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IX. CONTRIBUTIONS TO A KNOWLEDGE OF THE ORIENTAL DIPLOPODA ONISCOMORPHA.

I. THE FAMILY GLOMERIDAE.

By F. SILVESTRI (*Portici, Italy*).

The authorities of the Indian Museum have kindly sent me a collection of Oriental, especially Indian, Diplopoda for identification. From these I began the study of the Oniscomorpha with a view to attempt a revision of the group and to catalogue the extra-European species described up to date. I treat in this paper of the family Glomeridae, of which I have been able to examine specimens of 26 species out of a total of 34 that are at present known, including those described by me as new in this paper.

In my opinion all the genera I deal with in this paper are true Glomeridae and all have the special characters of the family, as I shall show in the description of one of them, *viz. Apiomeris*. I would particularly like to note that all the Oriental Glomeridae have the latero-posterior incisura of the first tergite (figs. IV-V) shorter than the European *Glomeris*, *s. l.* (*p. e. G. connexa*, C. Koch), and consequently the praeincisural part of the same tergite is longer than the supraincisural part and the posterior point of the subincisural part is very near to the posterior border of the tergite. The second tergite of the Oriental Glomeridae has the latera narrower than in European *Glomeris*.

I refer the species of Oriental Glomeridae known to me to 4 genera, *viz. Apiomeris*, O. F. Cook, *Rhopalomeris*, Verh., *Hyperglomeris*, nov., *Dinoglomeris*, nov., of which *Apiomeris* comprises 4 subgenera¹ and *Rhopalomeris* two. Of the four genera *Apiomeris* is the richest in species, in the subgenus *Hyleoglomeris* alone numbering about two-thirds of all the known species of Oriental Glomeridae. *Rhopalomeris* contains 4 species and a variety, *Hyperglomeris* and *Dinoglomeris* one species each.

In regard to distribution I note that *Apiomeris* (subgenus *Hyleoglomeris*) is well distributed in North and East India, Burma, Siam and the Malay Archipelago to Celebes, it has not been collected up to the present in Ceylon and in South-West India; *Apiomeris* (*s. s.*) and *Malayomeris* in Sumatra; *Apiomeris* (subgen. *Aphero-*

¹ The difference of grade between genera and subgenera I follow at present is that in the case of genera we have one or more characters to distinguish the females, but in the case of subgenera we are unable to ascribe a species to one or to another subgenus unless we know the male also.

meris) in Java; *Hyperglomeris* and *Dinoglomeris* in Tonkin; *Rhopalomeris* in Burma, Malacca and adjacent islands and Tonkin.

CONSPECTUS GENERUM GLOMERIDARUM ORIENTALIUM.

- a. Collum pone marginem anticum transverse bistriatum ¹).
Tergitum ultimum interne lateraliter haud carinatum.
- c. Antennae conis sensitivis apicalibus quatuor Gen. *Apiomeris*, O. F. Cook.
- d. Antennae conis sensitivis apicalibus numerosis Gen. *Rhopalomeris*, Verh.
- b. Collum pone marginem anticum striis transversis tribus majoribus et aliis minoribus instructum. Tergitum ultimum interne lateraliter, parum longe a basi, carinatum.
- e. Caput quam collum parum latius, trunci tergiti primi parte laterali laminari antica, ut cetera superficies, perpendiculari, facie externa Gen. *Hyperglomeris*, nov.
- f. Caput quam collum haud latius; trunci tergiti primi parte laterali laminari antica introrsum directa ita ut ejusdem facies antica sit ... Gen. *Dinoglomeris*, nov.

Gen. *Apiomeris*, O. F. Cook.

- Glomeris*, Pocock, ex p., Max Weber's Zool. *Ergebn. Reise Nederl. Ost.-Ind.* III, p. 323 (1894).
„ Silvestri, *Ann. Mus. Genova* (2) XIV, p. 720 (1895).
„ Attems, *Abh. Senckenb. naturf. Ges.* XXIII, p. 480 (1897).
Malayomeris, Verhoeff, *Sitz. Ber. Ges. nat. Freunde* 1910, p. 243 et 246.
Hyleoglomeris, Verhoeff, *Sitz. Ber. Ges. nat. Freunde* 1910, p. 245.
Nesoglomeris, Carl, *Revue suisse d. Zool.* XX, p. 100 (1912).

