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Descriptions of nine species of Alycæinæ from Assam and the Naga Hills.

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(With Plate III).

(Read August 6th, 1874).

Another season of research in the N. E. frontier has added largely to its terrestrial molluscan fauna, and I was particularly fortunate among the smaller forms of the Cyclostomacea. The *Alycæi* particularly seem to be inexhaustible; the different species are very local but very persistent in character over comparatively small areas, and as they are generally abundant where they occur, the idea that they are accidental varieties is not supported. Very few have a wide vertical distribution and several common forms of the Khási Hills, at a distance of 120 miles east, in the Naga country, are absent or become very rare indeed. The whole section is a most interesting one and illustrates admirably the many changes that nature will ring on any particular form of life, when confined to particular habitats suited for their development and again subjected to all the slow alternations in climate, soil, &c. that time produces.

I give at the end of the paper a few additional notes as to the range of some species of the group previously described and again met with. Several species of *Alycæi* when taken in a fresh state are found covered with a coating of earthy matter rendering them very indistinct and difficult to find, especially as they are to be generally found below the surface and under the dead leaves and decaying bark and sticks that cover the ground so thickly in old

forest. Dead shells may be sometimes seen in hundreds in the clearings after the cut jungle has been fired, when all the surface vegetable mould is burnt and the ground deeply heated; in this way many local forms of landshells are destroyed off large areas as the country becomes cleared, and many of the more local species no doubt have thus died out.

ALYCÆUS INFLATUS, n. sp., Plate III, Fig. 1.

Shell depressedly turbinate, solid, pale ochreous horny, moderately umbilicated, smooth, finely sculptured on the swollen portion of the last whorl adjacent to the sutural tube. Spire conoid, apex blunt; suture impressed. Whorls $4\frac{1}{2}$, the last very much swollen for the size of the shell. Constriction smooth, very short. Sutural tube moderate. Aperture oblique, circular; peristome double, solid, united, and reflected. Operculum concave, black, its position far forward at the very edge of the aperture.

Dimensions, major diam. 0·28″—0·16,″ minor diam. 019″—0·13,″ alt. 0·15 —0·11,″ diam. ap. 0·07.″

Habitat.—I first noticed this shell in the collection of Mr. F. Stoliczka, who kindly allowed me to take it for figuring; it had been found in Assam, but its exact locality was unknown. In the winter of 1872-73 I was fortunate to find it myself in the Naga Hills under Japvo Peak and again at Yémi, Phúnggum, and Gaziphimi at the head of the Lanier River on the main water-shed.

This shell in many respects assimilates to *A. conicus*, mihi, but is more openly umbilicated; in another direction it has the character of the sub-genus *Dioryx* viz. in form of mouth, the short constriction, and position of operculum close to the edge of the aperture.

ALYCÆUS STRIGATUS, n. sp., Plate III, Fig. 2.

Shell pale corneous or amber, finely and evenly costulated throughout. Spire depressed, apex blunt and darker coloured. Suture moderate. Whorls $3\frac{1}{2}$, the last very little swollen, slightly constricted, with a single low ridge close behind the aperture, the constriction smooth and very finely striated. Sutural tube very short. Aperture slightly oblique, circular; peristome single, simple, continuous, moderately thickened. Operculum..... ?

Habitat.—Assam in collection Ferd. Stoliczka.

Major diam. 0·15,″ minor diam. 0·11,″ alt. 0·08,″ diam. ap. 0·05,″.

This is another species of the short-sutural-tubed section of *Alycæus*, of which *A. Khasiacus* (vide Pl. III, Fig. 4, J. A. S. Bengal, Vol. XL, Pt. II, 1871) is a good type. The general and distinct costulation from constriction to apex, particularly the form of constriction and mouth, mark it as a good species. It is more openly umbilicated than *A. Khasiacus*.

I have an *Alycæus* from Darjeeling, found by Mr. F. Stoliczka, but as I possess but a a single much worn specimen, I hesitate to describe it more fully: it is very similar to *A. Theobaldi*, Bs. from the Khási Hills, but is smaller with a more expanded aperture; peristome less thickened, and the sculpture appears to have been very fine; I name it *A. lenticulus*, and trust some day to get other specimens. Dimensions, major diam. 0·14," minor diam. 0 11," alt. 0·08".

ALYCÆUS STOLICZKII, n. sp., Pl. III. Fig. 3.

Shell globosely turbinate, thick, pale horny, finely and closely ribbed from the swell of the first whorl as far back as the end of the sutural tube, thence to the apex distantly and finely costulated; narrowly umbilicated, spire conoid; apex blunt; suture well impressed. Whorls $4\frac{1}{2}$, rounded, the last swollen, then sharply constricted close to the origin of the sutural tube, again swelling and expanding to the mouth. Constriction smooth with a few distant lines of costulation. The sutural tube peculiarly long. Aperture oblique, circular; peristome double, outer lip small, the inner much produced and expanded into 2 broad shallow channels on the inside of the outer margin separated by a V-shaped thickening of the same (see Fig. 3^b). Operculum black, concave, of the usual multi-spiral form.

