XXIV.—*Observations on Sponges and on their Arrangement and Nomenclature.* By Dr. J. E. Gray, F.R.S., V.P.Z.S., F.L.S., &c.

I read before the Zoological Society, in May last, some Notes on Sponges, in which I gave a Synopsis of the different arrangements that had been proposed for Sponges, and suggested a new one by which I hope that any one who will collect together the spicules of any specimen of sponge will be able at once to determine the order and family and also the genus to which it belongs.

As the proposed system contained many innovations, it has produced some discussion and opposition, which was to be expected. In the following observations I have attempted to meet the objections that have been made by various persons. As these persons generally take Dr. Bowerbank's 'British Sponges' as their text, I fear my observations will appear as if chiefly directed against that work. They are made, however, in the cause of science and in the hope of rendering the structure and arrangement of Sponges better understood, and not in the least from any ill feeling towards the author, for whom I have great personal regard.

Until the publication of Dr. Bowerbank's Essay in the 'Philosophical Transactions' and Dr. Oscar Schmidt's work on the Sponges of the Adriatic, no attempt was made to arrange Sponges into genera based on their structure and organization, or to arrange the genera into natural groups. Bowerbank's series of papers commenced in 1858; but the systematic part of these works appeared nearly simultaneously in the year 1862.

Nardo, it is true, studied the Sponges of the Adriatic, and some years before proposed an arrangement of them; but he never published any characters for the genera or species which he names; and his names are only known by prescription or to those who may have received specimens named by him. Dr. O. Schmidt uses some of Nardo's generic names, giving characters to them, and in some cases evidently restricting their significance. Such genera can only date from their publication in Dr. O. Schmidt's work—that is, from 1862.

One of the most careful and intelligent students of the lower animals in this country, whose name often appears in the 'British Sponges' (not observing that Dr. Bowerbank's and Dr. O. Schmidt's works on the genera of Sponges were published simultaneously in 1862), speaking of Dr. O. Schmidt's work, observes:—"Bowerbank, in the most extraordinary fashion, has completely ignored everything that has been written on the

Continent, and in this and in many other particulars it is most unsatisfactory." The author of the 'British Sponges' is himself partly to blame for this misconception. Though the writer above referred to places "Bowerbank" after each generic name (as he does after almost every specific name), he does not refer to his paper in the 'Philosophical Transactions' for 1862, in which they were first defined and published. Indeed I believe that many possessors of the 'British Sponges' have no idea that the first volume at least is only a reprint of the papers in the 'Philosophical Transactions,' with inferior copies of the plates; and therefore they may be easily misled so as to believe that the genera date only from the issue of that work.

Dr. Bowerbank's work is a rich mine of observation; and it is astonishing that a naturalist who has collected so many important facts and figured so many spicules should have formed such orders and genera, and have described his species in a manner so incomprehensible. I believe this chiefly arises from his having set himself to work to make an arrangement and nomenclature of the spicules which are in his collection of microscopic slides, rather than to study the sponges themselves. His entire absence of any knowledge of physiology leads him into most extraordinary theories about the uses of the spicules and the organization of the sponges, which are chiefly propounded in his introductory chapter, but equally deform his specific descriptions. In fact he undertook a work that required considerable scientific acquirements without any preliminary training.

In the 'British Sponges' the spicules are divided into seven classes, which are again subdivided and at length separated into several hundred kinds, some of them with names long enough almost to take away one's breath to pronounce them; and most of these are figured. After all this labour, the forms of the spicules are never used as generic characters. The genera often contain spicules that belong to what he considers different classes. Though the differences of the spicules found in each species form the principal part of the specific descriptions, the author does not even think it necessary to refer to the figures on his plates which represent the spicules he describes—which is to be regretted, as there can be no doubt that a reference of this kind would have rendered his descriptions more intelligible. In fact the author seems to have collected more material than he knew how to employ, like a soldier with a great stock of ammunition that he does not know how or fears to use.

In the system of Sponges which I have proposed, certain

families are determined by the presence or absence of certain kinds of spicules. Thus, in the more inconspicuous siliceo-spicular Sponges, the presence of bianchorate or birotulate spicules characterizes *Esperiadæ*, and of stellate spicules *Tethyadæ*; both kinds are absent in *Halichondriadæ*. Now Dr. Bowerbank's own specific descriptions show that some of his genera contain species belonging to two, and some to all of these three families; yet he does not use the presence or absence of these spicules to divide the genera into sections, though in his preliminary chapters he shows that he believes the stellate and bihamate spicules have an important use in the habits and economy of the animal.

