according to crystalline form, with their approximate chemical composition. Nothing more simple, complete, and illustrative for the student could be produced.

*Geology and History; a Popular Exposition of all that is known of the Earth and its Inhabitants in Prehistoric Times.* By Professor Bernhard von Cotta. London: Trübner. 1865.

This small work (fcap. 8vo, 84 pp.) gives a very concise epitome of present accepted deductions from the accumulated investigations in Prehistoric Geology and Archæology as to the Early History of Man. The main subjects treated are:—That no line of demarcation can be drawn between the historic age of man and the ages which preceded him; the conclusions drawn from the fossil Flint-implements; the Pile-dwellings; the Mammalia associated with early Human remains; the Danish and other relics; Human remains in caverns and drifts; summary of Lyell's views; the Darwinian theory.

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## A DESCRIPTIVE CATALOGUE OF THE PTEROCERÆ OF THE CRETACEOUS ROCKS.

By Ralph Tate, F.G.S.

The accompanying figure of *Pterocera retusa* was drawn in 1860, by Mr. S. J. Mackie, from a specimen in the British Museum, from the gault of Folkestone, and of which he has desired I should give a complete description, as of this species we have hitherto had but incomplete accounts, owing to the want of sufficiently perfect specimens.

### 1. Pterocera retusa, *J. Sowerby, sp.*

1836. *Rostellaria retusa*, J. Sowb. in Fitton, Geol. Soc. Trans. iv. p. 344, pl. 18, f. 22.
1845. *Pterocera retusa* et *P. bicarinata*, Forbes, Quart. Journ. Geol. Soc. i. p. 350.
1848. *P. retusa*, Bronn. Index Pal. p. 1053.
1850. *P. retusa*, D'Orb. Prod. (not of Pictet and Roux, 1849).
1854. *P. retusa*, Morris, Catalogue, p. 274, 1854.
1864. *P. retusa*, Pictet and Roux, Terr. Crét. p. 583.
1861. *Harpago retusus*, Gabb, Synopsis Cret. Mollusca, p. 56.

*Description*:—Body of the shell ovate, ventricose, with a spire of five convex whorls, inflated, ornamented by longitudinal ribs. The last whorl is very gibbous, with two subacute prominent keels, which are continued into the digitations. About six ribs occupy the space between the suture and the posterior keel, three or four between the keels, and about nine between the canal and the anterior keel. In specimens with the test well preserved, fine striæ occupy the longitudinal spaces between the ribs. The lip is dilated and furnished with three digitations, which are long, flexuous, and triangular; the

posterior rests upon the spire and extends far beyond it; the anterior digitation at about half its length, has a triangular dilatation, either on the left or right side. Callosity of the aperture continued over upon the whorl. Canal very long and arched to the left.

*Dimensions*:—Length of shell, 20 millim.; length of anterior canal, 25 millim.; breadth of shell, 12·5 millim.

*Affinities and Differences*:—*P. retusa* resembles *P. Moreausiana*, D'Orb., of the Lower Greensand, but the latter possesses an additional carina, and a more expanded lip, with a more elongated spire and less inflated body-whorl. Its nearest ally is *P. bicarinata*, Desh. sp., and considered by some authors as the same. It resembles it in form, and the character of the ornamentation of *P. bicarinata*, as given by Pictet and Campiche (1864), agrees entirely with that of *P. retusa*. The differences observable are the superior size and more dilated lip of *P. bicarinata*; the more slender and curved digitations and canal of *P. retusa*.

*P. bicarinata* is a characteristic fossil of the gault of Switzerland. I have not seen English specimens, though it is said to occur in the Lower Greensand of Atherfield, but I suspect it has been confounded with *P. Moreausiana*.

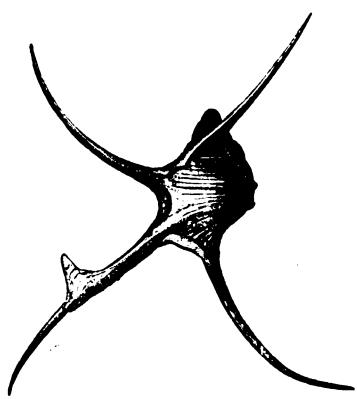

Fig. 15. *Pterocera retusa*. Complete specimen, *natural size*, in the National Collection, British Museum. Drawn by Mr. Mackie.

