

XXI.—The Structure of *Turrilepas Peachi* and its Allies. By F. R. Cowper Reed, M.A., F.G.S. Communicated by Dr HORNE, F.R.S. (With a Plate.)

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Having had the privilege of examining the type specimens of *Turrilepas scotica*, Etheridge jun.,\* and *T. Peachi*, Etheridge jun. and Nicholson,† in Mrs GRAY'S collection, and in addition to them a large number of examples of the genus recently collected by Mrs GRAY from the Girvan area, as well as many specimens in the Sedgwick Museum, Cambridge, from several horizons in the Haverfordwest district and from the Dufton Shales near Melmerby and from Bala beds of other localities, some important new features have been recognised in these curious fossils which help to throw light on their structure and relations.

CLARKE‡ discussed in 1896 the relations of the genera *Turrilepas* (= *Plumulites*), *Lepidocoleus* and *Strobilepis*, but made no mention of these Scotch species of *Turrilepas* which differ in a marked way from *T. Wrightii* (De Koninck), which is the type of the genus. The latter species was described by Dr HENRY WOODWARD in 1865,§ and is from the Wenlock beds of Dudley.

RUEDEMANN|| has more recently given an account of the Trenton species, *Lepidocoleus Jamesi*, Hall and Whitfield, and has made some suggestive remarks on the associated narrow leaf-shaped plates.

In the case of the British examples of *Turrilepas* it is unfortunate that the specimens in nearly all cases consist of isolated plates, but amongst Mrs GRAY'S new material there is one nearly complete individual (Plate, fig. 1) from the Starfish bed with the plates in position, and it closely resembles the form described and figured by BARRANDE as *Plumulites folliculum* from Stage Dd<sub>2</sub>. Though its state of preservation leaves something to be desired, yet it affords important evidence as to the relation of the separate plates and the general structure of the fossil, and indeed casts doubt on the view that *Plumulites*, Barrande, and *Turrilepas*, Woodward (type *T. Wrightii*) are synonymous.

Before proceeding to describe this specimen a few remarks may be made on the character and structure of the separate plates of *T. Peachi*, and on the specimens previously described by ETHERIDGE and NICHOLSON. These authors described the kite-shaped plates as possessing a "strong, narrow median keel." From an examination of

\* ETHERIDGE jun., *Proc. R. Phys. Soc. Edin.*, 1878, iv. p. 166, pl. ii., figs. 1, 2; ETHERIDGE and NICHOLSON, *Mon. Silur. Foss. Girvan*, fasc. ii., 1880, p. 214, pl. xiv., figs. 22-27.

† ETHERIDGE and NICHOLSON, *Mon. Silur. Foss. Girvan*, fasc. iii., 1880, p. 301, pl. xx., figs. 8-10.

‡ CLARKE, *Amer. Geol.*, xvii., 1896, pp. 137-143, pl. vii.

§ WOODWARD, *Quart. Journ. Geol. Soc.*, xxi., 1865, p. 486, pl. xiv., figs. 1a-1l.

|| RUEDEMANN, *Bull. 49 New York State Mus.*, 1901, p. 87, pl. 4, figs. 16-19.

the type specimen\* and other examples from the same horizon and locality, it is abundantly clear that this "keel" is really a narrow longitudinal sharp fold appearing on one side as a ridge or keel and on the other side as a groove. RUEDEMANN (*op. cit.*, pp. 88, 89) likewise has noticed that the apparent carina in *Lepidocoleus Jamesi* is the reverse side of a groove. In *T. Peachi* the groove, or rather fold, is on the outer side of the plate, and as it is the substance of the lamellated plate itself which is folded, the lamellæ are affected; there is not the least evidence of the presence of a median rod or anything resembling the main rib of a leaf such as ETHERIDGE and NICHOLSON indicated in their figures of *T. Peachi* and *T. scotica*, and described as a ridge-like keel. In both species the lamellæ which compose the plates are of regular and equal size, and the longitudinal fold which has been mistaken for a keel traverses them at right angles and is not strictly in the middle of the plate. Moreover, all of the kite-shaped plates in the type of *T. Peachi* show a narrower, less deeply impressed fold or groove above the main one, usually about half-way between it and the anterior margin, running similarly to the apex parallel to the edge of the plate. This groove is stronger in some detached plates than in the type. It should also be noticed that the lamellæ on the upper (anterior) half of the plates, *i.e.* above the median fold, do not curve forward so sharply or overlap to such an extent marginally as on the lower (posterior) half, but meet the upper margin nearly at right angles instead of at a very acute angle. This cannot be seen in the specimen figured by ETHERIDGE and NICHOLSON (*op. cit.*, fig. 8), as it is the inner surface of the series of plates which is exposed to view; for the plates themselves overlap from behind forwards in such a way that the anterior half of each plate lies above the posterior half of the preceding plate, so that the anterior portions of all the plates are consequently hidden in an inner view of the series. (Plate, fig. 4.)