Corpus capite, collo,² trunco 11-segmentato et segmento anali constitutum, subsemicylindraceum, arco dorsuali a tergitis, facie ventrali a paratergitis et sternitis formata, in globum contractile.

Caput (Fig. I, 1-6) parum minus quam duplo latius quam longius, clypeo unidentato, incisura postico-laterali clypei longa et a margine antico laterali retrorsum (haud introrsum) directa, media fronte convexiuscula et postice longitudinaliter parum carinata, ad verticem transverse carinata, circum Tömösvaryi organum et torulum depressa, vertice brevi, medio dorso postice in processum triangularem producto, processu pseudoccipitali externo brevi, processu pseudoccipitali interno magno.

Oculi serie ocellorum paucorum parum arcuatim (convexitate externa) secundum frontis marginem lateralem disposita et ocello alio externo ad ocellos posteriores approximato compositi.

¹ In specie una tantum inter omnes mihi notas, *A. (Hyleoglomeris) beccarii*, Silv., pone strias duas typicas stria alia et aliquantum diversa adest.

² Nomenclaturam vide in: F. Silvestri, *Classis Diplopoda*, vol. I, Anatome (Portici, 1903).

Tömösvaryi organum bene evolutum, ferri-equini instar dispositum.

Antennae (Fig. VI, 1) in faciei parte submediana, inter sese spatio latiusculo remotae, insertae sunt, 8-articulatae, articulis 1-4 sursum et extrorsum, articulis 5-8 deorsum et extrorsum directis, articulo sexto quam ceteris singulis longiore, articulo tertio quam sextus brevior, articulis 1°, 2°, 4° et 5° brevibus inter sese subaequalibus, articulo septimo brevior, articulo octavo brevissimo articulum septimum vix vel haud superante, articulorum superficie setis brevissimi plerumque numerosis aucta et seta brevi ad apicem inferum articuli primi et ad apicem inferum et superum articulorum 3-6 et seta nonnulla brevi ad apicem articuli septimi instructa, superficie apicali articuli octavi conis sensitivis quatuor aucta.

Mandibulae (Fig. II, 1-4) supra ab epicranio omnino obtectae et antice et lateraliter ab eodem aliquantum superatae, cardine a stipite tantum incisura profunda (haud integra) distincto, prae-mandibula dente apicali bene evoluta, lamina 4-dentata, laminis pectinatis 8-9, praemola brevi et brevissime setosa, mola bene evoluta antice parum concava, cetero convexo, supra et subtus serie longitudinali acicularum brevissimarum instructo.

Hypostoma (Fig. III, 1-3) basilari bene arcuato, infrabasilari integro sed medio minus spisso, divisionem simulante, postice a basilaris basi parum remoto, pseudocardine utrimque singulo magno, inframaxillari integro, subtrapezoideo, postice sinuato, stipitibus maxillaribus externis (internis haud praesentibus) antice quam postice latioribus, palpulorum maxillarium altero (exteriore) quam alter interior aliquantum minore.

Collum (Fig. I, 7) transverse subsemiellipticum postice rotundatum margine antico ad frontis carinam posticam transvexalem pertinens et vertice obtegens, capitis latitudinem aequans, supra vix convexum et pone marginem anticum transverse bistriatum.

Truncus segmentis 11 compositus, quorum primus et ultimus quam ceteri singuli majores sunt, segmento singulo tergito in arcum dorsualem (tergum s. s. vel melius mesotergum) et paratergum diviso, segmentis 1-3 sterno simplici et pedum pare singulo, segmentis 4-10 sternis et pedum paribus duobus, segmento 11° pedibus nullis.

