XLIV TERRESTRIAL ISOPODA, II.

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(Plates XLIX, L.)

The specimens here described were found in a tube containing a number of small land shells. One of them is a new species referred to the genus *Cubaris*, Brandt; the other I am unable to place in any known genus. I am, therefore, describing a new genus to which I have given the name *Rotungus*.

Gen. **Rotungus**, gen. nov.

Body oblong oval, strongly convex, smooth. Cephalon small, convex, lateral and median lobes prominent; epistoma with median vertical ridge. Eyes large, situated dorsally. Antennae slender, 4th and 5th joints elongated, setae short and thick; flagellum two-jointed, 1st joint short, expanded distally, 2nd joint much longer, terminating in a style. First maxillae with outer lobe terminating in a series of curved spines, inner lobe narrow, flat, with two setaceous spines on the inner border. Segments of the mesosome strongly convex, 1st broadly expanded laterally and partly surrounding the cephalon, lateral plates of 2nd to 5th segments excavate, 6th and 7th almost truncate, posterior angles produced backwards. Maxillipedes with small terminal lobes. Thoracic appendages stout and of medium length, setose, 1st appendage with numerous tridentate setae. The lateral plates of the metasome are somewhat flattened and turned inwards, the median portion of the segments being strongly convex. Uropoda extending beyond the telson, basal plate broader anteriorly than posteriorly; exopodite cuneiform, articulating at the posterior margin of the basal plate, endopodite longer than exopodite, articulating at the inner anterior border. Telson elongated, roughly triangular, posterior margin truncate, anteriorly broader than the length.

This genus is distantly related to *Mesarmadillo*, Dollf.[1], and *Saidjahus*, Budde-Lund[2], it also exhibits a remote relationship to *Gelsana*, Budde-Lund[3], and *Sumniva*, Budde-Lund[4], but

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[1] *Ann. Soc. ent. France*, 1892, p. 385.

[2] *Rev. Crust. Isop. Terr.*, 1904, p. 49.

[3] Sjöstedts *Kilimandjaro-Meru Exped.* 21 Crustacea, 2 Isopoda, 1910, p. 6, t. i.

[4] *Rev. Crust. Isop. Terr.*, 1904, p. 48, and Isopoda von Madagaskar und Ostafrika in "*Voeltzkow Reiseergebnisse*", Bd. iii. *Abhandl. Senckenberg. Gesellschaft*, 1908, Bd. xxvii, p. 267.

differs from all of these in the form of the cephalon, maxillipedes, and uropoda. The undersides of the inner margins of the 1st and 2nd segments of the mesosome are devoid of teeth or grooves, a character present in many genera the species of which are capable of rolling themselves up into a ball.

Rotungus pictus, n. sp.

(Pl. xlix, figs. 1—10).

Body oblong oval, strongly convex, smooth. Cephalon (figs. 1 and 2) small, convex, partly surrounded by 1st mesosomatic segment, lateral and median lobes well developed; epistoma with median vertical ridge. Eyes large, situated dorsally. Antennae (fig. 3) slender, 4th and 5th joints elongated, setae short and thick; flagellum 2-jointed, 1st joint short, expanded distally, 2nd nearly three times as long, terminating in a style. First maxillae (fig. 4) with outer lobe terminating in four strong curved spines, and five smaller ones, inner lobe narrow, flat, with two setaceous spines on the inner border. Segments of the mesosome strongly convex, 1st broadly expanded laterally and partly surrounding the cephalon (fig. 5), lateral plates of 2nd to 5th segments excavate, 6th and 7th almost truncate, posterior angles produced backwards. Maxillipedes (fig. 6) with small lobes, outer lobe terminates in a multispinous process and five fine curved spines, the inner lobe has two very small spines at each side and two larger ones on the ventral surface. Uropoda (fig. 9) extending beyond the telson, basal plate convex dorsally and flattened ventrally, broader anteriorly than posteriorly; exopodite cuniform, sparsely setaceous, articulating at the posterior margin of the basal plate, endopodite larger than exopodite, rudder-shaped, setae long and prominent. Telson (fig. 10) elongated, roughly triangular, posterior margin truncate, anteriorly broader than the length. Length 5·5 mm. Colour (in alcohol) horny yellow anteriorly, mottled brown posteriorly.

Habitat.—Kobo, Abor country, 400 ft., 30-xi—8-xii-1911. Under bark. No. 8084/10 (*S. W. Kemp*).

Type.—In the collection of the Indian Museum.

At present this interesting species stands out alone, separated from any known Indian genus by many striking characters. In the form of the cephalon and mesosomatic segments there is a slight resemblance to certain species of *Mesarmadillo*, Dollf. In only one specimen was there an antennule, which unfortunately was lost, the proximal joint of which was very broad. The flagellum of the antenna is very distinct in form. Apart from the small lobes of the maxillipedes the mouth-parts present no points of special interest. The thoracic appendages are stoutly built and setaceous; the setae on the 2nd appendage are of four kinds, *viz.* short stout spines (fig. 8*a*), longer curved spines (*b*), still longer curved spines with a spinous collar about two-thirds from the base, and then a plain curved spine terminally (*c*), and much

shorter and broader spines with a tridentate terminal portion set in a spinous bifurcation (*d*).

Cubaris marmoratus, n. sp.

(Pl. 1, figs. 1—8).

Body oblong oval, convex, smooth. Cephalon (figs. 1 and 2) small, anterior margin well defined, lateral lobes small, median lobe absent; epistoma dorsally sloping backwards, laterally concave. Eyes prominent, situated dorso-laterally. Antennae (fig. 3) small, slender and sparsely setaceous, 2nd to 5th joints grooved on their outer sides, 3rd joint elongated; flagellum 2-jointed, the distal joint being the longer and terminating in a long style. Segments of the mesosome convex, lateral plates of 2nd to 4th segments excavate, remainder truncate or nearly so, posterior angles slightly produced backwards. Segments 1 and 2 with notch and groove on their inner margins for reception of succeeding segments (figs. 4 and 5). Maxillipedes (fig. 6) small, lobes elongated, outer one terminating in a multispinous process with two small spines at its base and two longer ones on the inner margin, inner lobe has a single, comparatively large spine. Uropoda (fig. 7) not extending beyond the telson, basal plate narrow posteriorly, thickened and strongly raised, convex dorso-laterally, antero-dorsal surface expanded, ventral side almost flat; exopodite fairly large, truncate terminally with short style, articulating about the middle of the basal plate in deep concavity, endopodite twice the length of the exopodite, setaceous, terminally with two long whip-like setae , in section triangular. Telson (fig. 8) longer than breadth of the posterior margin, which is very slightly curved, as also the sides, expanded anteriorly, convex and smooth. Length 6·5 mm. Colour (in alcohol) dark grey with yellowish mottling.

Habitat.—Kobo, Abor country, 400 ft. Under bark. No. 8084A/10 (*S. W. Kemp*).

Type.—In the collection of the Indian Museum.

This species is characterised by the small and narrow lobes of the maxillipedes and by the form of the uropoda. In these latter the exopodites articulate in a deep groove in the middle of the dorsal face of the basal plate and extend inwards to the inner margin.

EXPLANATION OF PLATE XLIX.

Rotungus pictus, gen. et sp. n.

FIG. 1.—Dorsal view of the cephalon.

,, 2.—Anterior view of the cephalon.

,, 3.—Right antenna.

,, 4.—First maxilla, terminal portions of the outer and inner lobes.

,, 5.—First mesosomatic segment and cephalon.

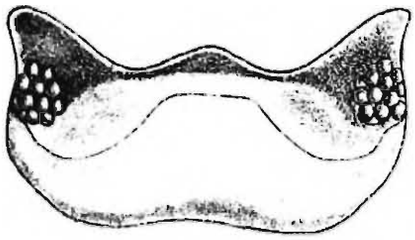
,, 6.—Left maxillipede, terminal portion.

,, 7.—First left thoracic appendage.

,, 8.—Types of setae present on the 4th joint of the 2nd thoracic appendage.

,, 9.—Left uropod, dorsal view.

,, 10.—Last metasomatic segment, telson and uropoda.



