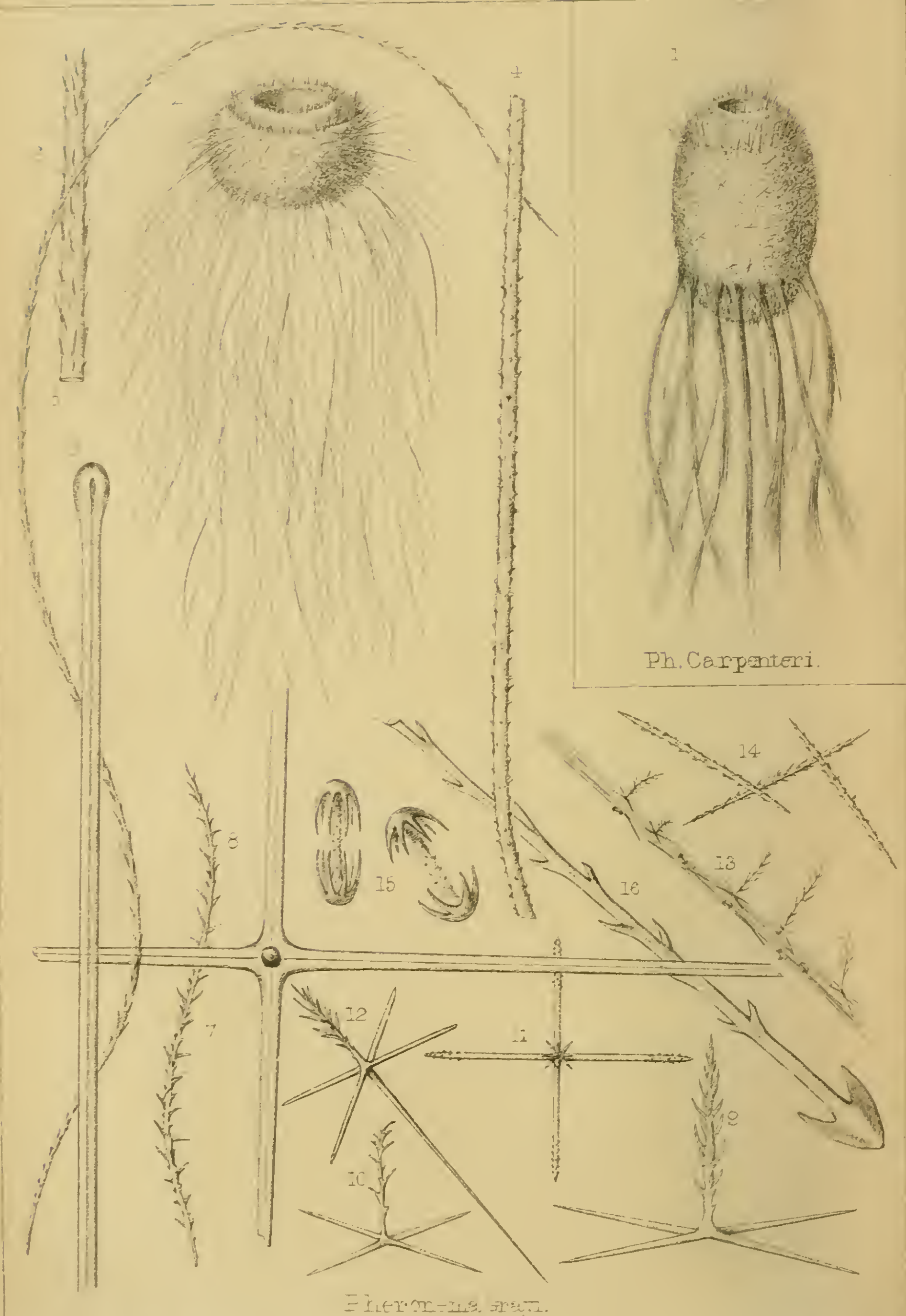

1
4
8
15
16
14
13
7
12
11
10
9
Ph. Carpenteri.

THE

MONTHLY MICROSCOPICAL JOURNAL.

NOVEMBER 1, 1870.

I.—*On the "HEXACTINELLIDÆ," or Hexradiate Spiculed Silicious Sponges taken in the 'Norna' Expedition off the coast of Spain and Portugal. With Description of New Species, and Revision of the Order.* By W. Saville Kent, F.Z.S., F.R.M.S., of the Geological Department, British Museum.

(*Read before the* Royal Microscopical Society, *Oct.* 12, 1870.)

In the paper it is my privilege to communicate to this Society on the present occasion, I propose to give an account of all those sponges belonging to the same group as the beautiful *Euplectella*,

EXPLANATION OF PLATES.

Plate LXIII.

Fig. 1.—*Pheronema Carpenteri*, ¼ natural size, showing the basal origin and fascicular distribution of the long anchoring spicula.

„ 2.—*Pheronema Grayi*, ⅕ natural size, showing the general and non-fascicular distribution of the anchoring spicula.

„ 3–16 represent spicula from various regions of the same sponge.

„ 3.—Basal portion of an attenuate spinulate spicule from the oscular fringe × 100 linear.

„ 4.—Portion of an attenuate erectly-spined spiculum from the same region × 100 linear.

„ 5.—A filiform adpressly-spined spiculum from amongst the long radiating spicula of the upper region × 100 linear.

„ 6.—A portion of the same still further enlarged.

