The Holothurians of the Iranian Gulf.

BY

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The only authors who have previously dealt with the Holothurians of the Iranian Gulf are K o e h l e r and V a n e y, who in their report on the "Investigator" collections mention a few species collected in this area, viz.:

Halodeima parva (Lampert)
Holothuria monacaria Lesson
„ *vagabunda* Selenka
„ *ocellata* Jäger
Stichopus variegatus Semper
Thyone festina Kochler and Vaney;

unfortunately they give the exact locality only for *Holothuria ocellata* and *Thyone festina,* recording the others merely from "Golfe Persique". It is interesting that the two localities named by K o e h l e r and V a n e y are both within the areas where Holothurians were found during the Danish Expeditions, i.e. for *Hol. ocellata:* off Bendar Abbas and for *Thyone festina* N. E. of Bahrein. As to the other species, which all live on coral reefs and to which no locality or station number are given, we may suppose that they were collected by chance when the "Investigator" was in harbour, which again indicates that they were collected either of Bushire or off Bendar Abbas, which are among the localities where the Danish Expeditions collected Holothurians.

Of the species recorded by K o e h l e r and V a n e y, the Danish Expeditions refound the three following: *Halodeima parva—Holothuria vagabunda -Stichopus variegatus,* and beside these, a further eleven species are found, so for the present we know the following 17 species of Holothurians from the Iranian Gulf:

Protankyra magnihamulae Heding
„ *pseudo-digitata* (Semper)
Halodeima atra (Jäger)
„ *parva* (Lampert)

Holothuria vagabunda Selenka
„ *monacaria* Lesson
„ *impatiens* (Forskål)
„ *ocellata* Jäger
„ *spinifera* Theel
„ *pardalis* Selenka
Stichopus variegatus Semper
Aphelodactyla irania n. sp.
Stolus sacellus Selenka
Thyone festina Koehler and Vaney
„ *dura* „ „ „
Thorsonia fusiformis n. g., n. sp.
Colochirus löppenthini n. sp.

Of these 17 species three are new to science; the one, viz. *Thorsonia fusiformis* is without any doubt a valid species, while both *Aphelodactyla irania* and *Colochirus löppenthini* certainly appear to be valid these genera are both insufficiently known, and it is possible that a revision will show that these species are but local forms of previously known species. To the biology and zoogeographical position of the Iranian Gulf this is however of very little interest, as they are at any rate characteristic forms, at present not found elsewhere. As further the specimens of *Hol. pardalis* vary considerably, and those of *Hol. impatiens* also to some extent from the specimens found in the Red Sea and Indian Ocean, it appears that more than one third of the Holothurians known from the Iranian Gulf are endemic forms, though they are closely related to species which are common in the Indian Ocean, especially from its African Coast. Species such as *Halodeima parva* and *Stolus sacellus* are typical African species, and most of the others occur from Suez down to Port Elisabeth. The occurrence of *Protankyra magnihamulae* off Bushire is remarkable, since this species has been hitherto known only from Hong Kong and the Gulf of Guinea, West Africa, but nowhere in the Indopacific Archipelago, though collectors such as Mortensen, Dawydoff, Stephensen and v. d. Horst have in recent years worked in Siam, Annam, and along the African Coast.

Most of the species in the collections are represented by single specimens. As both Dr. Thorson and Dr. Løppenthin say that all material found was preserved, except specimens of *H. vagabunda* from Jez Shit War, the Holothurian fauna of the Iranian Gulf must be extraordinarily poor both in species and number of specimens. The only exceptions are *Holothuria vagabunda, Protankyra pseudodigitata,* and *Thyone dura.* Of these species *Holothuria vagabunda* is represented by

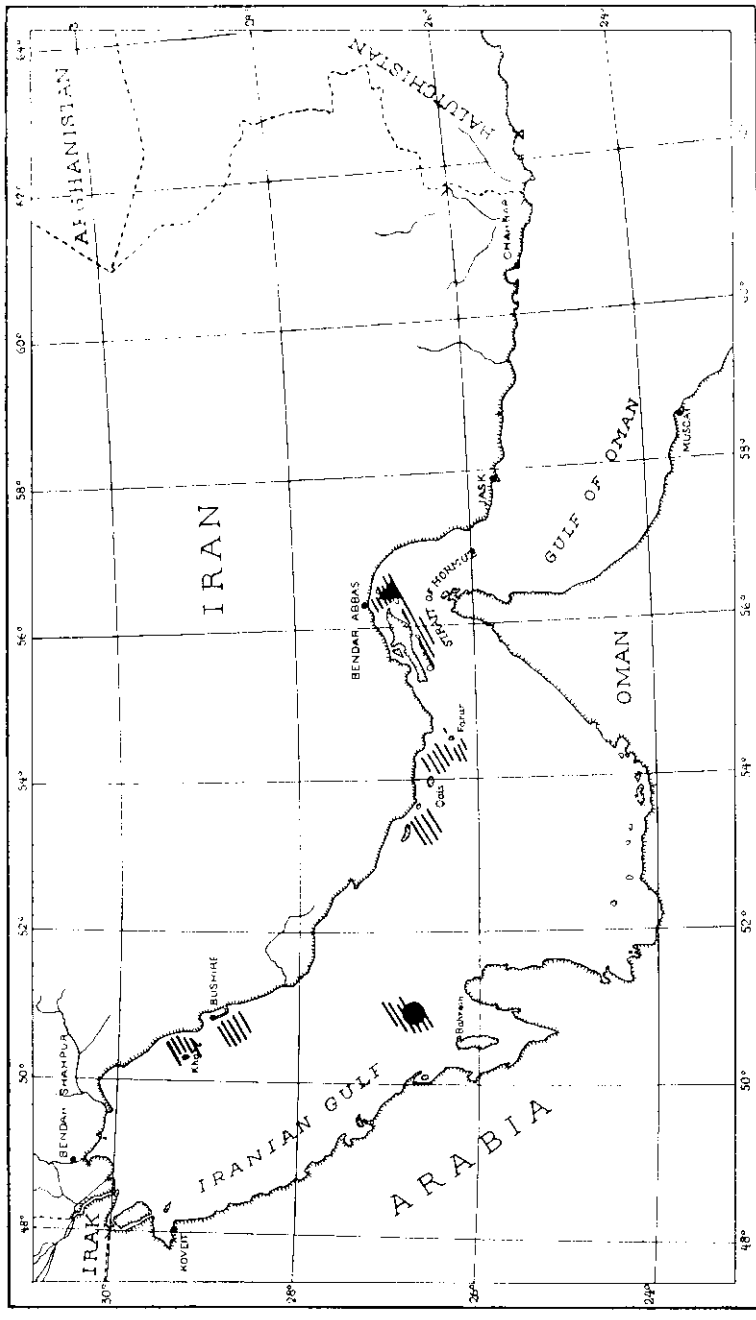

FIG. 1. Map showing the localities in the Iranian Gulf, where Holothurians were found. Stripes: Danish Investigations. Spots: "Investigator" stations. ● *Thyone festina*. ▲ *Holothuria ocellata*.