Major diam. 0·31"—0·28," minor diam. 0·24"—0·20," alt. 0.17"—0·15," diam. ap. 0·12," sutural tube 0·15."

Habitat.—Two specimens were obtained for me by Mr. Belletty on Angaoluo Peak, Nágá Hills at 7,000 feet, during field season of 1872-73. I found it again further to the east at Kezakenomih, and at the head of the Lanier River at about 5,000 feet where the specimens were much larger. It comes near to the forms of *A. Ingrami*, W. Blf. var. (Pl. IV and V, J. A. S. Bengal, Vol. XL, Pt. II, 1871) from the same range of mountains, but its tumid shape, and particularly the very produced aperture, render it a very distinct and well marked species. I have named it after that very accomplished conchologist F. Stoliczka* of the Geological Survey of India.

ALYCÆUS GLOBULUS, n. sp., Pl. III. Fig. 4.

Shell moderately umbilicated, globosely turbinate, white, finely costulalated on the swell of the first whorl, becoming gradually smooth thence to the apex. Spire conoid, apex flat and rounded. Whorls $4\frac{1}{2}$, flat, the last mo-

* Since this paper was written, the sad news has reached us that this highly gifted naturalist—to whom all readers of this Journal and I personally owe so deep a debt of gratitude, and who to many of us was a dear and cherished friend—had succumbed to the exposure when in Yarkund and on his return journey to Leh. It may be truly said of Stoliczka that he gave his life to the very last, and died nobly in the pursuit of Science.

derately swollen, then sharply constricted and again enlarged by a ridge, from which emanate four minor longitudinal ridges on the expanded portion of the peristome. Constriction narrow, close to sutural tube, this is moderate in length and about equal to the distance of its base to lip. Aperture much expanded, oblique, round, angulate above, waved on outer margin and channelled within; the outer lip of peristome thin, slightly recurved on the inner lower margin. Operculum black, multi-spirial, concave.

Major diam. 0·20," minor diam. 0·16," alt. 0·13,"

Habitat.—Phunggum, a Naga village at head of the Lanier valley, at 5,000 feet, where it is abundant.

It is near the *crispatus* form described in my last paper. Its larger globose form, long sutural tube, and more open umbilicus, mark it as distinct.

ALYCÆUS BICRENATUS, n. sp., Pl. III, Fig. 5.

Shell moderately umbilicated, sub-turbinate, pale corneous or nearly white, fine close ribbing on swell of last whorl, extending to behind the termination of the sutural tube and thence to apex very finely and evenly costulated. Spire depressedly conoid, suture impressed, apex blunt. Whorls 4, the last moderately swollen, constriction rather wide, followed by a single well defined high ridge close behind the expanded portion of the aperture where it is defined by a sharp narrow costulate rib. The expanded portion anterior to this is longitudinally waved on surface, produced by two deep triangular grooves situated well within the aperture and on outer margin. Sutural tube short. Aperture oblique; peristome round, slightly angular above. Operculum, pale horny, concave.

Major diam. 0·14," minor diam. 0·10," alt. 0·09," sutural tube 0·42."

Habitat.—Kopamedza Peak Naga Hill, 8—9,000 feet, in forest.

This shell belongs to the same group as the last and is very close to *A. crenatus*, mihi (vide plate III, fig. 5, J. A. S. B., Pt. II, 1871), but the longer sutural tube and the strongly crenated peristome of *crenatus* mark the distinction.

ALYCÆUS SERRATUS, n. sp., Pl. III, Fig. 6.

Shell very closely umbilicated, turbinate, rather thin, pale corneous or dark brown, finely costulated on tumid portion of last whorl, rest of shell smooth with shining surface, suture moderately impressed. Spire conoid, apex pointed. Whorls 4, rounded, the last very slightly tumid, constricted and enlarged into a low recurved ridge. Sutural tube moderate. Aperture sub-vertical, circular, very finely notched on lower and outer margin; peristome double, thick, the outer reflected on the inner margin. Operculum thin, pale horny, flat in front.

Major diam. 0·10," minor diam. 0·09," alt. 0 09," sutural tube 0·75."

Habitat.—Laisen Trigl. station, Munipur Hills; rare, some eight specimens only having been found.

In the thickened rounded form of the peristome this species assimilates to *A. conicus*, but the minute notches on the inner margin are peculiar and unlike what is seen in any form I am acquainted with. It seems intermediate between the above and *A. diagonius*.