*History*:—Sowerby, in 1836, described the present species as a *Rostellaria*, with "a short ovate shell, whorls rounded, with one distinct and obscure carina on each. It has only one elongated, narrow branch to the lip. The surface between the striæ is particularly smooth." Though the gault specimens show the lip to have three branches and the surface of the shell between the ribs to be finely striated, yet I cannot but refer them to *P. retusa*; and, from their excellent conservation, I am enabled to give a full description of the species, incompletely described by Sowerby, arising from the imperfection and nature of fossilization of the Blackdown shells.

*Formation and Locality*:—Greensand of Blackdown and gault of Folkestone.

The following species are also known in the English Cretaceous rocks:—

2. P. BICARINATA, *Deshayes, sp.*; *D'Orb. Pal. Franç.* ii. *p.* 307, *pl.* 208. —Possesses two keels, each corresponding to a long digitation, an anterior canal, and a posterior expansion towards the spire.—Gault, Folkestone; Upper Greensand, Devizes (Coll. Geol. Survey).

3. P. MOREAUSIANA, *D'Orb. Pal. Franç. Terr. Crét. t.* 2, *p.* 301, *pl.* 211, *f.* 1–2 (1843).—A species with three carinæ to the last whorl, the anterior of which is the smallest, and continued into a simple festoon of the wing, the two others correspond to the digitations.—Lower Greensand, Atherfield.

4. P. ROCHATINA, *D'Orb. Prod. t.* 2, *p.* 104 (1850); *id. Pictet and Renevier, Terr. Aptien. pl.* 4, *f.* 7 (1858).—Five digitations in addition to the canal; three tuberculose keels on the last whorl, separated by striæ.—Lower Greensand, near Lyme Regis. Coll. Geol. Soc.

5. P. FITTONI, *Forbes, Quart. Journ. Geol. Soc.* i. *p.* 351, *pl.* 12, *f.* 6 (1845).—Three digitations in addition to the canal, two tuberculose carinæ, strongly ribbed. Lip not so much dilated as in the last.—Lower Greensand, Atherfield; Maidstone (Coll. Geol. Soc. and Geol. Survey).

6. P. INFLATA, *Passy, sp.; D'Orb. Pal. Franç. t.* 2, *pl.* 218, *f.* 1, *p.* 311.—Easily distinguished by the inflated form of its whorls and its numerous equidistant small longitudinal ribs.—Lower chalk and chalk marl, Ventnor, Isle of Wight (Sharp, Coll. Geol. Soc.). Cénomanien, Rouen.

7. Undescribed species from the chloritic and chalk marls.

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## ON THE SO-CALLED ROSTELLARIÆ OF THE CRETACEOUS ROCKS, WITH A DESCRIPTIVE CATALOGUE OF THE BRITISH SPECIES.

BY RALPH TATE, F.G.S.

In the 'Geologist' for 1860, are two plates of figures of *Rostellariæ*, from the gault of Folkestone, drawn by Mr. Mackie, but no descriptions accompanied the figures; the late Dr. Woodward intended supplying such, and, at the request of the Editor, I have accepted the task, but have found it to be one of difficulty, for the investigations necessary to determine the generic relations of the so-called *Rostellariæ* demand more time than I have had allowed me; but yet, in fulfilment of my promise, I offer the present contribution.

The generic appellation, *Rostellaria*, has been employed *pro tem.*, for most of the aliform shells of the Secondary rocks. All palæontologists are aware of this impropriety; and, I would therefore, in the first place, trace out the various improvements that have been suggested and adopted in the classification of the species, originally contained in the genus *Strombus* of Linnæus, which embraced all the then known winged gasteropodous shells.

Klein, in 1753, constituted the genera *Gladius* and *Harpago*, better known by Lamarck's names (1799) of *Rostellaria* and *Pterocera;* to these he added *Struthiolaria.*

Dillwyn, in 1823, used Petiver's (1702) name of *Aporrhais*, first adopted as a generic appellation by Da Costa, in 1778, and applied it to *Strombus pespelicani*, and states, that "it may be observed that this species, when fully grown, has not any open canal at its base, and that, in the figure which Müller has given of the animal, there is no appearance, nor in Montagu's description is any mention made of the retractile proboscis or respiratory trunk, which are distinguishing characters of a carnivorous Trachelipode."

Further, Philippi, in 1836, described the animal of *S. pes-pelicani*, and showed it to differ materially from that of *Rostellaria*, and created for its reception the genus *Chenopus*. He associated it with *Cerithium;* and the affinities of the two have been observed by Swainson and others; Forbes (1853) concurred in the view of associating *Aporrhais* with the *Cerithiadæ;* but it differs in many particulars, among others, its dentition is most like that of *Strombus* and *Carinaria*. Woodward (1851) states it is more probable that *Aporrhais* is the *representative* of *Strombus* than it is very closely allied. M. Deshayes suggested that *Aporrhais* and *Struthiolaria* ought to be separated from the winged shells (*Strombidæ*), to constitute a distinct family. This suggestion Dr. Gray acted upon in 1856, and called the family *Aporrhaidæ*. Mr. Lovell Reeve still retains *Aporrhais* as species of *Rostellaria*.

