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A MONOGRAPH

OF THE

MOLLUSCA FROM THE GREAT OOLITE,

CHIEFLY FROM

MINCHINHAMPTON

AND

THE COAST OF YORKSHIRE.

BY

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PART III.

BIVALVES.

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OPIS SIMILIS, *Sow.*, sp. Tab. VI, figs. 4, 4a.

CARDITA SIMILIS, *Sow.* Min. Con., p. 56, t. 232, f. 3, 1819.

OPIS SIMILIS, *Morris.* Catal., p. 96, 1843.

Testá subrhomboidéá, fornicatá, concentricè lineatá, umbonibus terminalibus incurvis, cariná dorsali acutá, latere postico abrupto, lunulá planá. (Goldfuss.)

Shell nearly rhomboidal or cordiform, elongated; umbones terminal, rather angulated and incurved; dorsal surface with an elevated acute angle; the lunule is very small and cordiform, its borders rounded; the anterior portion of the surface has concentric lines, which pass over the carina, and are soon lost upon the flattened posterior surface.

The height, measured along the dorsal carina, very much exceeds the lateral diameter, the shell being much produced and pointed at the posterior and inferior extremity; it is associated with *Opis lunulatus* in the shelly beds of the Great Oolite, but is much less common; compared with that species it is much more lengthened and oblique, the lunule minute, and the lines are much more delicate and closely arranged.

Localities. Minchinhampton and Bisley Commons in the Great Oolite; Ancliff, Wiltshire; Ponton, Lincolnshire. Cloughton Wyke, Yorkshire. (Phillips.)

OPIS DESHAYESII. Tab. VI, figs. 5, 5a.

Testá elongatá, angustá, trapeziformi, concentricè costatá, anticè depressá, posticè acute-carinatá, sublævigatá, subsinuatá; costis regularibus depressis; lunulá magná excavatá, marginibus rotundis; umbonibus elutis, angustis, incurvis.

Shell elongate, narrow, trapeziform, the sides concentrically costated; anterior side depressed, truncated; posterior side acutely carinated, the carina separating a posterior depressed and smooth area from the costated portion of the shell; the posterior margin of the shell forms an angle at its middle part; lunule large and deep, its margins rounded; umbones elevated, angulated, and compressed at the sides.

The general figure is compressed, elongated, and attenuated, irregularly pentagonal, the anterior side being the most wide. The absence of an anterior angle is sufficient to distinguish it from *Opis cardissoides*, Goldfuss; but the two species which approach most nearly to it are the *Opis Archiaciana* and *O. Michelinæa*, figured and described by M. Buvignier in his work on the 'Geology and Palæontology of the Department of the Meuse:' but in neither of the latter species does the convexity of the valves equal that of our shell; they are comparable to it in the elevation and attenuation of the umbones, but are destitute of the regular concentric costæ.

Height, $5\frac{1}{2}$ lines; opposite diameter, $3\frac{1}{2}$ lines; diameter through both the valves, 4 lines. Rare.

Localities. Quarhouse, Bisley Common, and Minchinhampton Common; Ancliff, Wiltshire.

ASTARTE. *Sow.*, 1817.

Gen. Char. Shell equi-convex, inequilateral, thick, the surface usually concentrically costated, the margins of the valves close, and internally crenulated. Hinge with two diverging cardinal teeth in each valve, those of the left valve being elongated and nearly equal, those of the right valve unequal, the anterior one being small. Muscular impressions two; ligament external.

ASTARTE SQUAMULA, *D'Archiac.* Tab. IX, fig. 9.

ASTARTE SQUAMULA, *D'Archiac.* Mém. Soc. Geol. Fr., vol. v, pl. 25, f. 5.

Testá ovato-orbiculari, subdepressá, umbonibus medianis acutis, lunulá ovato-lanceolatá, costis concentricis, crebris, irregularibus et depressis, nonnunquam obsolete.

Shell ovately orbicular, rather flattened; umbones mesial, prominent, and acute; lunule ovately lanceolar, and but little excavated; hinge margin lengthened and rounded; concentric costæ numerous, irregular, and depressed, sometimes obsolete.

The valves of this little depressed species occur in considerable numbers throughout the shelly beds of the formation in the Minchinhampton district; in the greater number of instances the surface is smooth, probably by erosion. The lateral diameter is one fifth greater than the height, and in the largest examples does not exceed six lines. Individuals vary moderately, both in the outline and the convexity of the valves, but a considerable number can easily be obtained for comparison.

Localities. Minchinhampton. Eparcy, France.

ASTARTE MINIMA, *Phil.* Tab. IX, fig. 10a, b.

ASTARTE MINIMA, *Phil.*, Geol. Yorksh., t. 9, f. 23.

? ASTARTE PULLA, *Roemer*, Nordd. Ool., p. 113, t. 6, f. 26.

Testá convexá, ovato-orbiculari; umbonibus submedianis; costis regularibus convexis, interstitiis æqualibus (circa 14).

Shell convex, ovately orbicular; umbones nearly mesial; costæ (about fourteen in number) regular, rounded, elevated, and equal in breadth to the interstitial spaces.

This little shell is not associated with any other at all resembling it, but from its minuteness, it is probably often unnoticed; it does not appear to be abundant (at least in the Minchinhampton district, from which our specimens have been obtained).

The lateral diameter exceeds the height by about one third, and rarely equals 4 lines.

Localities. Minchinhampton Common, in the soft beds of Oolite beneath the planking; Ponton, Lincolnshire; Scarborough, in the grey limestone of the Great Oolite.

ASTARTE PUMILA, Sow. Tab. IX, fig. 13*a*, *b*.

ASTARTE PUMILA, Sow. Min. Con., t. 444, f. 2, p. 64.

— — ? Goldfuss. Petref., t. 134, f. 16.

— — Morris. Catal. Brit. Foss., 1854, p. 187.

Testá parvá, convexá, ovatá, umbonibus acutis, postmedianis, antrorsum incurvis, lunulá parvá, mediocre depressá, costulis regularibus, obtusis, crebris, interstiis angustioribus.

Shell small, convex, ovate; umbones acute, postmesial, but directed somewhat forwards; lunule small, moderately depressed; concentric costæ regular, obtuse, closely arranged, the interstitial spaces very narrow.

The height is always greater than the lateral diameter, a character which differs from the shell figured by Goldfuss, the latter probably being a different species; the depression of the lunule varies in different individuals, but never has the deep concavity figured by Goldfuss. The height is usually about 3 lines; it is somewhat rare.

Localities. Ancliff and Minchinhampton.

ASTARTE EXCENTRICA. Tab. IX, fig. 8*a*, *b*.

Testá parvá, ovato-orbiculari convexá, umbonibus medianis acutis, lunulá minimá; plicis incrementi paucis, magnis et irregularibus; costis crebris depressis, interstiis angustioribus; costis superioribus subundatis, excentricis, inferioribus semel subundulatis sed concentricis.

Shell small, ovately orbicular and convex; umbones mesial and pointed; lunule very small; folds of growth few, strongly marked, and irregular; costæ very densely arranged, depressed, the interstitial spaces very narrow; the superior costæ are slightly undulated, and are excentric, passing across the surface of the valves very slightly inflected; the inferior costæ are concentric, but are likewise slightly undulated.

The finely ornamented surface of this little shell is scarcely visible except under a magnifier; the costæ are flattened, and so closely arranged that the interstitial spaces are mere striæ; there is also about the borders of the costæ a kind of obscurely wrinkled appearance, or as though they were slightly crenulated; the superior or excentric costæ occupy a surface less than the inferior ones, and the two kinds are separated by a prominent fold of growth. Our little species does not appear to be very abundant, it occurs with other small shells of the same genus in the beds of soft shelly Oolite which underlie the planking.

Height and lateral diameter equal, or about 4 lines.

Localities. Minchinhampton and Bisley Commons.

ASTARTE ROTUNDA. Tab. IX, fig. 12.

ASTARTE ORBICULARIS, *Sow.* Min. Con., t. 520, f. 2.— ROTUNDA, *Morris.* Catal. Brit. Foss., p. 187.

Testá crassá orbiculatá, convexá, umbonibus submedianis acutis, margine cardinali obliquo, elongato, subrecto, lunulá magná lanceolatá, plicis incrementi paucis, irregularibus; costis depressis, crebris et irregularibus.

Shell thick, orbicular, convex; umbones nearly mesial, prominent, acute; hinge margin oblique, lengthened, and nearly straight; lunule large and lanceolate; folds of growth few and irregular; costæ depressed, small, closely arranged, and irregular.

The general figure has a considerable degree of convexity; the umbones are small, pointed, and curved forwards, and are placed somewhat nearer to the anterior than posterior side of the valves; the extremity of the lengthened hinge border forms an angle with the inferior margin. It is rare.

Height nearly equal to the lateral diameter, which is $2\frac{1}{4}$ inches; the diameter through both the valves is $1\frac{1}{2}$ inch.

Locality. Minchinhampton Common, in the planking.

ASTARTE? RHOMBOIDALIS, *Phil.*, sp. Tab. IX, fig. 20.ISOCARDIA RHOMBOIDALIS, *Phil.* Geol. York., 1, t. 3, f. 28.HIPPOPODIUM LUCIENSE, *D'Orb.* Prod. Paléont., p. 308.— BAJOCIENSE, *D'Orb.* Ib., p. 277.

Testá crassá convexá, subquadratá, vel oblongá, umbonibus anticis obtusis, margine cardinali elongato, subhorizontali, lunulá magná, excavatá, margine inferiore subrecto et sinuato, marginibus internis integris, superficie plicis incrementi paucis, magnis, distantibus; striis concentricis tenuissimis regularibus crebris. Ætate senili striis concentricis obsoletis, plicis rugis magnis irregularibus.

Shell thick, convex, subquadrate, or oblong; umbones anterior, obtuse; hinge margin elongated, subhorizontal, but slightly arched; lunule large, elliptical; inferior margin nearly straight, parallel to the superior border, and slightly sinuated; internal margins of the valves plain, acute; folds of growth few, large, and distant; concentric striations regular, delicate, and closely arranged. In an advanced stage of growth the concentric striations disappear, and the surface became rugose with the irregular plications of increase. An oblique prominence or obscure angle extends downwards posteriorly, and becomes prominent in specimens which are short and have the superior border much arched. The Great Oolite examples are very numerous, and for the most part rather flattened and rugose with adherent shells, the largest specimens not unfrequently having been perforated or grooved by the Lithophagidæ; the substance of the test is very thick, and the muscular impressions are deeply excavated; the cardinal teeth are remarkably large and massive.

Localities. The vertical range of this remarkable species is very considerable; it occurs in the Inferior Oolite of the Cotteswolds, the Great Oolite of Minchinhampton, the Coralline Oolite of Malton, and we have seen fine casts from the Kimmeridge Clay of Wilts. The *Hippopodium Luciense* and *H. Bajociense*, D'Orb., are probably identical with this species.

ASTARTE EXCAVATA, Sow., var. COMPRESSIUSCULA. Tab. IX, fig. 18, 19.

ASTARTE EXCAVATA, Sow. Min. Con., t. 233.

— COMPLANATA, Roemer. Nordd. Oolith., t. 6, f. 28.

Testá ovatá, transversá, compressá, umbonibus parvis anticis depressis, margine cardinali, elongato, carvato, subhorizontali, margine inferiore elliptico, lunulá angustá excavatá, margine acuto. Costis externis concentricis depressis irregularibus interdum confertis aut enim obsoletis. Ætate juniore testá planatá et fragili, costis paucis latis prominulis.

Shell ovately transverse, compressed; umbones small, anterior, and much depressed; hinge border elongated, nearly horizontal, and curved; lower border regular, elliptical; lunule deeply excavated, its margins acute; concentric costæ depressed, irregular, sometimes nearly obsolete. In the young state the shell is flattened, very delicate, pellucid, and has a few distinct broad concentric costæ near to the umbones.

In the shelly beds of the Great Oolite, the young delicate shells occur abundantly from 3 to 6 lines in length. Adult specimens are much more rare, and few exceed 20 lines in length.

The tenuity of the test is considerable; and this feature, together with the greater flatness, will serve to distinguish it from the typical form, *A. excavata*, Sow., which is a much larger and thicker shell. Notwithstanding its tenuity, flatness, and the small dimensions, we believe this to be only a variety of the well-known Inferior Oolite shell, induced by peculiarities of the stratum in which it occurs. The same change of aspect takes place in the freestone beds of the Inferior Oolite; but the form again attains its pristine dimensions and thickness in the upper ragstones higher in the series.

Localities. Minchinhampton Common in the Great Oolite; Nailsworth Hill, in the freestone beds of the Inferior Oolite.

The typical shell occurs abundantly at Dundry and at Rodborough Hill.

ASTARTE DEPRESSA, Goldf. Tab. IX, fig. 11.

ASTARTE DEPRESSA, Goldfuss. Petref., p. 192, t. 134, f. 14.

Testá compressá, transversim ovato-orbiculari; umbonibus medianis obtusis; lunulá ellipticá, angustá, costis convexis interstis que concentricè striatis. (Goldfuss.)

Shell compressed, transverse, ovately orbicular; umbones median, prominent, obtuse;

lunule elliptical, narrow; cardinal margin nearly straight, oblique; concentric costæ convex, irregular, with fine interstitial concentric striæ.

The lateral diameter is one fifth greater than the height; the smaller specimens are those which display the characters of the species most distinctly; with increase of growth the shell acquired some additional convexity, and the costæ became less distinctly elevated.

Locality. It occurs somewhat rarely in the shelly beds of the formation at Minchinhampton, and likewise in the middle division of the Inferior Oolite of the same district.

ASTARTE ANGULATA. Tab. IX, fig. 17*a, b*.

Testá crassá transversá, subtetragoná, aut cuneiformi; umbonibus anticis prominentibus; margine antico rotundato, postico elongato, subrostrato, dorso oblique subinflexo; striis concentricis crebris, irregularibus.

Shell thick, transverse, somewhat triangular or wedge-shaped; umbones prominent and anterior; anterior margin short and rounded; posterior margin elongated, slightly curved, and rostrated; dorsal surface slightly bent by an obscure angle, which passes obliquely downwards to the posterior extremity; striæ concentric, closely arranged, and irregular.

A sulcus borders the posterior side of the shell throughout its length; it is smooth, and the margin separating it from the dorsal surface is acute. This character will readily distinguish it from contemporaneous species of the genus.

This small shell is not very common: it occurs with other small Veneridæ in the soft Oolite which underlies the planking.

Locality. Minchinhampton Common.

ASTARTE ELEGANS, Sow. Tab. XIV, fig. 14.

ASTARTE ELEGANS, Sow.	Min. Con., t. 137, f. 3.
— —	<i>Phil.</i> Geol. York., 1, t. 11, fig. 41.
— —	<i>Goldf.</i> Petref., t. 134, f. 12.
— —	<i>Zeiten.</i> Petref., t. 61, f. 4.
— —	<i>Morris.</i> Catal., 1854, p. 186.

Testá ovato-obliquá plano-convexá, crassá; umbonibus antemedianis prominentibus; lunulá excavatá, marginibus rotundis; lateribus plicis concentricis magnis elevatis subacutis, plerumque regularibus; marginibus internis denticulatis.

Shell ovately oblique, with a low convexity; test thick; umbones prominent, anterior, and curved forwards; lunule excavated; border of the valves rounded; surface with large, elevated, and rather acute, usually regular concentric plications; inner margins of the valves denticulated.

Specimens vary much in the degree of obliquity and convexity.

This very common Inferior Oolite species occurs rarely in the Great Oolite, but it is absent in the shelly beds of the formation in Gloucestershire.

Geological position and localities. Minchinhampton and Scarborough in the Great Oolite; the Cotteswolds, Dundry, Yeovil, and Brora in the Inferior Oolite; Malton in the Coralline Oolite.

ASTARTE INTERLINEATA., var. *Lyc.*, sp. Tab. IX, fig. 14, 15a, b.

HIATELLA ? INTERLINEATA, *Lycett.* Ann. and Mag. Nat. Hist., 1850, p. 421.

Testá parvá subquadrátá vel oblongá, convexo-planá; umbonibus acutis, parvis, ante-medianis; lunulá excavatá; margine superiori et inferiori parallelis subrectis, antico rotundo, postico truncato, angulo obliquo; costis longitudinalibus magnis, postice in angulo flectis et trinodulosis; striis interstitialibus tenuissimis instructis.

Shell small, subquadrate or oblong, slightly convex; umbones acute, small, depressed, and placed anterior to the middle of the valves; lunule excavated; superior and inferior margins parallel, horizontal, and straight; anterior border rounded; posterior border truncated; longitudinal costæ few, somewhat irregular, large, and rounded in the Great Oolite variety, bent posteriorly upwards, forming an acute angle; their posterior portions have also in this variety three rather obscure nodules; the interstitial spaces have very fine longitudinal striations.

This species presents itself under two varieties of aspect, one of which occurs in the middle portion of the Cotteswold Inferior Oolite. This latter and more smooth variety has the figure somewhat shorter, the costæ rather more distant; they are also more narrow and acute; and posteriorly they have not the nodules of the other variety. It must not, however, be inferred that these distinctions are preserved in all specimens; on the contrary, the posterior nodules are uncertain in their distinctness; the number of costæ and their size are equally variable. The test is delicate.

Height, 3 lines; length, $4\frac{1}{2}$ lines; diameter through both the valves, 2 lines: but the greater number of specimens have smaller dimensions.

Geological position and localities. *Astarte interlineata* occurs in the shelly freestone of the Inferior Oolite of Leckhampton and of the Minchinhampton, and likewise in the shelly Great Oolite of the latter locality.

ASTARTE WILTONI. Tab. IX, fig. 16.

Testá ovato-subangulari planatá, umbonibus anticis acutis; costis apicalibus concentricis paucis, magnis.

Shell ovately subangular or subquadrate, flattened; umbones anterior, acute; the surface with a few acute concentric costæ near to the apex; the other portion of the surface nearly smooth.

The surface ornaments nearly resemble *A. striato-costata*, Munster, Goldf. Pet., tab. 134, fig. 18; but the latter shell has much larger dimensions, is somewhat more convex, and has not the subquadrate figure of our species. It is somewhat rare. The name from John Wilton, Esq., of Gloucester, who has investigated the minute anatomy of the univalve Mollusca.

Lateral diameter, 6 lines; height, 5 lines.

Locality. Minchinhampton Common, in a bed of soft Oolite, which underlies the planking.

ASTARTE RECONDITA, *Phil.*, sp. Tab. XII, fig. 10.

Syn. PULLASTRA RECONDITA, *Phil.* Geol. York., 1, t. 9, f. 13.

Testá parvá, ovato-oblongá, subdepressá; umbonibus obtusis, anticis; margine cardinali subhorizontali, basi ellipticá curvatá, superficie striis concentricis paucis magnis; lunulá excavatá.

Shell small, ovately oblong, rather depressed; umbones obtuse, anterior; hinge border elongated, nearly horizontal; basal margin curved elliptically; lunule excavated; the surface near to the umbones has a few large obscure concentric striations, which disappear towards the middle of the shell.

In figure, this little shell bears some resemblance to the young of *Astarte rhomboidalis*, but it is more flattened, and is destitute of the posterior angle of that species; the few rugose striations near to the umbones is another distinctive feature.

Locality. Ponton, Lincolnshire, where it has occurred rather sparingly in the coarse Oolite. In Yorkshire, Professor Phillips records it in the Great Oolite of Cloughton Wyke.

CYPRINA. *Lam.*

Gen. Char. Shell equivalve, inequilateral, transverse, subglobose or subovate; umbones curved obliquely; ligament external; hinge with three diverging cardinal teeth, and a remote laminar or lateral tooth in each valve; muscular impressions, two, lateral; pallial impression slightly angulated posteriorly; margins of the valves close, smooth internally.

CYPRINA LOWEANA. Tab. XIII, fig. 2 2a—d

Testá transvers im ovali, lævi, convexá; umbonibus antemedianis crassis; lunulá ovatá parvá, areá lanceolatá, latere postico subcompresso, infernè subangulato; striis concentricis tenuissimis irregularibus frequentèr obsoletis.

Shell transversely ovate, smooth, convex; umbones anterior, thick, and large; lunule ovate, but slightly excavated; area lanceolate; anterior side rounded; posterior side rather compressed, and slightly angulated at its inferior extremity; the surface has very fine irregular concentric striations, which in the greater number of instances are obsolete.

In none of the Oolitic forms do we find a greater variety of figure than in this species, and without ample materials for comparison, its examples would probably be regarded as pertaining to more than one species; these variations, which are irrespective of growth, refer to the degree of convexity, the extent to which the valves are produced posteriorly, and the more or less compressed and angulated, or, on the other hand, rounded and convex figure of the posterior side of the shell. The valves occur in such considerable numbers, and so fully illustrate all these minor variations of figure, as to remove all doubt that they belong to the same species, even though we place together two examples of very dissimilar aspect. The shell is rather thin, always very fragile, except at the umbones, which are not unfrequently the only portions preserved when the shelly beds are more than usually detrital in their character. The valves rarely occur in contact; but when this happens the ligament is preserved.

The subjoined proportions must be regarded as representing the median figure of the species. Height, 13 lines; lateral diameter, 15 lines; diameter through both the valves, 10 lines. It ranks as one of the most abundant of the bivalves in the Minchinhampton district, and ranges throughout the shelly beds. Named after J. G. Lowe, Esq., who has assiduously collected an interesting series of fossils from the middle Oolite.

Localities. Minchinhampton Common; Bisley Common.

CYPRINA TRAPEZIFORMIS, et var. SUBROTUNDA. Tab. XIII, fig. 5, 5a, c.

VENUS TRAPEZIFORMIS, *Roemer*. Verst. Nordd. Oolith., t. 7, fig. 14.

Testá orbiculato-subtrapeziformi, convexo-planá; antice rotundatá; postice subproductá, angulo acuto carinato-depresso; umbonibus anticis incurvis.

Shell orbicular or subtrapeziform, moderately convex; anterior side rounded; posterior side somewhat produced, forming a depressed angle; umbones anterior, incurved.

This small species occurs abundantly throughout the shelly beds of the formation at Minchinhampton, with the valves disunited. When well preserved, its surface exhibits concentric, irregular, and very fine striations; it is shorter and more convex than *C. Loweana*. The form which we have designated as a variety has greater convexity, and the posterior side has not the angulated outline of the typical form.

Dimensions of this variety: height, 8 lines; lateral diameter, 9 lines; diameter through both the valves, 7 lines. Another line added to the lateral diameter will represent the typical form.

Localities. Minchinhampton Common; Bisley Common.

CYPRINA JURENSIS, *Goldf.*, sp. Tab. XIII, fig. 3.

VENUS JURENSIS, *Goldfuss*. Petref., p. 245, t. 150, fig. 17.

Testá parvá suborbiculari; umbonibus medianis minutis; lunulá ovatá; areá lanceolatá.

Shell small, smooth, nearly orbicular, rather depressed; umbones mesial and small; lunule ovate; area lanceolate.

The nucleus figured by Goldfuss from the Coral Rag of Nattheim, agrees in form with our little species, and they are probably identical.

Height, $5\frac{1}{2}$ lines; lateral diameter, 7 lines.

Localities. Bisley Common, at Eastcombs, and Bussage.

CYPRINA DEPRESSIUSCULA. Tab. XIII, fig. 4.

Testá suborbiculari, lævi, convexo-planá; umbonibus medianis parvis acutis; lunulá subexcavatá; margine postico curvato; basi arcuatá.

Shell suborbicular, smooth, and slightly convex; umbones mesial, small, and pointed; lunule slightly excavated; hinge margin curved; base regularly rounded.

The smooth, rather depressed surface, the mesial pointed umbones, and absence of all angularity in the outline, are the leading characters of this shell, which appears to be rare. Its position is the soft shelly Oolite, about the middle of the shelly beds.

Height, 8 lines; lateral diameter, $9\frac{1}{2}$ lines.

Locality. Minchinhampton Common.

CYPRINA NUCIFORMIS, *Lycett.* Tab. XII, fig. 4.

CYPRINA NUCIFORMIS, *Lycett.* Journ. Geol. Soc., 1853, vol. 9, p. 340, pl. 14, fig. 3.

Testá subnuciformi, convexá; umbonibus magnis curvatis; marginibus rotundis; latere postico angulo obtuso obliquo; lunulá excavatá.

Shell subcordiform or nut-shaped, convex; umbones large, prominent, and curved forwards; margins of the valves rounded; posterior side with an oblique, obtuse angle; lunule large, slightly excavated.

