

ECHINODERMS AND ARTHROPODS FROM JAPAN.

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The marine invertebrates enumerated and described in the following pages were collected by Mr. Frederick Stearns, of Detroit, Michigan, during nearly a year's residence in Japan. He was assisted by an intelligent Japanese, who visited at intervals the entire southeastern coast from Tokyo by Sagama and Saruga, along Kii, Awa and Toza, and the north shore of the Inland Sea as far west as Bingo, in communication with the fishermen, who dredge for fish and molluscs in water sometimes as deep as thirty fathoms.

The southeastern coast of Japan is washed by the warm waters of the Kuro Schiwo, the continuation of the north equatorial current of the Pacific. The fauna of this coast is essentially Indo-Pacific, although it possesses many species both of echinoderms and crustaceans peculiar to it.¹ There does not appear to be any evidence of a recent connection of the southern portion of Japan with the mainland, and the Indo-Pacific species found there must have been carried thither by the Kuro Schiwo, probably in the larval condition. The forms that are peculiar may be regarded as Indo-Pacific types differentiated by the special character of these shores.

The knowledge of the echinoderm and crustacean faunas of these coasts has been largely derived from the collections made by Ph. Fr. von Siebold. The star-fishes collected by him were described by Müller and Troschel in the *System der Asteriden*, to whose descriptions additional information was furnished by Dr. Von Martens in 1865.² The crustacea were monographed by De Haan in the "*Fauna Japonica*," and this beautiful work even at this day leaves little to be desired by the systematist. To the knowledge of the latter group, additions were made by Stimpson³ in 1857, 1858 and

¹ For a discussion of the limitations of the Japanese region see Professor Dana in his monograph of the Crustacea of the U. S. Exploring Expedition; Prof. A. Agassiz in the Revision of the Echini and Dr. Paul Fischer, in the *Manuel de Conchyliologie*.

² *Arch. f. Naturg.*, Jahrg. 31, pp. 345-360.

³ *Prodromus descriptionis animalium invertebratorum quæ in expeditione ad oceanum Pacificum septentrionalem a Republicâ federatâ missâ Cadwaladaro Ringgold et Johanne Rodgers ducibus, observavit et descripsit. Proc. Acad. Nat. Sci. Phila.*, Pts. I-III, 1857; Pts. IV-VII, 1858; Pt. VIII, 1860.

1860, and by Miers¹ in 1879. Dr. Ludwig Döderlein² has made the most important addition to the department of Echinoids, recording in 1885 forty-seven species of sea urchins collected by himself in Japan, of which twenty were new. The most important contribution to the Pycnogonoids of Japan was made in 1890 by Dr. A. Ortman,³ who described the specimens collected by Dr. Döderlein. Three new species, collected by Dr. Hilgendorff in Japan had already been described by R. Böhm⁴ in 1879. The Challenger Expedition collected on the southeast coast of Japan. Its various monographs contain contributions to the fauna of this coast.

The entire collection made by Mr. Stearns was not forwarded to me, only duplicates being sent where more than one specimen was collected. I am, therefore, unable to give any particulars as to the abundance or scarcity of the forms obtained, except in the cases where only one specimen was found, when that fact is stated.

I wish to acknowledge my indebtedness to Mr. Stearns, for his liberality in making possible the publication of the plates accompanying this paper.

In the following pages the species of echinoderms and crustacea collected by Mr. Stearns are enumerated, a new Ophurian, a new crab, and a new and interesting Pycnogonoid are described, and several species of star-fishes hitherto unfigured, have been figured.

ASTEROIDEA.

Astropecten armatus.

Müller und Troschel, System der Asteriden, p. 71.

Astropecten Japonicus. Pl. VII, figs. 5-9.

Müller and Troschel, op. cit., p. 205.

Only a single specimen collected by Mr. Stearns.

Astropecten scoparius. Pl. VIII, figs. 1-4.

Müller and Troschel, op. cit., p. 71.

Luidia quinaria. Pl. IX, figs. 5-9.

Von Martens, Archiv f. Naturg. 1865, p. 352.

Sladen, Challenger Asteroidea, p. 253.

¹ On a collection of Crustacea made by Capt. H. St. John, R. N. in the Corean and Japanese Seas. Pt. I, Podophthalmia, with an appendix by Capt. H. C. St. John, Proc. Zool. Soc. 1879, pp. 18-61, Pls. I-III.

² Seeigel von Japan und den Lius Riu Inseln, Arch. f. Naturg., Jahrg. II, pp. 73-112, and Die Japanische Seeigel. 1, Familien *Cidaridæ* und *Salenidæ*, Stuttgart, 1887.

³ Zool. Jahrb. Bd. 5, pp. 157-167.

⁴ S. B. Gesellsch. Naturf. Freunde zu Berlin, 1879, pp. 53-60.

Asterina pectinifera. Pl. X, figs. 1-4.
Müller and Troschel, op. cit., p. 40.
Von Martens, op. cit., p. 352.

Nine specimens of this species were sent by Mr. Stearns, indicating that it is found in abundance. It agrees in general characters with *Asterina miniata*, but differs from that species in the more heap-like arrangement of the spinelets of the paxillæ, in the absence of a well marked series of paxillæ along the middle line of the dorsal surface of each arm, and in the color.

Nardoa semiregularis var. **Japonica.** Pl. VII, figs. 1-4.
Von Martens, op. cit., p. 351.

Cribrella sanguinolenta. Pl. IX, figs. 1-4.
O. F. Müller, Zool. Dan. Prodr., p. 234.
Sladen, op. cit., p. 542.

Asterias Amurensis. Pl. VIII, figs. 5-8.
Lütken, Vidensk. Meddel. Kjöbenhavn, 1871, p. 296.
Sladen, op. cit., p. 575.

This species is closely related to *Asterias versicolor* of Sladen. Future investigation may prove them to be identical.

Asterias torquata.
Sladen, op. cit., p. 570, Pl. CII, figs. 1-4.

Only a single specimen was collected by Mr. Stearns.

OPHIUROIDEA.

Pectinura Stearnsii, n. sp. Pl. XI, figs. 1-5.

Disk covered beneath the granulation with small coarse scales; granulation fine and close; radial shields large, irregularly oval, somewhat acute at both ends, nearly twice as long as broad. Mouth shields large, sub-triangular; supplementary plate semi-circular, less than one-fourth the size of the mouth shields. Side mouth shields small, smaller than the supplementary plates. Fourteen mouth papillæ to each angle; the two outer papillæ very broad, sub-quadrate, as broad as three of the others. At the apex of the mouth angle are two papillæ half as broad as the outer-most mouth papillæ, projecting into the mouth angle one on either side with their bases resting upon the side mouth shields.¹ Five rounded teeth. Length of the arms from the edge of the disk to the tip, rather more than four times the diameter of the disk. Upper arm plates entire; lower arm plates quadrate with the angles truncated with slight indentation of the aboral edge; half as broad again as long. Pores

¹ Unfortunately, through an oversight, the number and shape of the mouth papillæ, are not clearly shown in the accompanying figure of this species.

between the first and second under arm plates. Two tentacle scales, the inner one longer than the outer, with a round end, the outer broader than the inner one, shorter and truncated, overlapping the base of the lowest side arm spine; side arm plates occupying two-thirds of the height of the arm, near the base of the arm, with eleven short flattened arm spines, the lowest arm spine the longest, the rest subequal about one-half the length the side arm plate.

Dorsal surface of the disk in dried specimen dirty brown, mottled with darker and lighter brown. Radial shields chocolate brown. Dorsal surface of the arms greenish-gray irregularly banded with dark brown and spotted with lighter. Ventral surface of the disk brownish around the edges and reddish spotted with lighter towards the center. Ventral surface of the arms grayish towards the extremities and reddish spotted with lighter in the neighborhood of the disk.

In the specimen described, diameter of the disk 30 mm., length of an arm from the edge of the disk to the tip, 105 mm.

This species is allied to *Pectinura marmorata*¹ from the Philippines, but may be distinguished from it by its much smaller supplementary mouth shields, its higher side arm plates, its shorter and flatter arm spines, and its truncated, not rounded, outer tentacle scale.

A single specimen has been presented to the Academy by Mr. Stearns.

Ophioplocus imbricatus. Pl. XI, figs. 6-10.

Müller and Troschel, op. cit., p. 93.

