

MESOTHURIA CARNOSA, new species.

Plate LXX, figs. 4, 4a-f; young, Plate LXXI, figs. 4, 4a.

Size rather large. General form cylindrical, oblong, tapering abruptly at either end. Body very limp and soft, but integument firm; dorsal body wall apparently thicker than ventral. Mouth terminal but directed ventralwards in life; anus terminal. Tentacles 18 to 20, with rather small peltate crowns. Ambulacral appendages in the form of small pedicels scattered rather thickly over the ventral surface, those of either ventrolateral ambulacrum somewhat larger than in midventral region, where they are very small; pedicels of dorsal surface few, widely scattered and small in size. Here and there are low thickenings of the integument suggesting wart-like swellings. Deposits: Tables of rather large size, very crowded, and composed of a broad disk, irregular in outline with numerous perforations, and a spire composed of four rods, one crossbeam (besides those of crown), and a crown of four upright often divergent teeth, with one to several smaller denticles on sides. In pedicels are comparatively very small tables with three or four uprights and reduced disks. Under the tables, and apparently in the subcutaneous muscle layer also, are smooth, scattered, simple, very delicate, and slender spicule-like rods. Apparently no supporting rods in pedicels. In oral disk and tentacles nearly straight to irregular spiny rods, 0.1 to 0.55 mm. long. (Plate LXX, fig. 4, f.) Color in life: translucent pinkish white, more or less stained with brownish, often dirty whitish or shade commonly called flesh color. Ventral surface is darker on account of leaden purplish muscle bands of mid-ventral ambulacrum showing through body wall. Tentacles translucent grayish white; crown mottled yellowish white

and grayish brown. Length of largest specimen, nearly fully extended (preserved in formalin), about 250 mm.

*Localities.*—Type (Cat. No. 21215, U.S.N.M.) from Station 4130, vicinity of Kauai Island, 283 to 309 fathoms, fine gray sand, bottom temperature 46.1°; 13 specimens. Taken also at the following stations (in all 50 specimens):

*List of stations.*

Station.	Locality.	Depth.	Nature of bottom.
3988	Vicinity of Kauai Island ...	469-195	Gray foraminiferous sand, pebbles.
3997	.....do.....	418-429	Fine gray sand, brown mud.
4021	.....do.....	286-399	Coral sand, foraminifera.
4041	West coast Hawaii Island ..	382-253	Gray mud, foraminifera.
4131	Vicinity of Kauai Island ...	309-257	Fine gray sand.
4132	.....do.....	257-312	Fine gray sand and mud.
4134	.....do.....	324-225	Fine coral volcanic sand.
4136	.....do.....	294-352	Fine coral sand.
4139	.....do.....	512-339	Fine gray sand, rocks.

As noted in the diagnosis above, the number of tentacles varies from 18 to 20, and is frequently 19. Branches of crown are all short, the latter being subcircular and rather flat topped. Width of circle of tentacles over all about 25 mm. Ambulacral appendages very scarce on dorsal surface and scattered, but at hinder end of body they become more numerous, yet remain inconspicuous. Over most of dorsal surface it is difficult to distinguish any pedicels at all without the aid of a glass; but some specimens appear to have more than others. The wart-like thickenings seem to represent much contracted papillae possibly of a sensory nature, since they are more retracted than the pedicels. On median ventral region the pedicels are easy to see, but are very small, gradually increasing in size toward the ventral-lateral radii. In formalin specimens, which wonderfully retain the life appearance, the mid-ventral radial line is conspicuous owing to transparency of integument. Perisome is minutely roughened by spires of tables.

The calcareous ring is rather soft, and in alcoholic specimens is often much shrunken, giving an appearance of variability. Radial pieces much larger than interradii, with an abrupt deep notch on posterior border on either side of which is a little horn, forming an incipient posterior prolongation. This is apparently obsolete in some specimens. Anterior border has a central narrow notch and on either side a very shallow undulation. Interradii pieces with a prominent tooth anteriorly but not noticeably excavated posteriorly. One large Polian vesicle. Madreporic canal runs forward and upward in dorsal mesentery, the ovoid madreporic body being attached to body wall at anterior edge of mesentery. Ring canal and radial water canals between the former and calcareous ring large. No tentacle ampullae extending into the body cavity, only rudiments, filling the anterior excavations in calcareous ring. Thus there are two larger ampullae (interradii) alter-

nating with two smaller (radial), as Hérouard<sup>6</sup> has figured for his genus *Allantis*, but the tentacles do not differ a particle in size. Gonad forms a good-sized tuft on left side of dorsal mesentery. Intestine follows a long S-shaped course. Cloacal cavity large. Respiratory tree large, not in connection with intestinal vessel.

