On new Brachiopoda, and on the Development of the Loop in Terebratella.

BY MR. CHARLES MOORE, F.G.S.

AT the time of the commencement of Mr. Davidson's monograph on British Brachiopoda, published by the Palæontographical Society, little had been done towards their systematic arrangement and classification. Sowerby had figured many species; but valuable materials were accumulated, and many new forms waiting for description in the cabinets of different collectors, which have since been done justice to in the above valuable publication.

At the time referred to but fourteen species of the genera Lingula, Orbicula, Spirifer, and Terebratula had been figured from the three divisions of the Lias, but I had succeeded in discovering twenty new species in the Middle and Upper Lias of Somerset, including the genera Thecideum, Leptæna, and Crania, genera which had been previously unnoticed in these formations.

Of the genus Thecideum, the Middle Lias of Somerset yielded me three species, viz., *T. Bouchardii*, *T. triangularis*, and *T. Moorei*. In this formation they are rare, and when found are almost invariably attached to the plicated

exteriors of *Rhynchonella serrata* or *R. tetraëdra*. On a specimen of the former shell, which has been figured by Mr. Davidson, there are seventeen examples belonging to the three species I have mentioned.

The Upper Lias of the west of England, especially in the neighbourhood of Ilminster, rarely exceeds in thickness ten or twelve feet, and is sometimes reduced to four or five feet. In the clays at its base the genus Leptæna occurs of several species. About the time of their discovery, one species, the *Leptæna liasiana*, had been found in France, which I had sought for in vain in this country. During a visit paid me by Mr. Davidson, as we were approaching a section of Upper Lias, he remarked how interesting it would be to find the French species in association with those I had already discovered. To our great delight the first object that presented itself to me was a little shell, which rendered the *L. liasiana* a British species. I have never found more than four specimens, so that it is very rare.

Before the publication of Mr. Davidson's "Appendix," in 1853, I had examined the Inferior Oolite of Dundry for Brachiopoda, and found there eight species of Thecideum, five of which were new, together with the *T. Bouchardii* and *T. triangularis* I had previously obtained from the Middle Lias, and *T. Deslongchampsii* of the Upper Lias. The same locality also furnished me with a series of little shells, which threw light upon some I had previously found in the Upper Lias, forming a passage between the Thecideidæ and the Terebratulidæ, for which the sub-genus Zellania has been created. These, with a little shell named *Spirifera oolitica*, were shortly noticed by me in Mr. Davidson's "Appendix," and were, in 1854, figured in the *Proceedings of the Somersetshire Archæological and*

Natural History Society. At that time I was convinced many new species might be expected to be discovered from a continued investigation of the secondary formations, and below I am enabled to give figures and descriptions of sixteen additional species, whereby our knowledge of this interesting class of shells is completed to the present time.

On Hampton Down, near Bath, there are extensive excavations where the Great Oolite was formerly largely worked. Latterly a new quarry has been commenced, and in order to reach the workable beds of freestone, the following beds in descending order had to be passed through :—

	Ft.	In.
1. Thin bands of freestone	4	6
2. Brown raggy coralline bed . .	9	0
3. Compact grey limestone	5	0
4. Workable beds of great oolite	20	0

The grey limestone, (No. 3) contains many organic remains, but owing to its hard and intractable character few are to be extracted entire. In its weathered edges may be seen the *Lima cardiformis*, *Trichites*, *Lithodomi*, and many corals.

The raggy bed (No. 2) is very incoherent, and appears to have been an ancient coral reef, it being in great part composed of corals and sponges. Intermingled with these branching corals are myriads of beautiful organisms, which, from the unconsolidated nature of the bed, are easily extracted. They consist of dismembered ossicles of starfishes, the plates and occasionally the bodies of the Bradford Encrinite *(Apiocrinus Parkinsoni)*, spines and shells of Echini, Ostreæ, and other mollusca, and with them very many specimens of a small Brachiopod, which has

hitherto been considered the young of *Terebratula maxillata*, but which I shall presently show is to be referred to *Terebratella*.

The Brachiopods obtained at Hampton consist of *Terebratula cardium*, *T. coarctata*, *T. digona*, *T. hemispherica*, *T. maxillata*, *Rhynchonella concinna*, *R. obsoleta*, *Crania antiquior*. It will thus be seen that only three genera of Brachiopods have hitherto been known in the Great Oolite, and the bed under consideration. To these I have now to add four other genera, viz., Terebratella, Terebratulina, Thecideum, and Zellania.

Terebratula maxillata, Sow.

Pl. I., figs. 6, 7.

The adult form of this shell is found at Hampton, though usually either in single valves, or in a crushed state. The young ages of this shell are externally hardly distinguishable from the *Terebratella Buckmanii*, described below. It differs from the latter shell in its beak being more truncated, and the foramen more rounded; it is also usually longer than broad, a character it looses when more adult. Internally the generic difference is at once apparent, as this shell possesses a short reflected loop, which in Terebratella is doubly attached.

Terebratula hemisphærica, Sow.