*T. Peachi* is the only species from Girvan in which the plates have been found in natural serial position, and in the type specimen from Whitehouse Bay (Plate, fig. 4) there are five pairs of the kite-shaped plates present, though only those on the right side are well preserved. The longer axes of the plates in this specimen are inclined at about 75° to the axial line of the body of the fossil; in the other figured specimens (*op. cit.*, figs. 9, 10) the divergence of the lateral plates becomes progressively less towards the anterior end of the body, as ETHERIDGE and NICHOLSON remarked. The apical ends of these lateral plates are free, and in the type the surface of each plate seems not to be quite flat but to have weak broad longitudinal undulations, as well as the two sharp folds. In specimens such as this one, showing the true inner surface of the plates, the lamellæ are usually less obvious than on the outer surface. Portions of the thin calcareous shell are still adhering in many cases.

An important feature, not described or accurately figured by ETHERIDGE and NICHOLSON, is distinctly traceable in the oft-quoted type-specimen of *T. Peachi* here figured. This consists in the presence of a double median longitudinal row of strongly overlapping plates between the bases of the lateral kite-shaped plates. The plates of

\* ETHERIDGE and NICHOLSON, *op. cit.*, pl. xx., fig. 8.

these two longitudinal rows are arranged in pairs and lie on the outer surface of the body, and therefore are partly hidden by the bases of the lateral plates in this inner view of the series. The bases of the median plates appear to lie on a level with the anterior narrow fold of the lateral plates, over which they extend laterally for one-fourth to one-third their length. The plates are of an oblique subtriangular shape with their apices directed forward, and they are in contact in the middle line by their inner edges. The base of each plate is broad, rounded and sinuous, being somewhat excavated in the middle, and thus divided into an outer broadly-rounded lobe and an inner subequal one, so far as can be seen. The inner basal angle is rounded and curves sharply forwards, so that the pairs of plates meet medianly in a series of acute angles. Owing to the strong overlapping of the successive plates in each longitudinal series the apices are not clearly seen; but judging from isolated plates and other specimens the shape of the plates was broad and short, with an apical angle of about  $60^\circ$ . The overlapping is of the same nature as that of the lateral plates, the posterior ones successively overlapping the anterior ones, so that in an inner view, as in the case of the type specimen (Plate, fig. 4), the apices are hidden. The surface of each plate is marked by regular equal lamellæ like the lateral plates, but they are concentric to the sinuous base, and there is no sharp narrow median fold, but a gentle, low, rounded submedian undulation traverses the plate longitudinally to the apex. The plates seem to be flattened and not markedly convex or angulated, though this appearance may be due to crushing of the specimen.

The specimens of *Turrilepas* from the Drummuck beds and Starfish bed of Thraive Glen (Plate, figs. 1–3a) seem to be specifically identical with those from Whitehouse Bay, and may be referred without much hesitation to *T. Peachi*. On one slab in Mrs GRAY's collection there are seven or eight of the kite-shaped plates associated, but not in natural serial position, and they show all the usual characters; two or three of the median plates in an imperfect condition occur along with them.