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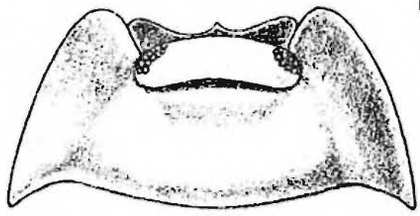

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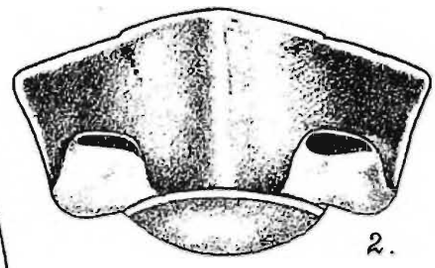

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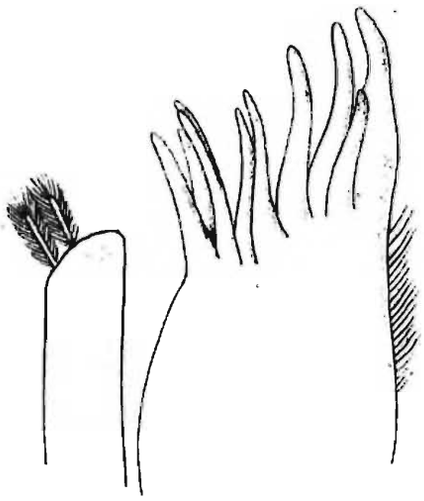

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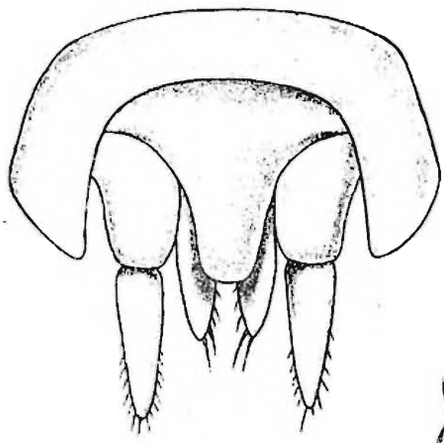

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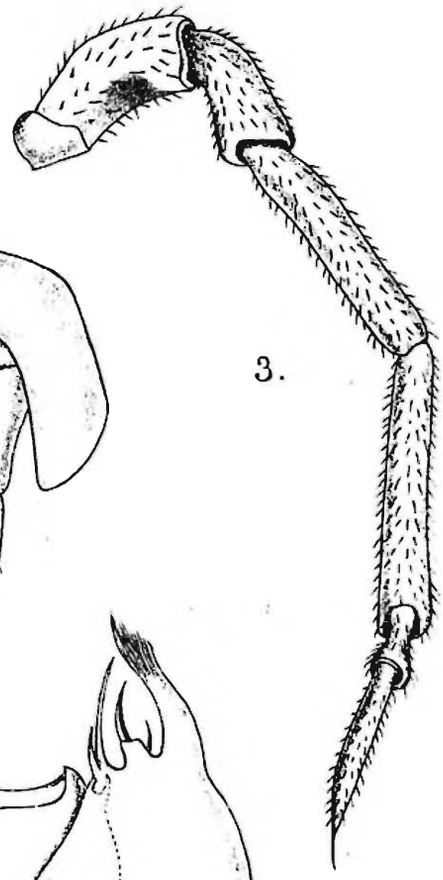

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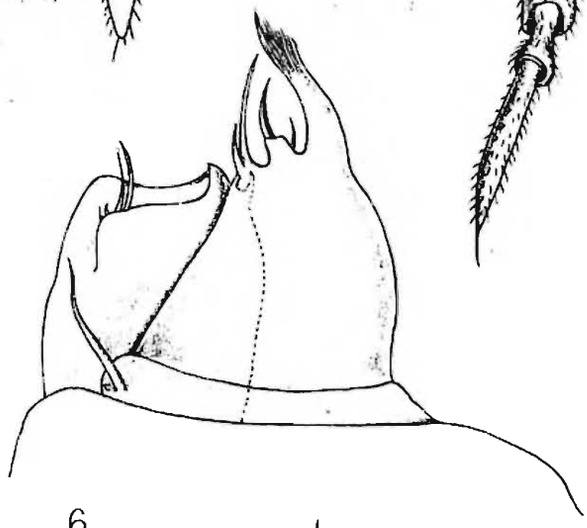

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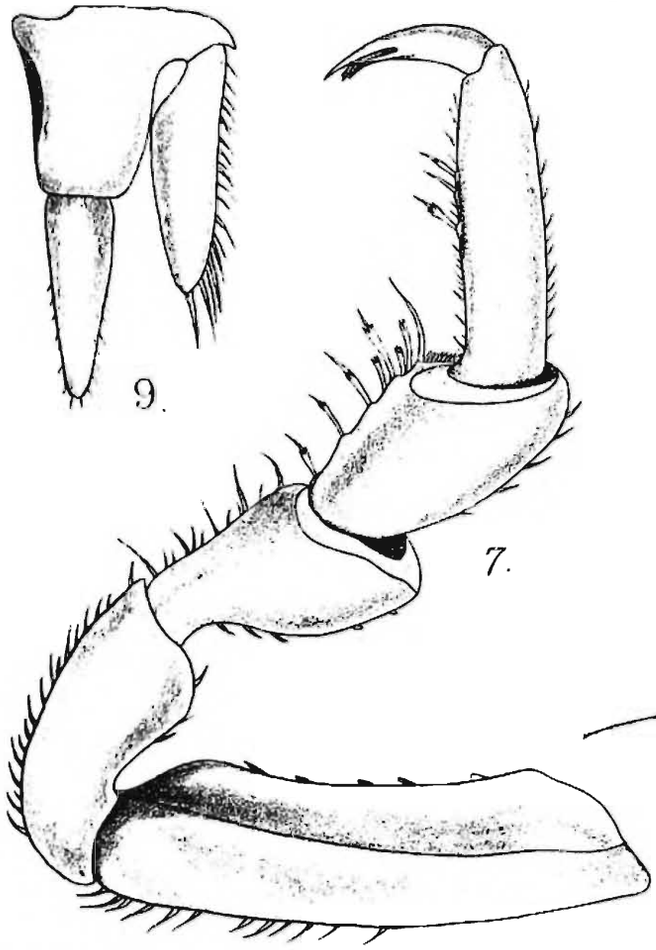

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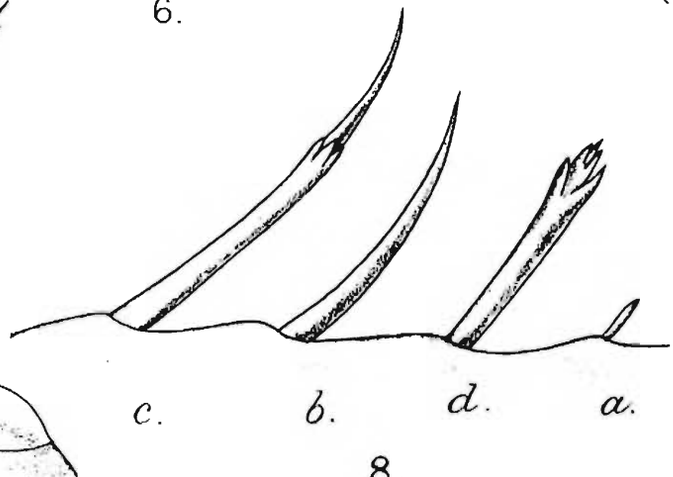

c. b. d. a.

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H.G.K. del. A. Chowdhary, lith.

ROTUNGUS PICTUS, gen. et sp. nov.

EXPLANATION OF PLATE L

Cubaris marmoratus, n. sp.

FIG. 1.—Dorsal view of the cephalon.

,, 2.—Anterior view of the cephalon.

,, 3.—Right antenna.

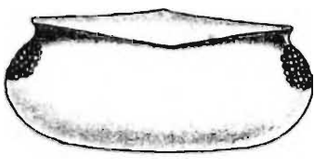
,, 4.—Lateral portion of 1st and 2nd mesosomatic segments showing notch and groove on the inner border of the under side.

,, 5.—Border of the 1st mesosomatic segment seen from the under side.

,, 6.—Maxillipede, terminal portion.

,, 7.—Right uropod, dorsal view.

,, 8.—Last metasomatic segment, uropoda and telson.