Lyman, Proc. Bost. Soc. Nat. Hist., Vol. VIII, p. 76; Illus. Cat., p. 69, Mem. Mus. Comp. Zool., Vol. I; Challenger Ophiuroidea, p. 20, Pl. XXXVII, figs. 10-12.

Three specimens. The largest with a disk 28 mm. in diameter, one-third of the length of an arm, and the smallest with a disk 13 mm. in diameter, one-fourth of the length of an arm. Genital slits, as observed by Mr. Lyman² on specimens from Japan and Java in the Leyden Museum, extending to the mouth shields, thus reaching for more than half the distance from the aboral edge of the mouth shields to the edge of the disk. The specimens collected by Mr. Stearns also differ from the typical form of *Ophioplocus imbricatus* in the presence of a number of small supplementary arm plates between, or on the edges of the larger plates.

¹ Lyman, Bull. Mus. Comp. Zool., Vol. 3, pp. 222, 223, Pl. V, figs. 1-7.

² Bull. Mus. Comp. Zool., Vol., VIII, p. 228.

ECHINOIDEA.

Goniocidaris biserialis.

Stephanocidaris biserialis, Döderlein, Archiv f. Naturg. Jahrg. 51, p. 80.

Goniocidaris biserialis, Döderlein, "Die Japanische Seeigel," Theil. I, pp. 10-13, Taf. V, Taf. VIII, fig. 8a-h.

A single test of this interesting species was collected by Mr. Stearns. The coronal, genital and ocular plates are moderately thick.

Diadema setosum.

Gray, 1825, Ann. Phil., p. 4 (from Rumph.).

A. Agassiz, Rev. Echin., Mem. Mus. Comp. Zool. Vol., III, p. 274, Pls. IVa, etc.

Strongylocentrotus depressus.

A. Agassiz, Proc. Acad. Nat. Sci. Phila., p. 440; Rev. Echin., Mem. Mus. Comp. Zool., Vol. III, p. 440.

A single specimen collected.

Strongylocentrotus tuberculatus.

Lamarck, Anim. sans Vert., p. 50.

A. Agassiz, Rev. Echin., p. 449, Pl. V b, figs. 4-5, Pl. XXXVI, fig. 4.

Temnopleurus Reynaudi.

Agassiz, C. R., Ann. Sci. Nat., VI, p. 360.

A. Agassiz, Rev. Echin., p. 461, Pl. VIII, figs. 22-24, Pl. VIII a, figs. 6, 7.

Temnopleurus toreumaticus.

Leske, Additamenta ad. Klein, p. 91.

A. Agassiz, Rev. Echin. pp. 463, 464, Pl. VIIIa, figs. 4-5.

Toreumatica Hardwickii, Gray, Proc. Zool. Soc. 1855, p. 39; A. Agassiz, op. cit., pp. 460, 461, Pls. VIII, VIIIa, XXV, XXXVI.

In the series of six specimens presented to the Academy by Mr. Stearns, three are forms connecting *Temnopleurus toreumatica* and *Temnopleurus Hardwickii* as defined by Professor Alexander Agassiz in the Revision of the Echini, and I am, therefore, compelled to regard the latter species as a synonym of the former. One specimen having rather deep pits, has the ocular and genital plates covered with prominent tubercles, and other specimens show the passage from the deep rectangular pits to the bevelled grooves of the ambulacral and interambulacral regions.

Toxopneustes pileolus.

Lam., Anim. sans Vert., p. 45.

Alex. Agassiz, Rev. Echin., Mem. Mus. Comp. Zool., Vol. III, p. 497, Pls. VIIIb, etc.

A single specimen obtained.

Echinanthus testudinarius.

Gray, Proc. Zool. Soc. 1851, p. 35; Cat. Echin. Brit. Mus., p. 6, Pl. 1, fig. 1.

A. Agassiz, op. cit., p. 514.

Laganum decagonalis.

Lesson, Blainville, Dict. Sci. Nat. Scut., p. 229.

A. Agassiz, op. cit., p. 520, Pls. XIIIe, XXXVII.

In the specimens presented to the Academy by Mr. Stearns the connecting walls do not ramify, and as there can be no doubt that these specimens belong to this species, the distinction between the genera *Peronella* and *Laganum*, as defined by Professor Alexander Agassiz, does not hold good.

Echinarachnius mirabilis.

Barnard, A. Agassiz, Proc. Acad. Nat. Sci. Phila. 1863, p. 359.

A. Agassiz, Rev. Echin., Mem. Mus. Comp. Zool., Vol. III, p. 526, Pls. XIII a, XXXVII.

Schizaster Japonicus.

A. Agassiz, Proc. Acad. Nat. Sci. Phila. 1879, Vol. XIV, p. 212; Challenger Echinoidea, p. 202, Pls. XXXVI, XLIII, XLV.

CRUSTACEA.

Pugettia incisa.

Pisa (Halmius) incisa, De Haan, Fauna Japonica, Crust., p. 98, Pl. XXIV, fig. 3, Pl. G.

Pugettia incisa, Miers, Challenger Brachyura, p. 40.

Chlorinoides longispinus.

Maja (Chorinus) longispina, De Haan, op. cit., p. 94, Tab. XXIII, fig. 2, *Maja (Chorinus) aculeata*.)

Chlorinoides longispinus, Miers, Challenger Brachyura, p. 53.

Schizophrys aspera.

Mithrax aspera, Milne-Edwards, Hist. Nat. Crust., Vol. I, p. 320.

Schizophrys aspera, A. Milne-Edwards, Nouv. Arch., Vol. VIII, p. 231, figs. 1-1f.

Lambrus validus.

Parthenope (Lambrus) validus, De Haan, op. cit., p. 90, Tab. XXI, fig. 1, Tab. XXII, figs. 1-3.

Atergatis floridus.

Cancer floridus, L., Syst. Nat., ed. XII, p. 1044.

Atergatis floridus, Dana, Crust. U. S. Explor. Exped., p. 159, Pl. VII, fig. 4.

A single specimen was collected.

Goniosoma Japonicum.

Goniosoma sexdentata, De Haan, op. cit., 41, Pl. XII, fig. 1.

Goniosoma Japonicum, A. Milne-Edwards, Arch. Mus., t. X, p. 372.

Goniosoma acutum, A. Milne-Edwards, Nouv. Arch., t. V, p. 150, Pl. VII, figs. 8-10.

The specimen given to the Academy by Mr. Stearns is intermediate in character between *G. Japonicum* and *G. acutum*, and I have, therefore, given the latter species as a synonym of the former. The posterior antero-lateral tooth on the right side is produced as in Milne-Edwards' figure of *G. acutum*, but on the left side it is not produced and is not longer than the preceding tooth. The carapace is rather less extended at the sides than in the figure of this species, and rather more so than in the figure of *G. Japonicum*. The antero-

lateral teeth are rather less prominent than in *G. acutum* and rather more so than in *G. Japonicum*. The outline of the postero-lateral borders of the carapace is also intermediate in character. Three other specimens from Japan in the Museum of this Academy show the passage of the one form into the other.

Macrophthalmus dilatatus.

Ocyroda (Macrophthalmus) dilatata, De Haan, op. cit., p. 55, Tab. XV, fig. 3.

Brachynotus (Heterograpsus) penicillatus.

De Haan, op. cit., pp. 32, 60, Tab. XI, fig. 5.

Helice tridens.

De Haan, op. cit., p. 57, Tab. XI, fig. 2; Tab. XV, fig. 6.

Sesarma affinis.

Grapsus (Pachysoma) affinis, De Haan, op. cit., p. 66, Tab. XVIII, fig. 5.

Eriocheir Japonica.

Grapsus (Eriocheir) Japonicus, De Haan, op. cit., p. 39, Tab. XVII.

Philyra pisum.

De Haan, op. cit., p. 131, Tab. XXXIII, fig. 7.

Arcania undecimspinos.

De Haan, op. cit., p. 135, Tab. XXXIII, fig. 8.

Leucosia unidentata.

De Haan, op. cit., p. 133, Tab. XXXIII, fig. 3.

Leucosia longifrons.

De Haan, op. cit., p. 132, Tab. XXXIII, fig. 4.

It is very probable that this and the preceding form represent merely two varieties of the same species.

Dorippe Japonica.

Von Siebold, Spicilegia, Fauna Japonica, p. 14.

De Haan, op. cit., p. 122, Pl. XXXI, fig. 1 (*Dorippe callida*).