A very well-preserved isolated median plate from Thraive Glen (Plate, fig. 2) measures 6 mm. in length and nearly 7 mm. in breadth. The base is divided into two broad rounded lobes, of which the inner one is rather larger, and with the inner edge of the plate forms a continuous rounded curve. The outer edge (hypotenuse) is nearly straight, and slopes obliquely back from the apex, which has an angle of about  $75^\circ$ . A low submedian longitudinal fold traverses the length of the plate from the apex to the basal marginal sinus. The lamellæ on the outer half of the plate are rather wider apart and less crowded, as well as less sharply curved, than those on the inner half.

The most interesting specimen from the Upper Bala of Girvan is the nearly complete individual from the Starfish bed (Plate, fig. 1). This has all the lateral plates in position, and though their surface is poorly preserved and the median plates are only here and there fairly distinct, yet the whole structure and relation of the plates can be made out, and it is seen to resemble in a strikingly close manner the specimen represented by BARRANDE\* as an adult example of *Plumulites folliculum* from Stage Dd<sub>2</sub>. The posterior end of our

\* BARRANDE, *Syst. Silur. Bohème*, suppl. vol. i., 1872, p. 573, pl. xx., fig. 15.

specimen is imperfect, but the general outline of the body is an elongated oval, with a very weakly convex surface, slightly carinated longitudinally down the middle. It is composed of a double series of overlapping plates, like the scales of a fir-cone, with their surface replaced by a film of yellow oxide of iron, just as BARRANDE described in his specimens, but where this has broken away we can see the transverse lamellæ of the plates, as in the typical examples of *Turrilepas*. The lateral plates composing the body are arranged in pairs in two longitudinal series on opposite sides of the median line, and their longer axes are inclined obliquely to this line, pointing forwards and making an angle of about  $60^\circ$  in the posterior part of the body, but the angle becomes increasingly more acute towards the anterior end till the last pair forming the apex make an angle of only  $10^\circ$ – $15^\circ$  and have their axes slightly curved inwards. The arrangement of the plates in pairs is rather obscured, owing to the poor preservation of the fossil, and it is impossible to determine the precise number, but there seem to be ten or eleven. Towards the anterior end they are more closely placed together, and overlap to a greater extent. The plates have the usual kite-shaped outline, but their margins are more or less broken, and they overlap in the usual way from behind forwards. They become rather narrower and more elongated in shape towards the anterior end of the body, and their apices are freer for a greater part of their length, while the more slender tapering shape of the last two or three pairs gives to them the appearance of spines. In all the posterior plates which are sufficiently preserved the usual submedian sharp fold is seen, but in the foremost two or three elongated plates there are in addition two very narrow submarginal folds, one on each side of the median line. The same feature is noticeable in some isolated plates from the same horizon and locality, and seems to characterise the terminal plates. The two rows of median plates can be traced only in places in this specimen and for the most part are obscure, but the general shape of the plates and their arrangement agree with what is seen in the Whitehouse Bay type-specimen.

The variation in the shape of the lateral plates is seen to be due to their different positions in the series composing the body; and probably some corresponding change occurs in the median series, as is suggested by isolated plates. The anterior lateral plates in the specimens of *T. Peachi* figured by ETHERIDGE and NICHOLSON (*op. cit.*, figs. 9, 10) are much less well preserved than the figures would lead us to infer, and no definite conclusions can be drawn from them, but they do not seem to be so attenuated as in the example from the Starfish bed (Plate, fig. 1). There is no evidence of the body being completely surrounded by plates, and the nature of the ventral side of the organism is unknown, but it may have been only membranous.

In consequence of the re-examination of the type-specimens of *T. Peachi* and the evidence afforded by the specimen from the Starfish bed, it appears that a certain amount of revision of ETHERIDGE and NICHOLSON'S definition of the species is necessary; and in place of their summary of the specific characters the following may be substituted. It must still be somewhat incomplete, owing to the nature of the material available, but it marks a step forward in the comprehension of this peculiar organism.