The following analyses of these genera show the details of this statement:—

Almost all the *Dictyocylindri* belong to Halichondriadæ; but *D. fascicularis* and *D. stuposus* have stellate spicules, and belong to Tethyadæ.

Hymeraphia vermicularis and *H. clavata* belong to Halichondriadæ, and *H. verticillata* and *H. stellifera* are Tethyadæ, having stellate spicules.

The three species of *Hymedesmia*, for example, belong to three families—*H. radiata* to Halichondriadæ, *H. stellata* to Tethyadæ, and *H. zetlandica* to Esperiadæ.

Six out of the eight species of *Microciona* have anchorate spicules and belong to Esperiadæ, and the others, *M. lævis* and *fallax*, to Halichondriadæ, having only fusiform spicules.

Of the genus *Hymeniacidon*, which contains thirty-nine species, by far the greater part belong to Halichondriadæ, one to Clioniadæ; but there are scattered among them (why, I cannot comprehend) nine belonging to Esperiadæ, as (9) *H. perarmatus*, (15) *H. variantia*, (16) *H. macilenta*, (24) *H. lingula*, (25) *H. floreum*, (27) *H. plumosa*, (28) *H. jecusculum*, (33) *H. subclavata*, and (37) *H. paupertas*,—one, (39) *H. Bucklandi*, to Tethyadæ.

Of the twenty-eight species of *Halichondria* more than half do not belong to Halichondriadæ: thus (8) *H. angulata* is a Tethyad; (9) *H. corrugata*, (10) *H. Thompsoni*, (11) *H. forcipis*, (14) *H. incrustans*, (15) *H. candida*, (16) *H. irregularis*, (17) *H. Dickiei*, (18) *H. Pattersoni*, (19) *H. pulchella*, (20) *H. Ingalli*, (21) *H. scandens*, (22) *H. Batei*, (23) *H. granulata*, (24) *H. Hyndmani*, (25) *H. nigricans*, (26) *H. albula*, and (28) *H. inornatus* belong to Esperiadæ.

Isodictya is the great magazine genus of the work: it contains no less than forty-three species; about two-thirds of them belong to the family Halichondriadæ. The following—

(15) *I. jugosa*, (20) *I. robusta*, (25) *I. palmata*, (31) *I. Normani*, (32) *I. fucorum*, (33) *I. Alderi*, (34) *I. Edwardii*, (35) *I. lobata*, (36) *I. paupera*, (38) *I. Clarkei*, (39) *I. gracilis*, (41) *I. Beanii*, (42) *I. lurida*, (43) *I. fimbriata*, belong to Esperiadæ.

With such a mixture in each of the genera, one is not astonished to hear, as one often does, that it is utterly impossible to make out any sponge by Dr. Bowerbank's work. Believing that the work contains much that is valuable, I have done what I could, in the paper published in the Proceedings of the Zoological Society, to make it useful to the British zoologist, among other ways by referring to the plates in which the spicules of his species are figured.

Dr. Bowerbank prides himself on having proved that eleven of the fifty-six species of British Sponges described by Dr. Johnston "are only repetitions with new names, or otherwise no species" (Brit. Sponges, i. p. 2). Further on, at p. 222, he shows his reasons for these reductions. It remains to be seen how many of the 193 British species described by Dr. Bowerbank will suffer the same fate at the hands of his successors in the study of this group of animals.

It would be very premature, with the very imperfect knowledge we possess, to attempt to give any arrangement showing the relations that the genera have to each other, though one cannot study them without observing that no linear arrangement that can be formed will show more than a few of such relations, and must separate some genera which appear to have considerable analogy, if not affinity, to each other.

The Coral Sponges (*Coralliospongiæ*), for example, are closely allied to the *Euplectelladæ*, the genus *Aphrocallistes* forming a passage between *Dactylocalyx* and *Euplectella*. The Coral Sponges and the *Euplectelladæ* are peculiar among Sponges for having the sarcode studded with long-rayed stellate spicules. And it would not be difficult to point out a number of such alliances; but this must be deferred until we have more works like the 'British Sponges' and the 'Sponges of the Adriatic Sea.' I am very glad to hear that Dr. Oscar Schmidt is now engaged on the Sponges of the Mediterranean, and especially of Algeria, and hope he may hereafter be induced to take up the exotic fibrous Sponges.