A pretty little shell, originally figured by Sowerby under the name of *Terebratula hemisphærica*, is not uncommon at Hampton Cliffs. This was subsequently removed by D'Orbigny from that genus, and placed with the Terebratellæ; and on the authority of the species to which I now refer, that author carried the latter genus into the oolites, in which he was followed, although with some

hesitation, by Mr. Davidson. It will be seen from what follows that two species at least of Terebratella are to be found in these beds; but when D'Orbigny placed the *Terebratula hemisphærica* in this genus, he could not have seen its interior, which, in several examples I possess, have the short and simple loop of Terebratula, and the shell in question will therefore have to return to its original position.

TEREBRATELLA.

Terebratella Buckmanii, Woodward M.S.

Pl. I., figs. 1–5.

Shell generally a little longer than wide, rounded in front, and tapering to the beak; valves moderately convex; beak short, very slightly incurved and truncated by a foramen, surrounded in part by the extremity of the beak, the umbo of the dorsal valve, and two small labral deltideal plates. Internally the adult shell is provided with a doubly attached loop, the first pair of lamellæ extending considerably before becoming reflected to form the loop. Shell structure punctuate. Dimensions of the largest example hitherto observed: length, $3\frac{1}{2}$ lines; width, 3 lines; depth, $1\frac{1}{2}$ lines.

Obs.—I had collected a considerable number of these little brachiopods from the oolite of Hampton Cliffs, under the idea that they were the young of *Terebratula maxillata*, my object being to prepare dissections shewing the loop of that species. I was much interested in finding in the example I first opened that it could not belong to the young of that genus, although outwardly it is almost undistinguishable from it. The difference in the loop proved it to be a true Terebratella. My observation does not shew that it attained larger dimensions than those

mentioned, but it had then assumed the character and development peculiar to the loop which characterizes the genus to which it is referred. In an early stage of my examination, modifications in the shape of the loop were noticed, and observations extending to several hundred specimens resulted in showing the curious changes effected by age in the form of the loop, which may be seen by referring to plate I., figs. 2, 3, 4, and 5.

The first stage of development I have been able to observe is sketched in fig. 2. Therein it may be perceived the two first lamellæ are united to the hinge-plate, and to a free rudimentary mesial plate, which is, in fact, the first origin of what at a later period becomes a mesial plate. In this state it is free, and does not touch the bottom of the valve, although when viewed in profile spines may be seen passing downwards, which afterwards join the mesial septum.

The loop has not yet been formed, but a plate projects between the lamellæ, and appears as if longitudinally split to a certain depth in the centre.

The second stage is exhibited in fig. 3. In this we find the two lamellæ with the rudimentary plate as in fig. 2, and, besides, the origin of the reflected portion of the loop, presenting in this first stage of its development but a very small and rudimentary aspect.

The third stage may be observed in fig. 4, where the different parts are still more developed, but the mesial plate has not yet reached the bottom of the valve.

By gradual changes we are thus conducted to the fourth stage, fig. 5, where the loop has attained its complete development. The central plate, which was freely suspended in the shell before, has now reached and become soldered to the bottom of the valve; the first pair of

lamellæ are still attached to its upper sides, and the reflected portion of the loop has become fully developed, the extremities facing the front of the shell being considerably prolonged, as is seen in fig. 5 of our plate. Numerous long spines also project from the outer edges of the lamellæ and loop, giving to the interior a very peculiar appearance.

The subject of the development of the internal calcified supports in brachiopoda is of considerable interest, and much may yet be learnt by a careful study of recent specimens of this class. The importance of attention to the subject is the greater when it is remembered that the classification of many of the brachiopoda depends more upon internal than external form, and that had the different stages of development shown by the *Terebratella Buckmanii* been observed under other circumstances, or from beds of different geological ages, each would probably have been constituted a distinct genus.

The *Terebratella Buckmanii* is the prevailing shell at Hampton Cliffs, and many hundred specimens have passed through my hands. It has before been remarked that the young of *Terebratula maxillata* also occur at Hampton, though this species is comparatively rare. It requires considerable experience to determine by the exterior to which genus the different shells belong. Both possess the same contour, and are strongly punctuate. In general, however, the *Terebratella Buckmanii* may be distinguished by a dark longitudinal line in the centre of the ventral valve, due to the mesial septum, and by the characters previously noticed when speaking of *Terebratula maxillata*.

It is due to my friend Mr. Woodward I should remark, that whilst my investigations on this shell were in progress, having been the means of conveying a series of them to him, he noticed it to be a Terebratella; and in a communi-

cation to Mr. Davidson suggested the specific name of *Terebratella Buckmanii* for it, which I have much pleasure in adopting.

TEREBRATELLA FURCATA, Sow. and Moore.
Pl. I., figs. 8–10.
Terebratula furcata, Sow.; *T. orbicularis*, Sow.; *T. cardium*, Lamarck.

Shell small, rounded—both valves moderately convex; valves coarsely plicated, varying in number, and may be seen on the inner side, bifurcating occasionally; surface punctuated; beak truncated; foramen large; loop doubly attached.