Tables are very crowded, the disks overlapping as much as possible, thereby bringing the spires unusually close together. In the general perisome there are tables with smaller and larger disks, the former about 0.08 to 0.1 mm. in diameter, the latter 0.13 to 0.15 mm. Smaller tables have a large central subcircular perforation and about eight to twelve primary peripheral ones. As the tables increase in size smaller perforations are interpolated at the end. Large disks have two to three series of holes. Margin of disks irregular and often, in large ones, produced into a few irregular tooth-like projections. The spire is composed of four (rarely three) rods; these, extending some distance above the transverse pieces of crown and often flaring somewhat, form the four prominent teeth of the crown. One or two accessory denticulations frequently occur near tip of primary tooth, and one tooth may be longer than the other three, especially in largest tables, thereby causing irregularity. Occasionally also a large tooth projects from the side of one or two of the rods near the crown beams; or a tooth may project from one or more of these transverse beams, but this is not common. The hole inclosed by the crown crossbeams is subcircular as seen from above. Spires of average tables are about 0.08 to 0.087 mm. in height. Pedicels apparently have no supporting rods, but their tables are much reduced in size, having a small annular disk about 0.056 mm. wide. The spire, made up of four or three uprights and one crossbeam, ends in four teeth, with occasionally an accessory horizontal tooth or two. At base of pedicels the tables are intermediate between this very reduced variety and the simpler forms of general perisome. As a rule the tables are variable (in same individual), scarcely two being alike, except in general features. This is especially true of larger disks, both the general contour and that of the perforations being subject to great variation. The figures will serve to show the typical forms. Beneath the tables occur very slender spicules of different lengths. They resemble sponge spicules very closely and are pointed at both ends or rounded. In length they range from 0.08 to 0.3 mm., or even more, in width from 0.002 to 0.004 mm. approximately. These spicules are scattered and appear to be a constant although inconspicuous part of the calcareous deposit. Terminal plates of pedicels resemble those of *Holothuria* rather more than the form figured by Ludwig for *Mesothuria multipes*. They are simple perforated plates with irregular outlines, often elliptical, about 0.28

<sup>6</sup>Holothuries provenant des Campagnes de la Princess Alice, Resultats Compag. Scientif. Prince Monaco, fasc. XXI, 1902, pl. 1, fig. 3 (*Allantis intestinalis*).

by 0.17 mm., although differing widely as to dimensions according to the size of the pedicel.

From *Mesothuria multipes* Ludwig, *M. lactea* (Théel), *M. thomsoni* (Théel), *M. murrayi* (Théel), *M. parva* (Théel), *M. marginata* Sluiter, *M. oktaknemus* Sluiter, and *M. holothurioides* Sluiter the present species differs especially in the form of the tables. These differences can be best appreciated by a comparison of figures. *M. marginata* and *M. holothurioides* have but three rods to the spire and the former has the spire ending in a long thorny point. *M. oktaknemus* has much less robust tables than *carnosa* with slenderer spire ending in longer points. The disks also are different. Other minor differences may be found in the distribution of pedicels and in the form of their terminal plates, although the latter feature may not be of any importance. In life *carnosa* is very soft and fleshy, almost jelly-like except for the firm perisome. This character is admirably retained in formalin specimens, but in alcohol, after the water is extracted from the tissue, the latter becomes thin and leathery. If it were not for this fact one might make comparisons in the character of the body wall of the different species. If one had only alcohol specimens of *carnosa* he would draw absolutely incorrect conclusions as to the appearance of the live animal.

