

SMITHSONIAN MISCELLANEOUS COLLECTIONS

VOLUME 91, NUMBER 24

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REPORTS ON THE COLLECTIONS OBTAINED BY THE FIRST
JOHNSON-SMITHSONIAN DEEP-SEA EXPEDITION
TO THE PUERTO RICAN DEEP

FOUR NEW BRITTLESTARS FROM PUERTO RICO

(WITH THREE PLATES)

BY

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FOUR NEW BRITTLESTARS FROM PUERTO RICO

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(WITH THREE PLATES)

Among the numerous brittlestars obtained by the First Johnson-Smithsonian Deep-Sea Expedition are three new species of the genus *Ophiomusium*, two of which are interesting in having the upper of the two arm spines transformed into a hook curving outward from the arm. There is also a new species of *Ophiocirce*, a genus of the family Ophioleucidae known heretofore only from the Philippine and Lesser Sunda Islands.

OPHIOMUSIUM REGULARE, n. sp.

Plate I, figs. 1, 2

Locality.—Caroline station 45; west of Puerto Rico (lat. $18^{\circ}03'45''$ N., long. $67^{\circ}48'10''$ W.); 240 to 300 fathoms; February 11, 1933. Eighteen specimens (U.S.N.M. nos. E.5194 [type] and E.5195).

Description.—The disk is pentagonal, slightly elevated centrally, 8 mm in diameter, and the slender arms are 28 mm long. The plates on the aboral surface of the disk are few in number.

The center of the disk is occupied by a central plate surrounded by five somewhat larger plates radially placed, between the bases of which, and adjoining the central plate, are five small triangular plates. From the outer edge of the radially placed plates to the arm base, separating the radial shields, runs a rather narrow row of four plates, the sides of this row converging for two-thirds of the distance to the arm base and then, on the last two plates, diverging again. In this row the innermost plate is the largest, the second is slightly to considerably shorter, the third is small, less than half the length of the second, and the fourth is somewhat longer than, and about twice as broad as, the third. On either side of the last (fourth) plate a band of low crowded papillae in three to four rows, which is nearly as broad as the length of the plate, separates the distal ends of the

radial shields from the arm base. In the interradial line a row of plates, of approximately the same width as the radial rows, runs from the central rosette to the edge of the disk. This row consists of three plates, first a six-sided plate about half again as long as broad, with the two distal outer sides converging to the rather narrow distal edge on which rests a long plate, more than twice as long as broad, with very slightly converging sides, which is followed by a much shorter, but slightly broader, plate, situated on the edge of the disk. On the outer edges of the radially placed plates and between the bases of the radial and interradial rows are one or two small rounded-triangular plates. The surface of all the plates on the abactinal surface of the disk is studded with small, regular, and closely set tubercles, those on the radial shields being rather larger and more widely spaced than those on the other plates.

On the oral surface the mouth shields are small, longer than broad, the outer half with the sides parallel, the inner half with the sides forming an angle of about 60° . The adoral shields are large, with about the same area as the mouth shields, wedge-shaped with straight sides, the outer end being about twice as broad as the inner. The jaw plates are low triangles bearing on their longest (outer) side a row of five blunt mouth papillae which slowly and gradually diminish in length and width toward the apex, where an unpaired triangular papilla lies on the suture between the jaw plates. The genital slits run from the pointed ventral ends of the bands of papillae that separate the radial shields from the arm bases, beneath the outer sides of the second side arm plates, to the obtuse angle in the lateral borders of the mouth shields. They are bordered with 12 to 14 flattened papillae with broadly rounded ends. Beyond the mouth shields is a large plate of about the same width, about twice as broad as long, which is often divided into two small plates. Beyond this is a larger rounded plate on the edge of the disk, between the upper portion of which and the large genital plate on either side is a single rounded and protuberant plate, with another similar but smaller one just beyond and nearer the interradial line.

There are three pairs of tentacle pores, each with a large rounded tentacle scale situated on the side arm plate.