This little shell was originally figured by Sowerby under the name of *Terebratula furcata*, but subsequently he considered it might be the young of *Terebratula orbicularis*, Sow., the *Terebratula cardium* of Lamark, in which he was followed by other naturalists. The *T. cardium* is found at Hampton Cliffs, in association with this species, and from the close resemblance it bears to it, might reasonably be considered its young form. Having succeeded in opening a beautiful example showing the interior of the shell, the double attachment of the loop proved it to be a Terebratella. The interiors may be seen by referring to pl. I., figs. 9, 10. The profile shows the upper lamellæ of the loop, after leaving the hinge plate, to be possessed of a pair of crural spurs. About the centre of the shell the lamellæ are attached to an elevated mesial septum. The front of the loop, as well as the reflected portion, is broad; and projecting towards the opening of the shell, and on the under side of the lamellæ, are a number of closely set spines. This shell is very rare at Hampton, owing to which I have been unable to make any observations on

the development of the loop as in *Terebratella Buckmanii.* The fact of the shell under consideration proving to be a Terebratella at once suggested the possibility that *Terebratula cardium* might also belong to that genus ; and I learnt from Mr. Davidson that he could not speak positively on this point, as the shell from which his interior was figured was not clear of the matrix, and only partially exhibited the loop. I have taken much trouble to establish the correct position of the *T. cardium;* and after the examination and dissection of many specimens, am able to say that the loop, as figured by Mr. Davidson, is correct. This species must therefore remain in its present position, but the examples supposed to be its young forms will have to be placed under Terebratella ; and, retaining Sowerby's original specific name, must be called *Terebratella furcata.* Two species of this genus are therefore added to British Jurassic beds, and the *Terebratula hemisphærica*, which was supposed to represent it in this age, removed. I have obtained a portion of the interior of a small brachiopod, showing a mesial septum, from the Upper Lias, near Ilminster, which convinces me that the genus may also be found in that formation.

TEREBRATULINA.

Terebratulina radiata, Moore.

Pl. I., figs. 11–14.

Shell small, nearly as broad as long; thickest near the umbo, and thinning gradually to the front and sides ; front rounded; valves convex, flattened, with numerous fine striations; foramen large, rounded ; area flattened ; the exterior of the ventral valve shows a mesial depression, with a corresponding elevation in the interior of the valve.

The loop is short; after passing the crura it forms a semicircular ring, slightly thickening in its centre.

This little shell is not uncommon in the Oolite of Hampton Cliffs, and is the first Terebratulina recorded in British Jurassic beds. In its external form it is not unlike *Terebratulina subradiata*, but it does not, in any example I have seen, attain one-tenth the size of that species. It is also more circular, less convex, and has a more pronounced sinus in the ventral valve than that shell.*

The *T. radiata* appears to have continued upwards from the Inferior Oolite, as I am unable to separate from it some specimens I have obtained from Dundry, near Bristol, the only distinction being that the latter assume a more elongated form, which is to be observed by comparing pl. I., fig. 14 (from Dundry) with figs. 11, 12 (from Hampton Cliffs).

ZELLANIA, Moore—1854.

Three species of this genus were described by me in the *Proceedings of the Somersetshire Archæological and Natural History Society*, for 1854; one being from the Upper Lias, the other from the Inferior Oolite of Dundry. To these I have to add another from Dundry, and a fifth species from the Oolite of Hampton Cliffs. The genus also occurs in the Coral Rag of Lyneham, Wilts. Its range is therefore shown to extend from the Upper Lias to the uppermost beds of the Oolite.

ZELLANIA GLOBATA, Moore.

Pl. I., figs. 15–17.

Shell very small, globose; valves moderately convex,

* In all the examples that have come under my notice, the crural processes, which are usually joined in this genus, are disconnected.

rounded at sides and front; exterior surface smooth; beak slightly projecting; foramen encroaching on both valves, rounded.

Obs.—I have five examples of this shell from the Oolite of Hampton. The interior of the dorsal valve possesses a well defined circular ridge, entirely encircling the inner portion of the shell. In this species I have been unable to observe any trace of a central septum, which in those previously figured is well defined. The examples that occur in the Coral Rag, at Lyneham, are of the same species, and are equally rare.

ZELLANIA OOLITICA, Moore.

Pl. I., figs. 18–20.

Shell small, triangular, rather longer than wide; front rounded; valves tapering to the beak, smooth, distinctly punctuate, thickest at the umbo; sides thick, flattened; hinge-line very short; foramen rounded.

This species is found with the *Z. Davidsonii* and *Z. Laboucherei*. It is a thicker and more triangular shell than the former, and is devoid of the striæ noticed on that shell. In its triangular and less symmetrical form it is to be distinguished from *Z. Laboucherei;* and it also wants the concentric lines on the valves characteristic of that species. The shell structure of the genus is shown by the *Z. oolitica* to be distinctly punctuate.

Under the microscope the shell shows a number of widely-separated, circular punctuations, which are arranged in longitudinal lines.

LEPTÆNA DAVIDSONII, Eug. Deslongchamps.

Pl. I., figs. 21, 22.