Cryptodromia Stearnsii, n. sp. Pl. XII, figs. 1-3.

Carapace sub-pentagonal in outline, the angle of the pentagon directed forwards being occupied by the rostral teeth as broad as long; upper surface very convex, smooth, minutely punctate, with a few minute scattered tubercles, cervical groove well defined. An ill-defined groove bounded on either side by a slight elevation leads to the depression between the lateral rostral teeth. Median rostral tooth small, triangular, depressed; lateral rostral teeth well developed, rounded triangular, their inner borders depressed, supra-orbital tooth very small. The posterior border of the orbit forming a slight prominence. Three small antero-lateral teeth, the third or most posterior placed at the junction of the lateral and the antero-lateral edges of the carapace; the second placed on a level with the third, at about two-thirds of the distance from the posterior border of the

orbit to the third, and the first placed rather higher upon the carapace than the other two, at about one-third of the distance from the posterior border of the orbit to the third tooth. Lateral border divided by a groove which commences at about one-third of the distance from the third antero-lateral tooth to the posterior border of the carapace. Behind the groove at its commencement is a small tooth. This groove is continued backwards and inwards across the branchial area and ends by passing forwards into the groove separating the branchial and cardiac regions. The subhepatic area is small and has four small teeth, two of them placed one behind the other beneath the eye, along the inner border of the area; a third placed behind these two; and a fourth placed half way between the last mentioned and the second antero-lateral tooth on the edge of the carapace.

Two large tubercles upon the distal edge of the outer surface of the carpus of the cheliped, a smaller one behind these two, and a still smaller one above this one. Two tubercles upon the distal end of the upper surface of the manus, the outer tubercle the larger of the two, and a minute tubercle situated at the proximal end of a row of three minute tubercles along the inner edge of the upper surface. The carpal joints of the two anterior pairs of cruripeds (ambulatory legs) end in two tubercles, the propodal joints in one. In the specimen examined only the first pair of the last two pairs of cruripeds are entire, and they possess but a single claw each.

The entire specimen under examination is covered with apparently a pilose pubescence.

The species closely resembles *Cryptodromia Japonica* but may be readily distinguished from it by the presence of three antero-lateral teeth instead of two.

The genus *Cryptodromia* was established by Stimpson in 1858,¹ and the following species, have been referred to it:—

C. nodipes, *Dromia nodipes* (Lamarck) Milne-Edwards, Hist. Nat. Crust., t. II, p. 177, 1837; Guerin, Icon., Pl. 14, fig. 1.

C. fallax, *Dromia fallax* (Lamarck) Milne-Edwards, op. cit., p. 176; Mauritius.

C. lateralis, *Dromia lateralis*, Gray, Zool. Miscell., p. 40; Haswell, Cat. Austral. Crust., p. 139.

Australia, New Zealand and Japan.

C. coronata, Stimps., Proc. Acad. Nat. Sci. Phila., 1858, p. 239.

Bonin Islands.

C. tuberculata, Stimps., op. cit., p. 239.

Gaspar Straits, Island of Kikaisima and Bay of Kagosima.

¹ Proc. Acad. Nat. Sci. Phila. 1858, p. 225.

- C. tumida*, Stimps., op. cit., p. 240.
Bay of Fou-kow, Island of Ousima.
- C. canaliculata*, Stimps. loc. cit.
Gaspar Straits, Loo-choo Islands, Kikaisima Island.
- C. tomentosa*, *Dromia tomentosa*, Heller, S. B. Akad. Wiss. Wein, Bd. XLIV, Abth. I, p. 241, 1861.
- Dromia* (*Cryptodromia*) *tomentosa* Hilgendorf, M. B. Akad. Wiss. Berlin, 1878, p. 813. Taf. II, figs. 3-5.
Red Sea; Ibo Island, Mozambique.
- C. pentagonalis*, *Dromia* (*Cryptodromia*) *pentagonalis*, Hilgendorf, op. cit., p. 814, Taf. II, figs. 1, 2.
Ibo Island. Mozambique.
- C. Japonica*, Henderson, "Challenger" Anomura, p. 6, Pl. I, fig. 2.
Off Yokoska, Japan.
- C. nodulifera*, Henderson, op. cit., p. 8, Pl. I, fig. 3.
Off the Australian coast.
- C. incisa*, Henderson, op. cit., p. 10, Pl. I, fig. 4.
Off Twofold Bay, Australia.

Mr. Miers¹ records a young specimen from the Korean and Japanese Seas of doubtful species, and Dr. de Man² records another young specimen of doubtful species from the Mergui Archipelago.

Lyreidus tridentatus.

De Haan, op. cit., p. 140, Tab. XXXV, fig. 6.

Eupagurus constans.

Stimpson, Proc. Acad. Nat. Sci. Phila. 1858, p. 248.

Henderson, Challenger Anomura, p. 67, Pl. VI, fig. 8.

A single specimen collected.

PANTOPODA.

An interesting Pycnogonoid collected by Mr. Stearns apparently represents a new species. In describing it I have followed in a general way the nomenclature of parts adopted by Dr. Hoek in his monograph of the Pycnogonoids collected by the Challenger Expedition. I differ from him slightly, however, in terming the whole of the trunk, from its junction with the proboscis to the commencement of the abdomen, the cephalothorax, instead of confining that term to the first segment of the trunk. This appears to me to be a more correct use of the term, as when the cephalon and thorax are united, the cephalon ceases any longer to be the cephalon pure and simple, and the thorax, in the same way, any longer the thorax pure and simple. The whole then becomes the cephalothorax, and any part of it is a part of the cephalothorax.

The following is a description of the species. :—

¹ Proc. Zool. Soc. 1879, p. 44.

² Jour. Linn. Soc., Vol. XXII, p. 211, 1888.

Ascorhynchus Japonicus, n. sp. Pl. XII, figs. 4-10.

Body strong, slender; its surface very minutely tuberculated; tubercles themselves, when highly magnified, seem to be multi-tuberculate; proboscis one-third of the total length of the body; abdomen one-half of the length of the proboscis; three strong spines placed on the dorsal posterior margin of the first three cephalo-thoracic segments. Proboscis stout, pyriform, triangular in transverse section; sides of the proboscis not longitudinally furrowed, divided by constriction into an anterior and a posterior portion, the anterior portion nearly twice as long as the posterior portion, the whole resembling an unopened rose-bud; truncated at its extremity. Mouth large, triangular.

Length of the first cephalo-thoracic segment about two-fifths of that of the whole cephalo-thorax. Anterior portion rectangular, bearing at the angles the mandibles. No azygous knob between the mandibles. Palpi inserted at about one-quarter of the distance between its anterior and posterior extremities, a slight elevation between the palpi. Slightly narrowed immediately behind the insertion of the palpi. Large, conical, oculiferous tubercle situated between the lateral processes of the ovigerous legs at rather more than half the distance from its anterior to its posterior border, possessing four distinct eyes of moderate size; the two anterior eyes rather larger than the two posterior; pigment of a light reddish color. A rather smaller tubercle is found upon its dorsal posterior border. Lateral processes for the insertion of the ovigerous legs, short, not longer than the width of that portion of the segment directly in front of them; those for the insertion of the true legs long, three times as long as those last mentioned.

Second and third cephalo-thoracic segments about as long as their lateral processes which are rather longer than those of the first segment; each segment possessing a prominent tubercle upon its postero-dorsal margin. Fourth cephalo-thoracic segment of about the same length as the third.

Abdomen long and narrow, slightly swollen at the extremity.

Mandibles three jointed, chelate, claws very small, slight. First joint the longest; second joint rather more than half as long as the first joint.

Palpi incomplete in the specimen, only eight joints being present, but apparently of very nearly the same form as in *Ascorhynchus gla-*

ber Hoek.¹ First two joints extremely small; the third the longest, half as long as the proboscis; the fourth short, the fifth nearly four times as long as the fourth; the sixth short, slightly shorter than the fourth; the seventh about twice as long as the sixth; the eighth slightly longer than the seventh.

The ovigerous legs have the fourth joint the longest, as long as the anterior portion of the proboscis; the fifth rather shorter; the sixth about one-half the length of the fifth; the seventh, eighth, ninth and tenth slightly decreasing in length from the sixth; the terminal claw minute; the first joint very small; the second and third about one-third of the length of the fourth. The denticulated spines placed in several rows of different sizes. The fourth, fifth and sixth joints armed with bristles most numerous at the distal extremities of the fifth and sixth joints.

