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XXXIV.—*Tabular view of Fossil Shells from the middle division of the Inferior Oolite in Gloucestershire.* By JOHN LYCETT, Esq.*

[With a Plate.]

THE term middle division of the Inferior Oolite has been adopted from an arrangement of this formation made by Sir R. Murchison in 1834, and which, with some slight modification, will be found to be a convenient one for the zoological as well as for the mineral character of the divisions. The following comparison of fossil testacea from the middle division of the formation at Leckhampton and Crickley Hills with others from a similar geological position near Minchinhampton, and of both collections with Great Oolite shells of the latter place, has been undertaken for the following reasons. The Leckhampton shells constitute a numerous assemblage, have only recently been procured or investigated, and present a striking contrast with those of the upper and lower divisions of the same formation which are well known, and have for the most part hitherto supplied the numerous Inferior Oolite fossils to be found in museums and illustrated works. The person to whom the merit is due of having first drawn attention to this assemblage is undoubtedly Mr. Buckman, who having procured a few species was immediately struck with the similarity of aspect, and even specific identity, which they presented to certain Great Oolite shells which had previously been believed were peculiar to that formation: as the number of species increased the same general similarity of aspect was remarked, until at length an opinion was entertained by some of our Cotswold geologists, that a large proportion, perhaps even a majority of these shells, were identical with Great Oolite species. That the Leckhampton shells should not previously have been procured will excite no surprise, when it is stated that they are not to be *picked up*, nor do they immediately arrest the eye of the observer like many other Inferior Oolite fossils; they are

* Read to the Cotswold Naturalists' Club, July 30, 1850.

usually small, even minute, and are disengaged from the investing stone only by great labour and perseverance. For the means of making this comparison I am indebted to the kindness and liberality of the Rev. P. B. Brodie, who has placed at my disposal his numerous collection, and to whom, as votaries of natural history, our thanks are due for the indomitable perseverance with which he has followed up the investigation of this very characteristic assemblage of shells. In the mean time having procured a considerable number of species from the same division of the Inferior Oolite near Minchinhampton, and been accustomed to compare them with Great Oolite shells of the same vicinity, I became desirous of making the following comparison, with the view of testing how far the two collections placed upon the same geological parallel, but fifteen miles asunder, resembled each other, what proportion of either and of both passed upward into the Great Oolite, and lastly, what amount had previously been figured and described; tables accompanied by notes, if carefully prepared, would obviously to a great extent supply this desideratum; and although the number of species procured from each locality probably falls far short of what will ultimately be obtained, the tables it is hoped will not be destitute of utility even in another point of view—they can be placed in comparison with collections from the Ragstones of the Inferior Oolite, and the zoological resemblance or difference between them ascertained. By following out this plan I am precluded from interfering with the labours of those who have recently investigated the geology of the Cotswolds, of Messrs. Buckman, Strickland and Brodie, to whom so much of our present amount of knowledge respecting these hills is due.

It would indeed have been desirable had the tables been made more comprehensive, so as to include the fossils of the upper and lower divisions of the Inferior Oolite; but a little reflection convinced me that by doing so I should be arrogating an amount of knowledge which I am very far from possessing; inasmuch as the information to be gathered from the literature of the science would scarcely be available for such a purpose, the general term Inferior Oolite with a locality attached being usually the amount of information of the position of a shell in this formation.

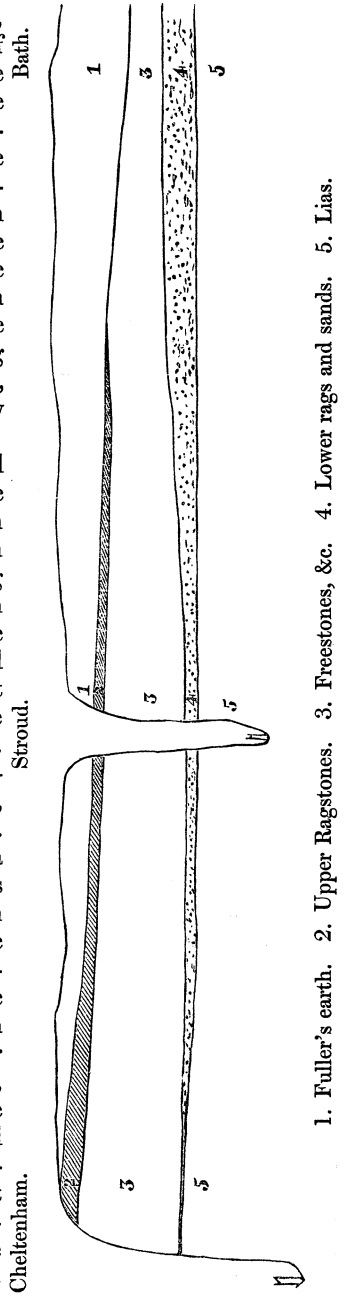
The Inferior Oolite in the vicinity of Cheltenham exhibits two very distinct assemblages of organic remains; the difference between these is so obvious, even to the uninstructed observer, that a glance at any well-arranged collection is sufficient to establish conviction of this fact. The upper of these assemblages is contained in the several beds called Upper Ragstones, numbered 1, 2, 3 and 4 in Mr. Strickland's valuable section of Leckhampton Hill* which is about to be published, where the united thickness assigned to them is 38 feet; the whole of the formation beneath, with the exception of about $2\frac{1}{2}$ feet, or about 189 feet of rock, belongs to the second zoological assemblage, which it is the especial object of this comparison to elucidate. The Inferior Oolite has long been known to geologists for the great profusion which it possesses both in species and individuals of the two great tribes of Ammonites and Belemnites; some few of these pertain to the first or uppermost of our assemblages, but the great mass of these tribes, together with a large and characteristic series of other shells, are absent in the neighbourhood of Cheltenham; these constitute a third and still lower zoological series, to examine which, *in situ*, we must visit the escarpment of the Cotswolds, some miles to the southward of Leckhampton, and from thence we shall find this assemblage to be persistent in gradually increasing importance to the neighbourhood of Bath, and to extend throughout the whole course of the formation in Somerset and Dorset to the English Channel. In the two last-mentioned counties the localities of Dundry, Sherborne and Bridport have become celebrated for the profusion of their fossils, and until very recently museums and collections have been supplied almost exclusively from those sources, and the fossils of this third and lowest assemblage have been held to represent those of the Inferior Oolite generally. In the middle portion of the Cotswolds, or from Stroud to Wootton-under-Edge, the three subdivisions of the Inferior Oolite are exhibited by the various sections; but a little to the southward of the latter place, the uppermost division and upper portion of the middle division thin out and are lost; at the same time the Fuller's earth above attains a much greater importance, its thickness, together with that of the Inferior Oolite, amounting to a little more than the aggregate thickness of the two formations about Cheltenham. The following imaginary section from Cheltenham to Bath will make the subject more clearly understood. Thus the Fuller's earth 148 feet thick at Bath has diminished to 70 feet at Stroud, and in the vicinity of Cheltenham to a very inconsiderable band of clay. The lower division of the Inferior Oolite (No. 4 in the section), consisting of several Ammonitiferous beds with brown sands beneath, altogether 70 feet thick, has diminished to 40 feet at Stroud, and at Leckhampton is represented by the lowest bed 2 feet thick, charged in the usual characteristic manner with Belemnites, beneath which are 6 inches of chocolate-coloured sands reposing upon the blue marls of the Lias. The upper division or Ragstones (No. 2 in the section) about 40 feet thick near Cheltenham is reduced to 20 at Stroud, and is ultimately lost to the south of Wootton as before mentioned.

The middle division, nearly 190 feet thick at Leckhampton, is

* See Qnart. Journ. Geol. Soc. 1850, p. 249.

somewhat diminished at Stroud, and loses the greater portion of its volume, including the Oolite marl and all the upper beds before it reaches Bath, where it is represented by 60 feet of freestone. The Bath section is taken from a valuable paper by Mr. Lonsdale in the Geological Transactions. The shells of the middle division are for the most part distributed in beds of no great thickness; the great mass of the deposit being nearly destitute of organic remains, or containing only minute shelly detritus.

