## Huygens Institute - Royal Netherlands Academy of Arts and Sciences (KNAW)

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The results are still much higher than for the ordinary temperature, a very favourable result for measurements at low temperature.
Lastly a single delermination in liquid hydrogen was made. Fifteen minutes after the thread had adopted the temperature of the bath it was pulled asunder. The total weight was 3013 grams, the diameter $0.271 \mathrm{~m} . \mathrm{m}$., hence the maximum strain in $\mathrm{KG} / \mathrm{mm}^{2}=52.1$ again much higher than at the temperature of liquid air. The structure of the section was striated, unridged and no smooth part occurred.

Zoology. - "Poterion a Boring Sponge." By Prof. G. C. J. Vosmarr.
(Communicated in the meeting of May 30, 1908).
In 1822 Hardwicke published ${ }^{1}$ ) a short notice on a remarkable "Zoophyte, commonly found about the Coasts of Singapore Island." The author stated that it belonged to the Sponges, and called it Spongia patera. Evidently not acquainted with this publication Schlegel $1858^{\circ}$ ) proposed the name Poterion neptuni for a sponge, which universally is considered to be identical with Hardwicke's sponge. According to the rules of nomenclature the object has, consequently, to be called Poterion patera (Harvw.), as first pointed out by Sollas ${ }^{3}$ ).

Both Hardwicke and Schlegrl state that the sponge is fairly common. No wonder that this object, which presents itself as a gigantic cup, with a height of more than 1 M . and an aperture of 30 cm . or more, drew the attention of sailors. It is also found in many museums, especially in Holland. The Leyden Museum of Natural History, the Museum of the Utrecht University and the Museum of the Amsterdam Zoological Gardens ("Artis") possess beautiful specimens, together more than 30. This rich material induced Harting
${ }^{1}$ ) Asiatic Researches XIV, p. 180.
${ }^{2}$ ) Handleid. Dierkunde IJ, p. 542.
${ }^{3}$ ) Ann. en Mag. Nat. Hist. (5) VI, p. 441 (1880).
to study the sponge, as far as the dry specimens allowed it. Harting published in 1870 his well-known "Mémoire sur le Genre Potérion", ${ }^{1}$ ) the result of an examination of 27 specimens. Since that time the sponge has hardly been mentioned. It seems indeed strange that since Schlegel's publication - half a century ago - these gigantic specimens which obviously were far from rare were never or hardly ever sent to any of our museums, and that none of the numerous expeditions of later times brought home even a single specimen of Foterion. As far as I can judge even the Sibogaexpedition is no exception. My request to several people in our colonies in the Malay Archipelago remained unanswered, till last year, when I received a letter from Dr. P. N. van Kampen, assistant Zool. Mus. Buitenzorg, mentioning, that in his presence three specimens of Poterion were dredged off Bantam at a depth of about 25 M . Thus the sponge was found again at last. Dr. van Kampen was kind enough to send me fragments, well preserved in $96 \%$ alcohol; he also told me from time to time when new specimens were collected all from the West part of the Java-sea. We learn from this, that the sponge is not rare.
Since nothing was known about the anatomy of the "soft parts" of Poterion, I was rather anxious to study microscopical sections of well-preserved specimens. It struck me at once that the structure of this Poterion closely resembles that of the so-called Osculina polystomella O.S. of which I prepared a description and drawings many years ago ${ }^{2}$ ).

Now this Osculina is nothing but the "free form" of a boring sponge, as first pointed out by Carter ${ }^{2}$ ); Lendenfled afterwards $(1895)^{4}$ ) proclaimed 0 . polystomella as the free form of Vioa viridis O.S. Independently of Lindenfeld I arrived at about the same result.

