



## A Monograph of the Eocene Mollusca, or Descriptions of Shells from the Older Tertiaries of England. Part III, No. II. Prosobranchiata (Continued)

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A MONOGRAPH

OF

THE EOCENE MOLLUSCA,

OR

DESCRIPTIONS OF SHELLS FROM THE OLDER TERTIARIES  
OF ENGLAND.

BY

FREDERIC E. EDWARDS.

PART III, No. II.

PROSOBRANCHIATA

(CONTINUED).

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**CORRIGENDUM.**

**Page 212, line 3 from the bottom, *add* "Nuneham" to the list of localities.**

In a fossil state, the genus first appears in the cretaceous formations, in which five or six species are stated to occur; but during the tertiary epoch, the species became much more numerous. More than forty have been described from the eocene strata, and a still greater number from the more recent deposits. From the English eocene strata, four species have been noticed; of these, three, described by Mr. Sowerby in 'Mineral Conchology,' appear to be confined to this country; the fourth occurs at Bracklesham, and is identical with a species abundant in the Paris basin. Three additional species are now described for the first time.

No. 118. MITRA SCABRA. *Sowerby*. Tab. XXIV, fig. 6 a—c.

SMALL LATTICED LYMINGTON WHELK, *Pet.* 1764. *Gazophyll.*, t. 73, fig. 9.

BUCCINUM SCABRICULUM, *Soland.* (non *Gmel.*) 1766. *Brand. Foss. Hant.*, p. 15, fig. 20.

MITRA SCABRA, *Sow.* 1823. *Min. Con.*, vol. iv, p. 142, t. 401.

— — *Morris.* 1843. *Cat. Brit. Foss.*, p. 151.

— — *D'Orb.* 1850. *Prod. de Paléont.*, vol. ii, p. 355, No. 313.

— — *Morris.* 1854. *Cat. Brit. Foss.* (2d edit.), p. 258.

*M. testá ovato-acutá, costulis longitudinalibus et lineis transversis sese decussantibus scabratá, ad basin profunde emarginatá: spirá conicá, apice obtusiusculo: anfractibus convexis, marginibus posticis tenuibus: aperturá elongato-ovalí, postice angustatá; labro incrassato, sub-marginato, intus crenulato; columellá quadri-plicatá, plicis distantibus, fere transversis; labii areá pliciferá incrassatá.*

Shell ovately oblong, slightly ventricose, deeply notched at the base, with a conical spire, terminating in a small, slightly obtuse apex, formed of two smooth, nearly round, embryonal volutions; whorls seven or eight, exclusive of the embryo, and covered with irregular longitudinal ridges, and conspicuous lines of growth, decussated by sharp, transverse, raised lines slightly thickened at the points of decussation, roughening the surface of the shell; the posterior margins are thin, and pressed against the preceding whorls. The aperture is of a lengthened oval shape, narrowed posteriorly; the outer lip sharp and thin in the young shell, but irregularly thickened at maturity, and presenting an obscure, slender, raised border along the outer edge, and a blunt triangular tooth-like callus on the inner edge, near the posterior extremity; the columella is furnished with four distant, nearly transverse folds, of which the anterior one is much the smallest; and some specimens also present one or two obscure transverse lines towards the posterior part of the columella. The inner lip is very narrow, and much thickened where the folds are placed. Owing to the great depth of the notch, the base of the shell is more bent backwards than is usually the case in the fossil *Mitræ*, and presents the prominent crest or ridge which, as we have seen in the *Volutes*, always accompanies a deep notch.

In the general form of the shell, the condition of the apex and of the outer lip, the columellar plaits, and the deep anterior notch, this *Mitra* so much resembles *M. labratula*, that it might almost be regarded as merely a variety of that species in which the longitudinal ribs and transverse lines found in the young state have been continued on the mature shell. I have not, however, met with any smooth specimen of the present species, and mature individuals of *M. labratula* are, apparently, always smooth, with the exception of a few obscure transverse lines near the suture, or at the base. This want of intermediate forms, therefore, confirms the title of *M. scabra* to specific distinction.

*Size*.—Axis, 11-12ths of an inch; diameter, 5-12ths of an inch.

*Locality*.—The species appears to be confined to the Barton beds. I have not met with it elsewhere.

No. 119. MITRA LABRATULA. *Lamarck*. Tab. XXIV, fig. 3 *a*, *b*.

- MITRA LABRATULA, *Lamk.* 1803. Ann. du Mus., vol. ii, p. 58, No. 5, t. 3, fig. 6.  
 — LABRATELLA, *Ib.* 1816. Tab. Encycl. et Méthod., t. 392, fig. 3 *a*, *b*.  
 — LABRATULA, *Ib.* 1822. Hist. Nat., vol. vii, p. 325, No. 5.  
 — — *Defr.* 1824. Dict. des Sci. Nat., vol. xxxi, p. 491.  
 — — *Desh.* 1830. Encyc. Méthod. (vers.), vol. ii, p. 465, No. 42.  
 — — *Ib.* 1824—37. Descr. des Coq. Foss. &c., vol. ii, p. 672, t. 88, figs. 9, 10, 18 and 19.  
 — — *Mellew.* 1843. Mém. sur les Sables tert. inf., &c., de Paris, p. 17.  
 — — *Roissy.* . Buff. Moll., vol. v, p. 443.  
 — MONODONTA, *Sow.* (non *Lamk.*) 1850. Dix. Geol., &c., Suss., p. 106, t. 7, figs. 20, 21.  
 — LABRATULA, *D'Orb.* 1850. Prod. de Paléont., vol. ii, p. 354, No. 296.

*M. testá ovato-acutá, lævi, aliquando in juventá costulis et striis transversis decussatá, ad basin profunde emarginatá: spirá conicá, apice obtuso: aperturá elongatá, angustá; labro incrassato, sub-marginato, intús unidentato; columellá quadriplicatá.*

Shell ovately oblong, slightly ventricose, smooth; sometimes in French specimens the early volutions present obscure undulating ribs, decussated by irregular, transverse, fine, raised lines, which altogether disappear on the last volution, or are reduced to a few faint lines, nearly obsolete, at the base, or round the sutural margin: the spire is conical with an apex formed, like that of *M. scabra*, of two roundish embryonal whorls, and, as in that species, the base is deeply notched, and bent backwards. The aperture is of a long, ovate shape, and rather narrow; the outer lip thickened, slightly bent outwards, so as to form a narrow, raised border along the outer margin, and furnished, generally, with a blunt, tooth-like callus on the inner edge, near the posterior extremity; the columella presents four prominent, almost transverse folds, the posterior three of which are nearly equal, and are larger than the one in front.

All the English specimens I have seen belong to the smooth variety, and do not present the longitudinal ribs and transverse lines which are sometimes found on the earlier whorls of the French shells, nor have I met with any specimen presenting the concentric striæ on the surface which characterise the variety from Courtagon and the neighbourhood of Valognes.

I have already mentioned the strong resemblance between this species and *M. scabra*; in fact, with the exception of the scabrous aspect of the latter, it would be difficult to point out specific differences between the two.

*M. Deshayes* states that in some of the French specimens traces of the natural colouring remain, consisting of longitudinal iron-reddish coloured bands. The English specimens, imbedded in a less favorable matrix, do not present any traces of their original colouring.

*Size*.—Axis, 11-12ths of an inch; diameter, rather more than 5-12ths of an inch.

*Localities*.—Bracklesham Bay, where it is somewhat rare. *French*: Grignon, Parnes, Mouchy, Courtagon, Chaumont, Valognes, St. Felix, Le Tomberay (fide *Desh.*), and Laon (fide *Mellev.*).

No. 120. MITRA PARVA. *Sowerby*. Tab. XXIV, fig. 1 *a—c*, and 2 *a—c*.

- MITRA PARVA, *Sow.* 1825. *Min. Con.*, vol. v, p. 37, t. 430, fig. 1.  
 — PUMILA, *Ib.* 1825. *Min. Con.*, vol. v, p. 37, t. 430, fig. 2.  
 — PARVA, *Ib.* 1850. *Dixon's Geol., &c., of Sussex*, p. 106.  
 — — *Morris.* 1843. *Cat. of Brit. Foss.*, p. 151.  
 — PUMILA, *Ib.* 1843. *Cat. of Brit. Foss.*, p. 151.  
 — PARVA, *D'Orb.* 1850. *Prod. de Paléont.*, vol. ii, p. 355, No. 314.  
 — PUMILA, *Ib.* 1850. *Prod. de Paléont.*, vol. ii, p. 355, No. 315.  
 — PARVA, *Morris.* 1854. *Cat. of Brit. Foss.*, 2d edit., p. 258.  
 — PUMILA, *Ib.* 1854. *Cat. of Brit. Foss.*, 2d edit., p. 258.

*M. testá parvá, ovato-fusiformi, sub-turritá, concentricè sulcatá, ad basin viæ emarginatá: spirá elevatá, acuminatá: anfractibus convexis, uno sulco prope marginem suturalem circumdatis; suturis distinctis: aperturá lanceolatá: labro undato, acuto, intús plicifero; columellá quinquies plicatá.*

*Var. SEMILÆVIS. Testá anfractibus uno sulco prope marginem suturalem circumdatis; et ad basin obscure sulcatis, cæterum lævi; spirá exsertiori.*

*Var. PUMILA, fig. 2 a—c. Testá fasciolis elevatis concentricis et costellis longitudinalibus decussatá.*

*Var. β. Testá costellarum longitudinalium experti.*

Shell small, ovately fusiform, transversely furrowed, and but slightly notched at the base; spire elevated, pointed, and formed of seven or eight convex volutions,

separated by a deep suture, and with the margins thickened and rather depressed, giving a sub-turreted character to the spire; the furrows are broad, round, and nearly regular; the posterior furrow is deeper than the others, and from this circumstance the margin of the whorls assumes the appearance of a rim. The aperture is narrow, and of a lengthened oval form; the outer lip waved, sharp-edged, and plicated within, at a short distance from the margin; the columella is nearly straight, and presents near the middle two rather prominent and nearly transverse folds, and in front of them three others more oblique, and of which the anterior one is much the smallest.

In the variety *semilævis*, the whorls are nearly smooth, presenting only the deep sulcus round the sutural margin, and a few obscure furrows, almost obliterated, near the base; and the spire is rather more elevated than in the type.

In the variety *pumila*, the surface of the whorls presents numerous longitudinal, irregular, slightly waved costellæ, not much elevated, but extending almost to the base, and crossed by concentric raised bands, which decussate them, and impart a rough aspect to the shell. The concentric bands are irregular, more or less numerous in different individuals, and rather flattened on the upper surface. When the costellæ are well defined, the concentric bands, at the points of decussation, rise into little tubercles; the marginal band, thus tuberculated, forms the crenulated edge to the whorls noticed by Mr. Sowerby; but this does not appear to be a constant character.

Occasionally specimens occur (*var. β*) in which the longitudinal costellæ are altogether wanting, and the whorls present only the concentric bands.

If we look only at the extreme forms figured in 'Mineral Conchology,' it need not excite surprise that Mr. Sowerby, who had not any intermediate forms before him, should have described the variety *pumila* as a distinct species. On an attentive examination, however, it will be seen that the distinction between that variety and the type lies in the character of the transverse marking, which in the type consists of shallow, rounded furrows; while in the variety it assumes the form of flattened bands. This difference, however, which is attributable to the greater or less depth of the furrows, cannot be regarded as of specific value; and the occurrence of ribless specimens with transverse bands, shows that the presence or absence of the costellæ is not a character on which reliance is to be placed.

The apex of the shell appears to have been very susceptible of erosion, for specimens with the embryonal whorls preserved are very rare.

*Size*.—Axis, rather more than 3-12ths of an inch; diameter, 2-12ths of an inch, nearly.

*Localities*.—For the type, Highcliff, where it is found in profusion, Barton, Alum Bay (No. 29, Prestw.), where the variety *semilævis* is abundant, and Brockenhurst; and for the variety *pumila*, Highgate, Basingstoke, Bracklesham Bay, Bramshaw (New Forest), and Barton. The species appears to be confined to England.



No. 121. MITRA PORRECTA. *F. E. Edwards.* Tab. XXIV, fig. 7 *a—c.*MITRA PORRECTA, *Morris.* 1854. Cat. Brit. Foss., 2d edit., p. 258.

*M. testá elongato-fusiforimi, gracili, ad basin concentricè sulcatá, cæterum lævi; spirá porrectá: anfractibus depresso-convexis, unico sulco prope marginem suturalem circumdatis; marginibus posticis simplicibus: aperturá angustá, lineari; labro acuto, intús crenulato; columellá quinquies plicatá.*

Shell elongated, fusiform, slender; smooth, except at the base, where it is traversed by several broadish, obscure furrows; the spire elevated, nearly equalling the aperture in length; the volutions, seven or eight, flatly convex, with the posterior margins simple, and bordered by a deep furrow, which runs round the shell near the suture. The aperture is narrow, with nearly parallel margins; the outer lip sharp-edged, and finely and regularly crenulated within; the columella presents five sharp folds, of which the anterior two are very oblique, and much smaller than the others.

In the smooth surface, margined whorls, sharp outer lip, and columellar folds, this Mitra resembles *M. marginata* (Lamk.), from the Paris basin. It is, however, a much narrower and more slender shell; the margins of the whorls are without the crenulations which characterise that species, and the outer lip is finely crenulated within. The species appears to be perfectly distinct.

*Size.*—Axis, 4-12ths of an inch; diameter, 1-8th of an inch.

*Localities.*—Barton, Bracklesham Bay.

No. 122. MITRA OBESA. *F. E. Edwards.* Tab. XXIV, fig. 4 *a—d.*

*M. testá ovato-oblongá, ad basin concentricè sulcatá, cæterum lævi; spirá acuminatá, aperturam in longitudine vix æquanti; anfractibus convexiusculis, antice coarctatis, postice marginatis; aperturá elongato-ovalí; columellá terties plicatá.*

An ovately oblong shell, smooth except at the base, where it is traversed by a few obscure furrows; spire elevated, nearly as long as the aperture, and terminating in a small, pointed pullus, formed of two round, smooth, unequal volutions; the whorls, which are five in number, exclusive of the embryo, are flatly convex, and contract rather suddenly in front; the posterior margin is bordered by a shallow furrow, which runs round the suture, and the edge is depressed and flattened, giving somewhat of a turreted appearance to the spire. The aperture is ovate, moderately wide, and terminates in front in a short, wide canal, formed by the sudden contraction of the whorl; the columella is nearly straight, and presents three oblique distant folds.

The general form, the width and greater size of the shell, and the number of the

columellar plaits, distinguish this species from the smooth variety of *M. parva*, and from *M. gracilis*. It is extremely rare: the specimen figured is, I believe, unique.

*Size*.—Axis, 5-12ths of an inch; diameter, rather more than 2-12ths of an inch.

*Locality*.—Highcliff.

No. 123. MITRA VOLUTIFORMIS. *P. E. Edwards*. Tab. XXIV, fig. 5 *a—c*.

MITRA VOLUTIFORMIS. *Morr*. 1854. Cat. Brit. Foss., 2d edit., p. 258.

*M. testá parvá, oblongá, turritá, longitudinaliter costatá, antice transversim lineatá, postice concentricè sulcatá, cæterum lævi; spirá exsertá, in longitudine dimidium totius testæ superanti: anfractibus planis, antice subito coarctatis, ad suturas marginatis et unicá serie tuberculorum instructis; costis crebris, elevatis, rectis, fere ad basin tendentibus, postice nodulosis: aperturá angustá; labro intus plicato; columellá quadriplicatá; labio angustissimo, postice incrassato.*

Shell small, oblong, turreted, longitudinally ribbed; spire elevated, exceeding the aperture in length; whorls five or six, exclusive of the embryonal whorls, with the sides nearly straight, and contracting suddenly towards the base, where they present five or six transverse, coarse, raised lines; the sutural margin is bordered by a single row of round tubercles, corresponding with the ribs; the posterior surface is concentrically furrowed; the middle surface smooth; the ribs, which are numerous, prominent, and straight, extend to the transverse raised lines on the base, and terminate, posteriorly, in a double row of knobs or tubercles, somewhat larger than those which run round the suture, and from which they are separated by a deep furrow. The aperture is lanceolate, and, owing to the contraction of the whorls, terminates anteriorly in a short, narrow canal, which is slightly emarginate in front; the outer lip is plicated within; the inner lip very narrow, and thickened near the suture, where it forms an oblong callus; the columella is slightly curved, and furnished with four oblique folds, gradually increasing in size as they ascend the columella.

The specimen figured is, I believe, unique. It is apparently an immature shell; but the characters are so strongly marked, and so distinct from those of the other English Eocene Mitræ, that it cannot be passed unnoticed.

*Size*.—Axis, 3-12ths of an inch; diameter, somewhat less than 2-12ths of an inch.

*Locality*.—Barton.

*Family*—CONIDÆ.Genus 25th. CONUS. *Linn.*

- CONUS *Brug.; Lamarck; Cuvier; De Blainv.*  
 VOLUTA, *Browne* (not *Linn.*), 1756.  
 STROMBUS, *Adan.* (not *Linn.*), 1757.  
 CUCULLUS, *Bolten*, 1798.  
 CONARIUS, *Dumér.*, 1806.  
 RHOMBUS, *Montfort*, 1810.  
 CONULUS, *Rafn.* (not *Fitzing.*), 1814.  
 PUNCTICULIS—CORONAXIS—CONILITHES, *Swains.*, 1840.  
 STEPHANOCONUS, *Mörch*, 1852.  
 CYLINDRELLA, *Swains.* (not *Pfeiffer*), 1840.  
 DENDROCONUS, *Ib.* 1840.  
 LITHOCONUS, *Mörch*, 1852.  
 CYLINDER, *Montfort*, 1810.  
 TEXTILIA, *Swains.*, 1840.  
 HERMES, *Montfort*, 1810.  
 THELICONUS, *Swains.*, 1840.  
 LEPTOCONUS, *Ib.* 1840.  
 RHIZOCONUS—CHELYCONUS, *Mörch*, 1852.  
 Sect.  $\alpha$  NUBECULA, *Klein*, 1753.  
     ROLLUS, *Montfort*, 1810.  
     UTRICULUS, *Schum.*, 1817.  
     TULIPARIA, *Swains.*, 1840.  
 Sect.  $\beta$  CONORBIS, *Ib.* 1840.

*Gen. Char.*—Shell inversely conical, turbate, rarely ventricose, smooth or concentrically furrowed or striated; spire truncate, short, or more or less elevated; whorls numerous, coronated or simple; aperture linear, narrow, slightly effuse, and emarginate in front; outer lip thin, and sharp at the edge, smooth, sometimes thickened within, generally straight, occasionally curved, notched at the suture; columella straight, smooth, truncate in front; covered with an epidermis, and operculated; operculum small, corneous.

In the genera which constitute the families *Cypræidæ* and *Volutidæ*, the animals are distinguished by their large mantles, capable, as we have seen, of great extension. In the present genus, the type of the family to which its name is given, the animal is furnished with a narrow mantle, prolonged in front into a short, fleshy siphon, resembling that of the *Volutes* and *Mitres*, by which water is conveyed to the branchial chamber. The head is small, and carries two subulate tentacles, near the free extremities of which the eyes are placed: it terminates in a retractile, proboscis-like muzzle,

at the end of which is the mouth, surrounded by a funnel-shaped veil: the teeth are elongate, subulate, and arranged in two series. The foot is simple, oblong, narrow, and truncated in front; in the middle it presents a pore, the function of which is not ascertained; and it bears, on the posterior extremity, a small, ovate, horny operculum, barely exceeding in length a third part of the aperture, and very narrow, so as to permit the animal to withdraw far within the shell. The epidermis, which covers the shell, is thick, and frequently very tenacious.

The cone-animal is endowed with the power of dissolving the calcareous matter on the outer surface of the inner whorls, which are thus made exceedingly thin, whatever degree of thickness they may have originally possessed. This power of absorption is possessed by many other molluscs, but, according to Mr. George Sowerby, is confined to those furnished with an operculum. It affords a valuable assistance to the Palæontologist.

The present genus, although comprising very many species, remains almost as Linnæus left it. The foregoing list of synonyms shows, indeed, that many dismemberments have been proposed; but at present these appear to depend principally on differences in the shells. In Klein's proposed genus *Nubecula*, however, the shell of which is sub-cylindrical, the animal, according to M. Quoy,\* is furnished with a large foot, not entirely retractile within the shell; the margin of the muzzle is fringed, and the operculum is curved and unguiculate: these peculiarities apparently justify the division in question being retained as a sub-genus.

The wide semicircular notch which, in many of the cones, separates the outer lip from the suture, closely resembles the sinus characteristic of the *Pleurotomæ*, and in some of the fossil species in which the outer lip is generally very much curved, it is difficult to determine to which genus the particular shell should be referred. In the well-known Eocene species, *Conus dormitor* (Sol.), for instance, the shell outwardly possesses quite as much of the character of a *Pleurotoma* as of that of a *Cone*; and Mr. Swainson has, in fact, taken it as the type for a genus which he has named *Conorbis*, and which, in his circle of affinities of the *Coninæ*, he regards as the representative of the *Pleurotomæ*. This division depends entirely on the external characters of the shell: no living representative, I believe, has as yet been found, and the animal is therefore unknown. It is certain, however, that it was a true cone-animal; for, on breaking the shell of a specimen of *Conus dormitor*, the inner whorls will be found reduced by absorption to a membrane-like thinness; and the capability to effect this is not, I believe, possessed by the animal of *Pleurotoma*. The proposed genus is not well defined by its author, and is not generally received, although it may be usefully adopted as a section of the present genus. The characters appear to be the elevated conical spire, the produced base representing the canal which dis-

\* Zoologie of the Voyage of the *Astrolabe*.

tinguishes the *Pleurotomæ*; the condition of the outer lip, which is much thickened within, and so strongly arched as to be almost semicircular in form; the deep, wide sinus, which divides the posterior extremity of the outer lip from the suture, and exactly resembles the notch by which the *Pseudotomæ* (a section of the *Pleurotomæ* proposed by Bellardi) are distinguished; and the elevated, reflected anterior margin of the columellar lip, forming the right wall of the anterior canal.

The recent cones, distinguished by the beauty and variety of their colouring, are very numerous: three hundred and sixty-nine species are enumerated by Messrs. Henry and Arthur Adams in the different divisions adopted by those authors; and, excepting two species which are found in the Mediterranean, all are inhabitants of tropical seas, abounding chiefly in those of Asia. They inhabit fissures and holes in rocks, and coral reefs, ranging in depth from low-water mark to thirty or forty fathoms.

