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Some Ophiuroidea from the Seychelles Islands and Inhaca, Mozambique

(Echinodermata)

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[British Museum (Nat. Hist.), London]

SUMMARY

The collection comprises 27 species of ophiuroids from Mahé and Praslin, Seychelles and 16 species (some the same) from Inhaca, Delagoa Bay, Mozambique. Included are new records for *Amphiura ambigua* Köhler (found to be viviparous), *Ophiactis picteti* (de Loriol), *Ophiosphaera insignis* Brock and *Ophiopeza spinosa* (Ljungman) from Mahé and *Ophiura kinbergi* (Ljungman) from Inhaca. Comments are also included on *Ophiothrix* (*Keystonea*) *propinqua* Lyman — transferred to the genus *Macrophiothrix*, some other anomalous specimens of *Macrophiothrix*, variations found in *Ophiothela venusta* (de Loriol) and *O. tigris* Lyman, a modification of certain podia in *Ophiocoma pusilla* (Brock) and the synonymy of *Paracrocnida sacensis* (Balinsky) with *P. persica* Mortensen.

PREFACE

The collections of Ophiuroidea which form the basis of this report were made by several joint missions of the Musée Royal de l'Afrique Centrale and the Université Libre de Bruxelles. I am indebted to Professor P.L.G. Benoit for the opportunity to study them. Most of the species concerned are well-known but several of them are of particular interest.

I. - SEYCHELLES

Ophiuroids were collected at Mahé and Praslin in 1966 and 1972. Unfortunately no details of localities or depths are available with the specimens.

Most of the species are well-known and widespread through the Indo-West Pacific, or at least the western Indian Ocean, so that only a few of them (marked * in the following list) merit particular comment.

Four records represent extensions of range to Mahé, namely :

Amphiura ambigua Koehler — from Indonesia, the South China Sea and N Australia,

Ophiactis picteti (de Loriol) — from Indonesia, though recently recorded from Madagascar (Cherbonnier & Guille) and Aldabra (Sloan, Clark & Taylor),

Ophiosphaera insignis Brock — from Madagascar, E Africa and the W Pacific,

Ophiopeza spinosa (Ljungman) — from Madagascar, Mauritius and the W Pacific.

LIST OF SPECIES COLLECTED

		specimens
<i>Astroboa clavata</i> (Lyman 1861)	Praslin	1
<i>Amphiura ambigua</i> Kœhler, 1905 *	Mahé	1
<i>Ophiactis picteti</i> (de Loriol, 1893b) *	Mahé	3
<i>Ophiactis savignyi</i> (Müller & Troschel, 1842)	Mahé	6
<i>Macrophiothrix demessa</i> (Lyman, 1861)	Mahé	1
<i>Macrophiothrix longipeda</i> (Lamarck, 1816)	Mahé	3
<i>Macrophiothrix propinqua</i> (Lyman, 1861) *	Mahé	19
	Praslin	arms only
<i>Ophiothela venusta</i> (de Loriol, 1900) *	Praslin	1
	Mahé	1
<i>Ophiothela tigris</i> Lyman, 1871 *	Mahé	9
	Praslin	6
<i>Ophiothrix trilineata</i> Lütken, 1869	Mahé	2
	Praslin	1
<i>Ophiothrix</i> sp. aff. <i>O. exigua</i> Lyman, 1874	Mahé	2
<i>Ophiocoma brevipes</i> Peters, 1851	Mahé	11
<i>Ophiocoma doederleini</i> de Loriol, 1893a	Praslin	1

<i>Ophiocoma erinaceus</i> Müller & Troschel, 1842	Mahé	20
	Praslin	4
<i>Ophiocoma pica</i> Müller & Troschel, 1842	Mahé	5
<i>Ophiocoma pusilla</i> (Brock, 1888) *	Mahé	5
<i>Ophiocoma scolopendrina</i> (Lamarck, 1816)	Mahé	14
<i>Ophiocoma valenciae</i> Müller & Troschel, 1842	Mahé	3
<i>Ophiosphaera insignis</i> Brock, 1888 *	Mahé	1 pair
<i>Ophionereis porrecta</i> Lyman, 1860	Mahé	3
<i>Ophionereis</i> sp. probably	Mahé	1
<i>O. vivipara</i> Mortensen, 1933a *		
<i>Ophiarachnella gorgonia</i> (Müller & Troschel, 1842)	Mahé	1
	Praslin	2
<i>Ophiarachnella septemspinosa</i> (Müller & Troschel, 1842)	Praslin	1
<i>Ophiopeza dubiosa</i> (de Loriol, 1893a) *	Mahé	3
<i>Ophiolepis superba</i> H.L. Clark, 1915 *	Mahé	2
	Praslin	5
<i>Ophioplocus imbricatus</i> (Müller & Troschel, 1842)	Mahé	2
<i>Ophiura kinbergi</i> (Ljungman, 1867)	Mahé	15

***Amphiura ambigua* Koehler**

Amphiura ambigua Koehler, 1905 : 39-40, pl. 4, figs 9-11; 1922 : 152, pl. 69, figs 5, 6, pl. 96, fig. 3; 1930 : 97; A.M. Clark & Rowe, 1971 : 80-81 [Non *A. ambigua* : H.L. Clark, 1938 : 213, Gibbs, A.M. & C.M. Clark, 1976 : 119-120].

The single specimen from Mahé is not in good condition. The disc diameter, d.d., is c.4 mm. The disc scaling is very fine on both sides, much more so than in *A. candida* Ljungman from Mozambique or any of the species of *Amphiura* recorded from Madagascar by Cherbonnier & Guille (1978), though their drawing of the specimen they refer to the Australian species *A. acrisia* H.L. Clark is similar to it in other respects than the disc scaling. No rosette is distinguishable. The radial shields are c.0.6 mm long with length : breadth c.3.5 : 1. All the superficial plates are very thin and delicate. The proximal lobe of the oral shields is either broadly rounded or truncated with a flat side matching the separation of the adoral shields. The distal oral papillae are flat, fairly broad and with rounded tips. There are up to 7 arm spines, somewhat flattened, most with rounded tips but the third from lowest sometimes has a small distally-directed hook, as shown in Koehler's pl. 96, fig. 3a (1922). There are two rather indistinct tentacle scales.

A second specimen of *Amphiura ambigua* has been collected by Dr. W.F. Humphreys at Aldabra. It has d.d. c.5 mm. The disc scaling is equally fine and delicate to that in the Mahé specimen and other characters are similar except that the second spine may also have a small hook. The disc is slightly ruptured which reveals the interesting fact that the species is viviparous, at least three young specimens, being contained in it.

Remarks. I have no doubt that these two specimens are conspecific with Koehler's « Albatross » specimen from the Philippines figured in 1922. His illustration of the holotype (1905, pl. 4), d.d. only 3 mm, indicates more pronounced hooks on the arm spines but is so diagrammatic as to be unreliable.

The British Museum collection also includes a specimen from Port Curtis, Queensland, which is very similar again to the two Seychelles specimens but a much larger one, d.d. 12 mm, from Nha-trang Bay, Vietnam, named *A. ambigua* by Mortensen, has much thicker plates and scales and distally-prolonged oral shields; however, this is likely to be attributable to the large size.