It was, therefore, but a logical conclusion to suppose that Poterion patera was likewise the free stage of a boring sponge, and I begged Dr. van Kampen to look whether in the localities where Poterion was dredged, shells, corals, limestone or similar substances occurred which were attacked by Clionidae. Meanwhile I reexamined the specimens of Poterion in the Leyden Museum. The director of the Museum, Dr. F. A. Jentink was so kind as to allow me to cut
${ }^{1}$ ) Natuurk. Verhandel. Prov. Utr. Gen.
${ }^{2}$ ) MS. for Fauna and Flora of the Bay of Naples. By unforeseen events the publication had to be postponed more than once. I am indeed very glad to be able to say that the bulk of the MS. is ready and I hope that no senous interruptions will prevent me fiom going to press soon.
${ }^{\text {s }}$ ) Ann. d. Mag. Nat. Hist. (4) V.
$\left.{ }^{4}\right)$ Zool. Anzeig. p. 150.
one specimen across for further examination. This I did with a specimen to which I gave the number 338. At the base of the sponge, which is somewhat broadened, I found between the "roots" much sand, rather large pebbles and a number of shells. One of these is a Voluta scapha Gmel. of about $10 \mathrm{~cm} . \times 5 \mathrm{~cm}$; it shows on its surface numerous holes of a boring sponge, which has pierced the shell a good deal and which has already destroyed a portion of the surface. Microscopical examination of the dried sponge-substance in the interior of the Voluta proved that the spiculation closely resembles that of the Poterion 338. The sponge substance on the surface of the shell is continuous with that of the Potericn. My supposition that Poterion represents the free stage of a boring sponge is hereby proved. I am not yet prepared to say whether it is identical with one of the numerous known species. I hope to be able to settle this later on and to give a full account (with illustrations) of the subject. I shall then discuss why only a small portion of Voluta is destroyed and the possible mode of growth. As to the anatomy of the spirit-specimens now at my disposal, a brief account may follow here.

A longitudinal secion through the wall of the cup, somewhat nearer its basis than its border, where the wall has a thickness of about 25 mm ., shows that the cortex has on both sides about the same thickness, viz. $1-5 \mathrm{~mm}$. The parenchyma shows large incurrent and excurrent canals, both surrounded by a transparent tissue. The main incurrent canals have a diameter of 0.5 mm ., the main excurrent canals of $0.5-1 \mathrm{~mm}$.; with the transparent tissue the former are, on an average, 3 mm . the latter 5 mm . Both enter deeply into the parenchyma; the former $15-20 \mathrm{~mm}$., the latter $10-15 \mathrm{~mm}$. In their course through the parenchyma the incurrent canals show several round apertures - the beginnings of secondary canals. The mass between these main canals and the surrounding tissue is composed of a crumb-of-bread like substance, and the trabecular network of the skeleton. At this part of the cup the incurrent apertures, stomions, are situated on the outside. They are congregated into pore-areas of indistinct outline; these areas are nevertheless clearly visible as dark brownish spots on a buff-coloured background. The areas have a diameter of a little more than a millimeter, and are situated at about the same distance from each other. In some places the areas are somewhat sunken; in dry specimens this shrinkage goes a good deal farther. I have not been able to detect the stomions on the surface; but sections clearly show that they are placed more or less in rows which start from a common centre. They are the apertures
of narrow and short canals which open just under the dermis into wider canals of which generally 5-6 unite in a common centre. These canals cause the star-like figures, already described by Harting. Tangential sections show this plainly; it becomes then obvious that these cortical canals sometimes ramify; but the final result is always that on an average five unite into a common wider canal, at right angles to the surface which runs through the rest of the cortex. It is evident that this latter canal corresponds to the incurrent chone ${ }^{1}$ ) of Tetraxonia, as sections at right angles to the surface prove.

The incurrent chones lead into the main incurrent canals; some of these, as stated above, run more or less straight on for about $15-20 \mathrm{~mm}$. at right angles to the sponge surface; they then bend and run in a direction almost parallel to the sponge-surface. In their course they give off branches, which ramify and terminate between a group of the mastichorions. These are ellipsoidal in shape and open with wide apopyle into the excurrent canals, the system being eurypylous. A certain number of excurrent canals flow together and finally open into the main canals, mentioned above; they traverse the cortex with excurrent chones, which open by procts on the inner surface of the cup.