The first side arm plate beyond the disk bears two short arm spines rather close together near the middle of its outer edge. The second bears one spine above the middle and two, close together, below, or only the latter, and those following to the eighth or tenth bear two short peglike spines close together below the middle. Beyond the eighth to tenth side arm plate the upper arm spine becomes trans-

formed into a stout, glassy tipped hook with the sharp, transparent point directed outward, and a supplementary sharp tooth below it, the lower arm spine remaining short, stout, and peglike.

OPHIOMUSIUM ROSACEUM, n. sp.

Plate 2, figs. 3, 4

Locality.—*Caroline* station 101; Virgin Islands (lat. $18^{\circ}45'40''$ N., long. $64^{\circ}48'$ W.); 300 fathoms; March 4, 1933. One specimen (U.S.N.M. no. E.5196 [type]).

Description.—The disk is circular, nearly flat, 6 mm in diameter, and the slender arms are 25 mm long. The plates on the aboral surface are few in number and regular in arrangement.

The center of the disk is occupied by a circular plate surrounded by five rounded slightly larger plates, radially situated, between the inner ends of which, and lying interradially on the central plate, are five small rounded triangular plates. Beyond each of the rounded radially situated plates is a triangular plate with somewhat convex sides that separates the inner thirds, or somewhat more, of the inner ends of the radial shields, which, except for this, are in contact. In the interradial line lying over the suture between each pair of rounded radially situated plates is a five-sided plate with the angles more or less broadly rounded, somewhat longer than broad, of which the two sides adjoining the radial shields converge to the distal edge, which is of about the same length. On the distal edge of this plate rests a very long plate with diverging sides that extends to the edge of the disk, separating the radial shields. The distal ends of the radial shields are separated from the arm base by a low triangular plate, the obtuse angle of which lies on the line separating the two radial shields of each pair.

On the oral surface the mouth shields are large; their distal edge is longer than the adjoining sides, which make a right angle with it. At the point where these sides turn to converge to the inner angle the plate is abruptly produced laterally in the form of a broad angular point supporting the inner end of the large genital plate. Resting on the distal edge of the mouth shields is a large trapezoidal plate occupying the entire area between the genital plates, which is gradually and regularly curved upward so as to form the interradial-lateral edge of the disk. The jaw plates are large, triangular, and rather more than twice as broad as high. They are bordered with five mouth papillae of uniform height, of which the first and third, counting from the base, are twice as long as the others, or even longer. The apex of the

jaws is provided with a large broadly rounded triangular papilla. The genital slits are strongly sinuous.

There are two pairs of tentacle pores, which are completely closed by single large oval tentacle scales situated on the side arm plates. The under arm plates beyond the second pair of tentacle pores are exceedingly minute.

The first side arm plate beyond the disk bears three short peglike similar arm spines, evenly spaced. The second and following side arm plates bear four, of which the second from the oral side is much stouter than the others, with the inner side strongly convex and a sharp glassy point at the outer side of the distal end. Further out the arm spines become reduced to three, of which the middle one is hooked and curves outward from the arm, and in the outer part of the arm there are only two arm spines, situated close together on about the middle of the side arm plate, the lower very short and of normal form, the upper stouter and hooked.

OPHIOMUSIUM ALECTO, n. sp.

Plate 2, figs. 5, 6

Locality.—*Caroline* station 100; northeast of Puerto Rico (lat. $18^{\circ}40'15''$ N., long. $64^{\circ}50'15''$ W.); 150 fathoms; March 4, 1933. One specimen (U.S.N.M. no. E.5197).

Description.—The disk is circular, somewhat elevated, 4 mm in diameter, and the slender arms are 10 mm long.

The center of the disk on the aboral side is occupied by a pentagonal plate with slightly concave sides which is surrounded by a closed ring of five larger seven-sided plates, of which the two distal sides lie on the inner portion of the lower border of the radial shields. In the angles between the plates of this circlet lie pentagonal plates. Beyond each of these pentagonal plates a long plate with slightly diverging sides runs to the edge of the disk and separates the radial shields. The radial shields are separated from the arm bases by a triangular plate not quite twice as broad as long with truncated lateral angles, adjoining which are two small triangular supplementary plates, one on either side.

