

## VIII. TUNICATA

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THROUGH the kindness of the authorities of the British Museum (Natural History) the Tunicata collected by the M.Y. *Manihine* in the Gulf of Aqaba in the early months of 1949 were forwarded to me for examination.

As far as I am aware no collection of Tunicata has previously been made there, but the tunicates of the Red Sea, and especially those of the Gulf of Suez, have been the subject of much study and are dealt with in several published articles.

The remarkable work by Savigny (1816), which was many decades in advance of his time, and which laid the foundations of much of our knowledge of the Tunicata, as well as important articles by Hartmeyer, Michaelsen, and others during the present century, were based in large part on specimens from those waters.

It was therefore hardly to be expected that new species would be found in a comparatively small collection, especially since no specimens were obtained except in very shallow water, in no case over about 2 fathoms.

All the specimens appear to be referable to species already described, but nevertheless the collection contains some that are of interest, especially those of the solitary form of *Salpa maxima* var. *tuberculata* described by Metcalf, 1918, from the southern Philippines, who, however, had specimens of the aggregated form only.

Since the Gulfs of Suez and Aqaba are extensions of the Red Sea and consequently of the tropical part of the Indian Ocean, their faunas are Indo-Malayan, in spite of their near approach geographically to the eastern Mediterranean.

This fact is, however, not so evident in the present collection as might be expected, since it happens to contain some species that are practically circumtropical, and found both in the Mediterranean and Indian Ocean. These species are shallow water forms, and it is possible that some of them may owe their very extensive distribution to human agency, by transportation on the bottom of ships.

The Tunicata in this collection appear to belong to the following 13 species, one of them (*Salpa maxima*) being perhaps represented by two varieties:

### Class ASCIDIACEA

#### COMPOUND ASCIDIANS

##### 1. *Polyclinum saturnium* Savigny, 1816

*Polyclinum saturnium* Savigny, 1816: 190, pl. 19, fig. 1; Michaelsen, 1920: 9.

One rather thick colony measuring over 50 mm. in extent.

##### 2. *Didemnum candidum* Savigny, 1816

*Didemnum candidum* Savigny, 1816: 194, pl. 4, fig. 3, pl. 20, fig. 1.

Several small colonies with abundant spicules, whose points are so short and

slightly developed that the spicules are almost spherical. Also one small colony having spicules with larger and better developed rays or points.

There is also one colony, growing on coral, which has very few spicules and a great many faecal pellets in the intestinal tracts of the zooids, perhaps indicating an incipient case of the so-called 'Hypurgon' condition to which this and allied forms are subject, in which the water currents in the cloacal canals become too weak to carry off the waste material, which remains in the cloacal system and in the common test, greatly altering the character and appearance of the colony, but there does not seem to be any reason for assuming that it is of a different species. See Michaelsen, 1919a: 11-13.

*Didemnum candidum* appears to be a species of very wide distribution, being found also in American waters, very abundantly in some places.

It cannot be doubted that far too many species of the genus *Didemnum* have been described. Apparently this is in part due to overlooking the great effects on the general appearance of the colony of its age and past history, particularly in the case of old colonies. Many or most of the species are subject to periods (in many cases seasonal) of regression and extensive degeneration of the zooids, followed by subsequent recovery and regrowth of the colony to its normal functional condition. During such regressive periods, though the zooids degenerate more or less completely, the spicules may endure unchanged through several or perhaps many generations of the zooids. The result is that in old colonies we may find a far greater abundance of spicules than the spicule-forming ability of the zooids present could possibly account for, and likewise often peculiarities in the distribution of the spicules, which one must not mistake for specific characters. Old colonies are apt to acquire a hard calcareous character in which the spicules form a far larger component than the test substance and zooids do.

#### SIMPLE ASCIDIANS

##### 3. *Phallusia nigra* Savigny, 1816

*Phallusia nigra* Savigny, 1816: 163, pl. 2, fig. 2; pl. 9, fig. 1.

*Ascidia atra* Lesueur, 1823: 2, pl. 1, fig. 2.

*Ascidia nigra*, Herdman, 1882: 210.

*Phallusia nigra*, Hartmeyer, 1916: 408, figs. 5-9.

Eleven specimens, all of small size. This species, widely distributed and common in shallow water in many warm regions of both hemispheres, is easily recognizable from its bluish or blue-black coloration.