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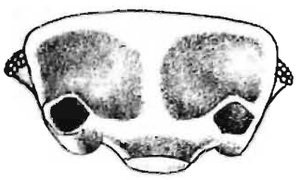

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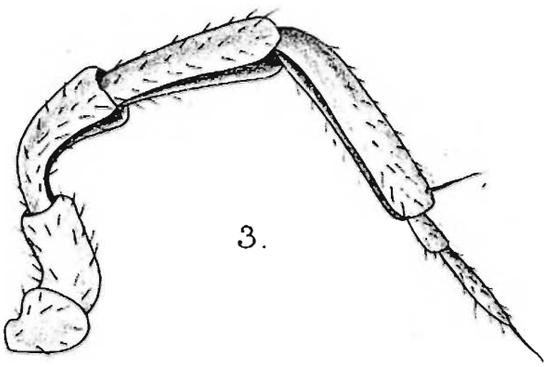

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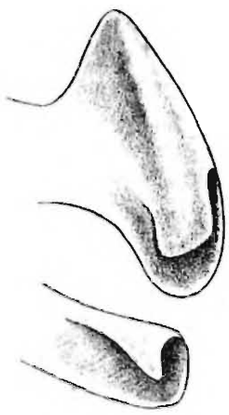

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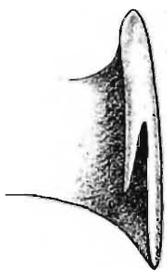

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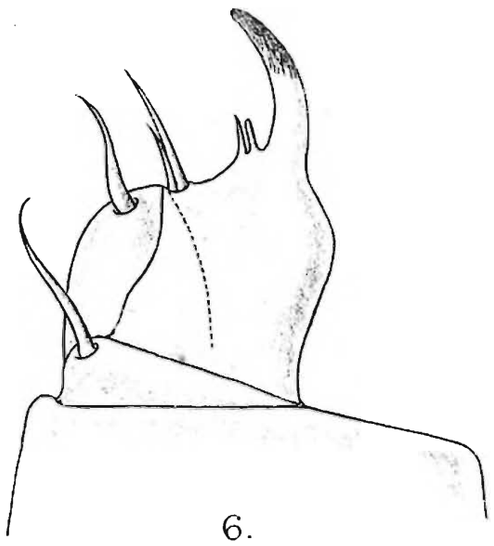

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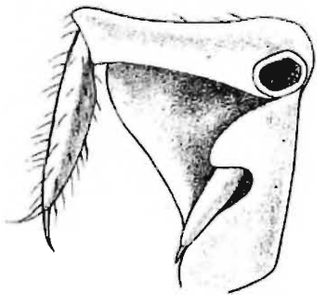

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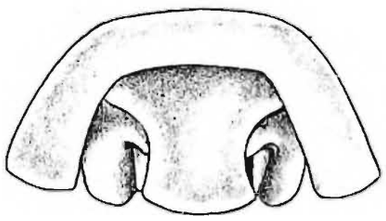

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H.(A. Chowdhary, lith

CUBARIS MARMORATUS, n. sp.

XLV MOLLUSCA, VI

By Lt.-Colonel H. H. Godwin-Austen, *F.R.S.*

(Plates XLV—XLVIII).

From the malacological point of view this contribution to the Land Molluscan fauna of the Abor country is perhaps the most interesting one as the result of Mr. Stanley Kemp's collecting when attached as naturalist to the punitive force which entered the country in 1911–12. I much regret the delay in its publication, that expedition having almost become ancient history. So much of what he discovered was preserved in spirit, that the details of anatomy have absorbed much time, and could only be taken up in the intervals of other work.

This part treats of the slug-like forms and among them it is surprising how many discovered in this far-off corner of Assam and the Eastern Himalaya prove to be new. I have taken the opportunity of including one species from the Singpho country south of the Brahmaputra. The species are fully figured, and comparison has been made with the genera and species previously known from the mountain ranges on the west. The photographs of the animals have been made by my friend and neighbour Mr. J. S. Gladstone, and I think it can be said are beautifully done, the epidermal detail is shewn to perfection and in a way these creatures have seldom been illustrated before; much beautiful detail has however been lost in reproduction. I am much indebted to him for the pains and interest he took over the plates, and I am sure all those interested in this group of the Mollusca will feel that they greatly add to the value of the contribution

There remain to be figured some species of *Macrochlamys* and *Oxytes* with Micro-Helices that are very difficult to locate generically. The virgin forests of this part of the world are full of them and they have not yet been properly looked for—they have generally been taken accidentally, often inside the empty shells of the larger species.

The very large number of species is remarkable, and as a series they differ very much from what has been hitherto collected on the south face of the Eastern Himalayas. This can be partly accounted for by the thorough systematic way Mr. Stanley Kemp worked. His method of searching behind the overlapping leaves of the Plantain may be mentioned, and was quite an original idea. Some of the species he obtained may therefore be looked for in this rather restricted resort, further to the west of the Abor Hills, and also south of the Brahmaputra valley.

Family ZONITIDAE.

Subfamily *HELICARIONINAE.*

Genus **Cryptaustenia,** Cockerell.

Cryptaustenia bicolor, n. sp.

(Plate xlv, figs. 12—14).

Locality.—Sadiya, Eastern Assam, No. 5982 (*S. W Kemp*).

This being a single specimen the shell has not been removed. Shell (fig. 14) very globose and depressed, thin, transparent and membranaceous, the black markings on the visceral sac are seen through it; sculpture none, surface glassy, colour ochraceous green; spire low, apex flatly rounded; suture very shallow; whorls 2½, rapidly increasing; aperture not to be seen with animal in the shell; peristome thin.

Size: major diameter 9·5, minor diameter 7·0, alt. axis 5·0 mm.

The animal (figs. 12, 13) in spirit is 16 mm. in length, ground colour pale blue grey with black mottling on the side of the foot, this is in strong contrast to the ochraceous ground of both the right and left shell lobes, which are ornamented with distant spots and lines and a well papillated surface. Neither of these lobes are very large, and they would apparently leave a good deal of the shell showing in life. The left shell lobe lies well on the left side, it is narrow for some distance and just overlapping the edge of the peristome up to where the broad lobe is developed.

Foot narrow, sole divided; the central area quite pale in colour, the outer margins grey. The mucous gland is narrow, vertically oval, no defined overhanging lobe. Edge of foot with narrow fringed margin and the usual two peripodial grooves.

Genus **Austenia,** Nevill.

Austenia aborense, n. sp.

(Plate xlvi, figs. 2, 2*a*).

Locality.—Rotung, Abor Hills, 31-xii-11 (*S. W Kemp*).

Shell chesnut brown, with white apex, spatulate, smooth shining, lines of growth indistinct. Whorls 2, the first very small, the last expanding rapidly.

Size: major diameter 23, minor diameter 16 mm.

This shell is very like *A. tigris* of Preston from the Naga Hills, and probably from the Eastern Naga.

Mr. Kemp described it as follows: "Slug C," 31-xii-11. Granulation of anterior part dull yellow with black interspaces. Mantle area dull brown, rather pale. Posterior portions pale dull brown with obscure or indistinct large brown or black flecks; interspaces of rugae black. Shell olive-green, a good deal exposed. Eyestalks very dark brown. Sole pale brown, its dorso-lateral margin vertically barred with pale brown and black. Common under bark, under stones and behind the leaf-stems of plantain."

The specimen sent home (No. 5928) is 46 mm. in length, very much contracted in the spirit and very hard, so that I have refrained from removing it or opening the body to view the genitalia. Colour darkish grey brown with indistinct mottling. Foot divided, the oblique grooving rising from the peripodial grooves is parallel and very closely arranged. The right shell lobe is small, dark grey, the left is very narrow, even in width all round the edges of the shell, which it overlaps, the absence of any expansion into a flap or lobe is noticeable to be seen in *Austenia*. The extremity of the foot is square, compressed at the side, with a narrow nearly vertical linear mucous gland. The dorsal lobe is rather small to the left and behind the respiratory orifice, the left is ample, covering the neck and extending round to the left side.

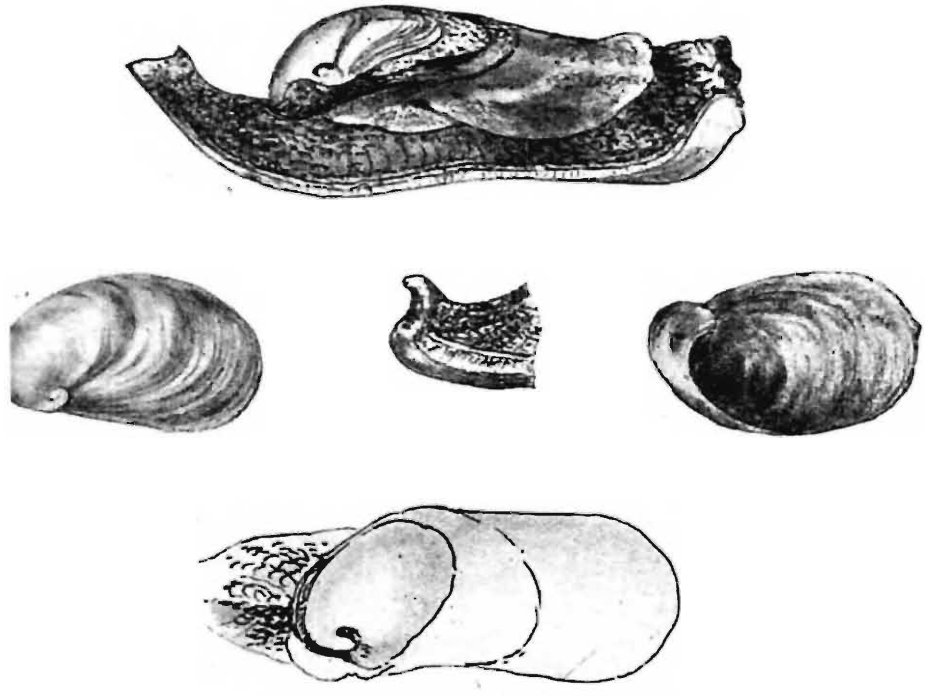


FIG. 1.—*Austenia alba*, n. sp.