In a fossil state, the genus first occurs in the upper cretaceous strata. M. Deslongchamps, it is true, has referred to it certain shells from the lias of Calvados, exactly resembling cones in outward form, and which, if the genus were correctly determined, would present the anomaly of the cones not being represented during the long epoch which elapsed between the deposit of the middle lias and that of the upper chalk. M. D'Orbigny, however, found, on examination, that the inner whorls were as thick as the outer ones; and from this circumstance he has inferred that the shells in question are not true cones, and he has referred them to *Acteonina*, a genus peculiar to the Oolitic formations, and proposed by him for certain Acteon-like shells, without teeth or folds on the columella. And thus the apparent anomaly disappears. In Europe two species only have hitherto been found in the Chalk—one from Tours, described by Dujardin; the other from Martigues (Bas du Rhone), described by Mathéron: and from the eocene strata, sixteen species have been described by Solander, Bruguière, Lamarck, Sowerby, and Deshayes. After the eocene era, the genus disappears from our Fauna; although, on the Continent, it appears to have been largely developed during the miocene and pleiocene epochs, sixty-seven species having been described by Grateloup, Michelotti, Brocchi, Borson, and other authors, from the formations of those periods, in France, Italy, and Germany. In America only four species, I believe, have as yet been found—one in the Chalk of South Carolina, a second in the eocene strata of Alabama, and two in the more recent formations.

No. 124. CONUS DIADEMA, *F. E. Edwards*. Tab. XXIV, fig. 8 *a—d*.

- CONUS DIVERSIFORMIS, *Sow.* (non *Desh.*) 1841. *Min. Con.*, vol. vii, p. 26, t. 623, figs. 3, 4, 6.
- — *Morris*. 1843. *Cat. Brit. Foss.*, p. 143.
- — *Sow.* 1850. *Dixon's Geol., &c., of Suss.*, p. 108, t. 8, fig. 10.
- — *Morris*. 1854. *Cat. Brit. Foss.*, 2d edit., p. 244.

*C. testá conicá, oblongá, sub-turritá, coronatá, lævi, ad basin transversim obscure sulcatá; spirá elevatá, sed trientem totius testæ longitudine nequaquam æquanti; anfractibus numerosis, angulatis, marginibus posticis depressis, sub-cavatis, concentricè lineatis: aperturá angustá; labro mediocriter arcuato, postice late emarginato.*

*Var. PYRIFORMIS* (fig. 8 *d*). *Testá spirá depressá.*

- CONUS PYRIFORMIS, *Sow.* 1850. *Dixon's Geol., &c., of Suss.*, pp. 108 and 189, t. 8, fig. 18.
- — *Morris*. 1854. *Cat. Brit. Foss.*, 2d edit., p. 244.

A smooth, oblong, conical shell, with a turreted spire, formed of numerous (10—12) volutions, and moderately elevated, varying to some extent in different individuals, but never attaining a height equal to a third part of the length of the shell. The whorls are nearly straight on the sides, with the posterior margins much depressed, somewhat concave, and ornamented with four or five thickish, concentric, raised lines, separated by shallow, rounded furrows; the angles of the whorls present a series of oblong, regular tubercles, which are continued almost to the last whorl, when they are replaced by a rounded, cord-like thickening of the shoulder; the front part of the whorls is traversed by shallow, irregular furrows, which are effaced towards the middle part of the shell. The aperture is narrow, with parallel margins; the outer lip moderately arched, and presenting a wide, shallow curvature between the angle and the suture.

The specimens separated by Mr. Sowerby, under the specific name *pyriformis*, have a much depressed spire associated with the tuberculation, and other characters which distinguish the present species, of which, therefore, I regard them as a variety only.

The shells for which I propose the specific name, *C. diadema*, were referred by Mr. Sowerby, in part to *C. deperditus* (Brug.), and in part to *C. diversiformis* (Desh.). In the former species, however, the shell is narrower and more turbinate, with a more curved outer lip, and the tuberculation on the spire, where it occurs, is feeble and lost on the very early whorls; and in the latter species, M. Deshayes, in his description, states expressly that the angles of the whorls are somewhat sharp, and always simple;\*

\* It is somewhat difficult to appreciate the distinct specific value of the shells constituting the species *C. diversiformis*, without an examination of a series of specimens equal to that upon the study of which M. Deshayes proposed the separation. To the unschooled eye they appear to be only broader forms of *C. deperditus*, with more variable spires.

while in the English shells, the angles of the whorls are blunt and strongly tuberculated, resembling in that character *C. sulciferus* (Desh.), to which, indeed, I should be inclined to refer them, notwithstanding the transverse sulcation from which the name is taken, but on which much stress is not to be placed, as it does not appear to be a strongly marked character; the shell of *C. sulciferus*, however, is thick and ponderous, with a narrower aperture, and a deeper curvature in the outer lip. In *C. Lamarckii* (a name which I propose to give to the eocene species still miscalled *C. antediluvianus*), the tubercles are also found, but they are not so prominent nor so persistent as in the present species; the shell, also, is narrower, with a sub-conical and more elevated spire, and it never attains the size of *C. diadema*. The only other eocene tuberculated species at all resembling the present one, is *C. crenulatus* (Desh.); but in that species the shell is perspicuously furrowed, even in its mature state, and the spire is shorter and more conical.

*Size*.—Axis, 2 inches and 10-12ths (72 millim.); diameter, 1 inch and 8-12ths (42 millim.).

*Locality*.—Bracklesham Bay, where it is common.

No. 125. CONUS DEPERDITUS. *Bruguière*. Tab. XXV, fig. 2 a—c.

- D'Argenv.* 1742. Conchyl. Append., 2d edit., p. 349, t. 29, fig. 8.  
 ? *Walch.* 1768. Traité des Petrifact., vol. ii, p. 102, t. 43, fig. 4.  
*Favanne.* 1780. D'Argenv., Conchyl., 3d edit., t. 66, fig. G 1.  
 CONUS DEPERDITUS, *Brug.* 1789. Encycl. méth., vol. i, p. 691, No. 80, t. 337, fig. 7.  
 — — *Lamk.* 1802. Ann. du Mus., vol. i, p. 386; vol. xv, p. 441, No. 6.  
 — — *Def.* 1818. Dict. des Sci. nat., vol. x, p. 261.  
 — — *Lamk.* 1822. Hist. Nat., vol. vii, p. 528, No. 6.  
 — — *Desh.* 1823. Dict. class. d'Hist. nat., vol. iv, p. 388.  
 — — *Ib.* 1824—37. Descr. des coq. foss., &c., vol. ii, p. 745, t. 98, figs. 1, 2.  
 — — *Galeotti.* 1837. Const. géog., &c., de Brabant, p. 148, No. 63.  
 — — *Bronn.* 1838. Lethæa geog., vol. ii, p. 1118, t. 42, fig. 14. (ex plur. syn.)  
 — — *Sow.* 1841. Min. Con., vol. vii, p. 25, t. 623, fig. 5 (non figs. 1, 2).  
 — — ? *Nyst.* 1843. Coq., &c., de Belg., p. 583, No. 501.  
 — — *Morris.* 1843. Cat. Brit. Foss., p. 143.  
 — — *D'Orb.* 1850. Prod. de Paléont., vol. ii, p. 355, No. 336.  
 — — ? *Bell.* 1851. (Foss. nummul. du Comté de Nice), Mém. de la Soc. Géol. de France, 2d ser., vol. iv, p. 219, No. 65.  
 — ALLIONI? *Beyr.* (non *Michel.*) 1853. Die Conchyl. des Norddeut. tertiär., p. 24, t. 1, figs. 4—6.  
 — DEPERDITUS, *Roissy.* 1804. Buff. Moll., vol. xlv, p. 409, No. 10.  
 CONILITHES CINGULATUS, *Schlot.*? 1820. Die Petrif., vol. i, p. 125, No. 3.

Nec	CONUS	DEPERDITUS,	Brocc. 1814. Conch. Foss. Sub-app., vol. ii, p. 592, No. 10, t. 3, fig. 2.
nec	—	—	Bors. 1821. Oritt. Piem., p. 14, No. 13.
nec	—	—	Brongn. 1823. Terr. tert., &c., du Vicentin, p. 32.
nec	—	—	Bast. 1825. Desc. des coq. foss., &c., de Bord., p. 39.
nec	—	—	Bronn. 1831. Italiens tertiärgéb., p. 12, No. 5.
nec	—	—	Pusch. 1837. Polens Palæont., p. 115, No. 2.
nec	—	—	Grat. 1838. Cat. zool., &c., de la Gironde, p. 47, No. 422.
nec	—	—	Ib. 1838. Tabl. statist. &c., de l'Adour, t. 19, No. 22.
nec	—	—	Ib. 1840. Conchyl. foss., &c., de l'Adour, t. 2, figs. 18, 19.
nec	—	—	Sismon. 1847. Synop. method., &c., Pedem. Foss., p. 44.
nec	—	—	Sow. 1850. Dixon's Geol., &c., of Sussex, p. 108, t. 8, fig. 9.

*C. testá turbinatá, elongatá, lævi, ad basin transversim obsolete sulcatá; spirá prominulá, acutiusculá: anfractibus numerosis, angustis, angulatis, marginibus posticis depressis, strias tenues concentricas gerentibus; ultimo anfractu regulariter conoideo, sursum dilatato: aperturá angustá; labro tenui, simplici, valde arcuato, postice profunde emarginato.*

Shell oblong, turbinate, with a moderately elevated mucronate spire, variable in height, but rarely exceeding a fourth part of the whole length of the shell, and terminating in a smooth, conical pullus, formed of three volutions; whorls numerous (10—12, exclusive of the pullus), bluntly angulated at the shoulders, nearly straight on the sides, with the posterior margins depressed, narrow, somewhat concave, and concentrically lined; the concentric lines are usually four or five in number, sharp, irregular, unequal, separated by moderately deep, rounded furrows, and frequently decussated by the lines of growth. In some specimens the early whorls are very finely tuberculated on the shoulders, and concentrically sulcated; the tubercles, however, disappear after the third or fourth volution, and the shoulders are afterwards smooth and simple: the concentric furrows also become gradually effaced on the posterior portion of the whorls as the shell approaches maturity, and ultimately are altogether lost, leaving only a few very obscure waved furrows traversing the base of the shell. The last whorl is conical, much attenuated in front, with nearly straight sides; the aperture is linear and narrow; the outer lip, which is thin, sharp-edged and much arched, presents a shallow but wide curvature at the posterior extremity.

M. Deshayes states that traces of the natural colouring are sometimes found in the French shells, consisting of narrow, transverse bands, occasionally interrupted by irregular, zigzag patches, following the direction of the lines of growth. Similar traces appear, though very rarely, in the English specimens.

This species appears to be confined to the middle eocene strata; for the shells from Ronca (Vicent.), described by Brongniart as *C. deperditus*, D'Orbigny regards as belonging to a distinct species, which he has named *C. Brongniartii*, and to this species the shells described by Bellardi from the nummulitic beds at Nice, probably are also referrible. Subsequent comparison has shown that specific differences also exist in the various shells from the more recent deposits which have been referred to the



present species. Thus the Sub-apennine shells, described by Brocchi, and those from Perpignan and Cassel, recorded by Sismonda, have been separated by Bronn under the name *C. Brocchii*; while to those from Dax and Gaas, described by Grateloup, M. D'Orbigny has given the name *C. Grateloupi*; and he has referred to the same species certain shells described by Pusch, to which Eichwald had given the name *C. argillæcola*. The cones described by Mr. Sowerby as belonging to the present species are young shells of *C. diadema*.

Dr. Beyrich ('Die Conchylien des Norddeutschen tertiärgebirges,' vol. i, p. 24) has described some shells from the North German tertiaries, which he has referred to *C. Allioni* (Michel.), but which agree so well with the present species, that it is difficult to separate them. That author states that, in *C. deperditus* of the Paris basin, the shells are comparatively wider, the concentric lines on the margins of the whorls more strongly marked, and the angles at the shoulders sharper than in the German specimens. These differences do not appear to be greater than may be fairly attributed to variations of local conditions, and I have therefore cited Dr. Beyrich's shell, but with a query. The English shells are wider, and appear to have attained a greater size, than the French shells; and the edges of the shoulders, instead of being somewhat sharp and elevated, as in the latter, are rounded or flattened obliquely; in all other respects our shells agree so well, that I have no doubt of their specific identity.

*Size*.—Axis,  $2\frac{1}{2}$  inches, nearly (63 millim.); diameter, 1 inch and 5-12ths (36 millim.).

*Localities*.—Bracklesham Bay, Bramshaw (New Forest), at which places they are not uncommon. *French*—Grignon, Parnes, Mouchy, Courtagnon, &c. (fide *Desh.*) *Belgian*—Afflighem (fide *Galeotti*), Rouge-Cloître, Saint Josse-ten-Noode and Groenedael (fide *Nyst*). *German*—Westeregeln in Magdeburgh, Hermsdorf, Freinwalde and Buckow, and Freden, near Alfeld (fide *Beyrich*). *Italian*—La Palarca (fide *Bellardi*)?

No. 126. CONUS VELATUS, Sowerby. Tab. XXIV, fig. 12.

CONUS VELATUS, *Sow.* 1841. *Min. Con.*, vol. vii, p. 27, t. 623, fig. 7.

— — *Morris.* 1843. *Cat. Brit. Foss.*, p. 143.

— — *Sow.* 1850. *Dixon's Geol., &c., of Sussex*, pp. 108 and 189, t. 8, fig. 17.

— — *Morris.* 1854. *Cat. Brit. Foss.*, p. 244.

*C. testâ lævi, oblongâ, turbinatâ, antice sub-productâ; transversim obsolete sulcatâ; spirâ conicâ, prominulâ, trientem totius testæ longitudine paulo superanti: anfractibus angulatis, inermibus; marginibus posticis declivis, sub-concavis, lineas concentricas et rugas*

*curvas obliquas sese decussantes gerentibus, ad suturam incrassatis, plicatis: aperturá angustá; labro valde arcuato, postice late emarginato.*

Shell smooth, oblong, turbinate, somewhat produced at the base, where it presents traces of transverse sulcation: spire conical, slightly elevated, barely exceeding in height a third part of the whole length of the shell: whorls narrow, angulated, and smooth round the shoulders; the posterior margins much depressed, very slightly concave, and presenting four or five rather coarse, raised, concentric lines, which are crossed and decussated by prominent, curved, wrinkle-like elevations, corresponding with the curvature in the outer lip; the edge is thickened, and presents a raised border round the suture, plicated by the extension of the marginal wrinkles over the surface. The aperture is narrow; the outer lip much arched, and separated from the suture by a wide, moderately deep curvature. The surface of the shell is much eroded, and the lines of growth are consequently more conspicuous than is usually the case; these, with the decussated lines on the spire, "give the shell," Mr. Sowerby says, "the appearance of having been enclosed in a net or net-veil; whence the name."

The specimen from which the figure is taken, and on which the species was founded, forms part of Mr. Bowerbank's collection, and is, I believe, unique. In the general character the shell resembles *C. deperditus*; but the more elevated posterior margins, the thickened and plicated edges of the whorls in the present species, apparently justify the separation.

*Size*.—Axis, 1 inch and 4-12ths; diameter, 5-12ths of an inch.

*Locality*.—Bracklesham Bay.

No. 127. CONUS LAMARCKII, *F. E. Edwards*. Tab. XXV, fig. 3 *a—c*.

- CONUS ANTEDILUVIANUS, *Desh.* (nec *Brug.*, nec *Lam.*) 1824—37. *Descr. des coq. foss.*, &c., vol. ii, p. 749, t. 98, figs. 13, 14.  
 — — — *Bronn.* 1838. *Lethæa Geog.*, p. 1118.  
 — DEPERDITUS, *Sow.* (non *Brug.*), 1850. *Dixon's Geol.*, &c., of Sussex, p. 108, t. 8, fig. 9.  
 — ANTEDILUVIANUS, *D'Orb.* 1850. *Prod. de Paléont.*, vol. ii, p. 355, No. 335.  
 — CONCINNUS, *Phil.* (non *Sow.*) 1846. *Tert. foss. Magdeb.* (Paleont., vol. i, p. 80, No. 183).  
 — — — *Beyr.* (non *Sow.*) 1853. *Die Conchyl. des Norddeutsc. tertiärg.*, vol. i, p. 21, t. 1, fig. 2.

*C. testá oblongo-turbinatá, lævi, ad basin transversim sulcatá; spirá elevatá, acuminatá, trientem totius testæ longitudine superanti: anfractibus angustis, nodulosis, marginibus posticis oblique depressis, sub-concavis, ad suturam tenuiter plicatis; anfractu ultimo conico: aperturá lineari, angustá; labro tenui, arcuato, postice emarginato.*

*Var. FILIFER.* *Testá latiori; marginibus posticis anfractuum concentricè lineatis; lineis irregularibus, aliquando granulatis.*

Shell oblong, inversely conical, smooth, with an elevated, nearly conical spire, in height a little exceeding a third part of the whole length of the shell, and terminating in a small pointed pullus of three volutions. The whorls, 8—10 in number, exclusive of the pullus, are narrow, angulated at the shoulders, the posterior margins slanting backwards towards the preceding whorl, and concave; the sutural edge finely plicated by the strongly marked lines of growth. The early whorls present on the shoulders a row of small rounded tubercles, which are continued, more or less, on the later whorls, in different individuals. The aperture is straight and narrow; the outer lip thin, sharp-edged, not much arched, and separated from the suture by a wide, shallow curvature.

In the specimens from Bracklesham Bay, forming the variety *filifer*, the shells are wider than in the type, the posterior margins of the whorls present concentric lines, variable in number, and occasionally finely granulated where they are decussated by the lines of growth, and a single row of very small, bead-like knobs runs round the sutural edge, instead of the plication usually found there, in this respect somewhat resembling *C. concinnus*. The specimens from Bramshaw agree better with the French shells than do those from Bracklesham Bay; in the latter the shells generally are somewhat wider, the tubercles on the angles of the whorls disappear more early, and the shoulders are blunter than in the typical form. I regard these differences, however, rather as merely local variations than as sufficient to justify the separation of the shells from the present species, with which they agree in the elevated spire, the slanting concave margin and crenulated edge of the whorls, and the size of the shell itself.

With regard to the nomenclature of the French shell, much confusion has arisen, the origin of which is explained by M. Deshayes in a note in the 2d edition of Lamarck's 'Histoire Naturelle' (vol. xi, p. 155). From this it appears that the shell described by Bruguière as having been found at Courtagnon, and to which he gave the name *C. antediluvianus*, was, in fact, a Sub-apennine shell, and that Lamarck, misled by this, quoted *C. antediluvianus* as a Paris-basin species in his Mémoire, published in the 'Annales du Musée.' In 1814, Brocchi, in his work, applied the name given by Bruguière to the Sub-apennine shells, to which it strictly and properly belongs; but Lamarck, in 1822, in the first edition of his 'Histoire Naturelle,' again recorded Bruguière's species as occurring in the environs of Paris. Subsequently, M. Deshayes, in his 'Description des coquilles fossiles,' &c., pointed out the fact that Bruguière's description referred to an Italian species not found in the Paris basin; but unfortunately, in describing the French Eocene shells, he applied Bruguière's name to them. Bronn also, in the 'Lethæa Geognostica,' retained the name *C. antediluvianus* for the Paris-basin species, erroneously associating it with *C. concinnus* (Sow.), a species perfectly distinct; and he proposed the specific name *C. Apenninicus* for the Sub-apennine shells. The same author subsequently, in his 'Index Palæontologicus,' again united

the so-called *C. antediluvianus* of the Paris basin with the English *C. concinnus*, retaining for them the name of the latter. It is obvious that the name *antediluvianus* belongs to the Sub-apennine shell, and cannot be applied correctly to the French eocene species; and the attempts of MM. Bronn, Nyst, and others to remove the difficulty by giving a new name to the Italian species, can but increase the confusion. Dr. Beyrich, who fully appreciated the specific distinctness of the forms, has observed ('Die Conchyl.,' &c., p. 20), that "there will not be any necessity for a new name for the older eocene species of the Calcaire Grossier if the union proposed by Bronn be adopted." In the description of *C. concinnus*, I have stated the characters in which I consider that species to be perfectly distinct; and it is a cone which, although recorded by Mr. Sowerby as occurring at Barton, is, I believe, peculiar to the older eocene strata, and cannot be associated with the present species. It becomes necessary, therefore, to give a new name to the middle eocene species, and I propose to distinguish it as *C. Lamarckii*.

*Size*.—Axis, 1 inch and 7-12ths (40 millim.); diameter, 9-12ths of an inch, nearly (18 millim.).

*Localities*.—Bracklesham Bay, Bramshaw. *French*—Parnes, Mouchy, Courtagnon (fide *Desh.*); Vaudancourt, Hermes (fide *D'Orb.*).

No. 128. CONUS CONCINNUS, *Sowerby*. Tab. XXIV, fig. 13 a—c.

		CONUS CONCINNUS, <i>Sow.</i> 1821. Min. Con., vol. iii, p. 180, t. 302, fig. 2.
	—	<i>Morr.</i> 1843. Cat. Brit. Foss., p. 142.
	—	<i>D'Orb.</i> 1850. Prod. de Paléont., vol. ii, p. 356, No. 337.
Nec	—	<i>Phil.</i> 1846. Tert. Foss. Magdeb. (Palæont., vol. i, p. 80, No. 183).
nec	—	<i>Beyr.</i> 1853. Die Conchyl. des Norddeutsc. tertiärg., vol. i, p. 21, t. 1, fig. 2.

*C. testá elongato-turbinatá, lævi, ad basin concentricè sulcatá; spirá elevatá, sub-conica: anfractibus angustis, sub-planis, angulatis, ad angulos nodulosis; marginibus posticis declivis, duas vel tres lineas elevatas granulatas gerentibus, ad suturas marginatis, plicatis vel moniliferis: aperturá angustissimá; labro valde arcuato, postice late emarginato.*

*Var. β. Testá spatiis inter suturas et angulos anfractuum tres vel quatuor lineas elevatas simplices gerentibus.*

Shell elongate, turbinate, concentrically furrowed at the base; spire elevated, but variable in height, sometimes nearly equalling a half, sometimes not much exceeding a third part, of the whole length of the shell: whorls seven or eight, exclusive of the pullus, very narrow, nearly straight on the sides, angulated at the shoulders, with the posterior margins slanting backwards; the edges round the suture thickened, and either plicated or furnished with a single row of rather small bead-like nobs; the space

between the edge and the shoulder is straight, and ornamented with two or three concentric raised lines, very finely granulated. The shoulders bear a single row of prominent, round tubercles, placed at regular and not distant intervals, and continued throughout. The aperture is straight, and very narrow; the outer lip much arched, and presenting a wide, shallow curvature at the posterior extremity. The concentric furrows cover the whole surface of the young shell, but become more or less effaced as the shell is enlarged, and on the last whorl they are confined to the anterior portion of the shell; through all stages of growth the basal furrows are deep and sharp-edged.

A variety occurs at Lee, near Southend, in which the sutural edge and margin of the whorl present four thick, prominent lines, rounded and smooth on the upper surface, and devoid of the granulations which characterise the type.