The numerical results obtained from the Tables of comparison are as follow:—255 species have been examined from the middle division of the Inferior Oolite, 181 being from Leckhampton, and 145 from Minchinhampton; of these 73 are common to the two localities and 64 pass upwards into the Great Oolite, or 28 per cent. Of the Leckhampton shells alone 59, *i. e.* 33 per cent., and of the Minchinhampton Inferior Oolite suite 43, *i. e.* 31 per cent., pass upwards. Thus, from each of the localities, a larger per-centage of shells pass upwards than is obtained when the entire number of species are reckoned; an instance of the cautious reliance which should be placed upon estimates derived from a limited number of species or from shells of a single locality, where the object is to draw wide and general inferences. It should also be stated that about 40 species in addition to these were not sufficiently perfect to be determined, nearly or quite the whole of which are unknown to the Great



1. Fuller's earth. 2. Upper Ragstones. 3. Freestones, &c. 4. Lower rags and sands. 5. Lias.

Oolite; this addition would still further reduce the per-centage of those which pass upward to the latter formation.

For remarks on particular species the notes which accompany the Tables should be consulted, but some further observations upon the several families of shells may here be given. The Leckhampton shells as a whole are remarkable for their diminutive size: this remark is not only applicable to those species which are likewise found in the lower and upper divisions of the same formation, but to those also which are found in the same formations at Minchinhampton. Upon the whole it may be stated that there is a nearer approximation between the Great Oolite and Leckhampton shells than between those of the two formations at Minchinhampton. As compared with the upper and lower assemblages, the middle is characterized by an entire absence of the Pholadomyas, the Homomyas, the Gresslyas, and I had almost said of Ammonites, Belemnites and Nautili, genera which constitute so large a proportion of the other assemblages, in this respect presenting a striking accordance with the contents of the shelly beds of the Great Oolite. Again, the large number of *Nerineæ* and *Cerithia*, though differing specifically from those of the Great Oolite, tend much to separate it zoologically from the upper and lower assemblages, where they are few and rare. Mr. Brodie's collection has a single Nautilus and Belemnite; my own has four Ammonites of one species, and a single Nautilus; their presence under such circumstances is a sufficient indication of the solitary and perhaps accidental nature of their occurrence, a proof in fact that they did not live and propagate in the middle division. The *Rostellariæ*, though few in number and differing specifically from those of the Great Oolite, serve also to mark the separation of the assemblage from other Inferior Oolite groups, and its approximation to the conditions of sea-bottom under which the Great Oolite shelly beds were deposited; but the most striking circumstance which tends to the same conclusion is the occurrence of a great diversity of forms in the family of the *Patelloidea*, which appears to be altogether absent in the upper and lower series; of the fourteen species it will be observed, that no less than six are specifically identical with Great Oolite forms; and what renders this fact the more worthy of notice is, that the entire family are absent in the Inferior Oolite contemporaneous beds at Minchinhampton. The *Terebratulæ*, which usually are of much importance in the determination of particular groups of rocks, are abundant in this division only in the bed of Oolite marl; but in localities where the marl is consolidated into a cream-coloured mudstone, or where a considerable number of other genera of shells are present, the *Terebratulæ* are comparatively scarce; the genus however is one which conduces much to

impress an individual or distinctive character upon the assemblage, or to isolate it from other shelly deposits; it will be observed that of the twelve species two only of them appear to have been continued to the period of the Great Oolite; the other species do not even seem to be found in the other divisions of the same formation, each of which has its distinctive *Terebratulæ*.

The vertical range of the several species throughout the middle division is considerable, for with the exception of certain small and very rare species, the same *Terebratulæ* may be found to occur at intervals through a vertical thickness of 140 feet of rock. The genera which may be pointed out as most eminently to characterize this division are the *Cerithia*, the *Nerineæ*, the *Trochi*, the *Solaria*, the *Cylindrites*, the *Melaniæ*, the *Rostellariæ*, the *Trochotomæ*, the *Tancrediæ*, and the *Terebratulæ*; of these tribes all but two belong to the Gasteropoda; they constitute the great bulk of the univalves, and contain in all fifty-two species, not one of which is found in the Great Oolite. Other genera might be mentioned whose species equally belong to this series, but such have been selected as acquire importance either by the number of their species or by that of the individuals of such species. It may perhaps place the subject in a more striking point of view when it is stated, that of the 108 Gasteropods only 20 are continued to the Great Oolite. The smaller per-centage obtained from the total number of species when compared with a single locality is caused by a large proportion of the shells which are common to the two localities being likewise those which pass upwards into the Great Oolite, thus illustrating the fact, that species which occur in considerable number and have a wide range horizontally, are those which we should expect to find through a considerable range of beds vertically.

I would define the limits of the middle or freestone division of the Inferior Oolite as including all that portion of the formation situated between the upper ragstone beds (1, 2, 3 and 4 of Mr. Strickland's section), and the Ammonitiferous beds or upper portion of the lower division.

Lastly, the general conclusion may be stated to which this comparison has led, that these testacea constitute a zoological assemblage distinguished from those of the other portions of the Inferior Oolite by features as well-marked as those which distinguish the fossils of the other great groups (proximate in sequence), which are termed formations, from each other, and that these features, varying in detail, will probably be found to occur, like some other shelly deposits of the oolitic formations, at intervals and over small areas wherever the freestones of the Inferior Oolite are extensively developed.

On Tancredia, *a fossil genus of Lamellibranchiate Conchifera.*

Plate XI. figs. 8, 9, 10.

Gen. Char. Shell thin, equivalve, inequilateral, smooth, flattened, subtrigonal or transverse, somewhat gaping at the posterior extremity, which is produced and attenuated; anterior side with a longitudinal angle passing from the umbo to the antero-ventral border. Hinge with two cardinal teeth in each valve, the anterior one the larger, and a wide and deep, rather irregular fossa between them; lateral teeth distant, one or two in each valve (usually two); ligament probably partially internal and contained in the cardinal pit.

The figure of the cardinal pit varies in the different species; in one it is triangular, one of the angles being at the umbo, in others it is wider and more irregular, but there is not any raised edge bordering it, as in *Mesodesma* and the *Lutrariæ*; the figure and size of the cardinal teeth likewise vary; occasionally the posterior cardinal tooth can hardly be distinguished; strictly speaking, the anterior cardinal tooth is immediately beneath the umbo, the pit and other tooth being posterior to it; the posterior lateral tooth is sometimes wanting altogether; the internal margins of the valves are smooth; the valves are thin and delicate, but such as have had their internal surface exposed showed no traces of the muscular impressions. This genus may be classed as one of the *Mactracea*, and placed near to *Mesodesma* and *Amphidesma*; the external figure is donaciform; the character of the dentition approaches near to, but is really distinct from, *Mesodesma*, from which latter genus the gaping posterior extremity tends to separate it; the shell is likewise thinner and more delicate than in either of the genera with which it has been compared; with *Donax* it has nothing more in common than the external form.

This genus of small bivalves is eminently characteristic of the lower members of the oolitic system of rocks; the Great Oolite has three species, and the freestone beds of the Inferior Oolite have two other species; neither of these are common to the two formations, nor have they been found in the upper or lower divisions of the Inferior Oolite. The diffusion of this generic form is worthy of notice; it may without exaggeration be said, that certain layers in the shelly portion of the Great Oolite were merely so many colonies in which they propagated almost exclusively in countless numbers, but the great mass of these are of one species; the freestone beds of the Inferior Oolite contain likewise a great number of another species. A knowledge of these five species is of importance in the recognition and distinction of the shelly beds in the two formations, as from the numbers of two or three

species they may be expected to occur over large areas; already they are known in the lower oolitic system of Normandy.

The generic appellation is derived from the name of Sir Thos. Tancred, Bart., the founder of the Cotswold Naturalists' Club.

The descriptions of two species will be found in the notes to the tables of Inferior Oolite shells; those of the Great Oolite are deferred to the monograph upon that subject.

Note on No. 199, *Ptychomya*? *Agassizii.*

At pl. 11. f. 3, 4 of the 'Etudes critiques sur les Mollusques fossiles,' by M. L. Agassiz, is an imperfect impression of an oblong flattened bivalve shell to which is affixed the new generic appellation *Ptychomya*, but no account is given of the locality or geological formation to which it belongs; the figure is founded upon a single impression. M. Agassiz has not ventured to define the genus, and in his introduction mentions that M. D'Orbigny considers it to be a *Crassatella*, to which genus M. Agassiz remarks it has no external resemblance.

Having long possessed specimens of a small shell which exhibits the external characters of *Ptychomya*, and as two of the specimens are in a condition nearly perfect, I have ventured to record the little information thus acquired with the impression, that although meagre and imperfect, it should not be withheld when the object of investigation is obscure or unknown; nevertheless the present note would not have appeared but for the necessity of affixing a generic name in my Tables to the little shell in question. The high degree of critical acumen displayed by the talented author of the 'Études,' together with the just confidence which he shows in the accuracy of his own observations and deductions when controverted by others, rendered it probable that the generic value which he had claimed for this obscure form would eventually be found to be justified; the present species therefore became an object of interest upon the discovery that it could scarcely with propriety be assigned to any other known genus.