The specimen from the northern Great Barrier Reef recorded in Gibbs, Clark & Clark (1976) appears from re-examination not to be conspecific with *A. ambigua* Koehler, though it is probably the same species as the Barrier Reef specimen recorded as *ambigua* by H.L. Clark (1938). It differs in the absence of scaling on the ambitus and ventral side of the disc (used in H.L. Clark's 1946 key), the slightly coarser dorsal scaling, the more rounded but tapering form of the papillae and the form of the arm spines (many of the latter having very well-defined bihamulate tips or hooks. There is some resemblance to *A. fasciata* Mortensen, 1940, from the Iranian Gulf, except that the oral shields in that species have a distinctive fan-shape, semi-circular proximally.

***Ophiactis picteti* (de Loriol)**

Ophiocnida Picteti de Loriol, 1893b : 405-407, pl. 14, fig. 2.

Ophiactis picteti Clark & Rowe, 1971 : 82-83, 104 : Cherbonnier & Guille, 1978 : 123-125, fig. 56; Sloan, Clark & Taylor, 1979 : 101-102.

The discovery of this species in the western Indian Ocean has been discussed in the two last references cited above. With records from Madagascar (Cherbonnier & Guille), and Kenya, Tanzania and Aldabra (Sloan et al.) this record from Mahé was to be expected. The type-locality is Amboina, Indonesia.

Macrophiothrix propinqua (Lyman) New combination

Ophiothrix propinqua Lyman, 1861: 83; Koehler, 1922: 256-257, pl. 38, figs 1, 2, pl. 101, fig. 4.

Ophiotrichoides propinqua: H.L. Clark, 1939: 90-91; Balinsky, 1957: 21-22.

Ophiothrix (*Keystonea*) *propinqua*: A.M. Clark, 1967b: 648; 1968: 283-284; A.M. Clark & Rowe, 1971: 86-87, 107; Cherbonnier & Guille, 1978: 149-150, pl. 5, figs 1, 2.

Affinities. More than any other of the Indo-West Pacific species referred to *Ophiotrichoides* by H.L. Clark (1938), subsequently referred to *Ophiothrix* (*Keystonea*) by A.M. Clark (1967b), *Ophiothrix propinqua* is closest to *Macrophiothrix* including *M. longipeda*, the type-species, even though the rudimentary nature of the armament of the dorsal side of the disc makes necessary a modification of the generic diagnosis of *Macrophiothrix*, the other species of which have a continuous coat of disc stumps. The arm structure is very similar and, even though the arms are relatively shorter (only c.10x d.d.) than in most of the species of *Macrophiothrix*, this proportion is matched by several species such as *M. hirsuta cheneyi* (Lyman) and *M. speciosa* (Koehler). On the basis of SEM studies of the jaw plates, Oldfield (in press) has stressed that the affinities of *Keystonea* are more with *Macrophiothrix* than *Ophiothrix*.

Ophiothela venusta (de Loriol) (Pl. 1, figs. 1-3)

Ophiocnemis venusta de Loriol, 1900: 81, pl. 8, figs 2, 3.

Ophiopsammium nudum H.L. Clark, 1923: 341-342.

Ophiothela caerulea: H.L. Clark, 1939: 91-92 [Non *O. caerulea* H.L. Clark, 1915].

Ophiotheresis beauforti Engel, 1949: 140-143, figs 1, 2.

Ophiothela beauforti: Balinsky, 1957: 22-24, pl. 4, fig. 16; A.M. Clark & Rowe, 1971: 84-85, 117, pl. 14, figs 10-12.

Ophiothela nuda: A.M. Clark, 1974: 469.

Ophiothela venusta: A.M. Clark & Rowe, 1971: 84-85, 117, pl. 14, fig. 6; Cherbonnier & Guille, 1978: 160-162, fig. 62, pl. 9, figs 1-6.

Synonymy. Cherbonnier & Guille (1978) have adopted the provisional suggestion which I made in 1971 that *Ophiothela nuda* (H.L. Clark), type-locality Natal, is conspecific with *O. venusta* (de Loriol), type-locality Singapore. Even though de Loriol's holotype or other specimens from Singapore have not been compared with those avail-

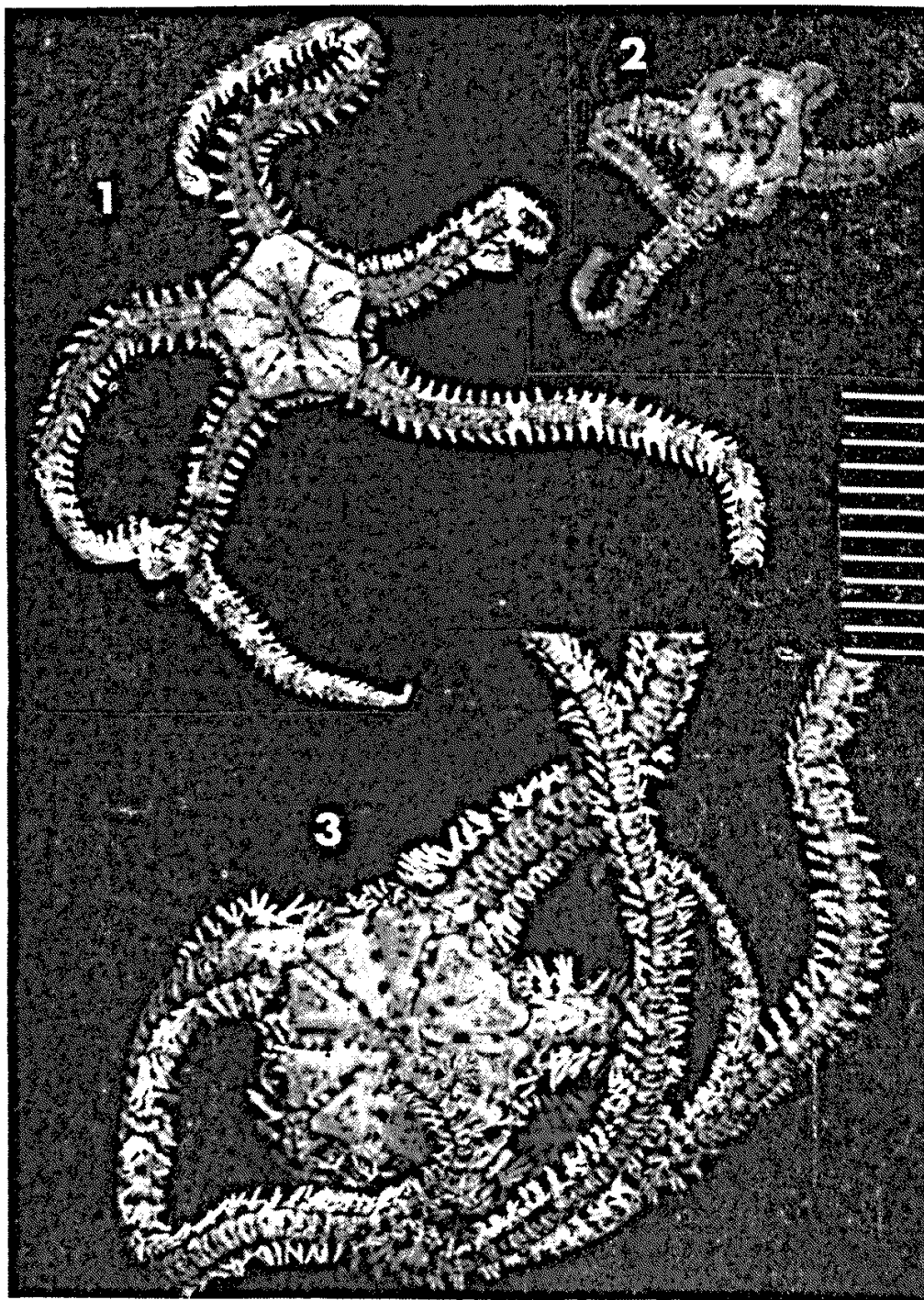


Plate 1. — 1. *Ophiothela venusta* (de Loriol)? Praslin, Seychelles; - 2. Mahé, Seychelles (The scale applies only to figs 1 and 2); - 3. *O. venusta*. Morrumbene Estuary, Mozambique, B.M. no. 1955.3.25.61, $\times 3$.