Animal view of right side; extremity of foot; shell from above and below; shell removed showing the visceral sac.

Austenia alba, n. sp.

(Text-fig. 1).

Locality.—Rotung 1,300 feet, Abor Hills, No. 5866 (*S. W Kemp*).

Shell ovate, spatulate, rather solid, apex much rounded, then arched; colour white, streaked transversely, strong lines of growth, right margin straight.

Size: major diameter 6·5, minor diameter 4·0 mm.

Animal only about 20 mm. in length, dark grey with a vinous tinge on the mantle lobes, some distant spotting on side of the foot behind. Foot white below, indistinctly divided, extremity

square, mucous gland linear with a short overhanging lobe. The right and left shell lobes united cover the edge of the shell for a certain distance right round to the left posterior side, in life they probably conceal the whole shell. Foot keeled near the extremity for a short distance up to the depression in which the hinder part of the visceral sac rests. The peripodial margin grooves are narrow. The visceral sac exposed when the shell is removed has a small hook-like coil which occupies the apex of the shell.

The genitalia were not seen complete, they were very small and undeveloped.

The radula formula is 30.2.12.1.12.2.30 or 44.1.44. The centre and admedian teeth of usual shape in the allied genera of *Austenia* and *Girasia*, but fewer than usual, the marginals curved

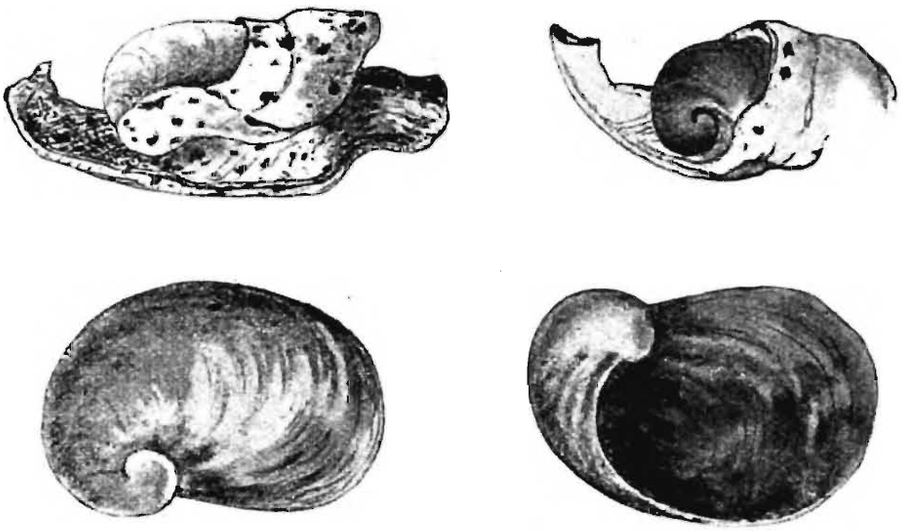


FIG. 2.—*Austenia siyomensis*, n. sp.

Animal view of right side; shell removed showing the visceral sac; shell rom above and below.

and bicuspid. Jaw rather straight in front with a small central projection.

Only three specimens were sent home of this species, the shell of which is very different from any I have seen before. One specimen had lost the shell. The animal of the type shell removed and figured was dissected. They will go back to the Indian Museum, Calcutta.

Austenia siyomensis, n. sp.

(Text-fig. 2).

Locality.—Damda, Siyom Valley, Abor Hills (*S. W Kemp*).

Shell broadly ovate, spatulate, bright and shiny; sculpture none, surface smooth with fine lines of growth; colour rich ochraceous; spire flat, apex large, white and round; suture impressed;

whorls 1½, the first small, then rapidly increasing. Major diameter 8·5, minor 6 mm.

Only one specimen (No. 5868) found, with other species under stones. The shell recalls *A. rotunda* from Cachar but is much smaller and rounder. The colouration of the animal of this species is very similar to that of *Girasia cacharica*, G. A. (*Moll. Ind.*, vol. i, p. 240, pl. lix, fig. 4), but the shell is very different.

The animal is about 25 mm. long in spirit, very pale grey distantly and strongly spotted throughout, except on the head which is dark in colour. Sole of foot very pale and very indistinctly divided; the extremity square, mucous slit linear with a painted lobe above it. The right shell lobe oval, covering the apex of the shell, an indistinct cicatrix between it and the left shell lobe, which overlaps the edge of the shell considerably leaving a good deal of the surface uncovered. In life it would probably cover it entirely.

Although a single specimen I had to remove the shell in order to figure it and then extract the buccal mass and generative organs. The visceral sac terminates in a complete whorl filling the apex of the shell. The genitalia were scarcely developed. The amatorial organ was seen.

The radula has well pointed centre and admedian teeth, marginals unevenly bicuspid; the outermost are minute. The formula 40.3.13.1.13.3.40 or 56.1.56.

Genus **Girasia**, Gray.

Girasia maculosa, n. sp.

(Plate xlvi, figs. 1, 1*a*).

Locality.—Diyung Valley, Singpho Hills (*M. T Ogle*).

A comparison of this animal (figs. 1, 1*a*), of which two specimens were secured, with *G. hookeri* of about the same size from Cachar, shows it to be distinct, although the differences are superficial, such as the mottling, the peripodial margin and grooves, papillation of the surface and the segmentation of the sole of the foot, this last is much stronger and very close together in the Diyung valley specimens.

The larger animal measures 50 mm. in length, the smaller 25 mm.; in colour it is ochraceous with close dusky spots on the side of the foot with larger spots on the mantle.

The shell removed from the smaller animal is very rudimentary, a mere epidermis, ruddy ochraceous in colour, covering a thin brittle calcareous layer which broke up on handling. Major diam. 14, breadth 5 mm., elongately oval, very thin on the outer margin. It has no defined apex and in this respect it differs from *Girasia hookeri*, as well as in not being so elongate and narrow. Differences sufficient even in the shell to constitute it a good species. The visceral sac shows no sign of a coil.

Girasia gladstonei, n. sp.

(Plate xlv, figs. 7—11).

Locality.—Sadiya, Assam, 25-xi-11, No. 5869 (*S. W Kemp*).

Shell extremely rudimentary, thin and membranaceous, the apical portion only slightly thickened, very difficult to remove without tearing it. It has been left in the single specimen received. Colour rich ochraceous with a green tint.

Size: major diameter 13, minor diameter 9 mm.

The animal (figs. 7—10) much contracted in spirit, measures 48 mm. in length. The hinder part of the mantle rests in a deep V-shaped depression. The foot is well keeled and terminates in a nearly vertical narrow mucous gland (figs. 7 and 8). The peripodial margin is well fringed, and from the usual two grooves above it emanate many close grooves directed obliquely upwards. The shell is completely hidden by the mantle, only exposed at the very small oval hole situated where the right and left shell lobes reach (fig. 11). From this opening a cicatrical line marks the uniting of these lobes, and it extends to the respiratory orifice. The sole of the foot is indistinctly divided. The dividing line of the left shell lobe and left dorsal lobe is also well seen. The mouth or oral aperture is beautifully displayed in this specimen (fig. 10). It slightly protrudes, a semicircle of over 20 lobulate organs lie above and on both sides of the jaw, while two large palps with a slit between them came in below and form the anterior portion of the odontophore. I name this species after Mr. J S. Gladstone who has helped me so much in the illustrating of this paper.

Genus **Dihangia,** nov.

Dihangia koboensis, n. sp.

(Plate xlv, figs. 1—6*a*; pl. xlvi, figs. 4—4*b*; pl. xlviii, figs. 1—5).

Locality.—Kobo, Assam (No. 5867) animal figured, and Sadiya (No. 5874-5) dissected (*S. W Kemp*).

Shell (figs. 6, 6*a*) ovately spatulate, broad, very flat, smooth, shiny as viewed from above, angular towards the apex; sculpture striation of growth only; colour umber brown; apex white; small, rounded; whorls one, large and ample; peristome thin.

Size: maj. diam. 12·5; alt. axis 5·5 mm.

