XVIII.—Some Observations on the Genus Serpula, with an Enumeration of the Species observed with the Animal in the Mediterranean. By Dr. A. Philippi*.

[With a Plate.]

Few animals have been so much neglected by naturalists as the Serpulae, frequent proofs of which assertion will occur in the course of these observations; it is on this account that I consider it advantageous to lay before the zoological public the results of my observations made on twenty-five species relative to the external structure of the animal; I shall reserve for a separate work more detailed descriptions, which will be accompanied by drawings.

Linnaeus, in the 12th edition of his ‘Systema Naturæ,’ p. 1264, characterizes the genus Serpula thus: “Animal Terebella. Testa univalvis, tubulosa, adherens (sepe isthmis integris intercepta).” By the words “animal Terebella,” Linnaeus, although he has admitted several species of Vermetus among Serpula from his being unacquainted with the animals, has nevertheless excluded Adanson’s Vermetus. The words “sepe isthmis integris intercepta” refer solely to the shell of Vermetus, and must therefore be excluded from the diagnosis. Lamarck likewise adopts this false characteristic; but Blainville has correctly stated in the ‘Dict. des Sciences Naturelles,’ vol. xlviii. p. 550, that it is precisely in the absence of septa that the shell of Serpula differs from that of Vermetus. My former supposition, that the shell of Vermetus possessed exclusively a porcellaneous nature, while that of the species of Serpula was calcareous, I must now retract, having become acquainted with true Serpula with a vitreous shell.

The true Serpulae have been divided by modern zoologists into the following genera: Serpula, Lamk.; Vermilia, Lamk.; Galeolaria, Lamk.; Cymospira, Savigny, Blainville; Spirorbis, Lamk.; Filograna, Berkeley; Protula, Risso; Spiromella, Savigny, Blain-

* From Wiegmann’s Archiv, Part 2. 1844. Translated by W. Francis, Ph.D.

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ville. The characters on which these separations are founded are of different value. Vermilia and Galeolaria differ from Serpula solely by the structure of the operculum; according to Lamarck, Serpula possesses an 'operculum pedicellatum infundibuliforme aut clavalatum (corneum)'; for some lines further he says, "cette opercule, par consequent, n'est point calcaire." (2nd ed. An. sans vertèbres, v. p. 361.) Vermilia, on the contrary, has an 'operculum testaceum orbiculatum, simplex'; and further on, 'à dos convexe, le plus souvent conique.' (Ibid. p. 368.) Galeolaria, lastly, is said to possess an 'operculum testaceum compositum,' which, according to my observations however, does not consist of five to nine but of fifteen pieces; the number however may differ in the various species; at all events, the drawing in the 'Dict. des Sciences Naturelles' is decidedly bad. Filograna, Berkeley, is said to possess constantly two opercula, which has likewise been observed exceptionally in other species. Protula, Risso, and Spioromella, Blainv., have no operculum: Cuvier refers them curiously enough to Sabella.

The genera Cymospira and Spiorbis have been established according to the number of filaments into which the branchie are divided and according to their arrangement. In Cymospira the branchie are on each side divided into numerous filaments and rolled up spirally; in Spiorbis they consist only of three filaments; but these characters are of very slight value. The different species of Serpula which I have observed with the animal have 3, 4, 6, 7, 8, 10, 11, 13, 18, 30, 40, and more filaments to each branchie, and the larger their number the more requisite is it for them to adopt a spiral arrangement. I have likewise found in Vermilia triquetra and Pomatoceros tricuspis (see below), that the filaments of the branchie describe a spiral of one convolution of the kind represented \( \bigcirc \) when they are expanded. It appears therefore to me that no very accurate limits exist between spiral and non-spiral branchie. According to Blainville, the branchial filaments of the Vermilia have cirrhi only on one side, which I look upon as an error.

The mode of growth has likewise been taken into consideration, and those species with a spiral growth have been referred to Spiorbis; yet the likewise remarkably spirally wound S. cereolus, the animal of which is still unknown, is excluded. One of the principal results of my observations is, that no relation exists between the nature of the animal and the shell, except perhaps in the genus Galeolaria; this indeed is a sad result: thus, for instance, we have a three-ridged shell in three different sections, an orbicular shell in still more; in one division there are smooth orbicular, orbicular with longitudinal bands, triangular, quadrangular, &c.

