

Family ASTERIDAE Gray, 1840

Genus SCLERASTERIAS Perrier

Discussion.—The present specimens and those described by Blake and Zinsmeister (1988) are readily assigned to the Asteriidae based on general form, the presence of compressed ambulacral column ossicles, four rows of podia, and small, cross-shaped body ossicles.

Genera and species of living asteriids are based largely on arrangement of body ossicles and the nature and arrangement of pedicellariae. Unfortunately, ossicular arrangement usually is significantly disrupted in fossil asteriids, and pedicellariae are almost always lost; the few that might remain cannot be relied upon to provide much information either on original form or distribution. Based on the generic revision of Fisher (1928), relatively poorly preserved Seymour Island specimens were assigned to *Sclerasterias* by Blake and Zinsmeister (1988); more complete material now available indicates that this assignment was reasonable, although the absence of pedicellariae makes interpretation difficult.

Assignment of the La Meseta fossils to *Sclerasterias* is based on the presence of a small disk and apparently pentagonal arms, and a dorsal skeleton consisting of regular transverse and longitudinal rows of lobate ossicles. Only one lateral ossicular series is present, and intermediate ossicles between the radial and superomarginal series are not developed. Many, but not all radials, laterals, and superomarginals bear prominent columnar spines, and a prominent lobe extends ventrally on individual ossicles of the superomarginal series. The actinal ossicles occur in a single series, although they can appear double locally, probably due to collapse in preservation. Adambulacrals are diplacanthid.

SCLERASTERIAS ZINSMEISTERI new species

Figure 4.6–4.13

Sclerasterias? sp. BLAKE AND ZINSMEISTER, 1988, p. 495, fig. 4.5–4.9.

Diagnosis.—*Sclerasterias* species with robust ossicles. Dorsally, one connecting ossicular series present, that between lateral series and superomarginal series. Radials and marginals with zero, one, or two spines and spine bases; superomarginals with medial spine base alternating with those either lacking bases, or less frequently, those with spine bases displaced laterally on descending ossicular lobe. Some superomarginals with two spine bases.

Description.—(Augmenting Blake and Zinsmeister, 1988) Central area of disk rather lightly constructed, interbrachial ossicles stout. Radial ossicular series clearly defined, ossicles gradually decreasing in size distally. Radial ossicles cruciform with lateral flanges approximately perpendicular to proximal-distal axis; length, breadth of medial ossicle about 5 mm, central region of ossicle small, medial spine bases one or two; spines stout, abruptly tapering, up to 4 mm long. Lateral ossicles present in single series on each side of radial series; laterals rectangular to weakly elliptical, transversely elongate, rather flat, with large medial spine base on at least proximal ossicles. Interossicular papular pores large. Secondary connecting series apparently linked to laterals and superomarginals near disk but absent from remainder of arm; connecting ossicles simple, rod-like. Ossicles of marginal series paired, quite strongly overlap-

ping proximally. Superomarginals rather low, cruciform, central area large, with prominent abradial flange, strongly overlapping proximally. Zero, one, or two spine bases present on superomarginals; ossicles with medial bases alternating with those lacking base, or those with base laterally offset, or with two bases. Medial superomarginals approximately 4 mm long on larger specimens, actinal flange about 2.5 mm long, abactinal flange about two-thirds length of actinal. Inferomarginals similar in size to superomarginals but thicker, with central area more irregular. Inferomarginal medial abactinal flange length about 3 mm, other flanges probably weakly defined. Inferomarginals with one or two spine bases; spines on medial ossicles about 3 mm long, 4 mm on proximal ossicles. One or two rows of actinals present, these stout, elliptical, closely arranged, with medial spine base, small lateral flanges. Ambulacral column strongly compressed, adambulacrals diplacanthid, with stout conical spines up to 3 mm long, the spines forming strong ventral armor; ambulacrals robust, with well-defined podial openings. Pedicellariae rarely preserved lateral to radials.

Comparisons.—The skeleton of *S. zinsmeisteri* is robust as compared to living species, and only a single connecting ossicular row adjacent to the laterals is developed; most radials and superomarginals have spines, and some spines on the superomarginal series are offset.

Etymology.—The species is named for William J. Zinsmeister.

Material.—From Blake and Zinsmeister (1988), holotype designated herein, USNM 406174, paratypes designated herein, 412358 and 412359. Forty-three fragments collected from locality 86.5, paratypes 490431–490433, paratype suite 490434; and a single unillustrated paratype USNM 490435.