It has occurred to me that if I abstained from dividing the Sponges into Netted and Spicular Sponges in my arrangement, and commenced by separating them according to the spicules, as I had divided the Spicular Sponges, the arrangement of the families would be simplified and more natural, as

the Coral Sponges would be placed near the Euplectelladæ, thus:—

Section I. Malacosporæ. Soft-spored Sponges.
  Subsection I. Leiospongiæ. Spicules none, or, when present, of only one kind.
    Order I. Keratospongiæ (Horny Sponges), including the families Spongiadæ &c.
    Order II. Raphispongiæ (Needle Sponges)—that is, the order Leiospongiæ of my Table, including Halichondriadæ &c.
  Subsection II. Acanthospongiæ. Spicules always present, of more than one form, akin in each Sponge.
    Order III. Coralliospongiæ (Coral Sponges). Spicules anchylosed by siliceous matter, as Dactylocalycidæ, Aphrocallistidæ, Euplectelladæ.
    Order IV. Armatospongiæ (Armed Sponges). Spicules distinct, more or less immersed in horny or fleshy matter. Includes Esperiadæ and Tethyadæ.
  Subsection III. Arenospongiæ, or Sand Sponges, &c.

Dr. Bowerbank has complained to me that I have erroneously described the Coralliospongiæ as formed of "siliceous spicules anchylosed together by siliceous matter, forming a netted mass." He says that I have confounded *fibre* with *spicule*. As the siliceous spicules are of the same structure, whether they are short and thick, or very long cylindrical filaments like those of *Euplectella*, I can see no reason why they should not all be called spicules.

Dr. Bowerbank states that fibres always anastomose and form a network, spicules never do so. According to this rule, some of the spicules of the *Euplectella* do anchylose and some do not; so that some should be called spicules and others fibres. Perhaps this is why Dr. Bowerbank speaks of the "long siliceous spicula or fibres of *Euplectella*" (Brit. Spong. i. p. 9).

Hence Dr. Bowerbank characterizes the Coral Sponges as having a siliceo-fibrous skeleton (B. S. i. p. 203); and he remarks that the structure and mode of growth in this suborder of siliceo-fibrous Sponges "appears to be precisely the same as that of the cerato-fibrous sponges" (*ibid.*).

This is true to a certain extent, as the spicules of the siliceous and the fibres of the horny sponges are each secreted by the animal and deposited in successive layers, and merely differ in the quantity of animal or horny and of siliceous matter that they contain. Some spicules are almost all silica, with scarcely any horny matter, and some horny fibres almost

all horny matter, with scarcely any appreciable silica; but in a large collection of spicules from different sponges the two forms pass into each other almost insensibly. I must consider that the Coralloid Sponges are sponges which have the siliceous spicules anchylosed together by siliceous matter; some of the fibrous sponges consist of siliceous spicules cemented together by horny matter, and others of horny matter only, without any imbedded spicules—the only difference between the two extremes being the abundance of silica in the first and the more or less entire absence of it in the last kind; so that it is a matter of little importance whether they are called spicules or fibres.

Dr. Bowerbank's considering the distinction of so much importance perhaps leads him into the following extraordinary observation:—"In the solid siliceous fibres of *Dactylocalyx*, fig. 274, pl. 15, and in the tubular siliceous fibres of *Farrea occa* (Bowerbank's MS. fig. 277, pl. 15), and especially in the latter, we observe a very much closer approximation to the tubular form of the bones of the higher classes of animals" (B. S. i. p. 28). Dr. Bowerbank has odd notions respecting the analogies between the parts of sponges and vertebrate animals: thus, in the characters of *Geodia*, he speaks of pores furnished with "*œsophageal* tubes" (B. S. i. p. 167).