„ 7.—An irregularly and profusely spined spiculum from the sponge body × 100 linear.

„ 8.—A portion of one of the large attenuate hexradiate spicula from the exterior surface of the sponge body × 100 linear.

„ 9.—One of the "spiculated hexradiate" spicula (Bowb.), having one radius of the perpendicular shaft suppressed, from the interior portion of the sponge × 100 linear.

„ 10.—An irregular variety of the same type.

„ 11.—A spiculum of the same type having the terminations of the lateral radii echinate.

„ 12.—Another variety of the same form, in which the perpendicular radius, suppressed in Figs. 9 and 10, is greatly produced.

„ 13.—Portions of attenuate spicula from the inner portion of the sponge, intercrossing one another, and showing the relation of the spiculated hexradiate and other smaller forms to them × 40 linear.

„ 14.—Minute fusiform echinate spicula from the same region × 200 linear.

„ 15.—Recurvato-birotulate spicula of the sarcode × 400 linear.

„ 16.—Termination of one of the anchorate spicula × 100 linear.

Plate LXIV.

or Venus' Flower Basket, and the notorious and frequently inverted *Hyalonema*, or Glass-Rope sponge or coral, taken during my recent dredging expedition off the coasts of Spain and Portugal in company with Mr. Marshall-Hall and Mr. Edward Fielding, in the former gentleman's yacht, the 'Norna.'

In the first place, however, I feel myself called upon to acknowledge here my indebtedness to the Council of the Royal Society for their kindness in awarding me a grant of 50*l.* wherewith to defray the cost of the necessary dredging and collecting apparatus, and on which it may be said in great measure the success of the expedition depended. The results accomplished will, I trust, convince the Council of the Royal Society that their confidence has not been misplaced.

Four of the species, belonging to the interesting group just

PLATE LXIV.

FIG. 1.—*Askonema Setubalense*, $\frac{1}{10}$ natural size.
„ 2.—Interlacing fascicles of simple attenuate spicula of which the skeleton is composed × 25 linear.
„ 3.—A portion of one of these simple attenuate spicula × 100 linear.
„ 4.—A variety of the same having a central inflation.
„ 5.—Another variety, in which the two extremities are slightly clavate and echinate.
„ 6.—One of the larger hexradiate stellate spicula, showing at *a* how the terminations are occasionally spined, × 100 linear.
„ 7 and 8.—Two of the smaller hexradiate stellate spicula, having their terminations profusely spined, × 100 linear.
„ 9.—One of the multiradiate spicula of the sarcode × 200 linear; at *a* one of terminations of the radii still further enlarged.
„ 10.—A fragmentary form discovered among the other spicula, but of uncertain origin, × 100 linear.
„ 11.—An ideal restoration of the same.
„ 12.—The basal skeleton of *Farrea occa*, in a perfect condition, natural size.
„ 13.—The meshwork forming the basal skeleton, viewed from above, × 40 linear.
„ 14.—The same viewed obliquely.
„ 15.—A furcate spiculated biternate interstitial spiculum (Bowb.), from *F. occa*, × 50 linear.
„ 16.—A spiculated biternate variety × 40 linear.
„ 17.—A small attenuato-stellate spiculum × 300 linear. Figs. 15, 16, and 17, are copied from Dr. Bowerbank's "Monograph of the Siliceo-fibrous Sponges," 'Proc. Zool. Soc.,' 1869.
„ 18.—*Aulodictyon Woodwardi*, natural size, attached to a piece of *Lophohelia prolifera*.
„ 19.—A fragment of the reticulated meshwork of the skeleton × 50 linear.
„ 20.—A portion of the accessory network composed of coalescing and attenuate hexradiate spicula × 100 linear.
„ 21.—One of the attenuate "tension" spicula, having one of the extremities inflated and recurvato-pellate and dentate, × 200 linear.
„ 22.—Portion of a variety of the same type, having the pellate expansion replaced by recurved uncini.
„ 23.—A free attenuate hexradiate spiculum, with one extremity slightly inflated, × 100 linear.
„ 24.—One of the minute "spinulo-quadrifurcate hexradiate stellate" spicula of the sarcode × 200 linear.
„ 25.—A termination of a radius of the same, still further enlarged.

PLATE LXV.

cited, out of a total number of nine collected, are altogether new to science, and two of these are described here for the first time. In addition, I am enabled by examination of the material amassed to add considerably to our knowledge of the history and structure of those species already introduced.

Pheronema Grayi, W. S. Kent.

Most conspicuous in the whole series is the fine sponge described under the above name in the 'Annals and Magazine of Natural History' for August last. This beautiful form is known to the fishermen of Setubal as "Ninos de Mer," or "the Sea Bird's-nest;" it bears a strong family likeness to the interesting form dredged up last year by Drs. Carpenter and Wyville Thomson in the Shetland seas, and described by the last-named gentleman in the 'Philosophical Transactions' as *Holtenia Carpenteri*. Unfortunately, the generic name proposed by Dr. Thomson has to give way to that of *Pheronema;* Dr. Leidy, an eminent American naturalist, having previously described as *Pheronema Annæ* a sponge evidently

---

PLATE LXV.

FIG. 1.—*Lanuginella pupa*, shown at *a*, natural size, attached to a calyx of *Lophohelia prolifera*.

„ 2.—A specimen detached × 12 linear.