At this stage we have the winged shells grouped into two widely separated families (yet there have been several retrograde movements), and *Aporrhais* comes to be far removed from *Rostellaria*, with which it is even now too much confounded.

The arrangement will be as follows:—

Family STROMBIDÆ, including the genera *Strombus*, *Pterocera*, *Rostellaria*, *Hippochrene*, and the extinct genus *Spinigera*.

Family APORRHAIDÆ.—Genera: *Aporrhais (=Chenopus)*, *Struthiolaria*, etc., and the extinct genera *Alaria*, *Diarthema*, and *Perissoptera*.

M. Pictet (1847–64) and also M. Chenu, have associated *Aporrhais* with *Strombus*, but M. Piette (1864) employs the family name of *Aporrhaidæ*, as containing *Aporrhais* and *Alaria*.

Accepting the above scheme of classification, the question to be answered is, "to what genus or genera do the winged shells of the Mesozoic rocks belong?" I find that the majority of them have been described at least in the earlier days of palæontology, as *Rostellariæ*, a generic title still erroneously prefixed to a very large number of the British cretaceous species.

As early as 1823, Dillwyn proposed the removal of the *Rostellariæ* of the secondary strata, to form a separate genus with Petiver's name *Aporrhais*. He says, "all the *Rostellariæ*, which have been found in secondary strata, are nearly allied to the Linnæan *Strombus pes-pelicani*. I therefore propose to remove these *Rostellariæ*, which are readily distinguished by the remarkable expansion of their outer lips, to form the genus *Aporrhais*, and the other fossil *Rostellariæ*, which have the recent *Strombus fissus* for their type, are only to be found in strata above the Chalk."

Dillwyn's paper (published in the 'Philosophical Transactions') appears to have received no attention, though containing suggestions that are now being applied to the classification of the winged shells. Thus, Koch and Dunker, in 1836, described three species of *Chenopus* from the Jurassic rocks; Pictet and Campiche (1864) regarded all the winged shells of the cretaceous rocks, such as were not *Pteroceræ*, as *Aporrhais*.

The Jurassic species, figured by Deslongchamps, Dunker, Sowerby, and others, as *Rostellariæ*, which presented the particularity of having a straight outer lip, which is developed into a wing in the adult, were by D'Orbigny

(1850) referred to the genus *Pterocera;* whilst the winged shells of the cretaceous rocks, he referred either to *Rostellaria*, *Pterocera*, *Spinigera*, or *Strombus*.

Mr. Woodward (1851) states that many of the "fossil *Pteroceræ* are more nearly related to *Aporrhais;*" and that "the fossil *Pteroceræ* and *Rostellariæ* probably belong to *Aporrhais* or to genera not yet constituted."

MM. Morris and Lycett (1854) created for the Jurassic so-called *Rostellariæ*, the genus *Alaria;* the other winged shells being referred to *Pterocera* or *Spinigera*. Though these authors pointed out important differences, which separate *Alaria* from *Strombus*, yet, still they associated it in the same family.

MM. Pictet and Campiche (1864) recognized the affinity of *Alaria* to *Aporrhais*, and regarded the former as not sufficiently distinct from the latter genus. *Aporrhais* they placed in the vicinity of *Pterocera*, and the winged shells of the cretaceous beds of Sainte-Croix they referred to one or other of these genera. The genus *Aporrhais* they divided into two sections, the one having for its type the living *A. pes-pelicani*, characterized by a moderately lengthened spire, a dilated wing, each digitation of which corresponds to a well-defined rib upon the last whorl; the anterior canal moderately long and compressed: but few species belong to this group. The second section having for its type the living *A. occidentalis*. The wing is nearly entire, prolonged into a point, recurved posteriorly. Ornamentation consisting generally of transverse, oblique ribs, with some tuberculate ribs on the last whorl. This section embraces by far the larger number of the fossil species.