The soft tissue, surrounding the main canals, excurrent as well as incurrent, is very remarkable. I found the same sort of tissue in many sponges, but especially well developed in the so-called Osculina polystomella. Lendenfrld bas seen this tissue, and in his description of "Papillella suberea" says"): "Das hyaline Gewebe, welches die Hanptkanale umgiebt . . . . besteht aus einer glashellen Grundsubstanz, in welcher zahlreiche multipolare und auch bipolare Zellen liegen, deren lange und schlanke, verzweigte Ausläufer überall mit

[^0]einander anostomosiren, so dass hier ein engmasschiges, spongiöses Netz zu Stande kommt. In einigen der Knoteńpunkte dieses Fadennetzes liegen die Zellleiber mit ihrem kugligen Kern, in anderen trifft man nur unbedeutende Plasmaanhäufungen an." In my MS. description of this tissue in Clionidae I differ somewhat from Lendenfrld's interpretation; in Poterion I find the same sort of tissue, only still more pronounced. The fact is that the reticulum is by no means simply formed by a network of "Ausläufer" of cells, as it becomes clear by careful focussing that a number of the supposed threadlike processus are really membranes. In Poterion these membranes are sometimes of enormons size, even larger than in Cliona (Osculina). The tissue has a close resemblance to the so-called lymphoid or reticular tissue, as Ranvier and Pebelfaring conceive it.
As to the skeleton of Poterion, this is formed by a trabecular very firm network of bundes of closely packed tylostyles. I found in Osculina that in some portions of the skeleton the spicula were united by a little spongin. The same holds true for Poterion. This is, however, only the case in the centre of the pillars or trabeculae; there is a mantle of spicules at the periphery which is devoid of spongin. The spicula of Poterion are tylostyles; the spicule for which I proposed ${ }^{1}$ ) the name spinispira I did not find in the specimens of Poterion I examined. We know, however, that in the genus Cliona itself spinispirae are often very rare or absent, especially in the so-called free stage. I am of opinion that Papillina suberea O.S. is identical not only with Osculina polystomella O.S., but also with Papillina nigricans O.S. and Vioa viridis O.S. They are all nothing but modifications of the very variable Cliona celata, as I hope to prove in my "Sponges of Naples". Lendenyeid (1897 l.c. p. 99) considers Papillina suberea O.S. as a species different from Papillina, nigricans O.S. This is especially on account of the absence of spinispirae in the former, in a type-specimen of which Lendenfeld fanled to find them. I found, however, in the collection of the Zoological Station at Naples a sponge labelled by Schmidt $P$. suberea; in this specimen I did find spinispirae. I found them likewise in some of the specimens I collected near Trieste. For these reasons I cannot distinguish niguricans from suberea. Consequently there is in the absence of spinispirae.in Poterion no ground for not placing this sponge in the same group as Cliona, since in every respect the anatomical structure of Poterion resembles that of Osculina.

Leyden, May 14, 1908.

[^1]
[^0]:    ${ }^{1}$ ) Of course I use here the term chone in the sense of Sollas, and not in the sense of Lendenfeld. This latter author is entirely wrong in using chone as a synonym for sphincter. Sollas wrote in 1880 (Ann. \& Mag. Nat. Hist (5) v. p. 135): -The cortex is traversed by the intermaginal cavities of Bowerbank, or, as I shall term them, the "cortical funnels" or "chonae". They consist essentally of a tube divided by a sphincter into a shorter proximal and a longer distal part, the "ectochone" and "endochone" respectively". Apart from the evident lapsus that in this sentence the words ecto- and endochone stand in the wrong place Sollas's meaning is plain enough and this defintion is generally accepted. However Lendenfeld has another opinion. Thus, for instance, he writes in 1897 (Die Cilavalina der Adria, p. 102-103): "In halber Hohe der Rinde..... vereinigen sich diese Sammelkanäle zu vertikalen Stammkanálen....." And further: "Oben ganz dunn, verdickt sich diese schlauchformige Einfassung des Stammkanales..... nach unten hin sehr beträchtlich und bildet proximal, in der Umgebung der erwähnten Verengung, mächtig verdickt einen starken Sphincter, der als eine Chone aufzufassen ist". I do not wish to discuss the matter here at length. The quoted passages leave no room for misunderstanding.
    2) Clavulina der Adria p. 104-105.

[^1]:    ${ }^{1}$ ) On the shape of some Siliceous Spicules of Sponges. (Kon, Akad. v. Wetensch, Amsterdam, 1902. Proceedings p. 104-114).