Tergum primum (Fig. IV, 1-2) magnum, medium antice sinuatum, colli marginem rotundatum circumdans, lateribus longis et deorsum aliquantum magis quam tergita cetera pertinens, postice ad marginem inferum incisura longitudinali antrorsum directa, affectum, quae quam dimidia longitudo lateris ejusdem segmenti aliquantum brevior est ita ut pars praeincisuralis quam supraincisuralis longior sit, parte subincisurali postice parum longe a tergiti margine postico pertinente; ejusdem tergiti superficie supera ad marginem sini antici striis transversalibus tribus, quarum postica plus minusve longe ad latera secundum marginem anticum pertinet, pone strias dictas, postmarginales appellatas

striis aliis superis 3-6 lateraliter integris vel divisis usque ad incisuram posticam lateralem pertinentibus, pone marginem anticum lateraliter parte laminari plus minusve evoluta et pone partem laminarem striis transversalibus 5-14, quarum nonnullae in dorsum ut striae superae continuant.

Tergitum secundum (Fig. V, 1-2) quam tergita cetera deorsum parum minus productum, lateribus inferis angustatis stria una vel nonnullis instructis.

Tergitum tertium lateribus quam eadem tergiti secundi paulum latioribus, tergiti quarti quam eadem tergiti tertii parum latioribus, tergiti quinti quam eadem tergiti quarti aliquantum latioribus, tergiti sexti quam eadem tergiti quinti parum latioribus, tergiti septimi quam eadem tergiti sexti in angulo antico vix latioribus, tergitorum 8-10 gradatim paullum vel parum minoribus et angulo postico retrorsum parum producto; tergитum ultimum margine postico late rotundato, medio haud vel vix sinuato, facie interna laeva (haud carinata).

Paratergitum (= *pleura* auctorum!) segmenti primi quam cetera minus est, paratergita sequentia 2-10 subaequalia integra, transverse subretangularia, antice striis transversalibus tribus exarata.

Pedes omnes (Fig. VI, 2), ungue terminali incluso, 7-articulati, articulo sexto quam ceteri longiore, articulo tertio quam sextus parum brevior, articulis primo et secundo brevibus, longitudine parum diversis articulis quarto et quinto inter sese subaequalibus et quam secundus brevioribus, ungue terminali simplici robusto.

Mas. Tergitum ultimum eidem feminae simile vel ab eodem aliquantum diversum.

Pedum paria 19, quia segmentum praeanae (trunci ultimum) pedum paribus duobus etiam instructum est.

Pedes paris 17ⁱ (Fig. VI, 3) 5-articulati (vel 6-articulati si seta apicalis ut unguis obsoletus considerata est) articulo primo plus minusve laminae instar deorsum et extrorsum dilatato, articulis 2-4 brevibus.

Pedes paris 18ⁱ (Fig. VI, 4) 5-articulati, articulo primo ceteris majore cum opposito coalito vel non, articulis 2-5 brevibus.

Pedes paris 19ⁱ (Fig. VI, 5) 4-articulati, articulis robustis antice et postice vel tantum postice processibus nonnullis, ut in subgenerum descriptione scribo, instructis.

Sternum inter pedes parium 1-18 perparvum, inter pedes paris 19ⁱ magnum infra productum, processu mediano lato et utrimque processu angusto terminatum.

Observatio. Genus *Apiomeris* ab O. F. Cook sine descriptione, sed cum speciei typicae (*Glomeris infuscata*, Pocock) nomine, propositum accepto, quia semper pro supervacuo habeo nomen genericum novum speciei eidem dare, quae jam sub nomine generico alio indicata est, etsi genus nondum descriptum sit.

CONSPECTUS SUBGENERUM GENERIS *APIOMERIS*.