A very convex species, with large umbones, less oblique and more convex than *Venus trapeziformis*, Roemer.

Height and length equal; convexity of the valves one third less.

Localities and position. In Gloucestershire it occurs in the middle portion of the Inferior Oolite; our specimens are from the Great Oolite of Ponton, in Lincolnshire.

Genus—TANCREIDIA. *Lycett*, 1850.

TANCREIDIA, *Lycett.* Ann. Nat. Hist., 1850, p. 407.

HETTANGIA, *Terquem*, 1852. *Buvignier.* Statistique Géologique, Minéralogique et Paléontologique du Département de la Meuse; Atlas, p. 14.

— *Terquem*, Bull. Soc. Géol. de France, 10. p. 368.

Gen. Char. Shell equivalve, subæquilateral, smooth, somewhat flattened, transverse, donaciform; umbones nearly mesial, small, contiguous, flattened; anterior extremity usually pointed; no lunule; posterior side more convex, with an oblique angle more or less conspicuous, the extremity truncated, and more or less gaping; ligament short, external, placed in a small depression; basal margin lengthened, curved, or elliptical;

hinge with an obtuse cardinal tooth in each valve, which is received into a corresponding cavity in the other valve; occasionally in the right valve there is a small anterior, and in the left a small posterior accessory tooth or prominence upon the margin of the cavity; lateral teeth are large, posterior, and approximate in each valve, that of the left valve projecting and received into a depression of the tooth or callosity of the other valve. Muscular impressions oval; pallial impressions simple, faintly marked. There is no lunule; the margin of the right valve anterior to the umbo forms a thickened projecting fold, which covers the tooth of the other valve, and is received into a corresponding receding portion of the margin of that valve; so that the junction of the valves anterior to the umbo has a sinuous flexure.

In the typical species, *T. donaciformis*, which is an Inferior Oolite shell, the lateral teeth are remarkably large; and they are nearly equally conspicuous in the *Hettangia Deshayesea*, Terquem, and *H. Broliensis*, from the Lias of the Moselle and the Meuse, figured by M. Buvignier; but the other Liassic species described by that author, coincide in their dental characters more nearly with our Great Oolite species of this genus. In these, the shells are more delicate, the hinges are smaller and more elongated, the teeth are less projecting, and the cardinal tooth of the left valve is elongated forwards, somewhat upon the anterior border; the lateral teeth are variable in their prominence, and not uncommonly the tooth of the right valve is indistinct or obsolete. When the valves are much flattened, the posterior aperture becomes narrow or not distinguishable. The figure of *Tancredia* varies according as the anterior or posterior sides are the most produced; but more commonly the posterior side is the shorter one, and when it is much truncated, the figure then nearly resembles that of the recent *Donaces*. All the species at present known are destitute of ornament; they are smooth, and exhibit but indistinctly the lines of growth. The margins of the valves are smooth, and, independently of the posterior aperture, there is a general irregularity in the form of the margins, so that they are not close fitting along their extent. In England, *Tancredia* has only hitherto been noticed in the lower Oolitic rocks. M. Buvignier and M. Terquem have recognised eleven species in the Lias of France, and Dr. Dunker one from Halberstadt. To the geologist a knowledge of this form is of importance, as the species appear to be very limited in their vertical range, and hitherto it has not been discovered that any one of them is common to two formations. The profuseness with which *T. brevis* is distributed in the shelly beds of the Minchinhampton Great Oolite, and the young of *T. donaciformis* in the shelly freestone of the Leckhampton Inferior Oolite, is such, that each becomes the most abundant bivalve of their respective localities; the valves are always disunited, and casts are unknown.

In looking to the affinities of this genus, we discover a near approximation—almost an actual passage—into a group of Oolitic forms, which are as yet very imperfectly known, and of which *Corbis lavis*, Sow., and *Corbis depressa*, Buvig., are examples. Three other species have been obtained from the Inferior Oolite of the Cotteswolds, and one from the Coralline Oolite of Malton. In all of these a smooth surface is coincident with a

compressed, elongated figure, and a hinge, the dentition of which differs materially from that of the better known forms of *Corbis*. The shells, likewise, are rather thin, the margins not toothed, and the posterior side is always the larger of the two.

TANCREEDIA TRUNCATA, *Lycett*. Tab. XIII, fig. 11.

TANCREEDIA TRUNCATA, *Lycett*. Ann. and Mag. Nat. Hist., 1850, pl. 11, f. 10.

Testá subtrigoná, ovato-cuneatá; umbonibus posticis; latere postico, brevi, truncato; antico elongato, margine superiore ejusdem recto, obliquè-declivi; margine inferiore subrecto.

Shell subtrigonal, or ovately wedge-shaped; umbones posterior; posterior side short, truncated; anterior side elongated, its superior margin straight, sloping obliquely downwards, the extremity rounded; basal margin nearly straight.

The short posterior side slopes suddenly downwards, it is bounded by an obscure angle or ridge.

Height, $6\frac{1}{2}$ lines; length, 13 lines; diameter through both the valves, 5 lines. Its position is the shelly beds of the Great Oolite, in which it is somewhat rare.

Localities. Minchinhampton and Bisley Commons.

TANCREEDIA BREVIS. Tab. XIII, fig. 8.

Testá parvá subtrigoná; umbonibus submedianis; latere postico brevi, angulo producto; marginibus acuminatis, margine inferiore elliptico.

Shell small, subtrigonal; umbones submesial, depressed; posterior side sloping obliquely, and having a prominent angle, which passes obliquely from the umbo to the postero-inferior border; margin of the valves pointed at both extremities, the inferior margin curved elliptically.

Compared with *T. axiniformis* this species is much more short and convex, and it always forms a prominent angle upon the posterior side, posterior to which the surface is flattened, or even slightly excavated, the extremities of the valves being pointed. In its geological range it accompanies the two other species; it is everywhere common, and certain layers of soft shelly Oolite beneath the planking of Minchinhampton Common are entirely covered with its valves; undoubtedly it is the most abundant bivalve in the district.

Length, $7\frac{1}{2}$ lines; height, $4\frac{1}{2}$ lines.

The *Tancredia donaciformis*, *Lycett*, 'Ann. and Mag. Nat. Hist.,' 1850, vol. vi, pl. xi, fig. 8, approximates so nearly to our species that it is necessary to discriminate between the two forms. The *T. donaciformis* is more lengthened, the umbones are mesial, but the anterior side is more attenuated, its marginal slope being slightly concave, and its extremity more pointed, so that the posterior side appears to be larger than the other; it occurs in the shelly free stone of the Inferior Oolite, Leckhampton Hill, in an abundance rivalling our Great Oolite species.

Locality. The whole of the Minchinhampton district.

TANCREEDIA CURTANSATA, *Phil.*, sp. Tab. XIII, fig. 7a, b.

CORBULA CURTANSATA, *Phil.* Geol. York., 1, t. 3, f. 27.

Testá ovato-elongatá ; umbonibus medianis, parvis ; antice compressá, acuminatá, postice convexá ; margine antico obliquè declivi concavo ; basi ellipticá curvatá.

Shell ovately elongated; umbones small, mesial; anterior side compressed, its extremity pointed; posterior side moderately convex, its margin slightly rounded; antero-superior border obliquely sloping and concave; base elliptically curved.

This is the largest of the Great Oolite species of this genus, it is moderately abundant in the shelly beds; specimens vary much in the convexity of the valves.

Height, 10 lines; length, 15 lines; diameter through the valves, 7 lines.

Localities. Minchinhampton, in the Great Oolite; Malton, in the Coralline Oolite.

TANCREEDIA AXINIFORMIS, *Phil.*, sp. Tab. XIII, fig. 6a, b.

NUCULA AXINIFORMIS, *Phillips.* Geol. York., 1, t. 11, f. 13.

TANCREEDIA EXTENSA, *Lycett.* Ann. and Mag. Nat. Hist., 1850, pl. 2, f. 9.

— AXINIFORMIS, *Morris.* Journ. Geol. Soc., 1853, v. 9, p. 341, pl. 14, f. 4.

Testá ovato-trigoná elongatá, convexo planá ; umbonibus medianis ; latere postico convexiore, angulo oblique subacuto ; margine anteriore et posteriore rectis, obliquè declivibus ; basi ellipticá curvatá.

Shell ovately trigonal, elongated, rather depressed, pointed at the extremities; umbones mesial, depressed, small, and pointed; the posterior side the more convex, with a subacute oblique angle separating a space posterior to it, which is slightly concave; anterior and posterior margins straight, and sloping obliquely downwards; lower margin curved elliptically.

Specimens of this species present a considerable amount of variability in their figure; those from Lincolnshire are usually more convex posteriorly, and have the angle more acute, the space posterior to it being somewhat concave; the Minchinhampton specimens are flatter, the umbones scarcely so much elevated, the posterior angle more obtuse, the space adjoining it being flattened. These differences at first induced us to regard the two as distinct species, and the first description of *T. extensa*, published in the 'Annals of Nat. Hist.' for 1850, was deduced from Gloucestershire specimens, as compared with the acute angle and otherwise distinct figure given in the 'Geology of Yorkshire;' but an examination of numerous specimens, and more especially of those from Lincolnshire, have satisfied us that at the utmost, those of the North of England can only be considered as a variety of the more common form seen in Gloucestershire.

Tancredia angulata is a higher shell, with a shorter posterior, and more attenuated anterior side.

Length, 11 lines; height, 6 lines.

Geological position and localities. *T. axiniformis* occurs in the Inferior Oolite of Yorkshire, and in the Great Oolite of Ponton, Lincolnshire, and of Minchinhampton, in the shelly beds.

TANCREDIS PLANATA. Tab. XIII, fig. 10*a*, *b*.

Testá ovatá, planatá; umbonibus submedianis parvis acuminatis; antice compressá; postice plano-convexá; margine postico obliquè-curvato; antico recto obliquè declivi; basi curvatá.

Shell ovate, flattened; umbones nearly mesial, small, and acute; anterior side compressed, its extremity rounded; posterior side rather more convex; the posterior margin has an oblique curvature; the anterior margin is straight, and slopes obliquely; the base is curved elliptically.

A delicate, smooth, and flattened shell, the anterior extremity of which is much less acuminated, and the posterior less truncated than is usual in this genus. It is moderately abundant in the shelly beds of the formation, and varies considerably both in its outline and degree of convexity.

Height, 9 lines; length, 13 lines.

Localities. Minchinhampton and Bisley Commons.

TANCREDIS ANGULATA, *Lycett*. Tab. XIII, fig. 9*a*, *b*.

TANCREDIS ANGULATA, *Lycett*. Journ. Geol. Soc., 1853, vol. 9, p. 341, pl. 14, f. 5.

Testá ovato-trigoná; umbonibus elatis, medianis, acutis; latere antico compresso; postico angulum obliquum formante; margine cardinali brevi, recto horizontali; basi curvatá.

Shell ovately subtrigonal; umbones elevated, mesial, acute; anterior side compressed; posterior side with an oblique angle separating a flattened posterior portion; ligamental margin short, horizontal; basal margin with a considerable curvature.

This species, which is smaller than *T. curtansata*, is distinguished from that form by the flattened and angulated posterior side, and by the more erect and acute umbones; and from the Inferior Oolite *T. donaciformis*, by the more erect, acute umbones, and more lengthened form; the basal margin has also a more considerable curvature.

Height, 9 lines; length, 14 lines.

Geological position and localities. Ponton, Lincolnshire, and Minchinhampton; at both places in the Great Oolite.

CORBIS. *Sub-genus*—CORBICELLA.

Testá inornatá, ovato-elongatá, subcompressá; umbonibus plerumque antemedianis depressis, contiguís; margine superiore elongato, subrecto, obliquo; ligamento externo

brevi; basi ellipticá curvatá. Cardio dentibus cardinalibus duobus subtrigonis, et lamina testaceá posticá, elongatá, cum dente laterali postico remoto obtuso in utráque valvâ. Impressiones musculares ut in Corbis; valvium marginibus interni integri.

Shell destitute of ornament, ovately elongated, rather compressed; umbones contiguous and depressed, and placed a little anterior to the middle of the valves; superior or ligamental border lengthened, nearly straight, and sloping obliquely; ligament external, short, and contained in a groove; basal margin curved elliptically. Hinge with two cardinal sub-trigonal teeth, a lengthened posterior lamina, and a remote, obtuse, posterior lateral tooth in each valve. Muscular impressions as in *Corbis*, the anterior impression being small and oval, the posterior larger and more rounded, the inner margins of the valves plain. Casts of a large Inferior Oolite species exhibit an oblique anterior sulcation, which passes downwards immediately behind the anterior impression, and is obliterated towards the lower border; this sulcus indicates the presence of an oblique rib upon the interior of each of the valves. The character of the hinge is shown in Tab. XII. fig. 13, 13a.

This group of shells, of which the Great Oolite contains a small species, consists of six or more Oolitic species, which all agree in their characteristic features; their external aspect is sufficiently distinct from the typical group of *Corbis*, their surface is destitute of ornament, and the greater development of the posterior side indicates a distinction, which is confirmed by an examination of the hinge characters. The anterior lateral tooth is always absent, and the internal ridge, which in the typical form of *Corbis* descends from it anterior to the impression, passes in our group posterior to the impression, as is clearly shown by the groove in the cast. The stratigraphical position of the known species of this group is as follows. The Inferior Oolite of the Cotteswolds has two species; our Great Oolite shell is the third; a large elongated shell in the Coralline Oolite of Malton is the fourth; the *Corbis depressa*, Desh., from the department of the Meuse, is the fifth; and another, probably, is the *Psammobia Moreana*, Buvig., 'Pal. de la Meuse' Atlas, pl. iv, figs. 8—10; the latter form nearly resembling our Great Oolite species. The number of these species, and their general accordance in form, surface, and hinge characters, indicate a distinctness worthy of consideration. M. Buvignier, in his description of *Corbis depressa*, Desh., 'Pal. de la Meuse,' p. 12, has, we believe, correctly indicated the natural affinities of this group; he regards it as establishing a passage between *Corbis* and *Hettangia* (*Tancredia*). Adopting this view, we would likewise place it intermediate to *Corbis* and the latter genus.

CORBIS (CORBICELLA) BATHONICA. Tab. XIII, fig. 14.

Testá ovato-elongatá subcompressá tenui; umbonibus antemedianis; latere antico rotundo, postico elongato, subtruncato, angulo obliquo obtuso; basi curvatá; lateribus plicis incrementi paucis, irregularibus.

Shell ovately elongated, rather compressed, the test thin; umbones small, anterior to

the middle of the valves; anterior side rounded, posterior side elongated, the superior border being nearly straight, and sloping obliquely, the posterior extremity is rather truncated; an obscure and obtuse angle descends obliquely upon the posterior side; the sides of the shell have a few irregular folds of growth; the base is curved elliptically.

A delicate species, which varies considerably in its figure, and in the distinctness of its lines of growth; the dental characters are minute, and can rarely be exposed. It is nearly allied to a much larger and more stout Inferior Oolite species, in which the figure is usually more elongated, and the dental characters much more conspicuous. The relative dimensions in this shell vary so much that measurements have little value, but the umbones are always anterior to the middle of the valves. It occurs rather commonly throughout the shelly beds of the formation.

Locality. Minchinhampton.

QUENSTEDTIA.

Testá æquivalvi, subæquilaterá, oblongá et planatá; umbonibus parvis, contiguís, compressis; ligamento externo; foveá ligamenti angustá et elongatá; margine antico rotundo, postico compresso, subquadrato; superficie plicis longitudinalibus plus minusve instructá. Cardio dente cardinali unicá obtusá et transversá in valvá sinistrá, valva dextra fossá cardinali unicá transversá sub umbone sitá. Impressiones musculares postici rotundi, antici elongati et sinuati; impressio pallealis sinu brevi.

Shell equivalve, subequilateral, oblong, and flattened; umbones small, contiguous, and compressed; ligament external, placed in a narrow elongated groove; anterior margin rounder; posterior margin compressed and subquadrate; the surface with irregular longitudinal plications more or less conspicuous. Hinge with one obtuse transverse cardinal tooth in the left valve, which is received into a corresponding pit in the opposite valve. Posterior muscular impressions rounded; anterior impression elongated and sinuated; siphonal scar with a small sinus. (Tab. XV, fig. 12. Tab. IX, fig. 4a. b.)

A genus approximated to *Psammobia* in the general figure of the valves, but distinguished from it in the position of the ligament, which is placed in a narrow fossa, instead of upon the raised nymphal plate of *Psammobia*; the single transverse tooth is another distinctive feature, and reminds us of *Myoconcha*; the sinus in the siphonal scar is much smaller than in *Psammobia* or *Sanguinolaria*.

QUENSTEDTIA OBLITA, var. Tab. IX, fig. 4, 4a, b., and Tab. XV, fig. 12.

Syn. PULLASTRA OBLITA, *Phillips*. Geol. York., 1, tab. 11, fig. 15.

Testá ovato-oblongá compressá; umbonibus parvis medianis; antice rotundatá, postice compressá, subtruncatá, angulo obliquo declivi obtuso; latere postico plicis longitudinalibus irregularibus.

Shell ovately oblong, compressed; umbones small, mesial, compressed, rather pointed; shell with the sides anteriorly rounded, posteriorly compressed, truncated, and forming an obtuse angle, which slopes obliquely downwards to the infero-posterior extremity; the posterior side has some irregular longitudinal plications, which disappear towards the middle of the shell.

The Great Oolite variety of this species is many times smaller than that of the Inferior Oolite, and it is rather more elongated, but it presents no real specific difference. The test is delicate.

This shell was referred to Pullastra, by Professor Phillips, from its external form only, and we believe that only one or two specimens were at his disposal. The figure in the 'Geology of Yorkshire,' unaccompanied by any description, appears to have misled Professor Quenstedt, who has figured the hinge of *Tancredia donaciformis*, Lyc., for his exemplification of *Q. oblita*. The *Panopæa Lebrunæa*, Buvig. 'Paléont. de la Meuse,' Atlas, pl. 7, fig. 6, 7, is nearly allied to our species, but is more elongated and less truncated posteriorly. The arrangement of the longitudinal ridges is very similar.

Localities and position. *Quenstedtia oblita* has occurred in the Inferior Oolite of Blue Wick, Yorkshire, and in the upper portion of the same formation at Rodborough Hill, Cotteswolds. The shelly Great Oolite of Minchinhampton Common has afforded our smaller variety; but the species appears to be rare at each locality.

Dimensions. Our largest Inferior Oolite specimen has a length of $2\frac{1}{2}$ inches, and is $1\frac{3}{8}$ inch in height, the greater number of specimens being about 2 inches in length; but the Great Oolite variety is only 6 lines in length, and 3 in height.

CORBULA, *Brug.* 1791.

Shell ovately trigonal, convex, inequivalve, the left valve being the smaller; a single cardinal tooth in each valve projecting, that of the left valve being compressed; there is likewise a pit in each valve contiguous to the tooth, which is destined to receive the ligament; the ligament is internal, inserted in the pit of the right valve, and in the cavity of the tooth of the left valve; depression of the mantle posteriorly angulated.

CORBULA INVOLUTA, *Goldf.* Tab. IX, fig. 6.

CORBULA INVOLUTA, *Goldfuss.* Petref., t. 151, f. 14.

„ STRIATA, *Buckman.* Geol. of Cheltenham, 2d edit. p. 97, pl. 3, f. 4.

Testá parvá convexá, concentricè striatá; umbonibus submedianis; latere postico rostrato, carinato, excavato; latere antico rotundato.

Shell small, convex, concentrically striated; umbones nearly mesial; posterior side rostrated and slightly excavated; anterior side rounded.

An acute angle passes from the umbo obliquely backwards, separating a narrow area from the remainder of the surface; the concentric striæ are continued upon the flattened posterior area. This little shell is one of the most abundant in the formation; its concentric striæ are very frequently not preserved, and the valves are never found in opposition. The test is thick, and the characters of the hinge strongly marked.

Height, 3 lines; lateral diameter, 4 lines.

Localities. Minchinhampton Common, and Eyeford, Gloucestershire.

NEÆRA IBBETSONI. Tab. XII, fig. 9.

NEÆRA IBBETSONI, *Morris.* Geol. Soc. Journ., 1853, p. 341, pl. 14, fig. 6.

Testá subglobosá, pyriformi, subæquivalvi, striatá; umbonibus magnis submedianis; latere antico rotundo; postico producto, bicarinato, subrostrato; basi curvato; lateribus plicis regularibus inconspicuis; nucleo levi.

Shell subglobose, pyriform, subequivalve, striated; umbones large, rounded, mesial; anterior side rounded; posterior side produced, attenuated, and bicarinated, the anterior carina acute; lower margin curved; the sides with regular, slightly marked plications; nucleus smooth.

A very convex and nearly equivalve shell, with an acutely marked angle upon the posterior attenuated slope; anterior side rounded. The nucleus has the posterior extremity compressed, short, and truncated. It ranks as one of the most rare productions of the Lincolnshire beds.

Height, 9 lines; length, 11 lines; diameter through both the valves, 8 lines.

Localities. Danes Hill; Essendine, and Ketton quarries. Dedicated to Capt. L. B. Ibbetson, F.R.S., in whose company it was first noticed, much compressed in the clays above the Ketton Oolite.

Family—MYADÆ.

Previously to stating our views upon this extensive family, we desire to record our obligations to Agassiz, for his important work, 'Etudes Critiques,' which exhibits a large amount of patient research, of critical sagacity, and original views. The author has, however, candidly admitted that his work is imperfect in certain of the details—that facts are sometimes wanting or insufficiently known, and consequently that the genera proposed by him are probably not all of equal value. The subject, indeed, is connected with difficulties of more than one kind, and of such a nature, that subsequent observers might be expected to differ in their estimates of the value of the several generic distinctions proposed by M. Agassiz, and might even determine to discard some of them altogether. The length of time which has elapsed since the publication of the 'Etudes Critiques' has been sufficient for the accumulation of many additional facts tending to render our theoretical

views more precise and conclusive. The considerable opportunities afforded us for investigation, and the interest with which we have long viewed this obscure family, combine to impart to our language a degree of confidence which we should not otherwise venture to express. The numerous and varied series of these fossil forms all agree in having their test of great tenuity and delicacy, so that not unfrequently we are reduced to derive our knowledge from an examination of their internal casts; or, should the tests be preserved, it is very rarely that we are enabled to expose sufficiently their hinges or other internal characters. In this family we also lose another important aid in the determination of the genera, inasmuch as the dental characters of the hinge are reduced almost to nothing, the Oolitic Myadæ being altogether destitute of hinge teeth, properly so called, and possessing only a shelly lamina, variously modified in form, and extending internally posteriorly to the umbones, and supporting the cushion of the ligament; but this lamina never forms an elevated nymphal collosity, as in certain recent genera.

At the period of the publication of the 'Etudes Critiques,' the internal hinge characters of certain of the genera had not been fully ascertained. They were known only from appearances upon the external moulds or internal casts; and in more than one instance the author was induced to rely upon the observations of others, although these were opposed to his own experience. These uncertainties have since gradually been diminished, not, indeed, without the perpetration of other errors, and it will be found that in the present Monograph, we have been induced to adopt certain modifications of, and other changes in, several of the genera, although our exemplifications of the Myadæ constitute only a subordinate position in the testacea of the Great Oolite.

In discriminating the fossil Myadæ, it will be found that certain features, which are only of subordinate importance in shells of the symmetrical acephala, generally become the principal, and, indeed, sole aids upon which we have to rely; fortunately, however, these features, which are included in the terms *general figure and ornaments of the surface*, acquire in the Myadæ an increased degree of importance from their invariable persistence and distinctness of design, in a similar ratio that the hinges and their characters have degenerated in value.

The thin flexible coverings of the fossil Myadæ have a much more intimate relation to the forms of the enclosed Mollusks than is possessed by the shells of other families of bivalves; the shell does not form a mere compact rigid cyst, but rather a thin sheath or tegument, which conforms to the figure of the Mollusk itself, and varies somewhat according to the circumstances in which the animal was placed with relation to the surrounding ground, or to contiguous organisms. The entire family have large, irregular, longitudinal folds or ridges, which are, for the most part, but imperfectly distinguishable upon the internal casts. The genera of Myadæ, proposed by Agassiz, are the following. Pholadomya, Homomya, Corimya, Ceromya, Cercomya, Goniomya, Myopsis, Pleuromya, Arcomya, Platymya, and Mactromya. Pholadomya had previously been established, and remains uncontroverted.

Corimya is the *Thracia* of Leach, the latter author having the priority; *Tellina incerta*, Thurm., is an English Oolitic example.