*Definition.*—Body elongated oval, bilaterally symmetrical; dorsal side gently convex, subcarinate longitudinally, composed of two lateral series of large plates arranged in pairs and two median rows of small plates in contact in median line, and also in corresponding pairs. Shell thin, calcareous. Lateral plates kite-shaped, slightly curved, with pointed apex, but varying somewhat in shape according to their position, with their longer axes making nearly a right angle with the median carina of the body in the posterior part of the organism, but becoming less and less steeply inclined anteriorly till they lie nearly parallel at the anterior end. Surface of lateral plates marked by narrow submedian fold along their length and usually a narrower, less impressed one on their anterior half, both appearing as grooves on the outer surface and as ridges on the inner surface of the plates; [the most anterior pairs may have an anterior submarginal and a posterior submarginal narrow fold in addition to the submedian one, which is always the strongest]. Surface of plates crossed by regular transverse equal, closely placed and equidistant, imbricating lamellæ at right angles to main fold and meeting the anterior edge at a large angle, but curved forwards sharply towards the apex near the posterior edge of the plate and more closely crowded together. Apex of lateral plates more or less pointed and curved forwards; anterior edge slightly concave, posterior edge more or less convex; base broadly rounded, convex. Bases of opposite lateral plates nearly in contact. Successive plates overlap from behind forwards for about half their width, but their apices are free.

Median plates arranged in a double longitudinal series, with their inner edges in contact along carina of body. Shape of plates short, broad, subtriangular, with sinuated rounded base, long hypotenuse, more or less arched perpendicular; apices directed forwards and overlapping considerably from behind forwards. Surface of plates marked by one or two low submedian longitudinal folds from apex to base and by regular equal transverse imbricating lamellæ concentric to base, meeting hypotenuse at large angle but curving forward sharply at inner angle concentrically to inner edge of plate and more closely crowded together. Terminal plate single, subcircular, emarginate. (See Addenda.)

Specimens of kite-shaped plates from the Shoeshook Limestone and Redhill Shales of the Haverfordwest area seem indistinguishable from Girvan examples of *T. Peachi*, and probably it is the same species which occurs in the Staurocephalus Limestone and Ashgill Shales of the Lake District. The genus is also represented, perhaps by the same species, in the St Martin's beds of the neighbourhood of Haverfordwest.

With regard to *T. scotica* only isolated plates are known, but they belong to both the lateral kite-shaped series and to the median triangular rows. No associated series in position is yet known. ETHERIDGE and NICHOLSON mention only Balclatchie as the locality at which this species is found, but it occurs in the same beds at Ardmillan and Dow Hill, and Mrs GRAY has many excellent examples of it from the latter place. In the specimens of the lateral plates figured by ETHERIDGE and NICHOLSON (*op. cit.*, pl. xiv., figs. 22, 23, 24) the weak narrow fold between the median one and the anterior margin of the plate is not so strongly marked as in *T. Peachi*, but in one specimen from

Dow Hill there are present the two narrow submarginal folds, one on each side of the median one close to the edges (Plate, fig. 7), as in the complete individual of *T. Peachi* from the Starfish bed.

The slender attenuated apex of the kite-shaped plates (Plate, fig. 12) and the broader, more rapidly tapering form of the plates, is a more or less marked distinction from *T. Peachi*; the curvature of the plates depends on what part of the series they come from, and cannot be considered a constant or reliable specific difference, but the lamellæ are more numerous and closer together than in *T. Peachi* and meet the anterior margin at nearly a right angle, while they curve forwards sharply towards the apex on the posterior margin of the plate (Plate, figs. 9, 11, 12).

The isolated triangular plates which may be referred to the median series (e.g. ETHERIDGE and NICHOLSON, *op. cit.*, pl. xiv., fig. 26) are much like those of *T. Peachi*, but usually have a more distinct and broader rounded longitudinal groove on each side of the rounded median fold or undulation (Plate, fig. 8).

