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MIDGARDIA XANDAROS NEW GENUS, NEW  
SPECIES, A LARGE BRISINGID STARFISH FROM  
THE GULF OF MEXICO

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In the late summer of 1968 the Texas A&M University R/V "Alaminos" collected in the southern Gulf of Mexico what is probably the largest starfish on record. It proved to represent a new genus and species, and I thank Dr. Willis Pequegnat of Texas A&M University, chief scientist on the cruise, for allowing me to examine and describe the specimen. I am also grateful to the scientific staff and the crew of the "Alaminos" for their care in handling the dredge and removing the starfish from it so that the specimen could be photographed intact. Thanks are also due to Mr. Bela James for photographing the animal before it broke up, and to Dr. David L. Pawson for reading and advising me on the manuscript.

Starfishes of the family Brisingidae are notably fragile, having many long thin rays, sharply distinct from the small, round disc. Because of their general form and very brittle skeleton, as well as their remarkable ability to cast off rays at the slightest disturbance, brisingids bear a strong superficial resemblance to the Ophiuroidea. They occur only in deep water, and it is therefore most unusual to collect a whole fully grown specimen. Only the fortunate circumstances of using a dredge with a 3-meter-wide opening, and of its apparently picking up the specimen just before it left the bottom, so that the starfish caught in the front of the dredge and did not slide back into the box end, brought this animal to the surface intact. A second specimen in the same dredge haul was found in the box end, but it was, of course, in fragments.

## ORDER EUCLASTERIDA TORTONESE, 1958

With the characters of the family Brisingidae.

## BRISINGIDAE SARS, 1875

Rays many, deciduous, sharply distinct from small circular disc. Ambulacral and adambulacral plates vertebralike, not compressed. Tube feet biserial. Dorsal skeleton weak, never reticulate, confined to proximal third of ray. Pedicellariae abundant, crossed, never straight. Mouth plates expanded; mouth large, with broad peristomial membrane. Papulae lacking or confined to disc and/or genital region of rays. Marginal and adambulacral spines long, delicate, acicular, encrusted.

**Midgardia** new genus

With the characters of the type-species, *M. xandaros* new species.

*Etymology:* N., from the Midgard (middle earth) serpent, of Norse mythology, which lies at the bottom of the sea and encircles the earth.

**Midgardia xandaros** new species

*Etymology:* Gr., xandaros—a fabulous sea monster.

*Material examined:* Holotype (USNM E 11420), and one paratype, "Alaminos" Station 69-A-11, 19°02.6'N, 95°27.5'W, 250 fms, 18 August 1969. R—680 mm, r—13 mm, Rr—1:60.

The disc is small (approx. 29 mm diameter), and plane (height 7 mm), covered by a thin abactinal tegument containing numerous small round plates, most of them bearing a single small pricklelike acicular spinelet. There is a central anal pore surrounded by a dense cluster of these plates, the spinelets here being more numerous and slightly longer. Around the upper periphery of the disc, there is a single row of small papulae, two over each arm. The tumid, almost conical madreporite is at the edge of the disc, interradial, irregular, and wartlike.

There are 11–12 long (approx. 600 mm), attenuate arms, covered abactinally with a thin tegument. Starting at about the 4th adambulacral, there are 25–28 costal arches, some incomplete (strongest and most complete over the genital region). From about the 10th adambulacral to about the 22nd, the arm is inflated (genital region). Beyond the gonadal swelling, the arches become thinner and eventually disappear altogether, being replaced by dense bands of small pedicellariae. The costae, of elongate, imbricate plates, arise from the center of each adambulacral and meet (or, frequently, pass) each other in the carinal region of the arm. Most of the costal plates bear a small, pricklelike acicular spinelet. Numerous flat, thin, irregularly rounded plates are scattered in the tegument between the costae in the genital region; elsewhere, these plates are absent, and the ambulacrals are plainly visible thru the thin tegument.