The oral side of the disk is covered by a thick skin which more or less conceals the outlines of the underlying plates, even when dried. The mouth shields are five-sided, and about as long as broad. In contact with their outer edge is a large trapezoidal plate that occupies the entire space between the genital plates and, turning upward and inward so abruptly as to form a rather sharp keel, forms the side of

the disk. The genital slits are rather short and are slightly sinuous. The papillae bordering the 10 genital slits and the 5 mouth slits are rather abruptly elevated.

There are two pairs of tentacle pores, each of the pores protected by a single large rounded tentacle scale attached to the side arm plate. There are four arm spines, the two lowest longer and stouter than the two uppermost, the second from the oral surface being the largest and longest. The two uppermost arm spines are short and slender; one of these, the shorter, is situated on the upper surface of the side arm plate and is directed forward.

OPHIOCIRCE ANTILLARUM, n. sp.

Plate 3, figs. 7-9

Locality.—*Caroline* station 99; off the Virgin Islands (lat. $18^{\circ}40'$ N., long. $84^{\circ}51'$ W.); 220 fathoms; March 3, 1933. Thirteen specimens (U.S.N.M. nos. E.5198 [type] and E.5199).

Description.—The disk is approximately circular, bowing outward between and more or less strongly incurved over the arm bases, flat and thick, 4.5 mm in diameter. The arms are 38 mm long. They are slender and evenly tapering. In cross-section they form aborally a sharp right angle with straight sides; orally they are lower, with a broadly rounded angle; the lateral angles are abrupt, but rounded.

The aboral surface of the disk is densely beset with minute slightly roughened granules which are about twice as large as those on the disk of *Ophiopyren longispinus*. Ordinarily the radial shields are completely covered, but the granules may be rubbed off from their well separated outer ends. Beyond the radial shields the granules extend over the proximal half of the first upper arm plate.

On the oral surface the granules are continued inward over all the plates to the bases of the mouth papillae. They are less crowded here than on the aboral surface. In most instances in the specimens as preserved they have been rubbed off the mouth shields, and more or less extensively removed from the other plates. The mouth shields are triangular with the lateral angles rounded, slightly broader than long. The adoral shields are large with approximately parallel sides. They extend distally for about one-third of their length beyond the lateral angles of the oral shields, and are proximally broadly in contact beyond them. The jaw plates are small, very low triangular. The mouth papillae number seven on each side of the mouth angle. The outermost is large and broadly rounded, and is attached to the adoral shield. The second is similar but slightly smaller, and is attached to

the jaw plate where it adjoins the adoral shield. The third is intermediate between the second and the other four, which are much narrower and pointed, those on either side of the apex of the mouth angle being the longest and most robust. There are four rather long, narrow, lanceolate, pointed teeth, and above these a single similar, but narrower, tooth papilla, almost on a level with the adjacent mouth papillae, which it resembles except that it is longer and stouter.

The second and third under arm plates are slightly broader than long with the distal edge gently concave, the distal angles broadly rounded, and the lateral edges excavated by the oval tentacle pores, and the proximal angles truncated by the side arm plates. Distally the under arm plates become narrower with slightly convex distal ends sometimes with a slight median depression or notch, and the truncation of their proximal angles rapidly increases until after about the fifteenth-seventeenth they end proximally in a sharp or slightly truncated angle, the side arm plates almost or quite meeting beneath them, and are half again as long as their distal edge, just beneath the outer ends of which the circular tentacle pores lie. Further out they become narrowly fan-shaped with a long narrow proximal angle beyond which the sides are excavated by the tentacle pores, and by the meeting of the side arm plates beneath them become separated from each other for a distance equal to about half their length. The distal edge of the under arm plates is convex, that of the larger proximal ones being more or less markedly biconvex with a median sharp or rounded notch. The earlier under arm plates, up to about the twentieth, have a fine median longitudinal line that distally becomes obscure. The surface of the plates is highly polished and glassy, and is finely sculptured with transverse lines.