able from the western Indian Ocean, there seems sufficient justification for taking this step in view of the great variation in armament of the disc and arms. The description of de Loriol that the radial shields are covered with « un chagrin d'une finesse extrême » with a group of very small tubercles near their distal ends while the rest of the disc shows indistinct plates embedded in the skin agrees very well with what is found in some specimens from south-east Africa and the Iranian Gulf.

In fact, I am not certain that the two seychellois specimens in the present collection are conspecific with those from the Arabian coast and south-east Africa (see pl. 1, fig. 3) which I would now call *O. venusta*. Both of them have relatively short spines, not as long as the segment; d.d. is 6 and 8 mm and the maximum spine number of five is only reached on one to five proximal segments (fewer in the larger specimen). This agrees better with *Ophiothela tigris* Lyman than *O. venusta*, where the longer spines equal or exceed the arm length and usually number six proximally. In *O. tigris* some specimens with d.d. as much as 10 mm may not have more than four spines, though at d.d. > 7 mm the maximum is often five and exceptionally six on isolated proximal segments. The Mahé specimen (pl. 1, fig. 2), as preserved in alcohol, has a very irregular patch of white, grey and black mottling on the middle part of the disc surrounded by a broad pale yellow area, its outer limits forming a pentagonal shape and covering the distal parts of the radial shields, in an approximation to the disc pattern characteristic of *O. tigris*, though that has a blue (or black) and white (or yellow) bold sharply-delimited pentagon or star surrounded by deep green. However, the Praslin specimen (pl. 1, fig. 1) has the whole upper side evenly marked with mottled dark and light grey, except for narrow pale cream bands on the arms. Some further comments on colour variation are given under the heading of *O. tigris* below.

In their table of variation in *O. venusta*, Cherbonnier & Guille note only two out of 23 specimens examined with short arm spines, both having d.d. only 4 mm and not more than four spines. However, other specimens of the same samples as these two at d.d. 5 or 6 mm do have relatively longer spines numbering up to six.

Although the comparative table for the species of *Ophiothela* given by the same authors indicates many differences between the two species, most of these are based on variable characters or misinforma-

tion. Apart from the colour and the arm spines, the degree of separation of the radial shields and the form of the oral shields are, I think, variable; also the dorsal disc armament may be completely lacking in *O. venusta* too or conversely some disc spines (though not granules) are found in a few specimens with the characteristic *tigris* colour (as noted below); the ventral arm plates of *O. tigris*, though obscured by skin, are also triangular in shape and the dorsal arm plates are absent or rudimentary (except at the arm bases) in *O. tigris* as well as *O. venusta*, as shown by Mortensen (1913). As the complex synonymies of the few species of *Ophiothela* still recognized suggest, the variations within this genus are so great that even a species as superficially distinct as *O. tigris*, with its remarkable colour pattern, may overlap to some extent with *O. venusta*.

***Ophiothela tigris* Lyman** (pl. 2, figs 1-3; pl. 3, figs 1-3)

Ophiothela tigris Lyman, 1871: 10-11, pl. 1, figs 10-12; Mortensen, 1913: 3-14, 16 (part), pl. 1, figs 8, 9; A.M. Clark & Rowe, 1971: 84, 116, pl. 14, fig. 9; Cherbonnier & Guille, 1978: 159-160, pl. 8, figs 5, 6.

Ophioteropsis elegans Bell, 1892: 178-179, pl. 11, figs 1-7; Mortensen, 1913: 3-14, 16 (part), pl. 1, figs 1-7, 10, pl. 2, figs 1-7.

Variations. All 15 of the specimens from Mahé and Praslin show the characteristic bold blue, white and green colour pattern of preserved specimens, little different evidently from the colour in life except that the white was probably yellow or cream. The pentagonal or stellate blue and white area on the disc is well-defined by a dark outline. In all of them there are no spines at all on the upper side of the disc. However, some specimens in the British Museum collections from East Africa, the Amirante Islands and Saya da Malha Bank, show various modifications in the colour pattern and may have some stout spaced disc spines, especially peripherally. The patterned area on the disc may be broken down to a blue/black and white mottling, though more often it is of concentric dark wavy rings, if not of coarse sinuous lines. Sometimes there is no dark line delimiting it from the green area. Also occasionally the green border itself may be interrupted in some or all interradii, allowing the central mottled area to extend and merge with the peripheral similar colour pattern.

Six specimens of *Ophiothela* from Marie-Louise Island, Amirantes, 31 mètres (collected by the « Alert ») show an interesting range of form and colour. Two have a perfect *tigris*-pattern; a third has the