The legs in the specimen collected are all imperfect but correspond in general shape to those of *A. glaber*, as shown in Dr. Hoek's figure. Of the first pair, the first, second and third joints are present; of the second, the first, second, third and fourth; of the third and fourth, the first, second, third, fourth and fifth. The joints of the first pair of legs are slightly shorter than those of the second pair, and the joints of second pair, are slightly shorter of those of the third and fourth pairs. Of the third pair, the first joint is nearly as long as the lateral process; the second nearly twice as long as the first joint, the third rather shorter than the first; the fourth joint about half as long again as the proboscis, and the fifth joint rather shorter than the fourth. The legs are hairless. The fourth and fifth joints where present are furnished with a row of minute tubercles upon the dorsal surface, such as is found in *Ascorhynchus glaber*.

The specimen collected is a male, the fourth joint of the legs being slender, the genital pores minute, and the ovigerous legs well developed. The genital pores are situated on the ventral extremity of the second joint of the two posterior pairs of legs.

Color of the dried specimen, a light yellowish brown.

Length of the proboscis, 12.5 mm.

Length of the trunk, 18.5 mm.

Length of the abdomen, 6.0 mm.

Length of the whole body, 37.0 mm.

¹ 'Challenger' Pycnogonida, pp. 53-55, Pl. VI, figs. 5-9; Pl. XV, fig. 16.

This is a very fine species, much larger than any other species of the genus yet known. The only other species which approach it in size are *Ascorhynchus glaber* and *Ascorhynchus orthorhynchus*. It is nearly half as long again as *Ascorhynchus glaber*, the larger of these two species.

It is closely allied to the latter species, but differs from it in the following well-marked characters:—

1. The proboscis is divided into two portions, is truncated and not longitudinally furrowed while in *A. glaber* it is divided into three portions, is sharply pointed and each of its three sides is longitudinally furrowed.

2. The oculiferous tubercle bears four distinct eyes, whereas in *A. glaber* it is entirely destitute of eyes.

3. The surface of the whole body is covered with a very minute granulation, whereas in *A. glaber* it is entirely smooth, with the exception of the dorsal cephalo-thoracic spines.

It will be seen from the above description that this is a species of great interest. The form to which it is closely related, *A. glaber*, was dredged in the Southern Ocean, between the Cape of Good Hope and Kerguelen Island in 1375 fathoms. The species from Japan was obtained in shallow water. The presence of eyes in *A. Japonicus* and the simple character of the proboscis, divided into two portions instead of into three, causes the question as to whether this species does not represent the ancestral type of *A. glaber*, which may have become adapted to deep water and migrated southwards.

Dr. Hoek in his monograph of the Pycnogonida collected by the Challenger Expedition, gives a list of the species then known. The following species of *Ascorhynchus* have been described since, all from Japan:—

A. cryptopygius, Ortmann, Zool. Jahrb. Bd. 5, p. 159, Taf. XXIV, fig. 2, 1890.

A. glabroides, Ortmann, op. cit., p. 160, Taf. XXIV, figs. 3a, 3b.

A. bicornis, Ortmann, op. cit., p. 162.

Of the nine species now known, five are peculiar to Japan.

EXPLANATION OF PLATES.

PLATE VII.

Fig. 1. *Nardoa semiregularis* var. *Japonica*, dorsal surface, natural size.

Fig. 2. Ventral surface, natural size.

Fig. 3. Portion of the dorsal surface of an arm, enlarged.

Fig. 4. Portion of the ventral surface enlarged.

- Fig. 5. *Astropecten Japonicus*, dorsal surface, natural size.
 Fig. 6. Ventral surface, natural size.
 Fig. 7. Portion of the dorsal surface of an arm, enlarged.
 Fig. 8. Portion of the ventral surface, enlarged.
 Fig. 9. Portion of the side of an arm near its base, enlarged.

PLATE VIII.

- Fig. 1. *Astropecten scoparius*, dorsal surface, natural size.
 Fig. 2. Ventral surface, natural size.
 Fig. 3. Portion of ventral surface, of an arm, enlarged.
 Fig. 4. Portion of dorsal surface enlarged.
 Fig. 5. *Asterias Amurensis*, dorsal surface, natural size.
 Fig. 6. Ventral surface, natural size.
 Fig. 7. Portion of the dorsal surface of an arm, enlarged.
 Fig. 8. Portion of ventral surface, enlarged.

PLATE IX.

- Fig. 1. *Cribrella sanguinolenta*, dorsal surface, natural size.
 Fig. 2. Ventral surface, natural size.
 Fig. 3. Portion of dorsal surface of an arm, enlarged.
 Fig. 4. Portion of ventral surface, enlarged.
 Fig. 5. *Luidia quinaria*, dorsal surface, natural size.
 Fig. 6. Ventral surface, natural size.
 Fig. 7. Portion of dorsal surface of an arm, enlarged.
 Fig. 8. Portion of the side of an arm near the base, enlarged.
 Fig. 9. Portion of the ventral surface of an arm, enlarged.

PLATE X.

- Fig. 1. *Asterina pectinifera*. Dorsal surface, natural size.
 Fig. 2. Ventral surface, natural size.
 Fig. 3. Portion of dorsal surface, enlarged.
 Fig. 4. Portion of ventral surface, enlarged.

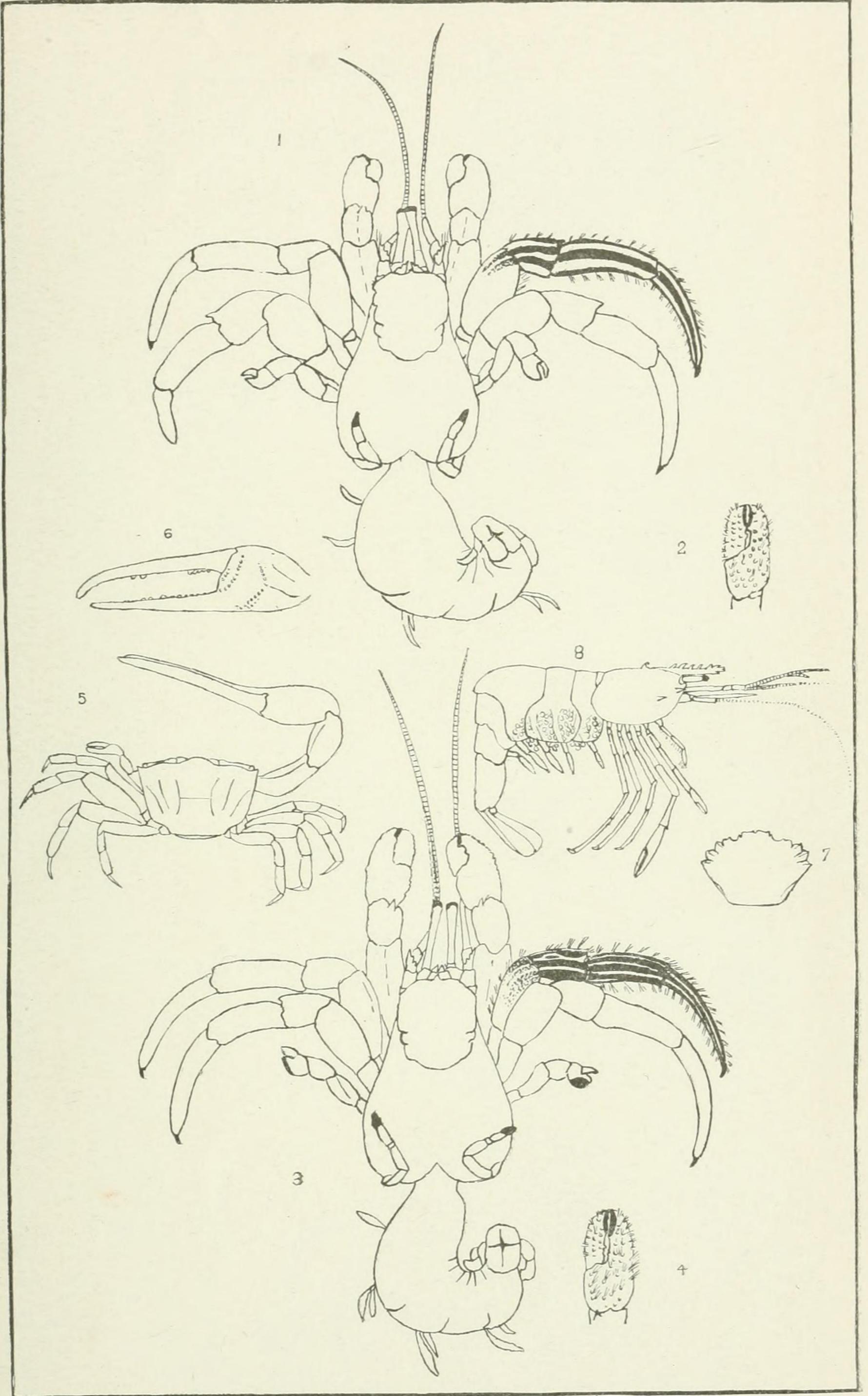
PLATE XI.