Mactromya has, we believe, justly been dismembered by D'Orbigny, the forms which Agassiz regarded as typical having been separated from the *Myadæ* to constitute the genus *Unicardium* of the former author, and has been previously described in this Monograph. Three remaining species, referred by Agassiz to *Mactromya*, are too imperfectly known to justify us in pronouncing their true position with any confidence.

Ceromya may now be considered as sufficiently established; the hinge characters, which were imperfectly known to Agassiz, have been fully described by M. Buvignier, 'Bull. Geol. Soc. Fr.,' 1850; for, although the shell upon which the latter author founded his description is a *Gresslya*, we have ascertained that the hinges of the two genera are altogether alike. M. d'Orbigny ('Prodrôme de Paléontologie') and M. Buvignier ('Paléont. Dep. de la Meuse') have merged *Gresslya* in *Ceromya*, but we consider that Agassiz was justified in regarding them as distinct, their figures are essentially different; the *Ceromyæ* are all ventricose, with incurved equal subspiral umbones; they are equivalve, for although there is much irregularity in this respect, and occasional inequality of the valves, these variations are altogether accidental, and resulted probably from the position which the Mollusk occupied in the ground, or its proximity to other bodies; their surface has regular ridges which are not altogether smooth, they are concentric, or in other species they take an oblique direction; or, again, they suddenly change their direction and are reflected after the manner of the *Goniomyæ*. *Gresslya*, on the contrary, is never perfectly equivalve, the right valve being always larger, and its umbo higher than the other; the form is much more compressed, the umbones more pointed, the surface is destitute of the peculiar ridges of *Ceromya*, but possesses a different kind of ornamentation; the outer layer consists of a very delicate pellucid semicorneous test, with densely arranged radiating lines of granules, the lines usually slightly undulate, and the granules, which are regular, are densely arranged, and so minute as scarcely to be visible to the unassisted eye. M. Agassiz was not acquainted with this fact, which we have ascertained by an examination of a large number of examples in a good state of preservation. *Cercomya* has been shown by M. d'Orbigny to be identical with *Anatina*, of which it possessed the usual vertical fissure beneath the umbones and the granulated surface; but the aspect of the two forms differs in other particulars, for Oolitic species are compressed, the posterior side is remarkably elongated, and the anterior side has large longitudinal ridges. These features indicate a distinction which we regard as of subgeneric value. We would, therefore, place *Cercomya* as a sub-genus of *Anatina*.

Goniomya is a form which we believe to be entitled to a separate generic rank, notwithstanding M. d'Orbigny and M. Buvignier have reunited it to *Pholadomya*; the ridges upon the sides are strongly impressed upon the internal casts, and are very different from the costæ of *Pholadomya*; and it has, moreover, a granulated surface, the granules, as in *Gresslya*, being radiating and linear.

There yet remain a very numerous and varied series of the fossil Myadæ, which have been separated by Agassiz under the names of *Myopsis*, *Pleuromya*, *Arcomya*, *Platymya*, and *Homomya*. These forms are found in the Muschelkalk, and throughout all the Secondary rocks; one or more species likewise occur in the older Tertiary rocks of England. M. Agassiz believed that *Myopsis* was distinguished from the others by the presence of a tooth in the hinge (*vide* D'Orbigny), although he had never been able to detect its presence, and also by its possessing a surface ornamented by radiating lines of granules. We have been enabled to ascertain that the most abundant of the British Myopsides (*Mya dilata*, Phil.) is destitute of any cardinal tooth, and that the granulated surface, which M. Agassiz relied upon as distinguishing *Myopsis*, is possessed also in a manner more or less modified by *Arcomya*, *Platymya*, *Pleuromya*, and *Homomya*.

There remains, therefore, between these proposed genera little more than the distinction of figure; and even this feature, although sufficiently remarkable and distinct in certain selected typical species, approximates so nearly in others, that in very many instances it is only possible to separate them as distinct groups by an arbitrary and uncertain arrangement. The test of these shells is very thin, and a depression more or less distinct exists upon the anterior side of the valves, extending from the umbones to the inferior border.

The Myopsides are usually elongated posteriorly; their siphonal aperture is large, and their radiating lines of granules are distantly arranged, and large upon the posterior side: *Mya dilata*, Phil., is a well-known English example. *Arcomya* is more rhomboidal or subquadrate; the anterior side is compressed; the posterior has an oblique prominence the siphonal aperture is elongated and narrow. *Pleuromya*, with more tumid umbones, has its superior border slightly concave, and the posterior third of the shell is attenuated with a small aperture. *Platymya* resembles *Myopsis*, except that the umbones are placed nearer to the middle of the valves; the figure is more compressed, and the siphonal aperture is small. *Homomya* resembles the more elongated of the Pholadomyas. The umbones are large and usually but little compressed; but, with this exception, there is nothing to distinguish the figure from one or other of the preceding types, insomuch that M. Agassiz, in the absence of a knowledge of the test, was sometimes unable to allocate them to either of his proposed genera. Certain of the shells which Agassiz would refer to *Homomya* possess a feature which tends to approximate them to the true Pholadomyas, viz., the presence of a few faintly marked radiating costæ upon the umbones. These, however, are uncertain, and sometimes vanish altogether. Such species appear to form a true passage, connecting the more elongated Pholadomyas with the Panopæas. The granulated surface which distinguishes this great series of fossil Myadæ presents several modifications of character, and tends to separate more fully the several species. The first modification has the granules rather large, placed upon lines which are slightly elevated and distantly arranged: some of the larger Myopsides and *Arcomyæ* present examples. The second modification has the lines of granules distinct; but the granules are minute, and both these and the rows are very closely arranged: the *Pleuromyæ* have usually this

kind of surface. The third modification has the entire surface covered with granules so minute as to be nearly or altogether invisible to the unassisted eye. They are so dense that the linear arrangement cannot be recognised: the *Homomyæ* have this kind of surface. In the present state of our knowledge, it would not appear that the figure of the shell affords any certain guide to the character of the granules which adorn its surface, a general resemblance of form being sometimes coincident with a very different kind of surface, and in the fossil *Myadæ*, wherein the figures of the individuals present much variability, and consist more commonly only of casts, the presence of a small portion of the outer granulated tegument will in some instances serve as a sure guide to distinguish species for which the casts alone would not have sufficed. It is owing to the absence of the test that so many of the figures of the 'Etudes Critiques' of Agassiz afford only doubtful guides to the correct knowledge of the species.

The foregoing observations will prepare the reader for the conclusion at which we have arrived, viz., that *Myopsis*, *Pleuromya*, *Arcomya*, *Platymya*, and *Homomya* cannot claim to be regarded as distinct genera, and that it is very difficult, or perhaps not practically possible, even to separate them into so many sections or sub-genera. They seem rather to constitute a single very extensive and varied series of forms, which, although individually resembling in certain of their features either *Pholadomya* or *Panopæa*, are nevertheless sufficiently separated from both of these genera, and possess a generic entirety which is rather strengthened than otherwise by these resemblances.

The hinge exactly resembles that of *Pholadomya*, except that the subligamental lamina is more stout, and the test at that part of the shell is generally more thickened. It is therefore destitute of the sharp tooth of *Panopæa*; but even this feature is not without exceptions, for M. Buvignier has figured an Oolitic species, which has a distinct tooth, and we have ourselves discovered a tooth slightly defined in an Inferior Oolite shell, other examples of which present no trace of this feature.

The hinge then generally resembles that of *Pholadomya*, and some few species or rather individuals of these species, by possessing a few delicate radiating costæ upon the umbones, present another feature which tends to approximate them to the same genus. To *Panopæa* other examples are allied by the occasional presence of a projecting cardinal tooth, and by a universal flattening or depression upon the anterior third of the valves. The granulated surface, however, removes it equally from *Panopæa* and *Pholadomya*. In the figure of the muscular impressions we recognise a close resemblance to those of *Pholadomya*, the anterior impression being very narrow, pyriform, and so much elongated upwards as to reach nearly to the umbo. In *Panopæa* the figure of this impression is irregular and different. The siphonal flexure is always very great, whatever may be the figure of the posterior side of the shell. Briefly to recapitulate these analogies and differences: our group is allied to *Pholadomya*, in the features of the hinge and of the muscular impressions, but differs from it in the absence of costæ, in the presence of radiating lines of granules upon the surface, and in the vertical depressions upon the sides of the shell. It

resembles *Panopæa* in the depression upon the middle or anterior side, and by the presence of an occasional cardinal tooth in the hinge; but these affinities are neutralized by the differing figure of the anterior muscular impression, by the usually edentulous hinge, and by the granulated surface. We regard, therefore, *Myacites* (*Schlot.*) as a genus intermediate and connecting *Pholadomya* with *Panopæa*.

The genus *Myacites*, *Schlotheim*, was founded upon certain *Muschelkalk* shells, which belong to our great group of granulated *Myadæ*, and have that kind of figure which belongs to the *Pleuromyæ* and perhaps to the *Homomyæ* of Agassiz. *Schlotheim*, who had no knowledge either of the hinge or of the test, characterised his genus in the following terms:

“*Testa transversa, inæquilatera, subhians, obovata vel ovalis, ventricosa lævis, concentricè striata; umbones anteriores.*”

The meagreness and insufficiency of this description would render the genus valueless, in the absence of other and more precise knowledge; but as the *Muschelkalk* shells are well known, *Schlotheim* has a claim to priority in the generic designation, and as the five genera proposed by Agassiz must necessarily be referred to the same group, those of the latter author must be discarded as superfluous. Our arrangement of the fossil *Myadæ* will be as follows:

Pholadomya.

Anatina, Sub-gen. <i>Cercomya</i>	.	.	.	.	.	Genus, <i>Cercomya</i> , <i>Ag.</i>
<i>Goniomya</i>	.	.	.	.	.	„ <i>Goniomya</i> , <i>Ag.</i>
<i>Ceromya</i>	.	.	.	.	.	„ <i>Ceromya</i> , <i>Ag.</i>
<i>Gresslya</i>	.	.	.	.	.	„ <i>Gresslya</i> , <i>Ag.</i>
<i>Thracia</i>	.	.	.	.	.	„ <i>Corimya</i> , <i>Ag.</i>
<i>Myacites</i>	.					<i>Myopsis</i> , <i>Pleuromya</i> , <i>Platymya</i> , <i>Arcomya</i> , and <i>Homomya</i> , <i>Ag.</i>

GRESSLYA, Ag.

Shell ovate, rather compressed, very inequilateral, sub-equivalve; umbones anterior, contiguous, compressed, acute, and incurved; lunule excavated; anterior side convex, its border rounded; posterior side more attenuated, sometimes rostrated; superior border rather convex, sloping obliquely downwards; lower margin curved elliptically, borders of the valves close, or with a very small posterior aperture; ligament external, short; hinge line externally somewhat sinuous; the shell is not perfectly equivalve, the umbo of the right valve being a little higher in the other; the test is extremely delicate, with fine longitudinal plications, and with very densely arranged radiating rows of minute granules. Hinge edentulous, but having an elongated lamina in each valve, that of the left valve being inserted beneath the outer lamina of the other valve, as in a groove; there is also in the right valve an oblique internal rib, which extends posteriorly, and is only visible

upon the casts, a feature similar to that in *Ceromya*; the muscular impressions are very faintly marked, as is likewise the pallial impression, the flexure of which appears to be short. This genus, having been reunited to *Ceromya* by M. d'Orbigny, and M. Buvignier having figured and described the hinge of a *Gresslya*, named by him *Ceromya Deshayesi*, in a very complete manner, it has become necessary to institute a close comparison between the two generic forms, and to weigh carefully their affinities and differences.

1stly. *Form.* *Ceromya* is usually larger than *Gresslya*, and always more ventricose, the umbones are more prominent, those of *Ceromya* approaching to the form of *Isocardia*; *Gresslya*, with its acute umbones and more compressed figure, approaches to that of *Cardinia*; *Gresslya* is also very constantly slightly inæquivalve, the right valve exceeding the other in height; in *Ceromya* they are equal, and any irregularity of form which may sometimes occur to give the semblance of inequality in the valves is altogether accidental, and depends, apparently, upon the portion of the shell during its growth.

2dly. *Character of the Surface.* The sculptured surface of *Ceromya* is quite unlike that of any other of the *Myadæ*, the longitudinal grooves being more or less visible upon the casts, but the casts of *Gresslya* are smooth, and the granulated surface of the test is altogether different from that of *Ceromya*.

3dly. *Hinge Characters.* In *Ceromya*, as in *Gresslya*, the casts of the right valve exhibit a groove posterior to the umbones which has been impressed by a corresponding prominence or internal rib in that valve; in *Ceromya*, however, this groove is likewise visible upon the exterior of the test, but not in *Gresslya*; the internal hinge laminæ are precisely alike in both genera; but this is a feature which in the fossil *Myadæ* has but little value in generic affinity or distinction. Whatever value the Palæontologist may be disposed to attach to the foregoing distinctions when viewed singly, it must, we think, be admitted that in the aggregate they are of considerable importance, and it is necessary to neglect none of them in forming a fair estimate of the two forms.

Gresslya was eminently gregarious, *Ceromya* not so, and for the most part it occurs much more sparingly; both lived in the same beds; the valves of *Ceromya* are frequently disunited, in *Gresslya* they are invariably in contact.

GRESSLYA CARDITÆFORMIS.

Testá ovato-depressá; umbonibus prominentibus subplanis, latere antico producto rotundato, basi curvatá, latere postico abrupte declivi, lineis incrementi paucis, irregularibus.

Shell ovate, depressed; umbones prominent, rather compressed; anterior side produced and rounded; base curved; posterior side sloping abruptly; lines of growth few and distant.

This species possesses a general resemblance to *Gresslya Saussuri*, the *Venus Saussuri* of Brongniart and Goldfuss, but our shell has much less convexity; in both species the outline has a considerable resemblance to that of a *Venus*, but an examination of the hinge border has proved that it is edentulous.

The extreme tenuity of the test will account for its uniformly bad state of preservation and rareness. It occurs in a bed of soft shelly Oolite, which is situated about the middle of the shelly beds, and abounds with valves of *Tancredia*.

Length, $2\frac{1}{4}$ inches; height, $1\frac{3}{4}$ inches; diameter through both the valves, 7 lines.

Locality. Minchinhampton Common.

GRESSLYA PEREGRINA, var. ROSTRATA. Tab. X, fig. 7.

GRESSLYA ROSTRATA, *Agassiz*. Etud. Crit., t. 12 b, fig. 7, 8.

Testá ovato cuneiformi, antice rotundatá, postice elongatá et acuminatá, basi subrectá.

Shell ovate or somewhat cuneiform, rounded anteriorly, produced and pointed posteriorly; basal margin nearly straight.

The posterior side is somewhat compressed, forming an angle which extends obliquely from the umbones to the infero-posterior extremity, and there forms a pointed termination.

Height, 13 lines; lateral diameter, 19 lines; diameter through both the valves, 10 lines.

Locality. The southern side of Minchinhampton common, where small openings in the Stonesfield slate have afforded a few of the internal moulds. The genus never occurs in the shelly beds of the formation. Marls of the *Ostrea acuminata* (fuller's earth).

CEROMYA, *Ag.*

Shell cordiform or oval, very inequilateral, ventricose; umbones large, contiguous, incurved, involute; lunule excavated; anterior side convex, its border rounded; posterior side elongated and more flattened, its border either closed or having a slight aperture; ligament narrow, external. The surface is ornamented with one or more series of ridges and sulcations, which are longitudinal but not always concentric. In certain species a change in the direction of the ridges occurred at a certain period of the growth; substance of the test thin, almost papyraceous. Hinge edentulous; a lengthened lamina beneath the ligament in the left valve is received into a groove beneath the lamina of the opposite valve; there is also in the right valve an obliquely elongated posterior rib or internal depression, which, unlike that of *Gresslya*, is visible upon the surface of the test; muscular and pallial impressions rarely distinguishable; the anterior impression is pyriform, elongated upwards, and jagged or fringed irregularly, as in *Pholadomya* and *Gresslya*.

The variety of figure in *Ceromya* is very considerable; *Ceromya similis*, Lyc., in its elongated and compressed form approaching to that of *Gresslya*; the opposite figure is exemplified by *C. Bajociana*, D'Orbigny, which has the short ventricose aspect of *Isocardia*, between these there is every gradation of figure. *Ceromya* occurs rarely in the shelly beds of the Great Oolite, the valves being most commonly disunited, the tests are then preserved; in other situations without shelly detritus the valves are united, but the tests have disappeared.

CEROMYA SYMONDSII. Tab. X, fig. 4a, b.

Testá ovato-ventricosá, umbonibus magnis obliquis incurvis, latero antico convexo, postico subcompresso et elongato, basi curvato; plicis concentricis regularibus tenuibus non nunquam obsoletis.

Shell ovately ventricose; umbones large, oblique, incurved; anterior side convex; posterior side rather compressed and elongated; base curved; concentric plications regular, very delicate, not unfrequently indistinct.

The general figure approaches *C. concentrica*, but it is more elongated, the umbones being more oblique and anterior; the concentric plications are more delicate, and are curved with a larger ellipse, they become undistinguishable near to the umbones. The substance of the test is extremely delicate, so that the fine plications are frequently visible upon the nucleus. The height of the shell is rather greater than the diameter through both the valves, and one fifth less than the longitudinal diameter, a slight aperture exists at the posterior extremity of the valves.

Localities. Nuclei occur rather commonly in the upper portion of the Great Oolite two miles east of Minchinhampton, but examples with the test preserved are very rare in the shelly beds of Minchinhampton Common; it also occurs in the Inferior Oolite of the same district.

The name in compliment to the Rev. W. S. Symonds, the Founder and President of the Malvern Naturalist's Field Club.

CEROMYA UNDULATA. Tab. IX, fig. 1, 1a, b.

Testá ovato-oblongá, tumidá; umbonibus anticis elongatis sub-terminalibus, involutis; latere antico angusto, brevissimo; postico lato, elongato; margine superiore convexo, interdum subundulato cariná dorsali oblique instructo; margine postico truncato; inferiore subrecto; lateribus lineis obliquis, excentricis crebris regularibus tenuissimis et undulatis; basi et margine postico plicis concentricis paucis irregularibus.

Shell ovately oblong, tumid; umbones anterior, elongated, subterminal, and involute; anterior side narrow, very short; posterior side much wider and elongated; superior margin convex but irregular, sometimes rather undulated, a keel or angle passes obliquely from the umbones posteriorly nearly parallel to the superior border; the posterior margin is truncated, the lower margin straight. The sides of the shell are covered with densely arranged undulating fine lines, which are directed obliquely or excentrically from the umbones towards the wide posterior border, but do not reach it, being decussated by a few irregular concentric plications, which in advanced growth occupy the inferior and posterior margins of the valves; the supero-posterior angle separates the sides from a narrow posterior surface which is destitute of the excentric lines.

The tenuity of the test is extreme, and the fine radiating lines are usually visible upon the internal casts. The figure varies even more than is usual in the *Ceromyæ*. It has some resemblance to *Ceromya inflata*, Agassiz, but in that shell the character of the plications and their direction is altogether different, the size, likewise, never attains to that of our species.

In the greater number of specimens there is a wide depression, which extends from the region of the umbones to the inferior border, giving a compressed aspect to the anterior and inferior portion of the shell.

It occurs not unfrequently in the upper beds of the Great Oolite in beds of buff-coloured hard sandstone, situated about 95 feet above the fuller's earth, but always in the form of casts; in the shelly beds of the formation it occurs very rarely, the test is then preserved, and the valves disunited.

The form of *Ceromya undulata* presents the greatest possible contrast to *Gresslya*, but it is not easy to describe the distinctive features however striking.

Height, 17 lines; length, 20 lines; diameter through both the valves, 16 lines.

Locality. Minchinhampton.

CEROMYA PLICATA, *Ag.*, var. Tab. X, fig. 1*a*, *b*, fig. 2.

CEROMYA PLICATA, *Ag.* Etud. Cret. Myes., tab. 8*d*, 1842.

CARDITA V-COSTATA, *Buckman.* Geol. Chelt., 2d edit., p. 97, 1845.

Testá ovato-oblongá, inflatá; umbonibus anticis depressis, involutis; latere antico brevissimo, tumido, truncato; latere postico lato, aperturá ejusdem magná et elongatá; margine superiore elato; inferiore subrecto et subundulato; lateribus fastigiis longitudinalibus crebris, subundulatis, superne acutangulo reflectis, (ætate progrediente) aliis concentricis decussatis; lateribus semel in medio sulcis radiantibus obscuris notatis.

Shell ovately oblong, much inflated about the middle of the valves; umbones involute, anterior and depressed; anterior side very short, truncated and tumid; posterior side wide, its aperture large and lengthened; superior margin much elevated, and rather compressed; inferior margin lengthened, nearly straight, and sometimes slightly undulated; the sides of the valves with closely arranged longitudinal ridges, which slightly undulate, and towards the superior and posterior border are suddenly reflected anteriorly, forming acute angles; in progress of growth these reflected ridges are nearly effaced, and a second series of concentric ridges are formed, which cross the others obliquely towards the inferior border; lastly, in adult specimens, there may be distinguished a few obscure radiating sulcations about the middle of the valves. This shell, in the young condition, is a pretty species; the longitudinal ridges are very distinct, and their V-like angle towards the superior border is clearly defined; in adult shells the figure is more ventricose, the superior angle formed by the ridges is nearly effaced; the second, or concentric series of ridges, are formed, and some few radiating sulcations may be traced.

Collectors have very generally mistaken this species for *Ceromya excentrica*, a shell which is stated to occur abundantly in the upper or Portlandian Oolite of Switzerland, at Porrentroy, and in a similar parallel in the Jura of Soleure; *C. plicata* has not heretofore been adequately figured or described; the specimens figured by M. Agassiz represent adult and even aged shells, not well preserved, and in which the V-like angle of the ridges has nearly disappeared; his description is likewise more than usually meagre, and, in the absence of other evidence, the reader would be inclined to believe that the author had unnecessarily separated this shell from *C. excentrica*, but an examination of specimens in several stages of growth has convinced us of the propriety of the specific distinctions which are given in the 'Etudes Critiques;' the general figure is near to *C. excentrica*, except that in the adult forms the superior border is more compressed and elevated, and the posterior aperture is much larger; the change in the direction of the ridges upon the surface is not peculiar to *C. excentrica*, but occurs in other species of the same genus, neither is it a regular and constant feature in any species, or rather, we should say, that it is never found in the young condition of any species. All the specimens known are casts, the delicate and very perfect markings in young examples is a sufficient indication that the test must have been of extreme tenuity, and the partial obliteration of these features with advance of growth, evidences a corresponding change in the character of the test. In the specimen figured by Agassiz the angles of the reflected ridges are less acute.

Dimensions. Our largest specimen is in length $3\frac{1}{4}$ inches; in height, $2\frac{1}{2}$ inches; the diameter through both the valves being $2\frac{1}{4}$ inches.

Localities and position. We have observed this species in the upper beds of the Inferior Oolite in Gloucestershire in the fuller's earth it has occurred over the Sapperton tunnel of the railway, from which deposit a specimen has kindly been forwarded to us by John Wilson, Esq., of Gloucester; we have ourselves obtained it from certain hard limestone beds near to the base of the Great Oolite in the Minchinhampton district, and Professor Buckman has recorded a specimen which he obtained in a bed of clay at Sevenhampton, which appears to be a little higher in the series; it is, however, rare at each of these localities.

CEROMYA CONCENTRICA, *Sow.*, sp. Tab. X, fig. 3a, b.

ISOCARDIA CONCENTRICA, *Sow.* Min. Con., tab. 491, fig. 1.

— — *Phil.* Geol. York., 1, pl. 11, fig. 40.

— — *Morris.* Catal. Brit. Foss., 1st. Ed. p. 88. 1843.

Testá ventricosá, ovato-obliquá, umbonibus magnis incurvis subanticis, latere antico convexo, postico subcompresso, basi curvato, lateribus fastigiis tenuibus concentricis regularibus crebris.

Shell ventricose, ovately oblong; umbones large, incurved, anterior to the middle of

the valves ; anterior side convex ; posterior side more elongated and compressed ; base curved ; the sides of the shell with regular closely arranged concentric and fine ridges.

