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Thalassema papillosum (Delle Chiaje), a forgotten Echiuroid Gephyrean.

By

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With plate 13.

In his great Monograph: *Animali invertebrati del Regno di Napoli*, Vol. 3 pp. 118—119 and 124, plate 106 fig. 19, DELLE CHIAJE describes and figures from a single specimen, a worm, obviously an Echiuroid Gephyrean, which he introduces under the *Annelosi Sifuncolacci* with the name *Holothuridium papillosum*.

His description runs as follows —

» Oloturidio (*Holothuridium* Delle Chiaje).

Corpo otreforme, allungato, imperfettamente anelloso, attenuato nell' estremità anteriore con bocca, trovandosi poc' oltre due fori respiratori inferiori, e nella posteriore l'ano.

O. papilloso (*h. papillosum* Delle Chiaje).

Corpo cerulescente, crasso, ovale-bislungo, ristretto nel mezzo con qualche traccia di anelli, cosperso di rare papillucce coniche; bocca ed ano increspati; due forellini per la coppia di vesciche respiratorie bislunghe. In marzo 1829 l'ebbi assai alterato nella interna organizzazione: ne l'ho visto mai più. Rassomiglia per la forma ad un' oloturia, approssimandosi in parte all' echiuro, ma conviene attendere ulteriori osservazioni, specialmente per le setole laterali come nello sternaspide, avendovene traveduto qualcuna.«

So far as I am aware, no reference has been made to this worm by any zoologist who has dealt with the Echiuroid Gephyrea, since the publication of DELLE CHIAJE's description. Two examples of *Holothuridium papillosum* were dredged at Naples, since the establishment of the Zoological Station; one of these specimens is un-

fortunately lost, but was figured from life by C. MERCULIANO on 23rd January 1886. This colour sketch is here reproduced (Pl. 13, fig. 1). The other example was very generously handed over to me for examination by the authorities of the Station, it is accompanied by a label with the following data — »Preso colla tartanella nel fango 1 miglio fuori Nisida; Alcohol 70%. 10. 3. 1882.« — D^r. Lo BIANCO informs me that the 1886 example was dredged in the same locality, and that both were at a depth of 30—40 Meters.

The example that I dissected presents no character which warrants its separation from the genus *Thalassema*, in which genus, as will be seen from the anatomical description, it occupies a position nearer to *Thalassema diaphanes* of SLUITER (10) than to any other known species, if the characters usually relied upon for systematic purposes (longitudinal musculature, number of segmental organs, form of anal pouches) are real evidences of affinity.

The length of this example was 70 mm, the average breadth 12—15 mm; but there can be no doubt that the living worm can extend itself considerably more; MERCULIANO's colour sketch is life size and measures 93 mm in length, while DELLE CHIAJE's drawing (1, Tav. 106, fig. 19) is referred to in the description (pag. 124) as »di giusto diametro, delineato morto e supino«. This figure is 150 mm long.

These three examples all lacked the proboscis, but I have determined, by means of sections of the small remaining stump, that normally a proboscis is present, as in the stump the nervous and blood-vascular systems are incomplete; indeed, without sections, the three holes, corresponding to the blood-vessels, were visible on the scar.

The body is sausage-shaped, the posterior end much rounded, and obtuse, the anterior end more pointed. Along the mid-ventral line is a shallow groove, marking the position of the nerve cord, which, in the middle third of the body, can be seen shining through the transparent integument.

As in all Echiuroids the mouth and anus are terminal. The openings of the two segmental organs are about 2 mm apart, and about 2 mm behind the pair of ventral hooks or bristles. The bristles had fallen out in the example that I dissected, but I could without difficulty determine their former position; the depressions in the skin that they had occupied were quite obvious, and the skin itself contained the usual »Ersatzborsten«. The hooks must have

occupied positions about 2 mm apart, and about 5 mm from the anterior end of the body.

Colour. The preserved specimen has lost all traces of its original colour, and has adopted that dull yellowish white hue characteristic of specimens which have been for a long time in alcohol. MERCURIANO's sketch shows the colour of the living animal. The papillæ are whitish in the preserved animal, as also in this coloured drawing (fig. 1).