- Fig. 1. *Pectinura Stearnsii*. Dorsal surface, natural size.
 Fig. 2. Ventral surface, natural size.
 Fig. 3. Portion of the dorsal surface of an arm near the base, enlarged.
 Fig. 4. Portion of ventral surface of an arm near the base, enlarged.

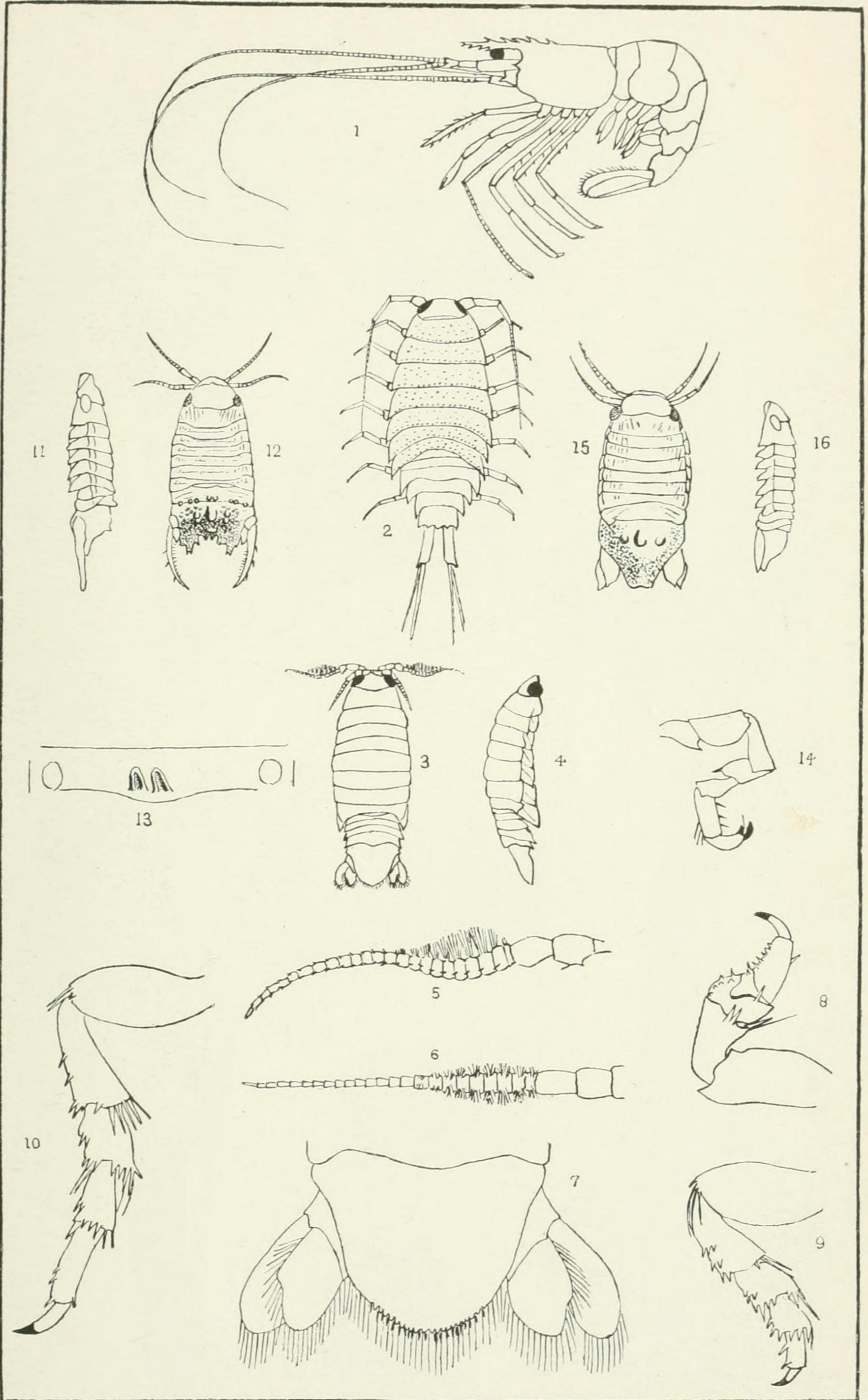
- Fig. 5. Portion of the side of an arm near the base, enlarged.
Fig. 6. *Ophioplocus imbricatus*. Dorsal surface, natural size.
Fig. 7. Ventral surface, natural size.
Fig. 8. Portion of the dorsal surface of the disk and an arm, enlarged.
Fig. 9. Portion of the ventral surface of the disk and an arm, enlarged.
Fig. 10. Portion of the side of an arm near the base, enlarged.

PLATE XII.

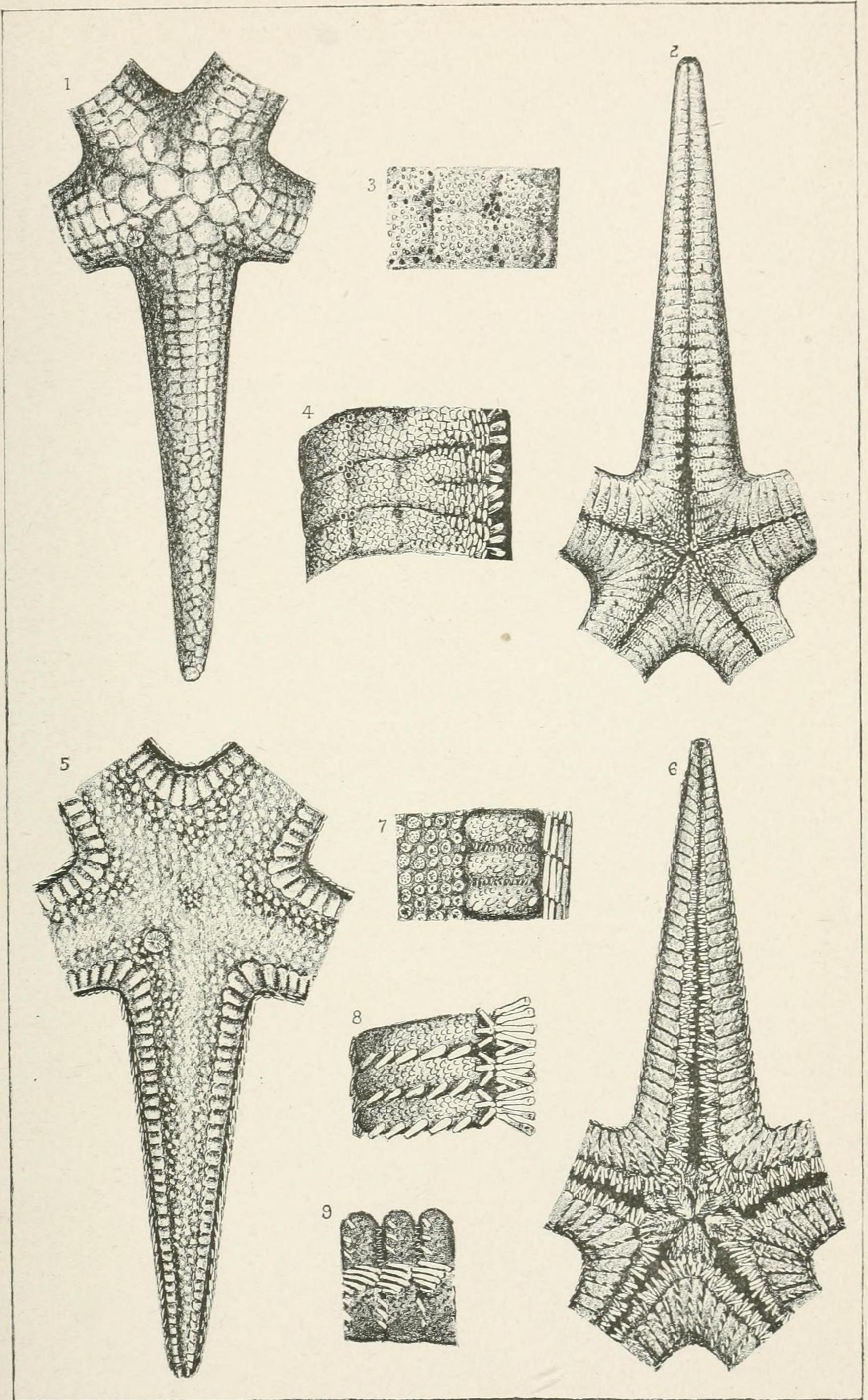
- Fig. 1. *Cryptodromia Stearnsii*, dorsal surface, natural size.
Fig. 2. Ventral surface, natural size.
Fig. 3. Left side of the carapace, natural size.
Fig. 4. *Ascorhynchus Japonicus*, dorsal surface, natural size.
Fig. 5. Ventral surface, natural size.
Fig. 6. Right side of the trunk with anterior appendages, without the legs, natural size.
Fig. 7. Oculiferous tubercle, viewed from the right side, enlarged.
Fig. 8. Oculiferous tubercle, viewed from above, enlarged, *a* anterior margin, *b* posterior margin.
Fig. 9. Fifth joint of the fourth leg on the right side, enlarged.
Fig. 10. Mandibles, viewed from above, enlarged.