The umbones are prominent and elevated, more especially by comparison with *C. Symondsii* and *C. Northamptoniensis*, the two contemporaneous forms which most nearly approach to it ; owing to this prominence, the superior border is rendered slightly concave. The valves fit closely, except at the posterior extremity, which has a slight aperture. The test is never preserved. It is liable to be confounded with a larger and magnificent Inferior Oolite species, which occurs in the neighbourhood of Stroud, and has the test preserved ; this latter, which we believe to be the *Ceromya Bajociana* of D'Orbigny, 'Prodrome de Paléontologie,' p. 275, and, probably, the *Isocardia concentrica* of Phillips ; in this shell the umbones are very large, and curve gracefully forwards ; they are more median and less oblique ; the general form is more ventricose, and the posterior side is shorter than in the true *Ceromya concentrica*.

Ceromya concentrica does not occur in the shelly beds of the Great Oolite, it occurs in the upper portion of the formation associated with *C. Symondsii* in the Minchinhampton district, and also near to Nymphsfield, it is also abundant in the Marl bed of the Inferior Oolite, and in the upper division of the same formation.

Dimensions of a Great Oolite specimen. Height, 16 lines ; length, 20 lines ; diameter through both the valves, 14 lines.

Localities. The neighbourhood to the east of Minchinhampton, and at Nymphsfield, in the Great Oolite ; the escarpment of the Cotswolds generally in the Inferior Oolite.

CEROMYA SIMILIS. Tab. XII, fig. 12.

CEROMYA SIMILIS, *Lycett.* Geol. Soc. Journ., 1853, p. 340, pl. 14, fig. 2.

Testá ovato-oblongá, convexá ; umbonibus anticis incurvis ; latere antico brevissimo, convexo, postico elongato mediocriter attenuato ; margine superiori et inferiori parallelis, subrectis ; striis concentricis magnis regularibus et crebris.

Shell oblong, elongated, convex ; umbones anterior, incurved, anterior side convex, very short, its margin rounded ; posterior side elongated, superior and inferior borders nearly parallel, horizontal, and slightly curved ; the lunule is excavated ; the sides of the valves have regular, strongly impressed, and closely arranged longitudinal striations, which nearly vanish as they approach the superior border.

The form of this elegant species is intermediate between *Ceromya concentrica* and *C. excentrica*, some examples approaching more nearly to the former, others to the latter shell, the striations are strongly marked, rather larger than in *C. concentrica*, and there exists a slight vertical depression upon the middle of the valves ; the umbones are rather depressed, scarcely rising higher than the elongated superior border.

Height, 15 lines ; length, 22 lines ; diameter through both the valves, 14 lines.

Locality. Ponton, in the shelly beds ; also in the lower strata of Stamford, Morcot, &c.

THRACIA, *Leach.*CORIMYA, *Agassiz.*

Shell subtrigonal, inequivalve, inequilateral, rather flattened; cardinal area distinctly marked, the hinge margin forming a sudden declivity posterior to the umbones; the area is separated from the sides by a carina more or less visible; the left valve is always smaller than the right, its umbo is flatter or less elevated; the surface has concentric plications more or less prominent; the substance of the test is extremely thin, more especially in the smaller valve; the valves do not gape, or but very slightly, and the hinge is destitute of teeth. From *Tellina* it is distinguished by the absence of teeth, and by its wanting the lateral flexion which distinguishes that genus.

THRACIA STUDERI. *Ag. sp.*

TELLINA INCERTA, *Thurm, Roemer, Verst. Nordd. Ool., p. 121, tab. 8, fig. 7.*

— — *Goldf. Petref., tab. 146, fig. 14.*

CORIMYA STUDERI, *Ag. Etud. Crit., p. 267, tab. 35.*

Testá subæquivalvi obovatá, convexá-planá, antice convexá; margine curvato; latere postico abrupte compresso; umbonibus medianis inæqualibus, compressis; lateribus plicis concentricis irregularibus.

Shell subequivalve obovate, moderately convex, anterior side convex, its margin curved, posterior side compressed, attenuated, and separated from the other portion of the shell by an obtuse angle (sometimes imperfectly defined). The umbones are mesial and contiguous, but not prominent nor large, the margins of the valves are close fitting; the sides of the valves have numerous irregular concentric plications.

This species is more elongated, and has the posterior side more produced than our other Great Oolite species; the Cornbrash specimens have considerable variety of figure, with respect to their height and to the distinctness of the posterior angle, irrespective of accidental compression.

Geological position and localities. In England it occurs in the Cornbrash of Wilts, and in the Great Oolite of Northamptonshire. M. Agassiz states that it is abundant in the Portlandian beds of Porrentroy, Jura. Goldfuss records it in the upper oolite of Hanover.

THRACIA CURTANSATA. Tab. XIII, fig. 1a, b.

Testá convexo-planá, subtrigoná, subæquilaterali, et lævigatá; umbonibus submedianis, inæqualibus incurvis; latere postico abbreviato; valvá sinistrá subplaná, umbone parvo; plicis concentricis tenuissimis irregularibus.

Shell depressed but convex, subtrigonal, nearly equilateral and smooth; umbones nearly mesial, unequal, and incurved; posterior side short; left valve compressed, its umbo small; surface with concentric, closely arranged, very fine, and irregular plications.

The surface is very smooth, the posterior side is scarcely so much attenuated as is usual in this genus, and the cardinal area is very obscurely defined. The general figure approaches the *Corinya tenuistriata* of Agassiz, but that shell has a smaller longitudinal diameter, and the umbones are not so nearly mesial. It would appear to be very rare, but has occurred both in the lower or shelly, and upper portions of the Great Oolite.

Locality. Minchinhampton.

MYACITES, *Schlot.*

Syn. MYOPSIS, *Ag.* PLEUROMYA, *Ag.* ARCOMYA, *Ag.*
 PLATYMA, *Ag.* HOMOMYA, *Ag.*
 ΠΑΝΟΡÆΑ, sp. *Buvignier.* ΠΑΝΟΡÆΑ, sp. *D'Orbigny.*

Shell elongated, umbones anterior to the middle of the valves, contiguous, depressed, anterior border rounded, posterior border either rounded or truncated, both extremities gaping, sometimes equally so, or the posterior aperture is the more expanded, and sometimes slightly reflected; a depression more or less distinct extends from the umbones to the inferior border; ligament external and short; test delicate, with irregular longitudinal plications, and ornamented with a pellucid outer tegument, having granules disposed in radiating lines. Hinge without teeth, with an elongated horizontal thickened plate, which extends posteriorly to the umbones, and supports the ligament; muscular impressions usually indistinct, but resembling those of *Pholadomya*, pallial impression with a very large posterior flexure.

Under the comprehensive term *Myacites*, we arrange a very extensive series of forms which have been referred to *Amphidesma*, *Lutraria*, *Sanguinolaria*, *Myopsis*, *Arcomya*, *Pleuromya*, *Homomya*, and *Platymya*; commencing in the *Muschelkalk*, their numbers increased in the *Lias*, and they continued to hold a very prominent position throughout the oolitic and lower portion of the *Cretaceous* rocks.

From others of the *Myadæ* which have granulated surfaces, as *Gresslya*, *Goniomya*, and *Anatina*, they are distinguished by features which will be found under those genera.

We regard *Myacites* as a form which connects *Panopæa* with *Pholadomya*, by means of the more elongated forms of the latter species, and more especially by the hinge, which differs from *Pholadomya* solely by the greater thickness and strength of the former.

MYACITES VEZELAYI. *Lajoie*, Sp. Tab. XI, fig. 5, 5a.

Syn.

MYA VEZELAYI, *D'Archiac.* Mem. Soc. Geol. Fr., vol. v, tab. 24, fig. 4.
 HOMOMYA GIBBOSA, *Ag.* Etud. Cret. Myes., pl. 18.

Testá nucleo elongato, umbonibus parvis anticis depressis, latere antico brevissimo, compresso, postico ventricoso, aperturá ejusdem valde elongatá, margine superiore concavo, inferiore curvato; lateribus plicis longitudinalibus magnis et irregularibus.

Shell with the nucleus elongated, ventricose about the middle portion, and compressed towards the two extremities; umbones anterior, rather small, and depressed; posterior aperture of moderate breadth, but very much lengthened upon the superior margin, which is concave; the inferior margin is curved and nearly parallel to the superior, it has a narrow antero-basal aperture. The sides of the valves have large irregular longitudinal plications, and near to the umbones are some traces of a few radiating lines or costæ.

The aspect of this species is so much compressed from above, and tumid laterally, that the diameter through both the valves exceeds the height of the shell, and exceeds half its length; there is a superficial depression which extends downwards obliquely to the middle of the lower border, and coincides with the extent of the basal hiatus; the figure altogether is more ventricose and depressed than any other example of *Homomya* hitherto figured. M. Agassiz appears to have mistaken this species for *H. gibbosa*, the *Lutraria gibbosa* of the 'Min. Con.,' tab. 42 and 211; but the latter shell differs from it very considerably in figure, it is less depressed, has much larger umbones, is less ventricose in its middle portion, is destitute of the flattening of the anterior side, and likewise of the large longitudinal plications of *H. Vezelayi*.

We are not aware that the test of *M. Vezelayi* has ever been found preserved, the prominence of the plication indicates that it was very thin; we have not seen any traces of the muscular or palleal impressions.

Localities and position. It is abundant in the clays of the fuller's earth throughout the Cotteswolds, and we have obtained several specimens a little higher in beds of hard sandstone, near to the base of the Great Oolite, on the southern side of Minchinhampton common, associated with several other of the *Myadæ*.

MYACITES CRASSIUSCULUS. Tab. IX, fig. 3.

Testá crassá, ovato-elongatá, antice et postice subcompressá, in medio ventricosá, umbonibus anticis subcompressis, latere antico brevi, margine rotundo; latere postico elongato, aperturá angustá, sed elongatá; margine superiori et inferiori subrectis et parallelis; lateribus plicis longitudinalibus crebris irregularibus; areá ligamenti magná, latá.

Shell thick, ovately elongated, umbones anterior, moderately large, and compressed laterally; anterior side short and compressed, its margin rounded; posterior side elongated and attenuated, its aperture narrow and elongated upwards, the middle portion of the shell obliquely ventricose; superior and inferior borders parallel, nearly straight and horizontal; the cardinal area is large and distinctly circumscribed; the surface has closely arranged irregular longitudinal plications. The internal surface of the left valve has a curved projecting rib placed a little anterior to and beneath the umbo.

From *Maetra gibbosa*, Sow., this species is distinguished by the less elevated and compressed umbones, by the more straight and horizontal superior and inferior borders, and more especially by the very marked depression of the anterior side, which in *M. gibbosa* is convex. The test upon the anterior side and near to the umbones has a considerable degree of thickness; the rib of the left valve deeply indents the cast. The surface of the test, although identical in character with that of other species of *Myacites*, has never exhibited any distinct portion of granulated surface; had the granules been large, they could scarcely have failed to have been preserved equally with the surfaces of other species in the same bed. Indications of a few radiating lines, near to the umbones, are sometimes obscurely visible upon the test.

Dimensions of a small Great Oolite specimen. Height, $1\frac{1}{4}$ inch, length, $2\frac{1}{2}$ inches, diameter through both the valves, 1 inch; but the examples from the Inferior Oolite of the Cotteswolds are not uncommonly more than double these dimensions.

Geological position and localities. Ponton, Lincolnshire, in the Great Oolite; Rodboro'-hill, near Stroud, in the gryphite grit of the Inferior Oolite; at the latter locality the test is preserved; it also occurs not uncommonly in the form of casts throughout the Cotteswolds, in the same stratum; but it has usually been confounded with *Maetra gibbosa*, Sow., a shell whose test is rarely preserved, and which does not occur so low as the gryphite grit.

MYACITES CALCEIFORMIS, *Phil.* sp. Tab. XI, fig. 2.

MYA MARGARITIFERA, *Young and Bird.* Geol. York. Coast, pl. 7, fig. 2.

MYA CALCEIFORMIS, *Phil.* Geol. York., 1, t. 11, fig. 3.

Testá elongatá, compressá, antice subconvexá, postice compressá et attenuatá, costá unicá obscurá ab umbone ad basin instructá, lateribus plicis longitudinalibus irregularibus, testá delicatissima, granulis radiantibus crebris minutis.

Shell elongated, somewhat compressed; umbones acute, anterior to the middle of the valves; anterior side rather convex, its margin rounded, and the aperture narrow; posterior side compressed, lengthened, and somewhat pointed, its aperture small; superior margin sloping obliquely, nearly straight; inferior margin nearly straight; a single obscure elevation extends from the umbo to the inferior border, and there is, occasionally, posterior to it, a wide superficial depression; the longitudinal plications are numerous, fine, and irregular; the test is of extreme tenuity, and covered with lines of very minute radiating granules.

Specimens are usually destitute of the delicate test, but well preserved portions of it are occasionally found. It is nearly allied to *Myopsis marginata*, Ag., 'Etud. Crit. Moll.,' tab. 30, fig. 1, 2, but the species of Agassiz has a shorter anterior side, less rounded, and the convexity of the valves is more considerable; it is also higher and shorter than the

Panopæa longa, Buvig., 'Géol. de la Meuse, Atlas,' pl. 7, fig. 1, 3, to which, in other respects, it has a general resemblance.

The *Arcomya calceiformis*, Ag., 'Etud. Crit. Myes.,' p. 176, tab. 9, fig. 7, 9, from the ferruginous Oolite of Moutiers, is a different species of the same group or sub-genus, and must be distinguished from our shell, which has the priority of name.

Height, 21 lines; length, 43 lines; diameter through both the valves, 14 lines.

Position and localities. The geological range of this species is considerable; in the Cotteswolds it occurs in the upper beds of the Inferior Oolite, in the fullers' earth, also in hard pale coloured sandstone near to the base of the Great Oolite; it occurs also in the Cornbrash of Chippenham, Malmesbury, and Cirencester; and at the latter three localities it is not uncommon. Professor Phillips records it in the Inferior Oolite of Blue Wick, and in the Kelloway rock of Scarborough.

MYACITES DILATUS, *Phil.* sp. Tab. X, fig. 5 a, b.

MYA DILATA, *Phil.* Geol. York., 1, tab. 11, fig. 4.

— — *Morris.* Catal. Brit. Foss., p. 92.

SANGUINOLARIA (?) DILATA, *Buckman and Strickland.* Geol. Chelt., pl. 6, fig. 1.

PANOPEA DILATATA, *D'Orb.* Prodr. de Paleont., 10 etag. No. 216.

Testá elongatá, anticè compressá, posticè subcylindricá, dilatá et truncatá; umbonibus antemedianis, parvis, compressis; aperturá anticá angustá; posticá magná supernè elongatá; margine superiori concavo, inferiore subrecto; lateribus plicis irregularibus magnis, angulo postico flecto; superficie granulis regularibus serialibus radiantibus dispositis.

Shell elongated, anterior side compressed, posterior side nearly cylindrical, dilated and truncated at the extremity; umbones anterior to the middle of the valves, small, and compressed; anterior aperture narrow; posterior aperture large, suborbicular, but extending along the superior border almost to the ligament; superior border concave; inferior border nearly straight; the sides of the shell with a few large irregular longitudinal plications, which are bent upwards posteriorly at a considerable angle; the radiating lines of granules are rather large, and most conspicuous upon the posterior side.

The compressed anterior side of the shell is strikingly contrasted with the posterior expansion. Much variation exists in the proportions of its posterior elongation, and the latter border is sometimes reflected, the more aged specimens being the most elongated: the figure in the 'Geology of Cheltenham' represents the most shortened phase of form. The Great Oolite specimens are small; they have not occurred in the shelly beds, but in some imperfectly slaty deposits near to the base of the formation. The species also occurs in the fullers' earth, and in the upper portion of the Inferior Oolite, the latter rock producing by much the finer specimens. The punctations upon the granules appear to resemble those of the recent *Anatina hispidula*, and in like manner probably gave in-

sertion to as many corneous prickles; but we have not been able to trace this feature in all specimens.

The species most nearly allied are *Sanguinolaria? rotunda*, 'Geol. Chelt.,' pl. 6, fig. 3, and *Panopæa Guibaliana*, Buvignier, 'Géol. de la Meuse,' Atlas, pl. 8, fig. 3—5, but it is more trumpet-shaped and less elongated than the former, and less compressed than the latter.

Localities. Small excavations on the southern slope of Minchinhampton Common, in the Great Oolite; also in the Cotteswolds generally in the fullers' earth and Inferior Oolite; Glaizedale, Yorkshire.

MYACITES TERQUEMEA, *Buv.* sp. Tab. XII, fig. 6.

Syn. PLEUROMYA TENUISTRIA, *Ag.*, 1848, pl. 24.

PANOPÆA TENUISTRIA, *D'Orb.*, 1850, Prod., 1, etag. 10, No. 242, (non *Buv.*)

Non LUTRARIA TENUISTRIATA, *Munst.* in *Goldf.*, pl. 153, fig. 2.

PANOPÆA TERQUEMEA, *Buvig.* Paleont. Dep. de la Meuse, Atlas, p. 7.

Testá obovatá, ventricosá; umbonibus subacutis, antemedianis, latere antico cordato-declivi, subdepresso, postice attenuato, aperturá parvá; plicis longitudinalibus tenuibus.

Shell obovate, ventricose mesially; umbones rather acute, anterior to the middle of the valves; anterior side rather compressed, its border rounded; posterior side attenuated, its border slightly gaping; lower margin curved; longitudinal plications delicate.

The greatest diameter through the valves is a little anterior to the umbones, which gives a somewhat ventricose aspect to the figure.

Length, 16 lines; height, 10 lines; diameter through both the valves, 8 lines.

Geological position and localities. Our specimens are from the shelly beds of Minchinhampton Common, where it is very rare. Agassiz and Goldfuss have recorded it in the lower Oolitic rocks of France and Germany.

MYACITES UNIONIFORMIS. Tab. X, fig. 6.

Testá tumidá, ovato-elongatá; umbonibus magnis, subcompressis; margine antico et postico rotundo; margine superiori concavo, lateribus levigatis; sulco lato superficiali ab umbone ad marginem inferiorem producto.

Shell tumid, ovately elongated; anterior side short; posterior side elongated; both anterior and posterior margins rounded; the posterior margin gapes but slightly; the hinge margin is elongated and concave; the area is lengthened, lanceolate, or narrow, and distinctly marked; the ventral margin is somewhat rounded; a wide, superficial depression extends from the umbo obliquely to the inferior border, and renders the anterior side nearly as much compressed as the posterior; the surface is smooth with faintly-marked irregular concentric plications.

The species which approach nearly to the present form, are the *Homomya gracilis* Agassiz, 'Etud. Crit.,' p. 162, tab. 20, f. 1—2, and *Mya Vezelayi* of D'Archiac, 'Mém. Soc. Geol. Fr.,' tom 5, pl. 25, fig. 4; but compared with the former shell, the figure is more compressed laterally and less elongated: the concavity of the superior border and larger umbones are other points of distinction. The species described by D'Archiac is very much more ventricose, and the umbones are more nearly terminal; the posterior aperture is likewise much more considerable.

Besides these there is another large undescribed species found in the upper division of the Inferior Oolite of the Cotteswolds, which resembles more nearly the present species than either of those before mentioned; but it is of thrice the linear dimensions, somewhat more elongated, and the superior border is not concave; the test and ligament, which are very well preserved, enable us to affirm its distinctness both from the Great Oolite species, and from *Homomya gracilis*, to which perhaps it is still more nearly allied. We possess two specimens, which occurred in the bed of soft shelly Oolite which overlies the Weatherstones: it would, therefore, appear to be very rare.

Height, 13 lines; longitudinal diameter, 26 lines; diameter through both the valves, 12 lines.

Locality. Minchinhampton Common.

MYACITES COMPRESSUS. Tab. XII, fig. 11.

Testá ovato-rhomboideá; umbonibus prominentibus compressis; latere antico brevi, compresso, margine ejusdem subrecto declivi; latere posteriore medocre elongato, convexo, margine truncato; margine cardinali, subrecto, oblique, declivi; margine inferiore sinuato; lateribus sulco lato superficiali ab umbone margine inferiore producto.

Shell ovately rhomboidal; umbones prominent and compressed; anterior side short, its margin nearly straight, sloping obliquely, and somewhat rostrated at the inferior extremity; posterior side moderately elongated, convex, its margin truncated; hinge border nearly straight, but sloping obliquely downwards; inferior margin sinuated; the sides with a wide and superficial depression directed from the umbones to the inferior margin.

The general contour of this species is remarkable for the anterior compression of the valves and of the umbones, which are prominent and very oblique; the height of the valves is so considerable, that it equals two thirds of the length. The straight anterior slope distinguishes it from *Arcomya Couloni*, Agassiz, which in other respects it nearly resembles. From our *M. tumidus* it is separated by the greater height of the valves and oblique slope of the hinge margin, which is also shorter; the anterior side is likewise more compressed, and its margin straighter. The granulated surface is not preserved in our specimen.

Height, 21 lines; length, 33 lines; diameter through both the valves, 16 lines.

Locality. Minchinhampton Common.

MYACITES TUMIDUS. Tab. IX, fig. 2 a, b.

Testá subrhomboidéá, valvis in medio tumidá, latere antico brevi, compressiusculá ; posticè elongato et truncato ; margine ventrali subrecto et sinuosá ; margine cardinali subrecto et horizontali ; valvis lævigatis ligamentum magnum ; lateribus lineis incremente confertis et irregularibus.

Shell subrhomboidal, its middle portion tumid ; anterior side short and compressed ; posterior side elongated and somewhat truncated ; ventral margin nearly straight and somewhat sinuous ; hinge margin straight and almost horizontal ; the valves smooth ; ligament large ; series of growth numerous and irregular.

An obtuse and very tumid surface extends obliquely from the umbones to the inferior and posterior border, which renders that part of the shell more convex than is usual in this genus. The anterior border slopes obliquely, but is somewhat rounded, and is moderately compressed. There can scarcely be said to be a hiatus at the anterior border, and the posterior border, which is somewhat truncated, has only a narrow opening. The entire form is short, as much so as *Arcomya brevis* of Agassiz. The shortness, together with the greater convexity of the middle portion of the valves, serves to distinguish it from *Arcomya quadrata* of the same author. This species of Myacites is represented by one specimen only : it has the ligament preserved, which is prominent, but not much lengthened.

Height, 16 lines ; length laterally, 27 lines ; greatest diameter through both the valves, 15 lines.

Locality. Minchinhampton Common.

ANATINA, Lam. CERCOMYA, Agassiz.

Shell elongated ; umbones mesial, small, and depressed ; anterior side rounded and produced ; posterior side attenuated, having a lengthened and strongly defined posterior area, which has two longitudinal furrows upon its surface ; no lunule. The surfaces of the valves are covered with large longitudinal ridges, which are strongly marked anteriorly, but are faintly traced posteriorly. There exists two depressions, more or less marked, upon the side of the shell, which, originating at the umbo, diverge obliquely, and are directed to the inferior border, causing that margin to undulate. These depressions, although superficial, influence the direction of the longitudinal folds, make them to deviate from their normal direction, and sometimes efface them altogether. The extremities of the valves gape, more especially at the posterior extremity.

M. Agassiz, judging from the contorted figure of the casts and the absence of anything like a fracture, thinks that the test must have possessed considerable flexibility.

M. d'Orbigny regards this group as identical with *Anatina*. He believes that the furrows upon the area are impressed by carinæ, which were destined to support the spoon-shaped processes of the hinge, and states that he has observed a chink or cleft at the summit of the umbo, left by the spoon-shaped processes and by the internal osselet of *Anatina*.

M. Agassiz admits that these features would indicate an affinity with *Anatina*, but directs attention to the elongated posterior side, to the cardinal area, and to the large longitudinal ridges upon the sides of the valves. These characters, which are wanting in *Anatina*, have induced him to retain his genus *Cercomya*.

One character of the genus has not been alluded to by M. Agassiz. It possesses an external semicorneous layer of test, which is furnished with radiating lines of tubercles, as in *Goniomya*, *Myacites*, *Gresslya*, and in the recent *Anatina*.

Anatina has not been found in the shelly beds of the Great Oolite. It occurs in beds near to the base of the formation, in pale argillaceous buff-coloured limestones and sandstone; it has also been found in the upper portion of the formation, associated with *Goniomya*.

M. Agassiz has sufficiently indicated the features which distinguish externally *Cercomya* from *Anatina*. The interiors of the valves of the fossil species have not been seen, but there is every reason to believe that they do not differ from *Anatina*.

ANATINA PLICATELLA. Tab. XI, fig. 6, 6 *a*.

Testá transverse-elongatá, convexiusculá, latere postico elongato; plicis concentricis crebris inconspicuis, postice obsoletis.