I have already noticed the fact, that Bronn has regarded the present species, apparently confined to the lower eocene strata, as identical with the so-called *C. antediluvianus* of Lamarck; and Dr. Beyrich, adopting that opinion, has applied the name *concinus* to a shell from the German Tertiaries which belongs to *C. Lamarckii*. The narrower form, the smaller number of the volutions, the large rounded tubercles on the shoulders, the more depressed margins of the whorls, with their thickened edges and concentric rows of granulations, or strong elevated lines, and the deep, sharp-edged furrows, barely effaced on the posterior part by the outer coating of the shell,—appear to me sufficiently to distinguish the present shells from those of the middle eocene epoch. I do not agree, therefore, with M. Bronn and Dr. Beyrich, in referring both to the same species; and in this view, apparently both M. Deshayes and M. D'Orbigny concur.

*Size*.—Axis, 1 inch and 3-12ths (32 millim.); diameter, rather more than 6-12ths of an inch (between 13 and 14 millim.).

*Localities*.—Highgate; Fortress Green, near Kentish Town; Lee, near Southend. Mr. Sowerby cites Barton, but I have never met with any specimen from that locality; and the specimen on the authority of which Barton is cited ('Min. Con.,' t. 302, lowest fig.) does not present the characteristic form of *C. concinus*; it is much mutilated, but it has rather the appearance of a worn specimen of *C. scabriculus*. M. Deshayes (2d edit. of 'Lam. Hist. Nat.')

states that this species occurs in the environs of Paris; it is not mentioned, however, in his 'Description des Coquilles Fossiles,' and M. D'Orbigny has not given any French locality for it. At present this cone appears to belong exclusively to the earlier eocene fauna.

No. 129. *CONUS SCABRICULUS*, Solander. Tab. XXIV, fig. 9 a—c.

	CONUS SCABRICULUS, Sol. 1766. Brand., Foss. Hanton., p. 15, t. 1, fig. 21.
—	— Sow. 1821. Min. Con., vol. iii, p. 180, t. 303, figs. 1, 2.
—	— Desh. 1824-37. Descr. des coq. foss., &c., vol. ii, p. 751, t. 98, figs. 17, 18.
—	— Ib. 1845. Lam., Hist. Nat., 2d edit., vol. ii, p. 158, No. 11.
—	— D'Orb. 1850. Prod. de Paléont., vol. ii, p. 416, No. 1472.
non	— Sism. 1847. Syn. Meth., &c., Piedmont. foss., p. 44.

*C. testá utrinque conicá, antice sub-productá, lineis concentricis, elevatis, ornatá; spirá elevatá, acuminatá; lineis concentricis acutis, denticulatis, aliquando confertis, aliquando distantibus; alternis sæpissime minoribus, sæpe inermibus: anfractibus planis, postice obtuse angulatis; marginibus sub-concavis, ad suturam granulosis: aperturá lineari, angustá, bessem totius testæ paululum superanti; labro tenuissimo, leviter arcuato, postice sinuoso.*

Shell oblong, doubly conical, slightly produced at the base, and ornamented with concentric raised lines; spire elevated, pointed, terminating in a very small conical pullus, formed of three smooth volutions. The concentric lines are sharp, and very variable in their character; sometimes numerous, sometimes distant, and very frequently the alternate lines are smaller than the others. Most generally the concentric lines rise, at regular intervals, into short, tooth-like tubercles, having their bases prolonged, both in front and behind, into short, rounded ribs, more or less prominent according to the size of the tubercles, and separated by deep, pit-like hollows. The whorls, exclusive of the pullus, are six or seven in number, flat at the sides, slightly contracted towards the base, obtusely angulated at the shoulder, longitudinally ridged by regular conspicuous lines of growth, and bordered at the suture by a row of small granulations; the space between the shoulder and the suture is traversed by two or three smooth, prominent lines. The aperture is straight, narrow, slightly emarginate in front, and in length, rather more than two thirds of the whole shell; the outer lip is smooth within, thin, sharp on the edge, of a flattened elliptical form, and separated from the preceding whorl by a moderately wide, but not deep, sinus. The columella is slightly curved inwards.

Not infrequently, the alternate smaller lines, where they do occur, are smooth and simple; and the same character sometimes, although very rarely, distinguishes the whole transverse lineation. In the latter instances the surface of the shell between the raised lines is flat and smooth, except where it is ridged by the lines of growth.

This pretty and well-marked species is, apparently, confined to the middle eocene strata; and the shells referred to it by Sismonda, from Piedmont and Turin, are considered by M. D'Orbigny to belong, in fact, to Michelotte's *C. ornatus*.

*Size*.—Axis, 4-5ths of an inch; diameter, rather more than 3-10ths of an inch.

*Localities*.—Barton. *French*—Monneville (fide Desh.), Chavançon (fide D'Orb.).

No. 130. CONUS LINEATUS, *Solander*. Tab. XXIV, fig. 10 *a—c*.

- CONUS LINEATUS, *Sol.* 1766. *Brand.*, *Foss. Hanton.*, p. 15, t. 1, fig. 22.  
 — CORCULUM, *Sow.* 1841. *Min. Conchol.*, vol. vii, p. 27, t. 623, figs. 8, 9.  
 — LINEATUS, *Morris.* 1843. *Cat. Brit. Foss.*, p. 143.  
 — CORCULUM, *Morris.* 1843. *Cat. Brit. Foss.*, p. 142.  
 — — *Sow.* 1850. *Dixon's Geol., &c., of Suss.*, p. 109.  
 — LINEATUS, *D'Orb.* 1850. *Prod. de Paléont.*, vol. ii, p. 355, No. 334.  
 — — *Morris.* 1854. *Cat. Brit. Foss.*, 2d edit., p. 244.  
 — CORCULUM. *Ib.* 1854. *Cat. Brit. Foss.*, 2d edit., p. 243.  
 non — LINEATUS, *Chemn.* 1795. *Conchyl. Cab.*, vol. x, p. 27, t. 138, fig. 1285.

*C. testá utrinque sub-conicá, lineis concentricis ornatá, antice sub-productá; lineis concentricis æqualibus, lævibus, confertis; spirá elevatá, acuminatá, sub-nodulosá: anfractibus planis, postice obtuse angulatis, marginibus sub-concavis, concentricè lineatis, ad suturam depressis, granulatis: aperturá lineari, angustá, longitudine bessem totius testæ fere æquanti; labro tenuissimo, leviter arcuato, postice sinuato.*

Shell oblong, doubly conical, ornamented with transverse raised lines; spire elevated, coronated, terminating in a small pointed pullus, consisting of two or three smooth volutions; the transverse lines are smooth, regular, numerous, and separated by rather deep, rounded furrows; the whorls, which are five or six in number without the pullus, are flat at the sides, slightly contracted and produced in front, angulated at the shoulders, and depressed at the sutural margins, forming a narrow ledge running round the spire, the outer edge of which is finely granulated; the space between the margin and the shoulder is slightly concave, and presents two or three faint, concentric, unequal, raised lines. The early whorls bear on the shoulders a row of transverse, oblong tubercles, imparting a somewhat nodulous character to the spire, but lost on the last whorl, the shoulder of which is smooth. The aperture is straight, narrow, and about two thirds of the whole shell in length; the outer lip, which is but slightly curved, presents a shallow sinus at the posterior extremity: the columella is nearly straight.

Brander's shell, deposited in the British Museum, is unfortunately mislaid, and I have not been able to compare with it the shells now described. They agree, however, with Solander's description and figure in all respects except in the striation. Brander's shell, which was apparently a larger and an older specimen than any I possess, and was probably somewhat worn, is described as *obsolete striata*; while the transverse lines on my specimen are generally bold and clearly defined.

The Bracklesham Bay shell, described by Mr. Sowerby as *C. corculum*, is a little shorter in the spire; but, in all other respects, it agrees exactly with the present species, to which, therefore, I have referred it.

Lamarck, and, since his time, MM. Deshayes and D'Orbigny, have considered *C. lineatus* as identical with *C. stromboides* (Lamk.), from the Paris basin. These two shells do not appear to me, however, to be referable to the same species, for in the French species the shell is narrower, the spire more elevated, and formed of more numerous volutions; the whorls, also, are more rounded at the shoulders, the transverse lineation is feebler and more irregular, and the outer lip is more strongly arched than in the English shells. I have, therefore, not cited *C. stromboides* as a synonym of the present species.

So closely does *C. lineatus* resemble *C. scabriculus*, from which, in fact, it is only distinguished by its smooth, crowded, concentric lines, separated by rounded furrows, that it ought, perhaps, to be regarded as merely a variety into which the smooth lined specimens of the latter species would lead; but, without an examination of Brander's shell, I do not venture to question Solander's species.

*Size.*—The dimensions of my largest specimen are—axis, 7-12ths of an inch; diameter, rather more than 3-12ths of an inch: those of Brander's shell were, according to the figure—axis, 10-12ths of an inch; diameter, rather more than 5-12ths of an inch.

*Localities.*—Barton, Bracklesham Bay. Very rare.

*Section*—CONORBIS.

No. 131. CONUS DORMITOR, *Solander*. Tab. XXIV, fig. 11 *a—c*.

CONUS DORMITOR,	<i>Sol.</i>	1766.	<i>Brand.</i> ,	<i>Foss. Hanton.</i> ,	p. 16, t. 1, fig. 24.
—	—		<i>Sow.</i>	1821. <i>Min. Con.</i> ,	vol. iii, p. 179, t. 301.
—	—		<i>Morris.</i>	1843. <i>Cat. Brit. Foss.</i> ,	p. 143.
—	—		<i>D'Orb.</i>	1850. <i>Prod. de Paléont.</i> ,	vol. ii, p. 356, No. 338.
—	—		<i>G. Sow.</i>	. <i>Gen. of Shells</i> ,	<i>Conus</i> , fig. 8.

*C. testá crassiusculá, fusiformi; utrinque conicá, concentricè lineatá, antice sub-productá, viá emarginatá, paulo retroflexá; lineis concentricis elevatis, æqualibus, irregularibus, sub-distantibus; interstitiis concavis, lineis incrementi tenuissime crenulatis: aperturá lineari, angustá; labro acuto, rotundato-elliptico, intús incrassato, postice late sinuato; labii margine anteriori elevatá, productá.*

*Var. SEMINUDA. Testá ad basin transversim sulcatá; anfractibus postice unico sulco exaratis, cæterum lævibus.*

Shell rather thick, fusiform, resembling two nearly equal cones, placed base to base, and ornamented with concentric raised lines; the spire, forming the shorter cone, is elevated, pointed, and terminates in a very small conical pullus of three volutions; whorls



seven or eight, exclusive of the pullus, rounded at the shoulders, nearly straight on the sides, somewhat produced in front, and very slightly bent backwards. The concentric lines are equal, not very distant over the middle of the whorls, but varying in that respect in different individuals; more crowded at the base and on the shoulders, distant on the posterior margins, which are much elevated, and pressed against the preceding whorls; occasionally on the last whorl of mature specimens additional faint lines appear. The spaces between the lines are very slightly concave, and finely crenulated by the lines of growth, which are very perspicuous over the whole surface of the shell. The aperture is narrow, straight, except at the base, where it is a little deflected, and scarcely emarginate; the outer lip thin and sharp on the edge, very much thickened within, faintly crenulated on the inner margin by the concentric lines, of a roundedly elliptical shape, and detached from the suture by a wide but very shallow curvature. The anterior margin of the columellar lip is elevated and prolonged in front, where it serves as the wall of the rudimentary anterior canal formed by the produced base of the shell.

In specimens from Brockenhurst and Lyndhurst, the middle and upper parts of the whorls are perfectly smooth, with the exception of a single furrow which traverses the posterior margins; and the base of the shell presents numerous shallow furrows, which extend almost up to the middle of the whorl, instead of the sharp elevated lines which characterise the typical form.

This well-known species, peculiar, I believe, to the Hampshire basin, forms the type of Mr. Swainson's genus *Conorbis*. In the elevated conical spire, the almost semicircular form of the outer lip, and the produced base of the whorls, it presents the closest analogies with that section of the *Pleurotomæ* formed of *P. prisca*, *P. amphiconus*, *P. linearis*, and similar species. Indeed, so closely does it approach to some of these, that, judging from external characters only, it is difficult to decide to which genus it should be referred. The straight, narrow aperture, however, is certainly that of a cone, and indicates a necessity that the animal, in order that it might withdraw into the inner whorls, should be enabled to enlarge the space within the shell; a necessity which, as I have already stated, was met by the power of absorption possessed by the animal. The curvature in the outer lip, also, is quite distinct in its character from the sinus in the outer lip of the *Pleurotomæ*.

*Size.*—Type—Axis, 1 inch and 1-12; diameter, 5-12ths of an inch. Var.—Axis, 1 inch and 3-12ths; diameter, 6-12ths of an inch.

*Localities.*—Barton, Alum Bay (No. 29, *Prestwich*), Lyndhurst, and Brockenhurst (New Forest).

No. 132. *CONUS ALATUS*, *F. E. Edwards*. Tab. XXV, fig. 1 *a, b*.

*C. testá sub-fusiformi, utrinque conicá, concentricè sulcatá, antice sub-productá, retro-flexá, emarginatá: spirá acuminatá, in longitudine trientem totius testæ superanti: anfractibus convexiusculis, sub-angulatis; marginibus posticis angustis, concavis, concentricè sulcatis; sulcis concentricis irregularibus, postice evanescentibus: aperturá angustá; labro aliformi, fere semicirculari, acuto, intús incrassato, antice crenulato, postice perparum breviterque emarginato; labio antice reflexo, producto.*

*Var. HEMILISSA. Testá breviori, latiori, postice lævi; marginibus anfractuum valde cavatis, unico sulco concentrico exaratis.*

Shell nearly fusiform, doubly conical, concentrically furrowed, rather produced and bent backwards at the base, and deeply notched; the concentric furrows are irregular, crowded, and sharp-edged over the base, more distant and obscure as they ascend the shell; the spire is pointed, elevated, rather more than a third part of the whole shell in height, and terminates in a very small, conical pullus. The whorls are rather convex, slightly angulated at the shoulder, and a little thickened on the edge round the suture; the posterior margin is narrow, rather concave, and traversed by two or three deepish furrows. The aperture is narrow and nearly straight, with the anterior extremity slightly curved outwards and backwards; the outer lip is remarkably large, almost semicircular, thickened within, thin and sharp on the edge, and separated from the suture by a very small but rather deep curvature; the inner lip produced, reflexed, and curved backwards; the columella presents a broad, elevated ridge or "crest" in front.

A variety occurs at Brockenhurst, in which the shell is shorter and wider; the posterior portion of the whorl is smooth; the angle on the shoulder sharper and more clearly defined, and the posterior margin more concave, and traversed by a single obscure furrow.

The presence, in this species, of concentric furrows instead of the sharp, elevated lines which characterise *C. dormitor*, is not a character to which much specific value can be attached, as these ornaments interchange by insensible degrees; but the depressed, concave posterior margin of the whorls, the very large wing-like, outer lip, the small, narrow, but deep curvature which separates the outer lip from the suture, and the deep anterior notch, with its usual accompaniment, the elevated crest on the columella, appear to me to justify the separation of the present species. Even the variety which, with its half-smooth half-sulcated surface, so much resembles the *var. seminuda* of *C. dormitor*, is easily distinguishable by these characters.

*Size.*—Type—Axis, 1 inch and 5-12ths, nearly; diameter, rather more than 6-12ths of an inch. Variety—Axis, 1 inch; diameter,  $\frac{1}{2}$  inch.

*Localities.*—Type: Bramshaw. Variety: Brockenhurst, Lyndhurst.

Genus 26th. PLEUROTOMA.\* *Lamarck.*TURRIS, 1797, *Humphreys.*PLEUROTOMA, 1801, *Lamarck.*PLEUROTOMARIUS, 1806, *Dumér.*PLEUROTOMUS, 1810, *De Montf.*TURRICULA, 1817, *Schum.* (not *Klein*).PLEUROTOMA, 1840, *Swainson.*— (exc. sect. A) 1847, *Bellardi.*SURCULA, 1853, *Adams.*GENOT, 1757, *Adanson.*CRASSISPIRA, } 1840, *Swains.*  
BRACHYTOMA, }CONOPLEURA, 1844, *Hinds.*GENOTA, 1853, *Adams.*Sect. DRILLIA, 1834, *Gray.*

*Gen. Char.*—*Shell* fusiform, turreted, or conoid, ribbed or concentrically striated, sometimes smooth; spire elevated: aperture oval, terminating anteriorly in a canal more or less elongated; outer lip thin, with a deep fissure or notch near the posterior extremity; columella smooth, nearly straight. *Operculum* pointed, nucleus apical.

This genus, first indicated by Humphreys under the name *Turris*, was established by Lamarck for various shells, which by Linnæus, Chemnitz, and others, had been placed with *Murex*, and by Brugnière with *Fusus*. The animal is very similar to that of the *Cone*, and, like it, presents a strong resemblance to those of the *Muricidæ*, from which it is mainly distinguished by the peculiar character of the dentition. It has a small, flat head, provided with a siphon varying in length, and with cylindrical tentacles wide apart, on bulgings near the bases of which the eyes are placed; and the mouth terminates in a small, fleshy proboscis. The foot is oblong, truncated at each extremity, of nearly uniform width, and thin at the edge; and the mantle has a notch or slit on the right side which corresponds with, and is represented by, the sinus in the shell. The function attributed to this notch is the more ready expulsion of the excretory matter, but the precise way in which it is subservient to that purpose is not known. Apparently it is intended, as Mr. Swainson asserts, for the protrusion of some particular organ of the animal; but the existence of such an organ is not noticed by MM. Quoy and Gaimard in their description of the anatomy of the animal of *Pleurotoma Babylonica*, nor has it as yet been ascertained. The lingual teeth are elongate, subulate, arranged in two series; but, as in the *Cone* animal, the central or rachidian teeth, usually found in other families, are wanting.

\* Etym. Πλευρά, the side; and Τομή, an incision.

When Lamarck first established the present genus, he at the same time separated the species whose shells terminate in a short canal, under the name *Clavatula*, a genus which, as defined by the author, rested wholly on characters taken from the shell, and which was afterwards withdrawn by him as not tenable. In this suppression subsequent writers have concurred until recently, when, a better knowledge of the animal having been acquired, characters have been pointed out which are generally considered as sufficient to justify the separation, and the genus has accordingly been adopted, and has been re-defined by Dr. Gray. The most prominent of these characters are the shape of the foot, which is large and ovular, and the condition of the operculum, the nucleus of which, instead of being apical as in the true *Pleurotoma*, is placed nearly at the middle of the right margin. The shell also, it must be observed, presents an emargination near the anterior extremity of the outer lip, similar to that found among the *Strombidæ*, and a thick callosity at the hind part of the columella near the suture, characters which are not found in the present genus.

The genus *Pleurotoma*, as originally defined, comprised a large number of species, and the list of synonyms shows how strongly the necessity for some subdivision has been felt. Some of the proposed divisions, however, so far as the present imperfect knowledge of the animals will enable the student to estimate their value, appear to rest on conchological distinctions, and as yet are not generally accepted. In others, however, the animals exhibit distinct characters, which, taken in conjunction with modifications of the shells, are received as of sufficient generic value. Thus in *Bela* (Leach), the eyes are placed on the upper part of the tentacles, which are approximate, and the outer lip of the shell is simple, or with a slight sinus confluent with the suture; and in *Mangelia* (Leach; *Defrancia*, Millet; *Raphitoma*, Bellardi), the eyes are sub-pedicelled, the foot is short, tapering behind, and enlarged in front at each corner into a hook-shaped projection, and the dentition, according to Messrs. Forbes and Hanley, presents a simple rachidian tooth in addition to the two lateral subulate teeth of the present genus; the animal, also, is without an operculum, and the outer lip of the shell has a sinus resembling that found in the notched species of *Bela*.\* Again, in *Perrona* (Schum.; *Tomella*, Swains.), the nucleus of the operculum is placed near the middle of the right side, as in *Clavatula*, of which genus, in fact, it appears to be only a smooth form; and again, in *Drillia* (Gray), according to Messrs. Adams, the eyes are placed near the lips of the tentacles, which are very slender and approximated, and the outer lip presents a small sinus in front, like the one in *Clavatula* already noticed. A more extended knowledge of the animals may hereafter support others of the proposed genera; but, in the mean time, they can be received only as subdivisions for facilitating the arrangement of the very numerous species which crowd the present genus.

\* Messrs. Forbes and Hanley have united *Mangelia* and *Bela*, using the latter name to distinguish the operculated species from those without an operculum, which, with those authors, form the true *Mangelia*.

With regard to the genus *Clavatula*, several shells are found among the English eocene *Pleurotomæ*, which, agreeing with Lamarck's definition of the genus, might be, perhaps correctly, referred to it; but since that genus, as re-defined, depends on zoological characters, and on the condition of the operculum, criteria which are not available to the palæontologist, and the species themselves do not exhibit any characters by which they can be separated from the true *Pleurotomæ*, those shells have been referred, in the following descriptions, to the present genus.

Bellardi, in his elaborate and most useful work, 'Monografia delle Pleurotome fossile del Piémonte,' has divided the *Pleurotomæ* into three genera, *Pleurotoma*, *Borsonia*, and *Raphitoma*. The first comprises the true *Pleurotomæ* and the *Clavatulæ* of Lamarck; and with these are associated some fusiform shells generally referred to *Fusus*, the outer lips of which present, not the true notch or slit characteristic of a *Pleurotoma*, but a wide undulation, which the author regards as a "rudimentary sinus." No other reason is assigned, and this certainly does not appear to be a sufficient one, for placing the shells in question in the present genus. Several of the so-called eocene *Fusi* present this undulation in the outer lip; and inasmuch as to refer them to the present genus would, in my opinion, uselessly create much confusion, I have left them among the *Fusi*, where they were first placed. The second genus, *Borsonia*, is proposed for certain shells in which the true sinus of a *Pleurotoma* is associated with a fold on the columella.\* The remaining genus, *Raphitoma*, consists of those species in which the sinus is very small and confluent with the suture, and the canal is indistinct, a division which corresponds pretty accurately with *Mangelia* (Leach). The *Pleurotomæ* are again divided into three sections, according to the size and shape of the sinus; namely, *Pseudotomatæ*, or false-notched shells, composed of the fusiform species before mentioned, in which the outer lip presents the so-called rudimentary sinus; *megatomatæ*, or widely-notched shells;† and *macrotomatæ*, or deeply-notched shells. The last section is again sub-divided into five groups; *deltoideæ*, in which the canal is but little produced, and the sinus is placed in an angular depression; *pteroideæ*, in which the canal is elongated, the outer lip aliform and produced in front, and the sinus is in a depression; *cariniferæ*, having the canal as long as the spire, and the sinus on a keel; *excavatæ*, in which also the canal is as long as the spire, but the sinus is between the shoulder and the suture; and *hemicycloïdales*, having the canal indistinct, and the sinus semicircular, and placed in a depression.

Although this classification will render great assistance in the study of the present

\* Shells referable to this division, as enlarged by Rouault, occur in our middle eocene strata; the genus *Borsonia* will therefore be noticed in its proper place.

