

- Rissoa zetlandica*, Mont. R. C. Walton, Waldringfield.
 * *Trochus granulatus*, Born. R. C. Walton, Butley, &c.
 * *Fissurella costaria*, Basterot. C. C. Sutton. R. C. Waldringfield.
 * *Puncturella noachina*, Linné. C. C. Sutton.
 * *Capulus? incertus*, Bell (n. sp.). Shell forming a flattened cone, with depressed and overhanging apex, which is nearly on a level with the margin. Volution twisted, inclining to the right. Opening truncated (with a slight inflexion) on the right side; left side expanded, sloping downwards from the top to the centre, and thence contracting towards the base. Sculpture 6-9 strong ribs or flexures on the left side, curving lengthwise and downwards from the apex. Surface finely striated all over; lines of growth very distinct. Long. $1\frac{1}{4}$ in., lat. $\frac{1}{2}$ in.
 Loc. R. C. Waldringfield.
 Two or three specimens are all that I have seen of the above shell, all being about the same size. This species and *Capulus militaris*, var. *partim-sinuosus*, Wood, also strongly flexured or ribbed, probably belong to the genus *Brochia*, Bronn (type *Patella sinuosa*, Brocchi), also with these same flexures on the left side, but running in a contrary direction. Mr. Wood's suggestion that these are caused by the shell adhering to a *Pecten*, appears to me inadmissible, because the flexures are always in each species in one direction.
Capulus obliquus, Wood. C. C. Orford.
Lepeta cocca, Müller. R. C. Walton.
 * *Actæon? Etheridgii*, Bell (n. sp.). Shell elongated, scalariform or turreted, thin, smooth, apex reversed; whorls 5-6; inner lip with one strong fold on the base of the columellar lip. Long. $\frac{3}{8}$ inch. R. C. Walton. Of this elegant little shell I have obtained but two specimens.
Rhynchonella psittacea, Chemn. R. C. Sutton.
 * *Ostrea cristata*, Born. C. C. Sutton.
 * — *cochlear*, Poli. C. C. (Jeffreys). R. C. Waldringfield.
Anomia patelliformis, Linné. Chil. ser. Sudbourn, near Orford.
Pecten princeps, Sow. R. C. Waldringfield. Chil. ser. Yarn Hill.
 * — *Westendorpianus*, Nyst. R. C. Waldringfield.
Hinnites giganteus, Carpenter, = *H. Cortesyii* (Crag Moll.). R. C. Trimley.
Limopsis pygmaea, Philippi. R. C. Walton.
Nucula nucleus, Linné. R. C. Butley.
Leda pygmaea, Münster. R. C. Walton.

- Leda hyperborea*, Lovén. R. C. Butley.
Cardium angustatum, Sow. N. C. Thorpe, Suffolk.
 — *interruptum*, Wood. C. C. Orford.
 — *strigilliferum*, Wood, = *C. elegantulum*, Möller. Hab. North seas.
 * *Cardita borealis*, Conrad, = *C. analis*, Phil. Chil. ser. Sudbourn, near Orford.
 — *rudista*, Lamarck, = the long variety of *C. senilis* (Crag Moll.), the shorter being the *Arca antiquata* of Poli, but not of Linné, and the *C. sulcata* of Lamarck.
Erycinella ovalis, Conrad. R. C. Walton.
Venus ovata, Pennant. R. C. Butley.
 — *chione*, Linné. R. C. Waldringfield.
 * *Tapes pullastra*, W. Wood. R. C. Waldringfield.
 — *virginea*, var. *sarniensis*. C. C. Orford. = *T. perovalis*, Wood?
Gastrana laminosa, Sow., = *Petricola ventricosa*, Krauss. Hab. South Africa.
 * *Neera arctica*, Sars. C. C. Orford.
 * *Pholas dactylus*, Linné. R. C. Walton.
 * — *parva*, Pennant. R. C. Waldringfield.
 * *Toxopneustes dröbachiensis*, Müller. R. C. Butley.
Echinocyamus oviformis, E. F. R. C. Walton.
 — *hispidulus*, E. F. R. C. Walton.
Flabellum Woodii, Milne-Edwards. R. C. Waldringfield.