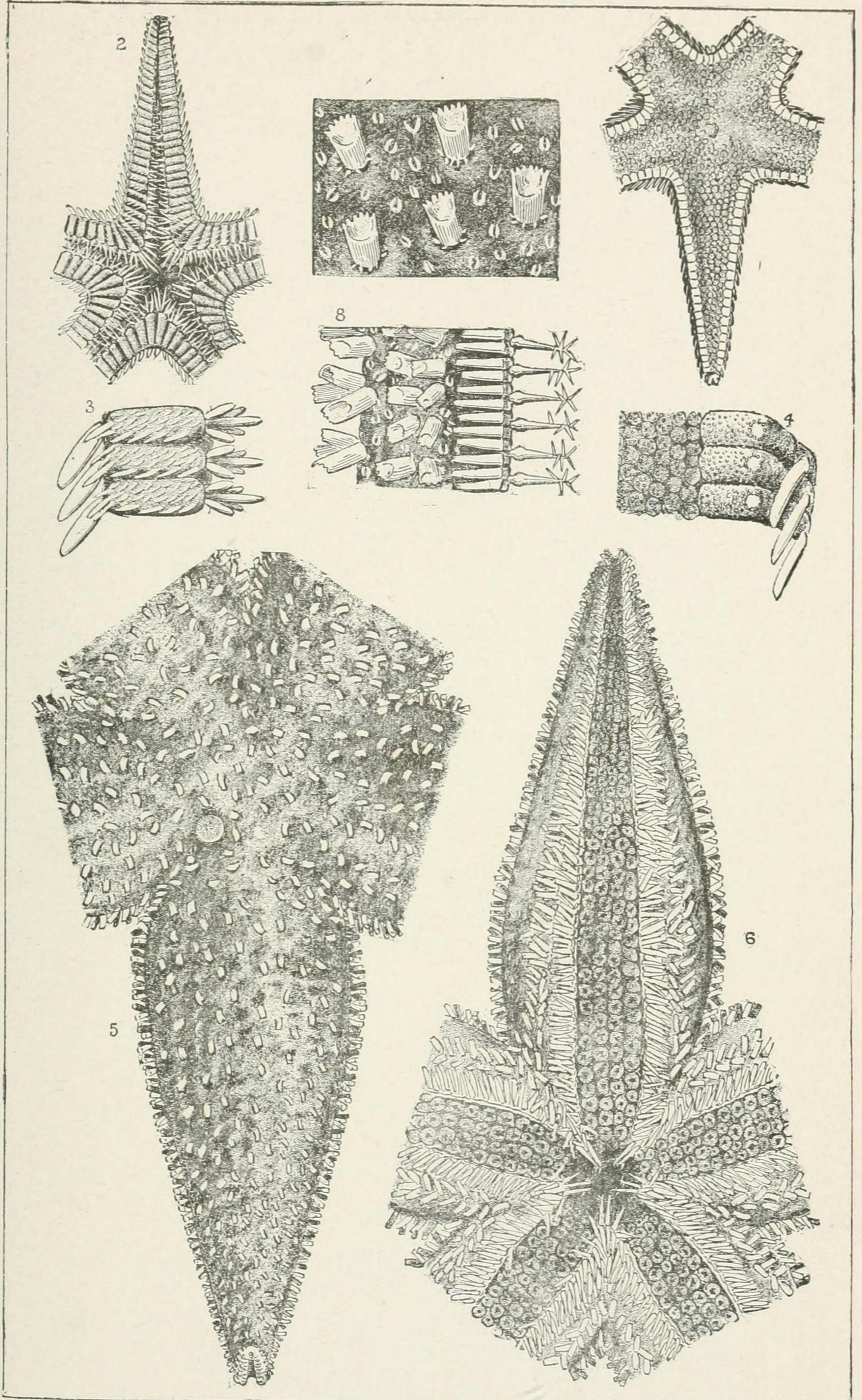


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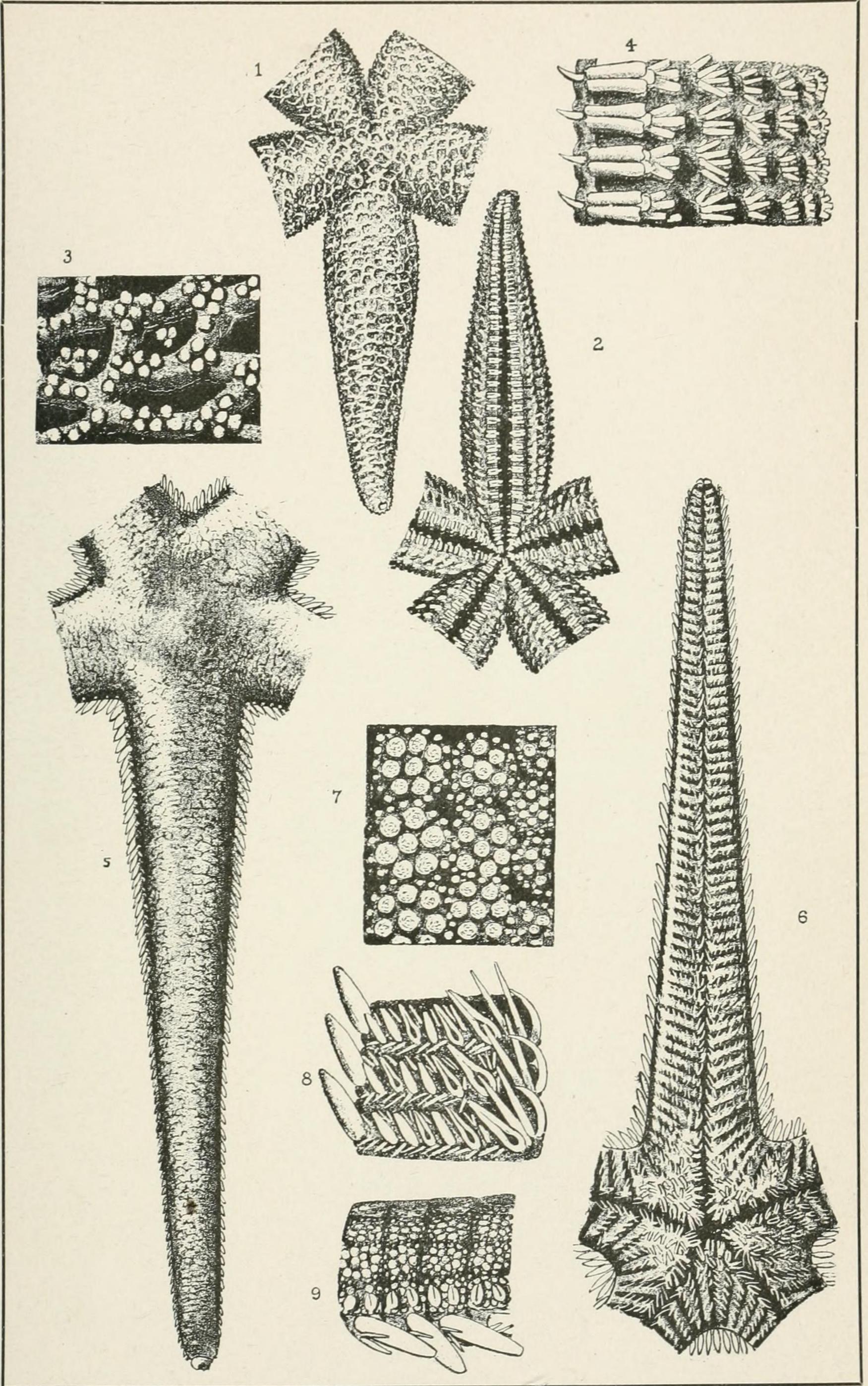
Ives, del.