† Bellardi cites *Tomella*, Swains., as corresponding with his section *Megatomatæ*; that section, however, consists of two species only, *P. cataphracta*, Broc., and *P. ramosa*, Bast., in both of which the shells are many whorled, turreted, coronated, and concentrically striated, and therefore do not at all agree with Mr. Swainson's definition of his genus *Tomella*.

genus, the distinctions between some of the groups will, I think, be found to be difficult of practical application; nor will the groups proposed embrace all the forms which occur in the English eocene fauna. The employment of a few broadly marked characters, which the eye can readily seize, will afford, in fact, more effectual aid to the student; and with this view I have adopted the division of the *Pleurotomæ*, proposed by M. Deshayes, into *fusiformes* and *conoidales*; but the *fusiformes* I have divided into two sections, distinguished by the position of the sinus, a prominent and unvarying character; while the size and, to some extent, the shape of the sinus are subject to modification. The first section will comprise the species in which the sinus is placed in the margin, that is to say the space between the suture and the shoulder, or widest part of the whorl; the second section will embrace those in which the sinus is placed on the shoulder of the whorl. Each of these sections will be sub-divided into two groups, respectively consisting of the species having the canal produced, and the species in which the canal is short or indistinct.

The genus *Pleurotoma* is one of peculiar interest; it seems to form a central group, in which either the animals present close affinities with those of the neighbouring genera, or the shells, radiating through aberrant forms in which the typical characters are prominently retained, present striking analogies with those of apparently distant genera; analogies which, if not suggestive of affinities, at least show the repetition of similar forms in dissimilar groups. Thus the passage from the true fusiform *Pleurotomæ* through the conoidal forms of that genus into the species of *Cone* forming the section *Conorbis*, and so into the true Cones, is a transition so gradual and so perfect as in itself to afford the strongest evidence of the intimate connection of the present genus with the Conidæ. So, again, the passage through *Lachesis* into *Murex*—that through the shells before referred to with the so-called rudimentary sinus in the outer lip into the true *Fusus*; and also that through *Borsonia* into *Turbinella* or *Fasciolaria*; while the short posterior canal in the species forming Swainson's genus *Brachytoma*, and the anterior notch on the outer lips of the *Drillia*, present strong resemblances to the *Strombidæ*.

The living species of *Pleurotoma* are very numerous, upwards of 450, including those forming the different sub-genera, having been described: they are found in all parts of the world, but principally in the seas of China and Western America, ranging in depth from low-water mark to 100 fathoms. In the fossil state they first appear in the upper cretaceous strata, from which four species referred to this genus have been described by Goldfuss, Sowerby, and D'Orbigny. During the tertiary epoch the genus was largely developed; upwards of 90 species, from the eocene formations of Europe, have been described by Lamarck, Sowerby, Deshayes, Melleville, and other writers; while from the more recent formations nearly 200 species have been recorded by Brocchi, Grateloup, Basterot, De Koninck, Nyst, Bellardi, Sowerby, S. Wood, Hörnes, and the many other authors who have described the mollusca of the newer

tertiary deposits. In the Western hemisphere, which presents a large proportion of the living species, the genus does not appear to have had so large a development; twenty-three species only from the tertiary deposits in the United States have been described by Conrad and Lea, and three species from the newer tertiaries of Chili have been described by Sowerby. The genus is largely represented in the English eocene fauna, but as yet comparatively few species have been described or identified.

The shells of the *Pleurotomæ* appear to have been peculiarly subject to modification by external conditions, and, as De Blainville has remarked, it is "apparently with them as with the *Cerithia*, the *Ammonites*, and other genera which contain many species; each locality presents different forms."

*Section I. Shells fusiform.*

A. *Sinus in the posterior margin of the whorl.*

a. *Canal elongated.*

No. 133. *PLEUROTOMA STENA*, *F. E. Edwards*. Tab. XXV, fig. 4 *a*, *b*.

*P. testá elongato-fusiformi, angustá, sub-turritá, fasciis et filis spiralibus, lineis incrementi decussatis, omnino tectá; spirá productá, apice acuminato: anfractibus convexiusculis, angulatis, obtuse carinatis, postice sub-concavis, ad suturam crenulatis; filis concentricis numerosis, inæqualibus; anfractu ultimo antice gradatim attenuato et in canali longo, recto, exeunti: aperturá elongato-ovali; labro vix arcuato; sinu labrali angusto, profundo in margine collocato.*

Shell elongate, fusiform, narrow, ornamented with numerous spiral bands, the spaces between which, as well as the surface between the shoulder and the suture, and sometimes even the spiral bands, are covered with numerous fine, thread-like, unequal, raised lines, decussated, or rather roughened, by the lines of growth; the spire, which is formed of seven or eight volutions, is much produced; the whorls are slightly convex, sharply angulated at the shoulder; the posterior margins depressed and slightly thickened at the edge, where one or two raised lines, stronger than the others, and crenulated by the lines of growth, run round the suture; the space between the suture and the shoulder is concave, giving somewhat of a turreted aspect to the spire. The spiral bands are irregular, narrow, flat on the surface, sharp edged; the posterior band runs round the shoulder, forming a blunt keel, and the space between it and the band immediately in front of it is wider than those between the other bands, and is concave; the bands, as they approach the anterior part of the shell, become closer, narrower, and less prominent, while, on the other hand, the concentric lines become stronger, more elevated, and more distant, until the two blend together, and form the round, coarse, raised lines which cover the base of the shell

and the canal. The body whorl is gradually much attenuated in front, and terminates in a long, nearly straight canal. The aperture is of a lengthened oval shape; the outer lip slightly arched; and the sinus which is in the middle of the margin, is narrow and deep.

The young shell of the present species presents some resemblance to the variety *Pagoda* of *P. terebralis*; but the latter shell is proportionably wider and shorter, and is distinguished as well by the smooth posterior margins of the whorls as by the sharp-edged keel, which is turned upwards, forming a deep channel round the margin.

*Size*.—Axis, 2 inches and 10-12ths; diameter, 8-12ths of an inch.

*Localities*.—Highgate, Clarendon Hill, Shenfield, and Southampton.

No. 134. PLEUROTOMA INARATA, *Sowerby*. Tab. XXV, fig. 6.

PLEUROTOMA INARATA, *Sow.* 1850. *Dixon's Geology, &c., of Sussex*, pp. 102, 183, t. 6, fig. 21.

— — *Morris.* 1854. *Cat. of Brit. Foss., 2d edit., p. 270.*

*P. testá elongatá, fusiformi, spiraliter lineatá; spirá conicá, acuminatá: anfractibus convexiusculis, postice sub-concavis, marginatis, ad suturam leviter crenulatis; ultimo anfractu in canali longo, angusto, subrecto exeunti; striis spiralibus numerosis, lineis incrementi decussatis, alternis vel trinis crassis, cæteris tenuibus: aperturá ovatá; labro arcuato, sinu profundo, sub-trigono, in margine collocato.*

Shell fusiform, elongated, ornamented with spiral, raised lines: spire elevated, conical, pointed: whorls convex, thickened on the margin, where they present a raised border running round the suture, feebly crenulated at the edge, and traversed by two or three slender, concentric, raised lines; the space between the suture and the shoulder slightly concave, and covered with very fine, thread-like, concentric, raised lines, which are crowded near the raised border: the last whorl terminates in an elongated, nearly straight canal, almost as long as the spire. The spiral lines on the middle and front parts of the whorls are numerous, strongly decussated by the lines of growth, and unequal; every alternate or third line being thick, prominent, and sharp on the edges, and the intermediate lines thread-like and slender. The aperture is ovate, the outer lip much arched, and the sinus, which is placed in the depression between the suture and the shoulder, is deep, moderately wide, and sub-trigonal in shape.

This species appears to be the analogue of the Barton and Highcliff species, *P. rostrata*, from which it is distinguished by the absence of the tubercles and the ribs, or undulations on the shoulders.

*Size*.—Axis, 2 inches and 2-12ths; diameter, rather more than 8-12ths of an inch.

*Locality*.—Bracklesham Bay.



No. 135. PLEUROTOMA HELIX, *F. E. Edwards*. Tab. XXV, fig. 7 *a, b*.

*P. testá elongato-fusiformi, sub-turritá, fasciis spiralibus, lineis incrementi asperatis, cinctá; spirá elevatá: anfractibus convexis; marginibus posticis latis, cavatis, lineas concentricas filiformes inæquales gerentibus, ad suturam crenulatis; fasciis spiralibus angustis, numerosis, alternatim majoribus et minoribus: aperturá elongato-ovali, in canali longo terminanti; labro valde arcuato; sinu angusto, profundo, in margine collocato.*

*Var. RICNA. Testá anfractibus sub-angulatis; fasciis spiralibus numerosioribus, tribus minoribus inter majores apparentibus.*

Shell lengthened, fusiform, and covered with concentric bands, roughened by the strongly marked lines of growth; spire elevated: whorls convex, rounded at the shoulder, produced in front; the posterior margins wide, channeled, and bordered round the suture by two or three bands strongly crenulated; the middle of the margin presents three coarse, rounded, raised lines, and on each side of these three or more fine thread-like lines. The line of the suture is very decurrent, and runs at some distance below the wide part of the whorl, giving a screw-like appearance to the spire. The spiral bands are numerous, rounded at the edges, and unequal, the alternate ones being smaller than the others. The aperture is of a narrow, ovate form, and terminates in a longish straight canal; the outer lip is much arched, and the sinus, which is deep and moderately wide, is placed in the middle of the margin.

Specimens occur at Potter's Bar (*var. ricna*), in which the shoulders of the whorls are angulated, and a fine thread-like line runs on each of the smaller spiral bands.

The specimens figured were obtained from the railway cutting at Primrose Hill, and form part of Mr. Wetherell's collection.

*Size.*—The exact dimensions cannot be given, but those of the largest specimen figured must have been—axis, nearly 3 inches; diameter, 11-12ths of an inch.

*Localities.*—Primrose Hill and Potter's Bar.

No. 136. PLEUROTOMA SYMMETRICA. *F. E. Edwards*. Tab. XXV, fig. 5 *a, b*.

*P. testá elongato-fusiformi, gracili, spiraliter fasciatá, in juvenetá costulatá; spirá elevatá: anfractibus convexiusculis, marginibus posticis viz cavatis, ad suturam marginatis, crenulatis; ultimo anfractu in canali longo exeunti; fasciis spiralibus irregularibus, lineis incrementi asperatis: aperturá ovali elongatá; labro valde arcuato; sinu mediocriter lato, parum profundo, in margine collocato.*

Shell lengthened, slender, fusiform, ornamented with numerous spiral bands, and, in the early stages of its growth, obscurely ribbed: spire elevated, pointed: whorls

(8—10) slightly convex; the posterior margins narrow, very slightly depressed, rather thickened at the edges, and presenting round the suture two raised lines, obscurely granulated; in front of these, two or three fine, thread-like lines run along the middle part of the margin, granulated by the lines of growth, which are much elevated until they cross the shoulder, and give a wrinkled appearance to the margin. The spiral bands over the other parts of the whorls are numerous, irregular, and unequal; smaller ones alternating with large ones. The aperture is narrow, and of an oblong-oval form; the outer lip arched, and the sinus, which is moderately wide, and not very deep, is placed in the front part of the margin, immediately behind the shoulder.

In the ornamentation the present species resembles *P. helix*, but the narrow posterior margin, the position of the sinus, and the slight but nearly regular convexity of the whorls, giving a symmetrical appearance to the shell, distinguishes it as well from that species as from *P. crassa*.

*Size*.—The largest specimen figured would be, if perfect—axis, nearly 4 inches; diameter, 1 inch.

*Localities*.—Potter's Bar, Chalk Farm, Southampton, Shenfield.

No. 137. PLEUROTOMA TERETRIUM. *F. E. Edwards*. Tab. XXV, fig. 8 a—h.

*P. testá elongatá, fusiformi, spiraliter lineatá: anfractibus convexiusculis, marginibus posticis concavis, concentrice lineatis, ad suturam marginatis; suturis perspicuis; ultimo anfractu valde producto, in canali longo exeunti; lineis spiralibus irregularibus, alternatim funiculosus et tenuibus, lineis incrementi per-asperatis: aperturá elongato-ovali; labro valde arcuato; sinu lato, profundo, in margine collocato.*

*Var. NANODIS. Testá breviori, latiori; marginibus posticis anfractuum pauvillum cavatis.*

*Var. CREBRILINEA. Testá minori, graciliori: anfractibus obsolete tuberculatis, lineis spiralibus numerosis, æqualibus, fortiter decussatis.*

*Var. TUBERCULATA. Testá graciliori: anfractibus sub-angulatis, tuberculatis, ad suturam crenulatis: lineis spiralibus confertis, sub-æqualibus.*

*Var. LATIMARGINATA. Testá minori: spirá tuberculatá: marginibus anfractuum latissimis, contrá spiram expressis.*

Shell elongate, fusiform, ornamented with numerous spiral, raised lines; spire elevated, formed of 7—9 volutions: whorls somewhat convex, separated by a perspicuous suture, and much produced in front, the last whorl terminating in a long, nearly straight canal; the posterior margins concave, slightly thickened, and occasionally feebly crenulated at the edge. The spiral lines over the middle and front parts of the whorls are irregular, thickish, cord-like bands, alternating with slender, thread-like lines, and

all much roughened, almost decussated, by the lines of growth; the spiral lines on the posterior margins are numerous and nearly equal, the two or three nearest the suture being rather more prominent than the others. The aperture is of a lengthened, ovate form; the outer lip much arched; and the sinus, which is placed in the front part of the marginal depression, is deep and moderately wide. Specimens frequently occur (var. *nanodis*, fig. 8 *b*) in which the shell is shorter and wider than in the typical form, and the margins of the whorls not being so much depressed and hollowed out, give a nearly conical form to the spire; but the character of the concentric lineation, the shape and position of the sinus, and the form of the outer lip, correspond with those of the type.

Other forms also occur which, although presenting differences in the proportions or ornamentation of the shells, or in the form of the outer lip, agree in other respects so closely with the present species, that they appear to me to be merely varieties of it.

In the first of these forms (var. *crebrilinea*, fig. 8 *f*), the shell is smaller and narrower, the spire more pointed and obscurely tuberculated; the spiral lines are slender, numerous, and deeply cut by the sharp, prominent lines of growth, and the margins of the whorls are finely plicated. In the next form (var. *tuberculata*, fig. 8 *c—e*) the spire is more slender; the concentric ornamentation resembles that of the variety *crebrilinea*, but the whorls are angulated, and present a single row of slightly oblique, oblong tubercles, which are continued, in some instances, even on the last whorl of the fully formed shell. The third variety (var. *latimarginata*, fig. 8 *g, h*) resembles the preceding variety in the proportions of the shell, and the angular and tuberculated whorls, but the posterior margins are widely spread out, and pressed against the preceding whorls, which are covered by them almost up to the tubercles. In all the last three varieties, the outer lip is not so much arched as that of the typical form.

This species so closely resembles one from Tortona (*P. granulosa*, Bon.; *P. Sismondæ*, Bell.), that it is difficult to separate the two. In the Italian shell, the whorls appear to be more numerous, and the posterior margins present from three to five rows of bead-like granulations near the suture; but, judging from the figure and description given by Bellardi, the two species appear to agree in the form of the whorls, the character of the spiral ornamentation, the condition of the outer lip, and the position and shape of the sinus. The differences pointed out are scarcely sufficient to justify the separation of the present species; but without an actual comparison of the shells themselves, I do not venture to identify a form from the older eocene deposits in this country with one from the pliocene formations of Italy.

*Size*.—Of the type; axis, 2 inches and a half; diameter, 10-12ths of an inch. Of the variety *tuberculata*; axis, 1 inch and 7-12ths; diameter, not quite half an inch.

*Localities*.—The species is found, in all its varieties, at Highgate; the variety *crebrilinea* also occurs at Potter's Bar and Shenfield; and the variety *tuberculata* at

Southampton, Shenfield, Clarendon Hill, Primrose Hill, Haverstock Hill, and Alum Bay (No. 4, Prestwich). In the variety *crebrilinea*, from Shenfield, the body-whorl is short, and rather suddenly contracted in front, and the lineation is very fine and nearly equal.

No. 138. PLEUROTOMA CRASSA. *F. E. Edwards.* Tab. XXVI, fig. 1 *a—d*.

*P. testá elongato-fusiforimi, longitudinaliter costulatá, spiraliter fasciatá; spirá elevatá, acuminatá: anfractibus convexis, antice subito coarctatis; marginibus posticis concavis, concentricè granuloso-lineatis, ad suturam incrassatis, oblique plicatis; suturis perspicuis; fasciis spiralibus numerosis, plus minusve latis, crassis, cum lineis concentricis filiformibus alternantibus, lineis incrementi per-asperatis: aperturá oblongo-ovali; labro leviter arcuato; sinu lato sub-triangulari in mediá margine collocato; canali antico, longo, recto.*

Shell elongate, fusiform, longitudinally ribbed, and spirally banded: spire elevated, being nearly as long as half the shell, and pointed: whorls many (9—11), convex, rather suddenly contracted, and much produced in front; the posterior margins hollowed out, thickened and strongly plicated by the prominent lines of growth on the sutural edge; the ribs rounded, moderately distant, rather oblique and short, not extending, even in young shells, much in front of the shoulder, and lost on the last whorl of the fully grown shell. Several coarsish concentric lines traverse the margins of the whorls, and are decussated by the lines of growth; two or three on the sutural edges are thicker and more elevated than the others, and from the deep decussation assume the appearance of a double row of coarse granulations: the bands over the middle and front of the whorls are more or less broad, prominent, rather closely set, and separated by strong, thread-like lines, the whole much roughened by the lines of growth: the body whorl is produced in front into a long, moderately wide, and nearly straight canal. The aperture is of an oblong, ovate shape; the outer lip arched, but not much; and the sinus, which is placed in the middle of the margin, is wide and subtrigonal. Occasionally specimens occur in which the shell is wider, and the spire not so much produced; but in all other respects agreeing with the typical form.

*Size.*—The large specimen figured would be, if perfect—axis, 4 inches and 3-12ths; diameter, 1 inch and 4-12ths.

*Localities.*—Clarendon Hill, Southampton, Shenfield.

No. 139. PLEUROTOMA PLANETICA. *F. E. Edwards.* Tab. XXVI, fig. 3.

*P. testá elongato-fusiforimi, sub-turritá, undique spiraliter lineatá; spirá elevatá, acumi-*

*natá: anfractibus numerosis, angulatis, convexis, sub-ventricosis, in juventá tuberculatis; marginibus posticis latiusculis, concavis; ultimo anfractu in canali longo, recto, terminanti; striis spiralibus numerosis, inæqualibus, lineis incrementi asperatis; striis duobus vel tribus ad humeros prominentioribus: aperturá pyriformi; labro arcuato; sinu lato, profundo, in margine collocato.*

Shell elongate, fusiform; spire much produced, pointed: whorls many (10—12), convex, somewhat ventricose, angulated at the shoulders, much attenuated, and produced in front, the last whorl terminating in a long, straight, moderately wide canal; the posterior margins are rather wide, depressed, channeled along the middle, and somewhat thickened at the edge, so as to present a broadish, slightly elevated border round the suture. The angulated shoulders, and depressed posterior margins of the whorls, give a turreted character to the spire. Two sharp, elevated, and rather distant spiral lines run round the border, and several faint and unequal lines traverse the hollow part of the margins. On the middle and front parts of the whorls the spiral lines are numerous, irregular, and unequal, a slender, thread-like line occasionally occurring between thicker and more elevated lines; two or three on the shoulder are more prominent and distant than the rest. The aperture is pear-shaped, rounded behind, contracted in front; the outer lip much arched; the sinus wide, very deep, sub-trigonal in form, and placed a little in front of the middle part of the margin.

This elegant *Pleurotoma* is apparently confined to the middle eocene strata; it has hitherto been obtained only from Bramshaw and the synchronous beds at Bracklesham Bay.

*Size.*—Axis, 2 inches and 9-12ths; diameter, 10-12ths of an inch.

No. 140. *PLEUROTOMA GONIÆA*, *F. E. Edwards*. Tab. XXV, fig. 10.

*PLEUROTOMA TRANSVERSARIA*, *Sow.* (non *Lam.*) 1850. *Dixon's Geol., &c., of Suss.*, p. 102.

— — — *Morris*. 1854. *Cat. Brit. Foss.*, 2d edit., p. 270.

*P. testá elongato-fusiforimi, turritá, lineis spiralibus omnino tectá; spirá elevatá: anfractibus depresso-convexis, angulatis, obscure carinatis; marginibus posticis latis, sub-concavis, ad suturam crenulatis; ultimo anfractu in canali mediocri, subrecto, exeunti; lineis spiralibus tenuibus, confertis, irregularibus: aperturá lanceolatá; labro rotundo-arcuato; sinu mediocriter lato, profundo, in margine collocato.*

Shell elongated, fusiform, turreted; spire elevated, apparently much exceeding the last whorl in length: whorls rather convex, flattened at the sides, and angulated at the shoulders, which slightly project, and present the appearance of an obscure, rounded keel; the posterior margins are very wide, hollowed out, and crenulated round the suture; the last whorl contracts rather suddenly in front, and

terminates in a widish, moderately long, and nearly straight canal. The whole surface of the shell is covered with very fine, spiral, raised lines, rather distant in front, crowded, unequal, and irregular over the middle part of the whorls, where very slender, thread-like lines frequently alternate with thicker and more prominent lines; three or four faint lines run along the middle of the posterior margin, and on each side of them are several others, rather stronger and decussated by the lines of growth. The aperture is lanceolate; the outer lip large, and roundly arched; and the sinus deep, moderately wide, and placed in the very middle of the collar: the columella is slightly twisted.

The shell figured forms part of my collection, and is the specimen which Mr. Sowerby (loc. cit.) has referred to *P. transversaria* (Lam.); but the long, turreted spire, the angulated whorls, the character of the transverse lineation, the shape of the outer lip, and especially the position of the labial sinus, seem to entitle it to specific distinction. The species is very rare.

*Size*.—If the specimen figured were perfect, the dimensions would be—axis, 2 inches and 4-12ths nearly; diameter, 10-12ths of an inch.

*Locality*.—Bracklesham Bay.

No. 141. PLEUROTOMA TRANSVERSARIA, *Lamarck*. Tab. XXV, fig. 9 *a*, *b*.

