PHYLLACANTHUS FORCIPULATUS, SP.NOV., A NEW CIDARID FROM THE INDIAN OCEAN.

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(Plates X-XII.)

Some years ago I received from the Zoological Survey of India, Indian Museum, Calcutta, a number of unidentified Echinoids, which had, evidently, not been in the hands of Koehler, when he was writing his famous reports on the Echinoderms of the "Investigator." Most of these unidentified specimens proved to be common, well known forms of no special interest. But among them was a Cidarid of the genus *Phyllacanthus* which looked rather peculiar and appeared to represent a new species. As it was apparently not fully adult, I put it aside in the hope that more material would turn up some day,—particularly I hoped that the "Murray" Expedition would succeed in collecting specimens of this form during its investigations in the Indian Ocean.

Although the said Expedition brought home several new forms of Cidarids, the above mentioned species is not represented in its collections. Fortunately, however, a collection of Echinoids sent me by Dr. B. Sundara Raj, Director of the Madras Fisheries, contained a couple of adult specimens of the said new Cidarid, so that it can now be duly described.

Dr. B. Prashad, Director, Zoological Survey of India, has suggested that the specimen from the Indian Museum, as the first one found, should be regarded as the type of the new species. Although, as remarked above, it is not fully adult, it is a very fine specimen (Pl. X, fig. 1), and I, therefore, accept Dr. Prashad's suggestion in designating this specimen as the type of the new species, which I describe below under the name *Phyllacanthus forcipulatus*, sp. nov.

Together with the as yet unpublished new Cidarids from the "Murray" Expedition, this new *Phyllacanthus* represents a very noteworthy addition to the rich Cidarid fauna of the Indian Ocean—a fauna so rich, indeed, that it can almost match with that of the richest region in the world, the Malay Archipelago. Moreover, the fact that such a notable new form could be found in the comparatively well known Bay of Bengal makes it rather safe to prophesy that further investigations, particularly in the little known Eastern and Southern regions of the Indian Ocean, will bring still more new forms to light.

Serial No.	Horizontal diameter.	Vertical diameter.	Apical system.	Peristome.	Number of plates.		Longest spines.
					I. A.	A. *pro.* I. A.	
1.	58 mm.	36 mm.	23 mm. (38% h.d.).	24 mm. (41% h.d.).	7—8	17—18	80 mm.
2.	27·5 mm.	16 mm.	11 mm. (40% h.d.).	13 mm. (47% h.d.).	(5)—6	12—14	55 mm.
3.	13 mm.	7 mm.	6 mm. (46% h.d.).	6·5 mm. (50% h.d.).	(4)—5	10—12	22 mm.

Specimen 2 of the above table is the type-specimen, which belongs to the collection of the Indian Museum, Calcutta ; the two other specimens are deposited in the Zoological Museum, Copenhagen.

Test.—Flattened above, but not below ; sides beautifully arched, circumference round.

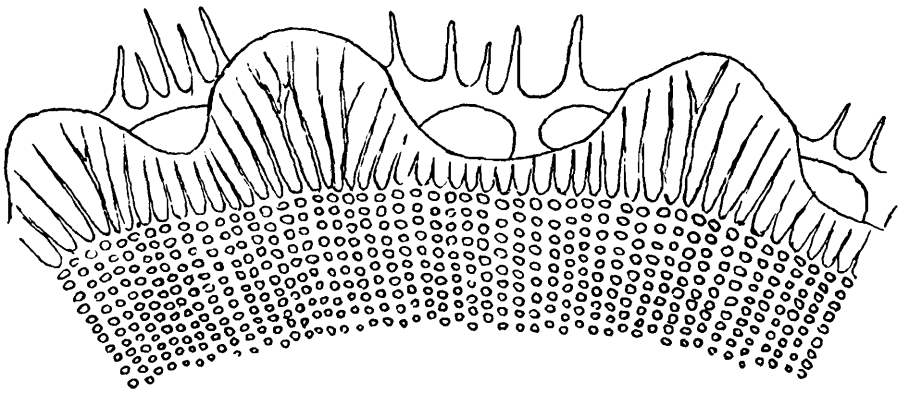
Ambulacra.—Rather conspicuously sinuate, only about $\frac{1}{5}$ the width of the interambulacra. Interporiferous zone slightly broader than a pore-zone. Marginal series of tubercles perfectly regular, the tubercles contiguous ; the mamelon not very distinct, but clearly excentrical. Adradially to the marginal tubercle each plate carries one somewhat smaller, not distinctly mamelonate tubercle, placed about in the middle of the plate, these inner tubercles forming regular series ; in the largest specimen there may also be some smaller tubercles on some of the plates at the ambitus. In any case the interporiferous zone is completely filled up by the secondary tubercles, there being no naked or sunken line. The pores, as is usual in *Phyllacanthus*, conjugate, but have the upper part of the wall is raised ; and the ridge is low and rounded (Pl. XII, fig. 1).