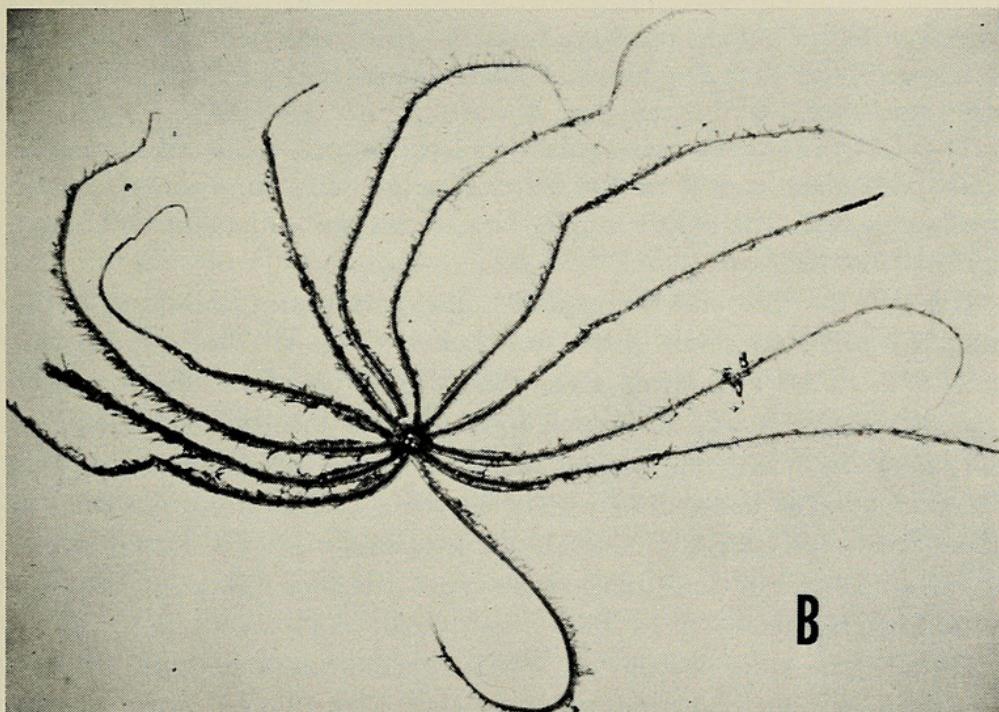
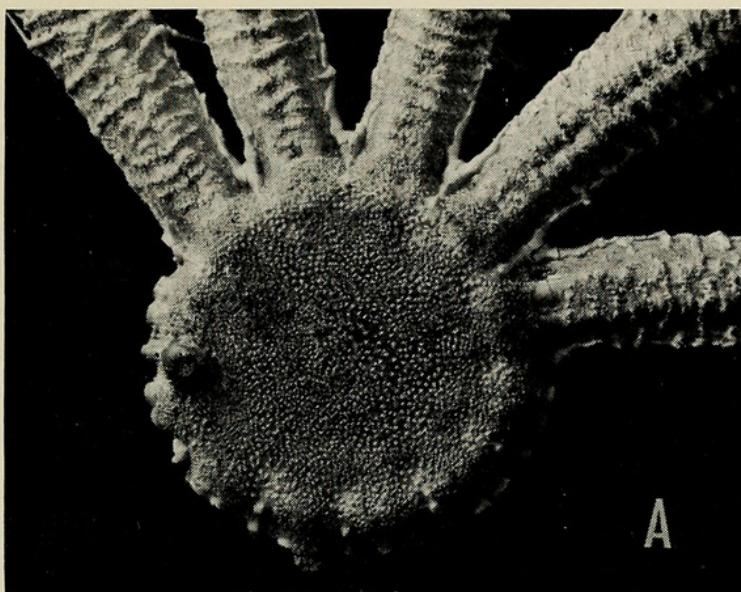


FIG. 1. *Midgardia xandaros* new genus, new species, holotype (USNM E 11420), A, Abactinal surface of the disc; actual size, disc diameter = 26 mm. B, Overall view of actinal surface, taken aboard ship immediately after removal from dredge; actinal size, arm tip to arm tip = 1380 mm.

There is a continuous heavy calcareous ring around the disc inside the mouth, and the mouth plates rest on and are partially fused to it. The mouth plates are smaller than the first adambulacrals and bear, on the oral edge, 2-4 slender delicate spines; there is a single similar

spine at the distal outer corner of the plate. On the actinal face is a much larger, long acicular spine. The second ambulacrals are compressed between the massive, tumid, fused first ambulacrals which form the calcareous ring, and the normal, vertebralike third ambulacrals. The second ambulacrals and adambulacrals, together with the first pair of marginals, form the outer wall of the disc when the arms are removed. One of the paired marginals separates the adjacent adambulacrals, as in the genus *Brisinga*.

The ambulacral groove is broad and shallow. There is a deep channel for the radial water vessel, bridged over between each pair of ambulacrals by a narrow band of calcite. The long, biserial tubefeet terminate in small suckers and are stiffened at the base by a thin calcareous collar. They rest in very large cuplike basins between the ambulacrals. In dorsal aspect, the ambulacral pores are covered with a thin membrane which appears to be only slightly expandable; indeed, it can hardly be called an ampulla. The tubefeet, which were very long and agile in the living specimen, therefore probably had a limited ability to contract. Sars (1875), in his study of the structure of the related genus *Brisinga*, noted that the tubefeet were not so highly contractile as in other starfishes.

The vertebra-shaped adambulacrals each bear 3–4 fine sharp furrow spines, 1–2 mm long, 2 on the distal edge of the plate and 1–2 on the proximal edge. There is a single, larger, acicular subambulacral spine, up to 10 mm long.

Between the disc and the genital region of the arm, there are 11–13 marginal plates in single series, not bearing spines. The second marginal is modified to form an attachment on the oral face with the distal face of the first marginal (which forms part of the disc wall), and on the lateral face with the second marginal of the adjoining arm. From the beginning of the genital region on, there is one tumid marginal to about every other adambulacral, each bearing a very long acicular spine, up to 25 mm long beyond the genital region. There is only one series of marginals.