„ 3.—Interlacing attenuate hexradiate spicula, of which the framework of the skeleton is composed, × 100 linear.

„ 4.—An isolated spiculum, with unequally developed lateral radii, similarly magnified.

„ 5.—Two of the minute spinulo-multiradiate spicula of the sarcode × 200 linear.

„ 6.—A supposed reproductive gemmule × 100 linear.

„ 7.—Another and possibly more advanced form, similarly magnified.

„ 8.—A fragment of the smooth reticulated fibrous skeleton of *Aphrocallistes Bocagei* × 100 linear.

„ 9.—A still more slender and irregularly stellate portion of the same.

„ 10.—One of the "spiculated hexradiate stellate" spicula, having the inferior radius of the perpendicular shaft greatly prolonged, × 100 linear.

„ 11.—Another variety of the same type.

„ 12.—A simple attenuate hexradiate variety × 100 linear.

„ 13.—One of the porecto-triradiate spicula of the sarcode × 100 linear.

„ 14.—Upper portion of the same, after Oscar Schmidt, and confirmed by my own observations, × 700 linear.

„ 15.—A minute attenuate, adpressly-spined, spiculum of the sarcode × 100 linear.

„ 16.—A portion of the reticulate and echinate skeleton of *Aphrocallistes Beatrix* × 100 linear.

„ 17.—A lateral view of a fragment of the same, showing the spinose prolongations, similarly magnified.

„ 18.—One of the porecto-multiradiate spicula × 100 linear.

„ 19.—A "verticillately-spined" spiculum of the sarcode × 100 linear.

„ 20.—A variety of the same, in which the extremities of the spines are minutely knobbed or spinulate, equally enlarged.

„ 21.—An attenuate hexradiate spiculum, with one of the radii spinous, referred by Dr. Bowerbank to this species, but which I have not yet succeeded in detecting, × 150 linear (after Bowb.).

possessing the same generic characters as the one subsequently described in the 'Philosophical Transactions.'*

As a species, my sponge differs from *Pheronema Carpenteri* in many points. In the first place, in the invariably more or less globose contour of its body, and in its large and outwardly expanding oscular orifice. In *Pheronema Carpenteri* the sponge body is usually sub-cylindrical, with an entirely cylindrical osculum. Another distinction is evidenced in the origin and distribution of the long, silvery, hair-like, anchoring spicula, which, spreading out on all sides, serve to fix the sponge in the treacherous ooze from which it was taken. In Dr. Wyville Thomson's species these originate in a number of distinct fascicles springing from the lower portion of the sponge, while in my own they are distributed equally throughout the greater portion of the external surface, without having any definite fascicular arrangement. Dr. J. E. Gray has considered this character sufficient for the institution of a new genus for its reception; but without committing myself to that extent, I regard this feature as an auxiliary and important one in proof of its specific individuality. But in addition to the readily recognized characters of external contour, there are others afforded by the internal spicular structure that assist us in discriminating between this form and *Pheronema Carpenteri*. Having examined the spicules of both species I have failed to find in the last-mentioned one the long attenuate spinulate forms which are present in mine, and also long attenuate erectly-spined ones, which likewise occur in *Pheronema Grayi*. I may also remark that the shafts of the recurvato-birotulate spicula (Amphidisci, W. Th.) are more profusely echinate in *Pheronema Grayi* than in *P. Carpenteri*. This more or less spinous character of the skeletal elements may be quoted as being of very great service in the specific diagnosis of many other forms; as, for instance, between *Aulodictyon fecunda* and another species of the same genus I shall presently introduce.

The specimen exhibited this evening, in company with about a dozen more examples, was procured with the aid of the fishermen's hooks at a depth of, at least, 600 fathoms. On first being brought on board, the sarcode investing and constituting the sponge body was of a brilliant orange colour, a hue remarkably predominant among the Protozoa, while their long, hair-like, anchoring spicula hung about them in matted tresses, cemented together by the

* Since writing my first paper descriptive of *Pheronema Grayi*, I have seen Dr. Leidy's representation of his species ('American Naturalist,' March, 1870). That it is generically identical with the one described by Prof. Wyville Thomson, I have no longer any doubt, and must even consider it to be very closely allied *specifically;* it possesses the same cylindrical outline and the same fascicular arrangement of the anchoring spicula. The smooth upper surface of Dr. Leidy's sponge is evidently owing to its having undergone a considerable amount of wear and tear before it was deposited in his museum. I possess a specimen of *P. Grayi* similarly denuded.

tenacious ooze of the ocean's bed. By careful washing these unkempt locks have been disentangled, and the true origin and distribution of each separate glassy filament been made manifest, while at the same time numerous other delicate organisms have been set free which at first appeared to be inextricably held captive in their mazy embrace. Among these were a quantity of a beautiful transparent Pecten (*P. vitreus*), numerous specimens of a fragile Ophiurid, and a whole host of Foraminifera, which may some day form the subject of a separate communication.

Plate LXIII., Fig. 2, represents *Pheronema Grayi* treated as above described, and Fig. 1, in the right-hand corner, illustrates *Pheronema Carpenteri* under similar conditions. The remainder of the Plate is occupied by figures of the spicula most characteristic of the first-named species.

The sponge I have next to call attention to, though being an indirect result of the expedition, is scarcely less wanting in interest than the form last alluded to.