In pursuance of a statement made by myself at the Norwich meeting of the British Association concerning the *non-derivative* character of the fossils of the Red Crag (except in such palpable instances as those of Eocene shells, &c.: see Report of Sections), I have now by me a list of nearly fifty species of bivalves which I have seen with the *valves united*, from this deposit, including *Solen ensis*, *Panopea Faujasii*, *Maetra glauca*, and many species which are held together by very slight ligamental fastenings.

XX.—On two new Siliceous Sponges taken in the late Dredging-Expedition of the Yacht 'Norma' off the Coasts of Spain and Portugal. By W. SAVILLE KENT, F.Z.S., F.R.M.S., of the Geological Department, British Museum.

[Plate XV.]

In addition to the form described as *Pheronema Grayi* in last month's number of this Magazine, other sponges were taken at a considerable depth, which, though not so pretentious in

size, in point of structure are deserving of an equal and perhaps even a greater amount of attention.

The first of these which I shall proceed to describe would seem, in the present transitional condition of the classification of the Porifera, to find its most natural position among that group of the Silicea known as the order ARMATOSPONGIÆ of Dr. J. E. Gray, and of which the genera *Tethya*, *Microciona*, and *Esperia* are familiar representatives.

All the examples of this form taken were, without exception, attached to specimens of the compound Madreporite *Lophohelia prolifera* or its variety *anthophyllites**. The external aspect, natural size, of a specimen attached to the coral is indicated at Pl. XV. fig. 1; fig. 2 being a transverse section of another specimen magnified about two diameters, while fig. 3 represents a small fragment with two dividing fascicles of spicula which form the upright supporting pillars to the "pin-cushion-like" cortex. The spicula, entirely siliceous, which enter into the skeletal structure of this sponge may be referred to three distinct types.

1. Simple acerate spicula of two sizes.
 - a. Very minute and attenuate, not exceeding $\frac{1}{16}$ inch in length. Pl. XV. figs. 4 & 4a.
 - b. Of the same type, but comparatively blunt-pointed, averaging a length of $\frac{1}{8}$ inch. Pl. XV. fig. 5.
2. Pin-shaped or "spinulate" spicula; heads or bases usually pyriform, sometimes slightly depressed; average length $\frac{1}{8}$ inch. Pl. XV. figs. 6 a, b.
3. A minute form, most closely approaching the "palmated inequianchorate" type (Bowerbank, Brit. Spong. pl. 6. fig. 138, spicule of an undescribed sponge); varying in length from $\frac{1}{16}$ to $\frac{1}{8}$ inch. Pl. XV. fig. 7.

The essential characters of the sponge-body, and the relationship of these various types of spicula to the same, are as follows:—

In the first place, we have a thin basal layer of sarcode covering the object to which the sponge is attached, and in which are distributed fascicles of the minuter acerate spicules, with a few isolated larger ones of the same type interspersed. From this layer there proceed at right angles upright shafts or pillars composed entirely of these larger acerate spicula, attenuate at their base, but expanding and evincing a ten-

* I entirely agree with Dr. P. M. Duncan that these two forms are simply variations of the same species.

dency to divide superiorly, where they become lost in the layer which composes the roof of the vaulted cavity enclosed beneath. This roofing layer of sarcode, slightly denser than the basal investing one, contains spicula of the same type, the fascicles of the minuter variety being particularly abundant. Exterior to this we meet with the spicula which confer upon the sponge its most characteristic external feature. These belong to the "spinulate" type, and are the largest which enter into the composition of the skeleton; they are all so disposed that their knobbed termination or head is directed outwards, while the opposite attenuate extremity passes through the superior layer of sarcode into the fascicles of large acerate spicula forming the upright supporting pillars. A few of these last acerate spicula are also occasionally met with projecting among the spinulate ones. The third and last type of spicula, "palmato-inequianchorate," occur, but not abundantly, in the sarcode investing the supporting pillars; and with these may also occasionally be found a few stray fascicles of the smaller acerate form.

No especial oscular system appears to belong to this sponge, and it would seem probable that all matters of nutrition are received through temporary apertures occurring in the thin cortical layer of the sarcode, rejectamenta being got rid of through the same channels.