The figures representing the above species are taken

from specimens for which I am indebted to M. Eugene Deslongchamps, of Caen. They were found in the Upper Lias of May, associated with several of the species found in this country. It appears to be abundant in France, and to attain larger dimensions than any other liassic Leptæna.

I have found a single dorsal valve of this species in the Upper Lias of Ilminster, which though not in good condition, sufficiently identifies the *Leptæna Davidsonii* as a British species.

THECIDEUM, Defrance.

THECIDEUM ORNATUM, Moore.

Pl. II., figs. 1–3.

Shell inequivalve; punctuate, rather rugose, front deep, rounded; attached by a considerable portion of the ventral valve; beak slightly incurved; deltidium small and depressed. The ventral valve is flattened on its under side. Its interior is surrounded by an elevated, slightly granulated margin. Under the deltidium are seen two raised oval processes, separated by a longitudinal septum, which occupies the greater length of the shell. The exterior of the dorsal valve is rugose and flattened. The interior possesses a narrow, thin, punctuated margin, immediately succeeding which is a ridge of single granulations, which are stronger towards the frontal margin, gradually disappearing as the ridge passes upwards. Springing from the centre of this granulated ridge is a septum, slightly tapering from its base, on either side strongly serrated, between which is a central longitudinal groove. The septum occupies nearly the whole height allowed by the cavity of the shell, and divides it to nearly three-fourths of its length. From the top of the septum there are thrown off two extremely delicate lamellæ, forming a loop which curves

downwards towards the front of the shell, where they bifurcate, and are then again united to the shell at its inner sides. Above the septum and attached lamellæ a band occurs, forming a bridge over the visceral cavity. This is united to the granulated ridge, which thus completely surrounds the inner portion of the valve.

Obs.—The preservation of the loop as shown in the enlarged fig. 3, pl. II., is remarkable, since in the original specimen it is in substance scarcely thicker than the finest unspun silk, and extremely brittle. The interiors of the Brachiopoda are only to be developed by careful manipulation in dissecting or opening up the valves. Many of the interiors of the Thecididæ are very beautiful; but I have never yet seen any species equalling in delicacy of structure that under consideration. It is from the Coral Rag of Lyneham, Wilts, where it is not uncommon.

THECIDEUM PYGMÆUM, Moore.

Pl. II., figs. 4–7.

Shell microscopic, longitudinally oval; both valves convex; attached to other bodies at the upper part of the ventral valve; beak slightly produced; area short; deltidium ill defined. A thin raised ridge passes round the front and sides of the dorsal valve, until it reaches the dental sockets. It is without a central septum, nearly always present in other species, the only ornamentation within the ridge being numerous punctuations.

Obs.—This shell is very numerous in the Coral Rag of Lyneham, associated with the *T. ornatum* and the *T. triangularis*. I have been unable to trace any passage into either of the above species, otherwise it might have been considered a young stage of one of them. As it is altogether different in character, and as the shell, though so

minute, is very persistent in its form, I have ventured to give it the above specific designation.

THECIDEUM TRIANGULARE, D'Orbigny.

This species has hitherto been noticed only in the Middle and Upper Lias, and the Inferior Oolite. I have now obtained it from the Lower Lias of Keynsham, which is the oldest formation in which it has yet been found. It then passes through the beds above mentioned, and is very common—attached to Lima, Ostrea, and other shells—in the Fuller's Earth of Combehay, near Bath. It occurs also in the coralline bed of Hampton Cliffs, and again in the still higher zone of the Coral Rag of Lyneham. No other species of Brachiopod has yet been known to have attained so long a range as is indicated by the above facts. Its uninterrupted passage through so many formations points out the absence of any considerable climatal or other changes during the deposition of the beds in which it is found.

I have evidence of the presence of several other species in the Inferior Oolite of Dundry, one very nearly approaching the *T. Deslongchampsii*, Dav.; but as only separate valves have been found, it will be unsafe at present to say more respecting them.

CRANIA, Retzius.

CRANIA CANALIS, Moore.

Pl. II., figs. 8–10.

Shell subquadrate, usually flattened, at other times more or less conical. The outer surface of the young shell exhibits a few coarse striæ, which continue to the margin of the valve. In the adult these become much more numerous, many of them passing as narrow spines, some

distance beyond the outer margin of the shell. The interior of the valve is concave, showing two pairs of muscular impressions, not strongly marked; the anterior pair curving upwards towards the posterior, which are rounded and larger. When viewed from the inner side the valve is seen to be surrounded by a flattened ridge, which is continued outwards in long spinose expansions, which are furnished with narrow longitudinal grooves, or canals, through the whole of their length.

Obs.—This is one of the most beautiful species of this interesting genus of shells. It is from the raggy beds of the Inferior Oolite of Dundry, which have furnished me with so many new forms of Brachiopoda. The upper valve only is known.

Crania Sandersii, Moore.

Pl. II., figs. 11, 12.

Shell rounded; exterior of the valve flattened, or slightly convex; surface wrinkled; shell-structure smooth. The interior of the valve shows four muscular impressions; the upper pair being rounded and depressed, the anterior, occupying the middle of the valve, are raised and prominent, ear-shaped, and curved outwardly.

