

X L M O L L U S C A, I V: H E L I C I D A E.

G E N U S P L E C T O P Y L I S.

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(Plates xli, xlii).

A small number of shells of the genus *Plectopylis* from the Abor country has been kindly entrusted to me for examination. They were collected for Lt.-Col. Godwin-Austen by Lieut. G. F. T. Oakes, R.E., who accompanied the Abor Expedition as officer in charge of the Survey Party, and all proved to be new to science. Although the number of shells is small, they comprise no less than seven species, two of them, unfortunately, being represented by unique specimens. One species is of special interest owing to the fact that it is a member of the section *Sinicola*, not previously known to occur within the limits of the Indian region.

***Plectopylis*, Benson (1860).**

***Plectopylis (Endothyra) oakesi*, sp. n.**

(Pl. xli, figs. 1, 1a, 1b, 1c, 1d).

Shell sinistral, discoid, corneous, widely umbilicated, finely and regularly ribbed, the ribs decussated by raised spiral lines. Whorls 7, increasing slowly and regularly, the last not dilated towards the mouth, slightly constricted behind the peristome, shortly and rather suddenly deflexed in front, angulated above and around the umbilicus, rounded at the periphery. Suture linear, apex slightly raised. Aperture oblique, subrotundate; peristome slightly thickened and reflexed, the margins united by a slightly raised sinuous ridge, which has a slight notch at the junctions with the peristome above and below.

The parietal armature consists of a single strong, slightly oblique transverse plate which gives off a short horizontal ridge posteriorly above, the lower extremity is somewhat dilated and notched, and gives off posteriorly a short ridge and anteriorly a long thin fold, which runs parallel with and close to the lower suture, joining the parietal ridge at the aperture. The palatal armature is very complicated and consists of: 1°, a short slight horizontal sinuous fold close to the upper suture; 2°, a short stout transverse fold with posteriorly a slight denticle and anteriorly an elongated slender horizontal fold, raised in the middle; 3°, a stout transverse fold, concave posteriorly and giving off

anteriorly from the upper extremity a thin horizontal fold, which is provided below its anterior extremity with an elongate sinuous denticle; 4°, a similar transverse concave fold with an anterior horizontal fold, notched at the junction and curving upwards, the denticle more distant from the anterior extremity; 5°, a sinuous transverse fold, its upper extremity deflexed posteriorly and its lower extremity deflexed anteriorly, with a short horizontally elongated denticle close to the lower extremity and provided on the anterior side, in a line with its upper extremity, with an elongated denticle, slightly curved downwards anteriorly, below the latter occurs a short curved fold, its anterior end descending, and below this again another horizontally elongated denticle in a line with the denticle below the lower extremity of the transverse fold; 6°, a slight sinuous horizontal fold close to the lower suture, its posterior extremity slightly ascending.

Major diam. 12.5, minor 11 mm.; alt. 5 mm.

Hab.—Yamne Valley, Abor Hills and Sibbum (Oakes).

Type No. 3125 *Brit. Mus.*; Nos. 6128 and 6130 Renging and Rotung (*Kemp*) in *Ind. Mus.*

This new species greatly resembles *P. pinacis*, but the last whorl of the latter is more sloping towards the umbilicus and does not descend in front, while the umbilicus is also more perspective. In the armature considerable difference exists, more especially in the palatal barriers, which are very complicated in the new species. Five specimens, bleached and much worn, were collected. A single specimen taken between Riu and Singging, on the Dihang River, I refer to the same species. It is in much better condition and is larger than the Yamne Valley shells, measuring 14.5: 12.75: 5.5 mm. The species is named after Lieutenant G. F. T. Oakes, the officer in charge of the Survey Party, who collected the shells.

Plectopylis (Endothyra) gregorsoni, sp. n.

(Pl. xli, figs. 2, 2a, 2b, 2c, 2d).

Shell sinistral, depressed conoid, almost discoid, dark corneous, polished below, widely and perspectivevely umbilicated, the last quarter of the last whorl receding still further below, exposing half the width of the penultimate whorl; finely and regularly ribbed, the ribs decussated by spiral ribs, giving the shell a reticulated appearance on the upper side, the spirals being less distinct at the side and disappearing at the periphery, below which the transverse ribs also begin almost to disappear. Whorls 5, increasing slowly and regularly, flattened above, a little convex at the side, steeply sloping towards the base, the last whorl scarcely dilated at the mouth, very shortly and slightly deflexed in front, angulated above, subangulated around the umbilicus, the portion between the upper angulation and the periphery encircled by three, about equidistant spirals. Spire depressed, suture linear, apex a little raised. Aperture oblique, subhastate, peristome white, thickened, and slightly reflexed; margins approximat-

ing, the upper horizontal and slightly arched, the outer straight and obliquely descending, basal curved, columellar straight, ascending.