Class OPHIUROIDEA Gray, 1840

Order OPHIURIDA Müller and Troschel, 1840

Family OPHIURIDAE Lyman, 1865

Genus OPHIURA Lamarck, 1801

Remarks.—H. L. Clark (1911, p. 36) noted that “several very different generic types” and well over 100 species were included within *Ophiura*. In spite of the apparent need for generic revision, Mortensen (1927) and A. M. Clark and Courtman-Stock (1976) provided very useful diagnoses of *Ophiura*; the Seymour Island specimens are consistent in all essential aspects with these diagnoses. The following list of characters is based on these references; all apply to *O. hendleri* although they are not necessarily unique to *Ophiura* and presumably some might one day be deemphasized or dropped from a revised generic concept.

The dorsal surface of the fossil disks are flat and covered by many small, similar scales. The radial shields are distinct rather than contiguous. An arm comb is present distal to each radial shield; each pair is separated by a notch across the arm. The primary plates on the dorsal surface of the disk are at most weakly differentiated. The dorsal profile of the arm of many species is arched, and arms issue from a reentrant in the disk; edges of the arm are bordered by a notch that extends to the ventral surface, and the notch is bordered by small papillae. The second tentacle pore is outside the mouth edge and opens into the mouth slit. Tentacle pores are associated with each arm segment apparently throughout the length of the arm, although they are small.

FIGURE 5—1–8, *Ophiura hendleri*, new species, showing general plate arrangements, all loc. 86-03; 1–4, 6, $\times 5$; 5, 7, 8, $\times 6$. 1, 2, dorsal view shows large radial shields, complex arrangement of smaller dorsal plates, arched dorsal surface of arm, ventral shows shape of shields, form of ventral plates, holotype, USNM 490436; 3, ventral view, paratype, USNM 490437; 4, 6, dorsal and lateral views, dorsal to right, paratype, USNM 490438; 5, ventral view, LACM 7187; 7, ventral view, LACM 7188; 8, dorsal view, LACM 7189.