Dactylocalyx pumicea was well described by Mr. Stutchbury in the Proceedings of the Zool. Soc. for 1841, p. 86, from a specimen that had been sent from Barbadoes to the Bristol Museum. Mr. Stutchbury most kindly let me have half of the Bristol specimen which he described, which is now in the British Museum. Dr. Bowerbank repeatedly refers to this species, under Stutchbury's name, in his 'British Sponges' (see pp. 204, 274, &c.). There is a similar sponge in the Museum of the Jardin des Plantes, where it is called "*Iphiteon panicea* (*Dactylocalyx*, Stutchbury)," a gemmule of which is represented by fig. 341 of Dr. Bowerbank's 'British Sponges.' Some years ago I obtained from the late Mr. Thomas Ingall a beautiful small specimen of this sponge, which he had received from St. Vincent, in the West Indies, where, I believe, it was obtained by Mr. Lansdown Guilding. Mr. Ingall informed me that he bought it with a number of sponges in a very dirty condition at the sale of Mr. Guilding's specimens in King Street, Covent Garden. Dr. Bowerbank, at p. 259 of his first volume of 'British Sponges,' observes, "[The spinulo-quadrifurcate hexradiate stellate spicules] occur abundantly in a beautiful and unique specimen of a cup-shaped siliceo-fibrous sponge formerly in the cabinet of my friend Mr. Thomas Ingall, now in the British Museum." This spe-

cimen is figured by me in the Proc. Zool. Soc. 1867, t. 27. f. 2. Dr. Bowerbank calls this specimen *Dactylocalyx Ingallii*, never observing that it is identical in every respect with the *D. pumicea* of Stutchbury and the *Iphiteon panicea* of Valenciennes; so that Dr. Bowerbank formed two species out of the same, regarding the second specimen as a unique sponge; and I am by no means certain that he does not think *Iphiteon panicea* a third one, as he only records it as belonging to the genus *Dactylocalyx* of Stutchbury, without mentioning its being the same species.

It is to be observed that though I have Dr. Bowerbank's own authority for regarding *MacAndrewia azorica* as identical with *Dactylocalyx Prattii*, at p. 79 he observes, "The external characters of these fibres vary in each species. In a new siliceous Sponge in the British Museum, designated by Dr. Gray *MacAndrewia azorica*, the fibres are quite smooth, as represented by fig. 274, pl. 15; but in the greater number of species they are more or less tuberculated, as in fig. 275, pl. 15, which represents a group of fibres from the type specimen of *Dactylocalyx pumicea*, Stutchbury, a portion of which is in the possession of Dr. Gray; in other species in my possession the tuberculation is very strongly produced, as represented in a few fibres of *Dactylocalyx Prattii*, Bowerbank's MS., fig. 276, pl. 15" (Brit. Sponges, i. pp. 78, 80). These observations are repeated at p. 204.

I quote these observations as showing that spicules are liable to variation within certain limits, most likely peculiar to each species, and that the idea of separating certain sponges because a slight difference in the surface of the spicules may be shown in two microscope-slides is exceedingly fallacious. In fact I am convinced, from the examination of many specimens, that spicules vary quite as much as the external form of the sponge, whatever those microscopists who confine themselves to the examination of slides may say.

MacAndrewia azorica was first described and figured by me from a specimen collected by Mr. MacAndrew at St. Michael (Azores), in the Proc. Zool. Soc. for 1859, p. 438, pl. 15. Dr. Bowerbank quotes my name, adding a needless *s* to it, in 'British Sponges,' i. p. 204, f. 274; at p. 237, f. 53, he calls it *Dactylocalyx Bowerbankii*, Johnson, from a specimen collected at Madeira by Mr. Johnson. Both these specimens are in the British Museum, and there can be no doubt of their identity. But at p. 18 of the same volume Dr. Bowerbank mentions "a new species of siliceo-fibrous sponge from India, *Dactylocalyx Prattii*, Bowerbank, MS." The name is repeated at pp. 19 & 20, and occurs again at pp. 204, 274, 278, where

the spicules are figured, viz. f. 52, 276, 278, & 306. I have Dr. Bowerbank's authority for considering the latter a synonym of *M. azorica*, he, when examining the specimens in the British Museum, having brought to me as a good example of his *Dactylocalyx Prattii* the specimen I described and figured, not recognizing it as the Sponge to which he had already given two other names (I believe the Indian habitat is a mistake); so that this Sponge has been referred to two genera and regarded as three species by Dr. Bowerbank.

I suspect that these errors arose from Dr. Bowerbank's habit of working from microscopic preparations, often made by his friends Mr. Tyler and Mr. Lee as well as by himself, from fragments which they obtained from various collections, under different names, without Dr. Bowerbank taking the trouble to compare the specimens from which they were obtained. If mistakes such as these arise in well-marked Sponges like *MacAndrewia azorica*, what may not occur in obscure, inconspicuous, nearly allied British Sponges?