The second and third upper arm plates are trapezoidal, much broader than long, the fourth is about as long as the distal width, and those following gradually decrease in width, at about the seventeenth becoming narrowly fan-shaped with a very acute proximal angle, and about twice as long as the distal width. Distally they become exceedingly small, and are widely separated by the side arm plates. The aboral surface of the arm is sharply and conspicuously carinate, and the large proximal upper arm plates tend to split into two parts along the carinate midline.

The lateral edges of the arm are more or less sharply carinate, the carinate ridge being sometimes more or less finely spinous. The lateral and aboral carination is accentuated by the slight excavation or depression of the aboral portion of the large side arm plates. The

lateral edges of the side arm plates diverge slightly so that the lateral profiles of the arm are somewhat serrate.

The arm spines are two in number, the lower situated on the lateral carinate ridge and the other just above and almost in contact with it. In the first pair the lower spine is about equal to the length of the succeeding side arm plate, and the higher is about one-third again as long. In the second pair the spines are larger and longer; the lower is nearly equal in length to two side arm plates, and the upper is similar, but longer, equal in length to about two and one-half side arm plates. The spines of the succeeding pairs decrease in length, those of the ninth and following pairs being scarcely longer than a side arm plate. On the outer portion of the arms the spines are similar, from one-third to one-half again as long as a side arm plate, the upper slightly the longer.

The first tentacle pore has two large rounded tentacle scales situated distal to it. The first brachial tentacle pore has two large rounded tentacle scales situated on the abradial side. The pores following have each a single large and conspicuous tentacle scale. At the base of the arms this is about twice as long as broad with the proximal end broadly and evenly rounded, the sides parallel or slightly convergent, and the distal end deeply notched. Outwardly the tentacle scale increases in relative length, becoming about four times as long as broad with a deep and narrow distal notch. Here it is about as long as the distance from its base to the distal edge of the under arm plate next proximal to it. The tentacle scale is thin and strongly curved so that it is approximately one-quarter of a hollow cylinder of equal length. This has the effect of making the outer borders appear much more opaque and dense than the central glassy strip which, in connection with the sharp and produced distal angles, gives the general effect of two spiniform tentacle scales situated side by side.

EXPLANATION OF PLATES

PLATE 1

- FIG. 1. *Ophiomusium regulare*, n. sp., the type specimen (U.S.N.M. no. E.5194) from *Caroline* station 45, aboral surface. $\times 3$.
- FIG. 2. *Ophiomusium regulare*, n. sp., the specimen shown in figure 1, oral surface. $\times 3$.

PLATE 2

- FIG. 3. *Ophiomusium rosaceum*, n. sp., the type specimen (U.S.N.M. no. E.5196) from *Caroline* station 101, aboral surface. $\times 3$.
- FIG. 4. *Ophiomusium rosaceum*, n. sp., the specimen shown in figure 3, oral surface. $\times 3$.

FIG. 5. *Ophiomusium alecto*, n. sp., the type specimen (U.S.N.M., no. E.5197) from *Caroline* station 100, aboral surface. $\times 3$.

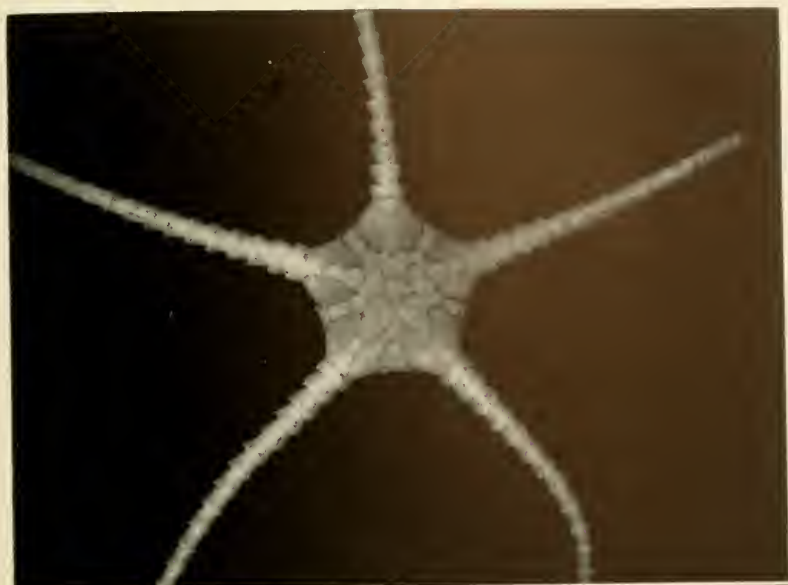
FIG. 6. *Ophiomusium alecto*, n. sp., the specimen shown in figure 5, oral surface. $\times 3$.