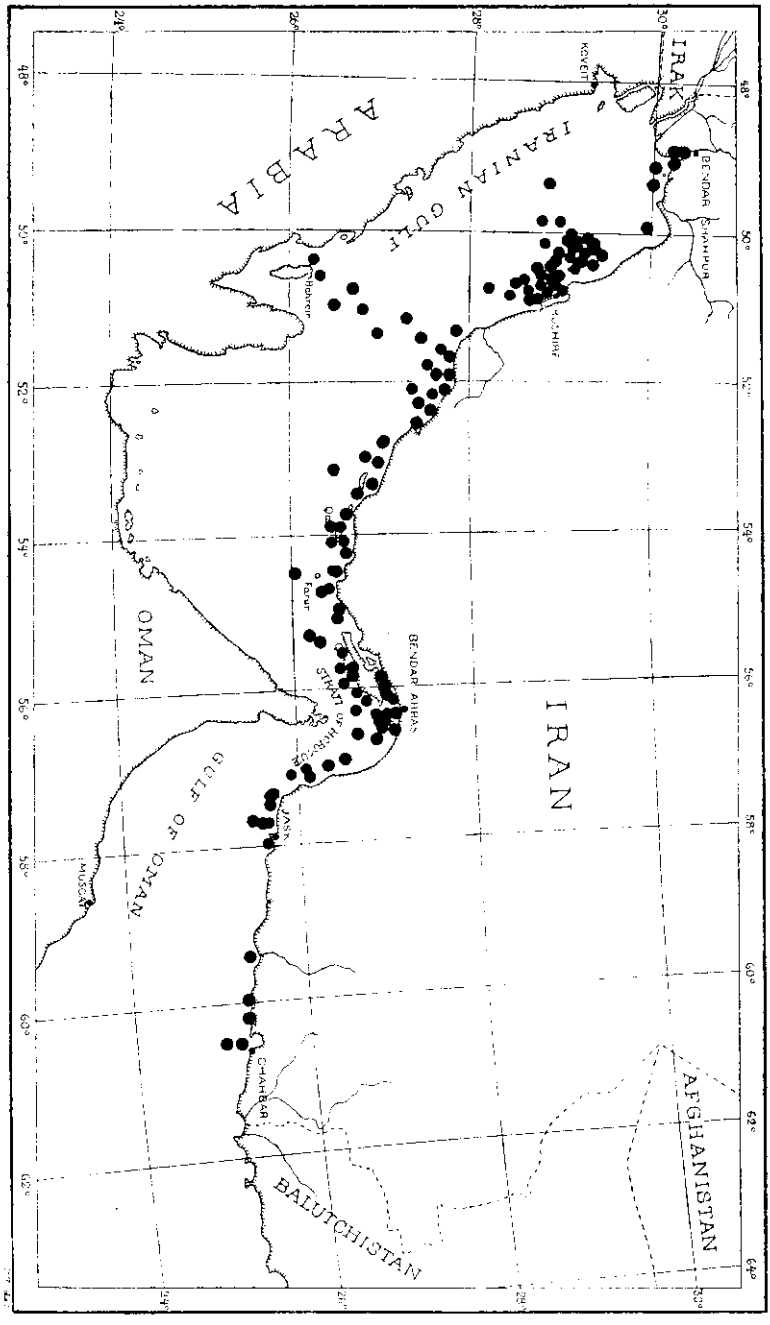

FIG. 2. Map showing the Stations i.e. the intensity of the Danish investigations in the Iranian Gulf. In connection with the Map Fig. 1 this shows the Areas where Holothurians are not found though searched for.

only three specimens from off Bushire and from Jez Shit War; and Dr. Thorson says that at Bushire he searched the coral reefs carefully for Holothurians and only found these two specimens; but Dr. Løppenthin says that on the reefs of Jez Shit War there were numerous specimens in about ½ m below low water level, all being of a beautifully dark bluish purple colour.

Protankyra pseudo-digitata and *Thyone dura*, in contrast to all others, were taken by a Petersen Grab on soft bottoms. *Protankyra pseudo-digitata* occurs in various localities, whereas *Thyone dura* was found only off Bendar Abbas and at the southern coast of the island of Qishm in the Strait of Hormuz. Here *Thyone dura* is very common, and must be regarded as the typical species of the soft bottom, being found in numbers of about a thousand per sq. metre.

It is remarkable that, in spite of the large number of research stations, Holothurians were not found in more than four localities. At first sight it would seem the collections do not give a true picture of the Holothurians of the Iranian Gulf, but, as seen from fig. 2, the whole Iranian shore was thoroughly examined, and we can safely conclude that Holothurians are very seldom found outside the four localities named. The material was, as stated, collected by Dr. Thorson (18/2—22/4 1937) and by Dr. Løppenthin (9/1—27/4 1938) during the fishery investigations carried out for the Iranian Government. Collections of marine animals were made in 156 localities, evenly distributed along the Iranian coast from Bendar Shahpur in the northwest to Baluchistan in the southeast.

Different types of trawls and dredges, seines, the Petersengrab (about 225 samples) and a dip-net were also used, besides collecting by hand along the whole coast, so that the collections made represent the entire Iranian coast, though those taken on the Arabian coast are limited to the waters round Bahrein.

Synopsis of the species.

Ordo: APODA

Family: *Synaptidae.*

Subfamily: *Heterournae.*

Genus: **Protankyra.**

Protankyra magnihamulae Heding.

Protankyra magnihamulae Heding 1928: Synaptidae p. 271. Papers from Dr. Th. Mortensens Pacific Exp. 1914 16. Nr. XLVI, Vid. Medd. Dansk Nat. Foren. Bd. 85.

Protankyra magnihamulae var. *guinensis* Heding 1932: Echinoderma III Holothurioidea 2 (Fam. Synaptidae) p. 356. W. Michaelsen: Beiträge zur Kenntniss der Meeresfauna Westafrikas Bd. III Lief. 7. (Hamburg).

Locality: Stat. 35 D. 3 miles N.W. of Kharg, 23/3—1937. Sand and mud. Trawl. 1 Specimen.

The specimen consists of three fragments measuring 2—3 7 cm in length, the smallest being the fore-end. No doubt the whole specimen is represented and an examination shows that the specimens from off the Congo described by me in 1932 (Op. cit.) as a variety, should be referred to the species *magnihamulae* itself. The fore-end quite agrees with my description of 1928, even to the smallest detail such as the dentation of the anchor arms and that of the handle. On the other hand, the two more posterior fragments agree well with var. *guinensis,* which therefore cannot be maintained.

Protankyra magnihamulae has been previously recorded only from Hong Kong (The type-locality) and from the Gulf of Guinea so that its presence in the inner part of the Iranian Gulf is perplexing. However, just as the deep sea fauna of the Atlantic must be regarded as an offshoot of the Indo-Pacific deep sea fauna, the littoral fauna of the Gulf of Guinea in many respects appears to be an offshoot of the Indo-Pacific littoral fauna, and in this respect it quite resembles that of the Iranian Gulf.

Protankyra pseudo-digitata (Semper).

Protankyra pseudo-digitata Heding 1928: Op. cit. p. 256—262, Textfig. 47,5—,7 and 48.

Localities:

St. 19 C. 3 miles S.E. by S. ½ S. of Bushire, 8 m, hard gray clay, 11/3—37.

St. 30 A, B and C. Between the red and white light buoy off Bushire, 6½ m, Sandy Clay, 19/3—37, Petersen-grab.