From what has been stated above, the structure of the operculum is the best character upon which to form the subdivisions
of *Serpula*; this character has moreover the advantage that it may still be frequently observed in dried specimens preserved in museums. The structure however of the operculum is far more varied than hitherto supposed, and several new subdivisions must be made, of which the following are the characters:

A. Animal with opercula. On each side of the neck a short membrane, broad above and narrow beneath, bearing seven fasciculi of bristles, the upper one being generally directed anteriorly (this structure is not known of *Galeolaria*). *Serpula*, Cuv.

- Operculum *horny*, shallow or infundibuliform, *curved at the margin*, radiately striped above; supported on a subconical fleshy petiole. *Serpula* in the restricted sense.
- Operculum *calcareous*, forming a shallow disc, *margin entire*. *Placostegus*, Ph. This operculum calls most to mind that of a gasteropod.
- Operculum *calcareous, conical*, shortened or elongated, without appendage. *Vermilia*, Lamarck.
- Operculum *calcareous, hemispherical*, with appendages (which are interiorly hollow). *Pomatoceros*, Ph.
- Operculum *calcareous? horn?, consisting of an elliptical shallow plate which supports on the hinder portion two ramified horns, but on the anterior margin uncinate bristles; the branchiae are rolled up spirally. *Cymospira*, Savigny, Blainv. The *Serpula gigantea*, Gm., which forms this division, I am not acquainted with from the original essays of Pallas and Home, but only from Blainville's 'Diet.' and from the copy of Home's figure given by Blumenbach (Abbildungen Naturhist. Gegenstände, no. 67).
- Operculum *horny*, almost as in a, but provided on the upper side in the centre with moveable points, which (at least in one species) are likewise horny. *Eupomatus*, Ph.
- Operculum *calcareous? obliquely truncated?; shell small, always spirally wound?; branchiae constantly? composed of few filaments. *Spiroorbis*, Lamk. [The form of the operculum exhibited by the figure in the 'Dict. des Sciences Nat.' 1. fig. 2. is, precisely as in *Placostegus*, different from the form which I have observed in another species.]

B. No operculum. The lateral membrane continued for half the length of the body, equally broad. *Apomatus*, Ph.

- Branchiae spiral. *Protula*, Risso; *Spiromella*, Blainv.
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'Dict.' xlviii. p. 560*. [The description which Risso gives in his 'Hist. de l'Eur. Mérid.' iv. p. 405. is quite romantic, and does not in the least agree with the statements of Cuvier in 'Règne Animal,' ed. 2. vol. iii. p. 192, whose description is exactly in accordance with my own observations, which will be detailed under b.]


I cannot agree with Cuvier in referring the last section, to which I have applied the name *Apomatus*, to *Sabella*. I would not lay any great stress on the fact that the *Sabella* form a membranous or coriaceous tube, while *Apomatus* forms a calcareous one; but I consider of great importance the fact, that in the *Sabella* all the rings of the body are formed alike and are provided with similar bundles of bristles, while in *Apomatus*, precisely as in *Serpula*, the first seven fasciculi of bristles are fixed in a membranous expansion, of which not a trace was indicated in the *Sabella* observed by me.

I will now pass on to the characters of the individual species.

1. *Serpula*, L. (*sensu strictiori*).


2. *S. pallida*, Ph., *testa* teretiuscula, protensa, flexuosa, pallide rosea, carina mediana conspicua, laterali utrinoque obsoleta, striisque incementi tenuibus subaspera. Diam. 1\(\frac{1}{4}\)\". *Animal* branchiis albo coccineo fasciatis, filorum pauciorum quam in antecedente, operculo albido.

3. *S. triquetra*, L. ? *testa* triqueta, flexuosa, alba, altero, latere tota adnata. Diam. 2\". *Animal* branchiis albo coccineo fasciatis, filorum circa 30; operculo coccineo, crenis circa 24 (according to the drawing; I forgot to notice the number of folds).