Integument. The whole skin is covered with papillæ (fig. 5), which cannot be said to have a regular arrangement, although in places they show a tendency to form transverse rows. They are of very different sizes, and the smaller ones occupy the grooves and valleys between the larger. Posteriorly the integument is somewhat thickened, the papillæ become flattened and more confluent, forming irregular rings; I have observed the same tendency in *Thalassema neptuni* and *gigas*. The skin is thinner in the middle of the body, in the preserved example it was here quite transparent. Macroscopically the skin and musculature present the same structure as in *T. neptuni* and *Echiurus*, the skin more especially resembling that of the latter worm in the greater concentration of the glands on the papillæ. We find an epidermis, a well developed fibrillar cutis, and three muscular layers, viz. an outer layer of circular muscles, a longitudinal muscular coat, which is by far the thickest of the three, and a very thin layer of internal oblique muscles. The longitudinal musculature is not divided into separate bundles, but forms a continuous sheet, as in *T. neptuni* and *gigas*.

The longitudinal ridge of muscle fibres, which in *T. neptuni* supports the nerve cord, is not present, the nervous system resting directly on the oblique musculature.

Hooks. Although the functional hooks had been lost, I found fully developed »Ersatzborsten« in the skin. These are but slightly curved (fig. 2), the free hooked part is rather widened out and spear-head shaped when seen from the dorsal or ventral surface (fig. 3). The musculature of the hooks is very weak (fig. 6 *h*), in comparison to the same structure in other Echiuroids; I cannot find any transverse muscle band connecting the hooks of the two sides with one another. Seen from inside in the dissected worm, the apparatus appears to consist of the two little papillæ, in which the hooks are developed, with a few weak muscular threads attaching

the free ends of the papillæ to the body wall. This is evidently a species in which the hooks are poorly developed.

Digestive System. The mouth is slit-like, situated in the centre of the stump which remains where the proboscis is broken off. This stump is well marked off from the body by a distinct groove, the strongly developed papillæ of the body do not seem to extend on to the proboscis. The mouth opens into a slightly dilated pharynx (fig. 6 *ph.*), followed by an œsophagus and a well marked crop (*cr.*), as in other Echiuroids; I cannot find a muscular gizzard, such as I have described in *Thalassema neptuni* (5). The crop is wider than the adjacent parts, and shows, notwithstanding the bad state of preservation, traces of the longitudinal epithelial ridges that characterize this division of the digestive canal. The vascular ring (*v.r.*) embraces the intestine about 7 mm behind the crop, it is followed by a structure which seems to resemble the perivisceral sinus described by RIETSCH (8) in *Bonellia*. However, the defective state of preservation prevented me from minutely investigating the relations of this sinus. The intestine proper, i. e. the division between the crop and the rectum, can be divided into three parts, as in the Echiuroids generally; (1), an anterior part, provided with a ciliated groove, but without a collateral intestine, about 100 mm long; (2), the middle division, which has a collateral intestine, this division measures about 130 mm; (3), a posterior division lacking the collateral intestine, but with a ciliated groove, measuring about 170 mm. The collateral intestine resembles macroscopically that of *T. neptuni*, but appears to be somewhat wider, in proportion to the intestine itself. I have not observed a cœcum on the beginning of the rectum, such as occurs in *Thalassema neptuni* and other forms, nor can I give any details as to the origin or end of the ciliated groove, as the somewhat macerated condition of the internal organs prohibited detailed microscopical study.

A few ovoid sand balls were present in the posterior end of the digestive canal.

The intestine is, throughout its entire length, supported by mesenteries, which are dorsal in position.

The **Anal vesicles** are of the same type as in *Thalassema neptuni*, that is to say they are elongated, unbranched sacs, studded with ciliated funnels; they are relatively shorter than in *T. neptuni*, measuring in the specimen I dissected only 12—15 mm in length.

The **Blood-vascular System** (figs. 4 and 6). Owing to the absence

of the proboscis, the cephalic part of the blood vascular system is incomplete; in sections of the short stump of the proboscis, the ventral vessel is seen to bifurcate along with the nerve, immediately on entering the proboscis. The remaining parts of the system show no marked aberration from the Echiuroid type, except that the neuro-intestinal anastomosis opens simply into the ventral vessel (fig. 4), without forming a »Muskelring«; this is no doubt owing to the absence of the muscle between the two hooks, which, when present in other Echiuroids, passes through the so-called »Muskelring« of the blood-vascular system.