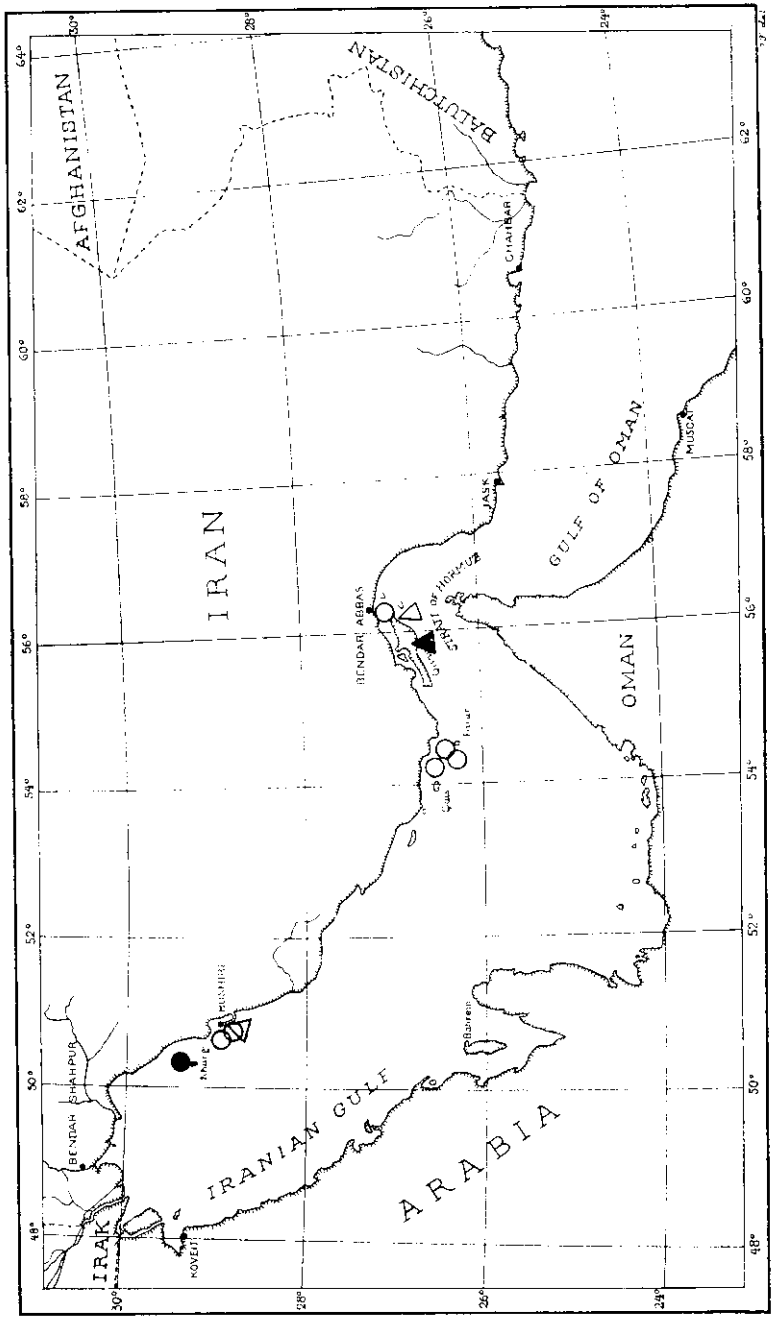

FIG. 3. Protankyra pseudo-digitata. ● Protankyra magnihamulae. / Halodeima parva. ▲ Halodeima atra.

St. 57 A, B and C. 8 miles N. by W. of the Island of Farur, 22 m, hard clay, 9/4—37, Petersen-grab.

St. 62 A, B and C. Roas off Bendar Abbas, 7 m, very hard clay, 11/4—37, Petersen-grab.

St. 122. 2 miles S.E. of Charak, 8 m, clay with sand, 9/4—38, Petersen-grab.

Protankyra pseudo-digitata was found in the Iranian Gulf in three different localities: off Bushire—north of Farur, and off Bendar Abbas; in all these places it was found in fairly large numbers. In all the stations *P. pseudo-digitata* was taken by the Petersen-grab on soft bottoms, in which it burrows.

Protankyra pseudo-digitata is known from the Philippines to the Red Sea, where it was taken at Port Towfiq, near Suez.

Ordo: ASPIDOCHIROTA

Familia: *Holothuriidae.*

Subfamilia: *Holothuriinae.*

Genus: **Halodeima.**

Heding 1940: Die Holothurien der Deutsche Tiefsee-Expedition II, p. 113.

Halodeima atra (Jäger).

Holothuria (*Holothuria*) *atra* Panning 1934: Die Gattung *Holothuria* II, p. 30.

Halodeima atra Heding 1939: The Holothurians collected during the cruises of the M/S Monsunen in the Tropical Pacific in 1934, p. 219.

Halodeima atra Heding 1940: Die Holothurien der Deutschen Tiefsee-Expedition II P. 113.

Locality: St. 68, the shore of Henjam, rocky coast with sand, 17/4—37. 1 spec.

The single specimen is dried, but the deposits are typical and leave no doubt that it is a normal *H. atra.*

Halodeima parva (Lampert).

Holothuria parva Lampert 1885: Die Seewalzen p. 246, Fig. 38.

Holothuria (*Holothuria*) *lubrica* Selenka var *parva* Krauss, Panning 1934: Die Gattung Holothuria II p. 45.

Locality: St. 2. South of Bushire, Coral Reef, 27/2—37. 1 Sp. St. 69, Qism (Tavila), in the tidal-Zone, 18/4—37. 2 Sp.

The three specimens are all typical representatives of *Holothuria parva* Lampert. In 1934 Panning suggests that all the species which he refers to the *lubrica*-group, are varieties of one species. In this I cannot follow him. Some of the species of Pannings *lubrica*-group are so different from the others that they cannot possibly be specifically identical with *lubrica*, and this is the case with *parva*.

Parva is a typical East African species which is distributed from South Africa to the Red Sea. Previously it was recorded from the Iranian Gulf by Koehler and Vaney ("Investigator").

Genus: **Holothuria.**

Holothuria vagabunda Selenka.

Locality: St. 14, East of Kharg, 12½ m, Sand, 6/3—37, seine. 1 Sp. St. ? North East of Kharg, 10—12 m, 31/1—38, Trawl. 1 Sp. St. ? Jez Shit War, E. of Sheikh Shuaib, 9/4—38. 1 Sp.

From the latter locality only one specimen was collected, but Dr. Loppenthin says that this species was very common on the Coral Reef about ½ m below low water.

Holothuria impatiens (Forskål).

Locality: Farur 22/3—38, tidal-Zone. 1 Sp.

The single specimen measures 11 cm in length; in alcohol it is uniformly brown with a faint purple tinge with yellowish tube feet and papillae. In colour it agrees fairly well with Clark's variety *concolor*.

The anal opening is star-shaped, since the anus is supplied with five large white knobs filled with numerous calcareous deposits. The examination of one of the knobs shows however that the deposits are merely tables and buttons of very nearly the usual form, perhaps a little denser, (fig. 5^{6-9}). The deposits of the body wall are rather large, and the tables have all two bridges, as in fig. 5^{1-4}. In the tube feet there are normal staves with a broader and perforated middle part (fig. 5^{5}), but the tentacle staves are very characteristic, being round, faintly bent, the ends with small spines arranged in rows (fig. 5^{10}).

Holothuria spinifera Theel.

Locality: St. 14, Off the east side of Kharg. 6/3—37, 12½ m, Sand, stones, corals. 1 Spec.

The single very characteristic specimen measures 12 × 6 × 3 cm. In all the dorsal papillae the large tables possess a single smooth spine.