Ptychomya? *Agassizii.* Pl. XI. fig. 6.

Figure suborbicular and flattened; umbones straight, small, pointed and mesial; the substance of the shell thick; the lunule indistinct or very slightly excavated; the hinge-line posteriorly straight or slightly curved and sloping obliquely; the ventral border rounded, the surface with about fourteen rounded, broad but depressed costæ, which are curved upwards and meet the costæ of the opposite side upon the middle of the shell forming an angle, the points of junction of the several costæ being upon a line passing obliquely from the umbo to the antero-ventral

border; the costæ are crossed by very fine, closely arranged encircling striæ or lines; the hinge is without teeth. Height 3 lines, breadth 3 lines.

The impression figured by M. Agassiz has a much more oblong or transverse figure, being much lengthened posteriorly; it is also rather imperfect or truncated at that extremity; the angle of the costæ is placed much more anteriorly than in our species, but inclines like the latter to the antero-ventral border; the costæ are likewise more narrow and numerous. Considering the flatness of the valves and their thickness, it would appear that the mollusk was shielded rather than inclosed by them; the valves would appear to have been open all round except at the ligament; the character of this latter organ must for the present remain doubtful, as no trace of a lamina for its attachment is visible. Our present imperfect definition of the genus *Ptychomya* therefore will be as follows:—Shell equivalve, suborbicular or oblong and transverse, flattened, thick; umbones small, straight, flattened; hinge-line posteriorly straight or slightly curved; valves open all round; surface with numerous curved ribs meeting at an angle, whose apex is directed towards the umbo; the costæ are covered with numerous, closely arranged, concentric striæ or lines. Hinge edentulous.

Of the fossil *Myadæ*, *Goniomya* is the only one which resembles it, but in that genus the costæ meet at an angle inclined in an opposite direction to *Ptychomya*; the surface has similar fine concentric lines, but here the resemblance appears to cease.

The true position of our genus in the molluscous tribes must therefore remain in abeyance; the smallness of the object and hardness of the investing stone are formidable obstacles in the way of further information to be obtained from it.

EXPLANATION OF PLATE XI.

Fig. 1. *Turbo elaboratus.*
— 2. *Solarium Cotswoldiæ.*
— 2 *a*. The same magnified.
— 3. *Chemnitzia gracilis.*
— 4. *Gervillia aurita.*
— 5. *Opis gibbosus.*
— 5 *a*. The same magnified.
— 6. *Ptychomya Agassizii.*
— 6 *a*. The same magnified.
— 7. *Corbis aspera.*
— 8. *Tancredia donaciformis.*
— 9. *Tancredia extensa.*
— 9 *a*. Interior of the same.
— 9 *b*. Magnified view of the hinge.
— 10. *Tancredia truncata.*

The two latter species pertain exclusively to the Great Oolite.

Tabular List of Fossils.

Genus.	Species.	Authority.	Inf. Ool. Leck-hampton.	Inf. Ool. Minchin-hampton.	Gr. Ool. Minchin-hampton.
1. Patella ...	rugosa	Sow. Min. Con. ...	*	...	*
3. ——	nitida	Deslongchamps ...	*		
2. ——	inornata	new sp.	*	...	*
4. ——	retifera	new sp.	*		
7. Emarginula	planicostula ...	Deslongchamps ...	*		
8. ——	scalaris	Sow. Min. Con. ...	*	...	*
9. ——	alta	new sp.	*	...	*
10. ——	granulata	new sp.	*		
11. ——	Leckhamptonensis.	new sp.	*		
6. Fissurella ...	acuta	Deslongchamps ...	*	...	*
5. ——	Brodiei	new sp.	*		
12. Rimula ...	clathrata	Sow. Min. Con. ... (Emarginula)	*	...	*
12*. ——	Blotii	Deslongchamps ...	*	...	*
13. ——	tricarinata	Emarginula, Sow. Min. Con.	*	...	*
13*. ——	minutissima ...	new sp.	*		
14. Pileolus ...	lævis	Sow. Min. Con. ...	*	*	*
15. ——	plicatus	Sow. Min. Con. ...	...	*	*
16. Nerita	costata	Phil. Geol. York. .	*	*	
18. —— ...	pulla ..... Roemer ..... / minuta ..... Sow. Min. Con.		*	...	*
19. ——	tumidula	Natica, Phil. Geol. York.	...	*	
17. ——	cassidiformis ...	new sp.	*		
43. ——	lineata	new sp.	*		
20. Naticella ...	decussata	Natica, Goldfuss...	*	*	
50. Natica	adducta	Phil. Geol. York. .	*	*	
52. ——	macrostoma? ... [sis.	Roemer and Goldfuss.	*	*	
53. ——	Leckhamptonen-	new sp.	*		
127. ——	Gomondii	new sp.	*		
21. Monodonta .	sulcosa	Nerita, Archiac ...	*	*	*
22. ——	Lyellii	Nerita, Archiac ...	*	*	*
23. ——	heliciformis	new sp.	*	*	*
27. ——	lævigata	Nerita, Sow. Min. Con.	*	*	*
24. Delphinula .	funata	Goldfuss	*	*	
26. ——	quaterno-cingillata.	new sp.	...	*	*
35. ——	lineata	new sp.	*		
25. Littorina ...	nana	new sp.	*		
30. Turbo	elaboratus	new sp.	...	*	
28. ——	capitaneus	Goldfuss	*	*	*
29. ——	princeps	Roemer	*	*	
33. ——	Cheltensis	new sp.	*		
34. ——	varicosus	new sp.	*		
31. Cirrus	nodosus	Sow. Min. Con. ...	*	*	
36. Trochus.....	monilitectus ...	Phil. Geol. York. ..	*	*	
37. ——	bi-cingendus ...	new sp.	*	*	
38. ——	alternans	new sp.	*		
39. ——	gemmatus	new sp.	*	*	
40. ——	cingillato-serratus.	new sp.	*		
41. ——	pileus	new sp.	*	*	
42. ——	infundibuliformis	new sp.	...	*	
44. Pleurotomaria	funata	new sp.	...	*	
45. ——	lævigata	new sp.	...	*	
48. Trochotoma	calix	Solarium, Phillips; T. affinis, Deslongchamps.	...	*	
46. ——	carinata	new sp.	*	*	
47. ——	depressiuscula ...	new sp.	...	*	
49. ——	funata	new sp.	...	*	
51. Natica	canaliculata	new sp.	...	*	*
54. Phasianella .	acutiuscula	new sp.	...	*	
55. ——	turbiniformis ...	new sp.	*	*	
55*. ——	subangulata ...	new sp.	...	*	
56. Acteonina ...	tumidula	new sp.	...	*	
57. ——	ovata	new sp.	...	*	
58. ——	glabra	Acteon, Phillips ...	...	*	
59. Cylindrites .	attenuatus	new sp.	*	*	
60. ——	gradus	new sp.	...	*	
61. ——	mamillaris	new sp.	*		
62. ——	tabulatus	new sp.	...	*	
63. ——	bulbiformis	new sp.	...	*	
64. Chemnitzia .	nitida	new sp.	*		
65. ——	elegans.....	new sp.	*		
98. ——	procera?	Melania, Deslongchamps.	...	*	
99. ——	gracilis.....	new sp.	...	*	
66. Ceritella, n.g.	sculpta.....	new sp.	*		
99*. Chemnitzia	turris	Melania, Deslongchamps.	...	*	
67. Ceritella ...	tumidula	new sp.	*		
69. Scalaria	pygmea	new sp.	*		
70. Solarium ...	Cotswoldiæ	new sp.	*	*	
71. ——	diadema	new sp.	*		
72. ——	.....	new sp.	*		
73. ——	.....	new sp.	*		
74. Eulima	parvula.....	new sp.	*		
75. Rissoa	lævis.....	Sow. Min. Con. ...	*	...	*
76. Rissoina.....	obliquata	Rissoa, Sow. Min. C.	*	...	*
76*. ——	obtusa	new sp.	*		
77. Cerithium ...	.....	new sp.	...	*	
78. ——	.....	new sp.	...	*	
79. ——	.....	new sp.	*		
80. ——	.....	new sp.	*		
81. ——	.....	new sp.	*		