- a. Pedes paris 18ⁱ articulo primo cum opposito coalito.
- c. Pedes paris 19ⁱ articulis 4 omnibus inter sese distinctis, articulis secundo et tertio processu postico conico tantum instructis ... Subgen. *Apiomeris*, O. F. Cook.
Typus: *A. infuscata* (Poc.)
- d. Pedes paris 19ⁱ articulo tertio a secundo antice tantum lateraliter separato, articulo secundo processu basali et processu apicali internis latis longis, articulo tertio tuberculo perparvo postico ... Subgen. *Malayomeris*, Verh.
Typus: *Malayomeris martensi*, Verh.
- b. Pedes paris 18ⁱ articulo primo ab opposito sejuncto; pedes paris 19ⁱ articulis 4 distinctis.
- e. Pedes paris 19ⁱ articulis 1-2 processu subconico setigero apicali interno bene evoluto, articulo tertio tantum seta apicali antica (interdum haud distincta), articulis 2-3 processu postico interno carnosio plus minusve evoluto et articulo tertio etiam processu postico subapicali tuberculiformi ... Subgen. *Hyleoglomeris*, Verh.
Typus: *Hyleoglomeris multilineata*, Verh.
- f. Pedes paris 19ⁱ articulis 2-3 tantum processu carnosio postico interno instructis ... Subgen. *Apheromeris*, nov.
Typus: *Apheromeris partialis*, sp. n.

Subgen. *Hyleoglomeris*, Verh.

Glomeris, Pocock, ex p., Max Weber's *Zool. Ergebn. Reise Niederl. Ost.-Ind.* III, p. 323 (1894).

„ Silvestri, *Ann. Mus. Genova* (2) XIV, p. 720 (1895).

„ Attems, *Abh. Senckenb. naturf. Ges.* XXIII, p. 480 (1897).

Hyleoglomeris, Verhoeff, *Sitz. Ber. Ges. nat. Freunde* 1910, p. 245.

Nesoglomeris, Carl, *Revue suisse d. Zool.* XX, p. 100 (1912).

Mas. Pedes paris 18ⁱ articulo primo ab opposito sejuncto; pedes paris 19ⁱ 4-articulati, articulis omnibus distinctis, articulis 1-2 processu subconico setigero apicali interno bene evoluto, articulo tertio tantum seta apicali antica (interdum haud distincta), articulis 2-3 processu postico interno carnosio plus minusve evoluto et articulo tertio processu postico subapicali tuberculiformi instructis.

Apiomeris (*Hyleoglomeris*) *multilineata*, Verh.

Sitz. Ber. Ges. nat. Freunde 1910, p. 248, taf. ix, abb. 1-2.

Corpus totum pallide ochroleucum. Caput ocellis 7-8+1, antennis (Fig. VI, 1) articulo sexto parum minus quam duplo longiore quam latiore.

Truncus. Tergitum primum (Fig. IV, 1) area mediana striis superis 6 lateraliter continuantibus, lamina laterali antica parva, area postlaminari striis 10. Tergitum secundum (Fig. V, 1) lateribus angustatis stria integra et stria abbreviata instructis; tergum ultimum postice late rotundatum.

Pedes (Fig. VI, 2) articuli primi angulo infero externo obtuso, articuli sexti spinis vide figuram.