Obs.—By its exterior it would be difficult to distinguish this shell from the *C. antiquior* of the Great Oolite of Hampton Cliffs, but the interior of the valves differ. In the *C. Sandersii* the two pairs of muscular impressions are more widely separated, the lower pair being much stronger, and in shape different from those of the *C. antiquior*, and there is also the absence beneath them of a longitudinal ridge usually present in the latter shell.

It is from the Inferior Oolite of Dundry, near Bristol. I have much pleasure in naming it after Wm. Sanders,

Esq., of Clifton, to whom the Museum of the Bristol Philosophical Institution is so much indebted. The shell also occurs in the Inferior Oolite of Minchinhampton, Gloucestershire.

Crania Ponsortii, Eug. Deslongchamps.

Pl. II., figs. 9, 10.

The shell described under the above specific name was found by M. Deslongchamps in the Great Oolite of St. Aubin. It occurs in the coralline beds of Hampton Cliffs, and with it the *Crania antiquior* of Jelly is found in great numbers. The outer surface of the latter shell is characterized by possessing a somewhat rugose or wrinkled surface, and the interior by its well defined muscular impressions, which always occupy the same position in the species, and give pretty uniformly the same pattern to the interior. The interior of *C. Ponsortii* appears to be undistinguishable from it, the chief difference being in their outer surfaces. This, in the *C. Ponsortii*, possesses plications which give it a slightly spinose aspect. After examining many examples of the *C. antiquior*, I have observed in some of them a tendency to become more rugose, and to pass gradually into the form represented by the above shell, and I am therefore disposed to consider it only a variety of *C. antiquior*.

DISCINA, Lamarck.

Discina Dundriensis, Moore.

Pl. II., fig. 15.

Shell small, thick, broader than long, flattened, apex smooth, elevated, exterior showing narrow bands of con-

centric lines of growth which are slightly plicated, giving to the shell a wrinkled surface.

It is from the Inferior Oolite of Dundry, and is the only species known in that formation. It appears to be rare; for after a lengthened examination of these beds, I have only succeeded in obtaining three specimens.

Discina orbicularis, Moore.

Pl. II., figs. 16–18.

Shell small, orbicular, tapering to an elevated apex, giving the shell a somewhat conical form; margin smooth and rounded. Outer surface of valve smooth, with numerous concentric lines of growth; the inner smooth, and very concave.

Obs.—This shell does not appear to have attained a larger size than is indicated in pl. II., fig. 18. It is from the fish-bed and the clays associated therewith in the Upper Lias of Ilminster. By its form it is readily distinguished from any other species.

Discina Townshendii, Forbes.

A very fine specimen of this shell, belonging to the Museum of Economic Geology, was figured by Mr. Davidson in the volume of the Palæontographical Society for 1850. Its locality was then uncertain, though Mr. Davidson was informed it was from the Oxford Clay. Subsequently it was suspected to be from one of the lower beds of the Lias. Having discovered the species in the "Avicula contorta zone" at the base of the Lias, near Taunton, I am enabled to settle its position. M. Edward Suess, of Vienna, has informed me that he has also obtained the shell in the Rhætic beds of Austria, in which the "Avicula contorta zone" is included.

Discina Humphreysiana, Sowerby.

This species has hitherto been found only in the Kimmeridge Clay. It may be desirable to record its presence in the Coral Rag of Lyneham, where it is abundant.

Rhynchonella spinosa, Schlotheim.

In the Cotteswold and other lower oolites this shell has been supposed to indicate a particular zone. Although it is therein especially abundant, it is by no means confined to it. I have obtained the species from the Fuller's Earth, near Bath, and also in the Bradford Clay. Some very dwarfed or young forms of it are to be found in the upper beds of the Inferior Oolite of Dundry.

Terebratula carinata, Lamarck.

This shell has hitherto been found only in the Inferior Oolite. Some specimens smaller than the type-form are to be found in the coralline bed of Hampton Cliffs, which I am unable to distinguish from this species.

In addition to the Brachiopoda noticed in this paper, I am possessed of various minute specimens, which differ from any described species. Some of these may be the young of Brachiopoda that occur in the beds in which they are found; but until their passages into adult shells can be satisfactorily recognised, it will be undesirable to figure or describe them. Three examples of well marked and persistent forms are provisionally named and given below.

Spirifera minima, Moore.

Pl. II., figs. 19, 20.

Shell microscopic, often one sided and unsymmetrical,

slightly rugose; valves moderately convex; deltidium triangular; area broad and flattened; hinge-line broad; front of shell rounded. In some specimens the shell presents a uniformly flattened surface, whilst in the majority the outer surface of the smaller valve possesses mesial folds, and in the larger valve a central sinus.