Finally, M. Piette (1864) has satisfactorily provided for the Jurassic winged-shells by restricting the genus *Alaria*, and clearly pointing out the distinctions between it and *Aporrhais*. Thus, the latter is known by its general winged form, its anterior sinus, and especially by the presence of a posterior one. Some of the species of *Alaria* of Morris and Lycett, Piette states should belong to *Aporrhais*, such as *A. pagoda*, *A. atractoides*, etc. M. Piette defines the genus *Alaria* as follows:—Shell turreted, fusiform, terminating anteriorly by a canal. Wing digitated or palmated, formed by the prolongation of the free border of the last whorl, and which is applied against the last whorl but one, but never adheres to the rest of the spire. Posterior canal wanting; right lip without a sinus,—to which should be added, no channelled process of the lip extending up the spire.

The digitations are usually isolated from each other, sometimes united by a festoon of the wing. Anterior canal compressed or rounded, variable in form, generally long, arched, and bent upon itself. Columella lip more or less callous in the adult; callosity never continued beyond the last whorl.

The so-called *Rostellariæ* of the cretaceous rocks, what are they? They certainly are not referable to the genus *Rostellaria*, for they want an upper or posterior siphon. All palæontologists have been aware of the incongruity of associating them with that genus. Leymerie, D'Archiac, Graves, Woodward, Cornuel, Sæmann, and others have referred these species with doubt to the genus *Rostellaria*. Pictet and Campiche regarded them as *Aporrhais*.

Of the species that have come under my observations, some are true *Alariæ*, a few belong to *Aporrhais;* the larger number of them have characters intermediate between these two genera. I propose to constitute for them a subgenus (*Perrisoptera*) of *Aporrhais*.

Genus ALARIA (*Morris and Lycett*).

1. ALARIA CINGULATA, *Pictet and Roux, sp.—Rostellaria cingulata*, Pictet and Roux (1849), Moll. Foss. Grès Verts, p. 261, pl. 25, f. 7; id. D'Orb. (1850) Prod. vol. ii. p. 133; id. Renevier (1854), Perte du Rhône, p. 44. *Gladius cingulatus*, Gabb (1861), Synopsis, Cret. Moll. p. 64. *Aporrhais cingulata*, Pictet and Campiche (1864), Terr. Crét. de Ste. Croix, p. 617, pl. 94, f. 10–11.

*Description.*—Shell fusiform, composed of about six very convex whorls, separated by deep sutures. Whorls ornamented by four simple carinæ, without any trace of tubercles; they are saillant, but rounded. The two median keels are large, the posterior one the more prominent. Of the two smaller carinæ, one is a little above the anterior suture, and the other much in advance of the apical suture. The lower half of the last whorl is longitudinally ribbed. Outer lip prolonged into a narrow wing, from which arises transversely to the axis of the shell a slightly recurved process, supported by the posterior of the two large keels. Anterior canal nearly equalling the length of the spire; slightly curved.

Fig. 16. *Alaria cingulata*, Pictet and Roux, sp.

The mould preserves traces of the keels.

*Dimensions.*—Length of shell without the canal, 25 millim.; diameter, excluding the wing, 0·52 millim; height of last whorl, 0·48 millim.

*History.*—When this species was first established, only the mould was known. In 1864 MM. Pictet and Campiche were enabled, by means of a nearly entire specimen received from Folkestone, to give a more complete description. The specimen in the National Collection, of which a figure is given, possesses the digital process and canal entire, desiderata in Pictet and Campiche's figure.

*Localities.*—Sainte-Croix; Perte du Rhône; Folkestone (Coll. Geol. Soc.; Brit. Museum).

2. ALARIA CARINELLA, *D'Orb., sp.—Rostellaria carinella*, D'Orbigny (1842), Pal. Franç. p. 287, pl. 207, f. 7–8; id. Pictet and Roux (1849), Moll. Foss. Grès, v. p. 258, pl. 25, f. 4; id. D'Orb. (1850), Prod. t. ii. p. 132; id. Cornuel (1851); id. Cotteau (1854); id. Raulin and Leymerie (1858).—*Gladius carinellus*, Gabb (1861), Synopsis, Cret. Moll. p. 54. *Aporrhais carinella*, Pictet and Campiche (1864), Ste. Croix, p. 616, pl. 94, f. 4–7.

*Fusus carinellus*, J. Sow. (1832) Geol. Trans. pl. 39. f. 24. Michelin (1838), Mem. Geol. Soc. Fr. p. 100, refers to *Rostellaria*. This may be correct, but from the imperfection of the specimen on which the species was founded, the name of the present species should remain intact; it may not, however, be an *Alaria*.

*Localities*.—Gault of France; Sainte-Croix; Folkestone.