Rhaphidotheca Marshall-Halli are the generic and specific names by which I propose to distinguish the sponge just described,—the first in reference to the external aspect this form presents under a low power of the microscope, it being so suggestive of a well-stocked pincushion that it was impossible to resist the temptation of giving a name which should bear some reference to this resemblance; and the one chosen supplies the desideratum. The specific one, I need scarcely mention, is a slight acknowledgment of my indebtedness to my friend Mr. Marshall-Hall, who so liberally devoted his yacht and time to the furtherance of this expedition, for the recent delightful cruise combined with opportunities of indulging a keen appetite for the acquirement of practical zoological information unattainable through any other source.

The second sponge I have to notice is, like the first, found associated with a coral, the single specimen obtained being attached to a mass of *Lophohelia prolifera*, var. *anthophyllites*. In common with *Rhaphidotheca*, this form is also provided with a distinct cortical skeleton; but the nature of this skeleton throughout makes it necessary to refer it to the

order CORALLIOSPONGIÆ of J. E. Gray*. Unfortunately the unique specimen taken was devoid of the sarcode which invested it in life, and in a fragmentary condition on its arrival on board our yacht. Sufficient, however, was remaining to illustrate the peculiarities of the form and its distinctness from any other member of the group previously described. One of the most striking superficial characters of this sponge lies in the presence of numerous spherical bodies, varying in size from the diameter of about $\frac{1}{16}$ to $\frac{1}{8}$ of an inch, contained within its general interior cavity; these are invested with, and have radiating from their external surfaces, an irregular meshwork of comparatively coarse siliceous fibres, which pierce through the delicate inner layers and coalesce with the external reticulation of the cortex to be presently described. The structure of these large coarser fibres is such as to warrant their being described as for the most part entirely, minutely, and erectly spined; interspersed among and attached to them are numerous minute "rectangulated hexradiate" spicula (Pl. XV. fig. 9a); these are also spined in a like manner. The specimen taken (about one half of a perfect individual) contained as many as nine or ten of the spherical bodies alluded to; and its general outward appearance, with some of the contained spherules, is represented in Pl. XV. fig. 8. Fig. 9 is one of these bodies isolated, with the investing and radiating fibres considerably enlarged; and at fig. 10 is an example less magnified, showing its relation to the cortical layer beneath. At first the possibility of these bodies being of the nature of gemmules most strongly suggested itself; but a clean section of one (Pl. XV. fig. 11) at once proved that they were simply close aggregations of spicula forming a dense and not altogether irregular network, comparable to the reticulated pith of many plants, such as that of *Juncus*, viewed under similar conditions. Fig. 12 is a minute frag-

* I must here venture to affirm that this order, the CORALLIOSPONGIÆ of Dr. Gray, embodies all the characters of a most natural one, and must necessarily take precedence of that of the VITREA, subsequently proposed by Prof. Wyville Thomson. It includes all those sponges of which the essential skeleton is composed of coalescent or reticulated siliceous fibres or spicula instead of free or isolated ones. To this first character it seems probable that that of the fundamental "hexradiate" type of the component spicula, proposed by Wyv. Thomson, should be also added, though further confirmatory evidence is wanting in many instances.

When penning my notes on *Pheronema* for the last Number of the 'Annals,' I did not recognize so fully as I do now the the comprehensiveness of Dr. Gray's order, otherwise the genus would have been arranged under that instead of the Vitrea.

ment of the interior of one of these bodies, detached and still further magnified; but it furnishes nothing more towards the interpretation of their true significance*. The next part demanding attention is the cortex, the appearance of which in longitudinal section is illustrated in fig. 13, consisting exteriorly of an irregular and somewhat coarse network of spicula, but having on its interior surface even reticulated laminae of extreme tenuity; these latter are strengthened by rather stouter spicula traversing them at intervals, for the most part at right angles, and which by frequently giving off at the point of crossing superior and inferior shafts, form connecting media with the circumjacent reticulations, major and minor, in addition to demonstrating their hexradiate type of structure—a type, by the way, which is still more clearly exemplified in the fibres investing and radiating from the spherules, though mostly so in the minute ones attached to them. In the delicate reticulated laminae just referred to, the component meshes are perfectly flattened, and not cylindrical, as is the case with the other reticulated portions of the organism—a phenomenon, I think, occurring in no hitherto described sponge. The superficial appearance of these laminae is represented in figs. 14 & 15, and in the groundwork of fig. 10.