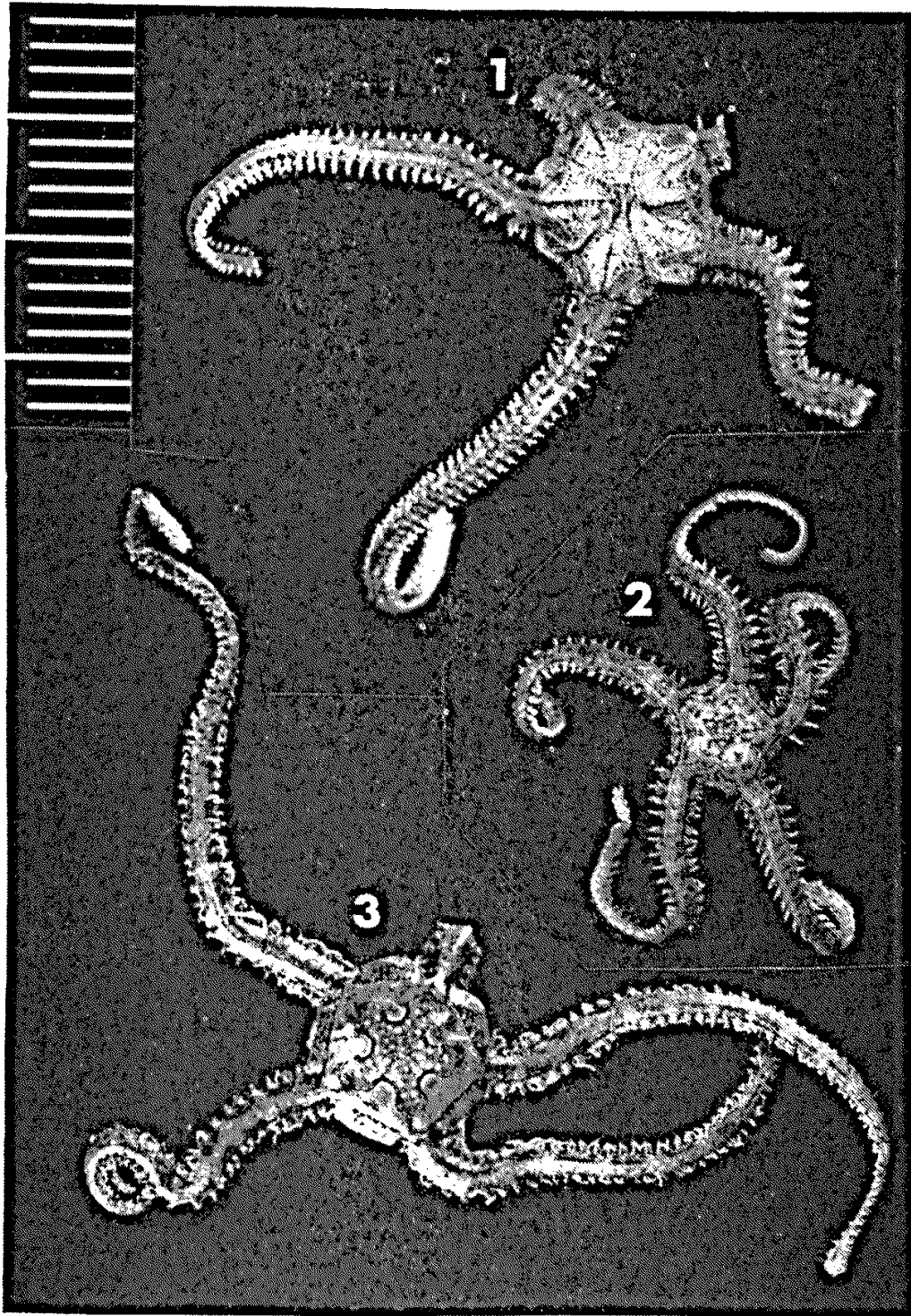


Plate 2. — 1. and 2. *Ophiothela tigris* Lyman. Fuartu, Zanzibar.
B.M. nos. 1965.6.1.148 and 149; - 3. Coopers, Zanzibar, 1965.6.1.152.

disc towards the edge and the arm bases greenish but the colour fades proximally into black and white mottling; a fourth specimen has the green limited to a triangular patch in one interradius, completely isolated from smaller green patches at the bases of several arms, the rest of the upper side of both disc and arms marbled with black and white wavy lines, those on the disc tending to make concentric five-rayed star shapes. This last specimen also has c.12 spinelets scattered on the upper side of the disc as well as others in the ventral interradii. The two remaining specimens were determined by Cherbonnier as *O. venusta*, having no green colour. They were preserved separately from the other four and their colour appears to have faded. One shows a very faint concentric stellate linear pattern on the central area of the disc; it has a few stout blunt spinelets between the radial shields, while the second specimen has more numerous spinelets. The arm spines are short, even the longest proximal ones not quite equal to the segment in length, and number only four proximally. As with the two specimens discussed above under the heading of *O. venusta*, it is debatable as to what name to give to these. Other aberrant specimens include one from Watamu, Kenya, collected recently by Dr. W.F. Humphreys, with c.20 dorsal disc spinelets and the pentagonal area and the peripheral parts of the disc mottled grey and white, the green area between rather pale and fading on the arms. Another from Zanzibar, collected by Dr. M. Angel, has the green interrupted interradially, making a Y-shaped green patch on each radius (pl. 2, fig. 1). Finally, one specimen out of eight from Aldabra, collected by Dr. N.A. Sloan, has c.25 stout spinelets on the upper side of the disc, coupled with the characteristic *tigris* colours (pl. 3, fig. 1).

***Ophiosphaera insignis* Brock**

Ophiosphaera insignis Brock, 1888: 526; Koehler, 1904: 116, figs 95, 96; 1930: 125-128, pl. 16, fig. 13, pl. 17, figs 1-4; A.M. Clark & Rowe, 1971: 82-83, 103; Cherbonnier & Guille, 1972: 279, fig. 1; 1978: 196-198, fig. 65.

Since the jaw structures of ophiuroids provide the prime characters for distinguishing most families and the jaws are considerably modified in the sexually dimorphic genera *Ophiosphaera*, *Ophiophane* and *Amphilycus* in connection with the mouth to mouth habit, the true taxonomic positions of these genera have been the subject of some controversy. From an initial position in the Ophiotrichidae