Interambulacra.—Areoles large, not deepened, all well separated, at most the two lowermost ones may be confluent ; they are all, except the two or three upper ones, markedly transverse-oval. The scrobicular tubercles are of the form typical of *Phyllacanthus*, with a raised inner part (*cf.* fig. 160, p. 501 of my *Monograph of the Echinoidea*, I). The median space is narrow, *ca* $\frac{1}{2}$ the width of an areole, wholly covered by the secondary tubercles, which decrease rather abruptly in size from the scrobicular circle towards the sunken, but not naked, median line. Also on the adradial side of the scrobicular circle there is room for a few secondary tubercles.

Apical system.—About 40 per cent of the horizontal diameter in the adult, somewhat more in the younger specimens. The ocular plates are all exserted ; the madreporite scarcely enlarged, not elevated. The whole apical system closely covered by a uniform tuberculation (Pl. XII, fig. 2). *Peristome*, as usual in the genus *Phyllacanthus*, larger than the apical system, slightly rising towards the mouth. The pores distinctly biseriate, *ca.* 21-22 in each ambulacral half. Interradial plates, in the adult, *ca.* 8 in a regular series, not reaching the mouth edge.

Primary spines.—Rather long, up to twice the horizontal diameter. They are slender, cylindrical, scarcely at all tapering, only slightly thicker in the basal part in the adult, in the young rather a little club-shaped. There are *ca.* 12 low, rounded-serrate ridges, which become slightly more prominent towards the end of the spine, forming a small, inconspicuous terminal crown. The space between the ridges covered by a coat of low, coarse, anastomosing hairs (*cf.* text-fig. on p. 309). The characteristic arrangement in bundles of the radiating septa (*cf.* fig. 162, p. 502, of my *Monograph of the Echinoidea*, I) is seen very distinctly in sections. The neck is very short and inconspicuous, the collar *ca.* 3 mm. long, increasing somewhat in thickness towards the very inconspicuous milled ring. The oral primaries are rather slender, not club-shaped, distinctly longi-tudinally ridged. The 2nd and 3rd form a very gradual transition to the ambital spines.

Secondary spines.—The scrobicular spines are *ca.* 6-7 mm. long, rather tightly appressed, flat, smooth, slightly narrowing towards the end,



Part of transverse section of primary spine of *Phyllacanthus forcipulatus*, sp. nov. ×45.

which is somewhat rounded. Marginal ambulacral spines slender, flattened, *ca.* 3 mm. long in the large specimen, not narrowing towards the rounded point. The smaller secondary spines scale-like, appressed; those around the anal opening slightly larger.

Pedicellariae.—The large globiferous form found only in the young specimen; they are small, but of the typical form, without end tooth; the stalk is slender, with a few small thorns at the upper end (Pl. XII, figs. 3, 4). The small globiferous pedicellariae of the type usual in *Phyllacanthus*; they are most of them very small, but larger samples occur, which form a transition to the tridentate pedicellariae (Pl. XII, figs. 6-8). A form with shorter but broader valves occurs on the peristome (Pl. XII, fig. 5). The tridentate pedicellariae are rather extraordinarily developed, the length of head up to *ca.* 5 mm.; the valves are very slender (Pl. XII, figs. 9,10), with the blade filled up by longitudinal, finely serrate low crests. Tridentate pedicellariae, though not of the largest size, also occur on the peristome, which is very unusual.

Spicules.—Of the usual form, irregular, thorny rods.

Colour.—The test, as covered with its spines, is a light brownish, in specimen 2 with a tinge of pink on the scrobicular spines. The primary spines are brown, with a whitish band near the tip. The ridges of the shaft are somewhat darker, which makes them the more conspicuous. The denuded test is white.

Remarks.—That this is a very distinct species is beyond doubt. From *Ph. imperialis*, the only other species known to occur in the Indian Ocean, as well as from all the other known species, it is distinguished at a glance by its primary spines, which are much more slender, not nearly as smooth, and have much fewer ridges. Also the tridentate pedicellariae distinguish it markedly from the other species.