The dead and partly crushed condition of this sponge, and the consequent absence of the sarcode, unfortunately prevent me from making any observations on the minute free spicula which we may reasonably anticipate were immersed within it. Scientific investigators at present engaged in conducting dredging-operations in waters contiguous to those from which this specimen was obtained may, however, shortly be in a position to fill in the missing link. As with the first sponge described in this paper, no special oscular or porous system is recognizable, though the general reticulated structure of the cortex would readily admit of the free access of all matters of nutrition.

It being necessary to create a new genus for the reception of this form also, I propose to distinguish it by the name of *Fieldingia*, in honour of my *compagnon de voyage*, Mr. Edw. Fielding (to whose skilful pencil we are especially indebted for numerous telling sketches of the lovely scenery through which we passed), adding the specific one of *lagetoides*, after the lace-bark tree, in reference to the delicate reticulated laminae associated with the cortex, which are so strongly

* My friend Prof. Perceval Wright, to whom I have had the opportunity of exhibiting specimens of these curious bodies, was struck with their resemblance to the "xanthidia" found in flint—a suggestion I hope at some future time to follow up.

suggestive of the internal lacc-like layers of the bark of the tree in question. The following will serve as a brief technical *résumé* of the two new genera and species here introduced; each of these latter standing at present as the sole representative of its genus, the characters embodying the genus will also be inclusive of the species.

Subclass *PORIFERA SILICEA*, J. E. Gray.

Order *ARMATOSPONGIÆ*, *ib.*

Fam. *Esperiadæ*, *ib.*

Gen. nov. *RHAPHIDOTHECA*.

Sponge incrusting, cavernous interiorly; entire external surface of cortex bristling with spinulate spicula having their attenuate apices directed inwards and mingling freely with the fascicles of simple acerate spicula which form upright supporting pillars to the roof; fascicles of smaller acerate spicula abundant in the sarcodæ of the cortex, and also distributed less frequently in the basal layer of sarcodæ, and in that investing the shafts or pillars; in the latter, also, minute spicula of the "palmato-inequianchorate" type (Bowbk.). Oscula absent or indefinite.

R. Marshall-Hallii, *ib.* Pl. XV. figs. 1-7.

Hab. A depth of 500 fathoms ten miles off the shore of Cezimbra, Portugal; attached to *Lophohelia prolifera*.

Order *CORALLIOSPONGIÆ*, J. E. Gray.

Gen. nov. *FIELDINGIA*.

Sponge adherent, consisting of a cortex of irregular reticulated spicula, having on its interior surface numerous reticulated laminae of extremely delicate consistence. Common cavity of the sponge containing numerous spherical aggregations of spicular reticulations; these invested and brought into relation with the cortex by loose reticulated fibres of coarser structure, having a general hexradiate arrangement; these fibres cylindrical, and to a considerable extent minutely and erectly spined; frequently attached to them very diminutive spicula of the "rectangulated hexradiate" type, these also minutely and erectly spined. Nutritive and exhalant functions most probably performed through the general reticulations of the cortex.

F. lagettoides, *ib.* Pl. XV. figs. 8-15.

Habitat and associations similar to the last.

Affinities of the described Species.

Rhaphidotheca Marshall-Hallii, on account of its possession of simple acerate, spinulate, and bianchorate spicula, and the non-existence of pronged, uncinatæ, or stellate forms (characteristic of the Tethyadæ), falls naturally into the family *Esperiadæ* of the *Armatospongiæ* of Dr. Gray. The characters of the spicules alone suggest its close affinity to the genus *Esperia* (O. Schmidt) itself; but the general contour of the sponge-body, and the relationship of the respective forms of spicula to the same, forbid its being embodied in it. The only illustration of an approach to the peculiar vaulted character of the interior cavity of this sponge is exemplified in a portion of the form figured and described as *Ciocalyppta penicillus* by Dr. Bowerbank in his 'British Spongiadæ;' the other characters of that sponge, however, are totally different. *Tethya spinularia* (Bowbk.) would also seem to show certain affinities, and especially in the presence of fasciculi of small acerate spicula, and in the possession of spinulate forms; but this last spinulate type, instead of being confined to the cortex, are distributed through the various regions of the sponge: this and their peculiar form ("ovo-spinulate," Bowbk.) would suffice to demonstrate the specific difference between Dr. Bowerbank's species and my own; while the massive character of the sponge-body of the former, and its well-developed oscular system, further demand its generic separation. I would, moreover, venture to suggest that the time has now arrived for the separation of *T. spinularia* from the Tethyadæ proper, the characters of its spicula denoting the necessity of referring it to the *Esperiadæ*, and also in all probability to the type genus of that family.