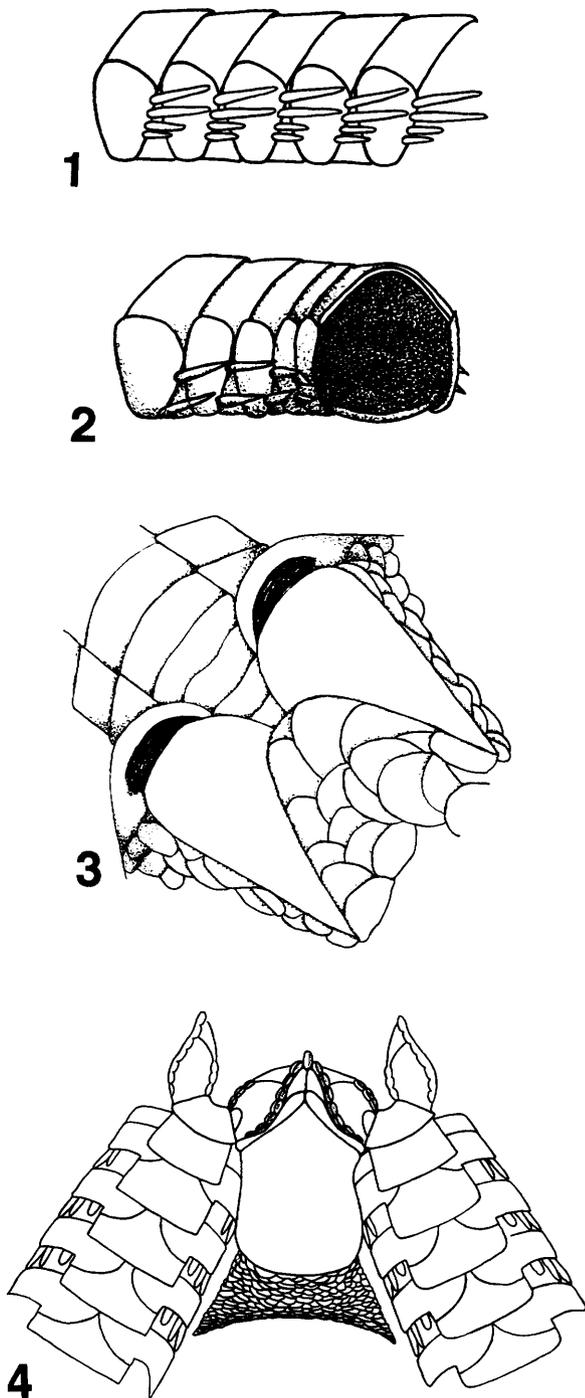


FIGURE 6—1-4, *Ophiura hendleri*, new species, generalized diagrams showing ossicular configuration with differences incorporated into drawings reflecting ranges of variation among specimens. 1, 2, lateral views of arm showing spine distribution and ossicular form, not all spines are shown on 2; 3, dorsal view of portion of the disk and one arm; radial shields are largest plates; 4, ventral view of portion of the disk and two arms; area around the mouth is somewhat obscured in available specimens; approx $\times 8$.

Among species assigned to *Ophiura*, size, shape and definition of radial shields, the primary plates, and other scales is varied, and *O. hendleri* lies within the range of variation, al-

though this is an unsatisfying foundation, reflecting the need for revision.

The name "*Ophiura*" has been applied to fossils as old as Cretaceous and questionably to Jurassic representatives (Spencer and Wright, 1966) as well, but no attempt was made here to reevaluate and revise earlier fossil assignments to *Ophiura*. Specimens of the species *Ophiura texana* (W. B. Clark, 1893) from the Cretaceous Washita Group of Texas were available; however, this species clearly is a congener of *O. hendleri* and therefore *O. hendleri* does not date from near the time of origin of the genus.

Ophiocten is similar to *Ophiura*; based on characters provided by Paterson et al. (1982, p. 110), *Ophiura*, including *O. hendleri*, is distinct in terms of connection of the second tentacle pores directly to the mouth slit, presence of well-developed arm combs, presence of a distinct notch at the base of the arm plates, and the shape of the arm plates, and presence of numerous tentacle scales.

OPHIURA HENDLERI new species

Figures 5.1-5.8, 6.1-6.4, 7.1-7.4, 7.6

Diagnosis.—*Ophiura* species with many similar thin, irregular?, overlapping, dorsal disk scales. Radial shields distinct, triangular, tapering sharply proximally, not contiguous. Arm dorsal surface arched, sides flat, spines 5, robust, short. Ventral arm plates robust, approximately first five ventral arm plates medially contiguous. Oral shields longer than wide; jaw plates prominent, weakly flaired; oral papillae truncate.

Description.—Disk diameter reaching at least 12 mm, arm length over 40 mm in specimen of disk diameter 10 mm; disk outline pentagonal with interbrachial outline typically slightly concave. Dorsal, ventral disk surfaces both probably fairly flat in life. In specimen of diameter 10.0 mm, arm width at base about 3.0 mm; at 10 mm, breadth nearly 2.0 mm. Arm cross section broadly rounded, dorsal midline of arm angular to sharply angular proximally becoming flatter toward the arm tip; arm flattened ventrally; arm tip attenuated. Surfaces of all ossicles covered by very fine (0.025 mm), closely arranged microgranular sculpturing.

Radial shields of pair 0.5-0.75 mm apart, triangular; in specimen of diameter 10.0 mm, exposed shield length about 2.5 mm, 1.5 mm at widest point, tapering distally to blunt terminus less than 0.5 mm distal to widest point; markedly tapering proximally to more or less acute point. Remainder of dorsal disk surface covered by small, thin, imbricate scales, sizes somewhat varied among individuals; scales at middle of disk more or less uniform, interradial scales can be enlarged; lateral, ventral interradial scales small.

Jaw plates robust, proximally-distally elongate, broadly in contact, nearly parallel-sided in some specimens to weakly flaring distally in others. Each jaw plate bearing one or two apical oral papilla, or possibly one on jaw plate pair; each side of jaw, adoral shields with a continuing series of six or seven blunt oral papillae. Distal papillae together with several adjacent ventral plates forming closing cover over second oral tentacle opening.

Oral shields pentagonal, width about three-fourths length, widest immediately proximal to distal side. Distal side broadly rounded, lateral sides weakly concave, with ossicular outline tapering very gradually proximally, proximal sides slightly concave, converging to form angular proximal margin. Adoral shields ovate or comma-shaped, broadly in contact medially, tapering laterally; proximal sides concave, distal side convex. Genital slits extend around lateral edge of disk; apparently bordered on both sides by series of small scales, more distal scales equidimensional, proximal scales elongate (but lost or obscured in most specimens).