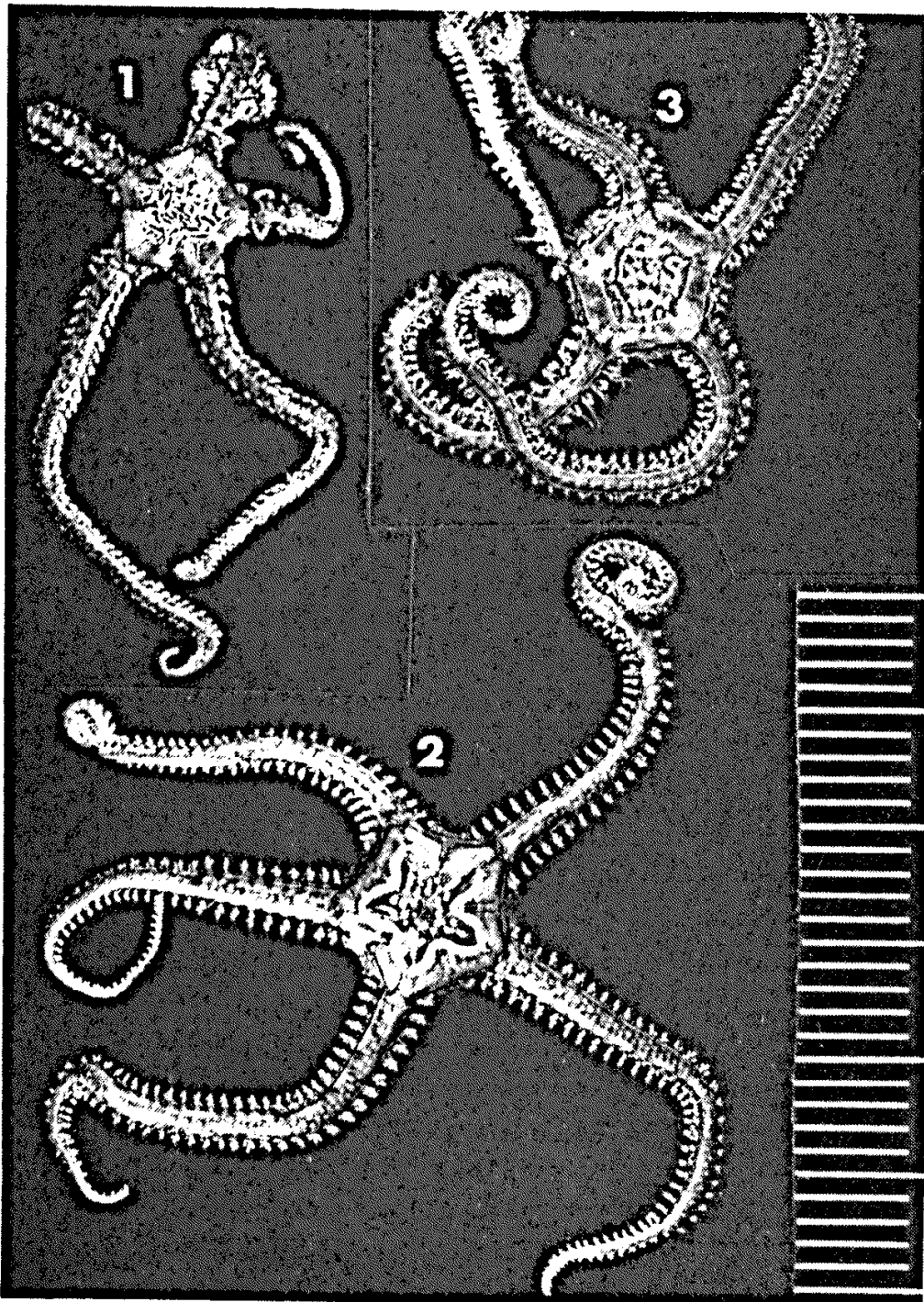


Plate 3. — *Ophiothela tigris* Lyman, Aldabra, B.M. nos. 1978.9.20.134 and 135 and 1969.5.1.325.

(Brock), *Ophiosphaera* has been referred to the Amphiuridae by Koehler (1930), to the Ophiactidae (without comment but on the grounds of common features with *Ophiodaphne*) by A.M. Clark & Rowe (1971) and to the Ophiocomidae by Cherbonnier & Guille (1972 and 1978). Although the apex of the jaws is rather narrow, the multiple apical papillae and the occurrence of oral papillae on the sides of the jaws support this last disposition; also the naked disc and numerous erect arm spines are shared by *Ophiopsila*, though the highly specialized tentacle scales in that genus contrast with the total absence of scales in *Ophiosphaera*.

The single female with attached male from Mahé represents an extension of range in the western Indian Ocean from Nosy Bé, Madagascar and Zanzibar (the unspecified record from East Africa in the table of Clark & Rowe, 1971).

***Ophiocoma pusilla* (Brock)**

Ophiomastix pusilla Brock, 1888 : 499-500; A.M. Clark, 1967a : 45-46, fig. 5.

Ophiocoma pusilla : H.L. Clark, 1921 : 131; Devaney, 1970 : 25, figs 26, 29; A.M. Clark & Rowe, 1971 : 86-87, 118; Cherbonnier & Guille, 1978 : 173-174, pl. 11, figs 3, 4.

In the five Mahé specimens of this small ophiocomid, the podia are well preserved in the extended position. The pair of podia on about the eighth free arm segment are markedly larger than the rest. This is the segment (or one of them) which normally in this species has the second from uppermost spine enlarged and clavate at the tip, probably due to a concentration of glandular tissue, since it shrinks drastically in drying. These Mahé specimens are unusual in showing a very limited development of these spines, on no more than one segment of an arm, while several arms may lack specialized spines altogether; also it may be the third rather than the second spine which is modified. The podia are enlarged whether or not the spines are modified so that clearly this area of the arm has some special function in the feeding behaviour. Cherbonnier & Guille have noted that modified spines may be absent on some of their 35 specimens from Tulear, Madagascar.

Ophionereis sp. ? *O. vivipara* Mortensen

See: *Ophionereis vivipara* Mortensen, 1934 : 191-192, fig. 7; Balinsky, 1957 : 24; A.M. Clark & Courtman-Stock, 1976 : 180-181.

The single specimen from Mahé is in poor condition; it has d.d. only c.3 mm but is very shrunken interradially so this measurement should be nearer 3.5 mm; arm length, a.l., is c.25 mm. The disc scaling is barely perceptible and only made evident by the opaque appearance resulting from partial drying. The same is true in specimens from South Africa and Mozambique (mentioned in discussion of *O. vivipara* in Clark & Courtman-Stock, 1976) as well as from Tanzania and southern Kenya. All these, including the Mahé specimen, are pale in colour, as preserved, with narrow dark bands across the arms and a few narrow, well-defined dark lines ramifying across the discs, sometimes making a Y-shaped pattern opposite each arm base with the arms of the Y running obliquely outwards across the small radial shields, as in some specimens of *O. dubia*. This contrasts with Mortensen's descriptions of the type material of *O. vivipara* from Mauritius as having a brownish patch on the centre of the disc, a similar pattern being noted by Balinsky on specimens from Inhaca. In *O. vivipara* the disc scaling is very fine, comparable to that in these specimens, judging from Mortensen's figures (1933) and far less distinct than the scaling in *O. dubia*. Better samples from outside Mauritius are needed to discover whether specimens such as these are also viviparous.

Cherbonnier & Guille (1978) have referred a single specimen from 70 mètres off Tulear, south-west Madagascar, to *Ophionereis thryptica* (Murakami, 1943), type-locality Palao, Caroline Islands. This too has minuscule, obscured disc scaling and lacks genital papillae. However, Murakami found that the arms number six (presumably in all ten of his specimens) and, since the type-locality is relatively remote in the western Pacific, I think that identity of these specimens from the western Indian Ocean with *O. vivipara* is more likely.

Ophiopeza spinosa (Ljungman)

Ophiarachna spinosa Ljungman, 1867b : 305-306.

Ophiopezella Lutkeni de Loriol, 1893b : 392-394, pl. 13, fig. 1.

Ophiopezella spinosa : Koehler, 1922 : 338-339; 1930 : 271.

Ophiopeza spinosa : A.M. Clark & Rowe, 1971 : 90-91, 127; Devaney, 1974 : 184-186; Cherbonnier & Guille, 1978 : 227-228, pl. 17, figs 3, 4.

Affinities. In 1971 (following H.L. Clark) I distinguished *Ophiopeza spinosa* (Ljungman) (type-locality Foua I., Pacific [? group]) from *O. dubiosa* (de Loriol, 1893a) (type-locality Mauritius) by the greater arm spine number (11 or 12 at d.d. c.8 mm rather than only 9) and the brownish rather than yellow-green ground colour. In a footnote, I doubted the value of this distinction.

Devaney (1974 : 183) noted that a specimen from Mauritius « appears to be an example » of *O. spinosa*, though he does not cite the size or spine number. On re-examination of examples from the Marshall and Gilbert Islands named *O. dubiosa* by Koehler, he decided that these are referable to *O. spinosa* and he also commented that he is inclined to think *O. dubiosa* is a synonym.

Cherbonnier & Guille (1978) have referred four specimens from Madagascar to *O. spinosa* rather than *O. dubiosa*. These have d.d. 7.9 mm and up to 12 or 13 spines, which supports this identity; their colour was light and dark chestnut.

The range of spine number in relation to the d.d. can best be shown in a table, which emphasizes the anomaly in the holotype of *O. dubiosa*; further material from Mauritius for comparison with it is needed to settle the question of its distinction from *O. spinosa*. The colour difference may not be significant.