Segmental Organs (fig. 6 *seg.org.*). *Thalassema papillosum* has but one pair of segmental organs. Each segmental organ is a thin walled pouch, about 8—10 mm in length in the example that I dissected. Each is provided with a ciliated funnel (fig. 6 *tr.*), which is simple as in *T. neptuni* and *gigas*, and not drawn out into spiral ciliated processes, as in some other species.

The **Nervous System** is, as in all Echiuroids, a simple ventral cord, running the entire length of the body, and giving off numerous nerves, which bury themselves in the musculature of the body wall. The nerve cord divides into the two lateral branches on entering the proboscis.

Owing to the state of preservation of this single specimen I can give no information about the genital organs.

The facts that a study of this worm have brought to light are sufficient to enable us to compare it with the other members of the genus *Thalassema*, and to assign to it a definite place in that genus. I will first sum up its characters in a short specific description.

***Thalassema papillosum* (Delle Chiaje).**

(*Holothuridium papillosum* Delle Chiaje (1).

Length, without proboscis (which is unknown) 70—150 mm; colour from flesh colour to violet; papillæ paler. Longitudinal musculature not broken up into bundles; one pair of segmental organs, with simple funnels; anal vesicles simple pouches, studded with ciliated funnels, as in *Thalassema neptuni*. The vascular system embraces the intestine some distance behind the crop; a »Muskelring« on the neuro-intestinal anastomosis is not present. The hooks are poorly developed, their musculature is small, and the transverse muscle connecting them is absent. Skin with distinctly separated (posteriorly more confluent) papillæ, not regularly arranged, smaller

papillæ in intervals of larger ones. No cœcum on beginning of rectum. Nerve cord not mounted on a longitudinal muscular ridge.

Now there are, in the genus *Thalassema*, among the species that have been described in such a manner as to be recognisable, four species that agree with *T. papillosum* in having an undivided longitudinal musculature, and only one pair of segmental organs. Three of these, viz. *T. gigas* Max Müller (7), *T. fax* Selenka (9), and *T. lankesteri* Herdman (4), differ from the species I am describing in the form of their anal vesicles, which are branched and tree-like as in *Bonellia*. The fourth species, however, *T. diaphanes* Sluiter (10), which inhabits the bay of Batavia, resembles *T. papillosum* in the form of the anal vesicles.

The general body form, the smaller size and the transparent delicate skin of *T. diaphanes* suffice to separate it from the Naples species.

At present the only members of the genus *Thalassema* known from the Mediterranean are *T. gigas*, from Trieste, *T. neptuni* recorded by RIETSCH (8) from Marseilles, possibly however distinct from the north European *T. neptuni*, the species recorded by KOWALEVSKY from Messina (6), which has three pairs of segmental organs, and the imperfectly described *T. grohmanni* of DIESING (2 and 3) which is quite too superficially described to be recognisable. It is therefore interesting to be able to add even this imperfect account of another member of this group from the Mediterranean.

Zoological Station, Naples. 6th Dec. 1898.

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Description of Plate 13.

- Fig. 1. *Thalassema papillosum* (Delle Chiaje), painted from life by C. MERCULIANO.
- Fig. 2. One of the Ersatzborsten, seen from the side.
- Fig. 3. The same, seen from below.
- Fig. 4. Opening of the neuro-intestinal anastomosis into the ventral vessel; *n.c.* nerve cord; *mes.* mesentery; *n.i.a.* neuro-intestinal anastomosis; *v.v.* anterior part of the ventral vessel; *v.v.!* posterior part of the same.
- Fig. 5. The skin, magnified to show the arrangement of the papillæ in the anterior part of the body.
- Fig. 6. The anterior end of the worm, laid open to expose the internal organization; *ph.* pharynx; *cr.* crop; *d.v.* dorsal vessel; *v.r.* vascular ring surrounding the digestive canal; *n.i.a.* neuro-intestinal anastomosis; *v.v.* ventral vessel; *n.c.* nerve cord; *seg.org.* segmental organ; *tr.* funnel of the same; *h.* hook.
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