If *Phallusia* is accepted as a genus distinct from *Ascidia*, the present species should be placed in it, as in old and large individuals the neural duct has accessory apertures, at least in many specimens. In other respects it is a very typical *Ascidia*.

##### 4. *Phallusia* sp., apparently *Phallusia arabica* Savigny, 1816

*Phallusia arabica*, Hartmeyer, 1916: 414, figs. 10-12.

One specimen of 52 mm. body length (or 63 mm. if the obliquely forwardly extending atrial siphon is included). In external features other than unusual forward

position of the atrial siphon (probably only an individual peculiarity), as well as in a majority of the internal characters, it agrees well with the descriptions of Savigny and Hartmeyer cited above.

But this specimen is abnormal and defective in the slight development of the dorsal tubercle, which is practically wanting, although its aperture, which is U-shaped, with the open interval obliquely forward and to the left and with one of the ends bent down, is clearly visible, but very small. Yet I was not able to find any neural duct extending from its aperture, nor any neural gland. Even the ganglion was only doubtfully demonstrated. The neural duct should be long in this species, with accessory lateral openings as well as the terminal one in the dorsal tubercle. The tissues of this specimen were dark coloured and somewhat opaque, but that would not account for the difficulty of finding the above structures if they were present in a normal state of development.

#### 5. *Ascidia cannelata* (Oken), 1820

*Phallusia sulcata* Savigny, 1816: 162, pl. 9, fig. 2. (Name preoccupied.)

*Phallusia cannelata* Oken, *Isis*, 1820: 796.

*Ascidia cannelata*, Hartmeyer, 1916: 400, fig. 1.

One specimen, 32 mm. in length, growing on coral.

#### 6. *Rhodosoma turcicum* (Savigny), 1816

*Phallusia turcica* Savigny, 1816: 165, pl. 10, fig. 1.

Seven specimens, all rather small except one 45 mm. long. This, apparently the only species of its genus, is found in many tropical seas, and is readily recognizable by the two apertures being near together in a cleft of the test which can be tightly closed to give them protection. Said to be in most places a rather uncommon species; apparently the Gulf of Aqaba is an exception, as is also the island of Curaçao, West Indies.

#### 7. *Cnemidocarpa hemprichi* Hartmeyer, 1916

*Cnemidocarpa hemprichi* Hartmeyer, 1916a: 218, figs. 6, 7.

One specimen of very irregular external form, about 29 mm. long. Found associated with coral in a depth of 2 fathoms.

#### 8. *Polycarpa mytiligera* (Savigny), 1816

*Cynthia mytiligera* Savigny, 1816: 158, pl. 8, fig. 2.

*Polycarpa mytiligera*, Hartmeyer, 1916a: 208, figs. 1, 2.

Two specimens, each of which contained a relatively large symbiotic macruran crustacean in the branchial cavity.

#### 9. *Herdmania momus* (Savigny), 1816

*Cynthia momus* Savigny, 1816: 143, pl. 1, fig. 2; pl. 6, fig. 1.

*Cynthia pallida* Heller, 1878: 96, pl. 3, figs. 17, 18.

Five specimens, all of rather small size and apparently all representing the typical variety of this widely distributed species of warm regions.

10. *Microcosmus exasperatus* Heller, 1878

*Microcosmus exasperatus* Heller, 1878: 99, pl. 3, fig. 19.

Three very small specimens. This is also a species of extensive distribution in tropical and warm-temperate waters.

11. *Halocynthia spinosa* Sluiter, 1905

*Halocynthia spinosa* Sluiter, 1905: 15, pl. 2, figs. 8-8d.

Five specimens, the largest about 20 mm. in greatest diameter.

This species, more or less red or pink in colour in life, is easily recognizable from its spiny exterior, the spines about the aperture on the siphons being especially long and conspicuously provided with sharp lateral branches.

12. *Molgula dione* (Savigny), 1816

*Cynthia dione* Savigny, 1816: 153, pl. 7, fig. 1.

One specimen, about 22 mm. long, found on coral.