Dr. Bowerbank informs me that *Placospongia melobesioides*, Gray, P. Z. S. 1867, pp. 128 & 549, is the "*Geodia carinata*," Bowerbank, MS., mentioned, but without any description otherwise than that there occur in its interstitial membranes "multiangular cylindrical" spicules, in common with another Sponge in the British Museum (see Phil. Trans. 1858, p. 314, and Brit. Spong. i. p. 239, f. 71, & p. 254), as having abundant "arborescent elongo-subsphæro-stellate spicules" (see f. 163). Such names cannot have any claim to be used as having any priority; indeed I cannot suppose that Dr. Bowerbank would propose that they should; for he repeatedly objects to other authors that they do not define their genera or species. Thus:— "Although the Sponge was designated *Dactylocalyx pumicea*, no generic characters were given; I propose therefore to characterize it as follows" (B. S. i. p. 203). "Professor Owen has not attempted to characterize his own genus" (*Euplectella*) (B. S. p. 175). "Grant, I believe, gave no generic description of *Cliona*" (B. S. ii. p. 221). This observation is the more remarkable as Dr. Bowerbank quotes, just before this remark, the excellent generic character given by Mr. Stutchbury, which is far better than that proposed by Dr. Bowerbank himself; for if he had adopted it, he would not have placed in the genus the incongruous *D. Prattii* = *MacAndrewia azorica*.

The system of giving a number of *names* without any description, which is to be found in Dr. Bowerbank's 'British Sponges' and Essay, is a very bad one. It is loading the list with a quantity of names which may very probably never

come into use; for if the author is too idle to describe them when he names them, and therefore defers doing so, it is very likely that he will never have the time or the inclination to do it. The insertion of these MS. names is so easy that the writer may give names to specimens without sufficient examination for ascertaining if they are distinct. Dr. Bowerbank has fallen into this error repeatedly, as I have pointed out in this paper. In the first two pages of the explanation of the plates, vol. i. pp. 229, 230, *Halichondria coccinea*, Bowerbank, *H. Alderi*, Bowerb., *H. crustula*, Bowerb., and *H. variantia*, Bowerb., are each mentioned. I do not find any of them described. They are probably British species to which other names have been given. The last may be *Hymeniacidon variantia*, Bowerb. Brit. Spong. fig. 174; but no reference is made to the figure or the name.

Dr. Bowerbank, because he has found that the Sponge attached to a single specimen of *Hyalonema lusitanicum*, out of twelve that have been obtained belonging to the genus *Carteria*, has the same spicules as the Sponge attached to the Japanese *Hyalonema*, concludes that the two species are only one, and blames me for having formed them into two genera. He has entirely overlooked the fact that the barks of the Portuguese and Japanese species are of very different texture, that the animals when contracted are of very different form (the one circular and the other oval), and that they have a different number of tentacles, in one placed in a double, in the other in a single row. Now, whether the polype forming the bark is a part of the coral or a parasite is a matter that may be open to discussion; but the difference in the structures of the polypes is sufficient to distinguish them from each other as species or genera.

But it is not astonishing that Dr. Bowerbank should overlook such differences; for he seems to have the faculty of seeing what he desires, and of not seeing what he does not wish to see. Thus, for example, he persists in denying the existence of the tentacles and cnidia in the polypes of the genus *Hyalonema*, though they have been figured by Brandt, Schultze, and Bocage, and have been seen by hundreds of persons at the late soirée of the Microscopic Society, where they were exhibited by Mr. Lee, Mr. Steward, and several other microscopists.

I am not convinced of the identity of the Sponge found attached to the Japanese and Portuguese specimens of *Hyalonema*. Professor Bocage sent me a fragment of the Sponge attached to the Portuguese *Hyalonema*. I examined it very carefully, and could only find needle-like spicules, without

defensive spicules of any form. The fragment was a very minute one, and it might be not a good specimen of the sponge; but I should like to be assured that Dr. Bowerbank, in preparing his slide, has not somehow mixed up the sponge of the Japanese and Portuguese species together; and I hope that Professor Bocage will give us a figure of the spicules he finds in the Portuguese Sponges. But should it even prove to be correct that the Sponges attached to *Hyalonema mirabile* and *lusitanicum* both belong to the genus *Carteria*, it would be no proof that the coral belongs to the Sponge. Mr. Carter has well observed that, if the polype that forms the bark can secrete the siliceous spicules that occur in the bark, there can be no difficulty in believing that it can secrete the longer spicules that form the rope-like axis.