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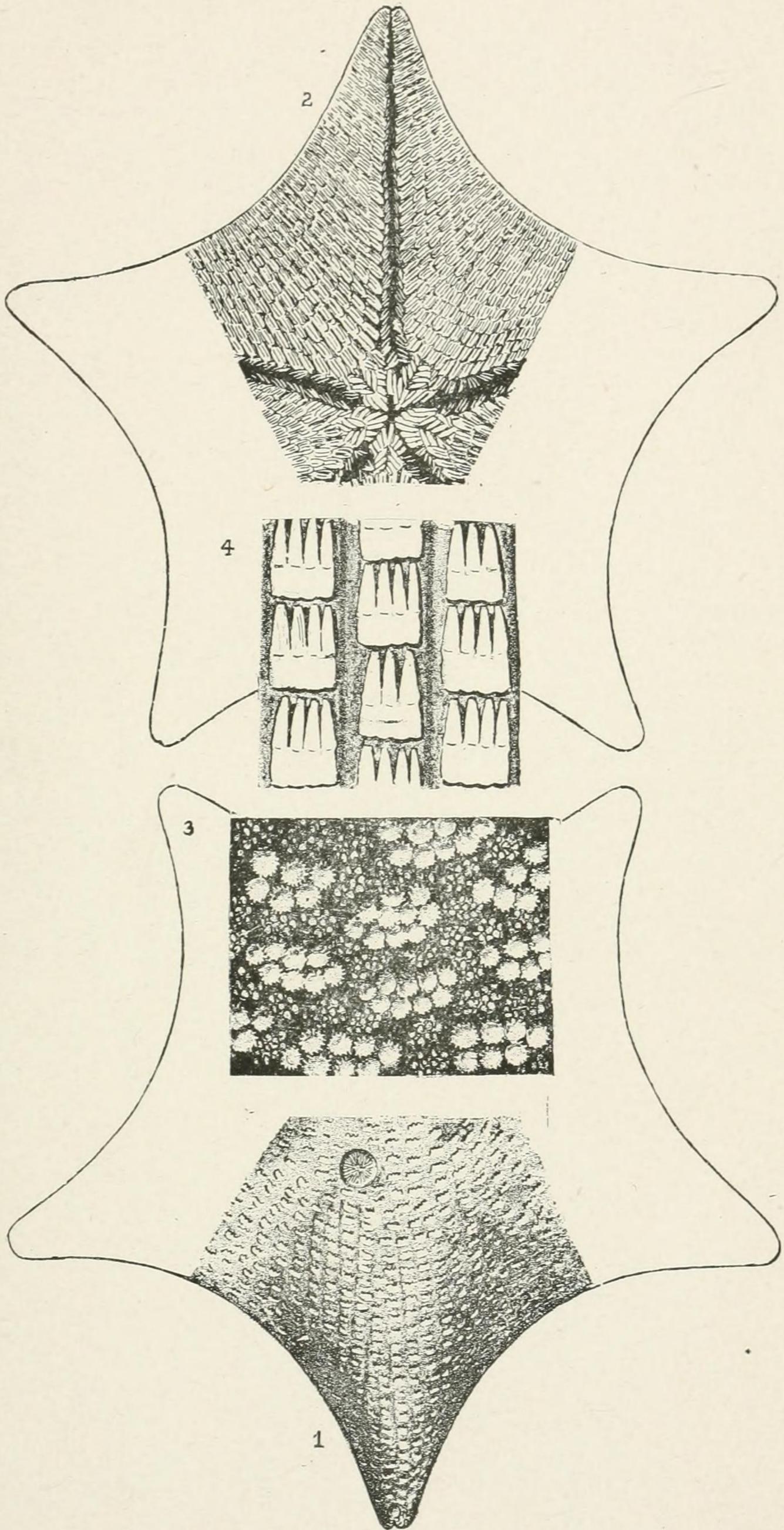
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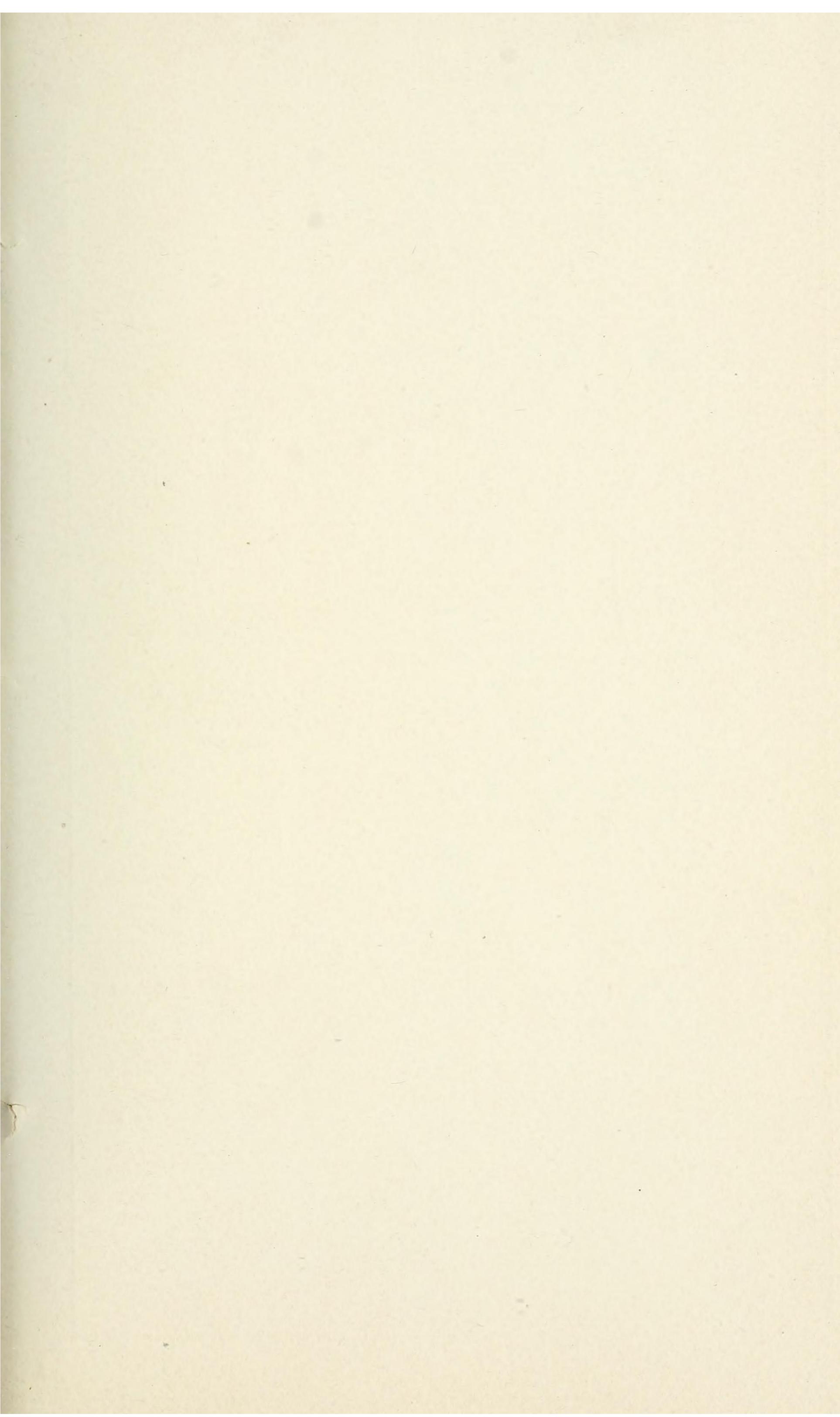