TABLE 1. — Relative arm spine number of specimens of *Ophiopeza spinosa* from published records and specimens in the British Museum (Nat. Hist.) and the two new Mahé specimens.

Locality	Disc diameter d.d. (mm)	Maximum no. of arm spines
Cook Islands	3	7
Marquesa Islands	3	7
Mahé	3.5	8
Mahé	4	8
Marquesa Islands	4	8
Tahiti	6	12
Amboina	8	12
Madagascar	7.9	12, 13
Tuamotu Islands	8.5	12
Marshall Islands	10	13
Gilbert Islands	11	14
Sinai	12	16

This new record from Mahé represents an extension of range in the Indian Ocean for this species widely-known in the Pacific. In addition to the records from Mauritius and Madagascar mentioned above, the Hebrew University has collected it at El Hamira, Sinai peninsula.

Ophiolepis superba H.L. Clark

Ophiolepis superba H.L. Clark, 1915 : 342; A.M. Clark & Rowe, 1971 : 90-91, 129, fig. 46d, pl. 22, figs 3, 4; Cherbonnier & Guille, 1978 : 236-239, fig. 76.

No individuals of this species with d.d. less than c.15 mm had been recorded prior to Cherbonnier & Guille's series with d.d. 1-7 mm. The smallest of the five specimens from Praslin has d.d. 11 mm and a.l. 23 mm; the remainder and two from Mahé have d.d. 25-32 mm, the largest one with a.l.: d.d. = 3.3:1.

II. - INHACA, MOZAMBIQUE

These ophiuroids were collected in 1969. No details of localities were kept with the specimens. Most of the species have previously been recorded from Inhaca in Balinsky's very useful study (1957), which included keys to the species and valuable notes on their habitats. However, Balinsky was hampered in his identifications by lack of comparative museum specimens and a dearth of recent literature on the ophiuroids of the western Indian Ocean, so that many of the names he used have been modified or synonymized in Clark & Rowe (1971) and Clark & Courtman-Stock (1976). For the sake of comparison, a list of his names with those since adopted, where necessary, follows:

<i>Astroboa nuda</i> var. <i>nigra</i> Döderlein	<i>Astroboa nuda</i> (Lyman)
<i>Amphiura angularis</i> Lyman	?
<i>Amphiura inhacensis</i> sp. n.	Valid
<i>Amphiura kalki</i> sp. n.	Synonym of <i>A. candida</i> Ljungman, 1867
<i>Ophiocentrus dilatatus</i> (Køehler)	Valid
<i>Ophionephthys africana</i> sp. n.	<i>Amphiura</i> (<i>Fellaria</i>) <i>africana</i> (Balinsky)
<i>Ophiophragmus sacensis</i> sp. n.	Synonym of <i>Paracrocnida persica</i> Mortensen, 1940
<i>Amphipholis squamata</i> (Delle Chiaje)	Valid

<i>Amphilycus androphorus</i> Mortensen	Synonym of <i>A. scripta</i> (Koehler, 1904)
<i>Amphioplus integer</i> (Ljungman)	<i>Amphioplus (Lymanella) integer</i> (Ljungman)
<i>Ophiactis carnea</i> Ljungman	Valid
<i>Ophiactis delagoa</i> sp. n.	Valid
<i>Ophiactis hemiteles</i> H.L. Clark	? non <i>O. hemiteles</i> H.L.C. but <i>O. picteti</i> de Loriol, 1893b
<i>Ophiactis lymani</i> Ljungman	? non <i>O. lymani</i> but <i>O. plana</i> Lyman, 1869
<i>Ophiactis modesta</i> Brock	Valid (? or synonym of <i>O. maculosa</i> von Martens, 1870)
<i>Ophiactis savignyi</i> (Müller & Troschel)	Valid
<i>Ophiactis parva</i> Mortensen	Valid
<i>Ophiothrix echinotecta</i> sp. n.	Valid
<i>Macrophiothrix longipeda</i> (Lamarck)	Valid
<i>Macrophiothrix hirsuta</i> (Müller & Troschel)	<i>M. hirsuta cheneyi</i> (Lyman, 1861)
<i>Macrophiothrix aspidota</i> (Müller & Troschel)	Valid
<i>Macrophiothrix mossambica</i> sp. n.	Synonym of <i>M. demessa</i> (Lyman, 1861)
<i>Placophiothrix foveolata</i> (Marktanner-Turneretscher)	<i>Ophiothrix foveolata</i> M.-T.
<i>Placophiothrix proteus</i> (Koehler)	<i>Ophiothrix (Acanthophiothrix) proteus</i> Koehler
<i>Placophiothrix trilineata</i> (Lütken)	<i>Ophiothrix trilineata</i> Lütken
<i>Ophiotrichoides propinqua</i> (Lyman)	<i>Macrophiothrix propinqua</i> (Lyman)
<i>Ophiothela dividua</i> von Martens	? synonym of <i>O. danae</i> Verrill, 1869
<i>Ophiothela beauforti</i> (Engel)	Synonym of <i>O. venusta</i> (de Loriol, 1900)
<i>Ophionereis australis</i> (H.L. Clark)	Valid
<i>Ophionereis porrecta</i> Lyman	Valid
<i>Ophionereis vivipara</i> Mortensen	Valid
<i>Ophiocoma scolopendrina</i> (Lamarck)	Valid
<i>Ophiocoma erinaceus</i> Müller & Troschel	Valid
<i>Ophiocoma pica</i> Müller & Troschel	Valid
<i>Ophiocoma insularia</i> Lyman	= <i>O. pusilla</i> (Brock, 1888)
<i>Ophiocoma valenciae</i> Müller & Troschel	Valid

<i>Ophiocoma parva</i> H.L. Clark	Synonym of <i>Ophiocomella sex-radia</i> (Duncan, 1887)
<i>Ophiomastix notabilis</i> H.L. Clark	Synonym of <i>O. variabilis</i> Koehler, 1905
<i>Ophiomastix venosa</i> Peters	Valid
<i>Ophiopezella decorata</i> Mortensen	Synonym of <i>Ophiopeza fallax</i> Peters, 1851
<i>Ophiolepis cincta</i> Müller & Troschel	Valid

LIST OF SPECIES COLLECTED

<i>Amphiura candida</i> Ljungman, 1867	1
<i>Amphioplus</i> (<i>Lymanella</i>) <i>integer</i> (Ljungman, 1867)	1
<i>Paracrocnida persica</i> Mortensen, 1940 *	1
<i>Ophiactis carnea</i> Ljungman, 1867	1
<i>Ophiactis savignyi</i> (Müller & Troschel, 1842)	9
<i>Ophiocnemis marmorata</i> (Lamarck, 1816)	1
<i>Ophiothela venusta</i> (de Loriol, 1900)	3
<i>Ophiothrix foveolata</i> Marktanner-Turneretscher, 1887	26
<i>Macrophiothrix hirsuta cheneyi</i> (Lyman, 1861)	14
<i>Macrophiothrix propinqua</i> (Lyman, 1861)	1
<i>Macrophiothrix</i> sp. aff. <i>M. aspidota</i> (Müller & Troschel, 1842) *	2
<i>Macrophiothrix</i> juv. sp. A *	1
<i>Macrophiothrix</i> juv. sp. B *	1
<i>Ophiocoma pusilla</i> (Brock, 1888)	1
<i>Ophiolepis cincta</i> Müller & Troschel, 1842	3
<i>Ophiura kinbergi</i> Ljungman, 1867 *	17

The record of *Ophiura kinbergi* is a new one for Inhaca, though the species is already known from the Durban area and from Madagascar and elsewhere throughout the Indo-West Pacific. The other species marked * are commented on further below.