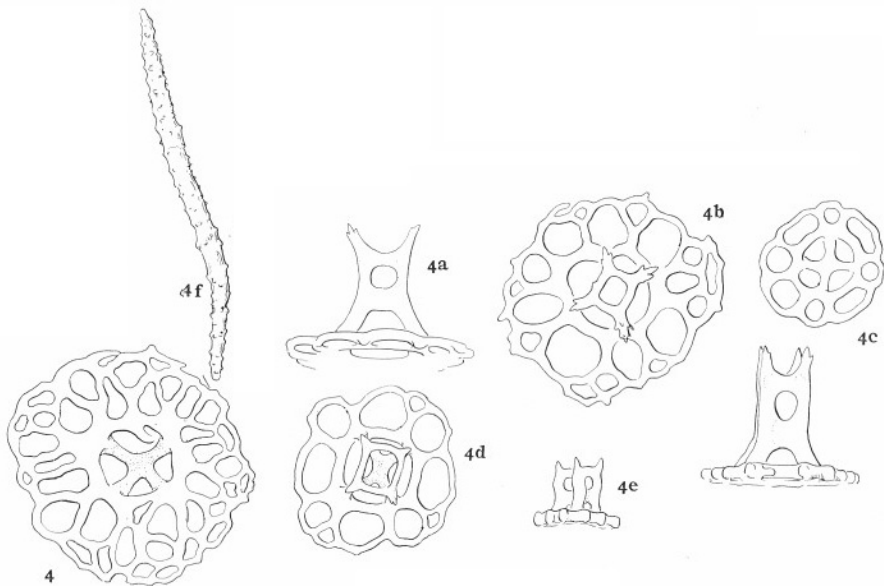
From *M. abbreviata*, *M. incerta*, and *M. squamosa* Kähler and Vaney, *carnosa* differs in the deposits and also in outward form.<sup>a</sup>

So far as the deposits are concerned, *carnosa* appears to be rather more closely related to *M. intestinalis* (Ascan.) as described and figured by Östergren<sup>b</sup>, than to any other known member of the genus. As a comparison of figures will show, the deposits are very much alike, although the three and five rod spires appear not to be present in any specimens of *carnosa* that I have examined. The body wall of *carnosa* is thick and fleshy in life; that of *intestinalis* is described as thin; whether it is so in life I am unable to learn. *M. intestinalis* and *M. verrilli* are hermaphrodite, whereas in *M. carnosa* the sexes are separate.

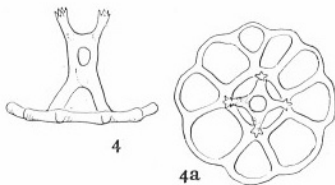
There are two small specimens from Station 3839 (South coast Molokai Island, 259 to 266 fathoms, light brown mud, sand) much dilapidated, which have peculiar deposits (Plate VI, figs. 4, 4a). These specimens, much contracted and compressed, are about 30 mm. long, and so far as can be determined resemble *M. parva*. The disk of the tables is subcircular and pierced by a central and eight peripheral holes of nearly the same size. The spire is composed of four rods and one crossbeam, the crown ending in four slightly diverging spinous tips. Disks are usually not wider than 0.1 mm., and are commonly much more regular than the figure. The specimens may be the young of this species. At least the tables approach nearer those of *carnosa* than those of *murrayi* or *parva*.

<sup>a</sup> See Kähler and Vaney, Deep-Sea Holothurioida of the *Investigator*, 1905, pp. 10-14; pl. I, fig. 6; pl. IV, fig. 10; pl. IX, figs. 4-11; pl. XII, figs. 19, 20.

<sup>b</sup> Festschrift für Lilljeborg, 1896, p. 347, pl. XVIII, figs. 1-26.



4. *Mesothuria carnosa*. Disk of one of the larger tables. 4a. Side view of characteristic table; only two spire rods shown. 4b. Table seen from above, showing disk and crown of spire. 4c. Two views of one of the smaller tables. 4d. Smaller table with sample crown, viewed from above. 4e. Reduced table from wall of pedicel. 4f. Medium-sized rod from oral disk. All  $\times 200$ .



4. *Mesothuria carnosa* (young?). Side view of table of a small *Mesothuria* referred with doubt to *carnosa*. 4a. Disk and crown of same,  $\times 200$ .