Shell transversely elongated, convex; anterior side rather short, its upper border sloping obliquely from the umbo; posterior side more lengthened. Lateral longitudinal plications closely arranged, distinct upon the anterior side of the shell, but disappearing as they recede from it, so that the greater portion of the surface is nearly smooth. The very delicate plications and general convexity of the valves are sufficient to distinguish it from contemporaneous species.

Height, 13 lines; length, 25 lines; diameter through both the valves, 9 lines.

The figure nearly resembles that of *C. antica*, Agassiz, tab. 11*a*, fig. 14, 15; but the plications of that species are much larger and more continuous upon the sides.

Locality. It occurs very rarely in Stonesfield Slate, on the south side of Minchinhampton Common.

ANATINA UNDULATA, *Sow.* sp. Tab. XI, fig. 4.

SANGUINOLARIA UNDULATA, *Sow.* Min. Con., t. 548, f. 1, 2.

— — *Phil.* Geol. York., 1, t. 5, f. 1.

Testá elongatá, convexá; umbonibus medianis, areá magná, marginibus depressis, lateribus plicis longitudinalibus magnis, striis longitudinalibus densè impressis.

Shell elongated convex; umbones mesial, area large, its margins faintly marked, the sides with very large regular plications, which are impressed with very fine densely arranged longitudinal striæ.

The length of the posterior side slightly exceeds the other; its extremity is slightly curved upwards, it is rarely preserved or perfectly represented upon the internal moulds; the lines of radiating tubercles cannot be distinguished upon the moulds. Height 9 lines; lateral diameter, 22 lines; diameter through both the valves, 8 lines.

Locality. Minchinhampton.

GONIOMYA, Ag.

Shell very thin, cylindrical and ventricose, or ovate and flattened, gaping at both the extremities, more especially the posterior extremity; anterior extremity rounded, posterior truncated; umbones mesial or a little anterior to the middle of the valves, contiguous and not very prominent; costæ large and curved, their anterior portions are directed obliquely backwards towards the inferior border, the posterior portions are directed in a similar manner forwards, so that the extremities of the costæ meet each other near to the middle of the shell at an angle more or less acute. The costæ are crossed and indented by closely-arranged concentric plications. The substance of the test has two layers, of which the outer one is semi-corneous, and is furnished with minute tubercles which are arranged in lines radiating from the umbones. Hinge edentulous; muscular impressions faintly marked; ligament external.

GONIOMYA LITTERATA, *Sow.* sp. Tab. XI, fig. 3.

GONIOMYA LITTERATA, *Agassiz.* Etud. Crit., p. 18, t. 16, f. 13-16.

MYA LITTERATA, *Sow.* Min. Con., t. 224, fig. 1.

LYSIANASSA LITTERATA, *Goldf.* Petref., t. 154, f. 8.

Testá ovato-elongatá, convexá; umbonibus ante-medianis, margine cardinali subhorizontali aut concavá, margine antico obliquè declivi; costis anticis angustis subundatis; posticis magnis curvatis ultimis evanescentibus; plicis concentricis crebris decussatis; angulo costarum acuto, obliquo margine postico producto; margine inferiore subrecto.

Shell ovately elongated, convex, umbones placed anterior to the middle of the valves, superior margin elongated, nearly horizontal, or even slightly concave, anterior margin sloping obliquely, inferior margin nearly straight; costæ anteriorly narrow, nearly straight, and slightly undulated, posterior costæ larger, curved but become obscure towards the extremity of the series; the costæ are decussated with closely arranged regular concentric plications; costal angle acute, and directed obliquely towards the infero-posterior border.

Our specimens agree more nearly with the figures of Agassiz than with those of Goldfuss; in the latter, the posterior side is not so much raised, so that the hinge margin slopes downwards in a manner similar to that of the anterior border, and the costal angle is not directed obliquely backwards; so that, judging from the figure alone, it might be regarded as a distinct species. Compared with *Goniomya v.—scripta*, our shell has much less prominent umbones, and the entire figure of the shell is more elongated or sub-cylindrical, the umbones being likewise more anterior; the posterior side of the shell is more lengthened, its superior margin being nearly horizontal. It is comparatively rare; we have obtained it in thin layers of pale or buff-coloured argillaceous limestone, about 100 feet above the fullers' earth, also in a much lower position, in a similar description of rock; but the genus has not been found in the shelly beds of the formation. Height and diameter through both valves equal, or half the longitudinal diameter.

Locality. Minchinhampton.

GONIOMYA HEMICOSTATA. Tab. XII, fig. 3.

Testá ovato-elongatá, convexá; umbonibus ante-medianis magnis subcompressis, margine antico oblique-declivi, postico subhorizontali, concavo-hiante; superficie in medio oblique, depresso, costis crebris biangulatis aut trapeziformis instructis; costis inferioribus evanescentibus.

Shell ovate, elongated, convex, gaping posteriorly with a considerable aperture; umbones anterior to the middle of the shell, large, elevated, but somewhat compressed; anterior border sloping obliquely downwards, posterior border lengthened nearly horizontal and concave; the middle portion of the shell has a wide depression which passes from the umbo directed slightly backwards and vanishing towards the inferior border; the superior and middle portion of the surface has numerous closely arranged costæ directed upon each side obliquely downwards towards the other, but connected with it by a horizontal straight costa; the lower half of the shell and the two extremities are altogether smooth. Outer or granulated layer of the test unknown.

A single well-preserved cast with the valves in contiguity is our only authority. The several features of this remarkable species clearly separate it from any other of the British *Goniomyæ*, the general figure with its elevated broad umbones, concave superior border, gaping and slightly reflected posterior extremity combined with the wide mesial depression, present no inconsiderable resemblance to a diminished figure of the great *Panopæa Aldrovandi*; the trapeziform direction of the costæ is governed by the mesial depression, and exists in those species only of the *Goniomyæ* in which this depression is well marked, thus in *Pholadomya trapezina*, Buy., *Lutraria trapezicostata*, Pusch., and *Goniomya inflata*, Ag. the horizontal costæ extend, with the depression, even to the lower border of the valve; in the present species they extend, with the depression, about half the depth of the valve, and in others, such as *G. Dubois*, Ag. *G. v.—scripta*, and *G. litterata*, the depression and

horizontal costæ only exist upon the umbo. Unfortunately our specimen has no portion of the granulated outer surface preserved.

Length, 19 lines ; height, 12 lines ; diameter through both the valves, about 8 lines.

Locality.—Blisworth, Northamptonshire.

PHOLADOMYA, Sow.

Shell thin, inæquilateral, ventricose, oval or oblong ; the borders of the valves more or less gaping, especially at the posterior extremity ; the umbones are large, contiguous, the apex of the one slightly impressing the other ; the ligament external, and placed in an oval depression, the surface is ornamented with costæ radiating from the umbones, which are regular and equal or irregular and unequal, smooth and rounded, or deeply notched and nodulous ; the entire surface has concentric plications which vary in their regularity, size, and prominence. The hinge is without teeth, but has an elongated lamina situated beneath the ligament.

The costæ are very commonly more numerous and prominent in the right valve than in the left.

The muscular impressions are faintly marked and cannot usually be distinguished ; the anterior impression is pyriform and elongated upwards towards the umbones, the posterior muscle is rounded, the syphonal scar has a considerable flexure.

PHOLADOMYA ACUTICOSTA, Sow. Tab. XIII, fig. 13.

PHOLADOMYA ACUTICOSTA, Sow. Min. Con., t. 546, f. 1, 2.

Testá ovato-elongatá ; umbonibus crassis, antemedianis, latere antico brevi rotundato, posteriore producto angustato, costis elatis acutis, anticis magnis remotiusculis et irregularibus ; posticis numerosis crebris et tenuibus ; striis concentricis decussatis.

Shell ovately elongated ; umbones thick, placed anterior to the middle of the valves ; anterior side short and rounded ; posterior side more produced and narrow ; costæ elevated, acute ; the anterior costæ large, rather remote, unequal, and placed at irregular intervals ; the costæ posteriorly are less elevated, numerous, and very closely arranged, gradually decreasing in distinctness towards the posterior extremity of the shell ; the costæ are decussated by concentric striations.

Our species is distinct from *Pholadomya acuticosta*, Roemer, tab. ix, fig. 15 ; and from Goldfuss, tab. cxxxvii, fig. 4 ; these, and likewise *P. multicosata*, Agassiz, tab. ii, figs. 3, 4, have the anterior costæ regular and less prominent than in our species ; the *P. multicosata* varies very considerably in its length, but our species is nearly uniform in figure.

Localities.—The upper beds of the Great Oolite, near Minchinhampton ; the slate of Stonesfield.

PHOLADOMYA SOCIALIS. Tab. XI, fig. 7, 7a.

Testá nucleo mediocre magnitudini, ovato ventricosá, latere antico brevi et gibboso, lateré postico elongato, attenuato, et hiante; umbonibus anticis magnis; area cardinali elongatá et planatá; marginibus anticis et posticis curvatis; plicis longitudinalibus magnis irregularibus; costalis radiantibus (circa 6) obscuris, aut evanescentibus.

Shell with the nucleus moderately large, ovately ventricose; anterior side short and gibbose; posterior side elongated, attenuated, and gaping, with a lengthened but narrow aperture extending upon the superior and posterior border to its junction with the hinge border; upon the anterior border there is scarcely any perceptible aperture. The umbones, which are placed anteriorly, are moderately large; the cardinal area is lengthened and rather flattened; both the anterior and posterior extremities are rounded, and pass insensibly into the superior and inferior borders. The longitudinal plications are large and irregular, with deep furrows between them, but they become less prominent, and are almost lost as they approach the posterior extremity. The radiating little costæ are distinct only upon the umbones; they are about six in number, but not unfrequently they are absent altogether.

This species presents its full share of variations of figure, not unfrequently the anterior side appears compressed, and forms an obscure angle or rib, extending from the umbones to the inferior border; we have never seen the test preserved, but the nuclei display all the more delicate features of the shell; there are no traces of muscular or pallial impressions. It was eminently gregareous, and occurred in a bed of buff-coloured calcareous sandstone, situated nearly 100 feet above the fullers' earth, and associated with *Lucina Orbigniana*, *Ceromya Symondsii*, *Ceromya undulata*, and other characteristic forms.

The examination of a large number of specimens has enabled us to affirm its distinctness from the *P. læviuscula*, Agassiz; a shell which is not so much elongated and attenuated posteriorly, and whose radiating costæ, though delicate, are visible over the sides of the shell, even to the inferior border. The large plications and more ventricose form distinguish it from *Pholadomya inornata*, Sow., 'Geol. Trans.' 2d ser., vol. v, pl. xxi; other species are more distantly allied.

Localities.—Small road side excavations two miles east of Minchinhampton; Blisworth, Northamptonshire.

PHOLADOMYA OVULUM, Ag. Tab. XIII, fig. 12.

Testá ovatá; umbonibus magnis anticis subdepressis, latere antico brevi, convexo, margine rotundo, latere postico elongato et attenuato; aperturá parvâ, margine ligamenti obliquè declivi, inferiore curvato; lateribus costis radiantibus distantibus paucis, plicis longitudinalibus impressis.

Shell ovately elongated; convex anteriorly, attenuated posteriorly; anterior side short, its border rounded; posterior side lengthened and attenuated, its aperture small; ligamental border nearly straight, sloping obliquely downwards, lower border curved; radiating costæ (about 7) distant, equal, spreading over nearly the whole of the shell, and rendered nodulous by some large longitudinal plications; the costæ of the left valve more prominent than those of the right. The convexity of the valves is considerable towards the anterior side; the umbones, though large, are but little elevated, and these features, together with the few distant and large knotted costæ, will serve to distinguish it from the Inferior Oolite *Pholadomya ovulum*, Ag., and *Pholadomya ovalis*, Sow., to both of which species it has some affinities; from the *Pholadomya Murchisoni* from *Brora*, it is distinguished by having a more elongated form, and much more distantly arranged costæ, so that only a small portion of the test is without them.

Dimensions.—Length, 2 inches; height, $1\frac{1}{4}$ inch; diameter through both the valves, 1 inch.

Geological position and localities.—We are not aware that this species has occurred except in the Great Oolite of the North of England; the specimens forwarded to us are from Scarborough, and from the vicinity of Stamford.

PHOLADOMYA SÆMANNI. Tab. XI, fig. 1, et Tab. XV, fig. 3.

Testá ovato sub-compressá; umbonibus elatis magnis; latere antico brevi, rotundo; postico sub-compresso, brevi; aperturá angustá; costis radiantibus, 7-8 depressis, subrectis subæqualibus, et remotis; plicis longitudinalibus impressis.

Shell ovate, rather compressed; umbones elevated and large; anterior side short, rounded, posterior side rather compressed and short, gaping, with a narrow aperture; radiating costæ 7-8 depressed, nearly straight, equal, regular, and remote; decussated but not much impressed by the longitudinal plications. The lateral diameter is somewhat less than the height, and exceeds considerably the diameter through both valves; but there is some variation in these proportions, the specimens which have the least convexity being usually less regularly ovate and rounded at their borders, so that they might, perhaps, be divided into two varieties.

From *P. solitaria* it is distinguished by the compressed posterior extremity, by the smaller convexity of the valves, and by the character of the costæ, which are less elevated and diverge so much more considerably that they nearly occupy the surface of the valves.

Localities.—Small openings or pits in the Great Oolite near to its base, and in the vicinity of the village of Avening. Scarborough, in the Great Oolite.

PHOLADOMYA SOLITARIA. Tab. XII, figs. 2, 5? *var.* of *P. producta*, Sow.

Testá ovato-subglobosá; umbonibus magnis, latis, medianis; lateribus brevibus, posticè lævi, aperturá angustá; costis (7) perpendicularibus elatis approximatis, æqualibus, leviter impressis; plicis concentricis tenuibus.

An ovately globose large species, with elevated median and broad umbones; the sides of the shell are short, the posterior side being destitute of costæ, its aperture is inconsiderable; the costæ (7 in number) are large, equal, but little divergent, and only slightly indented by the concentric plications, which latter are not conspicuous.

The height always exceeds the lateral diameter, and that through both the valves, the two latter measurements being nearly equal.

The combination of broad umbones, with equal little impressed perpendicular costæ only slightly radiating, together with the short but not truncated sides, will suffice to distinguish it from contemporaneous species.

Geological position and localities.—All our specimens are from the Minchinhampton district, they have been procured at several localities in oolitic sandstone a little higher than the fullers' earth, and obtained by well sinkings, they were unaccompanied by any other fossil.

PHOLADOMYA HERAULTI, *Ag.* Tab. XV, fig. 4, *var.* Tab. XII, fig. 1.

PHOLADOMYA MURCHISONI, *Ag.* *Etud. Crit.*, p. 79, t. 4 e, f. 5, 7.

— — *Roemer.* *Nordd. Ovl.*, p. 128, t. 15, f. 7.

— HERAULTI, *Ag.* *Etud. Crit.*, Appendice, 1845.

Testá ovato-globosá; umbonibus magnis anticis, serratis; areá cardinali magná, elongatá, latere postico modico hiante, latere antico brevi, costis (circá 9) obliquis, elevatis plicis longitudinalibus impressis; costá primá obscurá, costá secundá majorá et elevatá.

Shell ovately globose; umbones large, anterior, and serrated; cardinal area large and depressed, posterior side gaping with a lengthened and moderately large aperture, anterior side short, slightly truncated; the radiating costæ, (usually 9 in number,) are large and elevated, the posterior ones are oblique; the first is only slightly marked, the second is the largest and most elevated; they are strongly impressed or rendered nodulous by the longitudinal plications; the two extremities of the shell are destitute of costæ.

This shell is more elevated, and the prominence of the second rib will suffice to separate it from *P. Murchisoni*, with which it has been confounded.

Geological position and localities.—*Pholadomya Heraulti* occurs not unfrequently in certain sandstone beds of the Great Oolite, in Gloucestershire; also at Blisworth, Northamptonshire, but the dimensions of these specimens are usually small; in the Inferior Oolite it appears to range throughout the extent of that formation in this country, in which it attains its full dimensions, and is very common.

HINNITES ABJECTUS, *Phil.*, sp. Tab. IX, fig. 7, and Tab. XIV, fig. 3.

PECTEN ABJECTUS, *Phil.* Geol. York., 1, t. 9, f. 37.

— — *Morris*, Cat. Brit. Foss., 1854, p. 175.

Testá suborbiculari convexá ; auriculá anticá productá lineatá, posticá subobsoletá ; costellis rádiantibus numerosis (80 ad 100) irregularibus inæqualibus nodulosis et transversè striatis ; interstitialibus interdum lineisque tenuissime notatis ; valvá propè mediam costellis 2 vel 3 elevatis acutis sed nodulosis instructá. Valvá alterá planatá, delicatissimá lineis tenuissimis et undulatis non nunquam obsoletis.

Shell, when not distorted, sub-orbicular and convex ; the umbones small and depressed ; the anterior auricle produced, the other usually indistinguishable ; the radiating little costæ are very numerous, (from 80 to 100,) irregular, unequal, nodulous, and transversely striated ; the interstitial spaces have likewise more minute costæ or lines, which are also nodulous, unequal in size, and uncertain in number ; the auricle has these fine irregular lines ; there will also constantly be noticed, towards the middle of the valve, two or three costæ, which are larger and more elevated than the others, they are acute but nodulous, and will alone at once serve to distinguish the species from *Hinnites velatus*, to which the general character of the surface offers a considerable resemblance. The figure of the latter and smaller species, however, is more fan-shaped or less orbicular and less convex. The other valve, which is very rarely seen, is extremely delicate and flattened, its surface has numerous very fine waved radiating lines, which are occasionally indistinct.

The numerous examples which we have obtained of this imperfectly known species exemplify its extreme irregularity of contour and convexity, not one is altogether regular ; the test is thin, and there can be no doubt that it readily assumed the figure of any surface to which the flat valve was attached. In young examples the two or three more elevated costæ form a conspicuous feature which becomes less remarkable with the increase of the dimensions. Our largest example is upwards of four inches across.

Geological position and localities.—*Hinnites abjectus* is found in the Coralline Oolite of Malton, in the Great Oolite of Whitwell, and in the Inferior Oolite of Glaizedale, Yorkshire ; it is also not uncommon in the upper division of the Inferior Oolite of Gloucestershire, but it has only occurred very rarely in the Great Oolite of the Minchinhampton district.

PHOLAS. *Linn.* 1758.

Shell elongated, sub-cylindrical, gaping at both the extremities ; umbones incurved and contiguous. Hinge thickened, reflected to form a plate which covers the umbo in each valve ; internally it has a curved spatulous tooth which projects in each valve.

PHOLAS OOLITICA. Tab. IX, fig. 21.

Testá parvá ovatá, anticè convexá, posticè compressá, dorso in medio sulco profundo; costulis radiantibus acutis, anticis magnis distantibus, posticis crebris; plicis longitudinalibus regularibus imbricatis.

Shell small, ovate, anterior side convex, posterior side rather compressed and attenuated; the dorsal surface with a deep mesial depressed line, which extends from the umbo to the inferior border; radiating costæ acute, elevated, and distant upon the anterior side, less elevated and more numerous posteriorly; they are indented by longitudinal plications, or lamellæ, which are regular and imbricated.

The test of this small species is very delicate; in adult specimens the umbones are placed one third from the anterior extremity; the convexity at that part is equal to the height, or about half of the length; young examples are shorter in proportion, and the mesial furrow is more strongly marked. The *Pholas crassa*, of Deslongchamps, 'Mém. Soc. Linn. de Normandie,' 1839, pl. ix, figs. 1, 3, 5, 7, has a similar or perhaps shorter figure; it has prominent but fewer imbricated folds, and it would appear to be destitute of the radiating costæ which ornament our species.

Length of our largest specimen, 10 lines; height and diameter through both the valves, $5\frac{1}{2}$ lines.

Localities.—Minchinhampton and Bisley Commons, Gloucestershire.

YORKSHIRE SHELLS.

OSTREA MARSHII, *Sow.* Tab. XIV, fig. 2, 2 a.

- OSTREA DILUVIANA, *Park.* Org. Rem., 3, t. 15, f. 1.
 — — *Zeiten.* Petref., t. 46, f. 1.
 — MARSHII, *Goldf.* Petref., t. 73.
 — — *Roemer.* Verst. Ool., p. 58.
 — SULCIFERA, *Phil.* Geol. York., 1, t. 9, f. 35, *junior.*

Testá subsolitariá subæquivalvi, ovato-trigoná, convexo-planá, crassá, plicis radiantibus, magnis inæqualibus acutis subimbricatis. (Roemer.)

Shell subequivalve, either ovately oblong or fan-shaped; umbones small, terminal; the dorsal surface near to the umbones, has a mesial elevated smooth longitudinal ridge fringed upon each side with acute radiating plications, towards the lower border.

The central ridge divides into several very elevated acute costæ; the interstitial spaces of which, form acute angles with them; the substance of the test is thick. The *Ostrea sulcifera*, Phil., of which we have a specimen from Whitwell, Yorkshire, is only the germ of this large species, in which the central longitudinal smooth ridge has not divided to form the great posterior denticulate plications, the latter change having taken place at a subsequent period of its growth. In the adult condition the figure is sometimes a lengthened oval or oblong as in *O. sulcifera*, but, in other instances, which probably represent the final stage, the lower and larger plications spread out laterally, giving the shell a fan-shaped contour.

Geological position and localities.—We have received *O. Marshii* from the grey limestone of the Great Oolite near Scarborough; we have collected it in the Cornbrash near to Malmesbury, and it occurs not uncommonly in the upper division of the Inferior Oolite in the Cotteswolds. *Ostrea sulcifera* is from the Great Oolite of Whitwell, Yorkshire.

GRYPHÆA MIMA, *Phil.* Tab. XIV, fig. 5.

GRYPHÆA MIMA, *Phil.* Geol. York., 1, t. 4, f. 6.

Testá parvá obliquá, subglobosá, valvá convexá, rugis concentricis magnis; areá adherenti magná, alterá convexo-planá.

Shell small, oblique, subglobose, the larger valve convex, rugose, with large concentric folds; the adherent surface subterminal, large; the smaller valve more smooth, slightly convex.

More globose than *Ostrea rugosa*, Sow., and destitute of the marginal plications; in other respects it much resembles that little species.

Height, 6 lines; lateral diameter, 5 lines; diameter through both the valves, 3 lines.

PECTEN DEMISSUS, *Phil.* Tab. XIV, fig. 7.

PECTEN DEMISSUS, *Phil.* Geol. York., 1, t. 6, f. 5.

— — *Goldf.* Pet., p. 74, t. 99, f. 2.

Testá suborbiculari planatá; umbonibus parvis acutis; auriculis parvis æqualibus, valvá dextrá subplaná, valvá sinistrá convexio; lateribus æqualibus marginibus rotundis; superficií glabro lineis tenuissimis concentris, aliis subobsoletis radiantibus decussatis.

Shell suborbicular, depressed, smooth and shining; umbones small, acute; auricles small, equal, rising slightly at their extremities, their outer borders curving obliquely downwards; the margin of the valves slope downwards from the umbones nearly at an equal angle on each side, (about 40° to the axis of the valves) and the margins and base are regularly rounded; the right valve has only a very slight convexity, and sometimes is traversed on each side obliquely by a slight furrow diverging from the umbo; the left

valve is somewhat more convex; the shining surface of the valves discloses closely arranged, very delicate and unequal concentric lines, which are decussated by radiating lines, equally dense, but slightly waved and knotted when viewed under a magnifier; the auricles are densely striated. The auricles are so small, that the length of their superior border is less than a third of the height of the shell, the measurement of the lateral diameter being equal to the height. The specimen forwarded to us from Yorkshire, is only 14 lines across, and agrees with small examples from the Inferior Oolite of the Cotteswolds, in which latter rock the species attains to thrice this measurement.

Geological position and localities.—The Coralline Oolite of Malton, the Kelloway rock of Scarborough, the Cornbrash of Gristhorpe, the Great Oolite or grey limestone at Cloughton, and the bed called Trigonía Grit, in the Inferior Oolite of the Cotteswolds; it would appear to be abundant in each of these positions.

PERNA RUGOSA, *Goldf.* var. Tab. XIV, fig. 16, *et antea*, Tab. III, fig. 1.

PERNA QUADRATA, *Phil.* Geol. York., t. 9, f. 21, 22.

— — *Goldf.* Pet., t. 107, f. 12.

Testá ovato-sigmoideá convexo-planá, in alam brevam productá; umbonibus acutis prominentibus; margine cardinali obliquo, canaliculis (8—12) plano concavis. (Goldfuss.)