Paracrocnida persica Mortensen (pl. 4, figs 1 and 2)

Paracrocnida persica Mortensen, 1940 : 86-88, fig. 14, pl. 1, fig. 8; A.M. Clark, 1967a : 39-41, fig. 1; A.M. Clark & Rowe, 1971 : 82, 100.

Ophiophragmus sacensis Balinsky, 1957 : 9-10, fig. 4, pl. 2, figs 5, 6.

Paracrocnida sacensis : A.M. Clark & Courtman-Stock, 1976 : 160.

Description. The single well-preserved specimen collected has d.d. 13 mm and a.l. 80-85 mm so that a.l. : d.d. = c.6.5 : 1. The disc is dis-

tended and the ventral scaling is fairly smooth, so it seems likely that the more or less marked projection of the ventral scales observed in other specimens of *Paracrocnida* is an artefact of shrinkage in preservation. There is a sharp demarcation between the dorsal and ventral scales, as usual. The distal parts of the arms are very attenuated. The podia are well extended and very long and smooth attenuating to a fine tip, stretching for up to the length of five arm segments. In each radial slot between the adjacent jaws, one of the two second oral podia emerges between the oral papillae and curls proximally towards the mouth. These podia are heavily coated with grey matter — presumably food particles trapped in mucus. The second oral papillae are preserved in the vertically erect position; they are probably longer than the third papillae and their free end is rounded, not conical. The ventral arm plates have a very deep distal notch. There are 9 arm spines on the first two free segments, then 8. The colour is brown in alcohol, deepening in the middle of each disc scale and on the radial shields.

Synonymy. I have previously (1967a and 1971) expressed doubts about the validity of Balinsky's *Ophiophragmus sacensis* as distinct from Mortensen's *Paracrocnida persica* from the Iranian Gulf. The two syntypes of *O. sacensis* have d.d. only 5-6 mm and up to 7 arm spines. Since the ventral disc scales are markedly overlapping and projecting the disc has probably shrunk somewhat in comparison to that of the specimen now studied. Others from the Gulf of Aqaba described as *P. persica* in 1967 have d.d. 6-7 mm, ventral scaling overlapping and up to 9 or 10 spines. Allowing for the better preservation of the new Inhaca specimen, their resemblance to it is so close that I must regard them as conspecific. It should be repeated that both *persica* and *sacensis* may yet prove to be synonyms of *Paracrocnida sinensis* A.H. Clark, 1917, from southern China, when further material from that area is available.

Macrophiothrix sp. aff. *M. aspidota* (Müller & Troschel) (pl. 4, figs 3 and 4)

See : *Ophiiothrix aspidota* Müller & Troschel, 1842 : 115; Koehler, 1922 (part) : 209-211, pl. 32, figs 1, 2, pl. 33, fig. 8 [non pl. 32, figs 3-5, pl. 33, fig. 7, pl. 97, fig. 3].

also : *Macrophiothrix aspidota* : H.L. Clark, 1938 : 284; (?) Balinsky, 1957 : 18; A.M. Clark, 1968 : 285-287, figs 3a, 4a, 5a, b, c, 7a; A.M. Clark & Rowe, 1971 : 82-83, 114; A.M. Clark & Courtman-Stock, 1976 : 137.

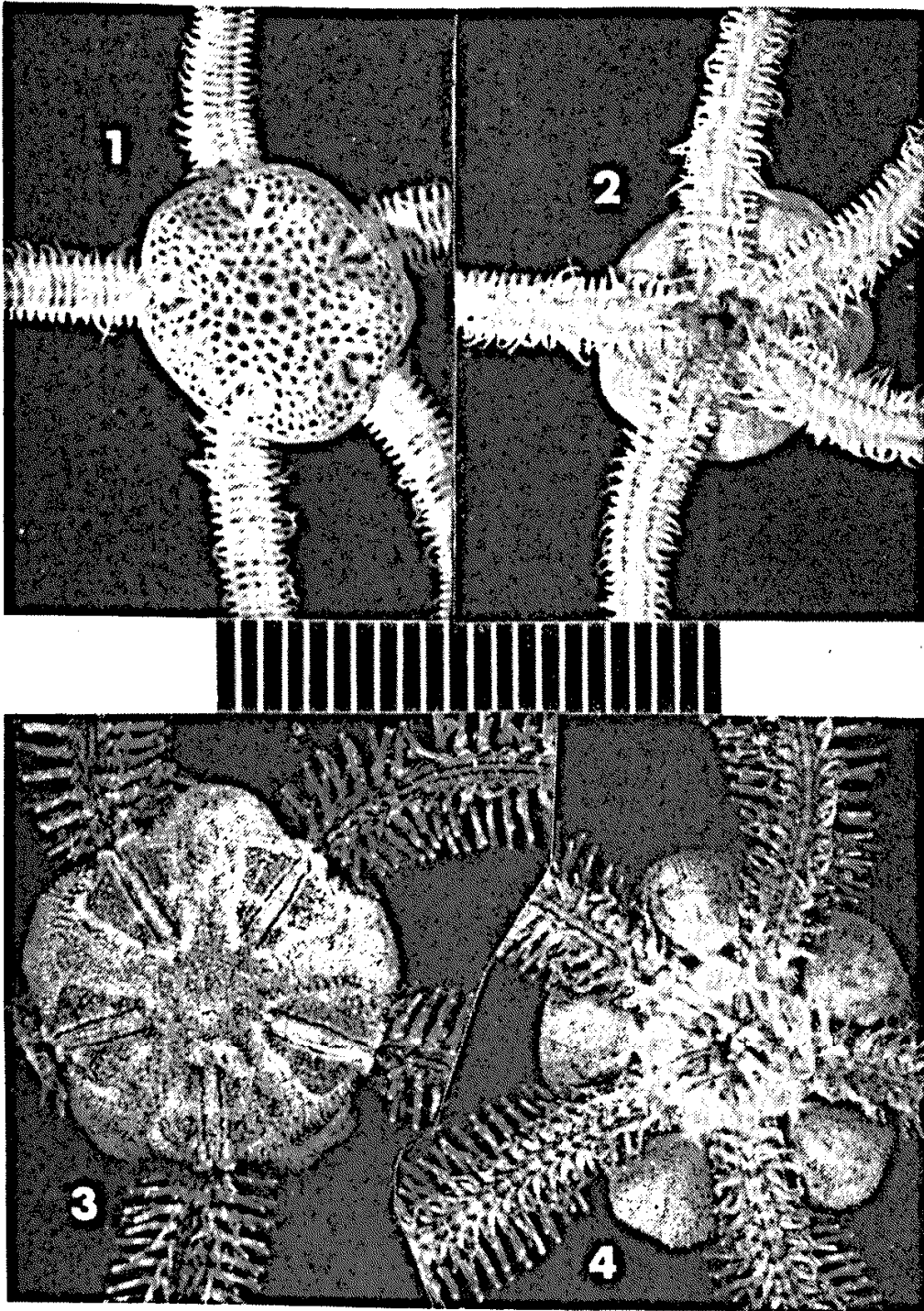


Plate 4. — 1. and 2. *Paracrocynida persica* Mortensen. Inhaca, dorsal and ventral views; - 3. and 4. *Macrophiolithrix* sp. aff. *M. aspidota* (Müller & Troschel). Inhaca, dorsal and ventral views.