Obs.—This shell is not uncommon in the Inferior Oolite of Dundry. Although no internal characters have yet been noticed, there seems little doubt the shell must be referred to the genus Spirifera. It is perfectly distinct from a little shell found with it, described by me in the *Proceedings of the Somersetshire Archæological and Natural History Society* for 1854. We have thus evidence of the presence of two species of this genus in oolitic strata, although in both instances they have become very degenerate in size. No larger specimens of the genus have yet been found in the same beds to which these diminutive shells can be referred.

TEREBRATULA (?) MINUTA, Moore.

Pl. II., figs. 21, 22.

Shell very small, smooth, inequivalve, longitudinally oval, with large triangular deltidium; valves equally convex; hinge-line straight. The dorsal valve is usually square, and its inner side possesses a broad flattened septum nearly the length of the shell, and dividing it into two equal portions.

Obs.—I have been unable to determine the form of the loop of this shell, and until this has been seen it will be doubtful whether it be a true Terebratula. Should it be such it will be the smallest known species with which we are acquainted. It is from the coraline bed of Hampton Cliffs, Bath. It differs entirely from any other Terebratula

found in the great Oolite ; and although so small, appears to present the characters of an adult shell.

Rhynchonella (?) coronata, Moore.
Pl. II., figs. 23–25.

Shell small, smooth, rounded ; ventral valve rather convex ; dorsal more flattened, and with a slight sinus ; beak produced, with a large triangular deltidium, bordered by a narrow area, from which spring two raised lateral ear-like processes, which again fold over upon the area. Under the above the valve possesses strongly marked hinge-teeth.

The shell is from the Upper Lias of Ilminster, whence I have nine examples. The lateral ear-like expansions give to it a very peculiar appearance. With some little doubt it is referred to Rhynchonella, though the shell-structure appears to agree most with that genus.

In addition to the foregoing new species, the observations recorded in this paper show that the vertical range of other previously known Brachiopoda has been extended beyond the zones to which they were supposed to be confined. My friend Mr. Davidson, to whose kind hints I have always been indebted in my study of the Brachiopoda, has shown the continuity of some species in the Carboniferous and Permian eras, a fact which has since been more fully noticed by Mr. J. W. Kirby, in the *Quarterly Journal of the Geological Society* for November last, and in the same number may be found the interesting conclusions arrived at by Messrs. Jones and Parker bearing on this point, and having reference to the extraordinary range of some of the Foraminifera.

The range of specific forms is a question to which the attention of palæontologists should be especially directed.

The following table gives a list of new genera and species I have within a few years been successful in adding to British Brachiopoda, all of which are from the secondary beds of Somersetshire, except the *Thecideum ornatum* and *T. pygmæum*, which are from Wiltshire.

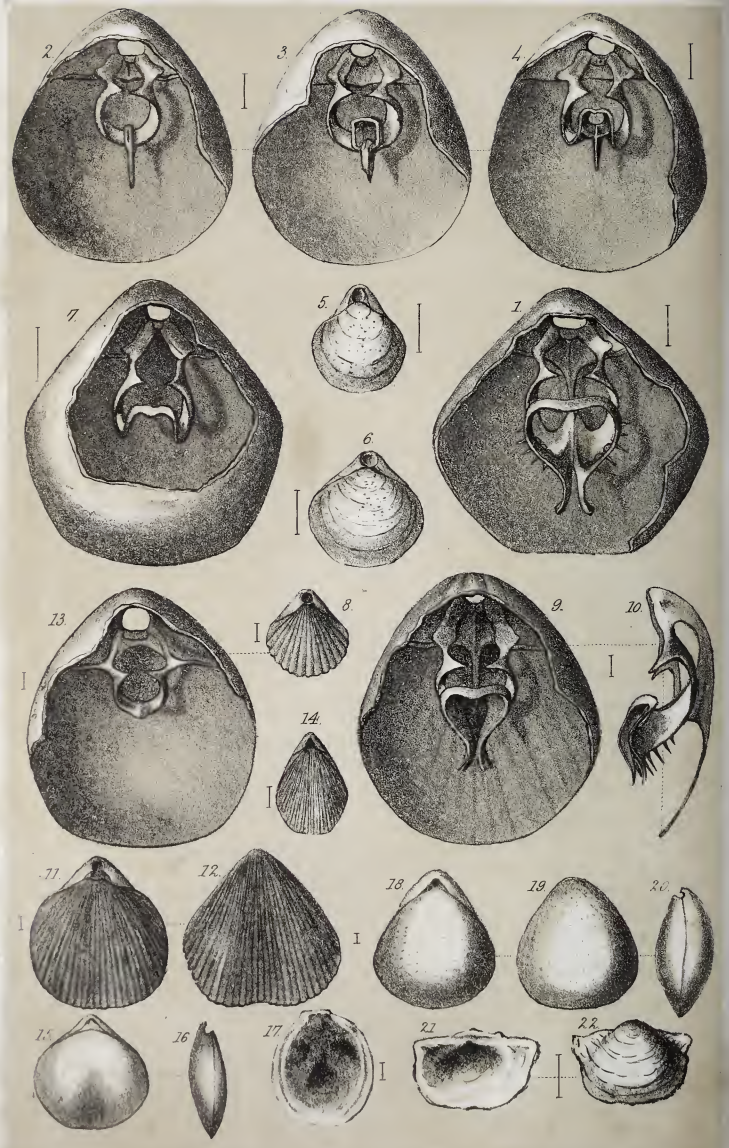
TABULAR VIEW OF ADDITIONS TO BRITISH SECONDARY BRACHIOPODA DISCOVERED BY THE AUTHOR, WITH THEIR STRATIGRAPHICAL DISTRIBUTION.