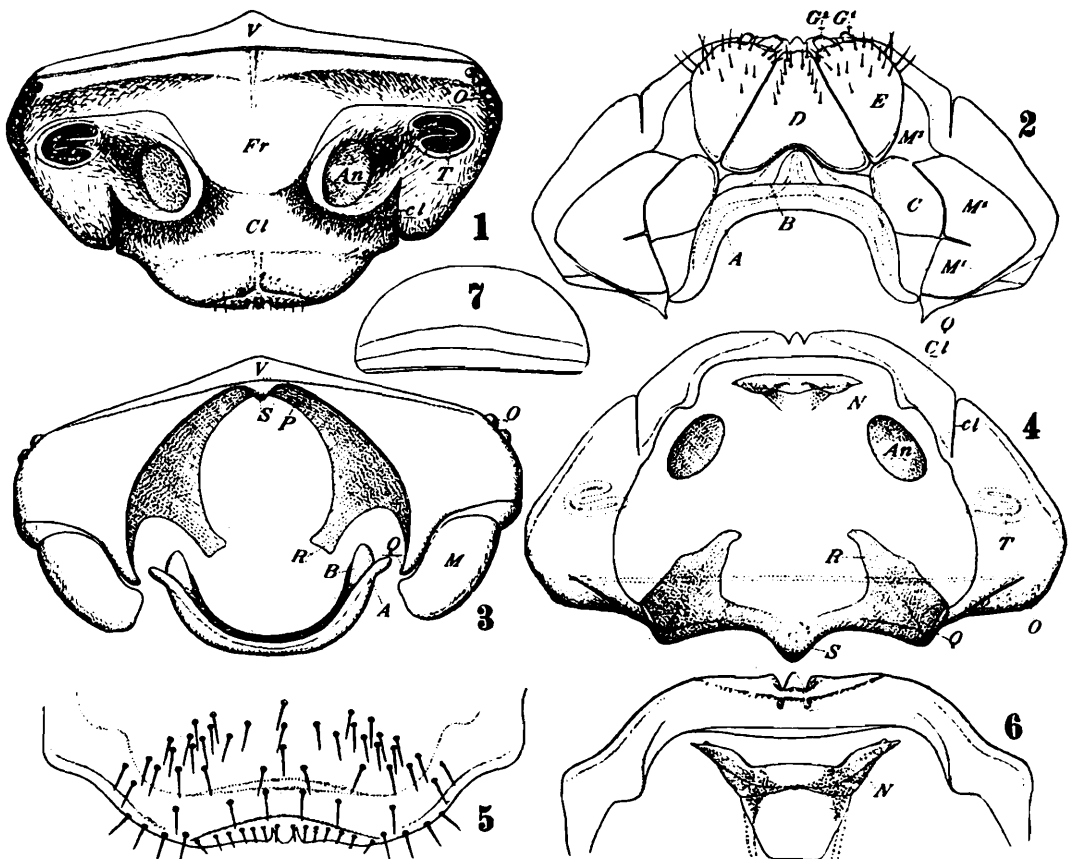


FIG. 1.—*Apiomeris (Hyleoglomeris) multilineata*.

1. caput pronum; 2 caput supinum; 3 caput a facie postica inspectum; 4. epicranium subthus inspectum; 5. clypeus pronus; 6. clypeus supinus; 7. collum pronum.

A. basillare; An. torulus; B. infrabasilare; C. pseudocardo; Cl. clypeus; cl. incisura postico-lateralis clypei; D. inframaxillare; E. stipites maxillares; Fr. frons; G¹. et G². palpi maxillares; M. mandibula; M¹. ejusdem cardo; M². ejusdem stipes; M³. ejusdem praemandibula; N. lamina palatina; O. ocelli; P. phragma pseudoccipitalis; Q. processus pseudoccipitalis externus; R. processus pseudoccipitalis internus; S. processus verticis medianus; T. Tömösvaryi organum; V. vertex.

Long. corp. mm. 17, lat. 8.5, long. antennarum 3.6, pedum paris decimi 5.5.

♂ Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. VI, 3-6.

Habitat. Borneo: Bengkajong (Mus. Berlin).

Apiomeris (Hyleoglomeris) crebristriata, sp. n.

Corpus totum testaceum antennarum articulis 5° et 6° brunneis.

Caput ocellis 7+1 (in latere laevo abnormaliter ocellis 1 interno, 8 in serie arcuata et 1 externo), antennis (Fig. VII, 1) articulo sexto duplo longiore quam latiore.