Genus.	Species.	Authority.	Inf. Ool. Leckhampton.	Inf. Ool. Minchinhampton.	Gr. Ool. Minchinhampton.
82. Cerithium.	.....	new sp.	*	*	
83. ——	.....	new sp.	*		
84. ——	.....	new sp.	...	*	
85. ——	.....	new sp.	*	*	
86. ——	.....	new sp.	*		
87. ——	.....	new sp.	*		
88. ——	.....	new sp.	*		
89. ——	.....	new sp.	*		
90. Nerinæa ...	Bruntrutana? ...	Archiac?	*	*	
91. ——	acicula?	Archiac	...	*	
92. ——	.....	new sp.	...	*	
93. ——	.....	new sp.	...	*	
94. ——	.....	new sp.	...	*	
95. ——	.....	new sp.	...	*	
96. ——	.....	new sp.	*	*	
97. ——	.....	new sp.	*		
100. Fusus? ...	carinatus	Roemer	*		
101. ——	obliquatus	new sp.	...	*	
101*. ——	carino-crenatus .	new sp.	...	*	
102. Rostellaria .	unicornis	new sp.	...	*	
103. ——	simplex	new sp.	...	*	
104. ——	spinigera	new sp.	...	*	
105. ——	solida	new sp.		*	
106. ——	gracilis	new sp.	*		
107. Serpula ...	lævigata	new sp.	*		
108. ——	Undetermined...	.....	*		
108*. ——	socialis	Buckman.....	*	*	
109*. Belemnites	Undetermined...	.....	*		
109. Nautilus ...	lineatus	Sow. Min. Con. ...	*	*	
110. Ammonites	Undetermined...	.....	...	*	
111. Echinus ...	germinans	Phil. Geol. York...	*		
112. Pygaster ...	patelliformis ...	Agassiz	*	...	*
113. Cidaris.....	subangularis ...	Goldfuss	*	...	*
114. ——	Undetermined...	.....	*		
115. ——	coronatus	Goldfuss	*	...	*
116. Acrosalenia	Hoffmanni	Goldfuss	*	...	*
117. Cidarites ...	crenularis	Goldfuss	*		
118. ——	Undetermined...	.....	*		
119. Nucleolites	clunicularis	Goldfuss	...	*	*
121. Lima	punctata	Goldfuss	*	*	*
122. ——	duplicata	Sow. Min. Con. ...	*	...	*
124. ——	notata	Goldfuss	...	*	*
128. ——	lunularis	Deshayes	*	*	*
129. ——	læviuscula	Goldfuss	*	...	*
123. ——	squamicosta.....	Buvignier	*	*	
125. ——	plicata	new sp.	...	*	
126. ——	alata	new sp.	...	*	
130. ——	punctatilla	new sp.	*	...	*
130*. ——	minutissima.....	new sp.	*		
134. Pecten.....	clathratus	Roemer	*	*	*
134*. ——	variety? of the above.	.....	*		

Genus.	Species.	Authority.	Inf. Ool. Leckhampton.	Inf. Ool. Minchinhampton.	Gr. Ool. Minchinhampton.
135. Pecten.....	lens	Sow. Min. Con. ...	*	*	*
131. ——	vimineus	Sow. Min. Con. ...	*		
130**. Lima ...	ovalis	Plagiostoma, Sow. Min. Con.	*	...	*
136. Pecten.....	Undetermined...	.....	*		
137. ——	lineolatus.....	new sp.	*		
138. Hinnites ...	sepultus	new sp.	*		
139. ——	comptus	Spondylus, Goldfuss.	*	*	
140. ——	velatus	Spondylus, Goldf.	...	*	
139*. ——	tuberculatus (left valve).	Spondylus, Goldf.	...	*	*
141. Plicatula ...	elongata	new sp.	...	*	
142. Placuna?...	jurensis	Roemer	*	*	*
143. ——?	armata	Plicatula, Goldfuss	*	...	*
144. ——?	complicata	new sp.	*		
145. Mytilus ...	pectinatus	Sow. Min. Con. ...	*	*	*
146. ——	striatulus	Goldfuss	*		
147. ——	pulcher.....	Goldfuss	*	...	*
149. ——	cuneatus	Modiola, Sow. Min. Con.	*	*	*
148. ——	subrectus.....	new sp.	*	...	*
150. ——	crenatus	new sp.	*		
151. Dreissena...	lunularis	new sp.	*		
152. Gervillia ...	tortuosa	Gastrochæna, Phill.	*	*	
153. ——	lata	Phillips	...	*	
154. ——	aurita	new sp.	...	*	
155. ——	costatula	Deslongchamps ...	*	*	
156. ——	lævigata	new sp.	*	...	*
157. Perna	mytiloides	Goldfuss	*	...	*
158. Gervillia ...	ovata	Avicula, Sow. Min. Con.	*	...	*
158*. ——	complicata	Buckman.....	*		
159. Pteroperna	gibbosa.....	new genus and sp.	...	*	
160. Pinna	cuneata	Phillips	*		
161. ——	hastata	new sp.	...	*	
164. Hiatella ...	interlineata	new sp.	*	*	
166. Myoconcha	crassa	Sow. Min. Con. ...	*	*	*
163. Ostrea	costata	Sow. Min. Con. ...	...	*	*
163*. ——	Undetermined...	.....	*		
168. Opis.....	Moreausius	Buvignier	*	*	
169. ——	angustatus	new sp.	...	*	
170. ——	elongatus.....	new sp.	...	*	
171. ——	gibbosus	new sp.	*	*	
172. Trigonia ...	clavo-costata ...	new sp.	...	*	
173. ——	lineolata	Agassiz	*	*	
174. ——	angulata	Sow. Min. Con. ...	...	*	
175. ——	striata	Sow. Min. Con. ...	...	*	
176. ——	costatula	new sp.	*	*	
177. ——	v. costata	new sp.	...	*	
177*. ——	tuberculosa	new sp.	*		
178. Corburella .	curtansata	Corbula, Phillips...	*	...	*

Genus.	Species.	Authority.	Inf. Ool. Leckhampton.	Inf. Ool. Minchinhampton.	Gr. Ool. Minchinhampton.
181. Corbula ...	involuta	Goldfuss, striata, Buckman.	*	...	*
179. ——	imbricata	new sp.	*		
180. ——	depressa	Phillips	*		
183. Cypricardia	cordiformis	Deshayes	*	*	*
183. ——	siliqua	new sp.	...	*	*
186. Cardium ...	cordiforme	new sp.	*		
187. ——	lævigatum	new sp.	*		
188. ——	cognatum.....	Phil. Geol. York. . .	*		
189. ——	punctato - striatum.	new sp.	*		
190. ——	granulatum	new sp.	*		
184. ——	semicostatum ...	new sp.	*	*	
191. Sphæra ...	Madridi	Cardium, D'Arch.; Cardium incertum, Phillips.	*	*	*
192. Venus	trapeziformis ...	Roemer	*	*	*
193. ——	curvirostris	new sp.	*	*	
194. ——	Suevica	Goldfuss	...	*	*
195. Cytherea ...	picta.....	new sp.	*	*	
196. Astarte.....	excavata	Sow. Min. Con. ...	...	*	
197. ——	quadrata	new sp.	*	*	*
198. ——	bullata	new sp.	...	*	
199. Ptychomya	Agassizii	new sp.	...	*	
200. —— ...	depressa	Goldfuss	*	*	
	sulcato-striata ...	Roemer			
201. ——	Menkei	Unio, Dunker	...	*	*
202. ——	detrita	Goldfuss	...	*	
203. ——	formosa	new sp.	...	*	
215. ——	orbicularis	Sow. Min. Con. ...	*	...	*
204. Lucina.....	lyrata	Phillips	*	*	
208. ——	despecta	Phillips	*	*	*
205. Corbis	aspera	new sp.	...	*	
206. ——	ovalis	Phil. Geol. York. .	...	*	
207. ——	lævigatus	new sp.	*		
209. Psammobia	lævigata	Phil. Geol. York. .	*		
210. Mactromya	globosa.....	Agassiz	*	*	*
211. Panopæa? .	delicatissima ...	new sp.	*		
212. Tancredia .	donaciformis ...	new sp.	*	*	
213. ——	sulcata	new sp.	*		
214. Nucula ...	variabilis	Sow. Min. Con. ...	*	...	*
216. Ceromya ...	concentrica	Isocardia, Sow. Min. Con.	...	*	*
217. ——	striata	Cardita, Sow. Min. Con.	...	*	
218. Macrodon .	Hirsonensis	Cucullæa, D'Arch.	...	*	*
219. Goniomya .	literata	Mya, Sow. Min. Con.	...	*	
220. Arcomya ...	oblonga	Sanguinolaria, Buckman.	*	*	
221. Myopsis ...	punctata	Sanguinolaria, Buckman.	*	*	