While engaged in inspecting the numerous treasures contained in the Lisbon Museum of Natural History, my attention was arrested by some dilapidated hat-like bodies, of a whitish-brown colour and felty consistence, which occupied a considerable amount of space on the well-filled shelves. Professor du Bocage, the talented Conservator of the Museum, informed me that Professor Wyville Thomson had recently examined these organisms, and had communicated to him his opinion that they were vegetable and not animal structures. The eminent Professor of Belfast had probably only commenced his sponge studies at that period, otherwise he would hardly have failed to recognize the essentially spongious nature of their tissues. A lighted match, applied by my friend Mr. Fielding, determined on the spot the silicious consistence of the framework of one of the objects of our suspicions, and a subsequent microscopic examination on board the yacht, of a piece kindly placed at my disposal by Prof. Bocage, established beyond doubt the correctness of our premises, while at the same time it revealed to us that we had lit upon a sponge altogether new to science.

We may proceed to summarize its technical peculiarities as follows:—

Askonema, nov. gen.,* W. S. Kent.

Sponge body, bag- or cup- shaped, of felt-like consistence; composed of an interlacement of long filiform silicious fibres or spicula. Interspersed among these, hexradiate spicula of various sizes and minute multiradiate ones with capitate extremities.

[While the revise of this paper passes through my hands, I avail myself of the opportunity of expressing my conviction that "the lovely lace-like vase form, upwards of three feet in diameter at the

* ἀσκός, a bag; νημα, that which is spun.

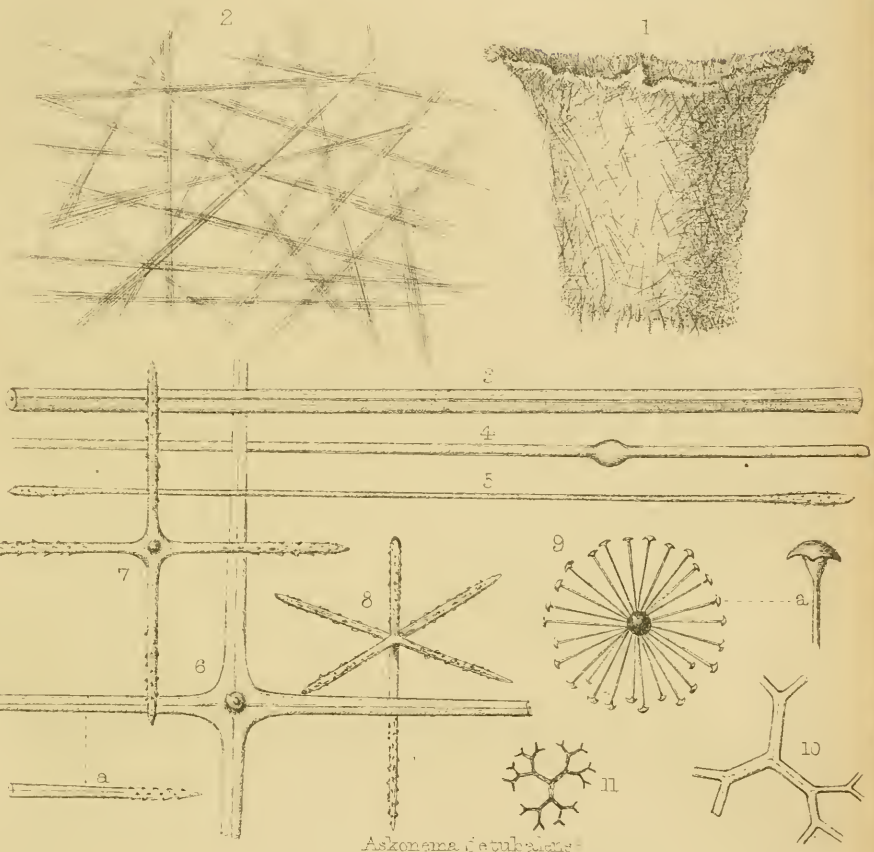
lip," referred to in 'Nature,' for Oct. 20th, as taken in the recent 'Porcupine' expedition, is identical with the species I here introduce under the name of *Askonema*. A few words' conversation with Dr. Wyville Thomson has tended to more fully deepen this conviction. Should my surmises prove correct, my opinion expressed in reference to the habitat of this interesting sponge will likewise be confirmed.]

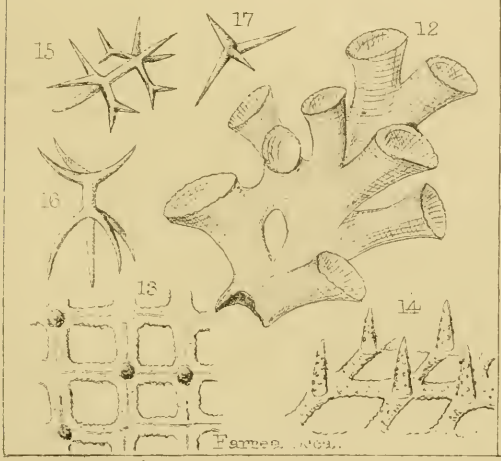
A. Setubalense, sp. nov.