I do not however think that is the Linnaean species. Linnaeus has not described the animal, and only saw small individuals; the subsequent citations of Baster, copied by Martini, Gualtieri and others, do not exactly correspond to my species, as they represent the shell much thinner. It should also be observed, that the shells of *Serpula triquetra*, *Vermilia triquetra*, and *Pomatoceros tricuspis* are difficult to distinguish without the animals. Would it therefore not be better to banish entirely the name *Serpula triquetra* of Linnaeus?

* The figure of Seba (i. t. 29. fig. 1, 2) does not agree, as already observed by Cuvier, with the diagnosis; it wants the disque of Cuvier or the thorax, "égalant au moins la moitié de l'abdomen."
4. *S. vermicularis*, L.? *testa* tereti, flexuosa, læviuscula, apice libero protensa, rosea; ore patulo; carina denticulata dorsali demum obsoleta. Diam. 2½".

*Animal* branchiis omnino coccineis, filorum multorum; operculo coccineo, crenis plurimis. (Fig. A. Plate III.)

This species shows with how little judgement the *Serpulae* have been investigated. Blainville, 'Dict.' l. c. p. 553; assigns to each branchia *seven to eight* digitations, while in the drawing we find on each side twenty-six! In the description he terms the operculum clavate with two minute horns; but this is the case, according to pl. 1. fig. 3, with the operculum of *Vermilia triquetra*; and the figure of *Serpula vermicularis*, pl. 1. fig. 1, exhibits a totally different form of operculum, being according to the definition I have given above, that of a true *Serpula*. Is it possible to commit greater contradictions? Thus then, according to Blainville's *description* of the operculum, the animal is not a *Serpula* but must be a *Vermilia*, Lamarck, which genus Blainville adopts. Cuvier likewise states in the 'Regne Animal,' ed. 2. iii. p. 191, (according to Müll. Z. D.) that the operculum has two or three small points, in which his species and Müller's would be a *Pomatoceros*.

[It is possible that nos. 1, 2 and 4 should be considered as mere varieties of one species.]

5. *S. aspera*, Ph., *testa* teretiuscula costis circa 7, crenulatis ornata, alba. Diam. 1".

*Animal* branchiis fuscescentibus aut rubentibus, filorum 8 utrinque; operculo albido, crenis 16—24. (Fig. B.)

An *Vermilia scabra*, Lam.? The figure in Delessert's 'Recueil,' &c. is thoroughly bad, and the text in this work is, as is well known, of no assistance whatever.

6. *S. subquadrandula*, Ph., *testa* elongata, subquadrandula, angulis crenato-dentatis, carinis tribus, singulis in medio laterum liberorum. Diam. 1½".

*Animal* albidum, branchiis filorum 8 utrinque; operculo basi aucto, fuscescente, crenis admodum profundis, circa 24. (Fig. C.)

The fleshy petiole is not simply conically thickened at the extremity, but first cylindrically and then obconically.

7. *S. venusta*, Ph., *testa* tereti, transversim striata, varicibus pluribus ornata; alba, ore patulo. Diam. 3½".

*Animal* coccineum; branchiis filorum frequentium; operculi crenis circa 60.

The largest species which I have observed and preserved in spirits. The animal is 25½ in length, and 3½ in thickness.

2. *Placostegus*, Ph.

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carinis omnibus excurrentibus tricuspidata; carina dorsali serrata. Diam. 1¼″.

*Animal album; fascis duabus fuscis in branchiis; filis circa 9 in utraque; pedunculo operculi simplici.* (Fig. D.)


Lives in great depths upon corals.


*Animal album; branchiarum coccinearum filis utrinque circa 9; pedunculo operculi appendice aucto.* (Fig. E.)


3. **Vermilia, Lamk.**

1. *V. triquetra*, Lamk., *testa* triquetra, flexuosa, alba, altero latere adnata. Diam. 1″.

*Animal branchiarum albarum, fusco-articulatarum filis numerosis? (saltet ultra 7); operculo elongato, subcylindrico, obtuso; pedunculo utrinque filum gerente.* (Fig. F.)