The shell recalls that of *Girasia cacharica,* G.-A., *Moll. Ind.,* pl. lix, figs. 4*a*, 4*b*, also *G.* (*Ibycus*) *sikimensis*, G.-A., fig. 2*b*, but in both these it is much narrower in minor diameter. When the shell is removed the apical portion of the visceral sac (pl. xlviii, fig. 5) shows only a very slight remnant of the first whorl, and under the area which the shell covers are found the most vital organs, such as the heart, hermaphrodite gland and the branchial cavity. The visceral sac fills the whole of the foot up to within

10 mm. of the extremity ; pl. xlviii, fig. 1 shows the packing of the alimentary and generative organs viewed from the right side. The penis is seen extruded from the generative aperture, this took place probably when the animal was put alive into the spirit. I have attempted to show its relative position to the rest of the genitalia when it is thus extended externally. The amatorial organ is present, not seen in fig. 1, being below and on the other side, but in pl. xlviii, figs. 2 and 3 of the generative organs removed and more spread out, it is long and cylindrical. The spermatheca is an elongate sac, better seen in pl. xlviii, fig. 3 than it is in fig. 1. The heart, branchial cavity and the hermaphrodite gland and duct lie immediately under the shell, separated from the rest of the internal organs by a thin diaphram (pl. xlviii, fig. 4).

Comparing the anatomy of *Dihangia koboensis* with that of *Girasia hookeri*, of the Khasi Hills, very distinctive, considerable and interesting differences are found, *vide Moll. India*, plate lxxxviii, figs. 2—2*i*, particularly noticeable in the position of the liver and intestines. These in the first genus are situated near the extremity of the foot, in the second they are underneath the shell and mantle.

Another specimen was obtained at Sadiya (No. 5906), it is figured on plate xlvi, figs. 4, 4*a*, 4*b*, the shell has been removed and the contraction of the animal differs much from the figures on plate xlv.

Kobo is not in the mountainous Abor country but on the north bank of the Brahmaputra, 20 miles west of Sadiya.

Genus **Galongia**, nov.

Galongia kempi, n. sp.

(Plate xlvi, figs. 3, 3*a* ; pl. xlviii, figs. 6—10).

Locality.—Rotung, 31-xii-11, common under stones (*S. W Kemp*).

Shell (pl. xlviii, figs. 7, 7*a*) minute, flat, spatulate, embryonic, seen from below it is solid not concave, and this represents, it seems to me, the protoconch ; sculpture smooth, lines of growth only ; colour pale ochraceous, white on apex ; whorls only one ; aperture very large and expanding, thin.

Size : maj. diam. 2·7 mm.

Description of animal when alive, by Mr. S. Kemp of his Slug D.

" General tone almost black, a very dark warm livid brown with very obscure black mottling. Margin of sole, in dorso-lateral view, indistinctly barred vertically with warm brown and black. When fully extended the anterior part of the body, immediately in front of the mantle, rather pale brown."

The animal (pl. xlviii, fig. 6), preserved in spirit, which was drawn measures 20 mm. but is much contracted, it is probably when fully extended 40 mm., the largest sent is 24 mm. and was

mixed up with another species. In colour it is mostly blue-black, paling towards the sole of the foot, darkest on the mantle. This is oval, a simple shield with a very small opening at the extreme posterior end, through which the white apex of the shell protrudes a very short distance. The mantle is very finely papillate, and so is the side of the foot posteriorly, the surface is more rugose towards the head. There is a deep well-marked groove above the peripodial margin, having an indistinct one above it, the strip between being indistinctly segmented, the peripodial margin itself is not very broad, and is fringed, what Mr. Kemp noted in the living animal, much has disappeared in the spirit. It is however streaked sparsely with black, for its whole length, somewhat larger spotting occurs scattered over the side of the foot, in some of the five specimens sent there is much spotting. The extremity of the foot (pl. xlviii, fig. 6*a*) is square to the sole, the mucous gland vertical and small, with a raised border extending to the keel of the foot, but there is no overhanging lobe. The respiratory orifice lies in the middle of the mantle on the right side, beneath a short slit in the edge, a distinct line of separation, shown by a cicatrice, can be seen between what is usually known as the right and left shell lobes. The sole of the foot is most distinctly divided, the central area broad.

The visceral sac extends to the extremity of the foot, the liver filling this part of the animal.

Generative organs. Taken in mid-winter these are not in full development, the hermaphrodite gland is unusually large, situated far back near the extremity of the foot, and lying half buried in the liver lobes, it is an elongate oval mass, with a smooth surface. The hermaphrodite duct is very long and straight with no convolutions except just near the attachment to the albumen gland. The organ is very small, with a curious short, pointed protuberance. The oviduct was not developed. An amatorial organ is present, long and straight. The spermatheca is elongately pear-shaped, short. The retractor muscle of the penis is short, and has its attachment below the anterior margin of the mantle zone, other muscle attachments are on the posterior side. The sheath is long and bent into an **S**-shape; it bends sharply where the retractor muscle is given off, and continues as a long epiphallus, terminating in a short kalk sac, or blunt flagellum.

The jaw (pl. xlviii, fig. 10) is somewhat straight in front with a small central projection.

The radula formula is + 50.3.14.1.14.3.50 + or + 67.1.67 +, the laterals may be ten more.

The central tooth and admedian are well pointed, of the usual form in *Austenia* and *Girasia*, at the transitional teeth 15th, 16th and 17th, the plate narrows considerably, and there is a small cusp below the point on the outer side, the succeeding teeth are long, narrow and curved, the outer cusp well below the point, gradually becoming smaller and the marginals at last very minute, simple and aculeate.

Subfamily *DURGELLINAE*, Godwin-Austen, 1888.

Genus **Durgella**, Blf.

Durgella aborense, n. sp.

(Plate xlvii, figs. 1—1*d*).

Locality.—Upper Rotung, Abor Hills, 7 specimens, No. 5907–13 (*S. Kemp*).

Shell (fig. 1*b*) ovately globose, thin, transparent, shining, membranaceous; sculpture none, very indistinct close lines of growth on the last whorl; colour very palest ochre, apex white; spire flatly convex; suture very slightly impressed; whorls 3, rapidly increasing, tumid; aperture widely lunate; peristome thin, membranaceous; columella margin oblique, not thickened.

Size: maj. diam. 7·0, alt. axis 3·0 mm.

This is " Gastropod D ", 7—8-i-12, of Mr. Stanley Kemp described by him as follows: " Common under leaf stems of plantain. Shell largely covered by mantle-lobes when the animal is fully extended. Anterior part of foot very pale and semitranslucent with two broad dorsal dark grey stripes which are continued to the base of the eyestalks. Eyestalks entirely dark grey. Hind part of foot pale brown and semitranslucent, sometimes flecked with white. Mantle-lobes pale brown with flecks of white and red brown, with minute pimples. Body in shell horn-coloured with black marbling. Sole of foot pale and translucent, its dorso-lateral margins with small white flecks. This snail, when disturbed, withdraws the anterior part of its body into the shell and lashes about with the posterior part which it extends to an unusual length, twisting, turning and jumping by this means."

The animal (pl. xlvii, figs. 1, 1*a*) preserved in spirit is about 22 mm. in length, pale in colour throughout, two grey stripes on neck extend to the eye-tentacles. The living animal is well described above by Mr. Kemp. The foot is narrow, well divided, indistinctly segmented, the mucous gland has a conspicuous long overhanging lobe; the right and left shell lobes, which are both ample, are much contracted and the edges rolled in, as shown in the drawing, but it is easy to imagine how they would spread over the shell in life from the mantle edge, the dorsal lobes are not so affected, and the left is narrow and long. The peripodial margin is broad, and the side of the foot above it well segmented.

In the genitalia (fig. 1*c*), the male organ consists of a long sheath tapering upwards to the bend at the retractor muscle, the epiphallus is very long, the spermatheca short, wide at base, tapering to a blunt point. There is no amatorial organ and it is therefore interesting to compare this with the same organs in *Durgella assamica*, G.-A., *Moll. Ind.*, plate lxxvii, fig. 6. In *Durgella christianoe* and *rogersi* of the Andaman Islands, and in *Durgella dekhanensis* of Southern India, the amatorial organ is also absent.

The radula (pl. xlvii, fig. 1*d*) is quite typical of the genus, the number of teeth in the row being exceedingly numerous, over 600. There is a slight departure in the centre tooth and the three admedians, they are larger than usual, on broader plates, well formed and pointed and the third showing signs of a cusp on the outer margin. The teeth that follow are all alike, evenly bicuspid, much curved, on narrow plates, becoming very small on the margin. These teeth are a departure again from the usual serrated teeth of typical *D. levicula* of Tenasserim.

The jaw was broken, but sufficient of it was seen to show it was straight in front.

Subgenus **Minyongai**,[1] nov.