Genera and Species.	Authority.	Lower Lias.	Middle Lias.	Upper Lias.	Inferior Oolite.	Fuller's Earth.	Great Oolite.	Bradford Clay.	Coral Rag.
CRANIADÆ.									
Crania canalis	Moore				*				
——— *Ponsortii (?)*	Deslongchamps						*		
——— *Moorei*	Davidson			*					
——— *Sandersii*	Moore				*				
DISCINIDÆ.									
Discina Dundriensis	Moore				*				
——— *orbicularis*	Moore			*					
STROPHOMENIDÆ.									
Leptæna Bouchardii	Davidson			*					
——— *Davidsonii*	Deslongchamps			*					
——— *granulosa*	Davidson			*					
——— *liasiana*	Bouchard			*					
——— *Moorei*	Davidson			*					
——— *Pearcei (?)*	Davidson			*					
RHYNCHONELLIDÆ.									
Rhynchonella Bouchardii	Davidson			*					
——— *coronata (?)*	Moore			*					
——— *Lopensis*	Moore				*				
——— *Moorei*	Davidson			*					
——— *sub-concinna*	Davidson		*						
——— *sub-tetrahedra*	Davidson		*						
SPIRIFERIDÆ.									
Spirifera Ilminsterensis	Davidson			*					
——— *minuta*	Moore				*				
——— *Munsterii*	Davidson		*	*					
——— *oolitica*	Moore				*				

Most of the species found in the Great Oolite occur also in this zone.

TABULAR VIEW OF ADDITIONS TO BRITISH SECONDARY BRACHIOPODA, Continued.

Genera and Species.	Authority.	Lower Lias.	Middle Lias.	Upper Lias.	Inferior Oolite.	Fuller's Earth.	Great Oolite.	Bradford Clay.	Coral Rag.
TEREBRATULIDÆ.									
Terebratula Edwardsii ..	Davidson	..	*						
——— *globulina*	Davidson	..	..	*					
——— *Lycettii*	Davidson	..	..	*					
——— *minuta (?)* ..	Moore.....	..	..	..	..	..	*		
——— *Moorei*.....	Davidson	..	*						
——— *pygmæa*	Davidson	..	..	*					
——— *sub-punctata*	Davidson	..	*						
Terebratulina radiata	Moore.....	..	..	..	*	..	*		
Terebratella Buckmanii ..	Woodward....	..	..	..	..	..	*		
——— *furcata*	Sow. & Moore	..	..	..	..	..	*		
THECIDIDÆ.									
Thecideum Bouchardii....	Davidson	..	*	*	*				
——— *Deslongchampsii*	Davidson	..	..	..	*				
——— *Dickinsonii*....	Moore.....	..	..	..	*				
——— *duplicatum*	Moore.....	..	..	..	*				
——— *Forbesii*	Moore.....	..	..	..	*				
——— *granulosum*	Moore.....	..	..	..	*				
——— *Moorei*.....	Davidson	..	*						
——— *ornatum*	Moore.....	..	..	..	..	..	..	..	*
——— *pygmæum*	Moore.....	..	..	..	..	..	..	..	*
——— *rusticum*	Moore.....	..	..	*					
——— *serratum*	Moore.....	..	..	..	*				
——— *septatum*	Moore.....	..	..	..	*				
——— *triangulare*	D'Orbigny....	*	*	*	*	*	*	*	*
Zellania Davidsonii	Moore.....	..	..	..	*				
——— *globata*.....	Moore.....	..	..	..	..	..	*	*	*
——— *Laboucherei*.....	Moore.....	..	..	..	*				
——— *liasiana*	Moore.....	..	..	*					
——— *oolitica*.....	Moore.....	..	..	..	*				


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EXPLANATION OF PLATE I.

Fig.