Truncus. Tergitum primum area mediana striis 8 lateraliter

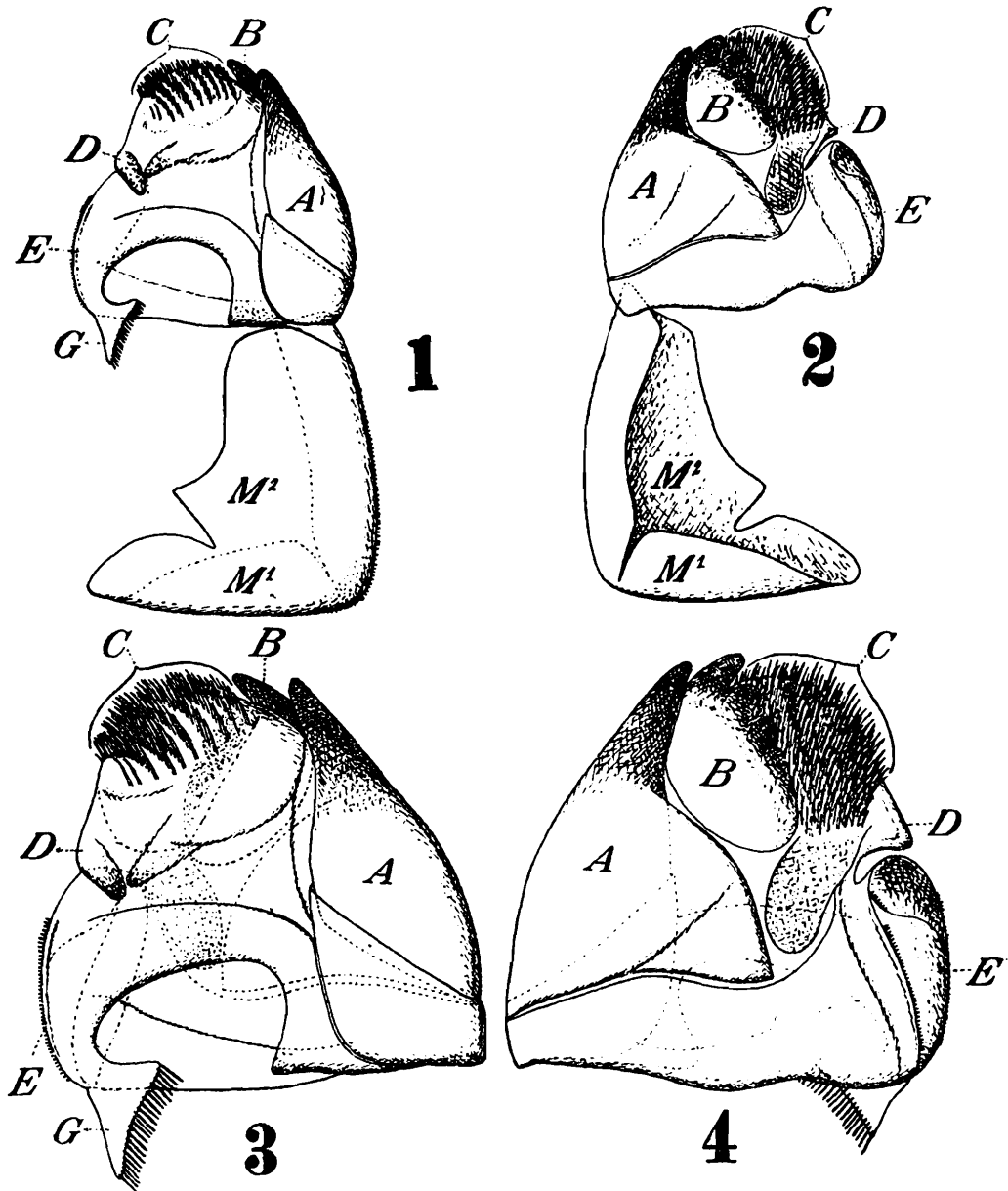


FIG. 11.—*Apimeris (Hyleoglomeris) multilineata*.

1. mandibula laeva supina; 2. eadem prona; 3-4. ejusdem praemandibula supina et prona magis ampliata.

A. dens apicalis; B. lamina dentata; C. laminae pectinatae; D. zona praemolaris; E. mola; G. apodema; M¹. cardo; M². stipes.

continuantibus, lamina laterali antica perparva, area postlaminari parum convexa striis crebris 13-14 instructa, quarum 8 supra continuant. Tergitum secundum lateribus angustatis praeter striam postmarginalem striis duabus; tergita cetera praeter striam post-

marginalem stria una, tergitorum 3° et 4° lateribus angustatis, sequentium sat latis angulo antico rotundato, postico gradatim parum acuto; tergum ultimum antice striis duabus, postice late rotundatum.

Pedes (Fig. VII, 2) articuli primi angulo infero externo obtuso, articuli sexti spinis vide figuram.

Long. corp. mm. 10.5, lat. 5, long. antennarum 2.20, pedum paris decimi 3.