Previously *H. spinifer* was recorded only from the Philippines and

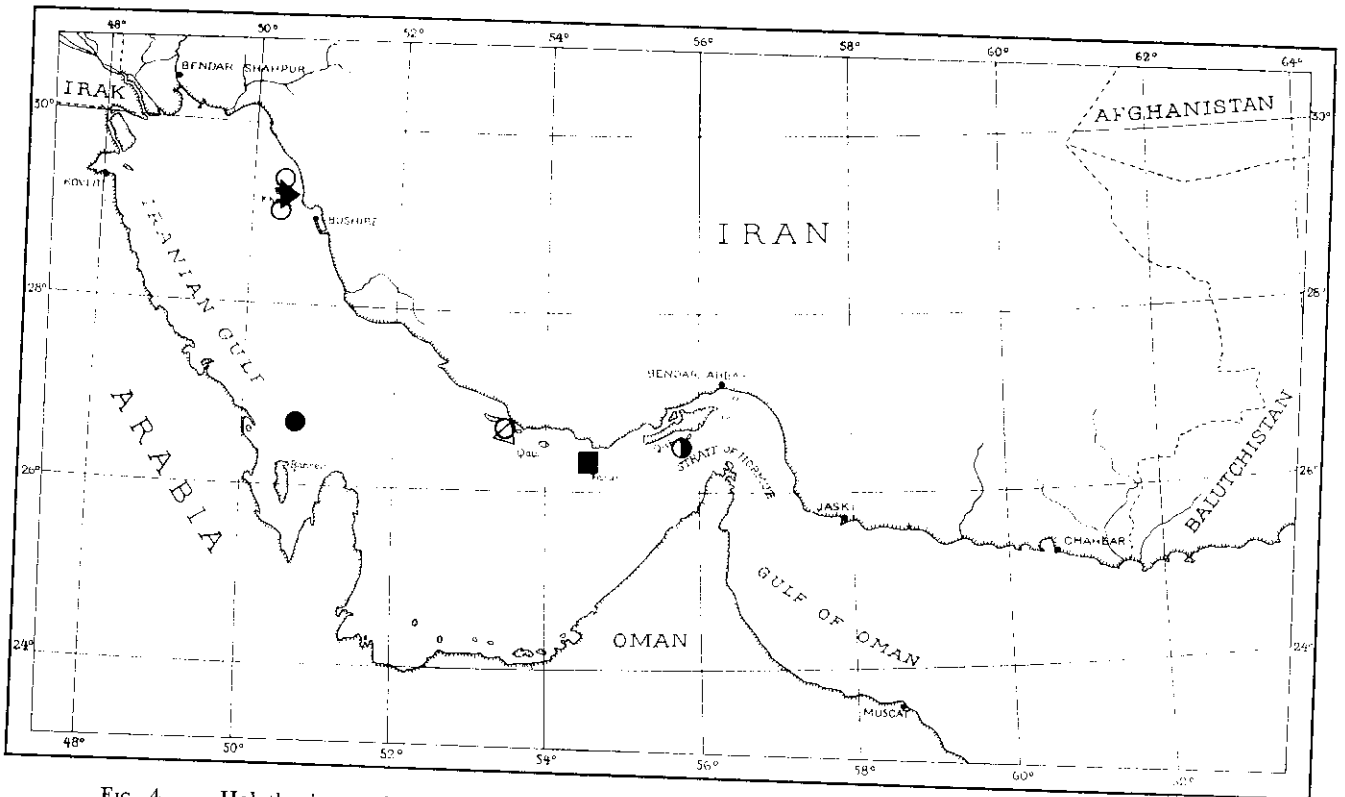

FIG. 4. Holothuria vagabunda. ● Holothuria pardalis. ◗ Aphelodactyla irania. ▲ Holothuria spinifera. Stichopus variegatus. ■ Holothuria impatiens.

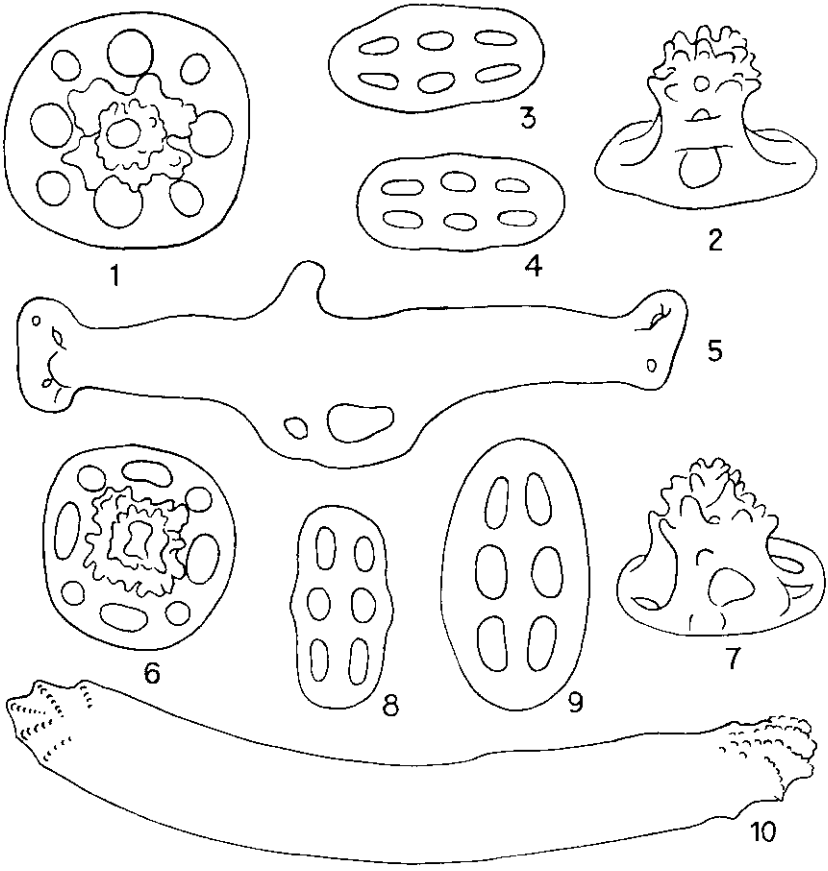

FIG. 5. *Holothuria impatiens*.
1—4 Spicules from the body wall.
5 Rod of a tube foot.
6—9 Spicules from an anal papil.
10 Rod from the tentacles.
300/1.

Ceylon, but Dr. Mortensen collected some specimens in the Red Sea at Ghardaqa, near the Marine Biological Station of the Egyptian University, (Coll. Zool. Mus. Copenhagen).

Holothuria pardalis Selenka (var.?).

Panning 1935: Die Gattung Holothuria, V p. 3.

Locality: St. 39 D, 12 Sm E.N.E. of Bahrein. 27/3—37, 23 m, shells and gravel, dredge. 1 Spec.

The single specimen measures 10 × 6 cm. In alcohol it is black, and has its tube feet scattered all over the body, but by far the most densely along the ambulacra.

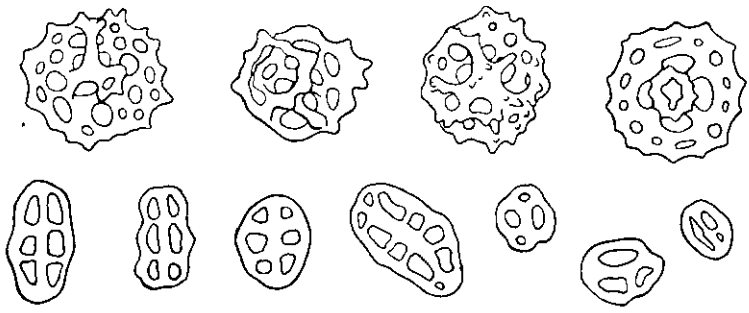

FIG. 6. *Holothuria pardalis* ?. Spicules from the body wall. 300/1.

The calcareous deposits (fig. 6) vary somewhat in shape. The tables may be quite regular as well as irregular, and in the latter case vary from small irregular plates to real balls. The buttons are normally fairly regular with six somewhat angular holes; some are found to have several holes, and many have but three to four holes. When only four holes are present, they are often arranged so as to resemble the rosettes of the Genus *Halodeima*.

Subfamilia: *Stichopodinae*.

Genus: **Stichopus.**

Stichopus variegatus Semper.

Clark 1922: The Holothurians of the Genus *Stichopus* p. 67.

Engel 1933: Holothuries, Res. Scient. du Voyage de la Prince et la Princesse Leopold de Belgique p. 11. Textf. 11—12, Pl. I f. 1.

Heding 1940: Die Holothurien der Deutschen Tiefsee Expedition II p. 116.

Locality: St. 124, E. of Jezsheikh-Shuaib, 9/4—38. 1 Spec.

The single specimen is rather large, measuring in alcohol 12 cm in length. It is quite typical.

Distribution: N.E. Africa, Red Sea and Indian Ocean.

Familie: *Molpadiidae*.

Genus: **Aphelodactyla.**

Clark 1938: Australian Echinoderms p. 542.

Aphelodactyla irania n. sp.

Locality: St. 59 D, 8 miles S.W. of Henjam, 10/4—37, 31 m, soft, clay. 1 Spec.

Calcareous deposits are found all over the body and they are fairly numerous. In the body wall proper they are nearly all small "fat" rings or doughnut-shaped bodies (fig. 7[2]), only now and then a single one is found which is C-shaped. In the wall of the cloaca the rings become irregular and more or less rosette-like (fig. 7[3]), and in the tail there are only rosettes (fig. 7[4]).