Shell quite rudimentary, situated on the anterior border of the mantle above the respiratory orifice, completely hidden by the mantle, minute, discoid. The foot long and narrow. The visceral sac rests in a deep **V**-shaped depression on the keel of the foot, distinctly different to its position in *Austenia* and *Girasia*, where it rests in a cavity of the foot itself. Mucous gland small, with a short overhanging lobe. Generative organs simple, vas deferens very short, as also the spermatheca. No amatorial organ.

Minyongia kempi, n. sp.

(Plate xlvii, figs. 2—2*g*).

No. 5988 is thus described by Mr. S. Kemp.—"Slug B", 3i-xii-11. "Common behind leaf-stems of plantain. When disturbed this species twists, turns and wriggles in a state of frantic excitement. General colour dull straw yellow. Anteriorly, behind the tentacles, are three very obscure median and sub-dorsal grey stripes. Posterior parts with whitish granulations and darker interspaces. Sole almost white with a pale yellow margin."

Locality.—Rotung, No. 5919; Kobo, one specimen, No. 5867 (*S. W Kemp*).

The shell is reduced to a very small oval thin disk, opaque white, granulate in structure.

It is situated on the anterior side of the mantle, just in front of the respiratory orifice (fig. 2*d*), quite internal and covering the heart, kidney and the branchial sac.

Size: major diameter 2·8 mm., minor diam. 1·75 mm.

The animal (pl. xlvii, fig. 2) is pale coloured with a grey streak on the neck. It has a narrow foot, divided, and from the look of the spirit specimens it reaches a considerable length when extended, probably to about 55 mm. The extremity of the foot (fig. 2*a*) is pointed with a very minute indistinct mucus pore. The peripodial margin has a narrow fringe with the usual two parallel grooves above (fig. 2*c*). The foot is slightly keeled above, dividing into a

[1] The name is derived from the Tribe of Minyongs, who inhabit the mountain country adjacent and west of the Abors.

deep V-shaped depression, in which the posterior part of the animal rests. The mantle is quite abnormal, it is quite smooth and skin-like, very thin ; on the right side, rather forward in position, is the respiratory orifice, with small dorsal lobes on either side, the left produced forwards forms the anterior dorsal part of the mantle, and only this portion is minutely papillate and speckled, distinct from the smooth cuticle covering the internal shell and visceral sac. With the gradual reduction of the shell and its anterior position, this appears to have been the course of development ; the shell lobes have disappeared and their place has been taken by the very thin skin of the visceral sac, through which the dark intestine can be discerned. When this thin membrane is cut and turned back, a lobe of the liver is exposed covering the extreme posterior end of the visceral mass, other lobes in which the intestine lies buried, succeed anteriorily. Just behind the respiratory orifice (fig. 2*e*) the branchial sac comes in, long and narrow, stretching diagonally across to the left side, the kidney and heart lie alongside it on the anterior side; covering these organs is the minute, oval, thin calcareous shell (fig. 2*b*).

Genitalia.—The male organ is a bulbous, short, solid mass, at the apex of which is the retractor muscle; just below this there is a very small pear-shaped accessory organ. The vas deferens is at first large, convoluted, short, rapidly decreasing in size up to the oviduct. This and the prostate are short. The spermatheca is very short, pear-shaped. The amatorial organ is absent.

The radula (fig. 2*g*) of this remarkable mollusk is very interesting, and at once settles its subgeneric position in the Durgellinae. It is of considerable breadth, the number of teeth in the row being very great, 300.1.300, or over 600. The centre tooth is elongate, with a blunt, rounded point, the teeth following are more pointed, long and narrow. Throughout the teeth are of the same form and about the same size, elongate, curved, rising from an oblong plate, bicuspid, finely serrate on the outer edge, the teeth often appear single pointed, due to a slight twist and to the position they are viewed from, one point thus becomes hidden behind the other.

The jaw is thin, narrow, straight in front.

This is a very interesting animal, and an equally interesting discovery. It goes far to clear up our knowledge of these Eastern slug-like forms.

In 1873, when surveying the Aughami Naga Hills, I found near Kohima a small slug under stones on the hill slopes under the village, of which I made drawings at the time. It was eventually described in the *Journal Asiatic Society of Bengal*, vol. xliv, pt. 2, 1875, as *Parmarion*? *rubrum*, plate ii, figs. 4—4*e*; republished by me in "*Mollusca of India*," 1887, vol. i, p. 228, pl. lxi, figs. 4—4*d*, and placed in *Girasia* with a query and with this remark: "The exceedingly small rudimental shell, so completely enveloped by the mantle, almost entitles this form to sub-generic rank ; but as only one specimen has been obtained and was not fully examined

as to its internal anatomy, I place it for the present at the end of the series of *Girasia.*"

Parmarion? rubrum, n. sp., plate ii, fig. 4.

Original description.—" Animal of a fine orange pink, grey on under side of the foot; tentacles short, mantle entirely covering the shell, with only a slight trace of a longitudinal opening running back from the anterior left side, three parallel bands of greenish grey along the back of the neck, the eye-tentacles being of the same colour. The gland at extremity of foot with a long, overhanging lobe.

" Extremity of foot to posterior end of mantle	0·9 in.
Mantle	0·8 ,,
Anterior side mantle to head	0·4 ,,
Total length when moving	0·8 ,,

" Shell quite rudimentary, minute, granular (fig. 4*b*). Major diam. 0·14 in.

" Hab.—Kohima, Naga Hills, in brushwood, under stones on the hill slopes.

" The mucous gland in this species differs considerably from that of *Helicarion gigas* and its allies, the upper lobe projecting and hanging over so as to present, when viewed sideways, a narrow horizontal slit."

In the *Annals and Magazine of Natural History*, Jan., 1891, Mr. T. D. A. Cockerell published a paper "Notes on Slugs"; on p. 99 he gives a classification of the sub-family Helicarioninae, in which several new sub-genera are intoduced. Section C is defined by shell characters only as follows:—" shell slug-like, hardly or not at all whorled," sub-sec. 2, " shell exposed by a hole in the mantle only or entirely covered."

a. Shell horny, exposed by a rather large aperture. Asiatic.
XV *Girasia*, Gray (*G. hookeri*, Gray).

b. Shell oval, rudimentary, covered, animal like *Girasia.*
XVI. *Girasia*, sect. Cryptogirasiae (*G. rubrum*, G.A.).

With regard to sub-sec. 2*a*. In life no hole is visible, its size therefore is not a true character. The form of the shell lobes is what should be described. Taking these combined with the other external and internal characters, *Girasia* is a well-established genus.

Sub-sec. 2*b*. *Cryptogirasia* was founded on the drawings made from life, referred to above by me, and out of the dried-up animal I obtained by soaking, the small rudimentary shell. The animal externally is not very like *Girasia.*

No further specimens coming to hand, Cockerell's genus was recorded in the *Fauna of British India*, 1908, Mollusca I, p. 203. I said then (p. 204) after the description of *G. rubra*, G.-A., " the generic relations of this animal are doubtful."

In my Presidential address to the Conchological Society of Great Britain and Ireland, 16th Oct. 1909, " The Importance of

the animal in the Land Mollusca shown by certain evolutionary stages in some genera of the Zonitidae," I again referred to *Cryptogirasia*, and gave a figure of the animal and its shell.

There are so many points of resemblance between this Naga mollusc and *Minyongia kempi*, that I feel very confident the former belongs to the same subfamily, the Durgellinae. This would remove *Cryptogirasia rubra* far from the position given it by Cockerell. It has no relationship whatever to *Girasia*, and his genus cannot therefore be retained. Until the Naga slug *C. rubra* is collected again and examined thoroughly, it may safely be placed in *Minyongia* with a query, only some 200 miles separating the respective habitats.

EXPLANATION OF PLATE XLV.

Dihangia koboensis, n. sp.

FIG. 1.—Animal as seen from the right side, × 1·2.
,, 2.— Do. left side, × 1·2.
,, 3.— Do. above, × 1·2.
,, 4.— Do. dorsal view showing mucous gland, × 1·7.
,, 5.— Do. anterior view of the head, × 1·1.
FIGS. 6, 6*a*.—The shell, upper and under sides, × 4·5.

Girasia gladstonei, n. sp.

FIG. 7.—Animal as seen from the right side, nat. size
,, 8.— Do. left side, × 1·4.
,, 9.— Do. above, nat. size.
,, 10.— Do. front view of head, × 2.
,, 11.— Do. the mantle, seen from above, showing the areas of the shell and dorsal lobes, × 2.

Cryptaustenia bicolor, n. sp.

FIG. 12.—Animal viewed from the right side, × 3·8.
,, 13.— Do. left side, × 3·8.
,, 14.—The shell seen from above, × 2.