Genus.	Species.	Authority.	Inf. Ool. Leckhampton.	Inf. Ool. Minchinhampton.	Gr. Ool. Minchinhampton.
222. Myopsis ...	dilata	Mya, Phill.; Sanguinolaria, Buckman.	*	*	*
223. Arca	pulchra	Sow. Min. Con. ...	*	*	*
225. ——	lata	Dunker	*	*	
232. ——	trisulcata	Goldfuss	*		
224. ——	rudiuscula	new sp.	*		
250. Modiolarca	ovata	Arca ovata, Buckm.	*		
226. Cucullæa...	elongata	Sow. Min. Con., not Phillips.	*		
227. ——	dense granulata .	new sp.	...	*	
228. ——	amœna.....	new sp.	*	...	*
229. ——	cucullata	Arca, Goldfuss ...	*	*	*
230. ——	elongata	Phil. Geol. York. .	...	*	
231. ——	triangularis? ...	Phil. Geol. York. .	...	*	
233. ——	nana	new sp.	*		
249. ——	bipartita	new sp.	*		
248. ——	funiculosa?	Arca, Goldfuss ...	*		
248*. ——	obliqua	new sp.	*	*	
234. Lithodomus	attenuatus	new sp.	*		
235. Trichites ...	nodosus	Lycett, Ann. Nat. Hist. 1850.	...	*	*
236. Terebratula	simplex	Buckman.....	*	*	
237. ——	plicata	Buckman.....	*	*	
238. ——	fimbria	Sow. Min. Con. ...	*	*	
239. ——	resupinata?	Sow. Min. Con. ...	*	*	
240. ——	ornithocephala?	Sow. Min. Con. ...	*	*	
241. ——	.....	new sp.	*	*	
241*. ——	.....	new sp.	*	*	*
242. ——	.....	new sp.	*	*	*
243. ——	.....	new sp.	*	*	
244. ——	.....	new sp.	*		
246. ——	.....	new sp.	*		

Notes and Descriptions of New Species.

2. *Patella inornata*; ovate, smooth; apex pointed, moderately elevated, subcentrical, but posterior and inclined slightly forwards. The Great Oolite shells are rather more elevated and pointed.

4. *P. retifera*; ovate, costated and cancellated; costæ numerous and unequal, crossed by numerous encircling lines; apex moderately elevated, posterior, but inclined forwards.

10. *Emarginula granulata*; ovately globose; apex curved posteriorly; costæ numerous, very fine, with others still more delicate alternating, and rendered granular by transverse encircling lines.

11. *E. Leckhamptonensis*; oval, depressed; apex posterior; costæ large, rounded and tuberculated where crossed by encircling lines; costæ twenty-six in number.

5. *Fissurella Brodiei*; figure a lengthened oval, rather depressed;

apex subcentral; costæ about forty-two, large, nearly equal, crossed by numerous encircling lines.

13*. *Rimula minutissima*; almost microscopic, conical; apex curved; ribs radiating, rounded, numerous, closely arranged, indented by encircling striæ; under surface nearly orbicular.

17. *Nerita cassidiformis*; subhemispherical, angulated; spire discoidal; an elevated smooth encircling carina divides the body-whorl into two portions, the upper of which is flat and has a few fine encircling lines; on the lower portion the lines are larger, rounded and closely arranged.

43. *N. lineata*; very oblique; spire of several whorls, not elevated and nearly concealed; surface with numerous very fine longitudinal radiating lines.

53. *Natica Leckhamptonensis*; spire elevated, whorls convex, the last enormously expanded, upper surface of the whorls rounded and sulcated; aperture very effuse, orbicular. Only casts known. A gigantic species.

23 & 27. *Monodonta heliciformis* and *M. lævigata*; these shells are smooth and depressed; they have the tooth of *Monodonta*, but are without any basal sulcus or umbilicus; they will appear in the Great Oolite monograph under the new generic name *Alostoma*.

26. *Delphinula quaterno-cingillata*; subglobose; spire of several whorls, angulated; longitudinal costæ large, elevated, rather angular, impressed by numerous transverse lines; umbilicus costated; aperture orbicular.

25. *Littorina nana*; small, smooth, thick; spire elevated; whorls few, convex, narrow; aperture rather small.

9. *Emarginula alta*; shell much elevated, compressed laterally; apex curved posteriorly, the convex side beneath the apex having narrow, simple, smooth elevated ribs, of which the middle one is the most prominent; there are also slight traces of smaller costæ upon the flattened sides of the shell; the height exceeds the length of the aperture: rare.

30. *Turbo elaboratus*; ovate; spire elevated, whorls five, slightly convex and angulated; surface above the angle smooth, horizontal, or even slightly concave, encircling ribs numerous, elevated, crossing numerous longitudinal elevations or costæ, which are indistinct upon the last volution; aperture oval, its length rather more than half of the entire shell. Axis 11 lines: rare.

33. *Turbo Cheltensis*; small; spire elevated, whorls five, convex, nodulated, nodules in four rows, about sixteen in a volution, the nodules of each row connected by an encircling line; nodules large, diminishing in size upwards in each successive row; length $\frac{1}{6}$th of an inch.

34. *Turbo varicosus*; turreted, whorls six, convex, each with four encircling, rounded and smooth costæ crossing about eight large longitudinal elevations, which pass rather obliquely from left to right. Axis 2 lines.

37. *Trochus bi-cingendus*; elevated, whorls rather concave, with two encircling nodose ribs, one at each margin of the whorl, and three mesial circles of nodules.

38. *Trochus alternans*; moderately elevated and costated, three nodulated costæ upon each whorl, the middle one the smallest.

40. *Trochus cingillato-serratus*; whorls few, bicarinated, the lower carina much the larger, the intermediate space concave with small serrated circles of ribs; the carinæ are longitudinally serrated.

41. *Trochus pileus*; very elevated; whorls few, concave, with longitudinal elevations united at the base, and overwrapping the upper portion of the succeeding whorl, base discoidal.

42. *Trochus infundibuliformis*; figure a low cone above, discoidal beneath; whorls three or four, flattened, with numerous obscure longitudinal wrinkled lines.

41 & 42. These two remarkable species are placed provisionally in the genus *Trochus*; it is probable however that they will ultimately be erected into a new genus.

44. *Pleurotomaria funata*; elevated; whorls five or six, convex above, but rather flattened at the sides, with numerous equal, closely arranged angular encircling ribs decussated by fine longitudinal lines. Fascia of the sinus broad, striated longitudinally, with an encircling elevated line bounding it upon each side.

45. *Pleurotomaria lævigata*; discoidal; whorls five, smooth, slightly convex; fascia of the sinus narrow, forming a slightly convex band; base smooth and discoidal.

46. *Trochotoma carinata*; moderately elevated, acuminated; whorls narrow, numerous, angulated, rendered concave both above and below by an elevated and acute carina; the first three or four whorls have closely arranged encircling striæ crossed by others longitudinal, but the larger whorls are perfectly smooth, or have only the oblique lines of growth; the carina is formed by two parallel lines; the base is widely and deeply excavated; height $\frac{5}{6}$ths of the basal diameter: rare.

47. *Trochotoma depressiuscula*; depressed; whorls five, narrow and angulated; ribs below the angle three, above more numerous; upper surface of the whorls concave, lower flattened; base striated, excavation large, not deep; height half the basal diameter: rare.

49. *Trochotoma funata*; elevated, acuminated, nearly smooth; whorls convex, their lower portions flattened, with numerous encircling granulated ribs, faintly traced, basal excavation contracted. Height about equal to the basal diameter.

51. *Natica canaliculata*; ventricose; spire elevated; whorls five, acute, flattened at their sides, their upper surfaces deeply channeled, the angle of the whorls slightly tumid; aperture obliquely ovate; axis imperforate, last whorl very large and tumid; axial diameter 1 inch 4 lines, transverse 1 inch.

54. *Phasianella acutiuscula*; ovate; spire small, acute, with four very narrow rather convex whorls, whose upper borders are disunited from the preceding whorls; body-whorl much expanded and globose; aperture large, $\frac{2}{3}$rds the axial length; axis 5 lines, transverse diameter 4 lines.

55. *Phasianella turbiniformis*; ovate, acute; whorls five to six, convex, narrow, last whorl large, ventricose; aperture large, oval, oblique, its length a little exceeding half of the axial and $\frac{4}{5}$ths of the transverse diameter.