In the anal papillae there is a dense layer of calcareous deposits, but here neither rings nor rosettes are present, only small bent and branched staves (fig. 7[5]).

This species agrees in many respects with *molpadioides* Semper and *leucoprocta* Clark (1938), but differs so much from them both that it appears reasonable to establish a new species. The fact that deposits do not vary in shape, but are rather uniform in the different parts of the

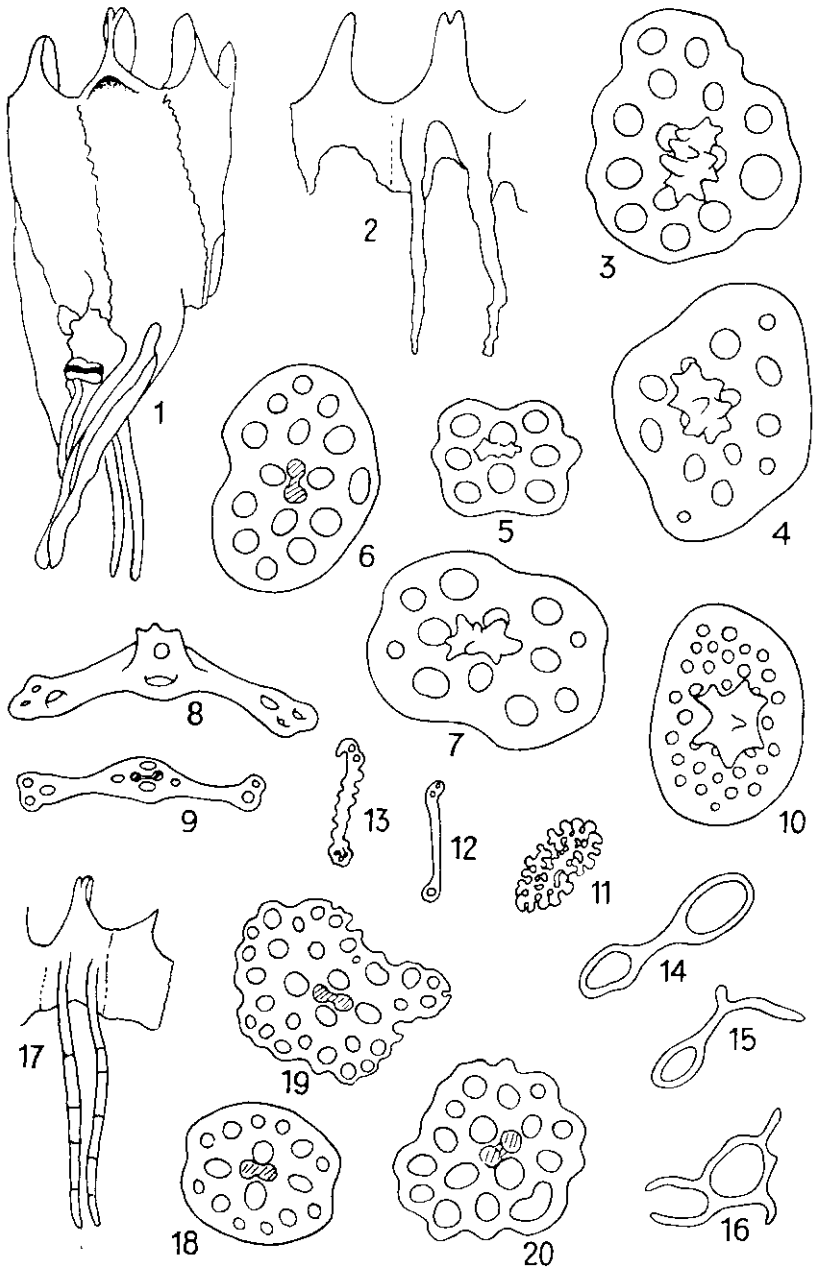

FIG. 8. *Thyone dura.*

1 Calcareous ring of a large specimen, showing the posterior prolongations of the radials and the stone canal. 6/1.
2 Calcareous ring of a large specimen with the introvert regenerating. 20/1.
3 Calcareous deposits of the body wall.
4—6 Calcareous deposits of the tube feet.
10—11 Calcareous deposits of the introvert.
12—13 Calcareous deposits of the tentacles.
14—16 Calcareous deposits from the gonads.
17 Calcareous ring of a small specimen. 20/1.
18—20 Calcareous deposits of a small specimen.
fig. 3—16 & 18—20 300/1.

species are to hand. They vary in size from 4 mm to 32 mm. A careful examination shows that they are without any doubt referable to Koehler and Vaney's species *Thyone dura*, of which only two small specimens were previously known, collected from close to the Strait of Hormuz, in 20° 37′ N. 69° 24′ E.

The present specimens show that H. L. Clark most likely is right in his supposition that the West Australian *Thyone alba* is adult of *T. dura*.

The specimens are all pure white and measure from 4 mm to 32 mm. All have the introvert drawn in, or, often, thrown off, and no specimens are fully extended. In the large specimens the tube feet are scattered all over the body, being only more densely crowded along the ambulcra; in the smallest specimens however there are only two regular rows of tube feet in each ambulacrum, and only the mid-dorsal interambulacrum is supplied with a few small tube feet.

There are ten tentacles, of which the two ventral ones are much smaller than the others, and there are five anal teeth. The calcareous ring (fig. 8^1) is large, and the radials are supplied with large posterior prolongations and a faintly bifurcate anterior process. The calcareous ring itself is bilaterally symmetrical since the interradial pieces are of different lengths. The shortest pieces are, as is common in the genus *Thyone*, the two lateral ones and the longest are the two ventral ones. The mid-dorsal interradial is of intermediate length.

This shape of the calcareous ring of a large specimen differs so distinctly from the shape of the ring in the type of *Th. dura* (cf. Kochler and Vaney op. cit. Pl. III f. 9) that there seems to be no doubt that these specimens cannot be of that species. An examination of the ring in the smaller specimens shows however, that the shape differs widely in small and large specimens, and that the ring in the small specimens quite agrees with that of *Th. dura*. A very interesting thing is that the largest specimen has the introvert with its calcareous ring under regeneration; and in this specimen the little ring (fig. 8^2) is very like that of the small specimens (fig. 8^{17}). As seen from Kochler and Vaney's figure as well as from fig. 8^{17}, the posterior prolongations are "cracked", but the study of the ring in the larger specimens shows as also stated by F. J. Madsen, that this cracked appearance of the calcareous ring in *Thyone*, in contrast to what is the case in *Stolus*, must be occasioned accidentally by violence, perhaps when the introvert is being suddenly withdrawn.

There is one polian vesicle and one stone canal, which runs forward

along the calcareous ring (cf. fig. 8^{1}) and is supplied with a madreporite folded once.

The calcareous deposits in the body wall of the large specimens are only tables with a spiny spire composed of two rods, i.e. they are normal *Thyone*-plates, measuring abt. 100 μ (fig. 8^{3-7}). The greater part of the plates are oval or squarish, with the pores arranged rather regularly. Plates with the four primary holes alone (as in *Thyone fusus* O. F. Müller) are not found, and only a single little squarish plate with four primary and four secondary holes is present (fig. 8^{5}). The normal plates have also four tertiary holes (fig. 8^{7}) and some more, irregularly placed ones. In the latter case the shape of the plates is either triangular or quite irregular.

In the tube feet there are numerous bent oblong tables with a low spire and a few perforations in the ends (fig. 8^{8-9}); in the introvert the plates are very numerous, regularly oval, and supplied with a large number of small irregularly placed perforations (fig. 8^{10}). Besides these plates there are in the introvert small heaps of rosettes (fig. 8^{11}) which are easily seen with the naked eye as small, pure white spots.

Real staves are not found in the tentacles, but there are some few very small rodlike ones (fig. 8^{12-13}) measuring not more than 50 μ, often less in the end branches.