Description. The two specimens have a.l.:d.d. 215:16.5 mm = 13.0:1 and 205:17 mm = 12.1:1. The discs are uniformly covered with slightly flared stumps with length: breadth about 3:1 terminating in several points. The radial shields appear superficially naked but do have a few granuliform stumps abradially. The oral shields are smooth, without armament. The dorsal arm plates are approximately hexagonal but might also be described as fan-shaped with the middle part of the distal side almost straight; laterally they may have an angle of c.90° near the distal end of the segment or this may be somewhat rounded off and obtuse. The ventral arm plates are not contiguous; they are slightly broader than long, tapering distally and have the distal edge straight or slightly convex. The arm spines number up to 8; the longer middle ones have parallel sides or may be slightly broadened at the tip without being really clavate; the shaft is not markedly thorny. The lowest spine on the more distal arm segments is hooklike but with three (sometimes only two) teeth, the outermost one curving smoothly, whereas on the more proximal segments the lowest spines have several little terminal points on the outside of this curve.

The colour is mainly dark bluish-purple and off-white with dark blue radial shields and bands at intervals across the arms but one specimen has a light brown tint on the paler areas of disc and arms and both have the outer parts of the longer spines brown and opaque. Most noticeably, both specimens have a conspicuous median light longitudinal line along each arm, defined by a pair of dark blue lines; also the lateral edges of the dorsal arm plates are defined by a zig-zag white line each side. The ventral arm plates are pale medially but light blue laterally.

Comparisons. Four species of *Macrophiothrix* were recorded from Inhaca by Balinsky and need to be distinguished from these two specimens, while four further species resemble them particularly in having naked radial shields and dorsal arm plates of somewhat similar shape. Comparison may best be done by means of a table.

In addition to the relatively shorter arms of *M. aspidota*, there is also a discrepancy in the colour pattern. In 1968 I observed that some of the long-preserved specimens in the British Museum collection from India showed traces of discontinuous light lines along the arms but Balinsky noted that there is « never any trace of a longitudinal light stripe » in the specimens he referred to *M. aspidota*.

TABLE 2. — Comparative table of outstanding characters of *Macrophiothrix* species geographically or morphologically adjacent to the two Inhaca specimens. In fact the radial shields are rarely completely naked. Faint arm stripes are indicated by the use of brackets. The last four species have not been recorded from East Africa

Species	Type-locality	Radial shields A.l.:d.d. naked	Light arm stripe	Distinctive characters
<i>M. sp. aff. M. aspidota</i>	Inhaca	+	12-13:1 +	Ventral arm plates distally convex
<i>M. aspidota</i> (Müller & Troschel)	« Ostindien »	+	6-9:1 (+) —?	Ventral arm plates distally concave
<i>M. hirsuta cheneyi</i> (Lyman)	Zanzibar	—	5-10:1 +	Dorsal arm plates rugose in texture
<i>M. longipeda</i> (Lamarck)	Mauritius	—	c.20:1 —	Dorsal arm plates trapezoidal
<i>M. demessa</i> (Lyman)	Hawaiian Is.	—	9-15:1 —	Dorsal arm plates granulated
<i>M. bedoti</i> (de Loriol)	Amboina	+	16+:1 +	Longer arm spines with thorny shafts
<i>M. speciosa</i> (Koehler)	Bay of Bengal	+	?8:1 +	Arm spines transparent and very woody
<i>M. robillardi</i> (de Loriol)	Mauritius	+	?c.10:1 (+)	Arm spines glassy
<i>M. elongata</i> H.L. Clark	Iranian Gulf	+	c.20:1 +	Ventral arm plates distally concave

M. elongata is possibly the closest, resembling the two Inhaca specimens not only in the bare radial shields and striped arm pattern but also in the shapes of the disc stumps, arm spines and dorsal arm plates. Only the relatively longer arms appear to distinguish it. Since too little is known about the form and variation of *M. bedoti*, *M. speciosa* and particularly the geographically adjacent *M. robillardi* to make an accurate comparison, it seems to me better to defer a decision on the identity of these specimens rather than to introduce yet another name into the literature of this unwieldy genus.

Macrophiothrix sp. juv. A

A.l. : d.d. = 28 : 6.0 mm = 4.7 : 1.

The disc is densely armed with stumps and there are some shorter ones spaced on the radial shields. The dorsal arm plates are smooth, broad hexagonal in shape with the lateral angle rounded or obtuse. The ventral arm plates are relatively broad on the proximal part of the arms; their distal edges are straight. The longer arm spines are clavate, their shafts thorny throughout their lengths. The lowest arm spine is in the form of a smooth triple hook. The tentacle scale is short and rounded with one to three small points. There is no linear pattern on the arms but each dorsal arm plate bears an irregular oval white patch along the distal edge medially and there are other white patches elsewhere on the dark purple-grey ground colour. The ventral colour is mainly white but many arm segments show a pair of elongate purplish patches, one each side; the purple colour is more extensive distally.

Macrophiothrix sp. juv. B

A.l. : d.d. = 20+ : 5.3 mm, probably less than 10 : 1.

The disc is armed with spaced short stumps and there are slightly shorter stumps (not granules) on the radial shields. The dorsal arm plates are smooth, slightly trilobed in shape, the lateral angles rounded or obtuse. The middle arm spines are distinctly broadened at the tip and thorny all along the shaft. The lowest spine is a triple hook, usually with rugosities on the outside of the terminal hook. The tentacle scale is short and rounded with a median point. The colour pattern of the arms consists of a well marked white stripe medially and each dorsal arm plate has a white lateral border, the rest of the surface being dark blue. More distally this resolves itself into two continuous broad blue lines with white between and lateral to them.

The relatively short arms, armed radial shields, shape of the dorsal arm plates and colour pattern approximate to *M. hirsuta cheneyi* but the radial shield armament is not granuliform and the dorsal arm plates are not rugose.

The dorsal arm plates and colour pattern resemble those of the specimens here called *M. sp. aff. M. aspidota* but the shorter arms, armament of the radial shields and thorny shafts of the longer arm spines distinguish it.

Ophiura kinbergi (Ljungman)

Ophioglypha kinbergi Ljungman, 1867a : 166.

Ophiura kinbergi : Koehler, 1922 : 381-383; A.M. Clark & Rowe, 1971 : 90-91, 128, fig. 46 a, b, pl. 22, figs 5, 6; A.M. Clark & Courtman-Stock, 1976 : 127, 194, figs 212, 222; Cherbonnier & Guille, 1978 : 229-231, fig. 73.

The 17 specimens collected provide a new record for Mozambique, although the species was taken in 43 metres off Natal (Clark & Courtman-Stock) and has also been recorded from several localities in Madagascar (Cherbonnier & Guille).

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