PLATE 3

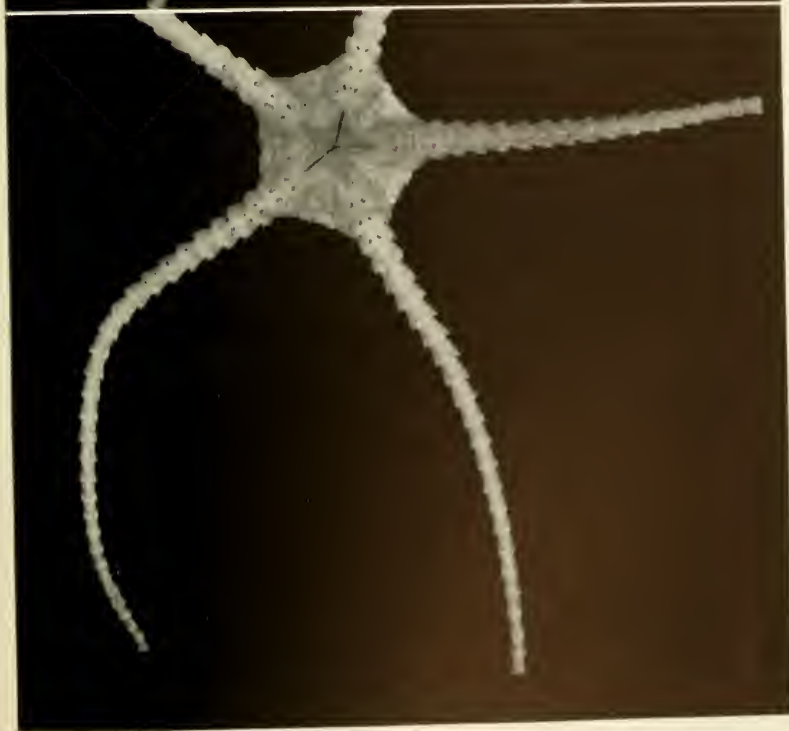
FIG. 7. *Ophiocirce antillarum*, n. sp., the type specimen (U.S.N.M. no. E.5198) from *Caroline* station 99, aboral surface. $\times 3$.

FIG. 8. *Ophiocirce antillarum*, n. sp., the specimen shown in figure 7, oral surface. $\times 3$.

FIG. 9. *Ophiocirce antillarum*, n. sp., cotypes from *Caroline* station 99 (U.S.-N.M. no. E.5199). $\times 3$.