ALYCÆUS MULTIRUGOSUS, n. sp., Pl. III, Fig. 7.

Shell depressedly sub-turbinate, rather openly umbilicated, translucent, pale corneous, smooth glistening surface, very minute ribbing near sutural tube. Spire flatly conoid; whorls 4, flat, the last very little swollen, constricted and enlarged again towards the aperture into a zigzag-shaped ridge or what might be described as three parallel and connected ridges. Sutural tube short. Aperture oblique, circular; peristome double, both continuous and the outer slightly reflected. Operculum..... ?

Major diam. 0·12," minor diam. 0·08," alt. 0·08," sutural tube 0.037."

Habitat.—Hills at head of the Lanier River, Naga Hills, about 5—6,000 feet, rare.

A close ally of *A. Khasiacus*, mihi, but a much smaller shell; the many ridged area near constriction, however, is a wide departure from that form. A large var. of *A. Khasiacus* occurred at Gaziphima and, as an instance of local variability in this genus, a few of the specimens have a slight tendency to a fimbriated peristome as in *A. crenatus*, mihi.

ALYCÆUS (DIORYX) GRAPHICUS, W. Blf., var. MINOR, Pl. III, Fig. 8.

This shell is much smaller than *graphicus* from the Khasi Hills, &c., and is longer in spire with close costulation throughout.

The differences though persistent in Naga Hill specimens are not sufficient to make the form distinct.

Major diam. 0·10," alt. 0·12."

ALYCÆUS BURTII, n. sp., Plate III, Fig. 9.

Shell turbinate, openly umbilicated, thick, pale ochreous; shallow but well marked ribbing on swell of last whorl and finely costulated on the apex. Spire conoid, apex sharp, suture well impressed. Whorls 5, the last moderately swollen, constriction very slight, short, and smooth up to the peristome, sutural tube moderate, rather large at base. Aperture oblique, laterally oval, angular on inner upper margin, with 4 well marked notches on the outer margin; peristome thickened, double, well reflected, inner lip continuous.

Major diam. 0·22," minor diam. 0·19," alt. 0·15."

Habitat.—Foot of the Bhutan Himalaya at the debouchement of the Barowli River, Assam ; collected by Mr. J. Burt, to whom my thanks are due for this and some other interesting shells.

It is close to *A. polygonoma*, but the form of constriction is slightly different, the peristome is well crenulated, and the sculpture stronger. At Kamakia hill near Gowhatty, I obtained specimens of an *Alycæus* still nearer in form to *polygonoma*, only that the sutural tube is but about half the length, ending abruptly, while in *polygonoma* it is long and thread-like. I shall describe it in my next paper.

A. crenatus was found as far east as Shiroifurar, also at Kezakenomih and Yémai.

A. Ingrami, var. is the commonest form in the Naga Hills and has a great range in altitude, being found at Dimapur in the Dunsiri valley under 300 feet and as high as 7,000 feet at Khúnho Peak on the Burrail range, also at Laisen Hill and Sikhámi, and on the east side of the Munipur valley on the slopes of Nongmaiching and Múngching.

A. Nagaensis I have from Kezakenomih, Kopamedza, Prowi, Laisen, and Nongmaiching.

A. Khasiacus occurred as far east as Kopamedza Peak, where it was associated with the nearly allied form above described, *A. multirugosus.*

A. urnula, Bens. is a very abundant shell all along the Burrail range, it retains the type form more persistently than any species of the genus known to me. Very fine large speeimens were collected at Kezakenomih, Naga Hills ; dimensions, alt. 0·20,″ diam. 0·20″.

A. diagonius and *A. crispatus*, I found again in the Dunsiri valley, Dimapur, and lower spurs of the eastern Burrail.

A. prosectus, Bens., so common in the Khasi Hills, is very rare in the eastern Naga Hills and I procured 2 or 3 specimens only ; these shew a transition, for they are not quite identical with the type form from Teria Ghat.

Explanation of Plate III.

Fig. 1, 1*a*, 1*b*, 1*c*, 1*d*, *Alycæus inflatus.*
Fig. 2, 2*a*, 2*b*, „ *strigatus.*
Fig. 3, 3*a*, 3*b*, „ *Stoliczkii.*
Fig. 4, 4*a*, 4*b*, „ *globulus.*
Fig. 5, 5*a*, 5*b*, „ *bicrenatus.*
Fig. 6, 6*a*, 6*b*, „ *serratus.*
Fig. 7, 7*a*, „ *multirugosus.*
Fig. 8, 8*a*, „ (*Dioryx*) *graphicus, var. minor.*
Fig. 9, 9*a*, „ *Burtii.*

ALYCÆI, NAGA HILLS AND ASSAM.

Godwin-Austen, del.

Maclure & Macdonald, imp.