55*. *Phasianella subangulata*; ovate, lengthened; spire pointed; whorls rather convex, few, body-whorl large, ovate, subangulated in the middle; aperture elongated and oblique, its length equal to the transverse and $\frac{3}{5}$ths that of the axial diameter of the shell.

57. *Acteonina ovata*; ovate; spire of moderate elevation, consisting of four flattened whorls, last whorl subcylindrical, large; aperture lengthened, oblique; axis 11 lines, breadth 6 lines.

56. *Acteonina tumidula*; spire small; body-whorl very large and tumid; aperture expanded anteriorly; axis 6 lines, breadth 4 lines.

59. *Cylindrites attenuatus*; conico-cylindrical; spire short, acute, of six whorls, which are very narrow and acute at their upper borders; body-whorl flattened and attenuated towards the base; length 8 lines, breadth 4 lines.

60. *Cylindrites gradus*; cylindrical, elongated; spire elevated; whorls five to six, step-like, but slightly rounded at the angles, the lower portions of the whorls perfectly flat.

The above-named two species of *Cylindrites* have elevated spires; those which follow have sunk spires, but exposed, the upper edges of the whorls being visible; the apex, which usually comprises the first two or three volutions, forms a kind of mamillary tubercle elevated above the depressed edges of the other whorls except the last. They constitute two very distinct sections.

62. *Cylindrites tabulatus*; conico-cylindrical, vertex large, but little depressed; whorls numerous, centre slightly mamillated and elevated; the figure is tuberose and the vertex unusually large.

61. *Cylindrites mamillaris*; conico-cylindrical, elongated; sides of the body-whorl flat, its upper edge acute; the inner whorls have their upper flat surfaces visible, the first two or three of which are elevated into a rounded or mamillary process. This nearly resembles a Great Oolite species, but it is less elongated, and the vertex is more depressed.

63. *Cylindrites bulbiformis*; very short or tun-shaped, the upper surface wide and flattened, but the apex rises a little; axis 4 lines, transverse diameter 5 lines.

64. *Chemnitzia nitida*; small, smooth; whorls five to six, convex, body-whorl large, oval, aperture oblique; length $\frac{1}{2}$ inch.

65. *Chemnitzia elegans*; subcylindrical, smooth; whorls numerous, convex, but short, their breadth exceeding their length; the body-whorl is symmetrical and not enlarged; apex unknown; length of fragment $3\frac{3}{4}$ inches, in which only the four last whorls are preserved.

99. *Chemnitzia gracilis*; spire excessively lengthened and acuminated; whorls very numerous, flattened or very slightly convex, longer than wide, sutures marked, aperture ovately elongated, pointed anteriorly; length 7 inches, diameter of last whorl 6 lines.

Ceritella, a genus related to *Cerithium*, which will be illustrated in a forthcoming monograph on the Testacea of the Great Oolite.

66. *Ceritella sculpta*; small, turreted; whorls few, long, nearly flat, each with three encircling striæ, equidistant; the body-whorl has six striæ besides numerous others closely arranged at the base.

67. *Ceritella tumidula*; small, smooth, much lengthened; whorls flattened, but slightly tumid at their upper junctions, body-whorl symmetrical; length $\frac{3}{5}$ inch.

69. *Scalaria pygmea*; shell minute; whorls seven, globose, the last whorl much enlarged; costæ eight in a volution.

70. *Solarium Cotswaldiæ*; depressed, both upper and under surfaces nearly equally concave; sides rather flattened, but with the borders rounded and furnished with numerous longitudinal elevations or nodules, twenty-eight upon the lower and twenty upon the upper border of the last volution; the entire surface has numerous narrow, crenated, encircling costæ, crossed by very fine longitudinal lines not always distinct; costæ upon the sides of the last whorl about fourteen.

74. *Eulima parvula*; minute; whorls five, convex, body-whorl rather large; apex obtuse.

76*. *Rissoina obtusa*; spire obtuse; whorls slightly convex, six; outer lip moderately large; costæ numerous, closely arranged, slightly curved from right to left.

77 to 89 inclusive. *Cerithium*; the descriptions of the species of this genus are omitted for the reasons given under the genus *Solarium*, as are likewise of *Nerinæa* 93 to 97 inclusive.

101. *Fusus obliquatus*; small, subconical, acuminated, longitudinal; costæ about nine in a volution, passing obliquely from left to right; base with several large encircling striæ, but the costæ are not continued to this part.

102. *Rostellaria unicornis*; spire lengthened, composed of many whorls, whorls costated, the costæ terminating in knobs on their upper portions; costæ ten in a volution, indented by five encircling striæ; last whorl smooth, with a single prominent carina, having an acute and elevated spire at one quarter of the circumference posteriorly from the outer lip; the wing single, rounded, curved, slender and produced; caudal extremity moderately long.

103. *Rostellaria simplex*; smooth; whorls long, few, convex; the spire moderately elevated; body-whorl with two carinæ, the upper one the larger, and forming two angles in its course; caudal extremity short. Only casts have been procured, but they are well characterized.

104. *Rostellaria spinigera*; spire elevated, acute; whorls few, each with seven prominent spines or spinous ribs; body-whorl spined above, grooved beneath; wing not digitated and but moderately expanded; caudal extremity straight and moderately long.

105. *Rostellaria solida*; spire turreted; whorls five, angulated by a circle of elevated longitudinal spinous ribs crossed by lines; body-whorl with a single carina, beneath which are several deep encircling grooves; wing simple, small, proceeding from the carina; caudal extremity short.

106. *Rostellaria gracilis*; spire lengthened, smooth; whorls six, lengthened, angulated, the angle being in the middle of the whorl forming an acute and crenulated carina; body-whorl smooth, with two

carinæ and large digital processes; caudal extremity slender and lengthened; the slender form, crenulated carina and smooth surface distinguish it from *R. trifida*. Portions and casts of two other species of *Rostellariæ* have been obtained, but not sufficiently perfect to admit of being described.

107. *Serpula lævigata*; a simple, round, smooth spiral tube, the tube being rather thick.

101*. *Fusus? carino-crenatus*; shell small, fusiform; spire of four volutions, keeled and striated; an elevated carina encircles the middle of each whorl, its edge undulated or crenulated; encircling striæ cover the whole surface of the shell, and there is an indistinct circle of nodules upon the upper portion of each whorl near to the junction.

127. *Natica Gomondii*; small, globose; spire small; whorls convex, narrow, their upper margins cinctured with a narrow, flat, horizontal area, the outer edge of which is acute: rare.

125. *Lima plicata*; elongated, narrow; costæ nine, very large and elevated, rounded and imbricated.

126. *Lima alata*; auricles very large, the length of the hinge-line being equal to that of the longitudinal diameter; anterior auricle much folded; ribs numerous, narrow, regular and imbricated.

130. *Lima punctatilla*; shell minute, gibbose, nearly straight; costæ about twenty, rounded, large; interstitial spaces narrow; surface of the costæ punctated where they are crossed by very fine lines.

134*. Possibly a variety of *Pecten clathratus* with large, elevated encircling ribs.

130*. *Lima minutissima*; oblique, broad, convex; costæ fourteen, rounded, smooth, wider than the interstitial spaces, nearly evanescent upon the anterior side.

137. *Pecten lineolatus*; auricles large, striated; shell ovate, slightly convex; costæ very minute, numerous, waved and granulated, degenerating into very fine lines towards the ventral border, and crossed by encircling lines, very fine, and arranged in the closest possible order.

138. *Hinnites sepultus*; suborbicular, rather irregular, convex; auricles unequal; costæ ten, equal, radiating, waved, small and crenulated, degenerating towards the ventral border into mere lines; interstitial spaces wide, each having one or two longitudinal lines; length $\frac{1}{4}$ inch.

141. *Plicatula elongata*; elongated, rather oblique; costæ longitudinal, waved, very fine, closely arranged, rounded and scabrous, terminating towards the tubular border in a few tubular spines.

143. *Placuna armata*; the normal form is that of curved radiating lines of tubular spines little elevated, but the general aspect is that of irregular elevated confused tubercles. This species is placed under *Placuna* merely to indicate that generically it agrees with the shell called *Placuna jurensis*, but which certainly is neither a *Placuna* nor yet an *Anomia*, to which latter genus it has sometimes been assigned; its true place must remain for the present in abeyance.

144. *Placuna? complicata*; surface covered with clusters of tubular spines, depressed and confused, producing a most irregular and uneven surface.

148. *Mytilus subrectus*; elongated, smooth, slightly oblique, anterior border straight, the two extremities of the shell attenuated; hinge-line lengthened, straight.

