Art. I.—*Preliminary Account of Synute pulchella, a New Genus and Species of Calcareous Sponges.*

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[Read March 12, 1891.]

The sponge which forms the subject of the present communication exhibits a very interesting modification of the usual Sycon type of Calcisponge organisation. If we imagine a colony of the Sycon genus *Ute*, whose component members, growing more or less vertically upwards side by side, have become fused together completely, so that the whole colony forms a single vallate mass in which the individuals can only be recognised externally by their oscula, we have then a tolerably accurate conception of the new genus *Synute*. The fusion of the Sycon individuals of which the colony is composed is complete (extending right up to the oscula) and universal, and by no means partial or accidental, and the entire colony is protected on the outside by a thick common cortex consisting mainly of huge oxeote spicules.

Vosmaer* gives the following diagnosis of the genus *Ute*:—"Tubarskelet gegliedert oder nicht. Peripherisches Skelet hauptsächlich aus grossen, in Schichten gelagerten Stabnadeln bestehend."

We may diagnose the genus *Synute* as follows:—"Sponge forming a colony of Sycon individuals completely fused together into a single mass invested in a common cortex.

* "Porifera," Bronn's Klassen und Ordnungen des Thierreichs, p. 372.

Tubar skeleton articulate or inarticulate, cortical skeleton formed chiefly of huge oxeote spicules arranged in several layers and lying parallel to the long axes of the Sycon individuals."

For the single species at present known I propose the name *Synute pulchella.*

Synute pulchella (n. sp.)

General Appearance and Canal System.

The colony (of which a single specimen only has as yet been obtained) resembles in general form a small specimen of Mr. Carter's *Teichonella prolifera.** It consists of a number of stout vertical walls, nearly a quarter of an inch in thickness, which branch or divide in such a way that the upper surface of the sponge presents a characteristic mæandriniform appearance. Along the mæandering ridge which forms the upper surface of the sponge small oscula are arranged, nearly always in a single row. These oscula are less than 1 mm. in diameter and they have no oscular fringe, neither are they raised on papillæ, for the fusion of the Sycon individuals (one of which corresponds, of course, to each osculum) is complete up to the very top. The sides of the walls exhibit a beautifully striated appearance, due to the large oxeote spicules of the cortex, which can be distinguished with the naked eye, although they do not project beyond the surface. The entire colony is somewhat constricted towards the base, so that the fused individuals composing it tend to radiate outwards and upwards from a common centre. The whole colony is about 38 mm. in greatest width and 18 mm. in height. It is attached to the surface of another, much larger, non-calcareous sponge, and in spirit is of a pale grey colour, nearly white.

The canal system, apart from the fusion of the Sycon individuals, closely resembles that of *Ute argentea* as figured by Poléjaeff.† A horizontal section of the colony

* Figured in my paper "On the Anatomy of *Grantia labyrinthica* Carter, and the so-called Family Teichonidæ." *Quarterly Journal of Microscopical Science*, January 1891. Plate I, Fig. 6.

† Challenger Calcarea. Plate IV, Fig. 3.

shows a number of circular spaces scattered at intervals, generally, but not always, in a single row. These are the gastral cavities of the Sycon individuals cut across. Each is completely surrounded by the thimble-shaped flagellated chambers, or radial tubes, which radiate outwards from the gastral cavity. On the adjacent sides of two neighbouring gastral cavities the radial tubes are shorter than on the outer sides.

The inhalant pores are not visible to the naked eye and are merely narrow interstices between the outer spicules of the cortex, leading into irregular canals which pierce the cortex to reach the flagellated chambers, exactly as in *Ute argentea*. At their lower ends the gastral cavities of the fused Sycon individuals communicate with one another, indicating that this peculiar form of Sycon colony has arisen from fusion of adjoining individuals of a branching colony such as *Sycandra arborea*.

The flagellated chambers or radial tubes are approximately octagonal in transverse section, while the much smaller interspaces between them are square. The gastral (exhalant) openings of the chambers are protected by very well developed membranous diaphragms. Each gastral cavity has also a single large well-developed diaphragm situate just within the osculum.

The Skeleton.

The skeleton, as in *Ute argentea*, is very complex and may be divided into Cortical, Tubar, Gastral and Oscular portions.