**Vermilia triquetra**, Lamk. nr. 2. "Son opercle est conique."

Rare. See the previous observation respecting Linnaeus’s *Serpula triquetra*.

2. *V. infundibulum*, Gm., *testa* tereti, alba, multoties varicosa, quas ex infundibulis sese recipientibus conflata; ore quam maxime patulo. Diam. (oris) 4½″.

*Animal* branchiarum albo coccineo que fasciatarum filis multis; operculo elongato-conico. (Fig. G.)

*Serpula infundibulum*, Gm. p. 3745; Lamk. nr. 9. excl. var.; Delespert, Recueil, 1. fig. 8. ad specimen malum.

3. *V. clavigera*, Ph., *testa* tereti, lineis longitudinalibus elevatis quinque ornata. Diam. 3½″.

*Animal* . . . . operculo valde elongato, subcylindrico. (Fig. H.)

The dry animal did not exhibit the branchiae distinctly on being softened.

4. *V. calyptrata*, Ph., *testa* tereti, crassa, transversim corrugata. Diam. 1¾″.

*Animal fuscenscens, collari lineaque in filis branchiarum viridibus, filis branchiarum 11; cillis rufo-fuscis; operculo conum obliquum truncatum referente.* (Fig. J.)

5. *V. multicristata*, Ph., *testa* tereti, lamellis 5, longitudinalibus, plerumque pectinatim incisis cristata. Diam. 3½″.

*Animal albidum; operculo parvo, conico, basi carnosae, multo crassiori, subglobosae insidente.* (Fig. K.)

I likewise possessed only a dried specimen of this species, the branchiae of which could not be disentangled.

Animal rubrum; branchiarum utrinque filis 6—8; operculo elongatoco-
cono; pedunculo utrinque filum gerente [ut in V. triqueta].
(Fig. L.)

7. V. quinquelineata, Ph., testa tereti, lineis elevatis, longitudinalibus,
levibus, quinque ornata [ut in V. clavigera]. Diam. 

Animal branchiarum lutescentium filis utrinque 8, rubro maculatis;
operculo conum brevem obliquum referente [fere ut in S. calyp-
trata]. (Fig. M.)

8. V. polytrema, Ph., testa triqueta adnata; carinis foris frequen-
tibus perforatis. Diam. 1

Animal coccineum, branchiarum filis utrinque c. 6; operculo forma
coni obliqui brevissimi; pedunculo albido annulis tribus fuscis
ornato et utrinque filum gerente [ut in nr. 1 et 6]. (Fig. N.)

In Vermilia triqueta and other triangular Serpulae, the keels
consist when broken through of a series of cells; in this species
only the septa as it were of the cells are developed, and the three
keels perforated by the rows of their apertures are highly elegant
in appearance. The diameter of the tubes is very small, from the
lateral adherent margins occupying the greater portion of the
diameter.

9. V. emarginata, Ph., testa tereti, alba, carinis 3—4 sæpe in dentes
antrorsum directos, dorso incisos elevatis. Diam. 1

Animal filis branchiarum utrinque 6—7; operculo formam coni ob-
liqui truncati referente; pagina superiore marginata, antice emar-
ginata, obscure bidentata. (Fig. O.)

I examined a softened specimen of the animal in Cassel.

4. Pomatoceros, Ph.

1. P. tricuspis, Ph., testa triqueta, sæpe in gyrum contorta, alba.
Diam. 2

Animal branchiis albo et coccineo, sive albo et fusco fasciatis; filis
ultra 18; operculo hemisphærico, vertice cornubus tribus acutis
instructo; pedunculo utrinque filum gerente. (Fig. P.)

Very common. This appears to be the Serpula triqueta, Fr.
Hoffmann, ‘Verhandl. Berl. Gesells.’ vol. iii. p. 150. It may pro-
bably likewise be S. triquetroides (!), Delle Chiaie, Mem. iv. t. 67.
f. 15. without description. Does S. vermicularis, Cuv., ‘Regne
Anim.’ ed. 2. iii. p. 191, likewise belong here? ‘son opercule en
massue est armée de deux ou trois petites pointes.’