			PLEUROTOMA TRANSVERSARIA, <i>Lamk.</i> 1804. Ann. du Mus., vol. iii, p. 166, No. 6.
	—	—	<i>Ib.</i> 1822. Hist. Nat., vol. vii, p. 98, No. 1.
	—	—	<i>De Blainv.</i> 1826. Dict. des sc. nat., vol. xli, p. 389.
	—	—	<i>Desh.</i> 1832. Encyc. méthod. (Vers.), vol. iii, p. 796, No. 14.
	—	—	<i>Ib.</i> 1824-37. Descr. des coq. foss., &c., vol. ii, p. 450, t. 62, figs. 1, 2.
			Nec PLEUROTOMA TRANSVERSARIA, <i>Grat.</i> 1838. Tabl. stat. des. coq., &c., de l'Adour, p. 13, No. 152.
nec	—	—	<i>Ib.</i> 1838. Cat. zool., &c., de la Gironde, p. 45, No. 382.
nec	—	—	<i>Ib.</i> 1847. Conchyl. foss., &c., de l'Adour, supp. Pleurot., t. 1, fig. 11, No. 19.
nec	—	—	<i>Sow.</i> 1850. Dixon's Geol., &c., of Sussex, p. 102.

*P. testá elongato-fusiforini, spirá acuminatá: anfractibus convexiusculis, postice et antice tenuissime lineatis, cæterum levibus; marginibus posticis depressis, sub-canaliculatis; ultimo anfractu in canali longo, angusto, exeunti: aperturá ovatá; labro tenuissimo, arcuato; sinu mediocriter lato, profundo, in margine collocato.*

*Var. CYPHA* (fig. 9 *b*). *Testá minori; anfractibus convexis; marginibus posticis depressioribus.*

Shell fusiform, elongated, with an elevated, nearly conical spire: whorls (10—11) slightly convex, and depressed, almost channeled, on the posterior margins; the space between the suture and the shoulder is covered with numerous, very fine, spiral,

raised lines, which, in well-preserved specimens, are decussated by the lines of growth; the middle part of the whorl in the adult shell is quite smooth, and the body-whorl, which is rather longer than the spire, terminates in a long, narrow, nearly straight canal, ornamented with numerous, somewhat irregular, obliquely transverse, raised lines; these lines, which are very fine and undulating, gradually become more and more feeble as they ascend the canal, and ultimately disappear towards the middle of the whorl. The aperture is ovately oblong; the right lip very thin, and much arched; the sinus, which is placed in the margin, just behind the shoulder, is wide and moderately deep.

In the specimens from Lyndhurst (var. *cypha*), the whorls are more convex, the posterior margins more depressed, and the outer lip less roundly arched than in the typical form, and the shells themselves are smaller; but in the ornamentation, and in the position and shape of the labial sinus, they agree with *P. transversaria*, of which they appear to be merely local varieties.

The shells from Dax and the environs of Bordeaux, described by Grateloup, and to which M. Deshayes refers as being possibly a variety of the Paris basin species, are specifically distinct, and have been named *P. opis* by M. D'Orbigny; and the specimen from Bracklesham Bay which Mr. Sowerby (Dixon's 'Geol.' &c.) has referred to the present species, also appears to be specifically distinct, and I have separated it accordingly under the name *P. goniæa*.

Our English specimens have attained a less size, and are somewhat narrower, than the French ones, but in all other respects they agree well.

*Size*.—Axis, 1 inch and 10-12ths; diameter, rather more than 7-12ths of an inch.

*Localities*.—Brockenhurst, Lyndhurst. *French*—Parnes, Grignon, Chaumont (fide *D'Orb.*); Marquemont, Lattainville, Hermes, Neuvillebose, Saint-Felix (fide *Graves*); Betz, department de l'Oise (fide *De Blain*.)

No. 142. PLEUROTOMA CYMÆA, *F. E. Edwards*. Tab. XXVI, fig. 4 *a*, *b*. Tab. XXVII, fig. 9.

*P. testá elongato-fusiforimi, latiusculá, tuberculatá, undique spiraliter lineatá; spirá elevatá, sub-conicá: anfractibus convexis, angulatis; marginibus posticis latis, vix cavatis; tuberculis numerosis, parvis, nodiformibus, obliquis; lineis spiralibus confertis, subtilissimis, undulosis, antice eminentioribus, postice fere obsolete: aperturá oblongo-ovali, in canali longo, recto, exeunti; labro arcuato, tenui; sinu profundo, in margine collocato.*

*Var. NANA. Testá minori, angustiori: canali longiori?*

Shell rather broad, fusiform, with an elevated, nearly conical spire, formed of nine or ten volutions: whorls convex, sharply angulated at the shoulders, where they present

a row of numerous, obliquely compressed, small, knob-like tubercles. The whole surface of the whorls is covered with very fine, slightly undulating, closely set, thread-like, concentric raised lines, irregular, unequal, and roughened by the lines of growth; these lines are prominent on the canal and the front part of the shell, but become more and more faint, and at last are almost effaced as they approach the shoulders of the whorls. The posterior margins are wide, very slightly channeled along the middle, and ornamented with numerous slender, concentric lines, four or five of which, running along the sutural edge, are more prominent than the rest, and are decussated by the oblique lines of growth of the sinus, forming a riband-like border to the whorls. The aperture is of an oblong, oval form, and terminates in front in a long, straight canal; the outer lip is thin, sharp-edged, and much arched; the sinus is deep, not very wide, and placed a little in front of the middle of the collar.

In the variety *nana* (Tab. XXVII, fig. 9), which is proposed for an immature specimen from Colwell Bay, in my collection, the shell is much smaller and narrower, and, apparently, the canal is more produced; but on this last point I cannot speak with certainty, as the canal is not perfect in any of the specimens of the type I have seen. In the general form of the shell, however, in the nearly conical spire, the character of the ornamentation, the position and shape of the sinus, and the roundedly arched outer lip, the specimen in question agrees so exactly with the true *P. cymæa*, that I can only regard it as a variety of that species dwarfed by unfavorable conditions.

This *Pleurotoma*, which at first sight might be considered to be a local variety of *P. dentata*, is distinguishable from that species by the greater width of the shell, the more conical spire, the wider posterior margins of the whorls, the character of the transverse ornamentation, and the numerous small, knob-like tubercles which take the place of the sharp-edged transverse teeth, characteristic of *P. dentata*. It more resembles *P. transversaria*, as well in the shape and relative proportions of the shell, as in the form and position of the sinus and the character of the concentric lineation; and a larger series of specimens may eventually lead to the conclusion that it is merely a variety of that species. The tuberculated and sharply angulated whorls, however, characters to which I am not aware that *P. transversaria* offers any approach, apparently entitle the shells in question to specific distinction.

*Size*.—Axis, 1 inch and 4-12ths; diameter,  $\frac{1}{2}$  inch.

*Locality*.—Brockenhurst and Colwell Bay, at each of which places it appears to be very rare.



No. 143. PLEUROTOMA COCCIPHORA, *F. E. Edwards*. Tab. XXVI, fig. 2.

*P. testá elongatá, fusiformi, longitudinaliter costellatá, undique spiraliter granuloso-lineatis· anfractibus convexiusculis, angulatis, ad suturas incrassatis, granulatis; marginibus posticis mediocriter latis, vix cavatis, lineas filiformes confertas gerentibus; costellis angustis; lineis spiralibus numerosis, fortiter decussatis, inæqualibus, lineis majoribus cum lineis tenuibus alternantibus: aperturá ovali; labro leviter arcuato; sinu fere semicirculari, in margine collocato.*

Shell elongate, fusiform, longitudinally ribbed, and having the whole surface ornamented with spiral raised lines; spire elevated, pointed: whorls (7—9) slightly convex, angulated; the posterior margins moderately wide, nearly straight, and covered with fine, thread-like, concentric lines; two on the sutural edge are more prominent than the others, and decussated by the lines of growth so as to present a double row of fine granulations; the last whorl is produced in front into a long, and apparently nearly straight, and moderately wide canal; the costellæ are narrow, rather short, barely extending beyond the middle of the whorl, and are more or less distant in different specimens; the spiral lines over the middle and front parts of the shells are numerous and unequal, a slender, thread-like line occasionally intervening between others thicker and more prominent; all are deeply and regularly decussated by the lines of growth, so that the larger lines assume the appearance of rows of bead-like knobs. The aperture is of an oblong, oval shape; the outer lip slightly arched; and the sinus, which is placed towards the front of the margin, is wide, not very deep, and almost semicircular.

This Pleurotoma closely resembles the young shell of *P. crassa*, of which, if it were not for the great difference in size, it might be considered to be only a local variety; the spire, however, is shorter and more conical, the whorls more angulated, less convex and more gradually attenuated in front; the posterior margins narrower and less concave; and the sinus nearer the shoulder, and rounder than in that species. The spiral lines also, broken into rows of beads by the lines of growth, form an ornamentation quite distinct in character from the broad, coarse bands which characterise *P. crassa*.

The specimen figured forms part of Mr. Wetherell's collection.

*Size*.—Axis, rather more than 1 inch; diameter, 4-12ths of an inch.

*Locality*.—Highgate, where it is apparently very rare.

No. 144. PLEUROTOMA ROSTRATA, *Solander*. Tab XXVI, fig. 8 a—c.

- MUREX ROSTRATUS, *Sol.* 1766. *Brand.*, *Foss. Hanton.*, p. 21, t. 2, fig. 24.  
 PLEUROTOMA ROSTRATA, *Sow.* 1818. *Min. Con.*, vol. ii, p. 104, t. 146, fig. 3.  
 — — — *De Bl.* 1826. *Dict. des. sci. nat.*, vol. xli, p. 390.  
 — — — *Morris.* 1842. *Cat. Brit. Foss.*, p. 157.  
 — SUB-ROSTRATA, *D'Orb.* 1850. *Prod. de Paléont.*, vol. ii, p. 359, No. 406.  
 — ROSTRATA? *Phil.* 1851. *Tert. Foss. Magdeb. (Palæont.)*, vol. i, p. 64, No. 118.  
 — — — *Morris.* 1854. *Cat. Brit. Foss.*, 2d edit., p. 270.  
 Nec PLEUROTOMA ROSTRATA, *De Kon.* 1837. *Desc. des. coq. foss., &c., de Basele, Boom, &c.*,  
 p. 24, No. 23.  
 nec — — — *Nyst.* 1843. *Desc. des. coq. foss., &c., de la Belg.*, p. 522, t. 42,  
 figs. 2, 3.  
 nec — — — *Ib.* 1843. *Bull. Soc. Géol. de France*, vol. xiv, p. 453.

*P. testá elongato-fusiforimi, angustá, turritá, undique spiraliter lineatá; spirá elevatá, acuminatá: anfractibus numerosis, convexis, in medio oblique tuberculatis; marginibus posticis concavis, ad suturam aliquando paulum incrassatis et cingulo duplici crenulato cinctis, aliquando simplicibus; lineis spiralibus in margine tenuibus, cæteris elevatis, rotundatis, irregularibus, inæqualibus, lineis incrementi per-asperatis: aperturá oblongo-ovali, in canali prælongo, angustato, subrecto productá; labro aliformi; sinu profundo mediocriter lato, in margine collocato.*

*Var. ANTIQUA. Testá latiori, breviori; anfractibus subangulatis.*

Shell long, narrow, fusiform, turreted, having the whole surface covered with spiral raised lines; the spire much elevated, being nearly half the length of the whole shell, and pointed; the whorls are numerous (10—12 without the pullus), very convex, and armed near the middle with a single row of oblique tubercles, more or less prominent in different individuals; the posterior margins are moderately wide, concave, occasionally thin, and nearly smooth along the sutural edge, but more frequently slightly thickened, plicated, and ornamented with two prominent concentric lines, granulated by the lines of growth. The spiral lines in the middle of the posterior margin are close-set and very slender; over the other parts of the whorl they are prominent, rounded, irregular, unequal, small filiform lines intervening between larger ones; and all are very much roughened, almost granulated, by the lines of growth. The aperture is of an oblong, ovate form, and terminates in front in a long, rather narrow, and somewhat curved canal; the outer lip is roundedly arched and wing-like; the sinus is deep, moderately wide, subtrigonal, and placed in the middle of the margin.

In the specimens from Highcliff (*var. antiqua*, fig. 8 c), the shells are wider, and

proportionately shorter than in the type, and the whorls are slightly angulated at the shoulders.

Much confusion exists among several of the Continental authors with respect to this species, in consequence of the shell figured as *P. rostrata* in 'Mineral Conchology' having been considered by them as distinct from the *Murex rostratus* of Solander, although Mr. Sowerby cites the latter as a synonym. Thus M. de Koninck has described a pleurotoma from Basele and Boom, which he has referred to *P. rostrata* of Sowerby, but without having cited Brander's figure; and this pleurotoma, Nyst, after stating that it differs essentially from *Murex rostratus*, but that it is without doubt Sowerby's *P. rostrata*, regards as merely a variety of *P. Selysii* (De Kon.), to which latter species he refers it. The same author subsequently describes another species, from Basele, Boom, &c., as identical with Brander's shell, but he excludes *P. rostrata* of Sowerby. The description given by M. de Koninck agrees tolerably well with the present species; but, assuming that the shells described by that author belong, in fact, to the same species as those represented by Nyst (*P. Selysii*, t. 40, fig. 11 and *P. rostrata*, t. 42, figs. 2, 3), I do not think that any one familiar with the English shells can regard either of them as identical with the species figured by Brander, and described by Sowerby. Philippi has recorded a single specimen from Görzig, in the Museum at Halle, which he has referred to the present species. This author, however, has not given either figure or description, and as, under the circumstances to which I have referred, the accuracy of this identification cannot be assumed, I have cited Philippi with a query. At present there appears to be every reason for believing that the true *P. rostrata* of Solander is confined to the upper beds of the middle eocene formations of England; and, although Mr. Morris gives Highgate and Sheppey as localities, I am not aware of its occurrence at either of those places, nor even at Bracklesham Bay, which is also given as a locality by the same author.

*Size*.—Axis, rather more than  $4\frac{1}{2}$  inches; diameter, not quite 1 inch.

*Localities*.—Barton, Alum Bay (No. 29, Prestwich), and Highcliff.

No. 145. PLEUROTOMA KEELEI, *F. E. Edwards*. Tab. XXVI, fig. 6 .

*P. testá fusiformi, turritá, tuberculatá spiraliter fasciatá; spirá elevatá, acuminatá: anfractibus convexis, ad humeros angulatis, unicá serie tuberculorum spiniformium munitis; marginibus posticis latis, concavis, concentricè lineatis, ad suturas crenulatis; ultimo anfractu turbinato, in canali longo exeunti; fasciis spiralibus, irregularibus, inæqualibus, fasciis crassis cum aliis tenuibus alternantibus: aperturá oblongo-ovali; labro valde arcuato, sinu mediocriter lato profundo, in margine collocato.*

Shell fusiform, turreted, tuberculated, spirally banded; the spire much elevated,

pointed, formed of nine or ten volutions: whorls angulated at the shoulders, and armed with a single row of large, pointed, rather distant tubercles; the posterior margins wide, concave, thickened and obliquely plicated at the suture, and ornamented with several fine concentric raised lines; of these, two running round the border are more elevated than the rest, and are decussated and feebly granulated by the plication on the edge, and two others, running along the hollow part of the margin, are also rather prominent and granulated by the lines of growth. The last whorl is somewhat turbinate, and terminates in front in a long, moderately wide, straight canal. The bands on the middle and front surfaces of the whorls are numerous, coarse, irregular, and very unequal, and much roughened by the lines of growth; three or four over the middle part of the whorls are thicker and more prominent than the rest, and between them appear two or three smaller unequal bands. The aperture is of an oblong, ovate form; the outer lip much arched; the sinus deep, moderately wide, sub-trigonal, and placed in the very middle of the margin.

This beautiful and well-marked species was first obtained from the Artesian well at Southampton, by Mr. Keele, to whom I have ventured to dedicate it.

*Size*.—Axis, 3 inches and 3-12ths; diameter, 1 inch and 1-12th.

*Localities*.—Southampton and Shenfield.

No. 146. PLEUROTOMA DENTATA, *Lamarck*. Tab. XXVI, fig. 5.

- PLEUROTOMA DENTATA, *Lamk.* 1804. Ann. du Mus., vol. iii, p. 167, No. 8; vol. vii, t. 13, fig. 1.
- — *Ib.* 1822. Hist. nat., vol. vii, p. 99, No. 13.
- — *De Bl.* 1826. Dict. des sci. nat., vol. xli, p. 395.
- COSTULIFERA? *Bronn.* 1827. Zeitschrift für Mineral., band ii, p. 535, No. 120.
- DENTATA, *Ib.* 1831. Italiens tertiärgeb., p. 46, No. 222.
- — *Desh.* 1832. Enc. méth. (Vers), vol. iii, p. 797, t. 440, fig. 8, No. 16.
- — *Ib.* 1824-37. Descr. des coq. foss., &c., vol. ii, p. 452, t. 62, figs. 3, 4, 7, 8.
- — *Morris.* 1843. Cat. Brit. Foss., p. 157.
- — *Sow.* 1850. Dixon's Geol., &c., of Sussex, p. 102, t. 6, fig. 24.
- — *Rouault.* 1848. Desc. des foss., &c., de Pau (Mém. de la Soc. Gèol. de France, 2d series, vol. iii, p. 484), No. 92, t. 16, fig. 24.
- — *D'Orb.* 1853. Prod. de Paléont., vol. ii, p. 358, No. 382.
- — *Morris.* 1854. Cat. Brit. Foss., 2d edit., p. 270.

*P. testá elongatá, fusiformi, undique concentricè lineatá; spirá elevatá, acuminatá: anfractibus convexiusculis, angulatis, dentato-tuberculatis; marginibus posticis mediocriter latis, vix cavatis, ad suturas paucillum incrassatis; ultimo anfractu in canali longo termi-*

*nanti*; *striis concentricis confertis, irregularibus, in marginibus posticis tenuissimis*; *cæteris, striis eminentioribus cum aliis tenuibus alternantibus: aperturá angusto-ovali*; *labro arcuato, tenui*; *sinu lato, sub-trigono, in margine collocato*; *canali subrecto, antice reflexo, emarginato.*

Shell elongated, fusiform, having the whole surface ornamented with concentric raised lines; the spire much elevated, being nearly as long as the body-whorl, pointed, and formed of ten or eleven volutions. The whorls are rather convex, sharply angulated at the shoulders, and armed with a row of transversely compressed, tooth-like tubercles, rounded in front, sharp, sometimes almost carinated at the edges, varying both in number and prominence in different individuals, and occasionally having their bases prolonged into short, rounded costellæ; the posterior margins are moderately wide, straight, or but very slightly hollowed out, and a little thickened at the sutural edges, where they are sometimes obliquely plicated by the lines of growth of the sinus; the surface between the suture and the shoulder is covered with very fine, almost obsolete, concentric lines, two of which, running round the sutural edge, are more elevated than the rest; the middle and front parts of the whorls are ornamented with numerous, irregular, undulating, thread-like, raised lines; of these some are prominent, and between them appear two or three others very slender, so much so, in fact, as to be barely perceptible by the naked eye. The aperture is of a narrow, ovate form, and terminates in a long, moderately wide, and nearly straight canal, bent backwards, and notched at the anterior extremity; the outer lip is thin, sharp-edged, and slightly arched; the sinus wide, rather deep, sub-trigonal in form, and placed in the very middle of the margin; the anterior extremity of the columella presents a prominent ridge or crest, formed by the notch of the canal.

This species is very common and widely distributed in the French formations; in England it is, apparently, confined to the middle beds of the Bracklesham Bay series. Our specimens are narrower than the French type; and in this respect and in the character of the transverse ornamentation they agree with the variety *a* of Deshayes; I have not met with the other variety recorded by that author, nor do our shells appear to have attained the size of those from the French beds. D'Orbigny, (loc. cit.) gives Claiborne, in Alabama (U.S.), as a locality. I cannot but think, however, that this identification is somewhat questionable. The present species is the type of a group of closely analogous forms, and two English species (*P. exorta* and *P. macilenta*, Sol.), which, as will be afterwards shown, are perfectly distinct, have in fact been confounded with it. No authority is cited by the author, and I have therefore given Claiborne as a questionable locality.

*Size*.—Axis, 1 inch and 7-12ths (40 millim.); diameter, not quite 7-12ths of an inch (15 millim., nearly).

*Localities*.—Bracklesham Bay; Bramshaw. *French*—Grignon, Parnes, Mouchy, Courtagnon, &c., La Chapelle près Senlis, Valmondois (fide *Desh.*), Cuise-Lamotte,

Acy-en-Mulcien, Fosse-Martin, Ermenonville, Ver (fide *Graves*), Laon (fide *Mellez*), Bos d'Arros (fide *Rouault*). *North American* — Claiborne, Alabama (fide *d'Orb.*)?

No. 147. PLEUROTOMA TEXTILIOSA, *Deshayes*. Tab. XXVI, fig. 7.

PLEUROTOMA TEXTILIOSA, *Desh.* 1824-37. Desc. des coq. foss., &c., vol. ii, p. 454, t. 62, figs. 5, 6.

— — — *D'Orb.* 1850. Prod. de Paléont., vol. ii, p. 417, No. 1480.

*P. testá elongato-fusiforimi, angustá, sub-turritá, longitudinaliter costatá, spiraliter subtilissime lineatá: spirá elevatá, acuminatá: anfractibus sub-convexis, angulatis; marginibus posticis angustis, concavis, ad suturam inerassatis; costis distantibus, obtusis; lineis spiralibus confertis, inæqualibus, lineis incrementi sub-decussatis: aperturá ovato-angustá, in canali mediocri exeunti; labro acuto; sinu lato, trigono, in margine collocato.*

Shell elongate, fusiform, narrow, longitudinally ribbed and ornamented with numerous, very fine, concentric, raised lines; the spire, which is formed of eight or nine volutions exclusive of the pullus, is pointed and much produced, fully equalling the last whorl in length: the whorls are slightly convex, and angulated at the shoulders; the posterior margins narrow, hollowed out, and thickened at the edges so as to form an elevated border round the suture; the whole of the margin is covered with very fine, regular, closely set, concentric lines, of which those on the border are more conspicuous than the rest. The longitudinal ribs are rather distant, round, thick, and short, barely extending to the middle of the whorls, and terminating abruptly at the shoulders, where they present a sharp keel-like edge, which gives somewhat of a turreted aspect to the spire. The concentric lines over the front and middle parts of the whorls are very numerous, unequal, and irregular; some of them, slender and thread-like, are prominent and more or less distant, and the intermediate spaces are covered with exceedingly fine lines, scarcely perceptible by the naked eye; the whole are roughened by the lines of growth. The aperture is of a narrow, ovate form, and terminates in front in a moderately long canal, slightly notched at the anterior extremity; the outer lip is thin, sharp-edged, and expanded behind; the sinus which is wide, deep, and somewhat trigonal in form, is placed a little in front of the middle part of the posterior margin of the whorl; the columella is slightly twisted and presents a conspicuous but not very prominent crest. *M. Deshayes* states that the columella is "sub-perforated at the base," presenting there a narrow, shallow "umbilical opening, partly covered by the inner lip;" this opening, however, is not truly umbilical, but a slight hollow caused by the ridge or crest being imperfectly overlapped by the inner lip, and is a character very variable, and sometimes wanting.