1


2


4

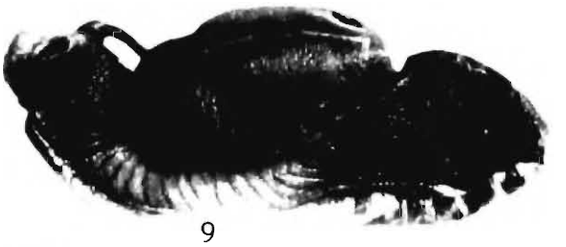

5


3


6


6a


7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J. S Gladstone, photo: 1-5, 7-10, 12, 13.
H. H. Godwin Austen, del., 6, 6a, 11-14.

ABOR MOLLUSCA.

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EXPLANATION OF PLATE XLVI.

Girasia maculosa, n. sp.

FIG. 1.—Animal, view of right side, nat. size.
,, 1*a*.— Do. dorsal side.

Austenia aborense, n. sp.

FIG. 2.—Animal, view of right side, nat. size.
,, 2*a*.— Do. dorsal side.

Galongia kempi, n. sp.

FIG. 3.—Animal, view of right side, nat. size.
,, 3*a*.— Do. dorsal side.

Dihangia koboensis, n. sp.

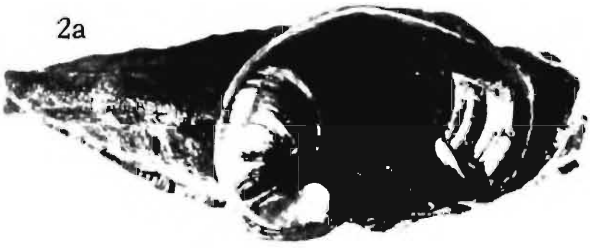
FIG. 4.—Animal, view of right side, nat. size.
,, 4*a*.— Do. dorsal side.
,, 4*b*.— Do. left side.

1

1a

2

2a



3

3a

4

4a

4b

S. Gladstone, photo.

ABOR MOLLUSCA.

Watford Engraving Co., collotype.

EXPLANATION OF PLATE XLVII.

Durgella aborense, n. sp.

FIG. 1.—Animal viewed from the right side, × 4·5.

,, 1*a*.— Do. left side, × 4·5.

,, 1*b*.—Shell, × 4·5.

,, 1*c*.—Part of the generative organs, × 8.

,, 1*d*.—Portion of the radula, centre and admedian teeth and the 30th to 34th, × 630.

Minyongia kempi, n. sp.

FIG. 2.—Animal viewed from the right side, × 2.

,, 2*a*.—Mucous pore at extremity of the foot, × 12·4.

,, 2*b*.—Shell, × 12.

,, 2*c*.—Extremity of foot from right side, × 9·25.

,, 2*d*.—Visceral sac, mantle removed, showing position of shell (S), br. branchial sac, and res. ap. respiratory aperture, × 6.

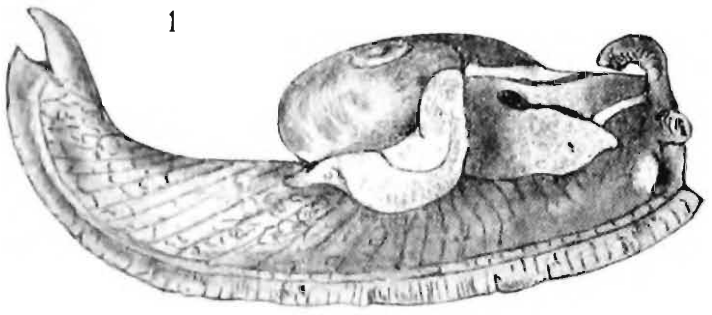
,, 2*e*.—Visceral sac, showing position of heart, kidney and branchial sac, × 6.

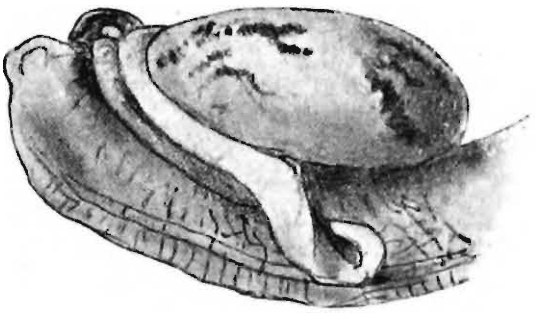
,, 2*f*.—Generative organs in part, × 6.

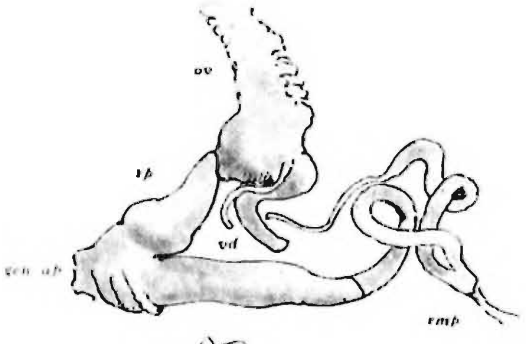
,, 2*g*.—Radula, teeth in different parts of the row, × 630.

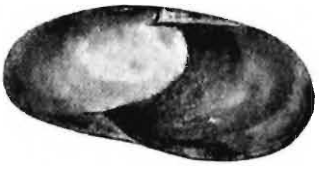
EXPLANATION OF LETTERING.

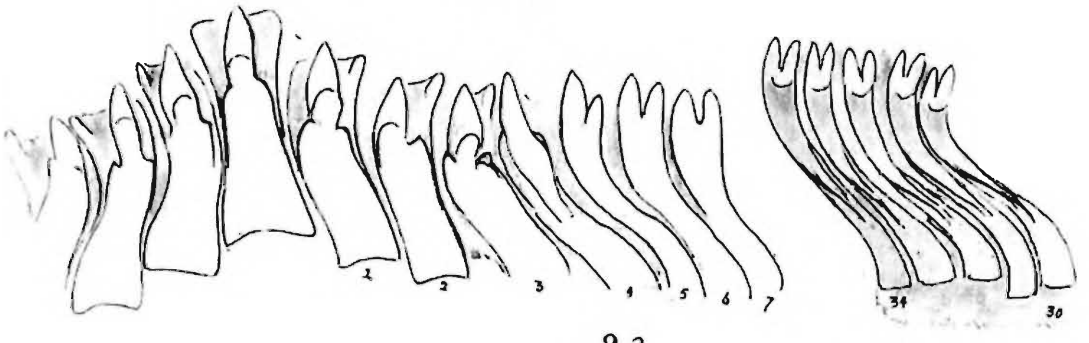
Am. or. amatorial organ; alg. albumen gland; ant. anterior; post. posterior; hd. hermaphrodite duct; hg. hermaphrodite gland; br. branchial sac; gen. ap. generative aperture; rmp. retractor muscle penis; rme. retractor eye tentacle; et. eye-tentacle; h. heart; i. intestine; ov. oviduct; f. foot; k. kidney; l. liver; p. penis; sp. spermatheca; ot. oral tentacle; m. mantle edge or muscle.

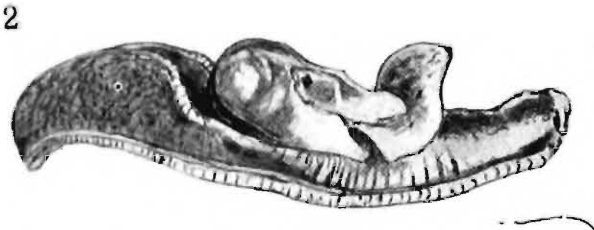


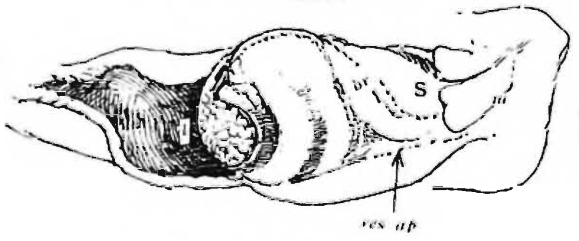


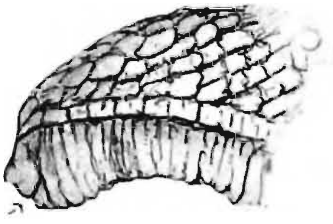


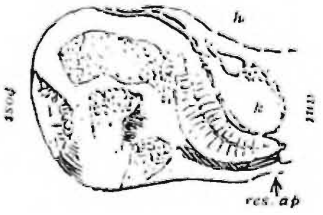


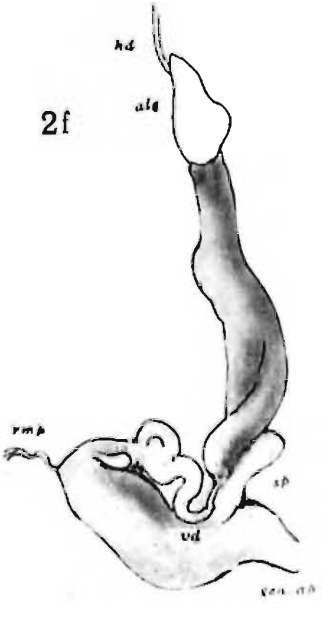


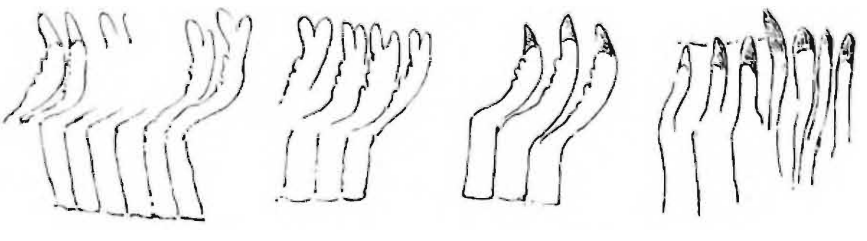












H. H. Godwin Austen, del.

ABOR MOLLUSCA.