3. ALARIA CARINATA, *Mantell, sp.*—*Rostellaria carinata*, Mant. (1822), Geol. Sussex, pl. 19. f. 12, 14; id. J. Sow. (1836), Trans. Geol. Soc. vol. iv. pl. 11. f. 19; id. D'Orb. (1842), Pal. Franç. p. 284. pl. 207. f. 2; id. of other authors. *Gladius carinatus*, Gabb (1861), Cret. Moll., p. 54. *Aporrhais carinata*, Pictet et Campiche (1864), p. 624.

*Description*.—Shell elongated, turreted, composed of numerous slightly convex whorls, finely striated longitudinally, and ornamented transversely by a spiral revolution of about ten oblique, flexuous (rather tuberculose), equal ribs; very faint striations are seen under a glass coincident with the ribs. A slight keel upon the anterior suture. On the last whorl the transverse tubercular ribs are absent, but there are two elevated longitudinal ribs, the posterior of which is higher and continued into the wing. Outer lip prolonged into a narrow wing, carinated above, from which two digitations arise in the same vertical plane, and nearly parallel to the axis of the shell, the posterior nearly equalling the length of the spire; the anterior one half the length of the canal, and directed slightly outwards. Canal straight, very long, equalling the length of the shell, terminating in an acute point. Mouth narrow, columella-lip much encrusted.

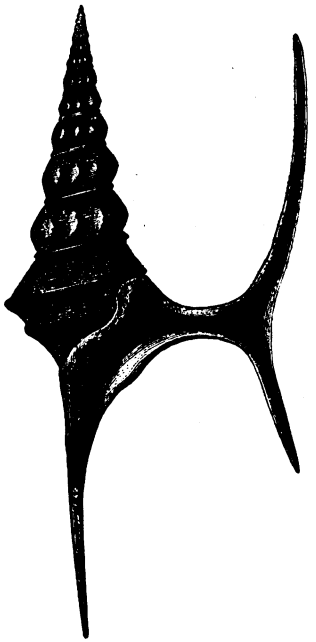

Fig. 17. *Alaria carinata*, Mantell, sp.

*Dimensions*. — Total length 80·4 millim.; breadth, including the wing, 35 millim.

*Localities*.—Gault, of the north of France; Folkestone; Ridge; Ringmer; Bletchingley. It is abundant at Folkestone. Greensand, Blackdown.

The Folkestone specimens differ from Sowerby's figure, as also from D'Orbigny's, in the short wing and straight canal. The figured specimen is entire, and is in the National Collection.

*Note*.—The generic term *Alaria* is also employed in cryptogamic botany;

Greville founded the genus, in 1830, upon a Lamarian seaweed, *Alaria esculenta*. Uniformity of system demands perhaps a non-repetition of generic names, and such would be satisfied by the restoration of the generic appellation, *Rostrotrema*, given by Lycett, in 1849, to the group of shells afterwards called *Alaria* by Morris and Lycett, in 1852; but, as no practical objection is likely to arise from the dual employment of the term, and as it has been so extensively adopted by palæontologists, both at home and abroad, it had better remain undisturbed.

Genus APORRHAIS (*Da Costa*).

1. APORRHAIS DUPINIANA, *D'Orbigny, sp.*—*Rostellaria Dupiniana*, D'Orb. (1843) Pal. Fr., vol. ii. p. 281. pl. 206; id. Marcou (1848); id. Cornuel (1851), etc. *Chenopus Dupinianus*, D'Orb. (1850) Prod., id. Pictet et Roux (1854), id. Renevier, Cotteau, etc. *Aporrhais Dupiniana*, Gabb (1861), Cret. Moll.; id. Pict. et Camp. (1864), pl. 92. f. 3.

*Description.*—Whorls rendered angular by a tuberculous keel; last whorl gibbous with three carinæ, carrying somewhat numerous and irregular tubercles.

*Localities.*—Étage Valangien, Ste.-Croix, Jura; Étage Néocomien, France. Lower Greensand, Sandown, Isle of Wight (Coll. Geol. Surv.).

2. APORRHAIS MACROSTOMA, *J. Sow., sp.*—*Rostellaria macrostoma*, J. Sow. (1836) Geol. Trans. vol. iv. pl. 18. f. 23. p. 344; id. Abich (1851) Deutsch. Geol. Ges. p. 27; id. Morris (1854), Cat. *Pterocera macrostoma*, D'Orb. Prod. vol. xx. p. 18. *Aporrhais macrostoma*, Pict. et Campiche (1864), p. 626.

*Description.*—Last whorl with five carinæ, the middle one the most prominent; lip much expanded with at least two digitations.

*Localities.*—Greensand; Blackdown. Néocomien; Daghestan, Caucasus (Abich).