The present species is an intermediate form between *P. crassicosta* and *P. dentata*; but the thick, rounded, distant ribs, the crowded transverse ornamentation, and the broader and shorter canal, render it easily distinguishable.

*Size*.—Axis, 1 inch and 5-12ths nearly (35 millem.); diameter, half an inch (13 millem.). The French shells attained a somewhat larger size.

*Localities*.—Bracklesham Bay; Bramshaw. *French*—Monneville (fide *Desh.*), Aumont, Acy-en-Mulcien (fide *D'Orb.*). It is very rare in England, but, apparently, common in the French beds.

No. 148. PLEUROTOMA EXORTA, *Solander*. Tab. XXVI, fig. 12 *a, b*.

MUREX EXORTUS, *Sol.* 1766. *Brand.*, *Foss. Hanton.*, p. 20, fig. 32.

PLEUROTOMA EXORTA, *Sow.* 1816. *Min. Conchol.*, vol. ii, p. 104, t. 146, fig. 2.

— — *Morris.* 1843. *Cat. Brit. Foss.*, p. 157.

— — *Sow.* 1850. *Dixon's Geol., &c., of Sussex*, p. 102.

— — *D'Orb.* 1850. *Prod. de Paléont.*, vol. ii, p. 359, No. 408.

Nec PLEUROTOMA EXORTA, *Nyst.* 1835. *Recher. sur les coq. foss., &c., d'Anvers*, p. 28, No. 27.

nec — — *De Kon.* 1837. *Descr. des coq. foss., &c., de Basele, Boom, &c.*, p. 22, No. 21.

nec — — *D'Orb.* 1850. *Prod. de Paléont.*, vol. iii, p. 13, No. 195 m.

*P. testá elongato-fusiforini, turritá, undique spiraliter lineatá: spirá elevatá, sub-conicá, nodulosá: anfractibus convexis, prioribus obscure costellatis; ultimo anfractu sub-conico scilicet sensim attenuato, in canali longiusculo exeunti; marginibus posticis declivis, cavatis, ad suturam incrassatis, transversim exilissime lineatis; striis spiralibus nonnullis remotiusculis, eminentioribus, acutis; cæteris subtilissimis æqualibus: aperturá lanceolatá; labro valde arcuato, tenui; sinu lato, in margine collocato.*

Shell elongated, fusiform, turreted, ornamented with spiral raised lines; the spire elevated and terminating in a small pointed pullus formed of two or three smooth volutions: whorls convex, the earlier ones very broadly and obscurely ribbed, giving a nodulous aspect to the spire; the posterior margins are somewhat thickened on the sutural edge, and but slightly depressed, so that the spire presents a nearly conical form; the space between the suture and the shoulder is channeled and covered with very fine and regular concentric lines, so slender as scarcely to be visible by the naked eye or to detract from the smoothness of the surface. On the middle and front parts of the whorls, some of the spiral lines, rather distant from each other, are sharp and elevated; the rest, which cover the intermediate spaces, are very fine, close-set, and regular, although somewhat unequally prominent. The aperture is lanceolate, and terminates in a moderately long canal, gradually diminishing in width, and thus

assuming the sub-conical form described by Solander as the chief distinction between *P. exorta* and *P. macilenta*. The outer lip is thin and much arched; and the sinus, which is wide and sub-trigonal, is placed in the very middle of the margin.

The elevated transverse line on the shoulders of the whorls, broken by the undulations caused by the ribs, occasionally presents a resemblance to the denticulation characteristic of *P. dentata*; and this circumstance probably led to *P. exorta* being considered as identical with *P. dentata*. The two species are, however, distinct; in this the shell is wider and shorter, the spire thicker and more conical, the whorls not so much angulated, the posterior margins narrower and less depressed, and the anterior canal shorter and more conical.

Nyst, in his 'Recherches sur les coquilles fossiles de la province d'Anvers,' has recorded certain shells from Boom which he has referred to the present species, and for which he has given Sowerby's diagnosis verbatim. Subsequently, De Koninck, in his 'Coquilles fossiles de Basele, Boom, &c.,' described some shells from those localities under the name *P. regularis*, and other shells he referred to the present species. These different shells, Nyst, in his later work, 'Description des coquilles, &c., de la Belgique,' considered to be merely individuals of the same species in different stages of growth, and that author referred them, erroneously as I have already shown, to *P. rostrata* (Sol.) Unfortunately I have not any specimens of the Belgian species to refer to; but, assuming that De Koninck's *P. exorta* is but the young shell of his *P. regularis*, and judging from the figures given by him of the latter species and from those given by Nyst of the so-called *P. rostrata*, it is impossible to accept the identification of the Belgian shells with the present species as correct; a conclusion at which D'Orbigny has apparently also arrived, as that author has placed *P. rostrata* (Nyst) and *P. regularis* (De Kon.) in his "26th étage," under the specific name *P. exorta* (Nyst), in forgetfulness, probably, of that name having been previously used by Solander.

*Size*.—Axis, 1 inch and 1-12th; diameter, 5-12ths of an inch.

*Localities*.—Barton, Alum Bay (No. 29, Prestwich), Highcliff, Bracklesham Bay.

No. 149. PLEUROTOMA MACILENTA, Solander. Tab. XXVI, fig. 13 a, b.

MUREX MACILENTUS, Sol. 1766. Brand., Foss. Hanton., p. 30, fig. 33.

*P. testá elongato-fusiformi, angustá, turritá, undique spiraliter lineatá, longitudinaliter costatá: spirá elevatá, acuminatá: anfractibus convexiusculis, angulatis; marginibus posticis concavis, ad suturam paulum incrassatis, transversim subtilissime lineatis; lineis spiralibus numerosis, inæqualibus, quibusdam filiformibus prætenuibus, inter alias eminentiores, acutas apparentibus; costis numerosis, angustis, obliquis, fere ad caudam tendentibus: aperturá*



*oblongo-ovali, in canali longo, angusto exeunti; labro leviter arcuato; sinu lato, in margine collocato.*

Shell long, narrow, fusiform, turreted, longitudinally ribbed, and concentrically lined: the spire, consisting of nine or ten volutions, is pointed, elevated, forming nearly a half of the length of the whole shell. The whorls are slightly convex and angulated at the shoulders; the posterior margins concave, slightly thickened round the suture, and covered with fine, thread-like, concentric lines, one or two of which near the edge are stronger and more prominent than the rest. The spiral lines over the middle and front parts of the whorls are numerous, irregular, unequal; some, more or less distant from each other, are prominent and sharp, and the intermediate spaces are occupied by two or three, occasionally by four, very slender and regular lines; the longitudinal ribs, which are rather numerous, narrow, and oblique, reach almost to the anterior canal. The aperture is oblong and ovate, and terminates in a moderately long, straight, and narrow canal; the outer lip is thin and slightly arched; the sinus wide, semi-circular in shape, and placed in the middle of the margin.

The present species, distinguished by its long costated spire, appears to be peculiar to the English middle eocene strata; DeFrance, it is true, refers to it, although with doubt, as a synonym of *P. dentata*, but a slight comparison of the shells will prevent the two species being confounded. It presents closer resemblances as well to *P. textiliosa*, as to *P. crassi-costa*; from both of these species, however, notwithstanding the similarity in the ornamentation, it may be easily distinguished by the slenderer and more numerous ribs, and the longer and narrower anterior canal.

*Size.*—The dimensions of my largest specimen are—axis, 1 inch and 4-12ths; diameter, 5-12ths of an inch. Those of Brander's specimen, although represented in the figure given by him as considerably larger, are, in fact, very nearly the same.

*Localities.*—Barton, Alum Bay (No. 29, Prestwich), Highcliff, Bracklesham Bay.

No. 150. *PLEUROTOMA CRASSI-COSTA*, *F. E. Edwards*. Tab. XXVI, fig. 10 *a, b*.

*P. testá elongato-fusiforimi, angustá, turritá, costatá, undique spiraliter lineatá; spirá elevatá; anfractibus convexiusculis, angustatis; marginibus posticis latiusculis, concavis, tenuissime lineatis, ad suturam incrassatis, cingulo duplici ornatis; ultimo anfractu parvo, repente coarctato, in canali lato, longo, subrecto exeunti; costis distantibus, brevibus, crassis: lineis spiralibus confertis, inæqualibus, nonnullis eminentioribus fortibus, cæteris exilibus: aperturá oblongo-ovatá; labro leviter arcuato; sinu lato, fere semicirculari, in margine collocato.*

Shell long, narrow, fusiform, turreted, ribbed, and having the whole surface ornamented with concentric lines: the spire, formed of eight or nine volutions exclusive of the pullus, is moderately elevated and pointed; whorls slightly convex, sharply angu-

lated at the shoulder; the posterior margins rather wide, hollowed out, and thickened on the sutural edge, which is bordered by two or three prominent, raised lines; the remaining surface of the margin is covered with very fine, close-set, concentric lines; the last whorl is small, and terminates in a wide and long canal, a little curved near the anterior extremity. The ribs are distant, rounded, short, not extending to the middle of the whorl, prolonged over the posterior margins almost to the suture, and bearing at the shoulders of the whorls a row of transverse tooth-shaped tubercles. The spiral lines over the middle and front parts of the whorls are numerous and unequal; some, at nearly regular and not very distant intervals, are rather thick and prominent, and between these appear two or three slender, thread-like lines. The aperture is ovate, the outer lip moderately arched, and the sinus, which is placed in the middle of the margin, is wide but not deep.

The *P. crassi-costa* bears a close resemblance to *P. dentata*, of which, perhaps, it may prove to be merely a local variety. It presents, however, certain peculiarities of form which appear to me sufficient to justify the separation. Thus the shell is narrower, the spire relatively more produced; the posterior margins of the whorls are not so wide, the whorls themselves smaller and more suddenly contracted in front, and the longitudinal ribs thicker and more distant. From *P. textiliosa* it is distinguishable by the character of the transverse ornamentation, and the thick, rounded, and more distant ribs of that species. It approaches very nearly to a species from the sables moyens, at Senlis, at present unpublished, but which M. Deshayes purposes to describe under the name *P. Michelini*, in his forthcoming appendix; without a comparison, however, with a better series of specimens of that species than I possess, I do not venture to pronounce on the identity. Should the English and French shells prove, eventually, to belong to the same species, the name proposed by M. Deshayes will be entitled to priority.

*Size*.—Axis,  $1\frac{1}{2}$  inch; diameter, not quite half an inch.

*Locality*.—Bramshaw.

No. 151. PLEUROTOMA LANCEOLATA, *F. E. Edwards*. Tab. XXVI, fig. 11 *a, b*.

*P. testá elongatá, angustá, fusiformi, spiraliter lineatá: spirá elevatá, sub-conicá, tuberculatá: anfractibus convexiusculis; marginibus posticis mediocriter latis, pauillum declivis, vix cavatis, transversim exilissime lineatis; ultimo anfractu antice gradatim attenuato, in canali longo exeunti: aperturá lanceolatá; labro valde arcuato; sinu lato sub-trigono, in margine collocato.*

Shell long, very narrow, fusiform, ornamented with spiral, raised lines: the spire elevated, nearly conical, and terminating in a small, smooth, pointed pullus of two volutions: the whorls, 9—11 in number, are but slightly convex, and in the young

state are tuberculated, or roundedly costellated; the posterior margins are moderately wide, very little depressed, nearly straight, and almost smooth, or ornamented with concentric lines, so faint and slender as to be almost imperceptible without the aid of a magnifying glass; the last whorl is produced in front, and, diminishing very gradually, terminates in a long, nearly straight canal. The aperture is lanceolate; the outer lip thin, sharp edged, and much arched; and the sinus, which is very wide, and sub-trigonal in shape, is placed a little in front of the middle part of the margin.

The long, narrow, lanceolate form, and nearly conical spire of this *Pleurotoma* distinguish it from all its congeners.

*Size*.—Axis, 1 inch and 4-12ths; diameter, 4-12ths of an inch.

*Localities*.—Barton and Alum Bay (No. 29, Prestwich), where it is not very common.

No. 152. *PLEUROTOMA LÆVIGATA*, *Sowerby*. Tab. XXVI, fig. 9 *a, b*.

*PLEUROTOMA LÆVIGATA*, *Sow.* 1823. *Min. Con.*, vol. iv, p. 120, t. 387, fig. 3.

— — *Morris.* 1843. *Cat. Brit. Foss.*, p. 157.

— — *D'Orb.* 1850. *Prod. de Paléont.*, vol. ii, p. 359, No. 412.

Nec *PLEUROTOMA LÆVIGATUM*, *Phil.* 1836. *Enum. Moll. Sic.*, vol. i, p. 199, t. 11, fig. 17.

nec — *LÆVIGATA*, *De Kon.* 1837. *Coq. foss. de Basele, &c.*, p. 27, No. 27, t. 1, fig. 5.

nec — — *Mellew.* 1843. *Mém. sur les sables infér., &c., de Paris*, p. 63, t. 8, figs. 9—11.

*P. testá elongato-fusiforimi, angustá, turritá, transversim tenuissime lineatá: spirá elevatá, acuminatá: anfractibus convexis, antice subito coarctatis, prioribus oblique costellatis; marginibus posticis angustis, depressis, sub-canaliculatis, lævibus; ultimo anfractu in canali longo, angusto, terminanti: aperturá oblongá, ovatá; labro valde arcuato, tenui; sinu lato, fere semicirculari, in margine collocato.*

Shell long, narrow, fusiform, turreted, costellated, and spirally lined: the spire elevated, pointed, terminating in a pullus of two round, smooth volutions; whorls convex, rounded on the shoulders, contracted rather suddenly in front; the posterior margins narrow, depressed, slightly hollowed out, having the sutural edges thin and quite simple, and the surface smooth, almost polished, presenting only very feeble lines of growth of the sinus. The ribs are distant, rounded, oblique, and extend almost to the front part of the whorl in the young shell, but become shorter and less prominent as the shell enlarges, and altogether disappear on the body-whorl of the fully formed shell; the spiral lines are very slender, sharp, but little elevated, irregular, unequal, and decussated by the lines of growth. The aperture is of an oblong, ovate form, and terminates in front in a long, narrow, and slightly curved canal; the outer lip is much

arched, and the sinus, which is wide and almost semicircular in shape, occupies the whole width of the margin.

Specimens occasionally occur in which the transverse lineation is nearly obliterated, and the whorls present a smooth, almost a polished, surface. The individuals figured by Mr. Sowerby were apparently in this condition; this smoothness, from which the specific name was taken, is, however, only an exceptional character.

The present species presents some analogy with *P. macilenta*; but the shell is narrower, the whorls more convex, more rounded on the shoulder, and more contracted in front; the canal is narrower, the outer lip more arched, and the sinus wider.

*Size*.—Axis, 1 inch and 3-12ths; diameter, rather more than 4-12ths of an inch.

*Localities*.—Barton, Muddiford (Highcliff). Mr. Sowerby also gives Highgate, but I do not know of any specimen from that locality. The species is, apparently, confined to the upper beds of the middle eocene deposits, and is not common.

No. 153. PLEUROTOMA FUSIFORMIS, *Sowerby*. Tab. XXVII, fig. 1 *a, b*.

PLEUROTOMA FUSIFORMIS, *Sow.* 1823. Min. Con., vol. iv, p. 119, t. 387, fig. 1.

— — — *Morris.* 1843. Cat. Brit. Foss., p. 157.

Non PLEUROTOMA FUSIFORMIS, *Sow.* 1831. Trans. Geol. Soc., 2d series, vol. iii, p. 418, t. 39, fig. 20.

*P. testá elongatá, fusiformi, angustá, subturritá, longitudinaliter costatá, spiraliter fasciatá: spirá elevatá, acuminatá: anfractibús angulatis; ultimo anfractu antice sensim attenuato, in canali longo, lato, terminanti; marginibus posticis concentricè tenuiter lineatis, pauzillulum cavatis; costis rotundatis, ultimo anfractu evanescentibus; fasciis spiralibus numerosis, irregularibus, inæqualibus, lineis incrementi scabratis: aperturá lanceolatá; labro arcuato; sinu lato, sub-profundo, in margine collocato.*

Shell elongated, narrow, fusiform, longitudinally ribbed, and spirally banded: the spire, which, in the larger specimen figured, consists of eight volutions exclusive of the pullus, is elevated, forming nearly two fifth parts of the whole length of the shell. The whorls are sharply angulated at the shoulders, giving a turreted appearance to the spire; the posterior margins are moderately wide, slightly depressed, a little thickened and crenulated round the suture, and ornamented with fine, concentric, raised lines, two or three of which, immediately behind the shoulder, are stronger than the rest, and granulated by the lines of growth of the sinus; the longitudinal ribs are rather numerous, rounded, and extend to the middle of the whorls, but become obsolete on the body-whorl of the adult shell; the spiral bands over the middle and front parts of the whorls are numerous, unequal, irregular, becoming more distant on the canal, where occasionally fine, thread-like lines rise between them; the bands are

much roughened by the lines of growth, giving a scabrous aspect to the shell: the body-whorl is attenuated very gradually in front, assuming a nearly conical shape, and terminates in a long, rather wide, and nearly straight canal. The aperture is lanceolate, the outer lip moderately arched, and the sinus, which is placed in the margin immediately behind the shoulder, is wide, moderately deep, and almost semicircular in form.

No foreign analogue of this well-marked species has as yet been noticed; and at present *P. fusiformis* appears to be confined to the older eocene strata in the neighbourhood of London, where it is exceedingly rare. Mr. Sowerby, it is true, has applied the name to a *Pleurotoma* from the so-called transition beds between the lower tertiaries and the upper cretaceous formation at Gosau, a notice of which is contained in a memoir 'On the Structure of the Eastern Alps,' by Prof. Sedgwick and Sir Roderick Murchison, published in the 'Geological Transactions' of 1831; but that shell is a short, wide, strongly costated shell, perfectly distinct in character from the Highgate shell, and the name *fusiformis* was used apparently in forgetfulness of its having been previously applied to the present species. The Gosau shell has been since distinguished by D'Orbigny as *P. sub-fusiformis*.

The specimens figured form part of Mr. Wetherell's collection.

*Size*.—If the larger specimen were perfect, the dimensions would be—axis, 1 inch and 9-12ths; diameter, 6-12ths of an inch. Those of the specimen figured in 'Mineral Conchology' appear to be—axis, 2 inches and 1-12th; diameter, rather more than 7-12ths of an inch.

*Locality*.—Highgate.

No. 154. *PLEUROTOMA SULCULOSA*. *F. E. Edwards*. Tab. XXVII, fig. 2 *a—c*.

*P. testá elongatá, fusiformi, sub-turritá, concentrice sulcatá: anfractibus convexiusculis, angulatis, tuberculatis; marginibus posticis paucillulum cavatis, transversim interrupte lineatis, ad suturam incrassatis: aperturá oblongo-ovali, in canali longiusculo exeunti; labro valde arcuato; sinu lato, sub-trigono, in margine collocato.*

*Var. β. Testá tuberculis longitudinaliter compressis, ultimo anfractu evanescentibus, instructá.*

Shell elongated, fusiform, transversely sulcated; spire formed of seven or eight volutions, moderately elevated, pointed: whorls rather convex, angulated at the shoulders, where they present a series of oblong, longitudinally compressed, and more or less oblique tubercles; the posterior margins slightly hollowed out, thickened on the sutural edge, round which runs an elevated, sharp line, granulated by the lines of growth of the sinus; the space between this line and the angle of the whorls is occu-

ped by three or four concentric lines, broken into oblong granulations, more or less widely separated by smooth spaces, formed at the successive stages of growth by the margins of the sinus; the angulated shoulders, and somewhat depressed margins of the whorls, give a turreted character to the spire. The tubercles are rather numerous, and prominent in all stages of growth; the transverse furrows deep, but not wide, and separated by rounded ridges, which are narrow near the shoulders, but become broader over the middle and front parts of the whorls, and on the canal. The body-whorl is suddenly contracted near the middle, and produced anteriorly into a wide, moderately long canal. The aperture is of a narrow, oblong, oval shape; the outer lip roundedly arched, almost semicircular in form; and the sinus, which is placed in the middle of the margin, is deep, rather wide, and sub-trigonal.

Specimens occur (*Var. β*, fig. 2 *b*) in which the tubercles are compressed, and a little prolonged, in the direction of the axis, imparting a sub-costellated appearance to the earlier whorls, and becoming obsolete as the shell approaches maturity.

This species presents a very close analogy with *P. fusiformis*, with which, in fact, it may be easily confounded. On comparing the two shells, however, it will be found that, in the present species, the shell is wider; the spire relatively more produced and tuberculated, not costated; the body-whorl more contracted, and less conical, in front; the canal wider and shorter; the outer lip more roundedly arched; and the sinus deeper, more trigonal, and placed nearer the middle of the margin. These distinctions, and the different ornamentation, which consists of deep conspicuous furrows instead of the rough spiral bands which characterise *P. fusiformis*, appear to me to justify the separation.

*Size*.—The dimensions of the largest specimen figured would be, if the shell were perfect—axis, 1 inch and 5-12ths; diameter, not quite half an inch.

*Localities*.—Highgate and Potters' Bar, at both of which localities it is rather scarce.

No. 155. PLEUROTOMA ACUMINATA, *Sowerby*. Tab. XXVII, fig. 3 *a—d*.

- |     |   |   |  |
|-----|---|---|--|
|     |   |   | PLEUROTOMA ACUMINATA, <i>Sow.</i> 1816. <i>Min. Con.</i> , vol. ii, p. 105, t. 146, fig. 4.                    |
|     | — | — | <i>D'Orb.</i> 1850. <i>Index Paléont.</i> , vol. ii, p. 359, No. 420.  |
|     | — | — | <i>Morris.</i> 1854. <i>Cat. Brit. Foss.</i> , 2d edit., p. 269.   |
|     |   |   | Nec PLEUROTOMA ACUMINATA, <i>Nyst.</i> 1836. <i>Rech. coq. foss. de Hoesselt et Vliermael</i> , p. 32, No. 83. |
| nec | — | — | <i>De Kon.</i> 1837. <i>Desc. des coq. foss. de Basele Boom, &amp;c.</i> , p. 24, No. 24.                      |
| nec | — | — | <i>Nyst.</i> 1843. <i>Bull. Soc. Géol. de France</i> , vol. xiv, p. 454, No. 27.                               |
| nec | — | — | <i>Ib.</i> 1843. <i>Descr. des coq., &amp;c., de la Belgique</i> , p. 519, t. 42, fig. 1 <i>a, b</i> .         |

*P. testá elongatá, angustá, turritá, acuminatá, longitudinaliter costatá, concentricè sulcatá: anfractibus convexiusculis; marginibus posticis angustis, concavis, transversim granuloso-lineatis, ad suturam plicatis; sulcis concentricis confertis, antice distantioribus; spatiis sulcos separantibus lineis incrementi granulatis: aperturá oblongo-ovali, in canali lato, longiusculo exeunti; labro arcuato; sinu fere semicirculari, in margine collocato.*

*Var. a.*—*Testá latiori, breviori.*

*Var. β.*—*Testá levigatá; sulcis transversis semi-obliteratis.*

Shell elongated, narrow, turreted, pointed, longitudinally ribbed and concentrically furrowed; the spire, formed of eight or nine volutions, much produced, equalling in length three fifths of the whole shell. The whorls are slightly convex; the posterior margins narrow, channeled, ornamented with several concentric raised lines, a little thickened at the suture, and plicated by the lines of growth of the sinus, which, in some specimens, are prominent over the whole margin, granulating the concentric lines; the last whorl is rather suddenly contracted in front, and terminates in a wide but not very long canal. The furrows in front of the shoulder are close-set, regular and equal, but, where the whorl begins to contract, they become more distant and irregular: the surface of the intervening spaces is granulated by longitudinal ridges formed by the elevated lines of growth; the longitudinal ribs are rather numerous, narrow, and extend to the middle of the whorls. The aperture is of a narrow, oblong-oval form; the outer lip but slightly arched, and the sinus, which is wide and almost semicircular in shape, is placed a little in front of the middle part of the margin. Specimens occasionally occur (*Var. a*, fig. 3 *b, c*) in which the shell is wider and shorter, and the spire is relatively not so much produced; and others, again (*Var. β*, fig. 3 *d*), in which the ribs disappear as the shell is enlarged, the transverse furrows are shallower and more closely set, and the lines of growth less prominent, giving to the surface a levigated appearance, as if it had been rubbed smooth.