The parietal armature consists of a single, slightly oblique, transverse plate, truncate below, where it is also slightly dilated anteriorly, with a very slight anterior support at its upper extremity, and posteriorly with two slight very low ridges, one each near its two extremities, the upper obliquely descending and the lower obliquely ascending towards the transverse plate. Below the latter occurs a very short, slight, horizontal fold with a second, still shorter fold posteriorly to it. The palatal armature consists of six spiral folds; the first short and slight, horizontal, near the upper suture; the next four stouter and more elevated, the second obliquely descending backwards, its posterior extremity bifurcate; the third nearly horizontal, its anterior extremity slightly bifurcate; the fourth and fifth obliquely descending backwards, their anterior extremity also slightly bifurcate; the sixth short, slight, horizontal, near the lower suture.

Major diam. 7.25, minor 8.5 mm.; alt. 3.5 mm.

Hab.—Yamne Valley, Abor Hills (*Oakes*).

Type No. 3124 *Brit. Mus.*

Its nearest relative is *P. macromphalus*, but it differs from, that species in having the palatal barriers in one series, instead of two, and it therefore stands in the same relation to its ally as does *P. sowerbyi* to *P. plectostoma*. It is also considerably larger. The new species is named in commemoration of Dr. Gregorson, Medical Officer, with Mr. Noel Williamson, who were both murdered in 1911 in the Abor country.

***Plectopylis (Endothyra) miriensis* (G.-A. MS.), sp. n.**

(Pl. xli, figs. 3, 3a, 3b, 3c, 3d).

Shell sinistral, discoid, pale yellowish-corneous, widely umbilicated, the 3 nepionic whorls nearly smooth and shining, the remainder covered with raised spiral lyrae, the interstices finely and closely transversely striated. Whorls $6\frac{1}{2}$, increasing slowly and regularly, the last slightly dilated towards the mouth, not constricted behind the peristome, slightly descending and shortly deflexed in front, angulated above, slightly compressed below the angulation, the underside convex. Spire almost plane, apex projecting, suture channelled. Aperture oblique, rhomboid-auriculate; peristome white, thickened and reflexed, the margins united by a thin callus on the parietal wall, without a ridge, but with the edge crenulated, owing to the prominent spiral lyrae; slightly notched at the lower junction with the peristome.

The parietal armature consists of a short transverse plate, its lower extremity a little obliquely deflexed towards the mouth, provided anteriorly with a short, almost horizontal ridge below, and an obliquely descending ridge above, a little stouter and longer than the lower; below the plate occurs a short thin bilobed

fold, close to, and parallel with the lower suture and continued posteriorly and anteriorly into a very slender fold, the posterior portion about 3 mm. in length, but the anterior part running as far as the edge of the parietal callus. On the posterior side of the plate occur two denticles, one in a line with the upper, and the other even with the lower extremity.

The palatal armature consists of: 1°, a short, low, horizontal fold near to and parallel with the upper suture; 2°, a longer; stouter fold, its anterior portion horizontal, next curving downwards in a semicircle, and its posterior portion again horizontal, terminating in a bifurcation; between the first and second folds occurs a slight denticle, elongated horizontally; 3° and 4°, two similar folds, but only their anterior portion nearly horizontal, their posterior portion deflexed obliquely downwards, with an obtuse angle; 5°, a fold similar to the preceding two, but shorter; and 6°, a short, slight, nearly horizontal fold, close to the lower suture; a low, transverse, callous ridge connects these folds.

Major diam. 12, minor 11 mm.; alt. 5 mm.

Hab.—Miri Hills, Upper Assam (*Officers, Miri Mission*).

Type No. 3205 Brit. Mus.