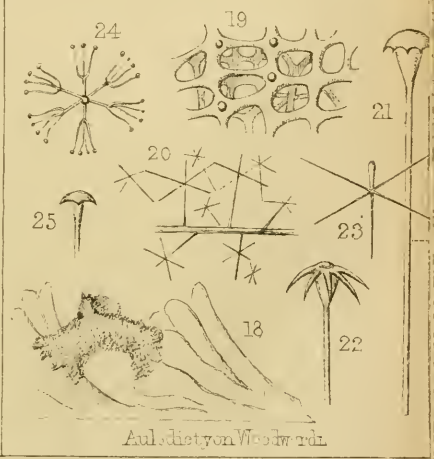
Sponge body, vase- or sac- like, of large dimensions, expanding superiorly, often upwards of two feet in height; composed of interlacing fasciculi of long filiform fibres or spicula. Individual filiform spicula, smooth, finely canaliculate, varying in diameter from $\frac{1}{6000}$th to $\frac{1}{500}$th of an inch, occasionally possessing a central or excentral inflation, as at Plate LXIV., Fig. 4. Hexradiate spicula of two types, the one large, with smooth attenuate radii, the other of smaller but more varying size, with obtuse extremities and entirely erectly spinous surfaces. Scattered through this sponge there also occasionally occur simple attenuate spicula clavate, and erectly spined at either extremity. (See Plate LXIV., Fig. 5.) Average diameter of the minute multiradiate spicula $\frac{1}{300}$th of an inch.

The radii of the minute sarcode spicula last referred to may originate from a six-rayed foundational portion, as in the "spinulo-multifurcate hexradiate stellate" type of Dr. Bowerbank; but an examination with a high power has failed to eliminate for me such a structure, each individual capitate radius apparently springing from a common irregularly spherical nucleus. All the specimens of this remarkable sponge, which I was accorded the honour of examining, possessed the same ragged basal extremity as represented in the reduced outline given at Fig. 1, so that from its hat-like point of view one would feel inclined to refer it to the species usually supposed to bedeck the head of one of the vivacious inhabitants of the Emerald Isle fresh from the allurements of "Donnybrook Fair," if I may be allowed to make so irrelevant a remark; this feature is, however, replete with scientific significance. It indicates that this sponge was either firmly attached by its base to some fixed submarine body, or otherwise being supported loosely in the muddy ooze, its interior cavity had become filled with sedimentary deposit to such an extent, that the bottom had given way on its removal being effected, either of which suppositions amply accounts for the lacerated inferior margin.

A certain amount of doubt at present remains attached to the exact locality and circumstances in which the specimens of this sponge were taken, some of the fishermen asserting that it is procured from the numerous rocky caverns that fringe the coast-line between Cezimbra and Cape Espichel, while others state that it inhabits the deep-sea fishing-ground, many miles off the coast, in







W.S. Kent del. Tuffen West sc. W. West imp.

New Sponge-forms.

company with *Pheronema*, *Hyalonema*, and numerous other abyssal forms. The balance of evidence is certainly in favour of the correctness of the latter of these two suppositions, no sponge belonging to the same group having yet been met with within the littoral zone, and the sponges themselves presenting the aspect of having been partially immersed in the same semi-calcareous ooze in which their congeners just referred to are known to occur.

Hyalonema lusitanica, Gray.

One or two specimens of this form were taken, particulars in connection with which I reserve for future publication.

Lanuginella pupa, Os. Schmidt.

This species has only just been described by Dr. Oscar Schmidt in his 'Spongien-Fauna des Atlantischen Gebietes.' The examples examined by Dr. Schmidt were attached to a specimen of *Aphrocallistes Bocagei* in the same manner that those taken by ourselves are attached to a branch of *Lophohelia prolifera*.

The sponge body of *Lanuginella pupa* is cup-shaped, and rarely exceeds one-eighth of an inch in height; the supporting skeleton is composed of a loose interlacement of hexradiate spicula of various sizes, having the appearance under a low power of the microscope of a continuous reticulation, in consequence of the shafts of the spicula being brought in contact with one another through the medium of the investing sarcode.

These hexradiate spicula are of various sizes, with long, slender, smooth, and acutely terminating radii, resembling in miniature the larger form alluded to in the description of *Askonema;* occasionally the basal extremity of the perpendicular shaft is slightly inflated.

Scattered in the sarcode are minute multiradiate spicula with capitate extremities, which must be referred to the "spinulo-multifurcate, or spinulo-trifurcated, or quadrifurcate hexradiate stellate" types of Bowerbank, though at the same time it is a matter of regret we cannot express our meaning in fewer words.

In examining a slide prepared from this sponge I have encountered some minute capsular bodies which appear to partake of the nature of reproductive gemmules, and which will, I think, prove to be the first record of their presence in the particular group of the Calicispongiæ, to which this form is referred in my appended system of classification. Two of these bodies were observed and are figured at Plate LXV.; the smaller one of the two, Fig. 6, presented the appearance of an ovoid, membranous, amber-coloured capsule, having at either pole a radiating fascicle of spicula, which embraced and guarded the extremity of the capsule to which it was attached. The larger, about double the size of the last, exactly resembled it, with the exception that minute simple hexradiate spicula were dispersed

irregularly throughout the interpolar region, seemingly as an additional protection; we may naturally presume that the last-mentioned form is simply a more advanced condition of the first.

Aphrocallistes Bocagei, E. P. Wright.