Subgenus PERISSOPTERA* (*Tate*).

This group, intermediate between *Alaria* and *Aporrhais*, corresponds with that section of *Aporrhais* which has *A. occidentalis* as its type; and referred to at p. 95.

The essential distinctive characters are:—spire elongated, anterior canal moderately short, anterior sinus of varying distinctness, aperture dilated into a nearly entire and broad wing, prolonged into a recurved point; wing applied against the last whorl but one, and not extending on the rest of the spire; the columella lip very callous. The wing is usually more or less entire, and broad with a recurved point; a few species have the wing narrow; rarely multidigitate. Shell ornamented with transverse costæ, or tuberculose ribs.

I distinguish three sections:—

Section I. *Parkinsoni* group.—Shell elongated; wing broad, entire; canal moderately lengthened.

Great confusion exists, even now, as to the species *Parkinsoni*. Mantell, in

* περισσος, excessive; πτερον, a wing.

his 'Geology of Sussex,' described a *Rostellaria* with the above specific name; Sowerby and some other authors confounded several species with it, thus:—

1. *Parkinsoni*, Mantell (1822)=*Parkinsoni*.
2. *Parkinsoni*, Sow. Min. Con. t. 349. f. 1 (?), 3, 4=*Aporrhais Sowerbii*, Mant. (a London clay fossil).
3. *Parkinsoni*, J. Sow. (1836) Geol. Trans. pl. 18. f. 2, 4=*Reussii*, Geinitz.
4. *Parkinsoni*, D'Orb. Pal. Fr.=*Orbigniana*, Pictet et Roux.
5. *Parkinsoni*, Phill. G. York, t. 2. f. 33 (1828)=*Phillipsii*, Roem.
6. *Parkinsoni*, of various authors, from the L. Greensand=*Robinaldina*, D'Orb.
7. *Parkinsoni*, Geinitz; id. Reuss=*Burmeisteri*, Geinitz.

1. Aporrhais (Perissoptera) Parkinsoni, *Mantell, sp.*—*Rostellaria Parkinsoni*, Mantell, Geol. Suss. pl. 18. f. 1, 2, 4-6, 10 (1822); id. Sow. Min. Con. pl. 349. f. 2?; pl. 558. f. 3.

*Description.*—Shell subfusiform; the last whorl more inflated, the canal longer, and the transverse ribs more pronounced than in *A. Reussii;* the lip I believe to be quite entire and the point more abruptly curved.

*Localities.*—Grey chalk marl, Hamsey, etc. Lower chalk, Dover.

2. Aporrhais (Perissoptera) Reussii, *Geinitz, sp.*—*Rostellaria Reussii*, Geinitz (1842), Character. pl. 18. f. 1; id. Reuss, Kreidef. p. 45. pl. 9. f. 9; id. Bronn, Index. *R. Parkinsoni*, J. Sow. Geol. Trans. vol. iv. pl. 18. f. 24 (non Mantell). *R. megaloptera*, Reuss, p. 45. pl. 9. f. 3. *Buccinum turritum?*, Roemer, Kreid., pl. 9. f. 19. *R. turrita*, D'Orb. Prodr.

*Description.*—Shell elongated; spire formed of a regular angle, and composed of about ten whorls; longitudinally striated; ornamented transversely by curved slender ribs. Last whorl with the same ornamentation and without a carina. The wing is large oblong, sinuous upon its anterior border, truncated at its extremity, and presenting a deep sinus at the posterior angle, and terminating in a long recurved point. The wing is slightly reticulated by lines concentric with the ribs, and the longitudinal striæ of the whorl continued up it.

*Dimensions.*—Total length, 50 millim.; length of canal, 15 millim.; breadth, including the wing, 31 millim.

*Localities.*—Gault, Folkestone; Greensand, Blackdown.

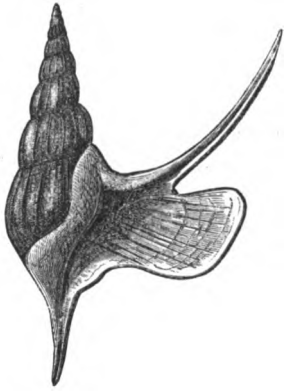

Fig. 18. *Perissoptera Reussii.*

3. Aporrhais (Perissoptera) Orbigniana, *Pictet et Roux, sp.*—*Rostellite*, Parkinson, Org. Rem. vol. iii. pl. 4. fig. 11. *Rostellaria Parkinsoni*,

D'Orb. Pal. Fr. vol. ii. p. 288. pl. 208. f. 1, 2 (non Mantell). *Rostellaria Orbignyana*, Pictet et Roux (1849), Moll. des Grès Verts, p. 249. pl. 24. f. 4; id. Renevier (1854). *Aphorrhais Orbignyana*, Pictet et Campiche (1864) Terr. Crét. de Ste.-Croix, pl. 93. f. 5–8. p. 608. *Rostellaria costata*, D'Orb. Prod. (1850), and others (non Sowerby, 1832).