A subquadrate thick shell, with a lengthened and large series of hinge-grooves; the apex is pointed, and projects forwards, beneath which the anterior border is concave and incassated, the lower border is rounded, the posterior side of the shell is thin, and its border nearly straight. The surface has irregular concentric plications, which, however, are not very prominent.

Aged specimens acquire a very considerable degree of elongation, the opposite measurement upon the hinge border having but little increase, usually the figure is more quadrate or less sigmoidal than is represented by Goldfuss.

Geological position and localities.—In Yorkshire, *P. rugosa*, var. *quadrata* occurs in the grey limestone of the Scarborough Great Oolite; in the Cotteswolds, we have examples both from the lower and upper division of the Inferior Oolite.

PTEROPERNA PLANA. Tab. XIV, fig. 4.

Testá obliquá, alatá, lineá cardinali recto elongato, postico valdè producto, valvis subæqualibus, depressis, inornatis; plicis concentricis irregularibus.

Shell oblique, winged; umbones small, acute, curved forwards, and placed near to the anterior extremity of the hinge-line, above which they are scarcely elevated; hinge border lengthened, produced posteriorly into an extended and pointed wing; the valves are nearly equally flattened, the left valve being a little more convex than the other; they are

destitute of ornament, and have only irregular concentric plications. The anterior border beneath the short anterior wing is but little excavated, its aperture being very narrow; the lower side of the shell has not much obliquity, and its border is regularly rounded. Two ribs extend the length of hinge border immediately beneath it, as is usual in the *Pteropernæ*.

In size it equals the larger specimens of our *P. costatula*, but it is less oblique than that species: the left valve is much less convex, and the anterior sinuation is much less considerable; the umbones are smaller, and are much less elevated above the hinge border; the anterior auricle is nearly upon the same plane as the posterior, but in *P. costatula* it is directed obliquely downwards and forwards.

Geological position and locality.—The Grey Limestone of the Scarborough Great Oolite.

AVICULA MUNSTERI, *Goldf.* Tab. XIV, fig. 6.

Testá (valva major) ovatá, obliquá, subconvexá, alá anticá acutá, posticá falciformi; costis radiantibus (3-4) acutis lineisque interstitialibus inæqualibus.

Shell very oblique and convex, inequivalve; anterior auricle acute; posterior auricle more lengthened and falciform; the larger valve with regular equal radiating slightly knotted costæ (about 16 in number); in the middle of each interstitial space is an elevated line, with one or more delicate or more faintly marked, upon each side of it; the auricles are ornamented in a similar manner.

An elegant shell, with convex prominent umbones, narrow but well marked costæ, which slightly project at the inferior border.

Geological position and locality.—The Great Oolite of Scarborough, in dark grey argillaceous sandstone.

AVICULA BRAAMBURIENSIS, *Sow.* Tab. XV, fig. 7, var. fig. 6.

AVICULA BRAAMBURIENSIS, *Sow.* Geol. Trans. vol. ii, p. 323.

— BRAAMBURIENSIS, *Phil.* Geol. York., 1, t. 6, f. 6.

Testá ovato obliqua, alá anticá rotundatá, posticá obtusiangulá, valvá majorá convexá, lineis radiantibus confertis minoribus alternis, interstiis angustis tegulatis. Valvá minorá convexo-planá levigatá, lineis radiantis paucis distantibus subobsoletis.

Shell ovately oblique; anterior auricle small, rounded, posterior auricle forming an obtuse angle; the larger valve convex, with numerous radiating lines, alternating with others which are smaller and indistinctly marked; the interstitial spaces narrow and indistinctly tegulated. The smaller valve slightly convex, smooth, with a few (7) radiating lines faintly marked.

The figure is remarkable for the smallness of the auricles and lengthened outline; the convexity is less than is usual in other of the ornamented aviculæ of the Lower Oolites.

It would appear to be nearly allied to a species which occurs in the Inferior Oolite of the Cotteswolds, from which it is distinguished by the shorter hinge border, less convex form, and fewer radiating costæ; it is not, however, quite certain that the Inferior Oolite shell may not be only a variety.

Locality.—Scarborough, in the bed of Grey Limestone.

PINNA CANCELLATA, *Bean*, MSS. Tab. XIII, fig. 20*a*, *b*.

Testá ovato-lanceolatá, quadriquetrá, anticè convexá plicis magnis concentricis; posticè compressiusculá; striis transversis crebris et lineis radiantibus angustis nodosis distantibus decussatis.

Shell ovately lanceolate, straight, quadriquetral, anterior side convex, with large densely arranged irregular, concentric plications; middle and posterior side more compressed, with fine irregular striations crossed by a few (about 12) longitudinal radiating knotted lines.

The single valve at our disposal does not exemplify the convexity and figure of the posterior aperture. It appears most nearly to resemble *Pinna Hartmanni*, Goldfuss, but it is more straight, with much fewer radiating lines, none of which are visible upon the anterior slope.

Locality.—Scarborough, in the Grey Limestone.

LIMA PUNCTATA, *Sow.*, sp. Tab. XV, fig. 9*a*, *b*.

PLAGIOSTOMA PUNCTATUM, *Sow.* Min. Con., t. 113, f. 1, 2.

LIMA PUNCTATA, *Goldf.* Petref., p. 81, t. 101, f. 2.

PLAGIOSTOMA PUNCTATUM, *Morris.* Catal., 1843, p. 117.

Testá ovato-obliquá, convexo-planá; margine antiore subrecto, elongato, abruptè truncato; lunulá excavatá; auriculis parvis inæqualibus; margine posteriore et inferiore rotundo; superficie lævi striis angustis, numerosis sub-flexuosis, densè punctatis.

Shell ovately oblique, rather flattened; anterior margin nearly straight, truncated, elongated; lunule large, excavated; auricles small, unequal; the posterior and inferior borders of the valves regularly rounded; the surface is smooth, with very numerous, narrow, slightly waved, and densely punctated striations, crossed by a few irregular folds of growth.

The smooth shining surface, densely arranged striations which cover the entire surface of the shell, and flattened elongated form, readily serve to distinguish it from other species of the lower oolites.

Localities.—The specimen forwarded to us from Yorkshire is from the hard Grey Limestone of Scarborough. In the Cotteswolds it occurs abundantly in the Inferior Oolite; but it has not occurred in the Great Oolite of the latter district.

HINNITES ABJECTUS, *Phil.* Tab. XIV, fig. 3, *vide antea*, p. 125.

MYTILUS (MODIOLA) CUNEATUS, *Sow.* Tab. XIV, fig. 9.

MODIOLA CUNEATA, *Sow.* Min. Con., t. 248, f. 2.

— — *Phil.* Geol. York., 1, t. 5, f. 28.

Testá ovato elongatá, convexá ; umbonibus subterminalibus parvis curvatis, acutis ; margine antico subsinuato ; margine cardinali oblique declivi, curvato, dorso obtusè fornicato, anticè subdepresso, superficie ; lineis concentricis tenuissimis irregularibus.

Shell ovately elongated, convex ; umbones nearly terminal, acute, and incurved ; hinge margin sloping obliquely and curved ; anterior margin nearly straight, but slightly sinuated ; dorsal surface obtusely ridged, most elevated about the middle of the valve, forming a depressed surface anteriorly and obliquely to it ; the surface with fine irregular concentric lines or striations.

The acute umbones, depressed and wedge-shaped anterior side, and slight obliquity of the entire form, serve to distinguish it from other species of the Lower Oolites.

Geological position and localities.—At Scarborough, in the Great Oolite ; Somersetshire, in the Inferior Oolite.

MYTILUS (MODIOLA) LECKENBII. Tab. XIV, fig. 8.

Testá ovato, arcuatá, convexá, acutá et obliquè fornicatá ; anticè angusto posticè lato ; umbonibus subterminalibus acutis ; dorso fornicato, latere anteriore sulcato et sinuato ; superficie striis tenuissimis, crebris, irregularibus.

Shell curved, ovate ; anterior extremity rounded but narrow, posterior extremity wide and curved obliquely ; umbones nearly terminal and acute ; dorsal surface with an elevated narrow ridge, anterior to which is a depressed and sinuated surface, the anterior border of which is much excavated, and its lower extremity rather pointed ; the hinge margin is lengthened, sloping downwards obliquely, and but very slightly curved ; the surface has closely arranged very fine concentric striations.

The great obliquity of the valves, the deeply sinuated anterior border, the pointed inferior extremity, and the flattened but raised posterior surface, will serve to distinguish it from *Mytilus (Modiola) bipartita*, to which its acute dorsal ridge presents a resemblance.

Length, 16 lines ; opposite diameter, 8 lines ; diameter through both the valves, 8 lines. The name is in complement to John Leckenby, Esq., of Scarborough, to whom we are indebted for the loan of the specimen.

Geological position and locality.—The Great Oolite of Scarborough, in a bed of hard grey ferrugino-micaceous sandstone.

MYTILUS (MODIOLA) UNGULATUS. Tab. IV, fig. 5 (*M. tumidus*).

M. UNGULATA, *Young and Bird*. Geol. Yorksh., pl. 7, f. 10.

M. TUMIDUS, *antea*, p. 37, pl. iv, f. 5.

This species has been previously figured under the name of *M. tumidus*, p. 37, but it is not distinct from the Yorkshire shell, and the latter name cannot therefore be retained.

CUCULLÆA CANCELLATA, *Phil.* Tab. XIV, fig. 12.

CUCULLÆA CANCELLATA, *Phil.* Geol. York., 1, t. 9, f. 24, t. 11, f. 44.

— OBLIQUA, *Lycett*. Ann. and Mag. Nat. Hist., 1850.

Testá ovato-rhomboidéá perobliquá ; umbonibus antemedianis contiguís, latere antico brevi, latere postico fornicato obliquè declivi et producto ; superficie lineis radiantibus minutis crebris aliis concentricis decussatis.

Shell ovately rhomboidal, very oblique ; umbones placed near to the anterior extremity of the hinge line, and contiguous ; anterior side short, its margin rounded, posterior side with an oblique ridge, obtuse, and much elongated posteriorly ; the surface with very densely arranged, equal, regular, radiating lines, decussated by others concentric and equally densely arranged ; the lines are smooth, and the angles produced by the junction of the decussating lines have a punctated appearance ; upon the anterior side of the shell the radiating lines are rather less densely arranged.

The surface of this species has a considerable resemblance to *Cucullæa cucullata*, Goldfuss, but the latter shell is more convex and is less elongated, the area being likewise larger.

Geological position and localities.—At Scarborough, in the hard grey limestone of the Great Oolite ; in Gloucestershire, it occurs in the middle division of the Inferior Oolite.

UNICARDIUM GIBBOSUM. Tab. XIV, fig. 11.

Testá ovato subglobosá ; umbonibus magnis medianis, curvatis ; margine cardinali brevi, subrecto, et subhorizontali ; marginibus aliis curvatis ; superficie plicis magnis irregularibus et inæqualibus.

Shell ovately sub-globose ; umbones large, mesial, prominent, and curved forwards ; hinge margin short, nearly straight, and horizontal, its posterior extremity rather angulated, the other margins of the valves regularly rounded ; the surface is covered with large, irregular, and unequal concentric plications ; the thickness of the test is moderate.

The umbones are more nearly mesial than *U. depressum* and *U. impressum* ; they also project more, and therefore more nearly resemble *U. varicosum*, but the anterior side is

less produced, and the height is much less than in that shell; it is more nearly allied to, but is more oblique, than a large lias species which is not uncommon in Gloucestershire and Oxfordshire. Height and diameter through both the valves equal, lateral diameter one fourth more. The specimen forwarded to us from Yorkshire is much smaller than several which we have obtained in the Cotteswolds, in one of which the lateral diameter exceeds two inches.

Geological position and localities.—The Great Oolite of Scarborough; also in the middle or freestone beds of the Inferior Oolite in Gloucestershire; but it has not occurred in the Great Oolite of the same county.

UNICARDIUM DEPRESSUM, *Phil.* sp. Tab. XIV, fig. 10.

CORBULA DEPRESSA, *Phil.* Geol. York., 1, t. 9, f. 16.

Testá ovato subglobosa; umbonibus magnis, subanticis incurvis, margine cardinali oblique declivi subrecto, basi et lateribus rotundis; plicis concentricis crebris irregularibus et inæqualibus.

Shell ovately globose, oblique; umbones large, depressed, anterior to the middle of the valves; hinge border sloping obliquely downwards and nearly straight, its posterior extremity rounded; the margins of the valves, basal, anterior, and posterior, rounded; the general figure tumid, excepting near to the hinge border, where the surface is more depressed; the surface is covered with closely-arranged concentric plications which are irregular and unequal.

The substance of the test is of greater thickness than is usual in this genus; it is most nearly allied to *U. varicosum*, p. 73, tab. 8, figs. 7—8; but it is much more oblique and of greater length, the dimensions being, height, 14 lines; length, 17 lines; there is some amount of variation in the obliquity of the valves and we have specimens which exhibit greater obliquity than the example from Yorkshire.

Geological position and localities.—The grey limestone of the Great Oolite at Scarborough. In Gloucestershire it has occurred only in the Inferior Oolite in the bed called Trigonia Grit.

TRIGONIA DECORATA, *Lyc.* Tab. XV, fig. 1.

TRIGONIA DECORATA, *Lycett.* Ann. and Mag. Nat. Hist., 1853, vol. xii, pl. 11, f. 1.

Testá ovato trigona, subcompressa, umbonibus obtusis, non recurvatis, areá cardinali latá planá tripartitá; cariná interná tuberculis in varicis elongatis instructús, cariná mediá et marginali tuberculis minimis crebris ornatá: lateribus tuberculis per series arcuatis concentricè dispositis.

Shell ovately trigonal, somewhat depressed; umbones obtuse, not recurved; anterior

and inferior borders rounded, posterior border lengthened and nearly straight; area wide, flattened, finely striated transversely, and divided into three portions by as many faintly traced carinæ, or rather as many lines of minute closely-arranged equal and regular tubercles, those of the inner carina, being elongated into as many varices or plications; there is, likewise, a median divisional groove, which is immediately adjacent to and parallel with the tubercles of the median carina. The clavellated portion of the shell has a numerous series of rows of concentric closely-arranged but not very prominent tubercles, the larger tubercles being towards the middle of the curvature; they are distinct, usually rounded, closely-arranged (15 or more being contained in a row), the number of rows in adult shells being about 20, the whole of which are distinctly tuberculated; the lines of growth upon the sides of the shell are fine and distinct. The dimensions are equal to the largest examples of the clavellated *Trigonæ*. The species which approximate most nearly to our shell are *T. perlata*, Ag. *T. Bronnii*, Ag. *T. muricata*, Goldf. and *T. clavellata*, Sow., it having usually been mistaken for the latter shell.

T. perlata has the umbones more recurved; the tubercles upon the carinæ are much larger, and those of the median carina have in addition a series of transverse varices which are absent in *T. decorata*. *T. Bronnii* has the apex more elevated, it is destitute of the inner varices upon the area; the sides of the shell have a less numerous series of rows of tubercles, the tubercles being larger.

T. muricata has the area much smaller and more narrow; the lanceolate post ligamental space is smooth; the costæ upon the sides of the shell are distinctly elevated, the tubercles being more prominent and more distantly arranged in the rows.

T. clavellata has the figure more elongated and rostrated posteriorly; the umbones are much more recurved; the superior border of the area is distinctly concave; the lanceolate space is of great size, and the inner carina is destitute of varices; the sides of the valves have the rows of tubercles fewer, the tubercles more elevated and more distantly arranged in the rows; the general convexity of the valves being greater than in *T. decorata*.

The specimen forwarded to us from Yorkshire, is rather more elongated, and the costæ are somewhat more prominent than obtains in specimens from Gloucestershire; but there appears to be no essential difference between them.

Geological position and localities.—The Great Oolite of Scarborough; it is abundant likewise in the bed called *Trigonia Grit* of the Inferior Oolite in the Cotteswolds.

ASTARTE MINIMA, *Phil.* Tab. XIV, fig. 15.

ASTARTE MINIMA, *Phil.* Geol. York., 1, t. 9, f. 23.

— — *Williamson.* Geol. Trans., 2d ser., vol. v, pt. 1, p. 240.

Testâ parvâ ovato-acutâ convexâ; umbonibus prominulis obliquis; superficie apice lævigato; dorso striis concentricis magnis irregularibus.

Shell small, ovately acute, convex; umbones prominent, pointed, oblique; margins of

the valves rounded; the surface smooth near to the apex, the remaining portion with large concentric irregular striations.

Locality.—This small species is not uncommon upon the slabs of Brandsby slate, and near Scarborough; it has not been identified in Gloucestershire. Mr. Williamson records it both in the Great and Inferior Oolite of Yorkshire.

ASTARTE ELEGANS, *Sow.* Tab. XIV, fig. 14, *vide antea*, p. 86.

CYPRINA ? DOLABRA, *Phil.*, sp. Tab. XIII, fig. 19.

CYTHEREA DOLABRA, *Phil.* Geol. York., 1, t. 9, f. 12.

Testá parvá ovato-orbiculari, plano-convexa lævigata; umbonibus subacutis medianis elevatis; marginibus rotundis; lunulá magná excavatá.

Shell small, ovately orbicular, rather flattened, smooth; umbones mesial, rather acute, and elevated; margins of the valves rounded; lunule large and excavated.

The depressed figure, elevated acute mesial umbones, and large lunule, separate it from other small contemporaneous species of the Cyprinæ.

Height, 4 lines; length, 5 lines; diameter through both the valves, a line and a half.

Locality.—Scarborough, in the Great Oolite.

ISOCARDIA CORDATA, *Buck.* Tab. XV, fig. 5.

ISOCARDIA CORDATA, *Buckman.* Geol. of Chelt., p. 98, t. 7, f. 1.

Testá ovato orbiculari convexá, umbonibus magnis obliquis antemedianis antrorsum curvatis et separatis; areá ligamenti magná, sulco elongato, marginibus rotundis et integris; superficie lævi, striis concentricis tenuibus et irregularibus instructis.

Shell ovately orbicular or cordiform; very convex near to the umbones, but rather compressed at the margins, which are regularly rounded and entire; umbones large, curved forwards, and separated by a large and lengthened ligamental area, upon each side of which is a groove which extends nearly to the posterior extremity, and is bounded above by an angle which may be traced to the extremities of the umbones; the surface is smooth, with fine irregular concentric striations; test very delicate.

Dimensions of the Yorkshire specimen; height, 18 lines; length, 21 lines; diameter through the valves, 15 lines.

Localities.—Scarborough, in the Great Oolite; larger examples, some of which have the test preserved, occur in the Inferior Oolite of the Cotteswolds, but it is unknown in the Great Oolite of Gloucestershire.

QUENSTEDTIA LÆVIGATA. Tab. XIV, fig. 13.

PSAMMOBIA LÆVIGATA, *Phil.* Geol. York., 1, t. 4, f. 5.

Testá ovato-elongatá, compressá, lævigatá; umbonibus depressis, medianis; anticè

rotundo, postice subtruncato, angulo obliquo obtuso instructo; margine cardinali subhorizontali, inferiore parallelo; lateribus striis irregularibus tenuibus.

Shell ovately elongated, compressed and smooth; umbones depressed, mesial; anterior border rounded, posterior border somewhat truncated; an oblique obtuse angle descends from the umbo posteriorly; hinge border horizontal, lower border parallel, the surface with fine irregular longitudinal striations.

Compared with *Quenstedtia oblita*, this species is more elongated, the umbones more nearly mesial, and the longitudinal plications are much more delicate, producing a general smoothness of the surface. Length, 2 inches; height, 1 inch.

Geological position and localities.—Specimens have been forwarded to us from the Grey Limestone bed of the Scarborough Great Oolite; it also occurs in the Inferior Oolite of Blue Wick upon the same coast, and in the upper division of the Inferior Oolite of the Cotteswolds; we have also obtained a specimen in the Great Oolite of Minchinhampton, but it appears to be rare at each of these localities.

MYACITES BEANII. Tab. XV, fig. 11*a, b*.

Testá ovato-oblongá subcompressá, umbonibus depressis; antemedianis, areá ligamenti angustá, parvá; margine postico rotundo; hiante basi et margine anteriore curvato; superficie sulco lato, superficiali instructo; plicis longitudinalibus magnis irregularibus.

Shell ovately oblong, rather short and compressed; umbones antero-mesial, depressed; ligamental area small and narrow, the margin posterior to it nearly horizontal; the extremities of the valves rounded, the anterior extremity being almost closed, the posterior extremity with a lengthened and moderately large aperture; a superficial and vertical wide depression passes downwards from the umbones crossing the longitudinal plications, which are large and irregular.

This species is not without a considerable resemblance to *Homomya compressa*, Ag., but as the latter shell has the anterior side less produced, with a distinct aperture, together with umbones more elevated, we prefer to consider them distinct species; the short form, depressed small umbones, and fully developed nearly entire anterior border, will also serve to distinguish it from other of the British Myadæ. Length, $2\frac{1}{4}$ inches; height, $1\frac{1}{4}$ inch; diameter through the valves, 1 inch.

Locality.—Scarborough.

MYACITES SECURIFORMIS, *Phil.*, sp. Tab. XIII, fig. 15.

Testá elongatá, securiformi, compressiusculá, umbonibus submedianis parvis, margine antico et postico oblique-declivi, basi elliptico curvato; valvis in medio subdepresso, plicis longitudinalibus magnis distantibus, lunulá nullá.

Shell elongated, subtrigonal or hatchet-shaped, umbones antero-mesial and small, anterior and posterior borders sloping obliquely downwards, the anterior slopes have the greater angle, lower margin curved elliptically; the extremities of the valves rounded, and no distinct aperture; the sides of each of the valves with a large superficial perpendicular mesial depression caused by a few large and distant longitudinal plications. The general figure is more compressed, the umbones more nearly mesial, and the extremities of the valves are more completely closed than is usual in this genus, there is also more or less degree of inequality in the valves. Numerous as are the forms of this genus, we have seen none which are likely to be confounded with the present species; some of the shorter specimens of *Pleuromya elongata*, Ag., resemble it in outline only, but the posterior aperture and greater convexity will at once distinguish the species of Agassiz.

Height, 13 lines; length, 22 lines; diameter through both the valves, 8 lines.

Localities. *Myacites securiformis* occurs abundantly in the Cornbrash both of Yorkshire and Wiltshire.

Mr. Bean has kindly forwarded us a fine specimen from the Great Oolite of Scarborough, which we have figured.

MYACITES DECURTATUS, *Phil.* Sp. Tab. XV, fig. 10a, b.

Syn. AMPHIDESMA DECURTATUM, *Phil.* Geol. York., 1, t. 7, f. 11.

PLEUROMYA DECURTATA, *Ag.* Etud. Crit. Myes., p. 232.

LUTRARIA DECURTATA, *Goldf.* Petref., t. 153, fig. 3.

Testá ovato-elongatá, umbonibus anticis elevatis, latere antico brevi, abruptè truncato, postico elongato, attenuato et hiante; margine superiori obliquè declivi, basi curvato, lateribus plicis longitudinalibus irregularibus.

Shell ovately elongated, umbones anterior, elevated; anterior side short, truncated, with a superficial vertical depression; posterior side elongated and attenuated, superior margin sloping obliquely downwards, the extremity with an aperture of moderate size and elongated, lower border curved elliptically; the sides of the valves with longitudinal irregular plications.

Compared with its congeners, the elevated umbones, short anterior side, and lengthened attenuated posterior side, will usually serve to distinguish it; the middle portion of the shell is moderately tumid, the two extremities being somewhat compressed; the posterior aperture extends both upon the superior and inferior borders; we have not seen the outer granulated layer of the test.

Height, 11 lines; length, 20 lines; diameter through both the valves, 9 lines.

Locality. *Myacites decurtatus* occurs in the Cornbrash both of Yorkshire and of Wiltshire; we have also been favoured by Mr. Bean, with a specimen from the Great Oolite near Scarborough.

MYACITES SCARBURGENSIS, *Phil.* Sp. Tab. XV, fig. 13.

Syn. LUTRARIA GIBBOSA, *Phil.* Geol. York., 1, t. 9, f. 6.

Testá ovato-elongatá, compressiusculá, umbonibus antemedianis parvis, margine antico rotundo, producto, postico elongato, hiante; basi elliptico curvato, margine superiori subhorizontali, concavo; lateribus compressis, plicis irregularibus magnis longitudinalibus.

Shell ovately elongated, compressed; umbones anterior to the middle of the valves, small and not much elevated; anterior side produced, its margin rounded; posterior side lengthened, and gaping with a moderately large aperture; base curved elliptically; the sides of the valves are compressed, and have large irregular longitudinal plications; the ligamental area is large and excavated, the posterior aperture extending upon the horizontal superior border nearly to the ligament.