150. *Mytilus crenatus*; thick, oblique, convex; length less than twice the width; striæ regular, concentric, deeply grooved upon the back; a single depression or fold (its edge acute) passes obliquely from the umbo to the antero-ventral border; hinge straight, moderately long.

151. *Dreissena lunularis*; smooth, anterior border straight or slightly concave, posterior side curved, umbones pointed, terminal, longitudinal ridge acute, anterior diameter through both valves equal to the breadth.

152. *Gervillia tortuosa*; this shell, the *Gastrochæna tortuosa* of Phillips, belongs to a very remarkable section of the *Gervilliæ*, of which *G. Hartmanni* and *G. Monotis* are likewise examples; they are tortuous, very inequivalve, the right valve being more or less concave, its borders fitting closely to the undulations of the convex valve.

154. *Gervillia aurita*; equivalve, smooth, very oblique, both the auricles very much extended and acuminated, the entire figure being very slender.

156. *Gervillia lævigata*; smooth, very oblique; anterior auricle produced and rather pointed, posterior moderately large; left valve convex, right nearly flat. This shell is more oblique than *G. costatula*, and wants the ribs of that species.

159. *Pteroperna*; a group of shells proposed to be separated from the *Gervilliæ* and *Pernæ*, to both of which genera they possess affinities, combined with the external form of *Avicula*. A species very nearly allied to our *P. gibbosa* is abundant in the Great Oolite; our shell however is more convex and oblique.

161. *Pinna hastata*; spear-shaped, compressed, lines of growth waved and strongly marked; lines longitudinal, delicate, waved and closely arranged, crossed by others more distinct.

164. *Hiatella interlineata*; subquadrate; anterior side rounded, posterior straight and truncated; costæ transverse, large, few, elevated, forming an angle upon the back of the shell; the interstitial spaces have numerous encircling very fine lines.

169. *Opis angustatus*; narrow, elongated, extremely convex, fornicated; lunule large, posterior depression cordate, large and deep, with a wide longitudinal sulcus posterior to the carina; ribs concentric, closely arranged, posterior side with densely arranged fine transverse lines; carina moderately elevated and impressed by the costæ; umbones narrow and incurved.

171. *Opis gibbosus*; subtrigonal or cordate, convex, anterior side and base nearly straight; umbones large, dorsal carina obtuse and scarcely elevated; costæ large, both upon the anterior and posterior side; lunule cordate and deep, inner margin toothed. The nearly globose form, nearly obsolete carina, and ribs upon the posterior side, separate it from contemporaneous species. The size does not usually exceed that of a pea; with increase of growth it becomes more trigonal.

176. *Trigonia costatula*; transversely oblong, anterior side trun-

cated, flattened, with two obscure longitudinal ridges crossed by numerous lines; dorsal ridge nodulated, but little elevated; dorsal costæ disunited from the carina, numerous, regular, narrow and curved. With advance of growth the anterior transverse lines become indistinct; the dorsal ribs are broken in their anterior portions and displaced, forming irregular nodules; this change commenced when twelve ribs had been perfected, but the Leckhampton specimens not having that number, do not exhibit it.

177. *Trigonia* v.- *costata*; semiorbicular, anterior side slightly concave, with a single deep longitudinal groove and numerous transverse prominent lines, prominent near the umbo, but becoming fine and indistinct afterwards; area lanceolate; dorsal carina narrow, smooth, but little elevated; dorsal costæ numerous, closely arranged, angular and narrow, partially broken in the middle, and forming an acute angle with their anterior portions; at the middle they also become slightly nodulated.

178. *Corburella*, new genus.

Gen. Char. Equivalve, inequilateral, transverse, thin, smooth; umbones small, approximate, posterior side attenuated and slightly gaping, anterior side more convex and rounded; hinge with a small depressed subconical cardinal tooth in each valve, and an extended slightly thickened laminar plate forming a kind of anterior lateral tooth or process; muscular impressions faintly marked, scarcely visible.

This genus differs from *Corbula* in being equivalve, and in the character of the hinge, the teeth are much smaller and not hollowed to receive the ligament; the substance of the test is thinner, and the muscular impressions much more faintly marked. The *Corbula curtansata* of Phillips is the type of this genus.

179. *Corbula imbricata*; shell suborbicular, small, slightly longer than wide, imbricated by a few elevated concentric ridges rising over each other; lunule cordate, excavated; umbones incurved: the largest specimens attained the size of a small pea.

177. *Trigonia tuberculosa*; ovately trigonal, depressed, fornicated; anterior side flattened, transversely striated; carina acute, elevated and crenated; ribs regular, curved and tuberculated, tubercles elevated, obtuse, very closely arranged, their upper surfaces flattened.

184. *Cardium semicostatum*; ovately convex, rather longer than wide; umbones prominent, mesial, incurved, posterior side ribbed longitudinally; ribs smooth, rounded, closely arranged, occupying about one-fourth of the surface; the remainder smooth in the adult state, but young individuals have very fine, closely arranged, concentric striæ.

183*. *Cypricardia siliqua*; transversely elongated; umbones small, anterior; hinge-line very long, posterior side extended and attenuated, ventral border straight, lines of growth few.

187. *Cardium lævigatum*; suborbicular, smooth, transverse, moderately convex; umbones mesial, incurved, anterior side rounded, posterior slightly truncated, ventral border rounded, lines of growth few and obscure.

189. *Cardium punctato-striatum*; oblong, transverse; umbones anterior; anterior side short, rounded, posterior lengthened and obliquely truncated, ventral border curved; striæ longitudinal, numerous and closely punctated, crossed by obscure numerous encircling lines giving the surface almost a scabrous aspect; there is likewise an obscure oblique posterior longitudinal keel, posteriorly to which the surface is much more depressed.

195. *Cytherea picta*; suborbicular, rather longer than wide, smooth, moderately convex; umbones mesial, slightly curved forwards; hinge-margin oblique, curved; ventral border rounded; surface with several broad zones of colours at irregular intervals, the bands being white upon a chocolate-coloured ground; length $\frac{1}{2}$ inch: rare.

197. *Astarte quadrata*; quadrate, transverse, thick, rugose, lines of growth irregular and strongly marked, forming an angle somewhat rounded upon the posterior side of the shell; umbones anterior, lunule excavated, cordate.

198. *Astarte bullata*; small, subglobose; umbones mesial, curved forwards; lunule excavated, cordate; costæ elevated, broad, rather distant, usually, but not always, regular; size that of duck shot.

199. *Ptychomya Agassizii*; new genus indicated, but not described, by M. Agassiz: see a notice of this genus at page 408.

201. *Astarte Menkei*; our specimens do not exhibit the wrinkled surface near to the umbones described by Dunker, but this probably is an inconstant character.

203. *Astarte formosa*; rather depressed, transversely ovate; umbones pointed, mesial, inclined forwards; lunule large, slightly excavated; hinge-line lengthened, oblique; anterior border rounded, posterior rather produced and slightly angulated; encircling ribs very closely arranged, irregular, small, and little elevated; length equal to $\frac{3}{4}$ths of the breadth.

205. *Corbis aspera*; transversely oval, gibbose; umbones large, mesial; lunule small, cordate; hinge-line straight, sloping, borders rounded, inner margin toothed; encircling costæ narrow, elevated, rather distant; interstitial spaces with fine encircling striæ. This species approaches near to *Corbis Lajoyei*, D'Archiac, but the ribs are more elevated and distant, the umbones are larger, and the hinge-line is not so nearly horizontal.

207. *Corbis lævigatus*; small, transverse, moderately convex; umbones mesial, lunule small; hinge-line straight, nearly horizontal; costæ few, widely separated, elevated, the interstitial spaces smooth; length $\frac{1}{4}$ inch, breadth $\frac{1}{4}$th more.

211. *Panopæa delicatissima*; small, transverse, oblong, convex; umbones large, mesial; hinge-line rather straight; ventral border lengthened, rather straight; costæ concentric, regular, closely arranged, delicate; length $\frac{1}{6}$ inch: breadth $\frac{1}{4}$ inch; the hinge has not been seen.

204. *Lucina lyrata*; the abundance of this species, its wide diffusion and great variety of aspect demand something more than a mere notice of its occurrence. The two extreme varieties are as follows:—

Var. '*a.*' shell orbicular, moderately convex; hinge-line oblique, short and curved. Var. '*b.*' shell transversely ovate, rather flattened; hinge-line straight, lengthened and nearly horizontal; the character of the surface, though variable, has nothing peculiar to either variety of figure; the encircling costæ are narrow, elevated, widely separated and never quite regular; the interstitial spaces have numerous encircling lines, which are serrated or indented, forming a finely granulated surface; there is also occasionally an obscure rib to be traced within them; the posterior side has an oblique longitudinal fold, posterior to which the shell is more compressed, and the costæ curve nearly at right angles to the other surface; the posterior border is likewise slightly truncated and angulated at its junction with the ventral border.