In the gonads there are some apparently characteristic irregular to spectacle-like rods (fig. 8^{14-16}) measuring abt. 80.

The calcareous deposits of the small specimen of which the calcareous ring, fig. 8^{17}, is drawn, are very like those of the large specimens (fig. 8^{18-20}), but only very few are equally regular and of the characteristic "fat" appearance like the plates of the large specimens. More often these plates are quite irregular and of a more delicate appearance.

No doubt the small specimen described, is Koehler and Vaney's *Thyone dura*, the shape of the calcareous ring and that of the plates in the tube feet being nearly identical. However, the shape of the plates of the body wall is apparantly very different, since Koehler and Vaney state that the spire in their specimens is composed of three to four pillars (trois ou quatre piliers massifs, convergents). In spite of this they mention the four primary perforations; it is obvious from their figure pl. III f. 10 that the arrangement of the pores is as described above for the Iranian specimens. Therefore I consider it certain that Koehler and Vaney's description of three and four pillars is due to a mistake, most likely occasioned by the large spines of the crown, which may, in fact, often bear a resemblance to pillars. This also agrees with the fact that species of *Thyone* do not seem to have more than two pillars on the plates, and that

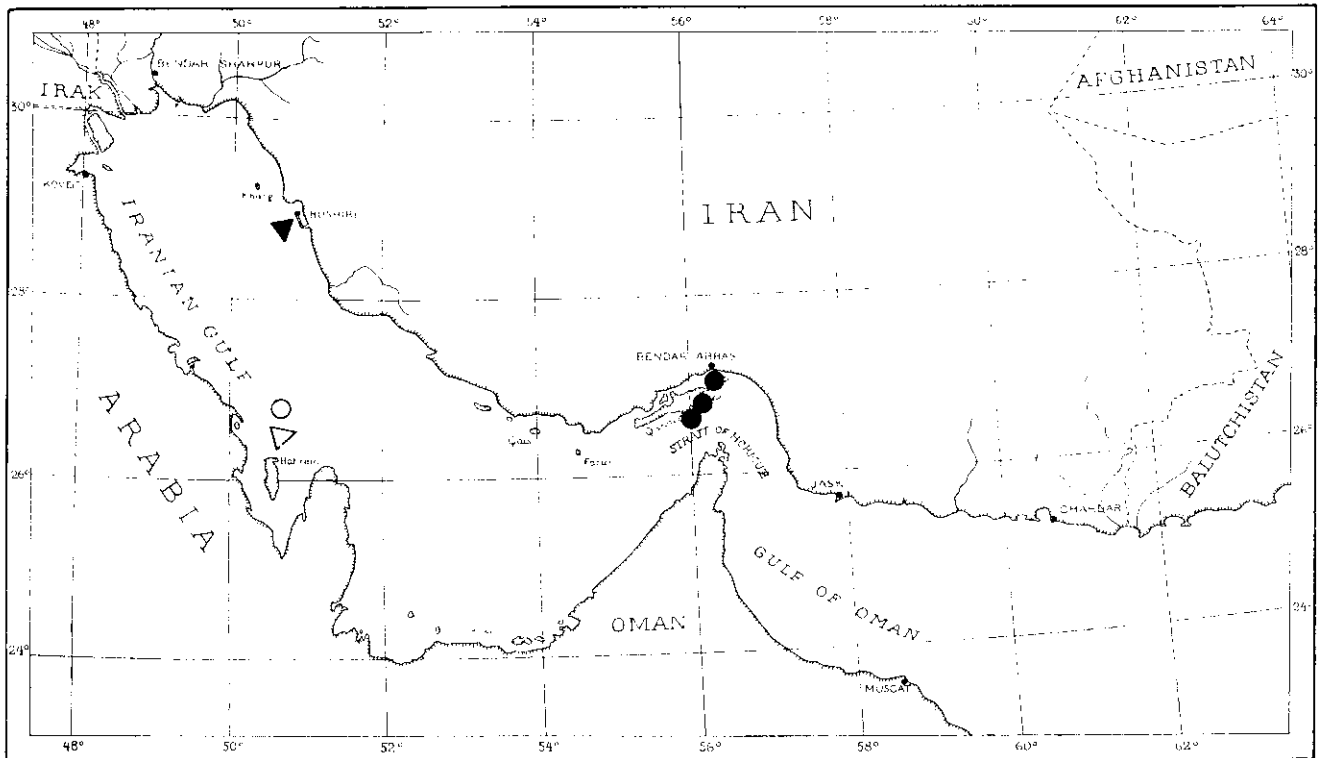

FIG. 9. ○ Stolus sacellus. ● Thyone dura. △ Colochirus löppenthini. ▲ Thorsonia fusiformis.

Clark, in 1938, does not attach any importance to this difference between his *Thyone alba* and *Thyone dura.*

It should also be mentioned that Koehler and Vaney do not mention that the two ventral tentacles are smaller than the others, but this is, indeed, very difficult to ascertain in such small specimens with the introvert retracted, so that its omission may mean nothing.

I have therefore no doubt that the specimens from the Iranian Gulf are Koehler and Vaney's *Thyone dura,* and that the differences between these specimens and the original description are due to less careful examination of the type specimens.

I quite agree with Clark that his single specimen of *Thyone alba* from South West Australia resembles a mature specimen of *Thyone dura,* but in spite of the fact that the present specimens still further unite the species *alba* and *dura* the general appearance of the calcareous deposits is so different that it seems reasonable to maintain two different systematic groups.

As to Pearson's species *Thyone calcarea* (Ceylon Pearl oyster Report, Holothurioidea p. 194 Pl. I f. 17—20) I quite agree with Koehler and Vaney that it is closely related to *dura* in the shape of its deposits, but the shape of the calcareous ring (pl. I fig. 17) differs so definitely from that of *dura* that the two species cannot be closely related. I have the more confidence in making this statement because Pearson is a very reliable investigator and in his works pays special attention to the shape of the calcareous ring.

Genus: **Thorsonia** n. g.

Echinocucumis Semper 1868: Die Holothurien p. 60 Pl. XI f. 7 Pl. XIII f. 26.

Echinocucumis Sluiter 1887: Die Evertebraten etc. p. 201, Pl. I f 10—16.

Diagnosis: Dendrochirote Holothurians with 10 (equal?) tentacles, and with the tube feet in rows along the ambulacra.

The body, in all known specimens, is U-shaped with attenuating ends, and this seems to be characteristic of the genus. The calcareous ring is composed of 10 pieces, of which the radials are alike, and supplied with a long bifurcate prolongation. Anal teeth large, five in number.

Calcareous deposits of body wall large 2—5 armed plates, with a high solid *central* spire and smaller more irregular polypore plates also with spire. Further some oval or fusiform plates without spire may be present. Calcareous deposits of tube feet small semicircular two-armed plates with a very high spire.