A species somewhat resembling *Myopsis Jurassi*, Ag., but less tumid, or more compressed in its middle part.

Height, 17 lines; length, 31 lines; diameter through both the valves, 12 lines. The specimen figured is the original one drawn by Professor Phillips.

Locality. Scarborough. Mr. Bean's Collection.

MYACITES GIBBOSUS, *Sow.* Sp. Tab. XII, fig. 14, (junior.)

Syn. PANOPÆA GIBBOSA, *Sow.* Min. Con., t. 211.

— AGASSIZII, *Valenc.* Arch. du Mus., 1, p. 31.

MYACITES GIBBOSUS. *Morris.* Catal. 2d edit., 1854, p. 213.

MYA GIBBOSA, *D'Archiac.* Mem. Soc. Geol. Fr., vol. 5, pl. 26, f. 1, 1845.

— MODICA, *Bean.* MSS. (junior.)

Testá ovato-oblongá, ventricosá, umbonibus rotundis, magnis, elevatis ante medianis, latere antico brevi, margine rotundo, latere postico compresso, margine aperturá angustá, basi elliptico curvato; margine superiori concavo; areá ligamenti magná, ellipticá; lateribus striis irregularibus tenuissimis.

Shell ovately oblong, ventricose; umbones rounded, large, elevated, and placed anterior to the middle of the valves; anterior side short, convex; its margin rounded, gaping with a small aperture; posterior side compressed, its extremity with a narrow lengthened aperture; base elliptically curved; superior margin rather concave; ligamental area large, elliptical, depressed; sides of the valves with fine irregular longitudinal striations.

The small specimen forwarded us from the Great Oolite of Scarborough, is the young

condition of the large and well-known *Panopæa gibbosa*, Sow., a species in which the test has not been observed, and which in the Cotteswolds and West of England, is procured in the upper portion of the Inferior Oolite; our small example is more than usually elongated, but the species differs very much in this particular, and we possess examples from the Inferior Oolite in which the posterior side is fully as much elongated. The large elevated umbones and tumid anterior side of the shell, serves to distinguish it from another Inferior Oolite species hitherto undescribed, and for which it has not unfrequently been mistaken; the older or fully developed specimens of *Myacites gibbosus* are invariably shorter and more ventricose. The shell figured by d'Archiac represents a specimen of medium size; the *Homomya gibbosa*, Ag., 'Etud. Crit. Myes,' pl. xviii, is our *Myacites Vezelayi*, a shell which never occurs in the Inferior Oolite.

Dimensions of the small Yorkshire example. Height, 13 lines; length, 25 lines; diameter through both the valves, 11 lines.

Locality. Scarborough.

MYACITES ÆQUATUS, *Phil.* Sp. Tab. XII, fig. 15.

MYA ÆQUATA, *Phil.* Geol. York., 1, t. 11, f. 12, (junior.)

Testá ovato-tumidá, umbonibus magnis, elevatis antemedianis, latere antico producto, postico attenuato; margine superiore concavo, declivi; basi elliptico curvato.

Shell ovate, tumid; umbones large, elevated, slightly compressed, and placed anterior to the middle of the valves; anterior side produced, middle portion ventricose, posterior side rather compressed and attenuated; lower border curved elliptically; the sides of the valves have fine irregular striations. Our species possesses some general resemblance to *Pleuromya tenuistria*, Ag., but it is more lengthened, and the posterior side is more attenuated, the superior border having a greater declivity.

We believe that the small shell figured by Phillips under the name of *Mya æquata*, is the young condition of the larger specimen we have figured, in which the posterior side has with increase of growth become somewhat more elongated.

Height, 12 lines; length, 20 lines; diameter through both the valves, 10 lines.

Locality. Scarborough, in the Grey Limestone.

GRESSLYA PEREGRINA, *Phil.* Sp. Tab. XV, fig. Sa, b.

Syn. UNIO PEREGRINUS, *Phil.* Geol. York., 1, t. 7, f. 12.

GRESSLYA ERYCINA, *Ag.* Etud. Crit. Myes., p. 214, t. 14, f. 1—9.

GRESSLYA CONCENTRICA, *Ag.* Etud. Crit. Myes., p. 213, t. 14, f. 10—15.

— PEREGRINA, *Morris.* Cat. Brit. Foss., 2d ed., 1854, p. 203.

Testá ovato-cordiformi, tenui, umbonibus antemedianis subdepressis, anticè productá et

tumidá, lunulá magná, excavatá; posticè compressá, margine cardinali curvato, obliquè declivi; plicis incrementi magnis, paucis, irregularibus. Superficie granulis densè, ornatis granulis in lineis radiantibus minutis serialibus regularibus instinctis.

Shell ovately cordiform, the test very thin, anterior side very convex and produced posterior side attenuated and compressed; umbones depressed, placed at about one third from the anterior margin, lunule large, excavated; hinge border curved and sloping obliquely downwards, its posterior extremity rounded. The sides of the valves have large irregular but distant plications.

The entire surface is very densely ornamented with minute granules disposed in closely-arranged fine radiating lines, the lines being distinctly raised and uniting the granules at their bases.

Agassiz has not noticed the *Unio peregrinus*, but his tab. XIV contains numerous and truthful exemplifications of its phases of aspect under the names of *Gresslya erycina* and *G. concentrica*.

The most prominent distinguishing feature of *Gresslya peregrina*, consists in the great development of the anterior side, and the compression of the posterior, so that when placed upon its side, the anterior border and lunule faces the spectator.

Some specimens of *Gresslya latirostris*, Ag., from the Inferior Oolite of the Cotteswolds, much resemble our species in their general outline, but the more considerable diameter through the valves upon the anterior side of *G. peregrina*, will always distinguish it, together with the more compressed and shortened figure of the posterior side.

From *Gresslya abducta* (*Unio abductus*, Phil.), it is readily distinguished by the more elevated umbones and shorter anterior side of the latter species.

Geological position and localities. *Gresslya peregrina* occurs both in the Cornbrash, and in the Grey Limestone of the Great Oolite, near Scarborough.

GONIOMYA V-SCRIPTA, Sow. Sp. Tab. XIII, fig. 16.

Syn. MYA V-SCRIPTA, Sow. Min. Con., t. 224, f. 2—5.

GONIOMYA V-SCRIPTA, Ag. Etud. Crit. Myes., t. 16, f. 17—19.

GONIOMYA V-SCRIPTA, Morris. Catal. 2d edit., 1854, p. 203.

Testá ovato-subtrigóná, umbonibus submedianis, margine antico rotundo, postico sub truncato, costis angulis acutis verticalibus, extremitate postico lævi.

Shell ovate, somewhat subtrigonal; umbones nearly mesial; anterior border rounded; posterior border somewhat truncated, lower margin nearly straight; from the umbones the anterior and posterior margins slope obliquely downwards, the posterior side, which is slightly the longer, having its slope at a smaller angle than the other; costæ numerous, their angle acute, and directly perpendicularly downwards, or a little backwards; the

posterior extremity is destitute of costæ; the costæ nearly of equal size upon both the sides of the shell.

The *Lysianassa v-scripta* of Goldfuss, Pet., t. cliv, fig. 6, is the *Mya literata* of Sowerby, Phillips, and Agassiz.

Geological position and localities. Great Oolite, Scarborough; Kelloway Rock, Wilts; Cornbrash, Bedford; Inferior Oolite, Brora; Claydon, and the Cotteswolds.

PHOLADOMYA OVALIS, Sow. Tab. XV, fig. 14.

PHOLADOMYA OVALIS, Sow. Min. Con., t. 226.

? — PELAGICA, Ag. Etud. Crit. Myes., p. 105, t. 2, f. 5—7.

— NANA, Phil. Geol. York., 1, t. 9, f. 7, (junior.)

Testá elongato-ovatá, anticè ventricosá brevi, posticè elongato, angusto, vix, hiante; umbonibus magnis, elevatis; lateribus plicis longitudinalibus irregularibus et costis (circa 9) distantibus angustis, subperpendicularibus.

Shell ovately elongated; anterior side ventricose, its margin closed; posterior side attenuated and elongated, its aperture small; umbones large, elevated; superior border nearly horizontal, and sinuated, base curved elliptically; the sides of the valves with irregular longitudinal plications, crossed by costæ, which are narrow, distant (about nine in number), nearly of equal size, and are nearly perpendicular; the anterior and posterior sides are without costæ.

Of the costæ five or six are prominent, and are distinct to the lower border, the others are less elevated, and are gradually lost upon the surface. *P. pelagica*, Ag., and *P. decemcostata*, Roemer, have the costæ more oblique, but we think that the species is subject to some variability in this respect, and that they cannot be separated; *Pholadomya nana*, Phillips, we also regard as a young example of the same species; we have arrived at this conclusion from a comparison of the original specimen figured in the 'Geology of Yorkshire,' and placed at our disposal by Mr. Bean.

Height, 14 lines; length, 25 lines; diameter through both the valves, 12 lines.

Localities. The specimen forwarded to us is from the Grey Limestone of Scarborough; it also occurs in the Cornbrash of the same locality.

PHOLAS PULCHRALIS, Bean. MSS. Tab. XIII, fig. 17.

Testá subcylindricá, medio constricto, lateribus convexis hiantibus, costellis paucis inæqualibus radiantibus, umbonibus medianis depressis, et sulco mediano perpendiculariter instructo, lateribus semel plicis longitudinalibus subundulatis et crebris.

Shell subcylindrical, short, compressed in the middle portion, and convex towards the two extremities, each of which gapes with a considerable aperture; umbones mesial and

depressed; a narrow sulcation passes nearly perpendicularly from the umbo to the inferior border; the sides of the valves have numerous closely arranged and nearly regular but depressed plications; the plications towards the extremities are crossed by a few radiating and rather irregular costæ, which are most prominent upon the anterior side, but upon each side the costæ become indistinct which are nearest to the middle of the shell.

Lateral diameter, 13 lines; height, 9 lines.

Geological position and locality. The specimen kindly forwarded to us by Dr. Murray of Scarborough, is from the Grey Limestone of the Great Oolite.

PHOLAS COSTELLATA. Tab. XIII, fig. 18.

Testâ parvâ, ovatâ, anticè convexâ, costellatâ, posticè attenuatâ sub-lævigatâ; umbonibus magnis ante medianis, compressis; valvis in medio sulco obliquo; costellis prominentibus subacutis irregularibus; laminis concentricis crebris depressis.

Shell small, ovate; anterior side convex, with radiating, irregular, subacute costæ; posterior side nearly smooth; the middle of the valves is depressed, with a groove which passes obliquely downwards and backwards; the umbones are placed anterior to the middle of the valves, they are large and compressed; the extremities of the valves are nearly closed; the concentric lamellæ upon the sides of the shell are fine, and closely arranged, nearly disappearing upon the posterior half of the valves. The calcareous crypt, which contains the shell, is obtuse anteriorly.

Compared with *Pholas Oolitica* the costæ are more distinct and numerous upon the anterior half of the valves; the concentric lamellæ are more numerous, closely arranged, and much less conspicuous, so that they scarcely impress the radiating costæ; the mesial sulcus is more oblique, and the general figure of the shell is less cylindrical; the crypt is less ovate, or more nearly pyriform, the anterior extremity being more obtuse. The posterior extremity of the shell is somewhat embedded in the crypt, and is not sufficiently exposed to enable us to give the dimensions with accuracy; the costæ upon the anterior half are about 12 in number, and nearly straight; the anterior extremity does not exhibit any distinct apertures.

Locality. Scarborough.

CEROMYA CONCENTRICA. Tab. XV, fig. 3, *antea*, p. 108.

GERVILLIA ACUTA. Tab. XIV, fig. 1, 1a, *antea*, p. 20.

Trigonia conjungens is probably a variety of *T. angulata*.

NOTE.—We are indebted to the liberality of Mr. J. Leckenby and Mr. W. Bean, of Scarborough, for the loan of the specimens above described from the Oolite of Yorkshire.

ADDENDA.

PHOLADOMYA OBLITA. Tab. XII, fig. 5.

Shell ovately ventricose, umbones large, elevated; anterior side tumid, posterior side produced, compressed, its extremity gaping with a narrow aperture; superior border concave, inferior border curved elliptically; sides of the shell with very numerous, fine radiating lines, which are effaced towards the lower borders, and are absent towards the two lateral extremities.

The shell which most nearly resembles the present species is the well known *Pholadomya fidicula*, Sow., from which it is distinguished by the shorter and more ventricose figure, by the much larger and more elevated umbones, by the considerable curvature of the lower border, and by the surface, which, in lieu of the acute elevated costæ of *P. fidicula*, has very much more numerous, fine, lines, which vanish towards the lower border. *Pholadomya oblita* has occurred rarely in sandstone at the base of the Great Oolite, and also in the Inferior Oolite of the Cotteswolds.

Localities. Minchinhampton Common, in the Great Oolite. Selsley and Frocester hills, in the Inferior Oolite.

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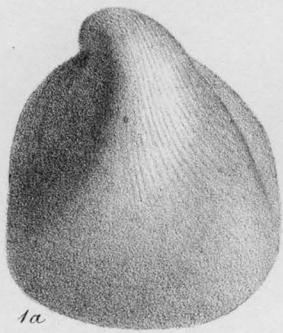
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<i>mucronata</i>	ib.	<i>Psammobia lævigata</i>	135
<i>subglobosa</i>	51	<i>Pullastra recondita</i>	88
		<i>oblita</i>	96
<i>Ostrea complanata</i>	85	<i>Sanguinolaria dilata</i>	114
<i>Knorrrii</i>	3	<i>undulata</i>	118
<i>obscura</i>	5	<i>Spondylus velatus</i>	14
<i>palmetta</i>	4		
<i>pectiniformis</i>	26	<i>Tancredia extensa</i>	93
<i>Ostracites pectiniformis</i>	ib.	<i>Trigonia conjungens</i>	57
		<i>cuspidata</i>	56
<i>Panopœa dilatata</i>	114	<i>pullus</i>	58
<i>tenuistria</i>	115	<i>Unicardium corbisoidium</i>	73
<i>Terquemea</i>	ib.		
<i>Pecten obscurus</i>	12	<i>Venus Jurensis</i>	89
<i>sulcatus</i>	8	<i>trapeziformis</i>	ib.
<i>velatus</i>	14	<i>varicosa</i>	73
<i>Pectunculus minimus</i>	54		
<i>oblongus</i>	ib.		
<i>minimens</i>	ib.		

CORRIGENDA.

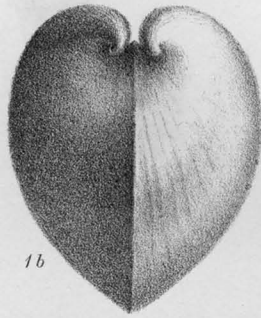
- Part I, p. 27, for "Purpuroidea Moreausia," read "P. Morrisii, Buv.;" Purpura Moreausia, is considered by M. Buvignier to be a distinct species.
- p. 48, for "Eulima pygmæa," read "Eulima vagans (junior)."
- p. 93, for "Patella nana," read "Patella cingulata (junior)."
- Part II, p. 24, for "Inoceramus Fittoni, Tab. iv," read "Tab. iii."
- p. 48, sixth line from the bottom, erase the four words within the parenthesis.
- p. 49, second line, erase the last three words. The raised ledge which supports the *anterior* muscular impression in Macrodon separates it from other sub-genera of Arca; in Cucullæa the ledge is *posterior*.
- p. 75. Both *Cypricardia Bathonica*, d'Orb. and *C. cordiformis*, Desh., occur in the Inferior Oolite of the Cotteswolds but in different beds, further observations have induced us to regard them as only varieties of the same species induced by peculiarities of the beds in which they occur.

TAB. IX.

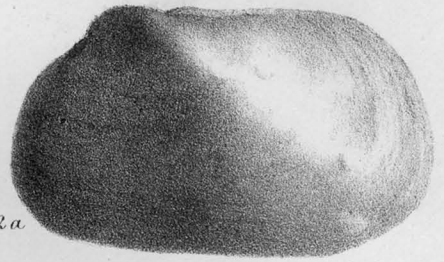
Fig.	
1 <i>a, b.</i>	<i>Ceromya undulata</i> , p. 106.
2 <i>a, b.</i>	<i>Myacites tumidus</i> , p. 117.
3.	<i>Myacites crassiusculus</i> , p. 112.
4.	<i>Quenstedtia oblita</i> , p. 96.
4 <i>a, b.</i>	Hinge of ditto.
5.	<i>Nucula variabilis</i> , p. 51.
6.	<i>Corbula involuta</i> , p. 97.
7.	<i>Hinnites abjectus</i> , p. 125.
8 <i>a, b.</i>	<i>Astarte excentrica</i> , p. 83.
9.	„ <i>squamula</i> , p. 82.
10 <i>a, b.</i>	„ <i>minima</i> , p. 82.
11.	„ <i>depressa</i> , p. 85.
12.	„ <i>rotunda</i> , p. 84.
13 <i>a, b.</i>	„ <i>pumila</i> , p. 83.
14, 15 <i>a, b.</i>	„ <i>interlineata</i> , p. 87.
16.	„ <i>Wiltonii</i> , p. 87.
17 <i>a, b.</i>	„ <i>angulata</i> , p. 86.
18, 19.	„ <i>excavata var. compressiuscula</i> , p. 85.
20.	„ <i>rhomboidalis</i> , p. 84.
21.	<i>Pholas Oolitica</i> , p. 126.



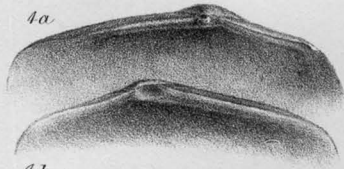
1a



1b

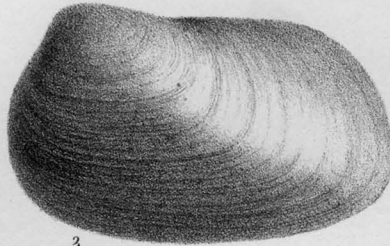


2a



4a

4b



3



2b



8b



4



6b



6a



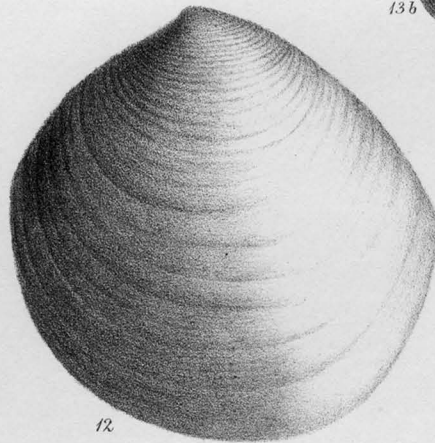
13b



7



5



12



13a



8a



9



10a



14



15a



11



10b



16



15b



18



17b



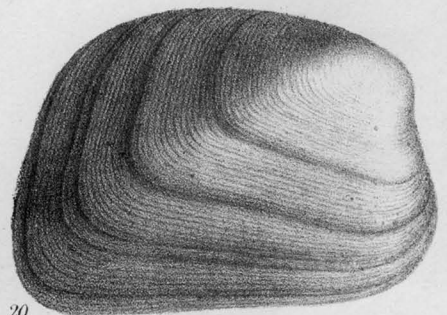
17a



19



21

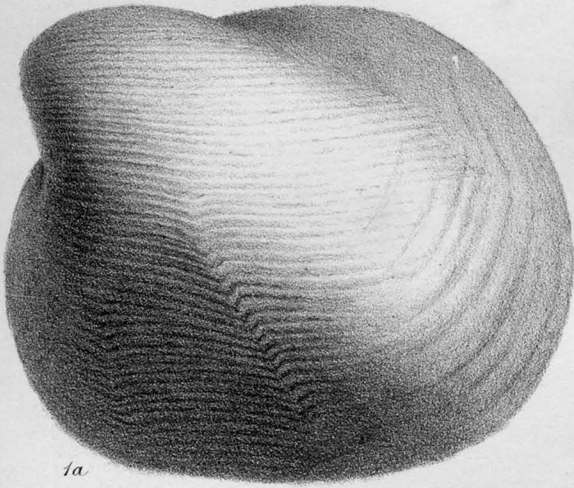


20

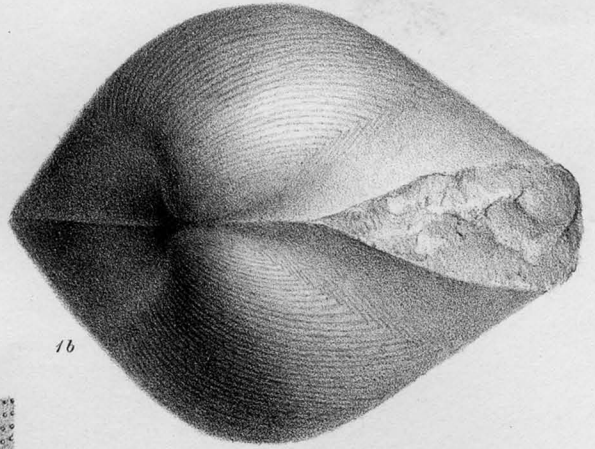
TAB. X.

Fig.

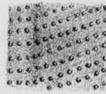
- 1*a, b*. *Ceromya plicata*, p. 107.
2. ditto. p. 107.
- 3*a, b*. *Ceromya concentrica*, p. 108.
- 4*a, b*. *Ceromya Symondsii*, p. 106.
- 5*a, b*. *Myacites dilatatus*, p. 114.
6. *Myacites unioniformis*, p. 115.
7. *Gresslya peregrina, var.*, p. 105.