Distally, the arms become extremely attenuate, terminating in a tiny, broader-than-long, down-curved plate (less than .4 mm wide), armed on the actinal edge with small spines, so that it looks like a tiny cat's-paw with claws extended.

The subambulacral spines and marginal spines bear a flap of tissue at the tip, and all spines bear numerous pedicellariae.

The pedicellariae are very numerous, and frequently, in the ambulacral groove, a few are enlarged. They are hyaline, crossed, with two long, curved, almost C-shaped valves, finely denticulate at the upper end, and arising from a flat, oval, sieved base plate.

One or two inconspicuous paired gonopores appear on either side of 1–2 of the central costae of the genital region, on either side of the

arm between the marginals and the top of the arm. It was not possible to determine the exact arrangement of the gonads, but probably there were 4 to each arm (inferred from the disposition of the gonopores).

*Discussion:* This genus closely resembles *Brisingenes* Fisher in having a single circle of small papulae around the margin of the disc, 2 corresponding to each ray. The numerous pedicellariae strongly resemble those of *Brisingenes*, but unlike *Brisingenes*, this genus does not have any pedicellariae on the abactinal surface of the disc. It differs from *Brisingenes* mainly, however, in having the 1st pair of adambulacrals in each interbrachium separated by the intrusion of one of the paired marginals above. In this feature, it most closely resembles the genus *Brisinga* Asbjørnsen, the arrangement of the plates around the edge of the disc (with arms removed) being almost exactly as in Figs. 1 and 2 of Fisher's 1917 paper. However, this genus differs from *Brisinga* in having numerous intracostal plates in the tegument of the genital region. The genus to which this bears the closest resemblance is *Stegnobrisinga* Fisher; like *Stegnobrisinga*, there are numerous immersed plates in the intracostal tegument, the proximal adambulacrals are higher than long, and the proximal subambulacral spines acicular rather than truncate or flared-tipped. However, *Stegnobrisinga* has no papulae, according to Fisher, and the costae are much more numerous.

The holotype, a female, arrived at the surface whole, caught on the front of the dredge. It was bright red, and measured over 130 cm from arm tip to arm tip ( $R = 68$  cm). This is probably the largest brisingid on record, and may be the largest starfish known, although it is certainly not the bulkiest. The largest previously recorded starfish was a specimen of *Pycnopodia helianthoides*, from Puget Sound, reported by Dr. C. McLean Fraser to W. K. Fisher (1928); this specimen had a major radius of 40 cm. Prof. F. J. Bell (1889) recorded a specimen of *Luidia savignyi*, from Mauritius, as being the largest starfish, with a major radius of 37 cm. A specimen of *Luidia magnifica* from Hawaii, in the collection of the National Museum of Natural History, measures 40 cm ( $R$ ). Of course, *Pycnopodia* may weigh as much as 5 kilograms, while the dry weight of this specimen of *Midgardia* is only about 70 grams.

The gonads were ripe, and strands of large yolked orange eggs were present. As soon as the dredge was raised from the water and the specimen exposed to the air, it started to autotomize its arms, most of them breaking at the juncture with the disc. The second specimen was at the bottom of the dredge, and pretty well broken up. It was a male, and a quantity of bright red sperm oozed, apparently, from base of the arms, around the periphery of the disc. In both animals, the peristome was wide open, and no trace of food could be found. It is quite likely that this species, and possibly most of the Brisingidae, do not feed directly but absorb nutrients through the general body tissue.

LITERATURE CITED

- BELL, F. J. 1889. Note on a remarkably large specimen of *Luidia* from the island of Mauritus. Ann. N. H. iii, p. 422.
- FISHER, WALTER K. 1916. New East Indian Starfishes. Proc. Biol. Soc. Washington, vol. 29, pp. 27-36.
- . 1917. New genera and species of Brisingidae. Ann. and Mag. Nat. Hist., ser. 8, vol. 20, pp. 418-431.
- . 1928. Asteroidea of the North Pacific and adjacent waters. II. Forcipulata (part). U.S. Nat. Mus. Bull. 76, pp. 1-245, 81 pls.
- SARS, GEORGE O. 1875. On some remarkable forms of animal life from the great deeps off the Norwegian Coast. II. Researches on the structure and affinity of the genus *Brisinga*, based on the study of a new species: *Brisinga coronata*. Christiania, 112 p., 7 pls.
- TORTONESE, ENRICO. 1958. Euclasteroidea: A new order of Asteroidea (Enchinodermata). Dorina, Supplemento agli Annali del Museo Civico di Storia Naturale "G. Doria", Genova, II (88): 1-3.



Downey, M E. 1972. "Midgardia-Xandaros New Genus New Species A Large Brisingid Starfish From The Gulf Of Mexico." *Proceedings of the Biological Society of Washington* 84, 421–426.

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