The plate with the rounded apical end figured by ETHERIDGE and NICHOLSON from Balclatchie (*op. cit.*, pl. xiv., fig. 27) is also represented amongst Mrs GRAY's specimens from Dow Hill (Plate, fig. 10), and as the pointed kite-shaped ones have been shown to belong to the anterior end of the body in *T. Peachi*, it is probable that this rounded plate belongs to the posterior end. It must be regarded as one of the kite-shaped, lateral series on account of its median sharp fold, though its apex has been modified. As ETHERIDGE and NICHOLSON pointed out (p. 215), such a plate with an obtuse apex was called by BARRANDE (*op. cit.*, p. 567) the "Valve fenestrée" (= "cancellated plate"), but they did not remark that this plate from Balclatchie differs from all the other plates of *T. scotica* by being bilaterally symmetrical. The median fold in it is truly placed in the middle; it ends abruptly in the subcircular depression round which the lamellæ curve. The lamellæ are parallel to each other and at right angles to the median fold, and curve forward very slightly (but to an equal extent on each side near the margin), while at the front end they sweep round in a circle and unite around the depression at the end of the median fold. Until a complete individual is found the true relation of this plate to the others cannot be determined. The same may be said of the strongly convex small triangular plate, such as ETHERIDGE and NICHOLSON figured on pl. xiv., fig. 25. This plate (Plate, fig. 13) has a thick calcareous shell preserved, and the whole surface is strongly bent down on each side of the median line; it is asymmetrically triangular, and if flattened would be referred to the left row of the double median series. It is difficult to realise its relation to the rest of the plates on the body, as they all seem to be more or less flattened. In shape and convexity it much resembles the plates of the type of the genus, *T. Wrightii*, from the Wenlock. As the similarly shaped plates of *Turrilepas* from the *Orthis argentea* zone of Haverfordwest and from the Dufton Shales have an intermediate convexity, it seems likely that the much flattened condition of the plates is largely due to the thinness of the shell or to crushing, or to both combined. It should be mentioned also that in this convex specimen from Balclatchie

the lamellæ are not curved forward near the margins, but meet them nearly at right angles, and the base also is not sinuated. Probably the difference in the shape of the plate and the want of curvature in the lamellæ is connected with its position in the median series; or it may be the case that in *T. scotica* part of the axial line of the body is more strongly carinated and the plates therefore more strongly folded, or they may overlap in the middle line.

A large triangular convex plate from Dow Hill (Plate, fig. 6) resembles this strongly folded plate in some respects, but it is much larger than any others referable to *T. scotica*, and differs in certain ways from the type. It measures 14 mm. long and 10 mm. wide at the base; it is irregularly triangular in shape, with the axial line somewhat curved and the apex bent inwards to the shorter inner side; the surface is strongly convex, the plate being folded sharply along a slightly curved line nearer the inner than the outer border; the inner slope is short, steep, and slightly excavated, but the outer one is gently inclined, gently convex, and more than twice as wide as the inner face, and has a very shallow longitudinal median depression running back from the apex to the weak sinus in the base of this face. The whole base of the plate is angulated at the fold, the inner part sharply curving forward at about  $45^\circ$  and passing into the inner margin of the plate, while the outer part of the base slopes forward obliquely with a sinuous outline at about  $75^\circ$  to the ridge, and has a broadly rounded outer angle. The lamellæ, which cross without interruption the whole surface of the plate, are numerous, parallel and equal, but are more closely crowded on the inner face and concentric to the inner margin, while on the outer face they are less closely placed, are concentric to the sinuated base, and meet the outer edge at about  $60^\circ$ .

Probably this plate belongs to the median series of the body, but it can only be doubtfully referred to *T. scotica*.

The only other representatives of *Turrilepas* which I have seen from the Girvan district come from the Middle Llandoverly of Newlands. The small imperfect isolated kite-shaped plates and fragmentary median plates are too poor for description or identification with any described species.

The species of *Turrilepas* from the *Orthis argentea* zone of Haverfordwest is only known to me by median plates, which, however, are rather numerous in Prendergast Lane and are well preserved. They are short, broad, and irregularly triangular, with an apical angle of  $60^\circ$  to  $75^\circ$ ; they are as broad as long, and are divided by a broad rounded or angulated fold into very unequal halves; the inner face is steeply inclined and narrow, the outer face is flattened and nearly three times as wide. The base is slightly sinuated, and the lamellæ, which are closely placed, meet the outer edge nearly at right angles. From numerous internal casts it is seen that the interior of these plates has a smooth surface. No kite-shaped plates from these beds have come under my notice.