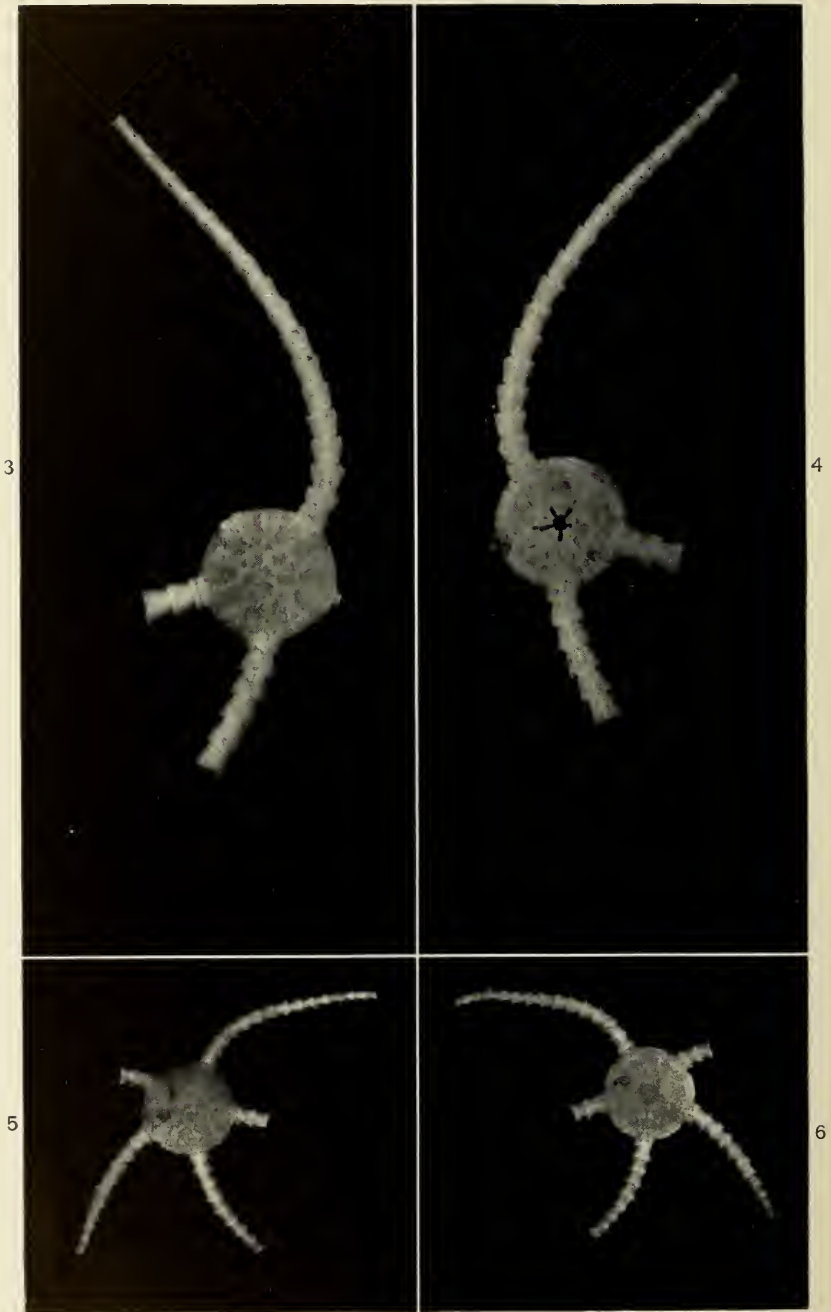


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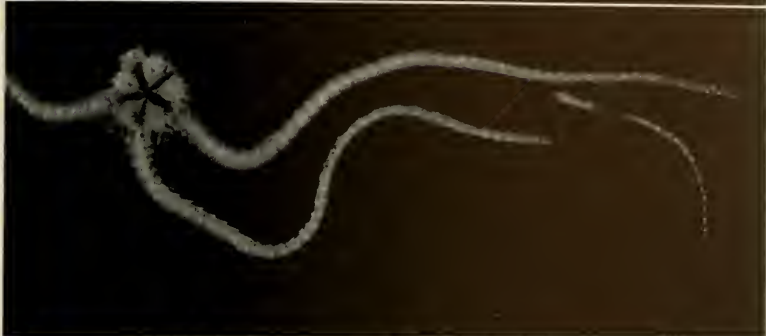
OPHIOMUSIUM REGULARE
(For explanation, see p. 7.)



OPHIOMUSIUM ROSACEUM (ABOVE) AND O. ALECTO (BELOW)
(For explanation. see pp. 7, 8.)



7



8



9

OPHIOCIRCE ANTILLARUM
(For explanation, see p. 8.)