Even if the Sponge of the two *Hyalonemata* belongs to the same genus, that affords no proof that the glass rope is part of the Sponge. It is remarkable that the *Palythoæ*, to which the polypes of *Hyalonema* are most nearly allied, are constantly parasitic on one particular animal; and yet we do not believe that they are part of the animal on which they are parasitic. Some forms of *Palythoa* are only parasitic on some bodies in a peculiar state. The one that Dr. Johnston called *Spongia suberea* (see Mag. Nat. Hist. vii. p. 491, f. 60) is only found growing on shells; but it is never found growing on a living shell, but only on shells inhabited by Bernhard crabs; and somewhat similar species with the same habit are found on the American coast and in other parts of the world; yet no one thinks there is any connexion between the *Palythoa* and the crab or the shell, as Dr. Bowerbank does because the Japanese and Portuguese *Hyalonemata* are sometimes found affixed to a Sponge of the same genus.

Dr. Bowerbank states that he has found in the Portuguese species of *Carteria* all the spicules that are found in the Japanese species, but one. If his observation is accurate, this, to my mind, goes to prove that there are two species of *Carteria* (*C. japonica* and *C. lusitanica*) as well as two species of *Hyalonema*, each having an *Hyalonema* sometimes growing from them, as the species of *Palythoa* on different coasts live on shells inhabited by Bernhard crabs.

I find that I neglected to state that the genus *Carteria* is named in honour of Mr. H. J. Carter, of Budleigh-Salterton, who observed so accurately the structure, habit, and development of the *Spongilla* of Bombay, and has described so well the structure and development of the Foraminifera.

I may also say that the genus *Ingallia* is named in honour

of the late Mr. Ingall, formerly in the Bank of England, an excellent microscopist and collector of sponges, fossils, &c.; *Collingsia* after Mrs. Collings, of Sark, near Guernsey, who has inherited from her father, Dr. Lukis, his love for natural history and the desire to extend it.

During the time this paper has been in type, Dr. Wyville Thomson, in the 'Annals' for February, p. 114, has proposed another arrangement of Sponges. He modestly calls it "a slight modification of Dr. Schmidt's arrangement;" but any reader, even Dr. Schmidt himself, would find it impossible to detect the characters assigned to the families in the very general and indistinct comparative characters assigned by Dr. Schmidt himself to the groups as printed in a previous page of the paper. These characters show the effect of Dr. Bowerbank's researches and figures, and my explanation of them. This arrangement is a step in advance; but it would be better if the step had been made from the examination of specimens instead of from the study of books.

Dr. Oscar Schmidt simply undertook to describe the Sponges of a limited fauna, and only formed an arrangement of them, never intending it for a general system. His work is a very excellent one of its kind, just such a one as we should expect from an experienced and educated naturalist on Sponges, after the publication of Dr. Bowerbank's essay in the 'Philosophical Transactions.'

In consequence of Dr. Wyville Thomson adopting Dr. Schmidt's arrangement, which does not contain several groups of exotic Sponges, he has found it requisite to introduce what he calls a new order. His order VITREA is only a new name given to Dr. Bowerbank's Suborders VI. and VII. (which I had called *Coralliospongiæ*) with the genus *Euplectella* added, but deformed and its character rendered prolix by trying to make it include *Hyalonema*! as his genus *Habrodictyon* is only a name given to my section of the family Euplectelladæ containing the genera *Corbitella* and *Heterotella*.

I have always considered that the characters that Dr. O. Schmidt gives to his families are the weakest part of his work. He perhaps felt that the very limited number of species he had examined did not justify his entering into greater detail. Three of his families were well recognized groups before his time; he added Gummineæ and Halisarcinæ for a few very fleshy Sponges. Dr. W. Thomson observes that "the horn Sponges (Ceratospongiæ) and the Gummineæ are so nearly allied that they can be distinguished by comparative characters only." The last group is founded on a mistake, as Dr. Bower-

bank has shown that *Halisarca* contains spicules. If Dr. W. Thomson's arrangement had been founded on the examination of specimens rather than on the characters in books, he would have found that the Gummineæ are allied to Halichondriæ rather than to Ceratospongiæ.