The species of *Turrilepas* from the Dufton Shales of Melmerby is represented mostly by small, short, broad, triangular plates of the median series, but a few imperfect kite-

shaped plates have been found. The material is too imperfect for specific description, but the form seems allied to *T. scotica*.

From the above description of fairly perfect specimens of *Turrilepas Peachi* from Girvan it seems legitimate to doubt if this and its allied species are congeneric with *T. Wrightii*, if we strictly adhere to Dr WOODWARD's original description of the type. Clarke has remarked on the want of definiteness in our knowledge of the latter, but the specimen of *T. Wrightii* seems to be referable to the peduncular part of the barnacle. The question arises whether we are to regard the fossils mainly built up of the kite-shaped plates as the capitular portion of the same genus. The structure as now revealed does not seem to commend this theory, and though one may be unwilling to go back to the old idea of the fossil belonging to the polyplacophorous molluscs, yet it is difficult to maintain its reference to *Turrilepas* in its strict sense. On the other hand, it seems to bear a considerable resemblance to the genus *Strobilepis* of CLARKE\* from the Hamilton Group of New York, which is described as having four vertical rows of plates, *i.e.* two lateral rows of large plates symmetrically disposed and an intermediate ventral and dorsal single series; the ventral series consists of spines. Our forms differ by having a double instead of a single dorsal series, and the ventral surface is unknown; but otherwise there are some striking points of similarity in the regular arrangement of the plates and the symmetrical shape of the fossil as seen in a dorsal view, and CLARKE is not quite satisfied as to the true position of the ventral row of spines.

With regard to foreign species referable to the same genus as *T. Peachi* and *T. scotica*, it may be mentioned that the plate described under the name of *T. canadensis*, WOODWARD,† from the Utica States of Canada, bears a close resemblance to the form from the *Orthis argentea* beds of Haverfordwest. *T. Mitchelli*, Etheridge jun.,‡ from the Wenlock beds of New South Wales, is known by kite-shaped, "cancellated," and median plates, according to the published figures, but ETHERIDGE thinks the median plate represents another species. The several allied Bohemian species, described by BARRANDE as *Plumalites*, are referred to by ETHERIDGE and NICHOLSON in their accounts of the Girvan species, and there is no need to discuss them again here.

The latest known species, stratigraphically, which have been described are those from the Hamilton Group of New York.§ Most of them are founded on isolated plates which possess either the shape of the median plates of *T. Peachi* and *T. scotica* or the so-called "cancellated plates" of the latter; no typical kite-shaped plates have been described. The conical, strongly folded plate of *T. (?) Newberryi* (CLARKE, *op. cit.*, p. 219, pl. xxxvi., fig. 16) much resembles the figured one referred by ETHERIDGE and NICHOLSON to *T. scotica* (ETHERIDGE and NICHOLSON, *op. cit.*, pl. xiv., fig. 25) which has been discussed above; and CLARKE remarks how widely this differs from the plates

\* CLARKE, *Palæont. New York*, vol. vii., 1888, p. 212, pl. xxxvi., figs. 20-22; *Amer. Geologist*, xvii., 1896, p. 138, pl. vii., figs. 11, 12.

† WOODWARD, *Geol. Mag.*, Dec. iii., vol. vi., 1889, p. 274, woodcut.

‡ ETHERIDGE jun., *Geol. Mag.*, Dec. iii., vol. vii., 1890, p. 337, pl. xi., figs. 1-5.

§ CLARKE, *Palæont. New York*, vol. vii., 1888, pp. 215-220, pl. xxxvi., figs. 1-19.



termed *Plumulites* by BARRANDE and from the other New York species, and expresses his difficulty in understanding how "the combination of these sub-conical bodies in vertical ranges could produce such a scaly peduncle or capitulum as existed in *Turrilepas*." But *T. Wrightii*, the type of the genus, consists of such plates. Consequently, it is obvious that much uncertainty exists as to the true reference and relations of such isolated plates, and it has not been lessened by the suggestion that some properly belong to Cystideans. We must wait for further and better material before we can hope to clear up all the difficulties connected with these curious organisms, but it is felt that with regard to *T. Peachi* and *T. scotica* we have now made some advance in the knowledge of their structure, however much it may affect our views as to their generic reference and zoological affinities.