The Cortical Skeleton.—This consists (1) of very large, fusiform oxeote spicules, slightly curved, fairly symmetrical in shape and gradually and sharply pointed at each end. Size when fully developed up to about 3·0 by 0·14 mm. These are arranged parallel to the long axes of the gastral cavities and in several layers; (2) Between the above are a few smaller oxea and great numbers of comparatively small triradiates. The latter although apparently disposed in the utmost confusion and frequently of irregular shape, generally show a marked tendency towards the sagittal type, the oral angle being decidedly wider than the lateral. The rays are

conical and gradually sharp-pointed and measure about 0·072 by 0·01 mm. The basal ray may be of about the same length or shorter or longer than the others, and is perhaps generally directed somewhat downwards towards the base of the sponge; (3) On the surface of the sponge, outside the giant oxeote spicules, is a layer of very minute oxea arranged at right angles to the surface and hence also at right angles to the large oxea, and each with one end projecting very slightly, if at all, beyond the ectoderm. These oxea are very slender, measuring at most about 0·07 by 0·003 mm. They are very gradually sharp-pointed at their inner ends and somewhat hastately sharp-pointed at their outer ends. They are straight or only slightly curved.

The Tubar Skeleton.—The tubar skeleton is articulate and thus differs from that of *Ute argentea*. It is composed of sagittal triradiates arranged according to the usual Sycon plan, and the number of joints depends, of course, upon the length of the chamber; sometimes there may be as many as a dozen. The sub-gastral sagittal triradiates, forming the proximal joint of the skeleton, are, as usual, rather different in shape from the remainder of the sagittal spicules constituting the tubar skeleton. The oral angle is nearly 180°; the oral rays are slightly curved away from one another towards the basal ray, they are conical, gradually sharp-pointed, and measure about 0·084 by 0·01 mm. The basal ray is straight, conical, very gradually sharp-pointed, measuring about 0·14 by 0·01 mm. There is a more or less gradual transition between these sub-gastral sagittal triradiates and the more distally placed spicules of the tubar skeleton. The oral rays first become approximately straight and spread out nearly at right angles to the basal ray; then, further away from the gastral cavity, they begin to curve towards one another away from the basal ray, and the oral angle is somewhat reduced. At the same time the basal ray becomes shorter, until it is only about the same length as the orals (now about 0·07 mm.) All the rays still remain conical and gradually sharp-pointed.

The Gastral Skeleton.—This consists of quadriradiates and triradiates, backed by the oral arms of the sub-gastral sagittal triradiates. The quadriradiates are stout sagittal

spicules having the apical ray projecting outwards and slightly upwards into the gastral cavity. The oral angle is a good deal wider than the lateral, and the oral rays often markedly longer than the basal, measuring, for example, 0·15 by 0·014 mm., as against 0·084 by 0·014 mm. The disproportion, however, is not always so great as this, nor are the spicules always so large. The rays are stout, conical and gradually sharp-pointed, and the oral rays curve slightly away from one another. The apical ray is usually short and stout, conical, gradually sharp-pointed and nearly straight, although inclined upwards; usually only about 0·056 mm. long, rarely a good deal longer. Amongst these quadriradiates are found a number of sagittal triradiates, while at a short distance below the osculum the quadriradiates gradually disappear, leaving triradiates only. We may call these latter the sub-oscular gastral triradiates. The sub-oscular gastral triradiates are arranged very regularly, like an articulate tubar skeleton, with the basal rays all pointing away from the osculum. They are all sagittal; at first (*i.e.*, away from the osculum) the basal ray is the longest and the oral rays are nearly straight, diverging at a very wide angle. All the rays are conical and gradually sharp-pointed. The oral rays measure about 0·1 by 0·01 mm. and the basal about 0·14 by 0·008 mm. On approaching the osculum these sagittal triradiates gradually become smaller and their shape gradually changes, the basal ray becoming very short (much shorter than the oral rays) and the oral rays spread out almost in a line with one another. The rays are still conical and gradually sharp-pointed. In the extreme form, found just within the osculum, the oral rays may still measure about 0·1 mm. in length while the basal is reduced sometimes to 0·02 mm. and is also much slenderer than the orals.

The Oscular Skeleton.—This consists of a closely packed layer of long, slender oxea arranged vertically side by side around the osculum, but the greater part of the spicule is imbedded in the wall of the gastral cavity, so that there is no conspicuous oscular fringe. These oxea, except for their much greater size, resemble the small surface oxea of the cortical skeleton. They are long and slender, usually gradually sharp-pointed at their inner ends and irregularly hastate at their outer ends. They measure about 0·3 by

0·01 mm. For the greater part of their length these spicules are imbedded amongst the sub-oscular gastral triradiates and they extend some way below the oscular diaphragm.

The specimen upon which the above account is based was dredged by Mr. J. Bracebridge Wilson, M.A., in the neighbourhood of Port Phillip Heads, Victoria.