In the January number of the 'Quarterly Journal of Microscopical Science' for this year, Professor Percival Wright describes and figures a very beautiful reticulated sponge under the name above given, at the same time he is not quite certain of its distinctness from an earlier described species *A. Beatrix* (J. E. Gray), in consequence of the specimens he examined being denuded of the minute and characteristic sarcode spicula. This late expedition has resulted in our obtaining a perfectly fresh specimen of this elegant sponge, and its examination enables me to fully substantiate its specific distinctness from *Aphrocallistes Beatrix*, as also to fill in many links missing in my friend Professor Percival Wright's description. Dr. Oscar Schmidt has likewise recently examined this species with results entirely at union with my own. As Professor Wright remarks, the "areas formed by the reticulated skeleton are much more regularly hexagonal in this species than in *A. Beatrix*, and the "spines (prolongations?) on the bosses" are much more attenuate. But it may be added that the whole skeleton is much more slender, and is wanting in that echinate aspect of the bosses and shafts of the radii, characteristic of *A. Beatrix*. The spicula of the sarcode are also very different, the "porecto multiradiate" spicules are not wanting as Professor Wright imagined, and which in fact appear to constitute the type form of the genus; but there are none of the verticillately spined ones so abundant in *A. Beatrix*; while, on the other hand, *Aphrocallistes Bocagei* is at once recognized by the abundant presence of hexradiate spicula, having one extremity of the shaft profusely spinous and accordingly bearing a close resemblance to those that occur in *Pheronema Grayi*, the opposite extremity of the shaft being frequently very attenuate, as shown at Plate LXV., Fig. 10: the terminations of all the other radii are usually more or less minutely and erectly spined. Dr. Bowerbank figures a spiculum of *A. Beatrix* belonging to the same type,* but the terminations of the radii are quite smooth, and the form is scarce comparatively to what obtains in *Aphrocallistes Bocagei*; this latter feature I remark after careful examination of examples of both species.

Farrea occa, Bowerbank.

A fragment of this species was first figured and alluded to by Professor Owen in his eloquent description of the matchless *Euplectella aspergillum*,† where it is described as the basal mass of some

* 'Proc. Zool. Soc.,' pl. xxii., 1869.

† See 'Trans. Linn. Soc.,' vol. xx., pl. xxi.

unknown silicious sponge. In his Monograph of the British Spongiadæ, Dr. Bowerbank has bestowed upon it the name above given; and has since, in the 'Proceedings of the Zoological Society' for 1869, figured the numerous minute sarcode spicula belonging to it. At the same time the essential basal skeleton of this sponge has hitherto only been obtained in a fragmentary condition, and it affords me much pleasure to give here a representation of its external form in its perfect state. The specimen figured was completely immersed in the hardened mud filling up the interstices of a dead mass of *Lophohelia prolifera* var. *anthophyllites*, and necessarily required some careful manipulation in its extrication. As will be observed, the skeleton of this sponge is composed of a series of infundibular netted tubuli branching out from one another and occasionally coalescing. In the condition in which it was taken, it was almost too much to expect to find the spicula of the sarcode also upon it, and such proved to be the case; but as that portion of its history has already been made known to us by Dr. Bowerbank, this circumstance was of minor importance; and we deemed ourselves only too fortunate to obtain the basal scaffolding intact. The figures of the sarcode spicula accompanying the illustration of this specimen, are copied from those by Dr. Bowerbank, given in his Monograph of the Siliceo-fibrous sponges in the 'Proceedings of the Zoological Society' for 1869.

Aulodictyon Woodwardi, W. S. Kent, nov. gen.* et sp.

From among the branches of the same mass of *Lophohelia prolifera*, which has already been referred to as yielding me so many new forms, I have yet to record another one, which in addition to being a new species must constitute the type of a new genus.

This sponge occurs in small fistulose ramifications, bridging over the minor interspaces between the branches of the coral to which it is attached. It possesses a certain exterior resemblance to *Farrea*, but differs from it in the following particulars:—In *Farrea* the basal skeleton is composed of a single reticulated lamina, in the sarcode investing which, according to Dr. Bowerbank, verticillato-stellate spicula and other minute forms are found. In *Aulodictyon*, on the contrary, the basal skeleton consists of a complex reticulated tube, between and continuous with the primary meshes of which, an abundant network of coalescing simple hexradiate stellate spicula occurs (see Plate LXIV., Fig. 20): the minuter spicula of the sarcode are again of an entirely different type. These are also represented in the Plate. Most remarkable among them are the long attenuate forms, *l.c.* Fig. 21, having one extremity inflated and reflecto-peltate with a dentate margin, and the other attenuately and finely acuminate; these seem to fulfil the part of

* *αὐλὸς*, a tube; *δίκτυον*, a net.

tension spicula, and are met with singly or in bundles of two or three together in the substance of the sarcode; occasionally, the dentato-peltate structure is replaced by a simple series of recurved hooks (see Fig. 22), and every gradation between the two varieties may be detected. Another minute and beautiful form of frequent occurrence must be referred to the "spinulo-quadrifurcate hexradiate stellate" type of Dr. Bowerbank: an illustration of this form is given at Fig. 24. Simple attenuate, free, hexradiate stellate spicula are also abundant, these often having the basal extremity of the perpendicular shaft slightly inflated as at Fig. 23. I devote this species to my esteemed friend and colleague, Mr. Henry Woodward.