*Description.*—Shell elongated: spire composed of convex whorls, regularly longitudinally striated; ornamented transversely by slightly oblique ribs or elongated tubercles; on each side of the spire, a rib forms a slight varix. The last whorl presents two tuberculated keels, the posterior of which is the more salient and is prolonged into the wing. The wing is large, quadrate; sinuous upon its anterior border and extremity, and terminates in a somewhat sharply recurved, long point.

Fig. 19. *Perissoptera Orbigniana.*

*Dimensions.*—Total length without the canal, 47 millim.; length of canal, 13 millim.; breadth, with wing, 31 millim.; without wing, 14 millim.

*Affinities and Differences.* — *A. Orbigniana* has been much confounded with the last species, from which it may be readily distinguished, even in the condition of casts, by the two tuberculose keels on the last whorl, the spiral angle being less acute, and the transverse ribs being tuberculose; the form of the wing and the arching of the point are very different from those of *A. Reussii*.

*History.*—This species has been very improperly called *costata*. Sowerby, in 1834, figured a *Rostellaria* from Gosau, under this specific name; Michelin (1838) referred French specimens of the present species (without figure or description) to *A. costata*, Sow.; D'Orbigny then adopted *costata* for the present species, and re-named Sowerby's *subcostata;* the majority of the French palæontologists retain the name *costata*, as a species of Michelin; but neither that author, nor in fact any other, has described or figured the present species under that name; Pictet very properly rectified this injustice by applying the specific term *Orbignyana* to it.

*Localities.*—Gault, Folkestone; Perte-du-Rhône; Ste.-Croix; Yonne; Aube; Pas-Calais, etc. Greensand of Blackdown, where it is common.

4. Aporrhais (Perissoptera) Robinaldina, *D'Orb., sp.*—*Rostellaria Parkinsoni*, Phill. Geol. York, pl. 2. f. 33, 34. *Rostellari Phillipsii*, Roemer. Kr. p. 78 (1841). *Rostellaria Robinaldina*, D'Orb. Pal. Franç. Terr. Crét. vol. ii. p. 282. pl. 206, 1842; id. auctorum. *Aporrhais Robinaldina*, Pictet et Campiche, pl. 92. f. 9, 10, 1864; et *A. Forbesi*, id. p. 601.

*Description.*—The height of the last whorl exceeds the half of the length of the shell. The oblique transverse ribs become tubercles on the last whorl.

*Affinities and Differences.*—Phillips figured a *Rostellaria* as *R. Parkinsoni*, Sow.; he gave no description. Roemer regarded Phillips's species as distinct,—but on what grounds it would be difficult to determine, for from the figure no critical differences can be observed,—and gave it the specific name *Phillipsi*. Pictet and Campiche regard the English specimen of this species as distinct, and described such under the name of *Forbesi;* the only differences observable are, the last whorl is proportionately less high, and the transverse ribs are stronger; whilst the former is exclusively characteristic of the Inferior Aptian, and the latter is confined to the Neocomian and Valangian.

*Localities.*—Lower Greensand, Atherfield; Chillworth, Guildford; Speeton Clay, Yorkshire.

5. APORRHAIS (PERISSOPTERA) MARGINATA, *J. Sow., sp.—Rostellaria marginata*, J. Sow. (1856); Trans. Geol. Soc. vol. iv. pl. 11. f. 18; id. Pictet and Roux (1853), Moll. des Grès Verts, pl. xxv. f. 5; id. Morris, Cat. (1854), p. 277, etc. etc. *Rostellaria submarginata*, D'Orb. Prod. *Aporrhais marginata*, Pictet and Campiche (1864), pl. xciv. f. 2, 3. p. 614.

*Description.*—Shell elongated; ornamentation similar to that of *A. Orbigniana;* last whorl having a simple, elevated, and gibbous carina.

*Localities.*—Gault, Folkestone; Sainte-Croix; Perte du Rhône; Pas de Calais; Cambridge, Ardennes.

