidea), 1932, p. 261).

***Tamaria megaloplax* (Bell).**

(Pl. xl, figs. 1-4.)

Linckia megaloplax Bell., Zool. "Alert", 1884, p. 126 (Albany Island specimen).

Linckia megaloplax Bell, Proc. Zool. Soc. London, 1894, p. 394—in part.

Tamaria megaloplax Livingstone, British Museum (Nat. Hist.), Great Barrier Reef Exped., 1928-29; Sci. Reports, iv, No. 8, Asteroidea, 1932, p. 259, pl. ix, figs. 1-3, pl. xii, figs. 8, 12, 14 (and synonymy).

„A specimen with R. = 58 mm., housed in the British Museum (Natural History), and bearing a locality label marked Holothuria Bank, agrees with the characters of *megaloplax* so well that I am confident it has no association with Bell's other specimens from Holothuria Bank referred to by Dr. H. L. Clark (1921).

This extension of the range of *megaloplax* is surprising; it was at first thought by me to be confined to east and north-eastern coasts of Australia, but now it is evident that *megaloplax* has a greater Australian range than was hitherto suspected. Bell's record (*loc. cit.*) included this specimen in a batch of wrongly identified material later referred to by Clark (1921) and shown by me in an earlier paper² to be referable to *ornata* and *hirsuta*. It is obviously the only specimen of *megaloplax* from Holothuria Bank handled by Bell.

***Tamaria propetumescens* sp. nov.**

(Pl. xlii, figs. 1-5, and Figure 1.)

Linckia megaloplax Bell, Proc. Zool. Soc. London, 1894, p. 395—in part (*non* Bell, Zool. "Alert", 1884, p. 126, Albany Island specimen).

Description.—R. = 38.5 mm., r. = 6 mm., R. = 6.4 r. Rays five. The disc is elevated. The rays taper gradually and evenly to a round, blunt, and slightly upturned tip. The papular areas are arranged in six rows. The row bordering the median radial series of abactinal plates on either side merge at a point within the distal half of the ray. This character is clearly noticed in *tumescens* (Koehler). The papular areas are distinctly sunken. From four to eight pores occur to an area, the number decreasing with the tapering of the rays. The abactinal plates are uniformly tumid and are arranged in regular longitudinal series. They are covered with a distinct and dense granulation. The granules in the central areas are, for the most part, the largest to be found on the abactinal surface. The disc bears the largest plates, which are irregular in shape. The plates of the median radial series, with the exception of the primaries, are more or less similar in shape, being roundly rectangular. The plates of the adradial series are more or less squarish in outline. Only a single series of adradial plates is present. In every case this series of plates terminates at a point

² Livingstone.—Brit. Museum (Nat. Hist.), Gt. Barrier Reef Exped., 1928-29; Sci. Repts., iv, No. 8, 1932, p. 257.

within the distal half of the ray, thus bringing together near the tip of the ray the median radials and the superomarginals. The terminal plate is of moderate size and sparsely covered with granules. The madreporite is situated near the edge of the disc; it is slightly concave from top to base and measures 6 mm. across its widest part, *viz.*, from side to side.

Pedicellariæ of the type usually found in the genus occur on almost all the adradial plates. None occur on either the centro-dorsal plates or plates of the median radial series. They are two-jawed and spatulate, each jaw being slightly curved and denticulate (see Figure 1). Pedicellariæ occur only sparingly on the actinal surface.

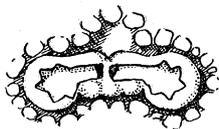


Figure 1.

Tamarina propetumescens sp. nov.

Pedicellaria from holotype.

C. C. A. Monro, *del.*

The actinal surface is covered with densely packed granules, making the plate formation indistinguishable. No papulæ are to be found on the actinal surface. Many inferomarginal plates bear a stout, conspicuous, central conical tubercle similar to those seen in *T. megaloplax* (Bell). These tubercles are fairly numerous, particularly upon inferomarginals in the distal half of the ray. The spinelets of the furrow series can be distinctly seen, and are more or less alternately stout and thin. Only a single series of subambulacral spines is present. They are placed close together and run without much variation in position right down to the oral spines. The subambulacral spines are separated from those of the furrow series by a single though very definite row of small granules.

Colour.—In dry specimens the colour has disappeared (*vide* Mr. C. C. A. Monro).