Regarding the new genus *Fieldingia*, in the present limited state of our knowledge of the *Coralliospongiæ*, it seems difficult to establish any immediate bonds of affinity. *Thionella* (Dr. J. E. Gray, Proc. Zool. Soc. 1868), however, in the more massive character of its cortical layer, and in its internal reticulated structure, indicates a distant resemblance, yet closer than is to be found in either *Habrodactylon*, *Hyalonema*, *Euplectella*, *Aphrocalistes*, *Dactylocalyx*, *Furra*, *Mucandrewia*, or *Pheronema* (*Holtenia*, Wyv. Thomson), the remaining genera of the order with which we are at present conversant.

EXPLANATION OF PLATE XV.

Fig. 1. *Rhaphidotheca Marshall-Hallii*, nat. size, adherent to a piece of *Lophohelia prolifera*.

Fig. 2. A section of the same, showing the vaulted internal structure,

magnified 2 diameters. The dark line *c* indicates the boundary of the coral.

- Fig. 3.* Two of the upright supporting pillars, with a portion of the cortical layer or roof, showing the relationship of the pin-head or "spinulate" spicule, $\times 25$ linear.
- Fig. 4.* A group of the small acerate spicula which occur principally in the cortical and basal investing layers of the sarcode, $\times 100$ linear. *4 a*, a few $\times 250$ linear.
- Fig. 5.* One of the larger acerate spicula which enter into the construction of the upright supporting pillars, $\times 50$ linear.
- Fig. 6.* Spinulate spicula of the cortex: *a*, the ordinary form; *b*, upper portion of one with head somewhat depressed, $\times 60$ linear.
- Fig. 7.* "Palmato-inequianchorate" spicula of the sarcode, $\times 250$ linear. The top figure is an example in profile.
- Fig. 8.* *Ficoidia layetoides*, in section, nat. size, showing the spherical bodies with their radiating fibres contained within.
- Fig. 9.* One of these bodies isolated, with the investing and radiating fibres $\times 15$ linear: at *a* and at various other parts the minute "rectangulated hexradiate" spicules are depicted.
- Fig. 10.* A smaller one attached to the inner layer of the cortex. The upper part of the figure illustrates the finer reticulated laminae of the cortex, while below is shown a looser reticulation which usually intervenes between the former and the coarser network of the internal cavity, $\times 10$ linear.
- Fig. 11.* A transverse section of a small spherule, illustrating the internal reticulated structure, $\times 40$ linear.
- Fig. 12.* An isolated fragment of this internal reticulation, $\times 100$ linear.
- Fig. 13.* The general cortex in transverse section, $\times 10$ linear.
- Figs. 14 & 15.* Fragments of the inner reticulated laminae, $\times 50$ linear.

XXI.—Description of a new Species of *Seisura*.

By JOHN GOULD, F.R.S.

Seisura nana, Gould.

Head glossy greenish black; back and tail the same, but somewhat lighter; wings brownish black, the secondaries with paler edges; under surface white, tinged with buff on the chest; bill and legs bluish lead-colour.

Total length 6 inches; bill $\frac{3}{4}$, wing $3\frac{3}{4}$, tail 3, tarsi $\frac{3}{4}$.

Habitat. Northern Australia.

Remark. In form and colouring this species is very similar to *Seisura volitans*; but it is so much smaller as to preclude the possibility of its being identical with that bird. It was received from Mr. Waterhouse of Adelaide, South Australia, accompanied by a *Limosa uropygialis* in the red or summer plumage, and some other species common to the northern part of the country.