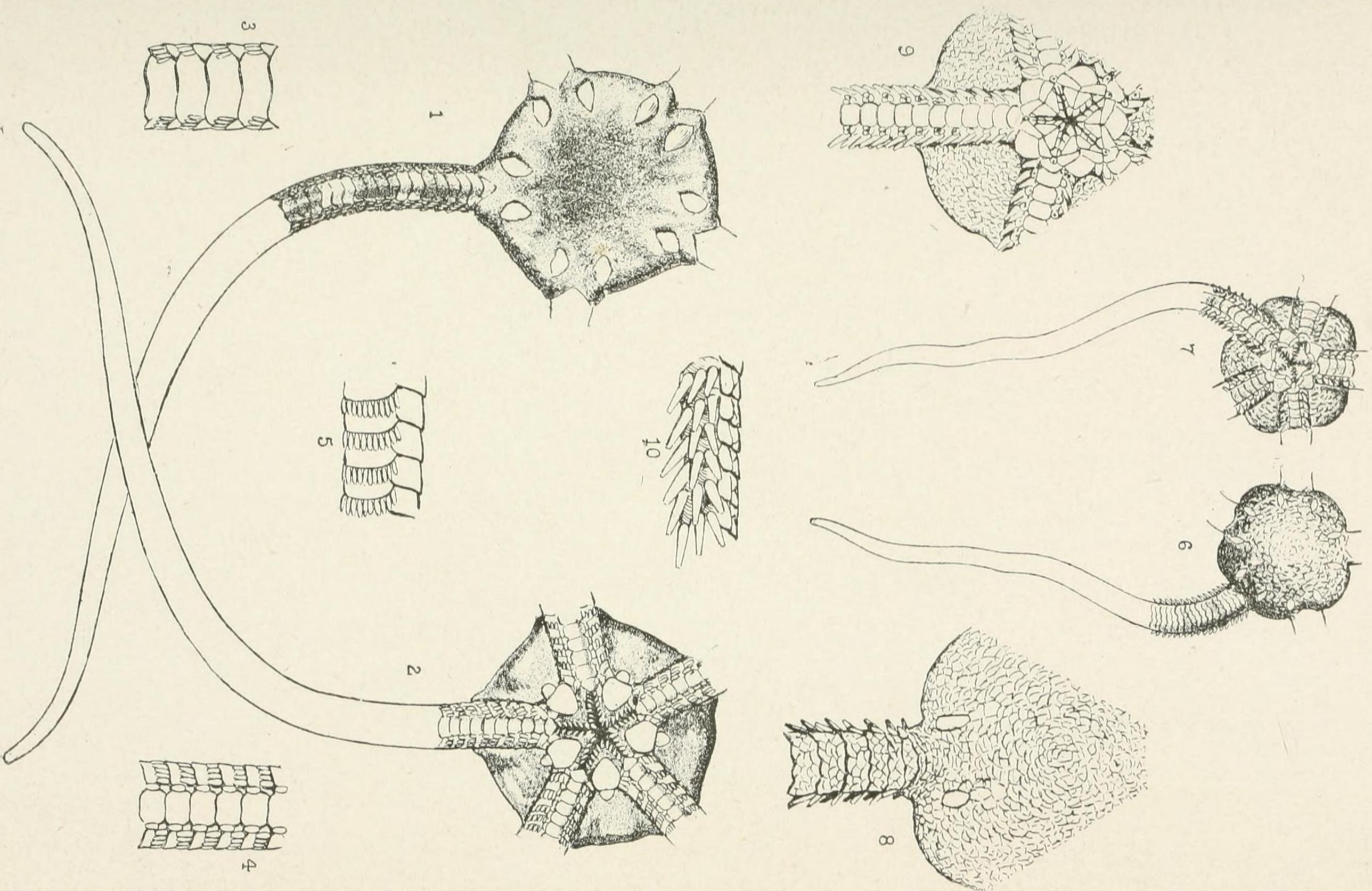
E. J. Lutz, del.

IVES, JAPANESE ECHINODERMS, ETC.



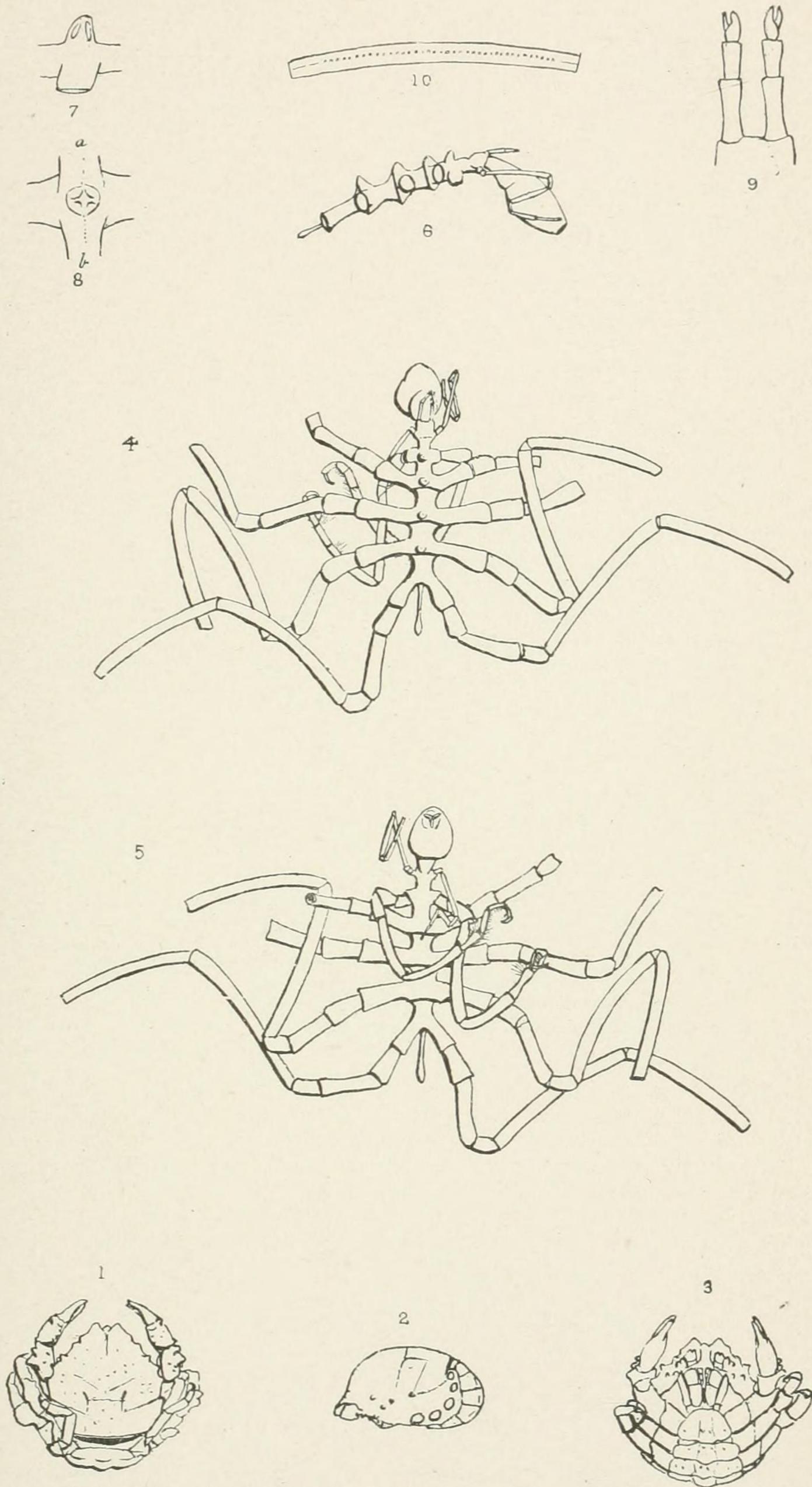






E. J. Lutz, del.

IVES, JAPANESE ECHINODERMS, ETC.



J. E. Ives, del.

IVES, JAPANESE ECHINODERMS, ETC.