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EXPLANATION OF PLATE XLVIII.

Dihangia koboensis, n. sp.

FIG. 1.—Animal from the underside, opened along the sole of the foot and turned back to show the packing of the internal organs, the extruded penis and generative aperture is shown and the approximate position of the retractor muscle penis attachment, × 3·4.

,, 1*a*.—Posterior lobe of the liver.

,, 2.—Part of the genitalia. The penis extruded close to the right eye-tentacle, showing internally the retractor muscles of both, × 3·4.

,, 3.—Part of the genitalia. External: The penis on the right side showing the generative aperture leading to the spermatheca; the right eye tentacle and right oral tentacle adjacent. Internal: The amatorial organ, the spermatheca, ovotestis, etc., up to the albumen gland and hermaphrodite duct, × 3·4.

,, 4.—View of branchial sac, heart, kidney and hermaphrodite gland lying beneath the shell, seen from the ventral side, opposite the floor of the foot, × 3·4.

,, 4*a*.—Same area on another plane showing the lobes of the hermaphrodite duct, × 3·4.

,, 5.—Mantle lobes and shell removed, dorsal view of 4 and 4*a* with the very slightest remnant of the first whorl of the visceral sac, × 3·4.

Galongia kempi, n. sp.

FIG. 6.—Animal, right side, note apex of shell (S), × 2·25.

,, 6*a*.—Extremity of foot and mucous gland, × 6.

FIGS. 7, 7*a*.—Shell from above and below, × 6.

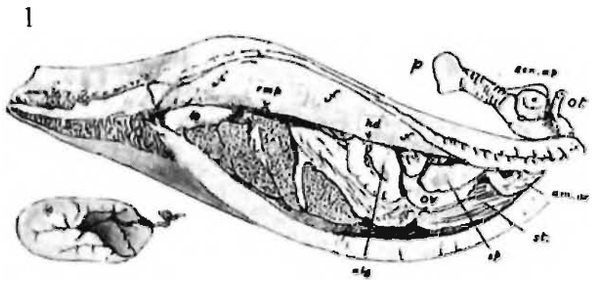
FIG. 8.—Generative organs, complete, × 3·4.

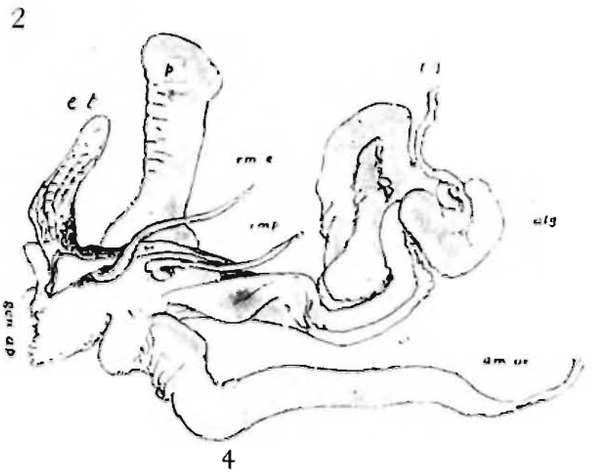
,, 9.—Teeth of the radula, at different parts of the row, × 368.

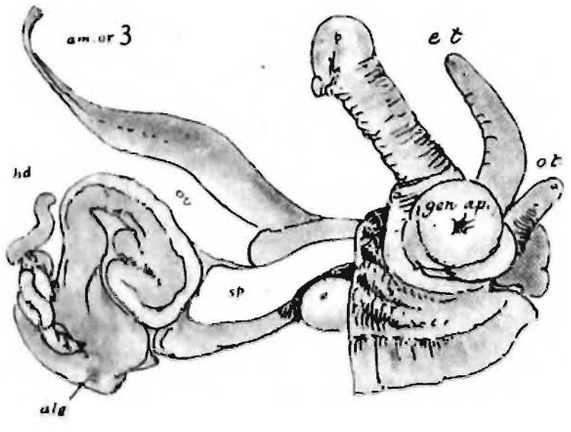
,, 10.—Jaw, × 18.

EXPLANATION OF LETTERING.

Am. or. amatorial organ; alg. albumen gland; ant. anterior; post. posterior; hd. hermaphrodite duct; hg. hermaphrodite gland; br. branchial sac; gen. ap. generative aperture; rmp. retractor muscle penis; rme. retractor eye tentacle; et. eye-tentacle; h. heart; i. intestine; ov. oviduct; f. foot; k. kidney; l. liver; p. penis; sp. spermatheca; ot. oral tentacle; m. mantle edge or muscle.







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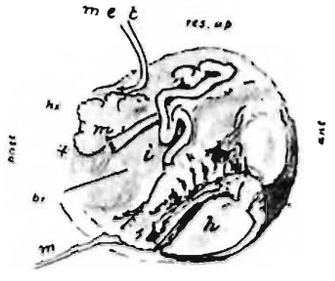

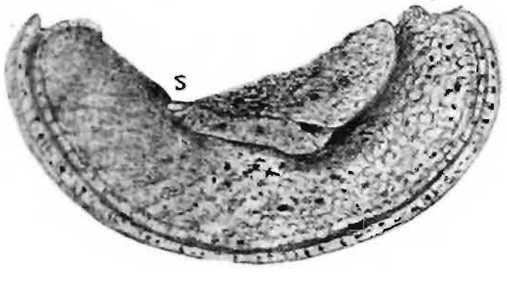

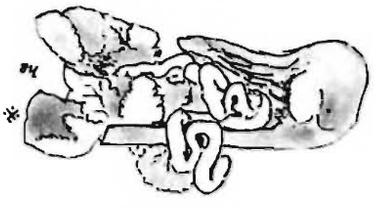

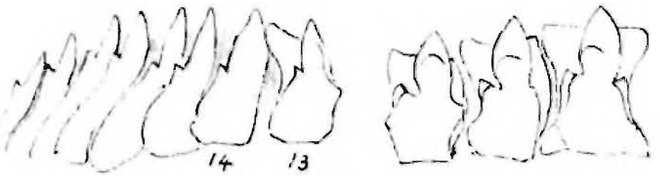

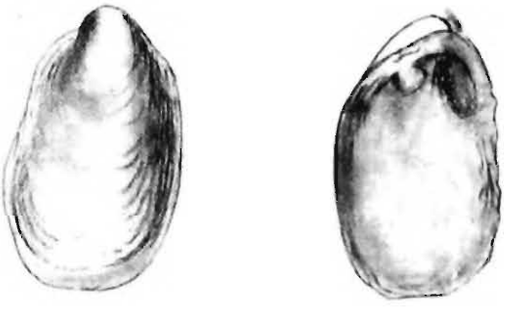

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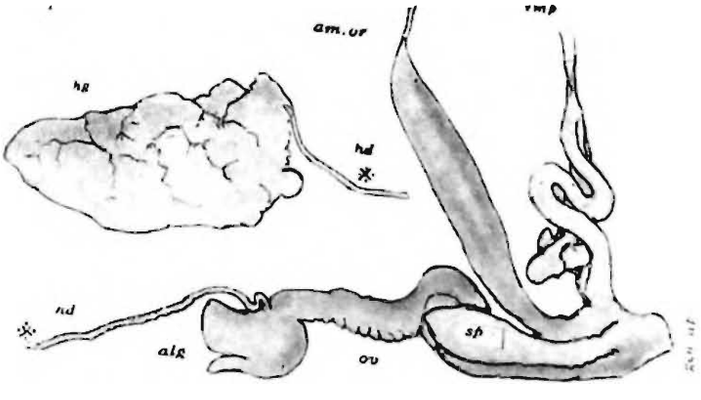

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