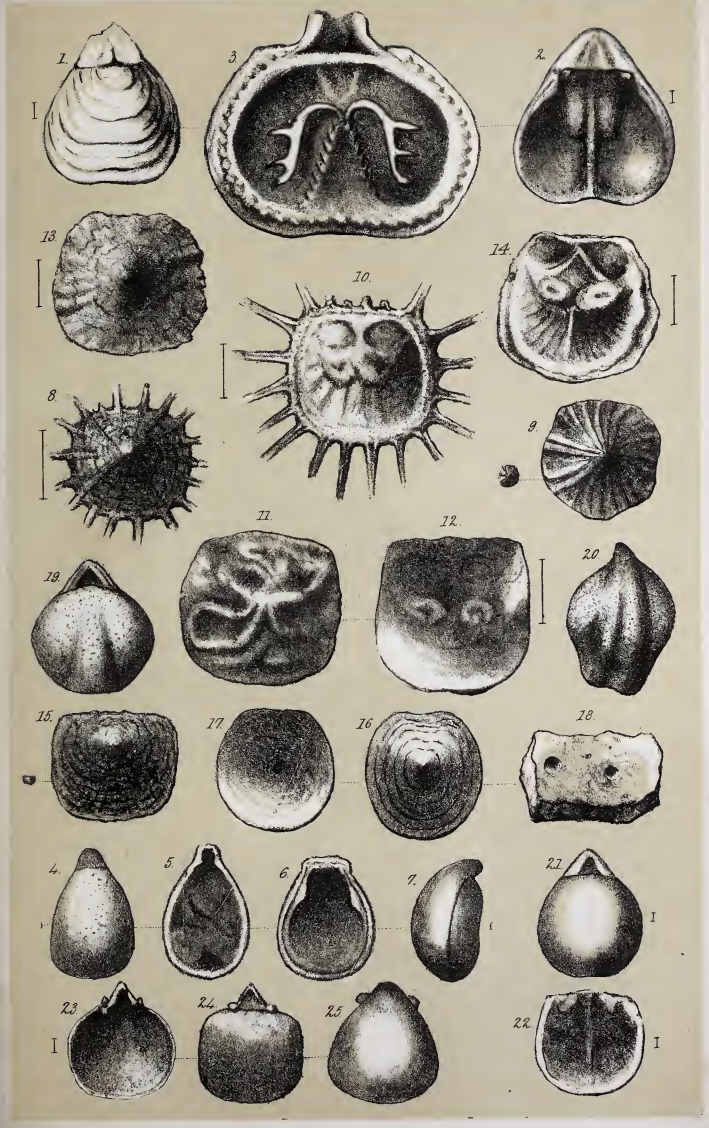
1. *Terebratella Buckmanii*, Woodward. Interior, showing the perfect loop.
2. ——— ———. Interior of shell much enlarged, showing the loop in its first stage.
3. ——— ———. Second stage of the loop, with a rudimentary reflected portion.
4. ——— ———. Third stage, with the reflected portion of the loop now developed.
5. ——— ———. Perfect shell, enlarged.
6. *Terebratula maxillata*, Sowerby. Young shell, enlarged.
7. ——— ———. Interior, exhibiting the loop.
8. *Terebratella furcata*, Sow. and Moore. Enlarged exterior.
9. ——— ———. Showing perfect loop.
10. ——— ———. Profile of ditto.
11. *Terebratulina radiata*, Moore. Perfect shell.
12. ——— ———. Exterior of ventral valve.
13. ——— ———. Interior, with loop.
14. ——— ———. Elongated variety, from Dundry.
15. *Zellania globata*, Moore. Much enlarged.
16. ——— ———. Side view of ditto.
17. ——— ———. Interior of dorsal valve.
18. *Zellania oolitica*, Moore. Perfect shell, much enlarged, showing punctuated structure.
19. ——— ———. Exterior of ventral valve.
20. ——— ———. Profile of shell.
21. *Leptæna Davidsonii*, Eug. Deslongchamps. Exterior, natural size.
22. ——— ———. Ventral valve, ditto.

The longitudinal lines indicate the sizes of the specimens, all of which are enlarged.

EXPLANATION OF PLATE II.

Fig.

1. *Thecideum ornatum*, Moore. Exterior of perfect shell enlarged.
2. ——— ———. Interior of ventral valve, showing raised oval processes and septum.
3. ——— ———. Interior of small valve, much enlarged, showing the serrated septum and the delicate loop for the support of the branchial membrane.
4. *Thecideum pygmæum*, Moore. Perfect shell much enlarged.
5. ——— ———. Interior of ventral valve.
6. ——— ———. Interior of dorsal valve, ditto.
7. ——— ———. Profile of perfect shell.
8. *Crania canalis*, Moore. Exterior of upper valve somewhat enlarged.
9. ——— ———. Young shell before possessing spinose expansions.
10. ——— ———. Enlarged restoration of interior of valve, showing the muscular impressions, and the grooved form of the spines.
11. *Crania Sandersii*, Moore. Exterior of shell.
12. ——— ———. Interior of valve, giving the position and form of the muscular impressions.
13. *Crania Ponsortii (?)*, Eug. Deslongchamps. Exterior of valve.
14. ——— ———. Interior of ditto.
15. *Discina Dundriensis*, Moore. Enlarged exterior of shell.
16. ——— *orbicularis*, Moore. Exterior of valve enlarged.
17. ——— ———. Interior of ditto.
18. ——— ———. Block, with specimens of natural size.
19. *Spirifera minima*, Moore. Perfect enlarged exterior.
20. ——— ———. Exterior of the ventral valve.
21. *Terebratula (?) minuta*, Moore. Perfect shell, enlarged exterior.
22. ——— ———. Interior of dorsal valve.
23. *Rhynchonella (?) coronata*, Moore. Enlarged dorsal aspect.
24. ——— ———. Interior, showing ventral aspect.
25. ——— ———. Exterior of ventral valve.


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