To this new genus, *Aulodictyon*, must be referred the species figured and described by Dr. Oscar Schmidt as *Farrea fecunda*, the primary characters being essentially in harmony with those applied to the species just described, and only differing in detail. In *Aulodictyon fecunda* (*Farrea*, ditto, O. Sch.) the interspaces formed by the reticulations of the basal skeleton are more regularly quadrate, and of much larger size than in my species; the reticulations are also more distinctly canaliculated, and their "bosses" present the same imbricated or fir-cone like appearance characteristic of *Farrea occa*, while in *A. Woodwardi* the canaliculi are very obscure, and the "bosses" of the reticulations are perfectly smooth. The spicula of the sarcode also differ specifically. I have not succeeded in detecting in my last-named species the attenuate forms with one extremity acutely digitate figured by Dr. Schmidt as characteristic of *Aulodictyon fecunda*, and the minute spinulo hexradiate spicula of his appear to have their terminations trifurcate instead of quadrifurcate as in mine.

Dactylocalyx, Stutchbury.

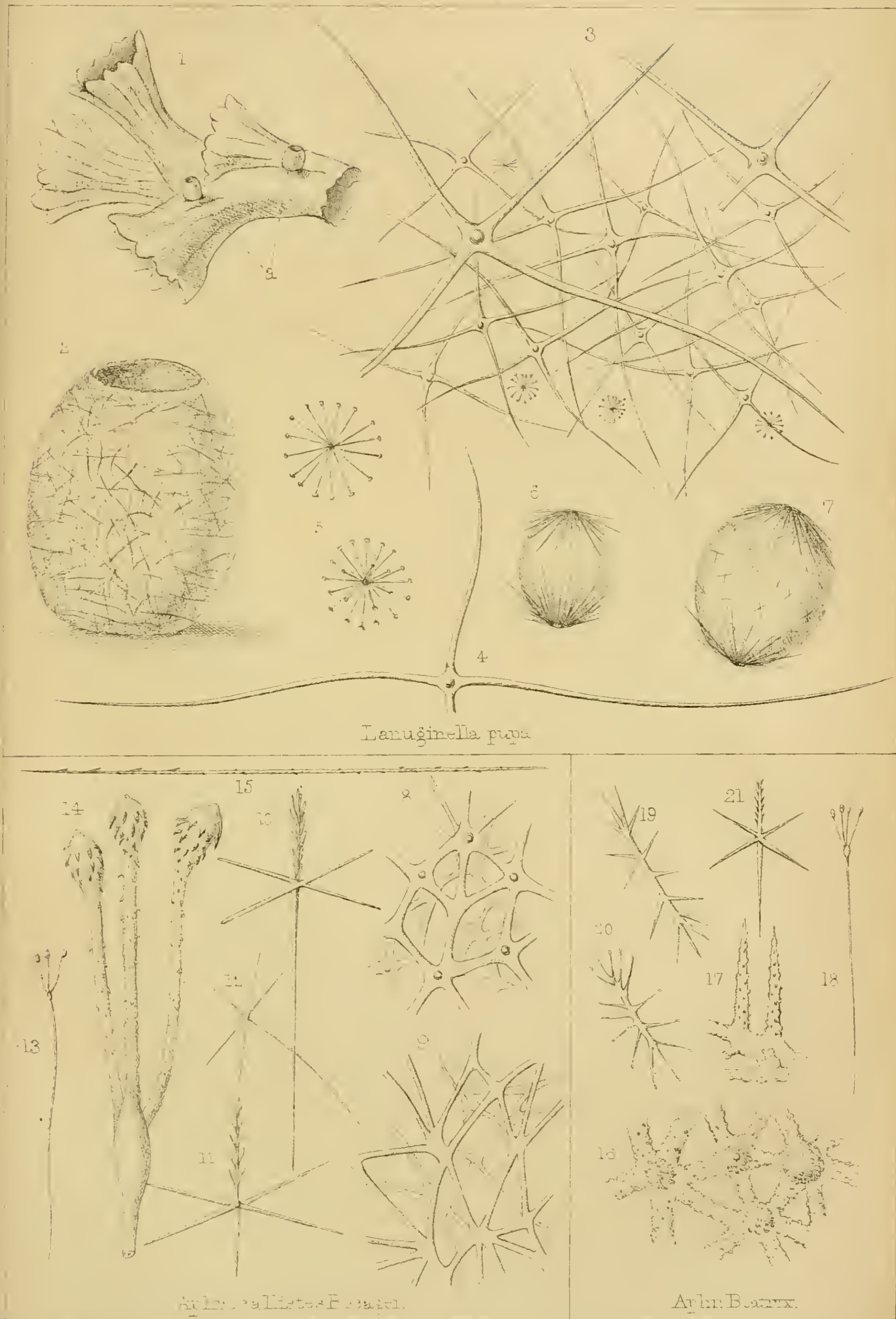
A representative of this genus has been likewise taken, but I have not yet had leisure to determine its specific identity.

Fieldingia lagettoides, W. S. Kent, nov. gen. et sp.

This form is figured and described in the 'Annals and Magazine of Natural History' for September last.

In conclusion, I consider it requisite, in the face of the large series of this interesting group of sponges I have lately been afforded the opportunity of studying, to propose a slight modification of the system of classification which has up to the present time been accepted, and which, in consideration of the limited number of forms known until within a very recent period, was perhaps almost sufficiently significant.

Dr. Gray has proposed to distinguish this group by the name of the Coralliospongiæ, its essential character being that the



W. West imp.

New Sponge-forms.

sponges belonging to it are structurally composed of anastomosing silicious fibres. This feature is evident in *Euplectella*, *Aphrocallistes*, *Dactylocalyx*, &c., but is not applicable to such species as *Hyalonema* and *Pheronema*, or the recently described *Askonema*, *Sympagella*, and *Lanuginella*.