1a



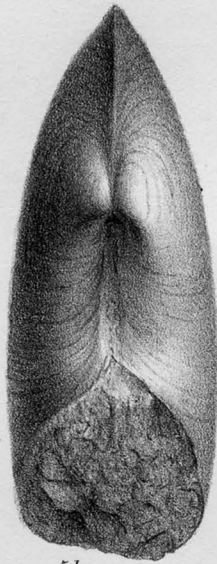
1b



5c



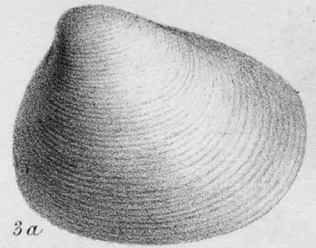
2



5b



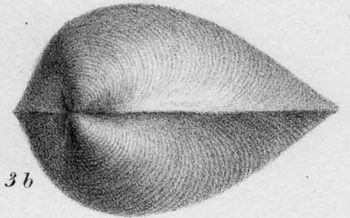
5a



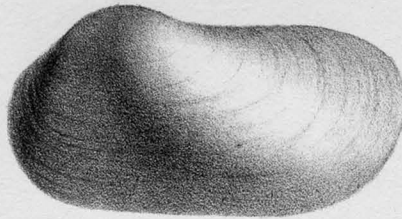
3a



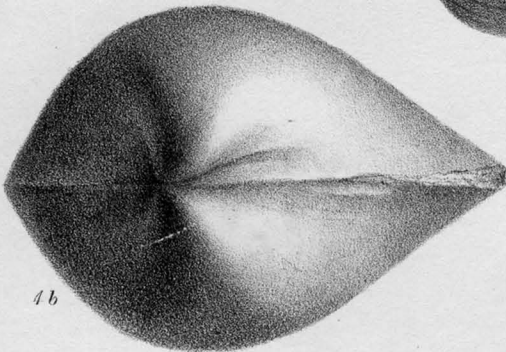
7



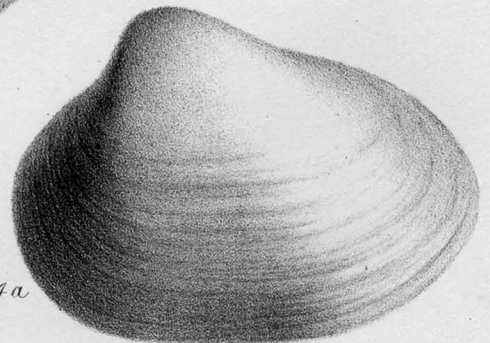
3b



6



4b

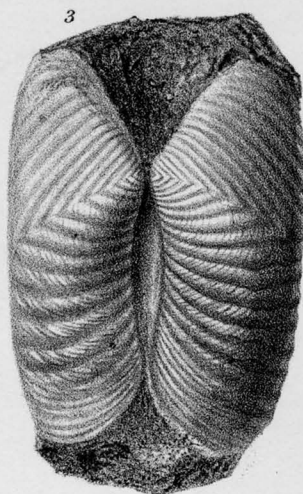
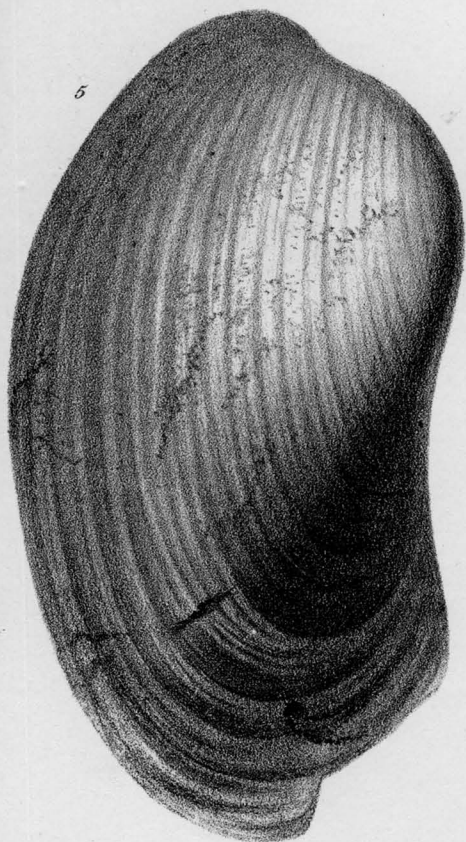
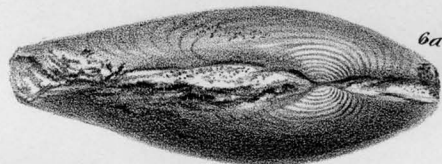
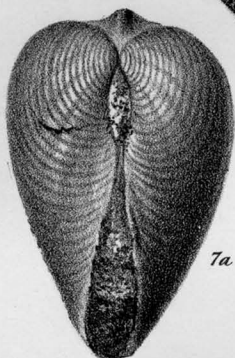
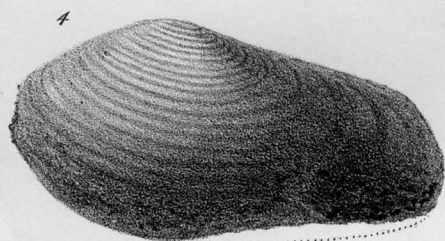
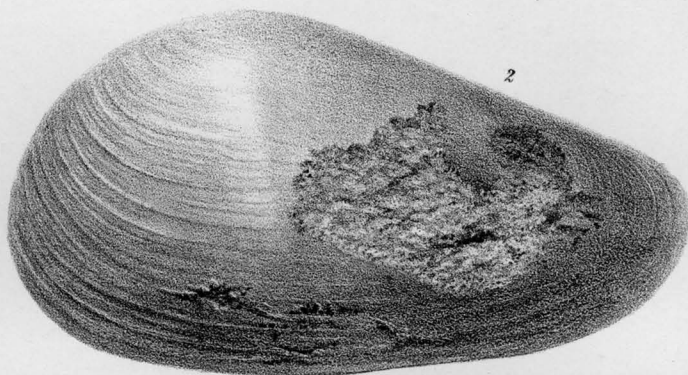
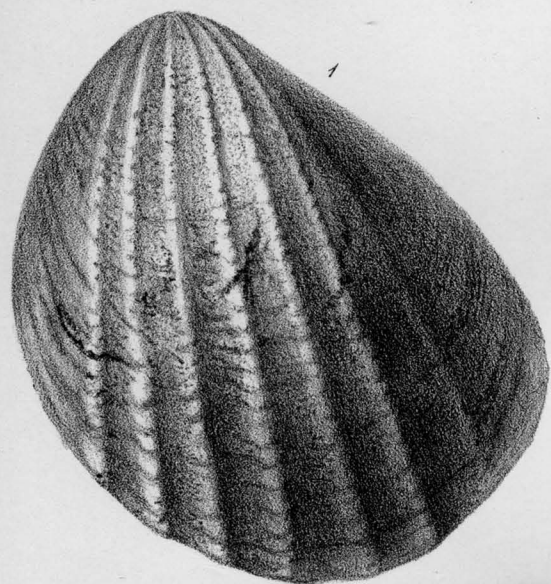


4a

TAB. XI.

Fig.

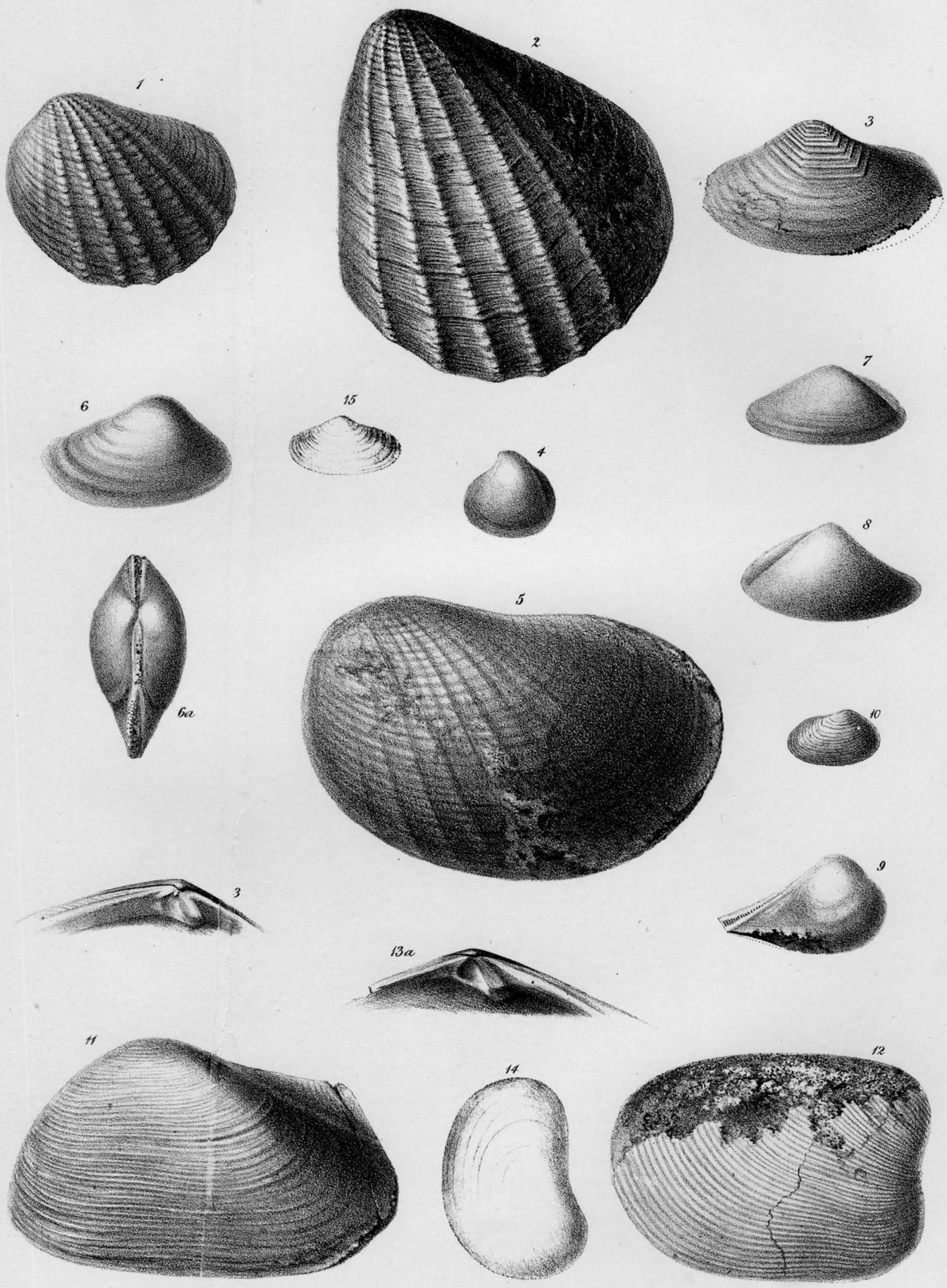
1. *Pholadomya solitaria*, p. 123.
2. *Myacites calceiformis*, p. 113.
3. *Goniomya literata*, p. 119.
4. *Anatina undulata*, p. 188.
- 5, 5*a*. *Myacites Vezelayi*, p. 111.
- 6, 6*a*. *Anatina plicatella*, p. 118.
- 7, 7*a*. *Pholadomya socialis*, p. 122.



TAB. XII.

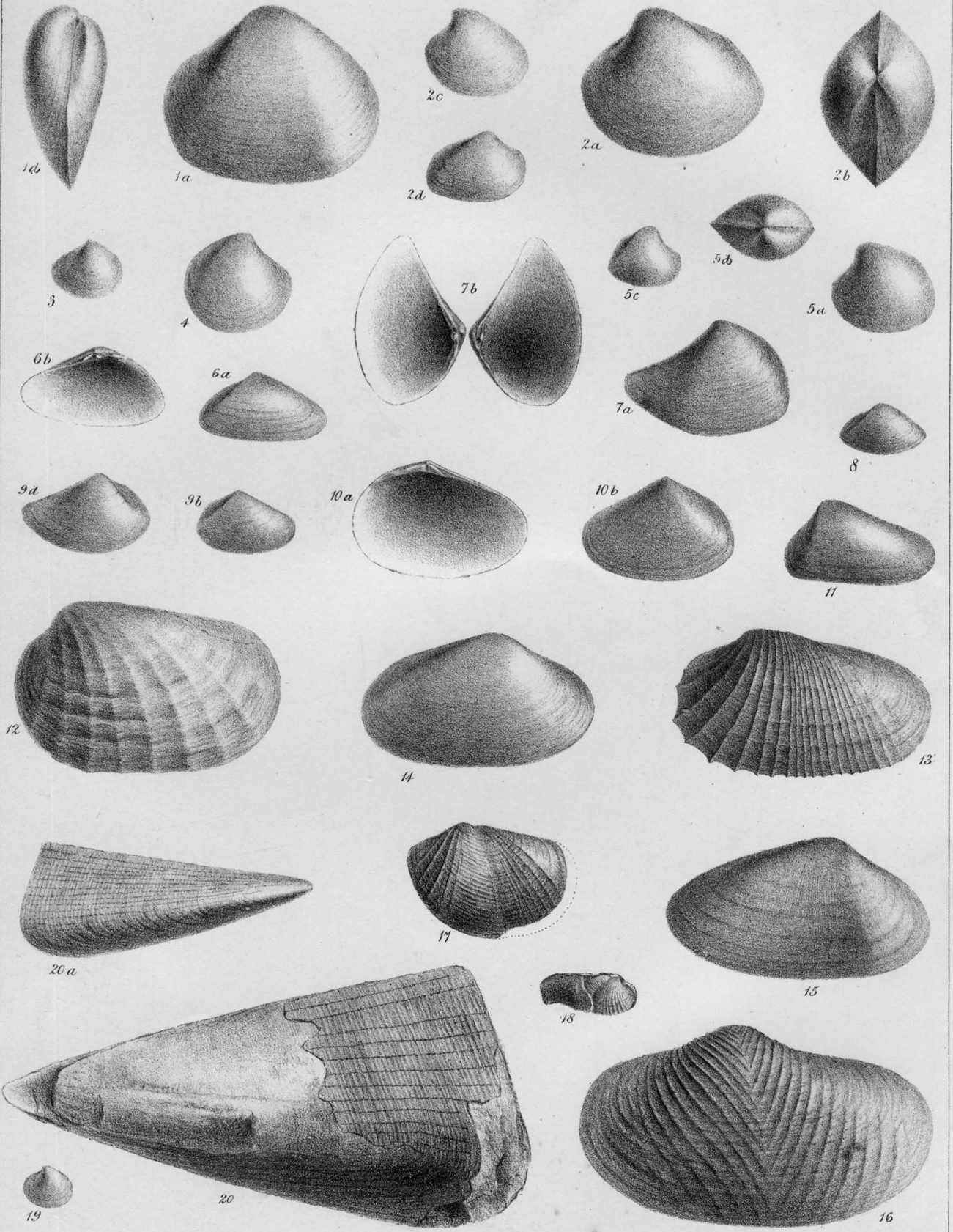
Fig.

1. *Pholadomya Heraulti*, p. 124.
2. *Pholadomya oblita*, p. 243.
3. *Goniomya hemicostata*, p. 120.
4. *Cyprina nuciformis*, p. 90.
5. *Pholadomya oblita*, p. 143.
6. *Myacites Terquemea*, p. 115.
7. *Tancredia axiniformis*, p. 93.
8. *Tancredia angulata*, p. 94.
9. *Neæra Ibbetsoni*, p. 98.
10. *Astarte recondita*, p. 88.
11. *Myacites compressus*, p. 116.
12. *Ceromya similis*, p. 109.
14. *Myacites gibbosus*, p. 138.
15. *Myacites æquatus*, p. 139.



TAB. XIII.

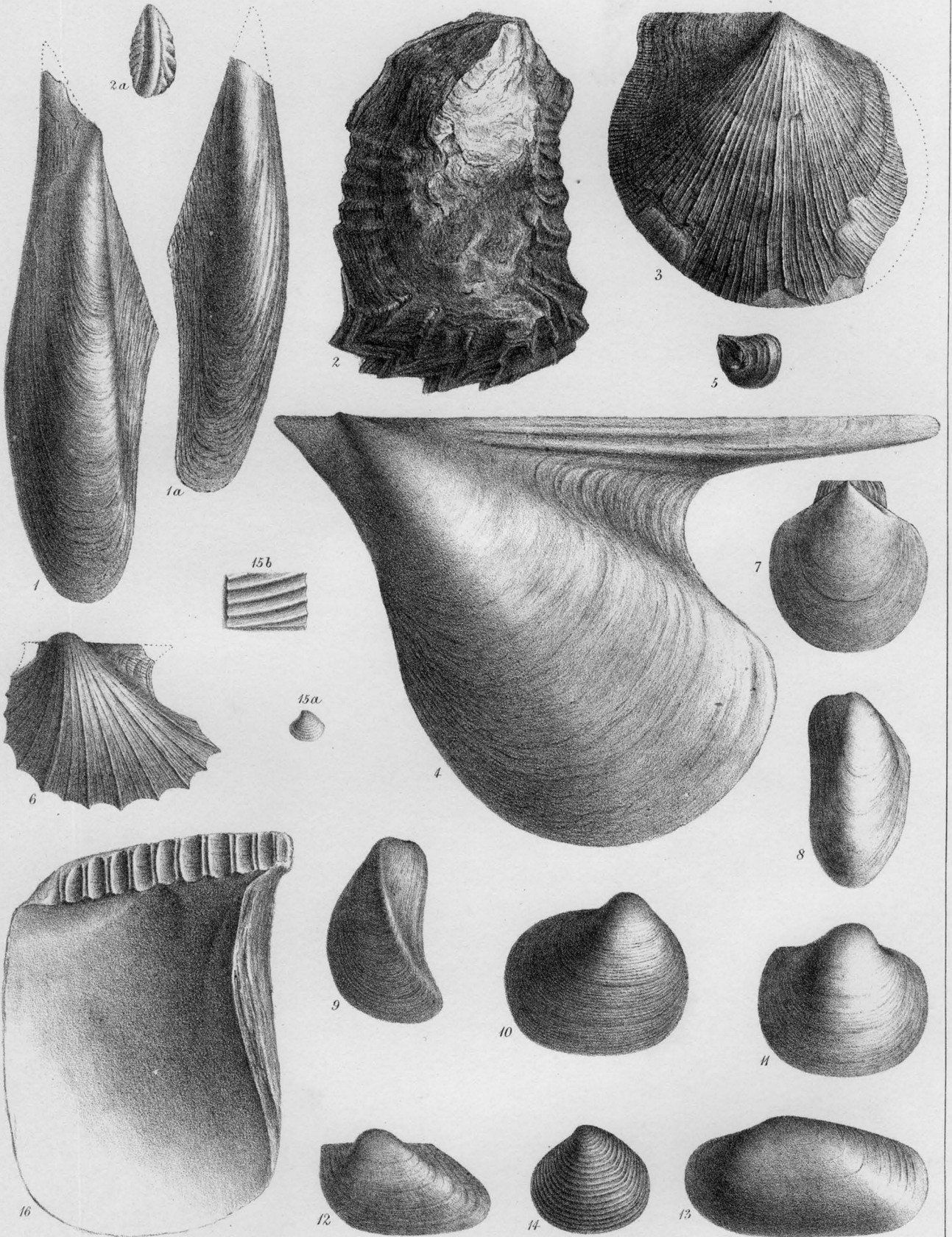
- Fig.
- 1, 1*a*, *b*. *Thracia curtansata*, p. 110.
- 2, 2*a*, *c*. *Cyprina Loweana*, p. 88.
- 2*d*. „ „ *var. elongata*.
3. *Cyprina Jurensis*, p. 89.
4. *Cyprina depressiuscula*, p. 90.
- 5, 5*a*, *b*, *c*. *Cyprina trapeziformis*, p. 89.
- 6*a*. *Tancredia axiniformis*, p. 93.
- 6*b*. Hinge of ditto.
- 7*a*. *Tancredia curtansata*, p. 93.
- 7*b*. Hinge of ditto.
8. *Tancredia brevis*, p. 92.
- 9*a*, *b*. *Tancredia angulata*, p. 94.
- 10*a*, *Tancredia planata*, p. 94.
- 10*b*, Hinge of ditto.
11. *Tancredia truncata*, p. 92.
12. *Pholadomya ovulum*, p. 122.
13. *Pholadomya acuticosta*, p. 121.
14. *Corbis (Corbicella) Bathonica*, p. 95.
15. *Myacites securiformis*, p. 136.
16. *Goniomya V-scripta*, p. 139.
17. *Pholas pulchralis*, p. 140.
18. *Pholas Oolitica*, p. 140.
19. *Cyprina dolabra*, p. 135.
- 20*a*, *b*. *Pinna cancellata*, p. 130.



TAB. XIV.

Fig.

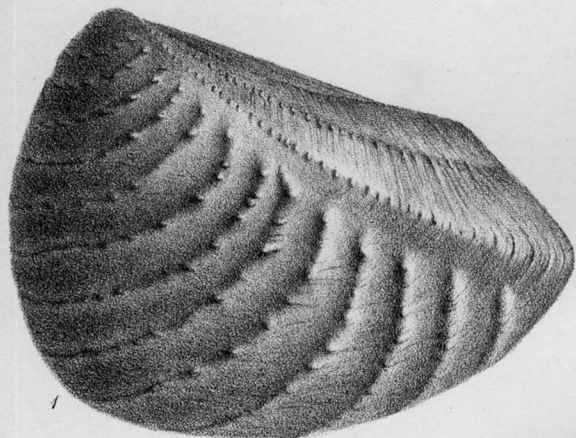
- 1, 1a. *Gervillia acuta*, p. 20.
2. *Ostrea Marshii*, p. 126.
- 2a. Young of ditto (*O. sulcifera*), p. 127.
3. *Hinnites abjectus*, p. 125.
4. *Pteroperna plana*, p. 128.
5. *Gryphæa mima*, p. 127.
6. *Avicula Munsteri*, ? p. 129.
7. *Pecten demissus*, p. 127.
8. *Mytilus (Modiola) cuneata*, p. 131.
9. *Mytilus (Modiola) Leckenbyi*, p. 131.
10. *Unicardium depressum*, p. 133.
11. *Unicardium gibbosum*, p. 132.
12. *Cucullæa cancellata*, p. 132.
13. *Quenstedtia lævigata*, p. 135.
14. *Astarte elegans*, p. 86.
15. *Astarte minima*, p. 134.
16. *Perna rugosa*, p. 128.



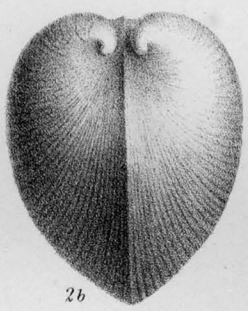
TAB. XV.

Fig.

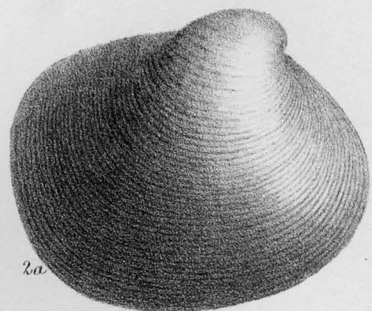
1. *Trigonia decorata*, p. 133.
- 2*a, b.* *Ceromya concentrica*, p. 108.
3. *Pholadomya Sæmanni*, p. 123.
4. „ *Heraulti*, p. 124.
5. *Isocardia cordata*, p. 135.
- 6, 7. *Avicula Braamburiensis*, p. 129.
- 8*a.* *Gresslya peregrina*, p. 138.
- 8*b.* Portion of surface, magnified.
- 9*a.* *Lima punctatum*, p. 130.
- 9*b.* Portion of surface.
- 10*a.* *Myacites decurtatus*, p. 137.
- 10*b.* Portion of surface.
- 11*a.* *Myacites Beñii*, p. 136.
- 11*b.* Surface of ditto.
12. Cast of *Quenstedtia oblita*, p. 96 ; showing muscular impressions, &c. (from Mr. J. G. Lowe's collection).
13. *Myacites Scarburgensis*, p. 138.
14. *Pholadomya ovalis*, p. 139.



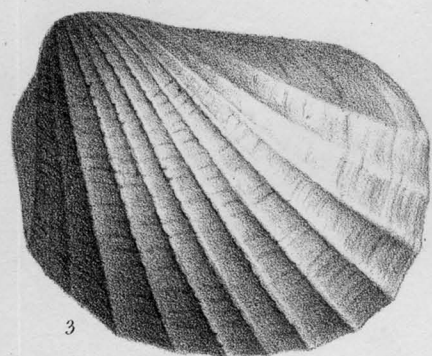
1



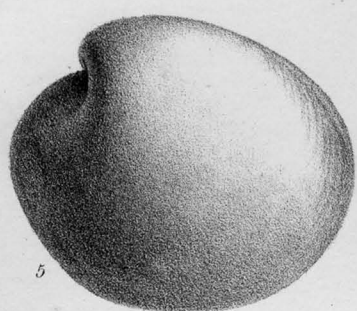
2b



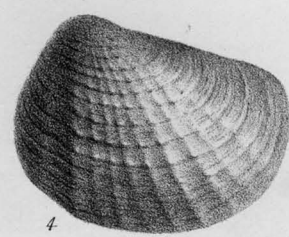
2a



3



5



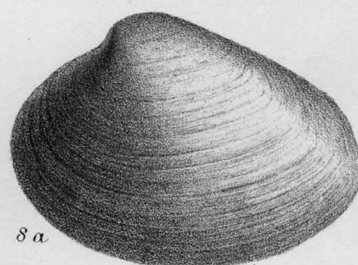
4



6



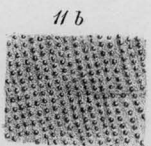
8b



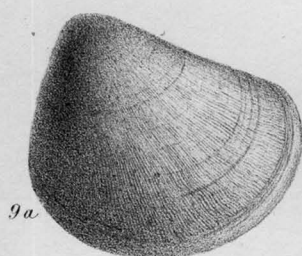
8a



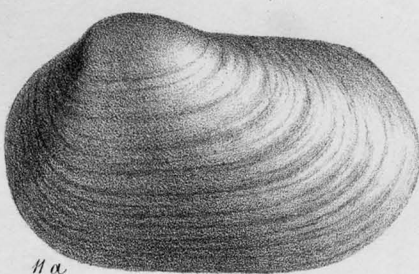
7



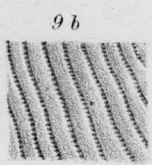
11b



9a



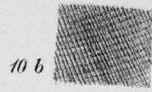
11a



9b



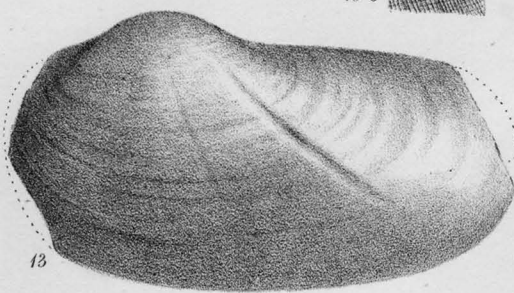
10a



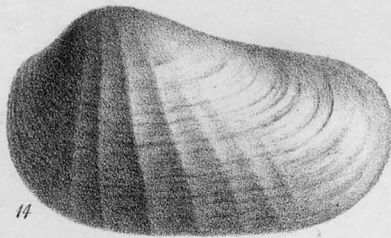
10b



12



13



14