Vermilia triqueta, ‘Dict. des Sc. Nat.’ pl. 1. fig. 3, appears
to form a second species, the operculum of which, supposing the
figure to be correct, consists of two appendages and supports a
forked appendage, the two ends of the fork being obtuse.

5. Cymospira, Savigny.

No species belonging to this genus occurs, as far as I am aware,
in the Mediterranean.
6. Eupomatus, Ph.

1. E. uncinatus, Ph., testa tereti, transversim rugosa. Diam. 1\".

*Animal* fuscescens; branchiarum albarum, fusco-fasciatarum filis utrinque 13; margine operculi inciso-dentato; cornubus octo; apice incurvo uncinatis. (Fig. Q.)

Not rare. Delle Chiaje, 'Memorie,' vol. iii. t. 48. fig. 21, figures a perfectly similar animal with *two opercula*, but calls it *Sabella eupleaana*, and asserts that its shell consists of grains of sand!!

2. E. pectinatus, Ph., testa tereti, transversim rugosa, lineisque longitudinalibus obsoletis. Diam. 3\".

*Animal* fulvum; branchiarum filis utrinque decern, punctis coccineis ornatis; operculi margine crenato; cornubus duodecim, rectis, utrinque pectinatis, dentibus tribus acutis. (Fig. R.)

A specimen which I examined possessed *two* perfectly similar opercula.

7. Spirorbis, Lamk.

1. Sp. Cornu Arietis, Ph., testa spirali, tereti, concentrice striata; anfractu ultimo reliquis abscondente. Diam. totus gyri 4\".

*Animal* pallide aurantiacum, branchiarum albarum filis utrinque quatuor; operculo obliquo, subspathulato, in parte postica appendice brevi aucto. (Fig. S.)

The operculum is placed obliquely on the petiole as in *Cymospira*; the inferior or hinder margin is thicker, and supports a short, weak, bifid appendage; the upper or anterior margin is thin and simple. *Spirorbis nautiloides*, Lamk., is extremely common; I have not however had occasion to examine the animal.

8. Filograna, Berkeley.

I have not been able to observe the animal of this section. According to the short notice, without any statement respecting the source, in Lam. 'Hist.' &c. ed. 2. v. p. 621, "le nombre des appendices tentaculaires est de huit, dont deux garnis d’un opercule infundibuliforme." Are there really *eight* tentacular appendages instead of two? That would be highly remarkable. Or are the other six *appendices tentaculaires* the branchies?


1. Pr. intestinum, Lamk., testa magna, tereti, undato-torta, laevi, primum repente, deinde libera. Diam. 5\".

*Animal* (secundum Cuvier) branchiis aurantiacis.

Rare. I have never been able to obtain the animal. The synonyma are: *Serpula intestinum*, Lamk., no. 3; Delessert, Recoeneil, t. 1. fig. 7. bene.—*Protula Rudolphii*, Risso, Hist. Eur. Mérid. iv. p. 406. [Risso’s description is so different from Cuvier’s state-
ments, that notwithstanding the authority of Cuvier, and notwithstanding the great mistakes which so frequently occur in Risso's descriptions, we are inclined to doubt the identity.]—Sabella Protula, Cuv. Règne Anim., ed. 2. iii. p. 192.

10. Psygmobranchus, Ph.

1. Ps. protensus, Gm., testa tereti, lævi, protensa, elongata, parum versus finem attenuata. Diam. 2\(\frac{1}{4}\)\text{\textquoteright}.

Animal flavescens; branchiarum filis utrinque ultra 40, albis rubro annulatis; membrana laterali lutea, maculis septem rubris.

Serpula protensa, Gm. p. 3744; Rumph. t. 41. f. 3; Martini, 1. fig. 12 A.

Although Rumphius's figure represents a species from Amboina, I cannot detect in the figure any difference between it and my species.

2. Ps. cinereus, Forsk., testa filiformi, glabra, varie flexa. Diam. \(\frac{1}{3}\)\text{\textquoteright}–\(\frac{1}{4}\)\text{\textquoteright}.