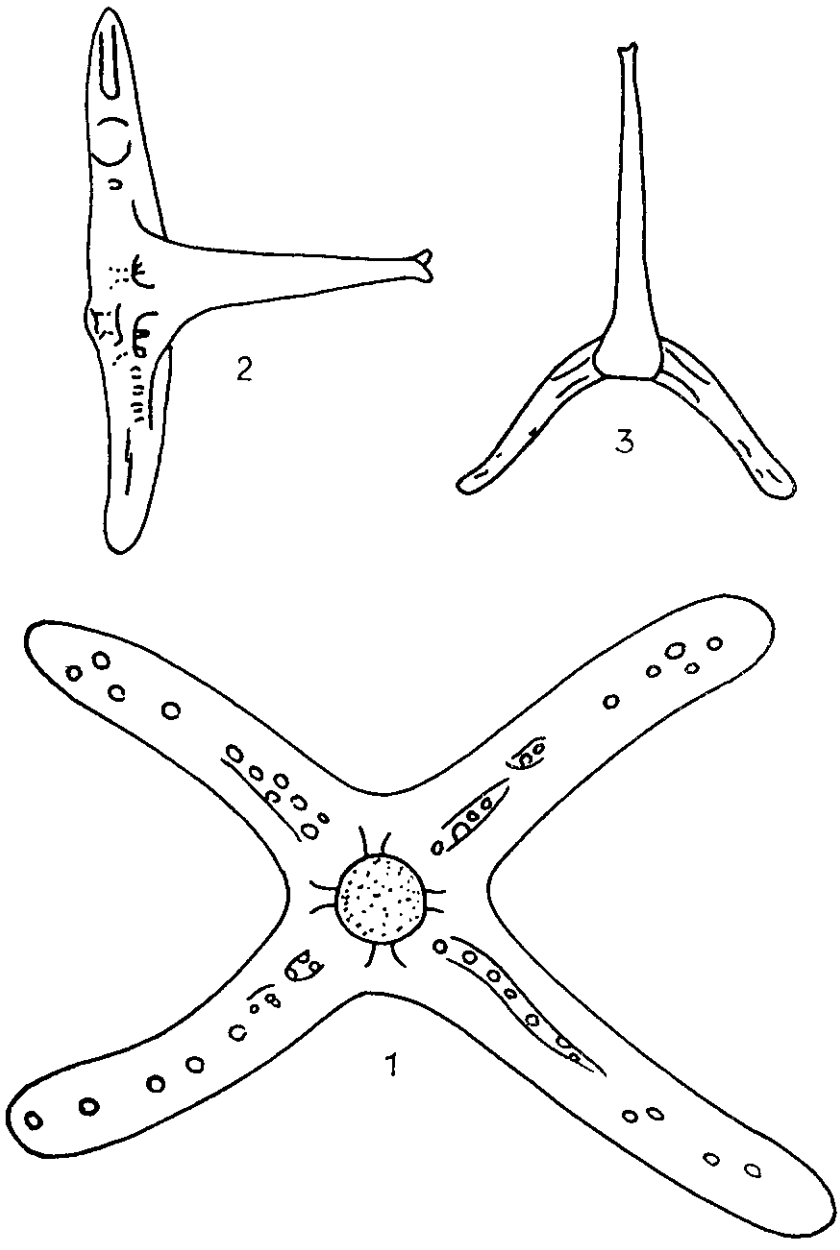

FIG. 10. *Thorsonia adversaria* (Semper).
Calcareous deposits of a preparation of the type specimen, made by Semper.
1 A plate from the body wall. 200/1.
2 Side view of a smaller plate from the body wall. 200/1.
3 Side view of a plate from a tube foot. 600/1.

Genotype: Echinocucumis adversaria Semper.

Remarks: In 1930 Deichmann suggests that Semper's species *Echinocucumis adversaria* is not *Echinocucumis* but "a typical *Cucumaria*, related to the calcigera-group". (Deichmann 1930: Atlantic Holothurians p. 150). There is no doubt that Deichmann is right in her supposition that *adversaria* is no *Echinicucumis*, but I cannot follow her in referring it to *Cucumaria*. According to Semper's description it might reasonably be regarded as a *Cucumaria*, and Deichmann herself states that her suggestion is based on Semper's description, as she has possibly failed to remember that Sluiter gave a more useful description of a good specimen of *adversaria* in 1887 (Op. cit.). On account of Sluiter's description and from an examination of a preparation in the Zoological Museum in Copenhagen of Semper's type specimen, made by Semper himself (see fig. 10^{1-3}), and also of a new species collected by Dr. Thorson in the Iranian Gulf, closely related to *adversaria*, I have no doubt that *adversaria* represents a separate genus. I have pleasure in naming this in honour of Dr. Thorson the very skillful biologist and collector of Echinoderms, arctic as well as tropical.

Where this genus ought to be placed within the *Dendrochirotae* I am not able to say at present, and certainly it would be preferable to await a closer study of all the dendrochirotes before establishing this new genus; but here I have a new species from the Iranian Gulf for which there is no genus to which I can assign it, so no other course is possible than to establish a new genus for it.

In the shape of the deposits *Thorsonia* in some degree resembles *Rhopalodina*, but the shape of the calcareous ring and the number of tentacles are rather definitely against such a relationship.

Thorsonia fusiformis n. sp.

St. 30 A. Between the red and the white light buoy off Bushire, 6½ m, Sandy clay, Petersen-grab. 1 Spec.

The single specimen is only a fragment, the intestine, the calcareous ring with introvert and other organs having been thrown off. It measures 11 mm in length and has a very long and attenuated caudal part. The tube feet are placed in rows along the ambulacra. They are rather abundant along the body proper, but along the caudal as well as along the oral part they are small and few. in number. On the posterior end of the tail tube feet are totaly lacking. There are five large anal teeth.

The calcareous deposits (fig. 11) in the body wall are large (200 --250 μ) two to five-armed perforated plates with a high solid spire,

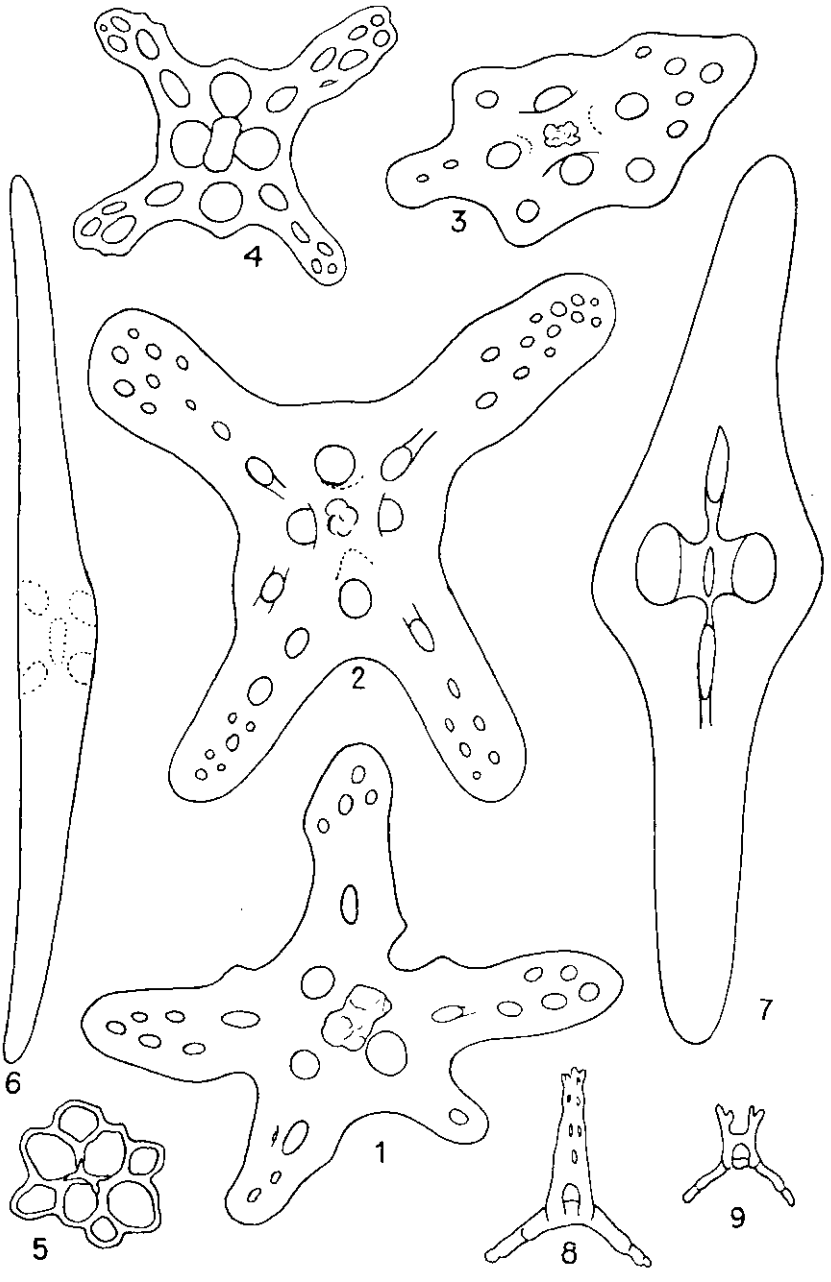

FIG. 11. *Thorsonia fusiformis* n. sp.
1—5 Plates from the body wall.
6—7 Fusiform bodies from the body wall.
8—9 Plates from the tubefeet.

smaller (80—150 μ) four-armed or irregularly rounded plates also with a spire and large (300—400 μ) long fusiform bodies with hollowed, perforated midpart and without any trace of spires. In the tube feet there are small two-armed semicircular plates with a very high perforated spire ending in a few knobs, or, fairly often, with a row of small teeth. Now and then these spires are incompletely developed as seen from fig. 11[9].