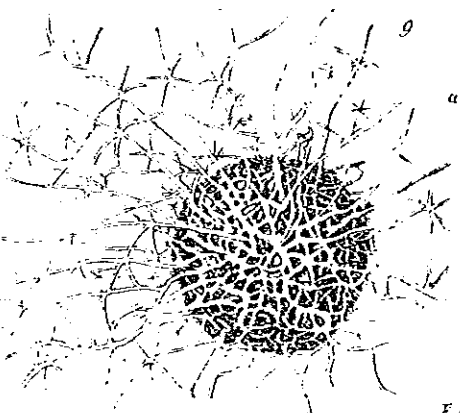
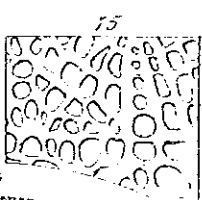
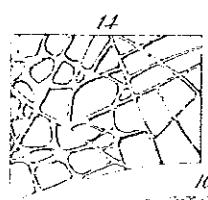
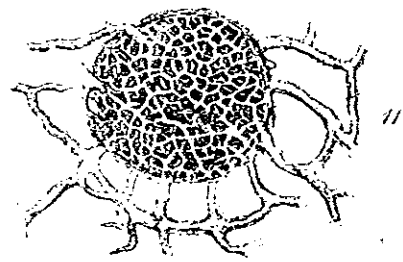
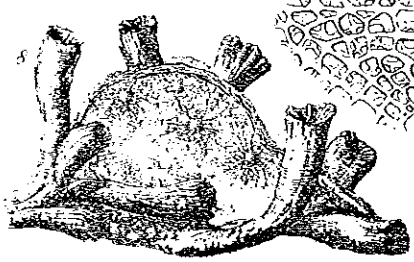
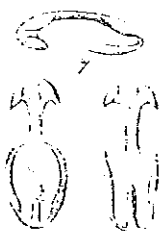
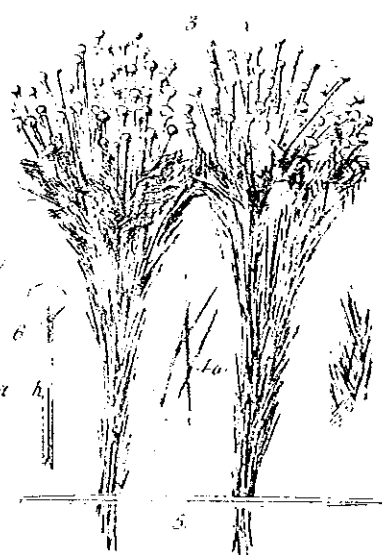
XXII.—On some new Fundamental Principles in the Morphology and Classification of Rhynchota. By Professor J. C. SCHIÖDTE*.

I.

IN all the large independent works, as well as in the numerous minor treatises, by which Latreille has founded the natural system of the articulated animals, there is an undercurrent of merely indicated scientific views, which he has abstained from working out, either because time and material failed him, or because he lacked the necessary courage and confidence in his own ability to get over some mistake of observation, often an entirely accidental one, which had stopped his progress. Thus, for instance, his exceedingly ingenious theory of the "segment médiaire," which, rightly understood, solves so many hard morphological knots, and is of such comprehensive and useful application in classification, has had the fate of being rejected by such anatomists as Burmeister, Westwood, Straus-Dürckheim, Lepelletier de St. Fargeau, Newport, Spinola, and Lacordaire, only because he was unable to supply that conclusive element which was required to give it scientific certainty and support it by decisive proof—namely, the demonstration of the apparently missing pair of spiracles between the second and third thoracic rings in *Piezata* †. There are other cases where Latreille has incidentally pointed out the importance of certain features in the structure of insects which are more easily investigated, and where these indications, which the great French naturalist had left undeveloped, have been investigated by subsequent authors; but they have rarely done more than accumulate descriptive details. As an example we may adduce a passage in 'Le Règne Animal' (nouv. éd. 1829, tom. iv. p. 306), where, after having treated of the relation between the epimera and the segments of the body, he continues in this manner:—"Les relations de ces parties, la grandeur et la forme du premier article des hanches, la manière dont elles s'articulent avec le demi-anneau dont elles dépendent, l'étendue et la direction de ce demi-anneau variant, le thorax considéré sous ce point de vue, présente une combinaison de caractères, qui est très avantageuse pour la méthode." The indication of the differences in the mode of articulation of the limbs with the body which is contained in these words was never more fully

* Translated from 'Naturhistorisk Tidsskrift,' ser. 3, vol. vi. 1869. Copenhagen.

† See 'Proceedings of the Royal Danish Society of Sciences, 1856, p. 135.



E.F.