Affinities.—There is no doubt about the close relationship the above species bears to *T. tumescens* (Koehler).³ So far as the abactinal surface is concerned practically no differences can be readily detected, but the actinal surface of *propetumescens* is seen to be clearly different to that of *tumescens*. *T. propetumescens* can be separated from *tumescens* by the following characters. The superomarginals do not overlap the inferomarginals to form a definite channel between these two series of plates. The inferomarginals are not clearly defined by grooves as are seen in *tumescens*. Many inferomarginals are provided with stout conical tubercles which are entirely absent in *tumescens*. The subambulacral spines, although only in a single series, are more regularly arranged and run down closer to the mouth than is the case in *tumescens*. Moreover, the subambulacral spines are not placed immediately next to the furrow series but are separated from these latter by a definite row of small granules.

In *propetumescens* the number of papular pores to an area is considerably less.

³ Koehler.—Abh. Senckenb. Naturf. Ges., xxxiii, 1910, p. 281, pl. xvi, figs. 3-4.

Locality.—Parry Shoal, 37 miles westward of Cape Van Dieman, Melville Island, North Australia.

Tamaria ajax sp. nov.

(Pl. xli, figs. 1-5, and Figure 2.)

Linckia megaloplax Bell, Proc. Zool. Soc. London, 1894, p. 395—in part (*non* Bell, Zool. "Alert", 1884, p. 126—Albany Island specimen).

Description.—R. = 41.5 mm.; r. = 7 mm., R. = 5.9 r., br. (at base of ray) 7.5-8 mm. Disc moderate in size. Rays strong and robust, each gradually tapering to a rounded and upturned tip; the rays may be described as slender when compared with those of *T. triseriata* (Fisher). The terminal plate is of fair size, very conspicuous, and carries two or more tubercles. The rays are well arched and slightly flattened actinally. The interbranchial arcs are rather acute.

The plates of the abactinal surface are tumid or swollen. They are arranged in regular series, which are separated from one another by six channels containing the papular areas. The median radial series of plates are of uniform shape and grow gradually smaller in size as they approach the tip of the ray. The primary plate of each series, is, in the majority of cases, the largest plate on the abactinal surface. The primary plates and adjoining plates on the disc collectively, form a kind of polygonal crown. The plates on the disc, as well as those forming the median radial series, each bear central granules of large size. These granules are of considerable size on plates of the median radial plates in the distal half of ray. The superomarginals are provided with large central granules, which could be more aptly termed tubercles on account of their large size. The granulation of the abactinal surface is otherwise almost uniform. A single series of adradial plates occurs between the median radials and the superomarginals. These adradial plates are smaller than the median radials and in addition possess a more or less uniform type of granulation. The adradial series ends or fades out at a point about two-thirds the distance along the ray. From the point of disappearance onwards to the tip of the ray the median radial plates and the superomarginal plates are separated only by a single series of papular areas. Six rows or series of papular areas are present. The series bordering the adradial plates on either side merge at the point of disappearance of the adradial plates and continue onwards to the tip of the ray as a single series of papular areas. The number of pores to an area ranges from six to thirteen on the greater part of the ray, but near the tip only two or three are to be seen to an area. The disc bears papular areas containing pores ranging from six to ten in number. The anal aperture is a little removed from the centre of the disc and is surrounded by a large number of well-developed granules. The madreporite is roughly semicircular and measures 3 mm. across its widest part.

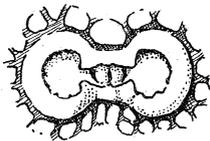


Figure 2.
Tamaria ajax sp. nov.
Pedicellaria from holotype.
C. C. A. Monro, del.

The granulation of the actinal surface is, on the whole, coarser than that of the abactinal surface. The inferomarginals in the distal half of the ray bear large central conical tubercles like those on the superomarginal series.

The furrow spinelets are flat and blade-like and are arranged in alternating large and small series. The tips are distinctly squarish and not rounded. A single series of subambulacral spines occurs. These spines are large and conspicuous and are directed outwards. The series is separated from the furrow spines by a single though clearly discernible series of granules.

Pedicellariæ occur sparsely and are to be found mostly on the abactinal surface. They are characteristic of the genus, two-jawed and spatulate. Only signs of denticulation are to be found (see Figure 2).

Affinities.—The nearest known relative of *ajax* is *T. triseriata* (Fisher).⁴ Characters which render a separation easy are as follows.

The rays are more slender in *ajax*. The plates of the median radial series in *ajax* are more regular in size and possess central areas covered by large tubercle-like granules which do not occur in *triseriata*. The supero- and inferomarginal plates in *ajax* in the distal half of ray are provided with large, central, conical tubercles which are absent in *triseriata*. Only one series of subambulacral spines are present in *ajax*, whereas *triseriata* possesses two. No naturally naked plates occur on *ajax*. The average number of papular pores to an area in *ajax* is considerably in excess of that given for *triseriata*. The pedicellariæ in *ajax*, although two-jawed and spatulate, are neither curved nor narrow. In *ajax* the free extremity of each furrow spinelet is squarish and not "round tipped to truncate" as described for *triseriata*. Moreover, the furrow spinelets in *ajax* are not of equal size, particularly in the distal half of the ray.