## Class THALIACEA

## PELAGIC TUNICATA

All the Thaliacea in the collection are of one species, *Salpa maxima* Forskål, 1775, which is found in both the Atlantic and Pacific Oceans, and though reported also from the southern part of the Indian Ocean, has apparently not previously been recorded from the Red Sea. The specimens, with the possible exception of some immature ones as noted below, belong to the following variety of this species:

13. *Salpa maxima* Forskål, 1775, var. *tuberculata* Metcalf, 1918

Metcalf, 1918, *Bull. U.S. Nat. Mus.*, No. 100, 2 (2): 87, fig. 72.

Described by Metcalf (who had examples of the aggregated form only, from the southern Philippines). The 'Manihine' collection has large adult examples of both aggregated and solitary forms, collected with dip nets near the surface, in some cases with the aid of a light.

Five adult specimens of the aggregated form agree well with Metcalf's description and figures, in having the anterior and posterior processes of the body longer than in the typical *S. maxima*, and in having on each side of the external body surface an oval area of the thickened test at the base of the atrial siphon, bearing small acute conical spinous tubercles as described by Metcalf, the area on left side being the larger.

Four adult examples of the hitherto undescribed solitary form of the variety *tuberculata*, the largest about 135 mm. in length, also differ from the solitary form of the typical *S. maxima* in having external spinous areas, though these are small. There are three of these in the case of the solitary form, the most conspicuous one being a narrow transverse strip of thickened test extending across the rear end of the

body just below (ventral to) the base of the atrial siphon, bearing two not very regular rows of conical spinous tubercles similar to those in the aggregated form. The rows are one above the other, and extend slightly farther on the left than on the right side. On the dorsal surface of the body, above the intestinal 'nucleus', there is on each side a thickened area of test bearing a few conical tubercles, but both areas are of small extent, especially the one on the right side.

The variety *tuberculata* appears to be a well-marked one, but the differences from the typical form are superficial and hardly seem to justify considering it a distinct species, especially since we do not yet know the extent to which intermediate forms may occur.

The collection also contains a number (over 50) of young specimens of *S. maxima*, aggregated form, measuring up to about 20 mm. in length exclusive of the anterior and posterior processes. Many of these, when collected, were still adhering together as parts of chains, but due to transportation and handling are now all separated. It is likely that they are all the young of the variety *tuberculata*, but as they fail, probably because too young, to show the varietal characters, they have been labelled simply *Salpa maxima*.

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## APPENDIX

*Ascidian from Mukalla Bay*Apparently *Ascidia savignyi* Hartmeyer, 1916

A large specimen of the genus *Ascidia* from Mukalla Bay, South Arabia (A. Fraser-Brunner, coll. 17-12-1948) is not included in the above list of specimens as it was not from the Gulf of Aqaba. It is remarkable for its large size (about 160 mm. long by 35 mm. transversely) and greatly elongated form, due chiefly to much lengthening of the anterior half of the body, though the siphons (both of which arise at the anterior end) are short, and the branchial one is much distorted. The internal structure does not show much abnormality, though the branchial sac extends close to the anterior end of the body, and the dorsal tubercle (whose aperture is irregular S-shaped, with the upper end bent down), also the neural gland and ganglion, are close to it and very near to the circle of tentacles. The branchial sac has no intermediate papillae; the internal longitudinal vessels are numerous (over 70 on the left and over 80 on the right side); the intestinal loop (about 37 mm. long) is far back in the body.

It is evidently an unusually old individual; one that has grown in a favourable position in respect to food-supply and protection from predatory fishes and crabs, but where surrounding obstructions compelled it to become unusually elongated.

A similar specimen might be hard to find again, but I do not think it should be assumed to be a new and undescribed species, though such mistakes have too often been made, resulting in burdening literature with supposed species having no real existence. Such a specimen is hard to identify with certainty, but I think it is an unusually large and abnormally shaped example of *Ascidia savignyi* Hartmeyer, 1916. (*Sitzungsber. Gesell. naturf. Freunde Berlin*: 1916: 404), described from the Sinai coast and Gulf of Suez.

In that article Hartmeyer mentioned (p. 407) the close relationship of *A. savignyi* to *A. depressiuscula* Heller, 1878, described from Ceylon, and common in the Philippines, which is a species that also attains rather large size. I am quite ready to agree with this opinion, and think he was also probably correct in believing it related to the European species *A. virginea* Mueller, but I do not consider it also related to *A. paratropa* (Huntsman) of the American Pacific coast, as Hartmeyer believed. That species has intermediate papillae on the branchial sac, and belongs to a different section of the genus.