ADDENDA.

Since the above was written, two specimens have been sent me by Mrs GRAY, which probably represent the single terminal plates of the paired median series of plates in both *T. scotica* and *T. Peachi*. The specimen from Balclatchie (Plate, fig. 14) shows a small subcircular flattened plate with a shallow median notch in its posterior (?) margin, lying near the end of a somewhat disarranged series of the usual triangular plates attributed to the median series of *T. scotica*. The other, from Whitehouse Bay (Plate, fig. 15), is a plate of similar shape, but rather more emarginate and with stronger concentric striation and possessing a group of 3-4 rugæ radiating from the centre to the margin opposite the notch; it may probably belong to *T. Peachi*. Another example of the latter species from the same locality, having the anterior part of the body preserved, shows that the arrangement and shape of the lateral plates at this end is the same as in the figured specimen (Plate, fig. 1) from the Starfish bed. In connection with the occurrence of the genus as defined by WOODWARD, it should have been mentioned that AURIVILLIUS has recorded it from the Silurian of Gotland (*Bihang till K. Svenska Vet. Akad. Handl.*, Bd. 18, iv., No. 3, 1892, p. 20). The genus has also been recognised by the present author amongst some Silurian fossils recently collected in the Northern Shan States, Burma, by the Geological Survey of India.

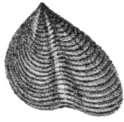
EXPLANATION OF PLATE.

- Fig. 1. *Turrilepas Peachi*, Eth. jun. and Nich. Nearly complete individual (slightly restored). × 4. Starfish bed.
- " 1a. " " " " Transverse section of same specimen.
- " 2. " " " " Median plate. × 2. Thraive Glen.
- " 3. " " " " Lateral plate, inner surface. × 3. Starfish bed.
- " 3a. " " " " " outer surface. × 4. Starfish bed.
- " 4. " " " " Inner surface of portion of body, showing lateral and median plates (figured by ETH. jun. and NICH., *Mon. Silur. Foss. Girvan*, pl. xx., fig. 8). × 5. Whitehouse Bay.
- " 5. " " " " Median plate. × 3. Whitehouse Bay.

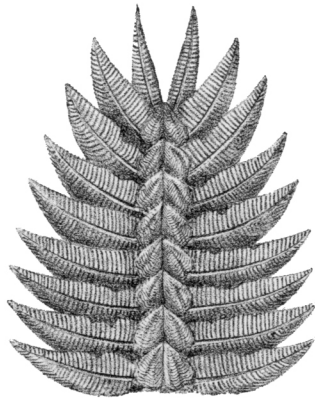
- Fig. 6. *Turrilepas* sp. Carinated median (?) plate. × 2. Dow Hill.
- „ 7. *Turrilepas scotica*, Eth. jun. Lateral plate. × 6. Dow Hill.
- „ 8. „ „ „ Median plate. × 4. Dow Hill.
- „ 9. „ „ „ Lateral plate, outer surface. × 6. Dow Hill.
- „ 9a. „ „ „ „ „ reverse of same specimen. × 6.
- „ 10. „ „ „ „ “Cancelled plate.” × 6. Dow Hill.
- „ 11. „ „ „ Lateral plate, outer surface (figured by ETH. and NICH., *op. cit.*,  
pl. xiv., fig. 23). × 6. Balclatchie.
- „ 12. „ „ „ Lateral plate, inner surface (figured by ETH. and NICH., *op. cit.*,  
pl. xiv., fig. 22). × 6. Balclatchie.
- „ 13. „ „ „ Median (?) plate (figured by ETH. and NICH., *op. cit.*, pl. xiv., fig. 25).  
× 5. Balclatchie.
- „ 14. „ „ „ Median plates with supposed single terminal plate. × 3. Balclatchie.
- „ 14a. „ „ „ Same terminal plate. × 8.
- „ 15. *Turrilepas Peachi*, Eth. jun. and Nich. Supposed single terminal plate. × 3. Whitehouse  
Bay.