Colour.—"Spirit specimen pale buff coloured; actinal surface mottled with brown" (*vide* Mr. C. C. A. Monro).

Locality.—Dammer Island, Banda Sea.

EXPLANATION TO PLATES.

PLATE XL.

Fig. 1.—*Tamaria megaloplax* (Bell). Actinal surface of Bell's Holothuria Bank specimen (slightly over natural size).

Fig. 2.—Portion of abactinal surface of ray of same specimen ($\times 4$).

Fig. 3.—Portion of actinal surface of ray of same specimen ($\times 4$).

Fig. 4.—Abactinal surface of same specimen (slightly over natural size).

PLATE XLI.

Fig. 1.—*Tamaria ajax* sp. nov. Actinal surface of holotype (slightly under $\times 2$).

Fig. 2.—Proximal portion of abactinal surface of ray of same specimen ($\times 4$).

Fig. 3.—Distal portion of abactinal surface of ray of same specimen ($\times 4$).

Fig. 4.—Portion of actinal surface of ray of same specimen ($\times 4$).

Fig. 5.—Abactinal surface of same specimen (slightly under $\times 2$).

PLATE XLII.

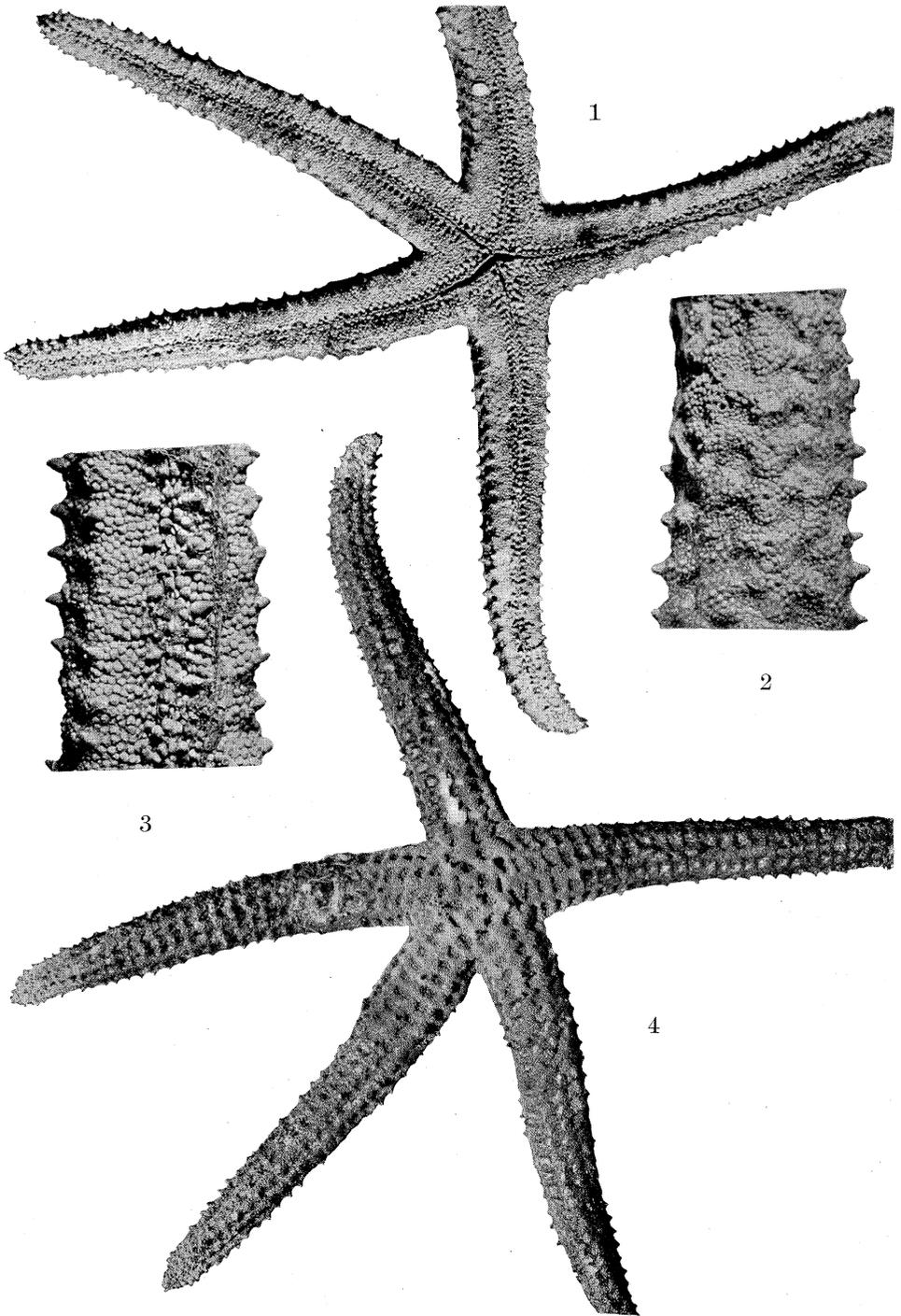
Fig. 1.—*Tamaria propetumescens* sp. nov. Actinal surface of holotype (slightly under $\times 2$).