Animal pallide aurantiacum, branchiarum coecinearum filis utrinque quattuor.

Serpula cinerea, Forsk. fn. arab. p. 128; Gm. p. 3747.

3. Ps. intricatus, L., testa filiformi, flexuosa, tereti, scabra, medio subcarinata, valde rugosa. Diam. \(\frac{1}{4}\)–\(\frac{1}{3}\)\text{\textquoteright}.

Animal aurantiacum; branchiarum albarum filis utrinque tribus.


I am in doubt about the following species, having only seen a single specimen.

Apomatus ampulliferus, Ph., testa transverse rugata, dorso sulcis duobus longitudinalibus, approximatis bipartito. Diam. \(\frac{1}{3}\)\text{\textquoteright}.

Animal operculo nullo; branchiis flavids, filis utrinque 7, punctis purpureis ornatis; filo uno in vesiculam sphericam terminato.

I should have looked upon this curious formation without hesitation as a monstrosity, if my friend Scacchi had not observed, a few years previously, the animal likewise with the vesicle.

Observation.—In the work ‘Actinien, Echinodermen und Würmer des Adriatischen und Mittelmeeres,’ by Dr. Grube, there is represented in fig. 11 the bristle of Serpula latisetosa. This name does not occur at all in the text p. 90, but there is a Sabella latisetosa; and in my copy, pages 57 to 64 are wanting. According to the catalogue, p. 90, the author collected the following species:

Serpula intricata, L.

—— glomerata, L. The Linnaean species is, according to the authorities quoted, Vermetus triquetra, Born.

—— plicaria, Lam.

—— infundibulum, Gm.

—— vermicularis, L.
Serpula proboscidea, Gm. Founded on two figures of Martini which I do not venture to explain.

— protensa, Gm.
— echinata, Gm.
— contortuplicata, L.

— decussata, Gm. Founded on Lister, t. 547. f. 4. (copied in Martini, 2. f. 17.) from Barbadoes, and is probably a Vermetus: I suspect that Dr. Grube has conceived under this name Vermetus subcancellatus, Born.

* Spirorbis nautiloides, Lam. *

**EXPLANATION OF PLATE III.**

Fig. A. The operculum of *Serpula vermicularis*, L.
Fig. B. — aspera, Ph.
Fig. C. — subquadranqua, Ph.
Fig. D. The operculum of *Placostegus crystallinus*, Sc.
Fig. E. — fimbriatus, D. Ch.
Fig. F. The operculum of *Vermilia triqueta*, Lam.
Fig. G. — infundibulum, Gm.
Fig. H. — clavigera, Ph.
Fig. J. — calyprata, Ph.
Fig. K. — multiceristata, Ph.
Fig. L. — elongata, Ph.
Fig. M. — quinquecineta, Ph.
Fig. N. — polytrema, Ph.
Fig. O. — emarginata, Ph.
Fig. P. The operculum of *Pomatoceros tricuspid*, Ph.
Fig. Q. — Eupomatus uncinatus, Ph.
Fig. R. — pectinatus, Ph.
Fig. S. The operculum of *Spirorbis Cornu Arietis*, Ph.
Fig. T. The operculum of *Vermilia triqueta*, Blainv., according to the ‘Dict. d. Sci. Nat.’ planches. From the description, it would be the operculum of *Serpula vermicularis*.

XIX. — Catalogue of Irish Entozoa, with observations. By O’BRYEN BELLINGHAM, M.D., Fellow of and Professor of Botany to the Royal College of Surgeons in Ireland, Member of the Royal Zoological, Geological and Natural History Societies of Dublin, &c.

[Continued from vol. xiii. p. 430.]

**Genus 13. Pentastoma.**

(Derived from πέντε, quinque, and στόμα, os.)

Gen. Char. — Body flattened or slightly cylindrical. Mouth situated between two pores upon each side, each pore having a hook-like process projecting from it. The five orifices placed in a lunate manner upon the head.

The genus *Pentastoma* is named so from the presence of five pores upon the head, the central one being regarded as the mouth. Rudolphi separated it from the genus *Polystoma* with