The raised lyrae differentiate *Plectopylis miriensis* from all other known species of the genus. These appear only on the post-embryonic $3\frac{1}{2}$ whorls, the earlier ones of which are furnished on the upper side with 4 lyrae, but about the beginning of the last half of the penultimate whorl their number gradually increases to 5. Owing to the fact that the inner one of these is at some distance from the suture, the latter appears channelled, the same condition obtaining as regards the suture in the umbilicus. On the outer and the lower side of the whorls—from the upper angulation to the umbilical suture—I have counted 21 such lyrae, making 26 in all.

The species has its nearest ally in *P. pinacis* from Darjeeling, but the latter is dark brown and larger and is only striated spirally, the spirals being also more crowded, while at the sides they are almost obsolete. *P. pinacis*, moreover, is angulated around the umbilicus, which is more open and perspective than in its ally. In their barriers the two species are also closely related, but the parietal transverse plate in *P. miriensis* has no posterior support at its upper extremity, and the anterior support is obliquely deflexed downwards at an acute angle, while in *P. pinacis* this support is much shorter and directed upwards. In the palatal armature likewise considerable differences are met with, the second fold in *pinacis* being straight, instead of curving downwards in the middle. The latter species, moreover, does not possess the transverse callous ridge connecting the horizontal and oblique folds in *P. miriensis*, a feature it shares with *P. muspratti*, and a few other species which, however, belong to a different section. Finally, the additional median denticle between the first and the second fold is lacking in *pinacis*, it is, in fact, a character which I have not observed in any other species of *Plectopylis*.

***Plectopylis (Chersaecia) williamsoni*, sp. n.**

(Pl. xlii, figs. 1, 1a, 1b, 1c, 1d).

Shell sinistral, depressed conoid, dark corneous, the earlier whorls lighter and shining, moderately umbilicated, closely plicate-striate. Whorls 6, closely coiled, increasing slowly and regularly, flattened above, convex at the side, tumid below, the last slightly dilated at the mouth, slowly descending for some distance in front, angulated above and around the umbilicus, subangulate at the periphery. Spire depressed, suture linear, apex obtuse. Aperture oblique, crescent-shaped, peristome white, slightly thickened, scarcely reflexed, the margins united by a raised flexuous ridge on the parietal wall, slightly notched at the junctions with the peristome above and below.

Parietal armature consisting of a low vertical plate, both extremities giving off a slight support posteriorly with a slight denticle behind the upper support; above the vertical plate occurs a short slender horizontal fold and on the anterior side are two stout horizontal folds, one very short, in a line with the upper extremity, the other nearly median in position and much longer, terminating at about 1 mm. from the parietal ridge at the aperture; below the vertical plate rises a filiform fold running parallel with the lower suture and united to the parietal ridge at the aperture. The palatal armature may be said to be in two series; the anterior set consisting of six horizontal folds, the first short and slender, near the upper suture, the next three longer and stouter, bilobed; the fifth still stouter, and almost bisected, its posterior portion deflexed; the sixth short and slight, near the lower suture; the posterior series consists of a vertical row of five minute denticles, one each between the second, third, fourth, and fifth folds, and two below the latter; with the exception of the sixth fold, which is placed further forward, all the folds terminate posteriorly in a line with the denticles.

Major diam. 6, minor 5.5 mm.; alt. 3.25 mm.

Hab.—Abor Hills, exact part not indicated (*Oakes*).

Type No. 3087 *Brit. Mus.*

This new species, of which 8 specimens were collected, resembles a small *P. sowerbyi* or *P. plectostoma* in outward appearance, but it is related to *P. brahma*. That species, however, besides being larger, may be readily separated by the fact that the parietal vertical plate gives off anteriorly from its lower extremity a short horizontal fold, while the palatal barriers consist of only four horizontal folds, as against six in the new species; on the other hand, in the posterior series it possesses 13 or 14 denticles and *P. williamsoni* only 6.

With this new species is associated the name of Mr. Noel Williamson of the Indian Civil Service, an active explorer on the far Assam Frontier, whose murder in 1911 led to the expedition against the hill tribes.

Plectopylis (Chersaecia) bedfordi, sp. n.

(Pl. xlii, figs. 2, 2a, 2b, 2c, 2d).