Fig. 2.—Enlarged portion of abactinal surface of ray of same specimen showing pedicellariæ ($\times 4$).

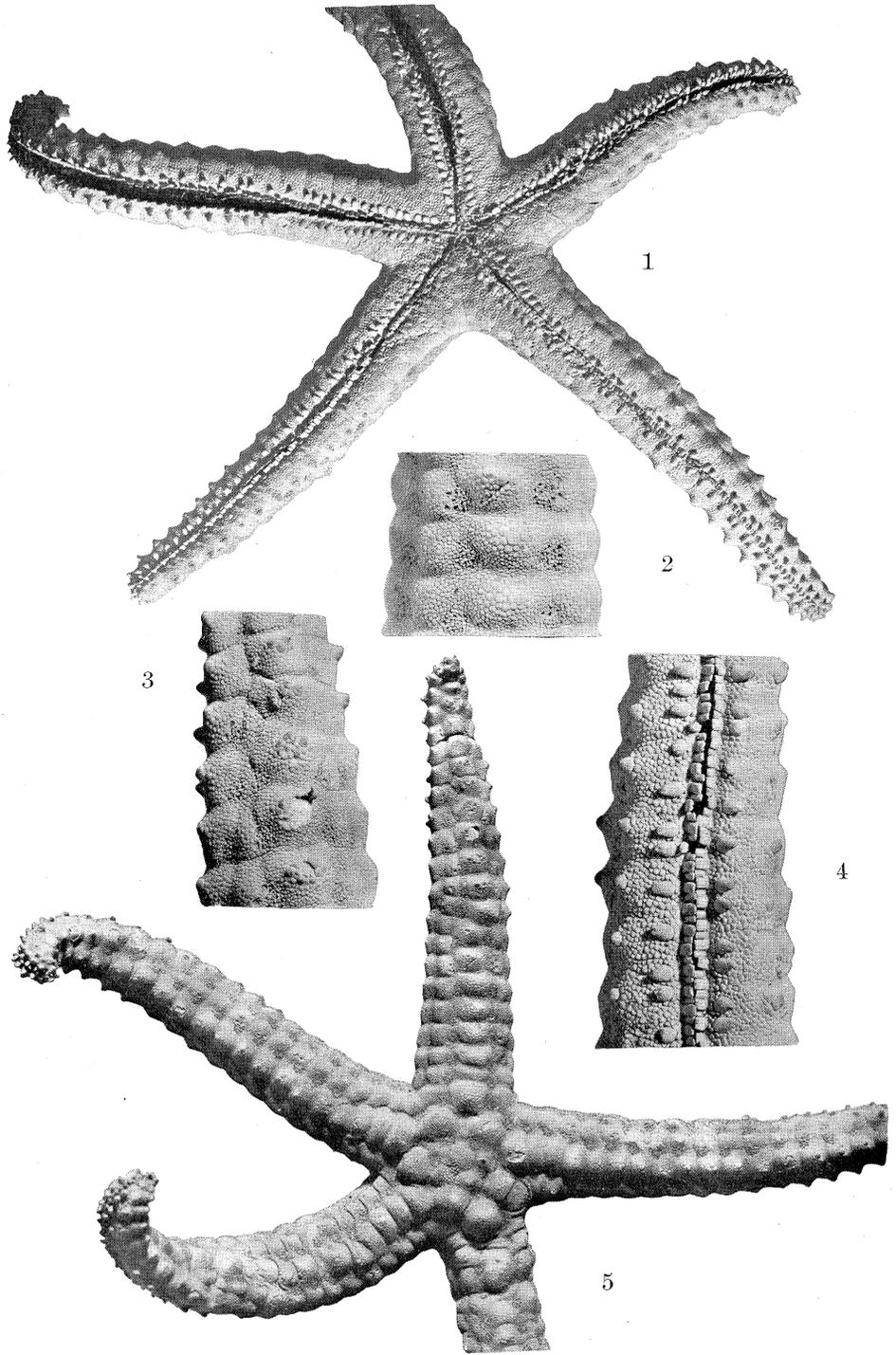
Figs. 3-4.—Enlarged portion of actinal surface of ray of same specimen ($\times 4$).