Dr. W. Thomson objects to my separation of the Sponges into Malacosporæ and Chlamydosporæ. The spores of many Sponges are not known, as he observes; but, though we may not know the structure of the spores of many species and genera, we do know that they have not ovisacs or spores like the Geodiadæ and Spongilladæ; for if they had, we should have observed them, as it is almost impossible to examine a fragment of a Sponge of either of those families without seeing them. The skeleton of *Spongilla* is doubtless very like that of *Halichondria*, or rather *Isodictyon*, as Dr. Thomson says after Dr. Bowerbank. The ovisacs of many *Isodictya* are known, and they are all membranaceous.

Both Geodiadæ and Spongilladæ are well defined recognized groups: the latter lives only in fresh water, and is green, all the other Sponges being marine and never green. And Dr. Thomson must regard the solidified ovisac as a good character, or I do not see how otherwise he can arrange the solid calcaceous Placospongiæ, which certainly have no bark distinguishable from the axis, such as characterizes his *corticata*.

I believe the proper way to form a natural system, or one as near nature as we can discover, is to search for some character that is common to a large number of the species, and when one is found, if the group appears a natural one, to use that character for the group, however trivial it may have appeared to our preconceived notions. And this is the course I followed when studying the Sponges; and the result of that study was the belief that the nature of the ovisac does form a good character to separate the Sponges into two groups.

The "fatal fascinations of the beauties" do not seem to have come to an end; and I think I may add to the instances recorded by Dr. W. Thomson that he regards "*A. speciosum* as a variety grown under peculiar circumstances, and the short *A. corbicula* with the netted lid as the normal form" of the species. Another is, surely, that Dr. Schultz has proposed to unite *Euplectella* and *Hyalonema* into one family, called Lophospongiæ (see Arch. micr. Anat. iii. 212)! It is astonishing that such an anatomist should regard *Hyalonema* as a Sponge, as it has not one character of the class, except its siliceous spicules; and even if it were a Sponge, no two genera of the same class could be more unlike in structure and form than *Euplectella* and *Hyalonema*.

I cannot understand Dr. W. Thomson's habitat of the two species of Venus's Flower-basket. He says, "The only known specimen of *H. speciosum* is that figured by MM. Quoy & Gaimard in the 'Voyage de l'Astrolabe,' and now in the Jardin des Plantes. The specimen is labelled '*Alcyoncellum corbicula*, Val. Tiré par 80 brasses de profondeur dans la rade de St. Denis de Bourbon par M. Leschenault, 1819.'" If he will turn to MM. Quoy and Gaimard's work, he will find those authors state that their specimen was given to them by Mr. Merkus, the Governor of the Moluccas. The same specimen cannot have two habitats or be collected by two persons at different periods. Does not the label belong to the true *Alcyoncellum corbicula*? The label is of little importance if *Alcyoncellum speciosum* and *A. corbicula* are one species!!

XXV.—*On* Autolytus prolifer. By Dr. R. Greeff *.

[Plate VIII.]

In the year 1850, Grube† established, under the name of *Autolytus*, a new genus of Annelids, previously regarded as forming a species of *Syllis*. *Autolytus*, indeed, has characters so definite and so different from those of *Syllis*, as is shown by even a cursory comparison, that this separation must be indicated as not only perfectly just, but actually necessary. For the actual establishment of this idea, however, we are indebted to A. Krohn, who, in his classical memoir "On the Phenomena of Reproduction in *Syllis prolifera* and *Autolytus prolifer*," first distinctly pointed out the distinctive characters of the two genera‡. The interesting processes in the reproduction of *Syllis prolifera* and *Autolytus prolifer* (which, however, as regards the latter, had certainly already been carefully observed by Leuckart and Frey§) are elucidated in this memoir from careful observation, both as regards what they have in common and what is peculiar in each. With regard to *Autolytus prolifer*, Krohn was able to confirm the results already in part obtained by Leuckart and Frey, although those observers still erroneously identified *Autolytus prolifer* with *Syllis prolifera*, and therefore also could not

* Translated by W. S. Dallas, F.L.S., from the 'Archiv für Naturgeschichte,' 1866, pp. 352–367.

† Wiegmann's Archiv, 1850, p. 309, and 'Familien der Anneliden,' 1851, p. 62.

‡ Wiegmann's Archiv, 1852, p. 66.

§ 'Beiträge zur Kenntniss wirbelloser Thiere, &c.,' 1847, p. 91, pl. 2. fig. 1. For the earlier observations of O. F. Müller, Milne-Edwards, Quatrefages, Johnston, &c., consult the authors just cited.