Shell sinistral, depressed conoid, almost discoid, dark corneous, moderately umbilicated, finely and closely plicate-striate, decussated on the upper side with very close raised spirals, giving it a closely and finely reticulated appearance; in addition there are at more or less regular, distant intervals, coarser transverse ribs; at the sides the reticulated appearance is less distinct, and there the shell is encircled by four distant fimbriae of cuticular processes, resembling coarse hairs, and a similar fringe of cuticular processes occurs at the top near the outer edge of the whorls; these processes are readily rubbed off. Whorls $6\frac{1}{2}$, closely coiled, increasing slowly and regularly, flattened above and at the side, becoming convex towards the base, tumid below, the last not dilated at the mouth, shortly and rather deeply deflexed in front, angulated above. Spire depressed, suture linear, apex prominent. Aperture oblique, auriculated; peristome white, slightly thickened and shortly reflexed, the margins approximating and united by a raised flexuous ridge on the parietal wall, notched at the junctions with the peristome above and below.

The parietal armature consists of a simple curved transverse plate, giving off posteriorly above a short support and rather strongly deflexed backwards at its lower extremity, where it gives off anteriorly a filiform fold running parallel with and close to the lower suture and joining the flexuous ridges at the aperture. The palatal armature is very complicated, being in two series; the anterior set consisting of six more or less horizontal folds; the first rather thin and short, parallel with and close to the upper suture; the next four stouter and longer, the second slightly curved, the third curving downwards in the middle and bifurcated at the posterior extremity; the fourth at first curves upwards and then downwards; the fifth similar to the fourth but, like the third, bifurcate at the posterior extremity; the sixth is parallel with and near the lower suture. The posterior series consists of a large number of more or less elongated denticles, all more or less in a line with the posterior terminations of the folds; three of these between the first and second folds, the centre one shortest; one, moderately long, between the second and third folds; three between the third and fourth folds, the middle one longest; one short one between the fourth and fifth folds; two, the upper one short and the lower one triangular, posteriorly to the fifth fold; two short ones between the last triangular denticle and the sixth fold, with a short denticle anteriorly and close to the posterior termination of the fifth fold; and lastly a minute denticle below the sixth fold.

Major diam. 9, minor 8 mm.; alt. 4.5 mm.

Hab.—Abor country, Tsanspu Valley, on the Dihang, about 50 miles above the junction of the Sigon River, alt. 2800 ft.

Type No. 3584 *Brit. Mus.*

This new species is evidently related by its palatal armature to *P. brahma*, these barriers being even more complicated than in the latter form. In its simple parietal armature, however, it stands rather isolated in the group, coming nearest to *P. oglei*, but that shell is much larger and is dextral. The species is associated with the name of Captain Bedford, who appears to have been the first officer to go into that part of Assam, *viz.* in 1826.

***Plectopylis (Endoplon) aborensis* (G.A. MS.), sp. n.**

(Pl. xlii, figs. 3, 3*a*, 3*b*, 3*c*, 3*d*).

Shell sinistral, solid, stoutly discoid, ochraceous, with a deciduous cuticle, widely openly umbilicated, finely and rather regularly striated, dull, the protoconch glossy and rather distantly faintly ribbed. Whorls $6\frac{1}{2}$, closely coiled, increasing slowly and regularly, the last a little dilated towards the mouth, deeply descending in front, the upper side flattened, bluntly keeled above, the keel disappearing near the aperture, convex at the side, angulated around the umbilicus, spire sunken, but the upper side of the whorls horizontal, not sloping, so that the whorls are terraced; suture impressed above, but channelled in the umbilicus; apex a little raised, being about on a level with the outer whorl. Aperture nearly horizontal, broadly lunate; peristome thickened and reflexed, the margins united by a slight raised ridge on the parietal wall, notched at the junctions with the peristome above and below; upper margin slightly ascending, outer depressed at first, basal arcuate, columellar ascending and slightly impinging upon the umbilicus.

Parietal armature consisting of: 1°, a transverse plate, obliquely curving downwards and backwards, with a short posterior support at the upper extremity, where it gives off anteriorly a horizontal fold, running parallel with the upper suture; 2°, a much shorter vertical plate, placed anteriorly to the first, its lower extremity having a short support on either side, its upper extremity simple and terminating about the periphery; a very slender fold rises some distance behind the first plate, running close to and parallel with the lower suture, joining the parietal ridge at the aperture. The palatal armature consists of five folds; the first, near the upper suture, slight and obliquely descending backwards; the next three transverse, very stout, short, elevated, and rather square in outline, the second having a short obliquely ascending support at its upper, and an obliquely descending one at its lower extremity; the third and fourth with a short support anteriorly above and below, giving that side a concave appearance, and posteriorly with a short obliquely descending support at its lower extremity; the fifth is near the lower suture, slight and horizontal, a little stouter and more elevated than the first.