Dr. Wyville Thomson has proposed to distinguish all these forms, taken together, by the name of the VITREA; but the diagnosis he gives is wanting in correctness, and his order must necessarily make room for a more carefully drawn up and more trustworthy one. One of the primary distinctions of his VITREA is,* "that all the spicules of these sponges, without exception, whether of the skeleton or of the sarcode, are referable to the hexradiate type." Such is by no means the case, and is, in short, entirely out of harmony with existing facts. This is fully shown in the simple hair-like spicula forming the greater portion of the skeleton of *Askonema*, in the long anchoring forms and the short fusiform ones of *Pheronema*, and in the various attenuate varieties peculiar to *Aulodictyon Woodwardi* and *fecunda*. Indeed, it is difficult to select any species in which the diagnosis laid down by Dr. Thomson holds good. If the forms just summarized are referable to the hexradiate type, so are the simple acerate ones of *Spongilla*, and the term VITREA may be applied with an equal amount of justice to every other group of the silicious sponges; but it being clearly evident that no such division as the one proposed by Dr. Thomson really exists, we are necessarily driven to seek further for a more carefully and correctly characterized diagnosis.

Dr. Oscar Schmidt, in his fine memoir already quoted, proposes to distinguish the whole series under the title of the HEXACTINELLIDÆ, from the fact of all the species sharing in common the possession of hexradiate spicula; though, at the same time, he does not commit himself, like Dr. Thomson, to the assertion that *every* spiculum is referable to that hexradiate type. This as a primary order or division is so natural, and the name is so fully suggestive of the common character by which Dr. Oscar Schmidt proposes to distinguish the group, that I shall not hesitate henceforth to adopt it, and most naturalists will, I think, recognize its importance and appropriateness.

Subordinate to this primary order, Dr. J. E. Gray's division of the CORALLIOSPONGIÆ, including all those sponge forms with a coalescing or reticulate silicious skeleton, remains intact; while of equal value to this I propose to form a new sub-order, which I distinguish as the CALLICISPONGIÆ, to include all such cup- or sac-shaped forms as *Hyalonema*, *Pheronema*, and *Askonema*, and which, while possessing the hexradiate silicious spicula characteristic of the

* See 'Philosophical Transactions' for 1869, and 'Annals and Mag. Nat. Hist.'

order, are supported by a skeleton composed of interlacing or isolated, but never of coalescing, elements.

I append, arranged under their newly-proposed sub-orders, a synopsis of all the genera at present known, which must be referred to the interesting division of the HEXACTINELLIDÆ.

Order HEXACTINELLIDÆ. Oscar Schmidt.

Sponges with a siliceo-fibrous or siliceo-spicular skeleton. Spicula of the hexradiate-stellate type invariably present.

Sub-Ord. I. CORALLIOSPONGIÆ. J. E. Gray.

Sponge body supported by an anastomosing or continuous reticulate skeleton. Reproductive gemmules entirely membranous, aspiculous (?).*

Gen. *Euplectella*, Owen.
Habrodictyon, Wyv. Thomson.
Aphrocallistes, J. E. Gray.
Farrea, Bowerbank.
Gen. *Aulodictyon*, W. S. Kent.
Macandrewia, J. E. Gray.
Dactylocalyx, Stutchbury.
Fieldingia, W. S. Kent.

Sub-Ord. II. CALLICISPONGIÆ. W. S. Kent.

Sponge body supported by an interlacing or isolated spicular skeleton; never by a reticulate and continuous one. Reproductive gemmules membranous, furnished with protective spicula (?).*

Gen. *Pheronema*, Leidy.
Hyalonema (et *Carteria*), Gray.
Askonema, W. S. Kent.
Sympagella, Oscar Schmidt.
Gen. *Lanuginella*, Oscar Schmidt.
Vazella, Gray. (*Holtenia* pars, O. Sch.)†

II.—*On a Mode of ascertaining the Structure of the Scales of Thysanuradeæ.* By JOSEPH BECK, F.R.M.S., F.R.A.S.

(*Read before the* ROYAL MICROSCOPICAL SOCIETY, *Oct.* 12, 1870.)

I ENDEAVOURED last year verbally to explain my view of the structure of the scales found on some of the Thysanuradeæ, and having continued my experiments, and having become more than ever convinced of the truth of my views, I think it worth bringing before the notice of the Society in a few words.

I regard the scale as an expansion of the hair, and as designed

* This last character is not laid down yet as essentially diagnostic, though all the evidence so far collected is in favour of it. Dr. Bowerbank records the occurrence of membranous, aspiculous gemmules in the genera *Dactylocalyx* and *Farrea*; while in *Lanuginella*, as observed in my foregoing remarks, forms having the likeness of these bodies, with protective spicula, have been detected. We wait for further evidence of their occurrence in this particular group.

† The generic name of *Vazella* is proposed by Dr. J. E. Gray in substitution for that of *Holtenia* (*H. Pourtalesii*, Oscar Schmidt), which is now necessarily suppressed; but even if Dr. Thomson's genus could hold its ground, a new one would have to be created for the species referred to it by Dr. Schmidt, that form possessing characters entirely different from what obtain in *Holtenia* (*Pheronema*) proper.