MM. Nyst and De Koninck have severally described certain shells from Basele, Boom, and Kleyn-Spauwen, which they have referred, erroneously in my opinion, to the present species. In the general character of the ornamentation these shells apparently agree with the English shells; but with them, judging from the figure given by Nyst, the spire is relatively longer, the whorls more convex, the posterior margins less depressed, giving a more conical and less turreted form to the spire; the body-whorl more suddenly contracted, and the columella more arched: the characters, however, which most clearly distinguish the Belgian shells are the form and position of the sinus, which is wide and very shallow, and is placed on the shoulder, and not, as in the present species, in the margin of the whorls.

*Size.*—Axis, 1 inch and 3-12ths diameter, 4-12ths of an inch.

*Localities.*—Highgate, Hornsey, Potters' Bar, and Clarendon Hill, at which last locality both varieties occur.

The specimens represented by figs. 3 *a* and 3, form part of Mr. Wetherell's collection.

No. 156. PLEUROTOMA PYRULATA, *Deshayes*. Tab. XXVII, fig. 7 *a, b*.

PLEUROTOMA PYRULATA, *Desh.* 1824-37. *Descr. des coq. foss., &c.*, vol. ii, p. 449, t. 66, figs. 1-3.

*P. testá elongatá, angustá, piruliformi, spiraliter lineatá: spirá mediocriter elevatá, sub-conicá; anfractibus angulatis, in medio convexiusculis, antice sensim attenuatis; marginibus posticis declivis, vix cavatis, concentricè tenuissime lineatis; ultimo anfractú in canali præ-longo terminanti; lineis spiralibus acutis, irregularibus, inæqualibus, lineis incrementi fortiter decussatis: aperturá elongato-ovalí; labro parum arcuato; sinu latiusculo, profundo, in margine collocato.*

Shell elongated, narrow, concentrically lined: the spire, formed of eight or nine volutions, is pointed and moderately elevated, not equalling in length a third part of the whole shell; the whorls are convex at the middle, bluntly angulated at the shoulders; the posterior margins but slightly depressed, giving a nearly conical form to the spire; slightly thickened at the edge, where they present two strong, prominent, raised lines, which run round the suture, and form a border to the whorls; the space between the suture and the shoulders is slightly channeled, and covered with several very slender, unequal, raised lines; the body-whorl diminishes gradually towards the base, and terminates in a very long and nearly straight canal. The gradual tapering of the whorls, joined to the rather short, conical spire, gives to the shell somewhat of the form of a long, narrow pear, from which appearance the specific name is taken. The spiral lines over the middle and front parts of the whorls are numerous, irregular, and unequal, slender thread-like lines alternating with thicker and more prominent lines; all are beautifully and regularly decussated by the strongly marked lines of growth. The aperture is of a long, narrow, oval form; the outer lip slightly expanded towards the middle; and the sinus, which is placed in the middle of the margin is deep and not very wide.

The French shells, in their typical form, are narrow, with a rather short spire; but, apparently, specimens from different localities present considerable variations, not only in the relative height of the spire and width of the shell, but also in the striation. The specimens from Compiègne, for instance, as M. Deshayes has recorded, have the spire more produced, the angle of the whorls more prominent, and the con-



centric lines more numerous; and in some specimens from Cuise-Lamotte, in my cabinet, the spire is also much elevated, the shell relatively narrower, and the concentric lines close-set, slender, and regular. In the English specimens the relative height of the spire and the character of the concentric lineation agree with those of the specimens from Compiègne; but the shell is wider, and the margins of the whorls are not so much depressed. These differences, however, attributable probably to local conditions only, do not suggest a doubt of the correctness of the identification.

*Size*.—Axis, rather more than 5-6ths of an inch (11 millim.); diameter, 3-12ths of an inch (rather more than 6 millim.).

*Localities*.—Clarendon Hill. French—Compiègne (fide *Desh.*); Cuise-Lamotte, Trosly-Breuil (fide *Graves*); Laon (fide *Mellev.*) MM. Deshayes and D'Orbigny also give Parnes; but M. Graves speaks with doubt of that locality.

No. 157. PLEUROTOMA TEREBRALIS, *Lamarck*, var. Tab. XXVII, figs. 10 a—k.

PLEUROTOMA TEREBRALIS, *Lamk.* 1804. Anm. du Musée, vol iii, p. 266, No. 20.

— — *Ib.* 1822. Hist. nat., &c., vol. vii, p. 101, No. 25.

— — *De Blainv.* 1826. Dict. des sci. nat., vol. xli, p. 391.

— — *Desh.* 1832. Encl. méth. (Vers.), vol. iii, p. 799, No. 21.

— — *Ib.* 1824-1837. Desc. des coq., &c., vol. ii, p. 455, t. 62, figs. 14—16.

*Var.* 1st. DITROPIS; fig. 10a. *P. testá parvulá, elongatá, fusiformi, angustá, turritá, lineis spiralibus elegantissime granulatis ornatá; spirá elevatá, acuminatá; anfractibus bicarinatis; marginibus posticis depressis, concavis, ad suturam granulatis, cæteris lævibus, vel tenuissime plicatis; cariná posticá acutá, denticulatá; cariná anticá fascioli-formi, denticulato-plicatá; lineis spiralibus plus minusve distantibus, inæqualibus; ultimo anfractu antice valde attenuato in canali longo exeunti; sinu lato, fere semicirculari, in margine collocato.*

*Var.* 2d. CONCINNA; fig. 10 i, k. *Testá parvá, bicarinatá, lineis spiralibus peræque granulatis, undique, etiam in marginibus anfractuum, ornatá; cariná anticá granulatá; lineis spiralibus numerosis.*

*Var.* 3d. GYRATA; fig. 10 b, d. *Testá bicarinatá; carinis fascioli-formibus, crassis, oblique plicato-denticulatis; lineis spiralibus inæqualibus, granulosis.*

*Var.* 4th. PULCHERRIMA; fig. 10 e. *Testá parvá, bicarinatá; cariná posticá denticulatá; cariná anticá rotundatá, lævi; lineis spiralibus elevatis, rotundatis, simplicibus vel obsolete granulatis, suprâ canalem confertis, cæteris distantibus.*

*Var.* 5th. REVOLUTA; fig. 10 f. *Testá bicarinatá; marginibus posticis anfractuum ad suturam lævissime crenulatis; cariná posticá acutá, obsolete plicato-denticulatá, superne revolutá; cariná anticá lineisque spiralibus granulatis.*

*Var. 6th. PAGODA; fig. 10 h. Testá latiori, fasciis et lineis spiralibus elevatis cinctá: anfractibus bicarinatis, ad suturam marginatis; carinis simplicibus, singulis unico sulco exaratis; cariná posticá superne revolutá; fasciis numerosis, inæqualibus, lævibus.*

The typical form of this elegant *Pleurotoma* is distinguished by the smooth concave margins of the whorls, by the remarkable regularity of the denticulation on the keel, resembling the teeth of a circular saw, and by the close-set rows of even, bead-like granulations, which cover the middle and front parts of the shell, slightly diminishing in size as they approach the anterior extremity of the canal. The shell, upon which Lamarck formed the species, was found at Parnes; and, apparently, the ornamentation which characterises it is confined in the French specimens to those from the "calcaire grossier." The species occurs, also, in the older eocene formations of that country; but the shells from them are generally of smaller dimensions, and present more or less strongly marked deviations from the typical ornamentation. In England the species has not as yet been found above the older eocene deposits; several forms, indeed, occur in them; one or two of which apparently agree with French varieties; but neither among them, nor, as I believe, among those from the "groupes glauconieux" of France, does the exact ornamentation of the typical *P. terebralis* of Lamarck occur.

In the first variety (*ditropis*), which corresponds with specimens in my cabinet from Cuisse-Lamotte, the shell is much smaller than that of the type, elongated, fusiform, narrow, turreted, and beautifully ornamented with concentric rows of regular bead-like granulations; the spire is pointed and much produced, being rather more than two fifths of the length of the whole shell. The whorls are somewhat convex, sharply angulated, and carinated at the shoulders; the posterior margins rather depressed, slightly channeled, and perfectly smooth, except round the suture, where they are bordered by a single row of small regular granulations; occasionally a specimen occurs in which the smoothness of the surface is broken by very fine curved plications formed by the successive margins of the sinus. The keel on the shoulder is sharp, prominent, and denticulated with great regularity: in front of this, just where the whorl begins to contract, is a thick concentric band, rather obliquely plicated, and so prominent as to present the appearance of a second keel on the whorl; the ends of the plications project beyond the edges of the band, giving to it a denticulated appearance. The concentric rows are unequal, irregular, and more or less distant in different specimens, but closer and more regular towards the anterior extremity. The last whorl is much attenuated in front, and terminates in a moderately long canal: the sinus is rounded, deep, and wide, occupying almost the entire width of the margin.

In the next variety (*concinna*) the shell is somewhat larger than that of the preceding variety, but yet smaller than that of the type; the front keel is narrower and less prominent than in the variety *ditropis*, and is evenly granulated; the concentric rows

of granulations are more numerous, and the margins of the whorls present, in addition to the sutural row of beads, three very slender concentric lines granulated by the lines of growth of the sinus. It has been before stated that one of the more prominent characters of the true *P. terebralis* is taken from the perfectly smooth concave margins of the whorls; and the granulated margins in the present case would apparently indicate a distinct species; but the occasional occurrence of a plicated margin in the last variety prepares the way for the present form; and as this agrees in all the more important characters with the variety *ditropis*, I have regarded it as merely another variety of *P. terebralis*.

The shell in the variety *gyrata* (fig. 10 *b—d*) is smaller than that of the type, and doubly keeled; but both keels are thick, band-like, and strongly and obliquely plicated, and have a denticulated appearance from the plications being continued over the edges of the bands; the plications, following the curve of the line of growth, are less oblique on the anterior keel than those on the posterior keel. A single slender raised line, finely granulated, traverses the space between the keels; the front part of the whorl is ornamented with several concentric raised lines, granulated with great regularity; of these, the one next to the anterior keel, in some specimens (as in fig. 10 *b*), and that next but one, in others (as in figs. 10 *c* and *d*), is the thickest and most prominent; the others slightly diminish in size as they approach the anterior extremity of the canal.

The next variety, *pulcherrima* (fig. 10 *e* and *g*),\* appears to correspond with the variety *a* from Compiègne, noticed by M. Deshayes. In this variety the shell is small and doubly-keeled; the posterior or shoulder-keel denticulated, the anterior keel rounded and obscurely plicated, almost smooth; the front part of the whorls is ornamented with several distant, thickish, concentric lines, which also are smooth and simple, or but very feebly granulated; the whorls are bordered round the suture by a thickish raised line, obscurely granulated or plicated; the margins and the spaces between the keels and between the concentric lines are perfectly smooth.

The variety *revoluta* (fig. 10 *f*) is a modification of the variety *pulcherrima*; in it the sutural edges of the whorls are very faintly crenulated; the shoulder-keel is sharp, obscurely plicated and denticulated, and the edge is bent upwards: the anterior keel is round and feebly plicated, and the concentric lines are slender and finely granulated.

In the last variety to be noticed, the variety *Pagoda* (fig. 10 *h*), the granulation and denticulation, which in the typical form and the preceding varieties form more or less prominent characters, are wanting; and a new mode of ornamentation prevails. In this variety the shell, which is relatively wider, is doubly-keeled, and ornamented with simple spiral bands; the margins of the whorls are concave, and

\* I have adopted for the shells forming this variety, the name by which they have been distinguished as a species in Mr. Wetherell's cabinet.

quite smooth, except where two slender, faintly crenulated, raised lines form a border round the suture. The keels are band-like and simple; the surface of each is traversed by a shallow but conspicuous furrow; the edge of the shoulder-keel is sharp, smooth, and bent upwards like that of the keel which characterises the preceding variety. The space between the two keels and the surface of the front part of the whorls is ornamented with numerous narrow, unequal, round-edged bands, between some of which a slender line occasionally appears; these bands are smooth, or but slightly roughened by the lines of growth.

A form intermediate between and connecting the last two varieties occurs, in which the sharp, smooth-edged, and furrowed shoulder-keel of the variety *Pagoda* is associated with an obscurely plicated anterior keel, and faintly granulated spiral lines.

Although the shell for which the variety *Pagoda* is proposed, differs so much in the ornamentation from the typical form, I do not regard it as specifically distinct. In the several varieties described, the characteristic ornaments of the species have been modified, and have become gradually less prominent, until at last, in the variety *revoluta*, they are almost obliterated; and the intermediate form, before noticed, connects that variety with the one in question, which, in fact, merely presents in strength a character of ornament which has already appeared in other varieties.

All the varieties are rare except the varieties *gyrata* and *Pagoda*, which appear to be more abundant.

*Size.*—Of the var. *ditropis*—axis, 5-12ths of an inch; diameter, 2-12ths of an inch: of the var. *concinna* and *pulcherrima*—axis, 7-12ths of an inch; diameter, rather more than 3-12ths of an inch: of the var. *gyrata*—axis, 1 inch, nearly; diameter, rather more than 5-12ths of an inch: and of the var. *Pagoda*, if the shell were perfect—axis, 1 inch and 2-12ths, nearly; diameter, 5-12ths of an inch.

*Localities.*—For the var. *ditropis*—Highgate, Potters' Bar, Hornsey, Hampstead; for the var. *concinna*—Highgate, Potters' Bar, Hornsey, Finchley; for the var. *gyrata*—Hornsey, Southampton, Shenfield; for the var. *pulcherrima*—Highgate and Clarendon Hill; and for the var. *revoluta* and *Pagoda*—Clarendon Hill. *French*—Parnes, Grignon, Beyne, Mouchy-le-Châtel, Compiègne (fide *Desh.*), Chaumont, Amblainville, Cuisse-Lamotte, Pont-Sainte-Maxence (fide *Graves*).

The specimens, fig. 10 *b* and *k*, are from Mr. Wetherell's cabinet.

NO. 158. PLEUROTOMA MICRODONTA, *F. E. Edwards*. Tab. XXVII, fig. 4.

*P. testá elongatá, fusiformi, tuberculatá, spiraliter exilissime lineatá: spirá elevatá, b -conicá: anfractibus angulatis, unicá serie tuberculorum denti-formium munitis; marginibus posticis latis, pauxillum cavatis, ad suturam cingulo triplici, distanter plicato, cinctis:*

*ultimo anfractu antice repentissime coarctato, in canali angusto, longiusculo, terminanti; lineis spiralibus confertis, inæqualibus, nonnullis eminentioribus, denticulatis: aperturá oblongo-ovali; labro valde arcuato, intus plicato; sinu lato, sub-trigono, in margine collocato.*

Shell elongated, fusiform, tuberculated, and ornamented with very fine, concentric, raised lines; spire nearly conical and much produced, exceeding one half of the whole shell in length; whorls convex, sharply angulated at the shoulders, where they present a single row of small, rather close-set, tooth-shaped tubercles; the posterior margins wide, frequently extending almost to the angle of the preceding whorl, slightly channeled, and bordered round the suture by three sharp, elevated lines, crossed by distant, oblique plications, corresponding with the tubercles on the shoulders of the whorls; the space between the suture and the shoulder is covered with very fine and nearly equal concentric lines. The spiral lines over the middle and front parts of the lines are numerous, very slender, but unequal; every fourth or fifth line being rather thicker and more prominent than the rest, and denticulated; the intermediate lines are simple, nearly equal, and so fine as to be barely perceptible by the naked eye. The body-whorl is suddenly much contracted in front, and terminates in a narrow, but not very long canal: the aperture is of an oblong oval form; the outer lip much arched and plicated within, and the sinus, which is wide and sub-trigonal in shape, is placed a little in front of the middle part of the margin.

The present species presents some resemblance to *P. cymæa*, but is easily distinguishable by the more elevated spire, the more numerous and smaller tubercles, the character of the transverse ornamentation, and the shorter canal.

*Size*.—Axis, 1 inch and 2-12ths; diameter, 5-12ths of an inch, nearly.

*Localities*.—Highcliff, where it is very abundant, and Bracklesham Bay.

*Section I—Shells fusiform.*

- A. *Sinus in the posterior margin of the whorl.* } continued.  
 b. *Canal short or indistinct.\**

No. 159. PLEUROTOMA ATTENUATA, Sowerby. Plate XXVII, fig. 6 a—c.

PLEUROTOMA ATTENUATA, *Sow.* 1816. Min. Con., vol. ii, p. 103, t. 146, fig. 1.

— — *Ib.* 1850. Dixon's Geol., &c., of Sussex, p. 102, t. 6, figs. 11, 14.

— — *Morris.* 1854. Cat. Brit. Foss., 2d edit., p. 269.

\* The sub-divisions dependent on the length of the canal are, it is unnecessary to say, merely artificial, and towards the extremes of the two, species occur which may be referred, apparently with equal propriety to either sub-division: in shells with a short canal, however, the anterior notch is generally wider and deeper, and consequently the crest on the columella will be more prominent.

Nec PLEUROMOMA ATTENUATA, *Desh.* 1824-37. *Descr. des coq. foss., &c.*, vol. ii, p. 483, t. 68, figs. 6, 8.

nec — — — *Dujar.* 1837. *Mém. Soc. Géol. de France*, vol. ii, p. 291, t. 20, fig. 22.

*P. testá elongato-fusiforimi, turritá, costatá, undique spiraliter lineatá: spirá elevatá, acuminatá: unfractibus angulatis, unicá serie nodorum spiniformium, costas coronantium, armatis; marginibus posticis latis, declivis, concavis, ad suturam pauxillum incrassatis, tenuiter crenulatis; ultimo anfractu antice sensim attenuato, in canali longiusculo, lato, terminanti; costis brevibus, sub-distantibus, rotundatis; lineis spiralibus numerosis, in marginibus tenuibus; cæteris inæqualibus: aperturá lanceolatá; labro arcuato; sinu lato, subtrigono, in margine collocato.*

Shell elongated, fusiform, turreted, longitudinally ribbed, and ornamented with concentric raised lines: the spire, formed of eleven or twelve volutions exclusive of the pullus, is much elevated and pointed; the whorls, angulated at the shoulders, are gradually attenuated towards the base, assuming an almost conical form; the body-whorl terminates in a wide, moderately long canal, rather deeply notched at the anterior extremity; the posterior margins are wide, slightly bent towards the preceding whorls, channeled along the middle, thickened at the sutural edge, and bordered by two thickish, prominent, raised lines, granulated or feebly plicated by the lines of growth. The ribs are rather distant, short, oblique, rounded, and terminate at the shoulder in large, transversely compressed, spiniform tubercles, the bases of which are frequently prolonged backwards half-way across the posterior margin. The whole surface of the whorls is covered with close-set concentric raised lines, which are thread-like and nearly equal on the margins, but irregular and unequal over the middle and front parts of the whorls; one or two more or less slender lines intervening between thicker and more prominent lines: the whole surface is roughened by the lines of growth, which in the Bracklesham Bay specimens are very prominent, and give a coarse, rugged character to the shell. The aperture is of a long, narrow, lanceolate form; the outer lip moderately arched; and the sinus, which is wide, not very deep, and sub-trigonal in shape, is placed in the margin. The columella is nearly straight, and presents a large prominent crest or comb at the anterior extremity.

M. Deshayes (*loc. cit.*) has given the specific name *attenuata* to certain shells from the older eocene beds of France, quite distinct from the present species, to which, in point of priority, the name belongs; and Dujardin has fallen into the same error with regard to a Pleurotoma from Touraine. D'Orbigny, in his 'Prodrome,' has distinguished the French eocene shells by the name *sub-attenuata*, and the miocene shells by that of *pseudo-attenuata*.

*Size.*—Axis, 4 inches, nearly; diameter, 1 inch and 2-12ths.

*Localities.*—Although Mr. Sowerby (Dixon's 'Sussex,' p. 102) and Mr. Morris

both cite Barton as a locality for this well-marked species, I have not been fortunate enough to meet with any specimen of it from that locality; it is confined, I believe, to the lower beds of the middle eocene formations. It is found plentifully at Bracklesham Bay, of which locality it may be said to be one of the characteristic fossils: it also occurs at Stubbington and White-Cliff Bay, and in the synchronous beds at Bramshaw.

No. 160. PLEUROTOMA CONICA, *F. E. Edwards* Tab. XXVII, fig. 8.

*P. testá elongatá, fusiformi, omnino concentrice sulcatá, unicá serie tuberculorum munitá; spirá conicá, elevatá, dimidium totius testæ in longitudine superanti: anfractibus convexiusculis, antice subito coarctatis, suturá conspicuá separatis; marginibus posticis latis, pauxillum declivis, cavatis; ultimo anfractu in canali longiusculo terminanti; tuberculis longitudinaliter compressis, obliquis, curvis: aperturá oblongo-ovali; labro arcuato; sinu lato, sub-trigono, in parte anticá marginis collocato.*

Shell elongated, fusiform, concentrically furrowed, and bearing on the shoulders a single row of tubercles: the spire conical, rather thick, and much elevated, exceeding one half of the whole shell in length. The whorls are slightly convex at the shoulders, rather suddenly contracted in front, and separated from each other by a very conspicuous suture; the posterior margins are wide, very slightly depressed, rather deeply channeled along the middle, and a little thickened on the sutural edge. The tubercles, which are somewhat numerous, are longitudinally compressed, narrow, oblique, and curved; the concentric furrows are nearly regular, shallow, and separated by narrow, rounded ridges, of which, as they approach the beak, every alternate one becomes more prominent than the rest. The aperture is of an oblong-oval form, and terminates in front in a slightly produced, widish canal; the outer lip is moderately arched; and the sinus, which is placed in the very front part of the posterior margin, almost on the shoulder of the whorl, is wide and sub-trigonal in shape.