Major diam. 14, minor 11.5 mm.; alt. 6.5 mm.

Hab.—Between Renging and Rotung, 2200 ft., Abor country.
Type No. 5998 *Ind. Mus.*; also No. 6135 I.M.

This new species is a very interesting addition to the Indian fauna, a single full-grown specimen and one immature of which were collected by I. H. Burkill and sent home by Mr. Kemp, who accompanied the expedition. It is the first sinistral form of the section *Endoplon* I have seen. In its parietal armature it is nearest to *P. brachyplecta*, but lacks the median horizontal fold of that species, while the anterior vertical plate is only about half the length of that in its ally; in addition it possesses a short horizontal fold proceeding from the upper extremity of the posterior plate, while the horizontal fold below the two plates—which in *P. brachyplecta* is very short and rather stout—is here very slender and, running parallel with the lower suture, reaches the aperture. In its palatal armature it differs in having only five folds—against six in *brachyplecta*—the median ones, moreover, being placed more vertically, and the third and fourth having the anterior side concave, instead of sloping backwards as in *brachyplecta*. In outward appearance it strikingly differs from all other known species of *Plectopylis*, the terraced upper sides of the narrow whorls and the channelled sutures in the umbilicus being features I have not observed in any other species, and which, without previous examination of the armature, enabled me at a glance to recognize this as an undescribed form.

Fig. 3*a* shows the parietal armature, fig. 3*b* the palatal folds as they would appear from the inside if the outer wall were removed, while fig. 3*c* gives the posterior aspect of both parietal and palatal barriers, only the posterior plate of course being visible in this view.

Plectopylis (Sinicola) babbagei, sp. n.

(Pl. xlii, figs. 4, 4*a*, 4*b*, 4*c*, 4*d*).

Shell dextral, discoid, dark brown above, olivaceous corneous below, widely and perspectively umbilicated, closely and rather coarsely plicate-striate, the striae decussated by raised spiral lines. Whorls 6, increasing slowly at first, then more rapidly, the upper side a little flattened and sloping towards the suture, slightly convex at the side, tumid below, encircled by three fimbriae of deciduous cuticular processes, like coarse hairs, the first near the upper side, the second at the periphery, the third around the umbilicus; the last whorl dilated towards the mouth, not constricted behind the peristome, shortly descending in front. Suture impressed, spire slightly sunken, apex a little raised. Aperture oblique, elliptic-subovate, the margins distant; peristome white, thickened and reflexed, the margins united by a slightly raised, flexuous ridge on the parietal wall; the upper margin shortly ascending, curved, outer margin straight, basal margin widely curved, columellar margin ascending, slightly impinging upon the umbilicus.

Parietal armature consisting of a simple, stout, curved, obliquely ascending, transverse plate. The palatal armature is composed of six spiral folds: the first short, horizontal, near the upper suture; the next four longer and stouter, their posterior terminations notched; the second horizontal; the third, fourth and fifth obliquely descending backwards; the sixth short, horizontal, near the lower suture; between the posterior ends of the fifth and sixth folds occurs a slight denticle.

Major diam. 14, minor 12 mm.; alt. 6 mm.

Hab.—Luyor Peak, Abor Hills, alt. 7200 ft. Lat. $28^{\circ}45'$:
Long. $95^{\circ}45'$

Type No. 3529 *Brit. Mus.*

When in 1899 the writer established the section *Sinicola* (*Science Gossip*, new series, VI, p. 148) it was believed to be confined within the limits of the Chinese Empire. Two species belonging to this group were subsequently discovered in Tonkin (*P. emigrans* and *P. fruhstorferi*), while a third (*P. hirasei*) was taken in the Loo Choo Group, but, until the present species was found, no member of the section was known to occur to the south of the Himalayas. *P. babbagei*, therefore, constitutes a very interesting and important addition to the Indian fauna. It appears to be nearest in affinity to *P. pulvinaris*, which, however, possesses 7 palatal folds and is not, like the present species, decussated by spirals. The name of Major-General Babbage, who led an expedition against the Abor tribes in 1847, suggested by Lt.-Col. Godwin-Austen, is associated with this new species.