217. *Ceromya striata*, syn. *Cardita striata*, Sow. Min. Con. t. 89. f. 1, but not *Isocardia striata*, Roemer, t. 7. f. 1, which is likewise a *Ceromya*, and of which latter shell *Ceromya inflata*, Agassiz, is a synonym. The present or Sowerby's species has the striæ longitudinal, in the other they are transverse.

212. *Tancredia donaciformis*; transverse, subtrigonal, smooth, moderately convex; umbones mesial; posterior border slightly concave, posterior extremity rather pointed, anterior border straight, obliquely sloping, ventral border rounded; length $\frac{3}{5}$ths the breadth.

113. *Tancredia sulcata*; small, transverse, subtrigonal or donaciform; umbones mesial, surface very finely striated concentrically with an anterior dorsal longitudinal ridge grooved at the angle; the striæ anterior to the sulcus rise at a right angle with the others.

228. *Cucullæa amœna*; rhomboidal, fornicated; umbones large, mesial, distant, both extremities of the hinge-line angulated; posterior dorsal ridge acute, the surface posterior to it concave; there are also several irregular longitudinal ribs upon each side of the shell; the middle portion of the surface has only encircling striæ.

224. *Arca rudiuscula*; transversely elongated; width $2\frac{1}{2}$ times the length; borders elliptically curved; a wide longitudinal mesial depression; longitudinal costæ irregular and rugose, nearly evanescent upon the middle portion.

250. *Modiolarca ovata*, syn. *Arca ovata* (Buckman); oblong, ovate, very gibbose; umbones anterior, very large, touching each other; hinge-line curved, its extremities rounded; ventral border sinuated by a wide mesial depression, but which does not reach the umbones; surface imbricated with longitudinal closely arranged waved and flattened costæ, crossed by densely imbricated transverse lines; lines of growth few and strongly marked. The diameter through the umbones is equal to that of the shell longitudinally. The general figure is nearly that of a very gibbose *Modiola*, but the character of the surface agrees with that of the *Arcacea*.

231. *Cucullæa triangularis* (Phillips?); subtrigonal, rather flattened; hinge very oblique to the ventral border, and nearly at right angles to the posterior border, which is straight and elongated; anterior border much shorter, rounded; umbones oblique, nearly mesial; surface with exceedingly fine decussating striæ producing a finely granular surface. The figure agrees with the shell figured by Phillips; the greater number of specimens do not exhibit any markings upon the surface.

233. *Cucullæa nana*; minute, rather compressed, suborbicular; umbones mesial, touching; hinge-line short, rounded at the extremities; surface with extremely fine decussating lines, two or three of which upon the posterior side are more elevated.

249. *Cucullæa bipartita*; small, rhomboidal; umbones large, mesial; hinge-line angulated at its extremities; a longitudinal oblique keel upon the posterior side, and a wide and deep depression extending from the umbo to the ventral border; surface with lines longitudinal, closely arranged, crossed by a few lines of growth.

234. *Lithodomus attenuatus*; elongated, smooth, posteriorly attenuated; umbones small, near to the anterior extremity; width $\frac{2}{4}$ths of an inch, which is thrice the length.

248*. *Cucullæa obliqua*; depressed, oblique, subtrigonal; umbones touching, small, mesial; hinge very oblique to the ventral border; anterior side short, rounded; posterior produced, flattened and angulated at the base; surface with extremely fine lines, both longitudinal and transverse, the latter very densely arranged. There may sometimes be difficulty in distinguishing this from *Cucullæa cucullata*, but the present shell is more flattened and oblique, the umbones are much smaller, the hinge-line shorter, and the posterior border more lengthened.

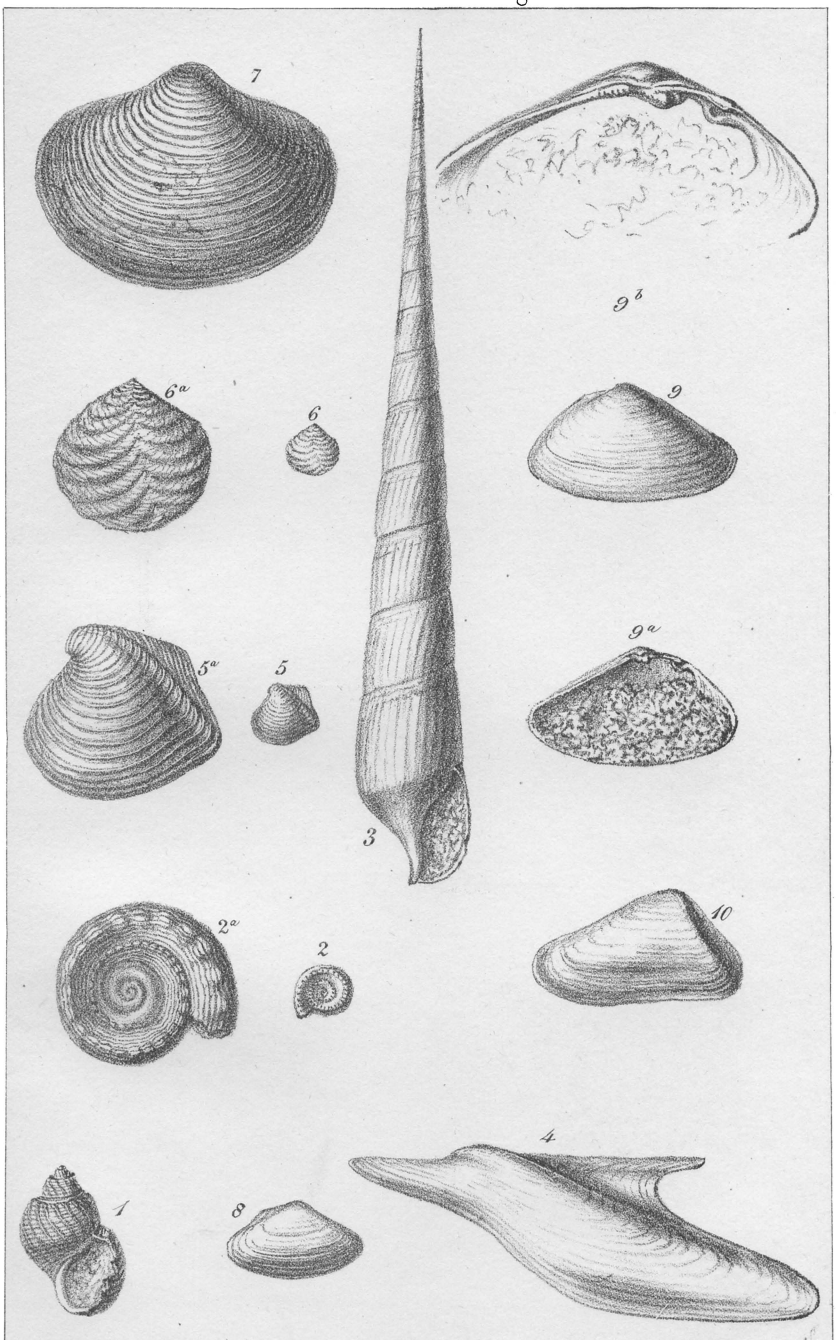
172. *Trigonia clavo-costata*; shell elevated, anterior border rounded; costæ regular, some tuberculated, others smooth; tubercles large, closely arranged, the first three or four and the last one or two elevated, but without tubercles; cardinal area broad, flattened, with oblique carinæ; posterior extremity short and truncated. This shell has usually been confounded with *T. clavellata*, but the figure is much more truncated or shortened posteriorly, the costæ are perfectly regular, and the tubercles are very large and closely arranged, the few first and last costæ being simple; these several features separate it from the Oxford clay species. It approaches near to *T. Bronnii*, Agassiz, in form, but the character of the costæ as above described are different.

XXXV.—*Observations on the Luminosity of the Sea, with descriptions of several of the objects which cause it, some new to the British Coast.* By Charles William Peach, Associate of the Royal Institution of Cornwall*.

[With three Plates.]

The Report of the Royal Institution of Cornwall for 1846 contained some remarks of mine on the luminosity of the sea; since that time I have taken every opportunity of extending my ob-

* Read November 2nd, 1849, and abridged from the Report of the Institution.



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