6. APORRHAIS (PERISSOPTERA) ELONGATA, *J. Sow., sp.—Rostellaria elongata*. J. Sow. (1836) vol. iv. p. 144. pl. 11. f. 16; id. Morris, Cat. (1854) etc. *Gladius elongatus*, Gabb (1861). *Aporrhais elongata*, Pictet et Campiche, p. 624 (1864).

*Description.*—Allied to the preceding, but more elongated; last whorl imperfectly known, apparently more inflated and without a keel.

*Localities.*—Gault, Folkestone.

7. APORRHAIS (PERISSOPTERA) PAUPERATA, *D'Orb., sp.—Rostellaria pauperata*, D'Orb. Terr. Crét. vol. ii. p. 290. pl. 208 (1843). *Aporrhais pauperata*, Pictet et Campiche, p. 627 (1864).

*Localities.*—Turonian, France; Lower chalk, Ventnor (Sharpe, Coll. Geol. Soc.).

Section II. *Calcarata* group.—Wing narrow, entire; canal short.

8. APORRHAIS (PERISSOPTERA) CALCARATA, *Sow., sp.—Rostellaria calcarata*, Sow. (1822) Min. Con. pl. 349. f. 6. *R. composita*, Leymerie (1842) (non Sow.). *R. calcarata*, D'Orb. Terr. Crét. vol. ii. p. 107. *R. Muleti*, D'Orb. Prod. (1850); id. Cotteau, etc. *Aporrhais Muleti*, Pictet et Campiche (1864), pl. 94. f. 1. *A. calcarata*, id. p. 626.

Fig. 20. *Rostellaria calcarata.*

*Localities.*—Gault, France; Sainte-Croix; Folkestone; Greensand, Blackdown.

9. Aporrhais (Perissoptera) neglecta, *Tate.*

*Description.*—Shell elongated, composed of slightly angular whorls; upper whorls with a strong median keel, and a faint one immediately above the anterior suture; ornamented transversely by numerous, oblique, flexuous, equidistant ribs; the ribs are imperfectly defined upon the upper half of the whorls; the whorls are further ornamented by longitudinal striæ. The last whorl strongly striated, without transverse ribs; bicarinated, the posterior carina the larger, and continued into the wing; lip prolonged into a very long free wing, narrow and carinated above, curved at the base; terminating posteriorly in a long, moderately sharply curved point; mouth narrow, callosity on the columella excessive; canal short.

Fig. 21.

Fig. 22. *Perissoptera neglecta.* (Drawn by Mr. Mackie.)

*Dimensions.*—Length, without canal, 12 millim.; breadth, including wing, 13 millim.; breadth of last whorl, 5 millim.

*Affinities and Differences.*—It is closely allied to *A. calcarata*, with which it has been long confounded; it differs in its superior size; more obtuse, spiral angle, in its carinated whorls, more gibbous, body whorl; greater length of wing, and in the less abrupting curvature of the free point. In *A. calcarata*, the flexuous ribs are very distinct, but in *A. neglecta*, they are barely conspicuous (and are more numerous) even upon the lower half of the whorl.

*Locality.*—Greensand, Blackdown.

10. Aporrhais (Perissoptera) stenoptera, *Goldf. sp.*—*Rostellaria stenoptera*, Goldfuss (1843), Petr. Germ. pl. 170. f. 6. *R. calcarata*, Gein. (1839) Charst. pl. 18. f. 2. p. 70; id. Reuss. (1846) pl. 9. f. 5. p. 45. *R. stenoptera*, D'Orb. Prod. (1850) 22. n. 335. *Aporrhais stenopterus*, J. Sow. in Dixon, Foss. Suss. t. 27. f. 31, 36; id. Morris, Cat. (1854); id. Gabb. (1861); id. Pictet et Campiche (1864), p. 628.

*Localities.*—Plänerkalk, Westphalia; Aix-la-Chapelle; Bochum; Prussia; Lower chalk, Sussex.

Section III. *Glabra* group.—Shell wing multidigitate.

11. Aporrhais (Perissoptera) glabra, *Forbes, sp.*—*Rostellaria glabra*, Forbes, 1843, Quart. Journ. Geol. Soc. vol. i. p. 350. pl. xii. (iv.) f. 5; id. Morris, Cat. (1854), etc. *Aporrhais glabra*, Pictet et Campiche, p. 623 (1864).

*Description.*—Allied to *A. Robinaldina*, with similar ribs on the whorls, excepting the last whorl, which is smooth, without a keel; winged, developed into three digitations.

*Localities.*— Lower Greensand, Atherfield.

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*Rostellaria buccinoides*, J. Sow., of the Greensand of Blackdown is a *Cerithium*.