Fig. 5.—Abactinal surface of same specimen.

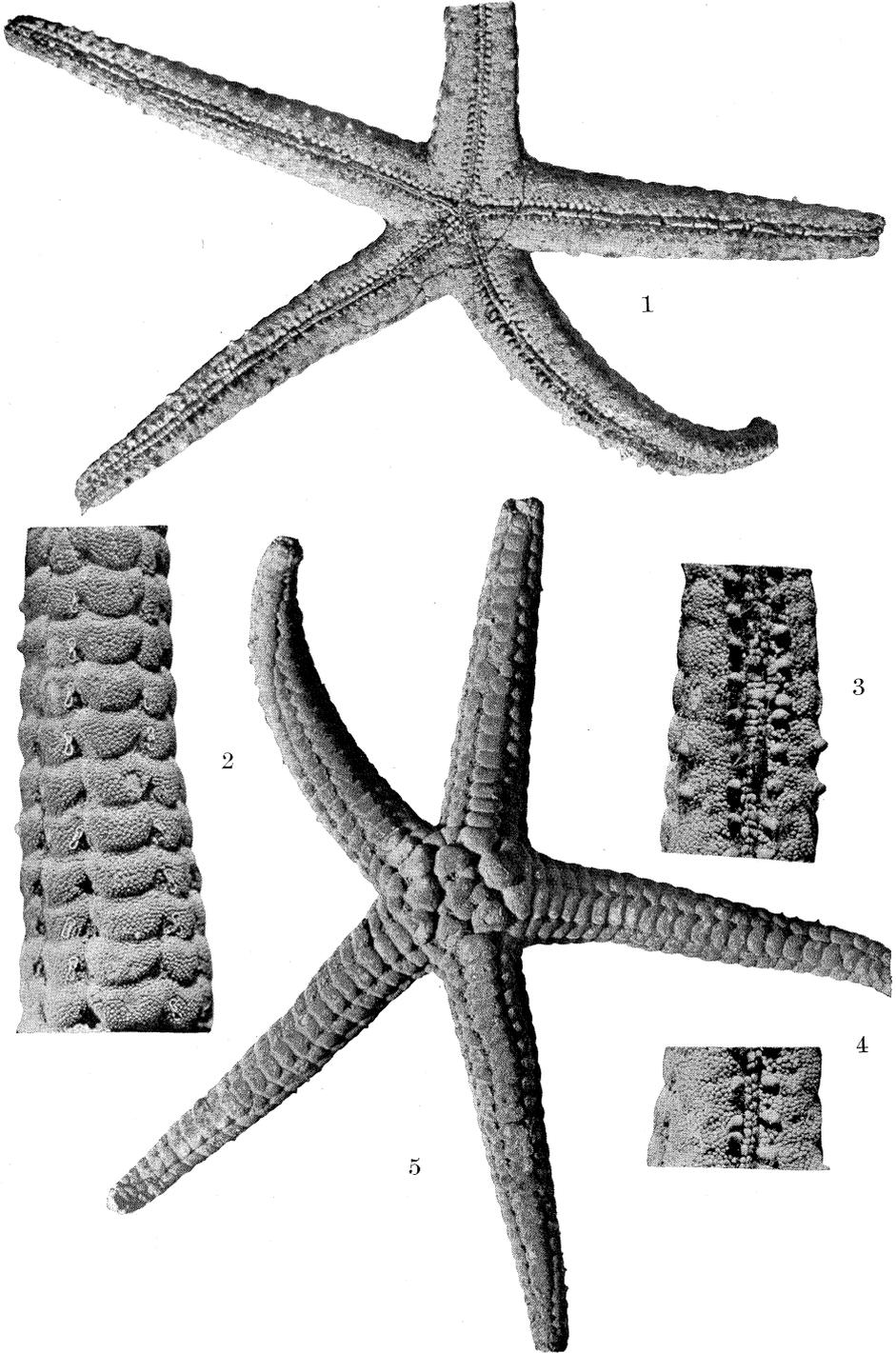
⁴ Fisher.—Bull. U.S. Fish. Comm., xxiii, 1903 (1906), p. 1080, pl. xxx, fig. 3, pl. xxxi, figs. 7-7a.



G. C. CLUTTON, photo.



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