Remarks: There is no doubt that the present incomplete specimen represents a new valid species, which is closely related to Semper's *Echinocucumis adversaria*. The two species agree in the shape of the body, in the arrangement of the tube feet and especially in the presence of the large, normally four-armed plates with a homogenous spire and in having the very highspired semicircular plates in the tube feet.

As far as it is possible to ascertain, all the large plates have their spires originally composed of four rods which are completely coalesced; from the preparations before me of Semper's *adversaria* it is seen that this is also the case in that species. The smaller plates, and especially the plates of the tube feet, appear to have only two rods in the spires.

The two species *adversaria* and *fusiformis* differ, partly in the shape of the large plates, partly in the presence of fusiform bodies in the body wall of *fusiformis*. These fusiform bodies do not seem to occur in *adversaria*. In the first place there are none in the preparation at hand though the tables are well preserved, and secondly neither Semper nor Sluiter mention such deposits, which seems impossible, if such characteristic deposits had been present in their preparations. However—by far the clearest difference between the two species is the shape of the spires of the plates from the tube feet (cf. fig. 10[3] and fig. 11[8]). In *adversaria* the spire is formed by one round homogenous rod, whereas *fusiformis* has these spires flat and laterally perforated.

Genus: **Colochirus.**

Pentacta Clark 1921.
Pentacta Deichmann 1930.

Colochirus löppenthini n. sp.

Locality: St. 86. 6 miles N.E. of Bahrein, 20/3 1938, 20 m. 5 Spec.

The specimens measure abt. 3 cm in length and 1 cm in diameter. Due to contraction their shape is rather variable, but the type specimen especially shows a fairly square transverse section, without any large papillae. The colour in alcohol is grey to greenish grey. The anal end is without any special characteristics, having but five distinct anal teeth. The introvert is closed by the usual five large protuberances.

Ventrally there are 4—6 rows of tube feet in each ambulacrum. Dorsally the base of the tube feet is surrounded by large scales forming low papillae with a large tube foot in each. These papillae are not densely arranged in the dorsal ambulacra, but also in the middorsal interambulacrum there are similar low papillae.

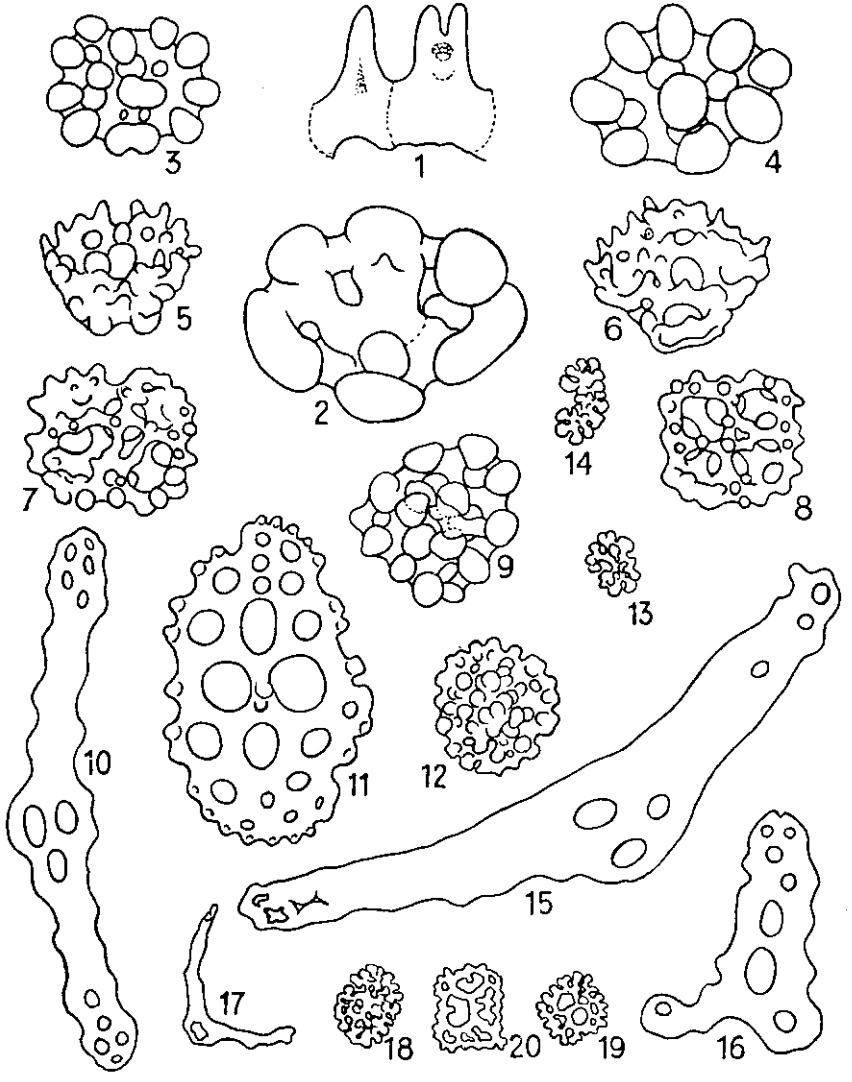

FIG. 12. *Colochirus löppenthini* n. sp.
1 Calcareous ring. 20/1.
2—9 Calcareous deposits from the body wall.
10—11 Calcareous deposits of a tube foot.
12—14 Rosettes of the introvert.
15—20 Calcareous deposits of the tentacles.
2—20 300/1.

The lateral interambulacra and also the central part of the ventral ones are without water vascular appendages.

The calcareous ring (fig. 12^{1}) is low and solid with five equal interradials and five equal radials, the latter of which have the anterior process notched. Posterior prolongations of the radials are totally absent. The tentacles are studied with difficulty, but it appears clearly from the shape of the calcareous ring that there are ten tentacles of which the two ventral ones are distinctly smaller than the others.

Calcareous deposits.—The calcareous deposits of the body wall (fig. 12^{2-9}) are of three different sports, the inner sort consisting of very large pine-cone like bodies; the median layer of deposits usually consists of rather regular small four-holed knobbed plates, and the exterior layer are small baskets which may close up to spherical bodies. In the tube feet there are, beside the rather irregular end plates, which have numerous small pores arranged without order, also large staves with perforated ends and midpart, and rather large regularly perforated plates with small spherical knobs along the margin (fig. 12^{10-11}). In the introvert there are numerous irregular rosettes (fig. 12^{12-14}) and normally no other deposits. In the tentacles there are besides the staves and the plate-like staves (fig. 12^{15-17}) numerous small rather regular rosettes (fig. 12^{18-20}).

This species resembles somewhat in the body shape, such species as *robustus* Östergren, *armatus* v. Marenzeller, *australis* Ludwig and *doliolum* Pallas, but in the shape of the calcareous deposits it differs definitely from them all. However, a closer study of the rather numerous species of *Colochirus* may most likely show that many of them are synonyms. In that case I am inclined to regard the Iranian form as a variety of *armatus*. At present, however, it is not possible to ascertain the real value of the specific characters used, for which reason I prefer to regard the Iranian form *löppenthini* as a separate species related to *armatus*.