This species, characterised by its thick, elevated, conical spire, is apparently confined to the older eocene beds in the neighbourhood of London. I have not met with any specimen of it either from Clarendon Hill or from the synchronous formations in Hampshire.

*Size.*—Axis, 11-12ths of an inch; diameter, 4-12ths of an inch.

*Locality.*—Highgate.

No. 161. PLEUROTOMA DESMIA, *F. E. Edwards*. Tab. XXVII, fig. 5.

*P. testá elongatá, fusiformi, tuberculatá, spiraliter fasciolatá et lineatá: spirá sub-conicá, valde productá: anfractibus convexis, sub-angulatis, longitudinaliter plicatis; marginibus posticis depressis, concavis, concentricè lineatis, ad suturam cingulo duplici, distanter plicato, cinctis; ultimo anfractu repente coarctato, incanali breviculo exeunti: fasciis numerosis, antice simplicibus, cæteris inæqualibus, nonnullis majoribus, crasse granulatis, cum aliis minoribus simplicibus, alternantibus: aperturá ovali; labro valde arcuato, intus plicato; sinu lato, sub-trigono, in margine collocato.*

Shell elongated, fusiform, tuberculated, and ornamented with concentric bands and raised lines; the spire rather thick, nearly conical and much elevated, almost equalling two thirds of the whole shell in length: the whorls short, convex, and obscurely angulated at the shoulders, where they present a double row of small, transverse tubercles; the posterior margins much depressed, hollowed out, and concentrically lined along the middle, and bordered round the suture by a double line, distantly and obliquely plicated by the lines of growth of the sinus, which are very prominent over the whole width of the margin; the last whorl is suddenly contracted in front, and terminates in a rather short and narrow canal, widely notched at the anterior extremity. The spiral bands over the middle and front parts of the whorls are divided with much regularity into rows of coarse, oblong granulations, placed nearly below each other in an oblique direction, following the curve of the outer lip, and giving an appearance of plication to the whorl: the rows of granulations, which are separated by thickish, raised lines, rounded on the surface, diminish in size towards the front part of the whorls, until, on reaching the canal, they barely exceed the intervening lines in size, and the granulations become nearly obliterated. The aperture is of an oval form; the outer lip much arched, projecting in front, and plicated within; and the sinus, which is placed rather towards the front of the margin, is wide, moderately deep, and sub-trigonal in form. The columella is slightly curved, and presents in front, at the anterior extremity, a conspicuous crest or comb.

The present species, in the young state, somewhat resembles *P. microdonta*, but the shell is narrower, the spire relatively longer, and the canal shorter; the regular granulations which characterise the concentric ornamentation also render it easily separable. It is apparently confined to the middle eocene formations of Barton, where it is not uncommon.

*Size*.—Axis, 1 inch and 8-12ths, nearly; diameter, half an inch.



TAB. XXIV.

Fig.

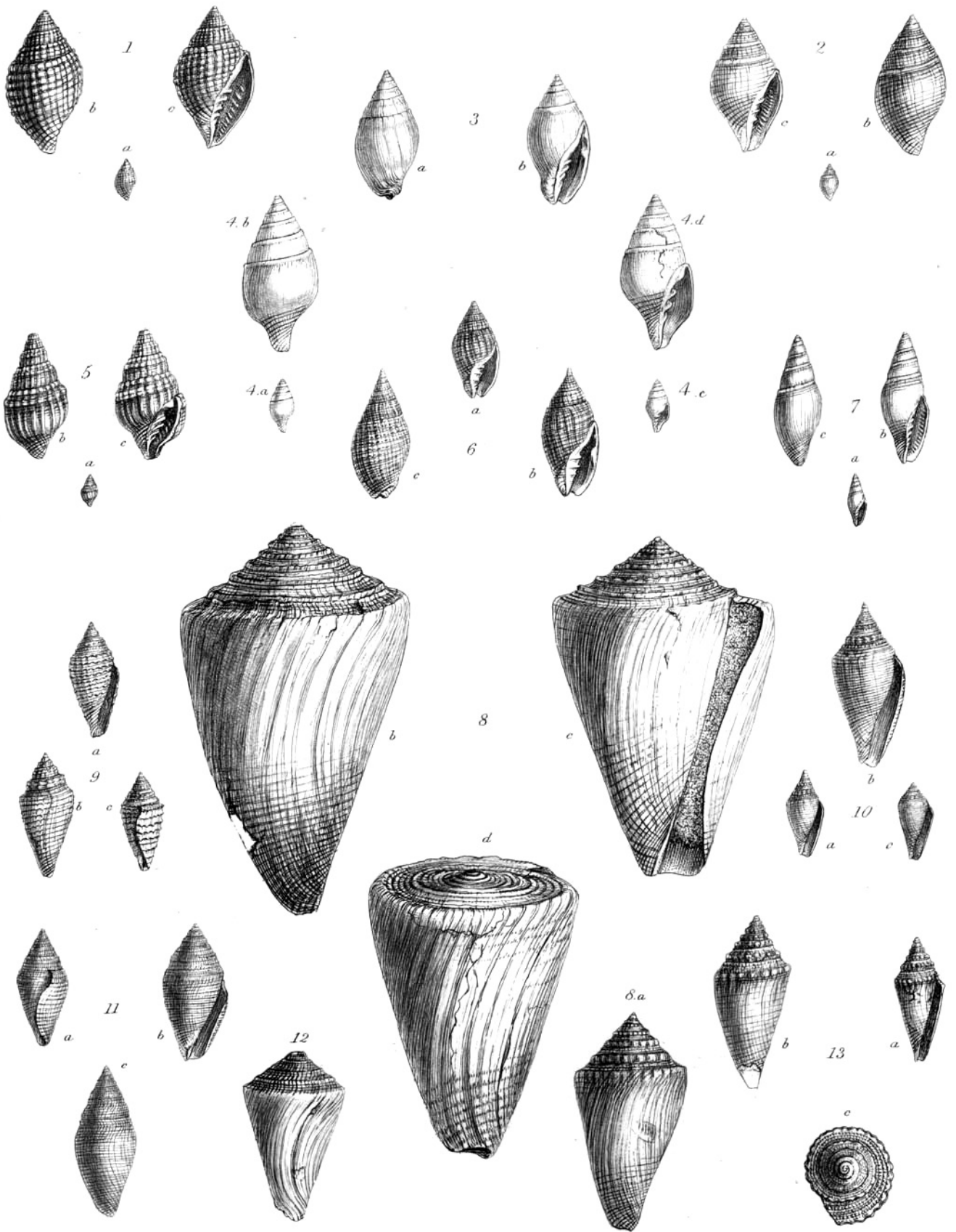
1. *Mitra parva*, No. 120, *p.* 183.
  - a.* Back view, natural size.
  - b.* Back view, magnified.
  - c.* Front view, ditto.
2. *Mitra parva* (var. *pumila*). No. 120, *p.* 183.
  - a.* Back view, natural size.
  - b.* Back view, magnified.
  - c.* Front view, ditto.
3. *Mitra labratula*. No. 119, *p.* 182.
  - a.* Back view.
  - b.* Front view.
4. *Mitra obesa*. No. 122, *p.* 185.
  - a.* Back view, natural size.
  - b.* Back view, magnified.
  - c.* Front view, natural size.
  - d.* Front view, magnified.
5. *Mitra volutiformis*. No. 123, *p.* 186.
  - a.* Back view, natural size.
  - b.* Back view, magnified.
  - c.* Front view, ditto.
6. *Mitra scabra*, No. 118, *p.* 181.
  - a.* Front view, shell of mid-growth.
  - b.* Front view, adult shell.
  - c.* Back view, ditto.
7. *Mitra porrecta*. No. 121, *p.* 185.
  - a.* Front view, natural size.
  - b.* Front view, magnified.
  - c.* Back view, ditto.
8. *Conus diadema*. No. 124, *p.* 190.
  - a.* Back view, shell of mid-growth.
  - b.* Back view, adult shell.
  - c.* Front view, ditto.
  - d.* Back view, ditto. (Var. *pyriformis*.)
9. *Conus scabriculus*. No. 129, *p.* 198.
  - a.* Front view.
  - b.* Back view.
  - c.* Side view.

TAB. XXIV (*continued*).

Fig.

10. *Conus lineatus*. No. 130, *p.* 199.
  - a.* Front view, natural size.
  - b.* Front view, magnified.
  - c.* Front view, (specimen described as *C. corculum*, Sow.)
11. *Conus dormitor*. No. 131, *p.* 200.
  - a.* Side view.
  - b.* Front view.
  - c.* Back view.
12. *Conus velatus*. No. 126, *p.* 193.

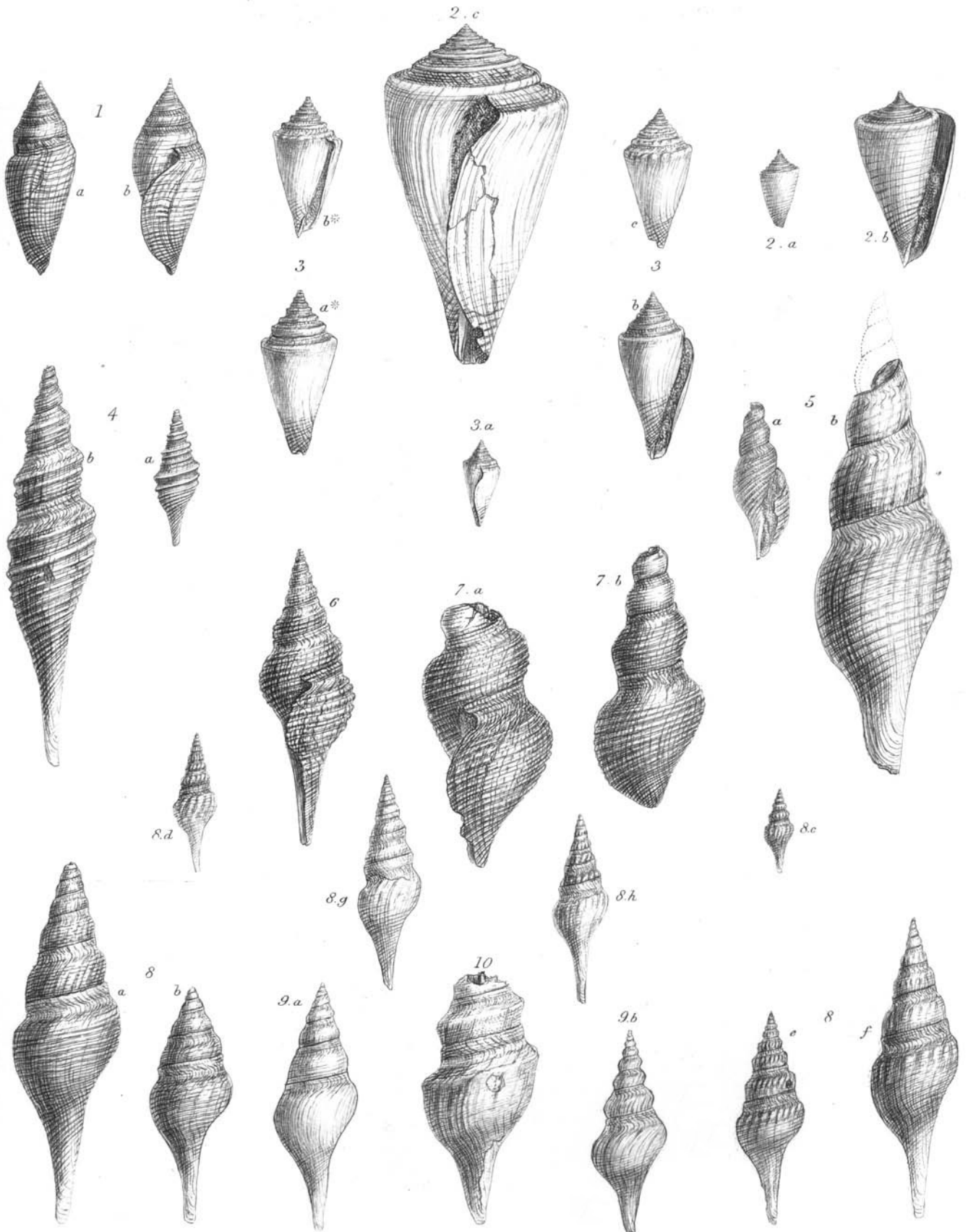
Back view.
13. *Conus concinnus*. No. 128, *p.* 196.
  - a.* Front view, shell of mid-growth.
  - b.* Back view, adult shell.
  - c.* View from above, showing the posterior margins of the whorls forming the spire.



TAB. XXV.

Fig.

1. *Conus alatus*. No. 132, *p.* 202.
  - a.* Back view.
  - b.* Side view.
2. *Conus deperditus*. No. 125, *p.* 191.
  - a.* Back view, young shell.
  - b.* Front view, shell of mid-growth.
  - c.* Side view, adult shell.
3. *Conus Lamarckii*. No. 127, *p.* 194.
  - a.* Side view, young shell, from Bracklesham Bay.
  - a.\** Back view, adult shell, from ditto.
  - b.* Front view, adult shell, from ditto.
  - b.\** Front view, adult shell, from Bramshaw.
  - c.* Back view, adult shell, from ditto.
4. *Pleurotoma stena*. No. 133, *p.* 207.
  - a.* Back view, young shell, from Southampton.
  - b.* Back view, adult shell, from Highgate.
5. *Pleurotoma symmetrica*. No. 136, *p.* 209.
  - a.* Front view, young shell, from Highgate.
  - b.* Back view, adult shell, from Southampton.
6. *Pleurotoma inarata*. No. 134, *p.* 208.
  - Side view, adult shell.
7. *Pleurotoma helix*. No. 135, *p.* 209.
  - a.* Side view, adult shell.
  - b.* Side view, shell of mid-growth.
8. *Pleurotoma teretrium*. No. 137, *p.* 210.
  - a.* Back view, adult shell, from Highgate.
  - b.* Back view, adult shell, from ditto. (Var. *nanodis*.)
  - c.* Back view, young shell, from Southampton. (Var. *tuberculata*.)
  - d.* Back view, young shell, from ditto. ditto.
  - e.* Back view, shell of mid-growth, from ditto.
  - f.* Back view, adult shell, from Highgate. (Var. *crebrilinea*.)
  - g.* Back view, Highgate specimen. (Var. *latimarginata*.)
  - h.* Back view, ditto. ditto.
9. *Pleurotoma transversaria*. No. 141, *p.* 214.
  - a.* Back view, Brockenhurst specimen.
  - b.* Back view, Lyndhurst specimen. (Var. *cypha*.)
10. *Pleurotoma goniæa*. No. 140, *p.* 213.
  - Back view.



TAB. XXVI.

Fig.

1. *Pleurotoma crassa*. No. 138, *p.* 212.
  - a.* Back view, young shell, from Southampton.
  - b.* Back view, shell of mid-growth, from Shenfield.
  - c.* Back view, ditto, from Shenfield.
  - d.* Back view, adult shell, from Nuneham.
2. *Pleurotoma cocciphora*. No. 143, *p.* 217.

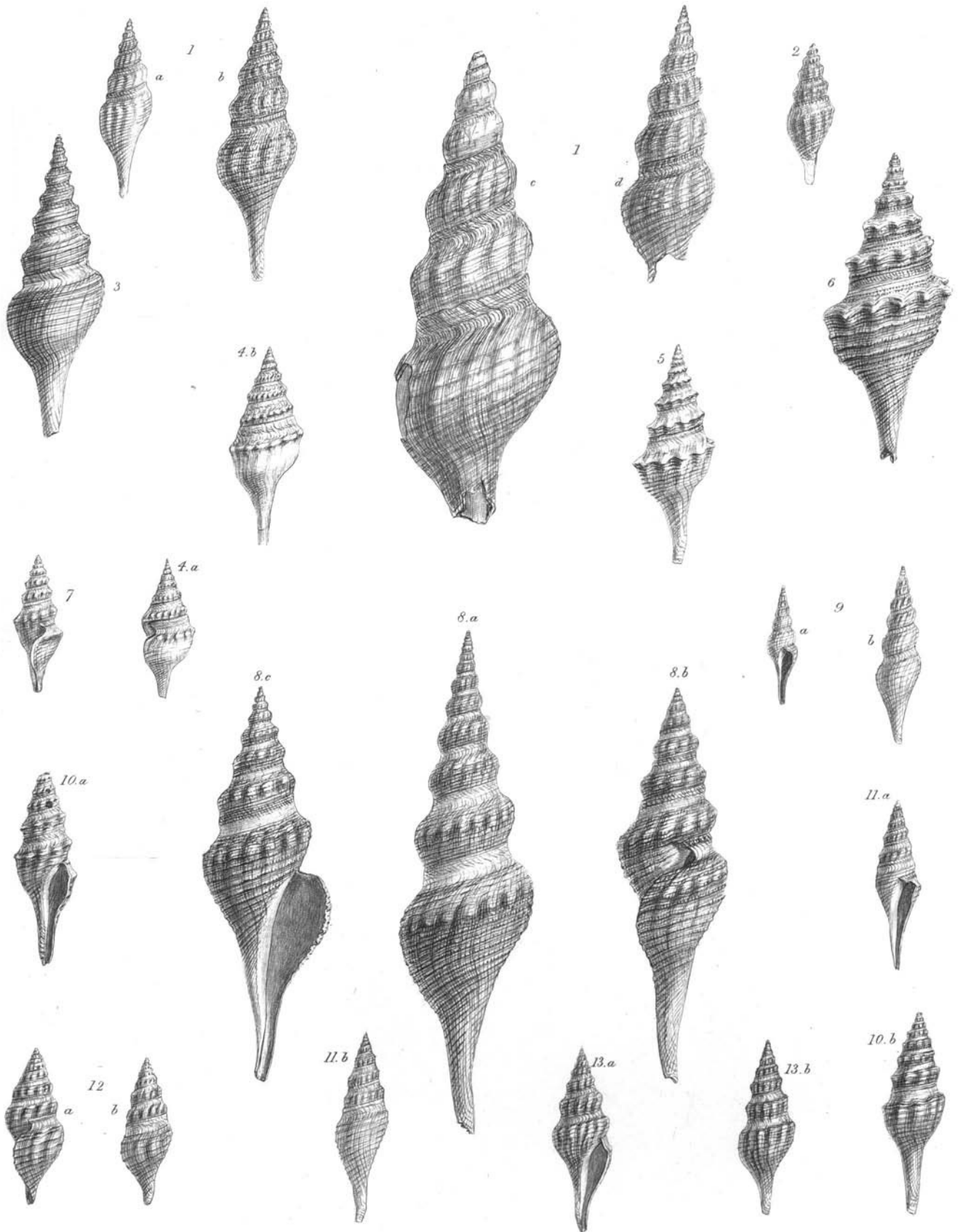
Back view, adult shell.
3. *Pleurotoma planetica*. No. 139, *p.* 212.

Back view, shell of nearly full growth, from Bramshaw.
4. *Pleurotoma cymæa*. No. 142, *p.* 215.
  - a.* Back view, shell of mid-growth, from Brockenhurst.
  - b.* Back view, adult shell, from ditto.
5. *Pleurotoma dentata*. No. 146, *p.* 220.

Back view.
6. *Pleurotoma Keelei*. No. 145, *p.* 219.

Back view, nearly adult shell, from Shenfield.
7. *Pleurotoma textiliosa*. No. 147, *p.* 222.

Side view, shell from Bracklesham Bay.
8. *Pleurotoma rostrata*. No. 144, *p.* 218.
  - a.* Side view, shell past mid-growth, from Barton.
  - b.* Back view, adult shell, from ditto.
  - c.* Front view, adult shell, from Highcliff. (Var. *antiqua*.)
9. *Pleurotoma lævigata*. No. 152, *p.* 227.
  - a.* Side view, shell of mid-growth, from Barton.
  - b.* Back view, adult shell, from ditto.
10. *Pleurotoma crassicosta*. No. 150, *p.* 225.
  - a.* Front view, adult shell.
  - b.* Back view, ditto.
11. *Pleurotoma lanceolata*. No. 151, *p.* 226.
  - a.* Front view, adult shell.
  - b.* Back view, ditto.
12. *Pleurotoma exorta*. No. 148, *p.* 223.
  - a.* Side view, adult shell.
  - b.* Back view, ditto.
13. *Pleurotoma macilenta*. No. 149, *p.* 224.
  - a.* Front view, adult shell, from Barton.
  - b.* Back view, adult shell, from ditto.



TAB. XXVII.

- Fig.
1. *Pleurotoma fusiformis*. No. 153, *p.* 228.
    - a.* Back view.
    - b.* Front view.
  2. *Pleurotoma sulculosa*. No. 154, *p.* 229.
    - a.* Back view, young shell, from Potters' Bar.
    - b.* Back view, shell of mid-growth, from ditto.
    - c.* Back view, adult shell, from Highgate.
  3. *Pleurotoma acuminata*. No. 155, *p.* 230.
    - a.* Back view, adult shell, from Highgate.
    - b.* Front view, adult shell, from ditto.
    - c.* Front view, adult shell, from Hornsey, smooth variety.
    - d.* Front view, adult shell, from Clarendon Hill.
  4. *Pleurotoma microdonta*. No. 158, *p.* 236.
    - Side view, adult shell, from Highcliff.
  5. *Pleurotoma desmia*. No. 161, *p.* 240.
    - Front view, shell nearly adult.
  6. *Pleurotoma pyrulata*. No. 156, *p.* 232.
    - a.* Back view, adult shell.
    - b.* Side view, ditto.
  7. *Pleurotoma attenuata*. No. 159, *p.* 232.
    - a.* Side view, shell nearly adult.
    - b.* Side view, adult shell.
    - c.* Back view, shell of mid-growth.
  8. *Pleurotoma conica*. No. 160, *p.* 239.
    - a.* Back view, adult shell.
  9. *Pleurotoma cymæa*. No. 142, *p.* 215.
    - a.* Back view, young shell, from Colwell Bay.
  10. *Pleurotoma terebralis*, *var.* No. 157. *p.* 233.
    - a.* Back view, shell magnified (*var. ditropis*), from Hampstead.
    - b.* Back view, shell magnified (*var. gyrata*), from Hornsey.
    - c.* Back view, shell natural size (*var. gyrata*), from Shenfield.
    - d.* Back view, shell magnified (*var. gyrata*), from Southampton.
    - e.* Back view, shell magnified (*var. pulcherrima*), from Highgate.
    - f.* Back view, shell natural size (*var. revoluta*), from Clarendon Hill.
    - g.* Back view, shell magnified (*var. pulcherrima*), from ditto.
    - h.* Back view, shell natural size (*var. Pagoda*), from ditto.
    - i.* Front view, shell natural size (*var. concinna*), from Potters' Bar.
    - k.* Front view, shell magnified (*var. concinna*), from Highgate.

NOTE.—The lines indicate the size of the specimens.