1a. x4



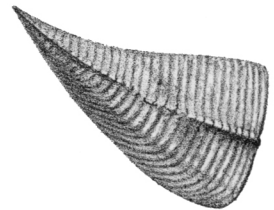
2. x2



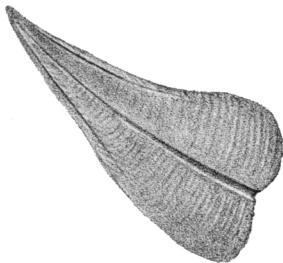
1. x4



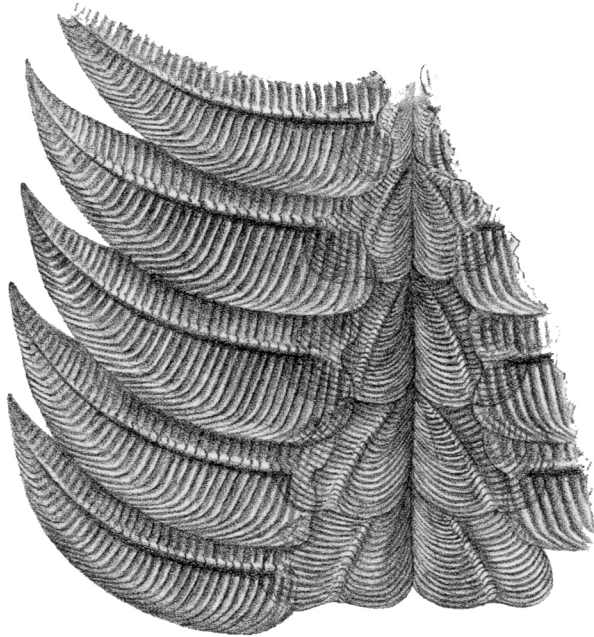
5. x3



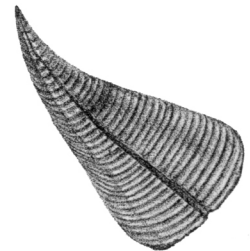
3. x3



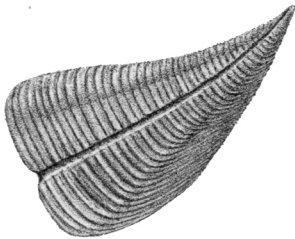
7. x6



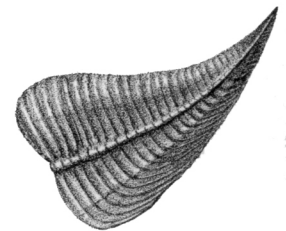
4. x5



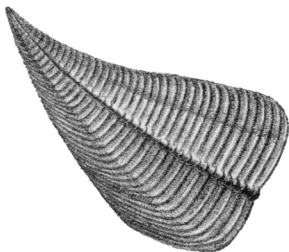
11. x6



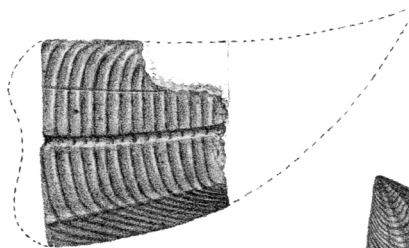
9. x6



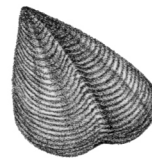
12. x6



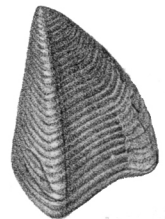
9a. x6



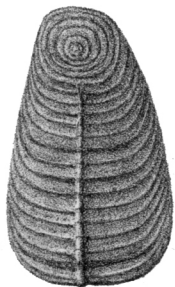
3a. x4



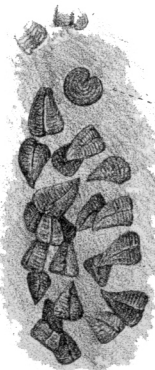
8. x4



6. x2



10. x6



14. x3



14a. x8



13. x5



15. x3