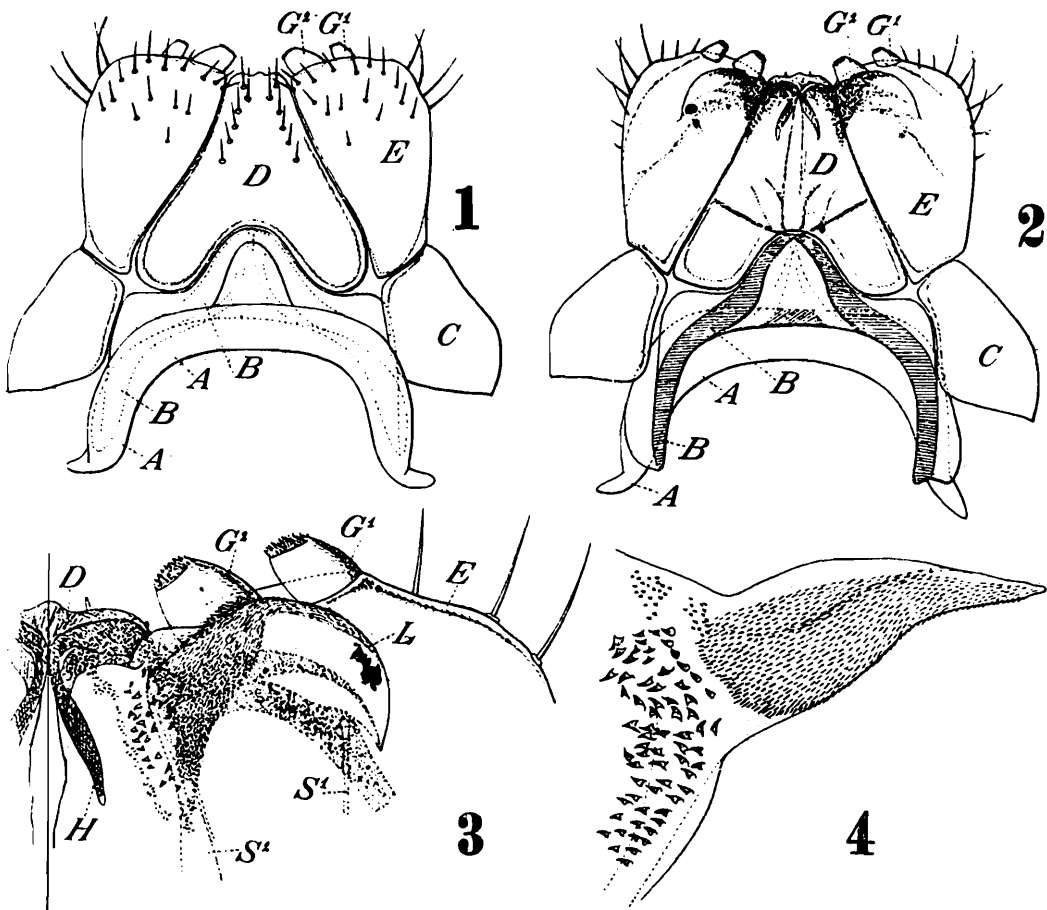


FIG. III.—*Apiomeris* (*Hyleoglomeris*) *multilineata*.

1. hypostoma supinum; 2. hypostoma pronum; 3. dimidia pars hypostomatis prona (a facie interna inspecta); 4. dimidia pars laminae palatinae.

A. basilare; B. infrabasilare; C. pseudocardo; D. inframaxillare; E. stipites maxillares; G¹. et G². palpi maxillares; H. laminae chitineae inframaxillares anteriores; L. laminae maxillares internae; S¹. ductus glandulae salivalis; S². ductus glandulae maxillaris.

Mas ignotus.

Habitat. Borneo: Sarawak.

Observatio Species haec ab *Hyl. multilineata*, Verh. magnitudine minore (exemplo descripto certe adulto!) et trunci tergiti primi striis magis numerosis et crebrioribus distinguenda est; ab *Hyl. atricornis*, Silv., trunci tergiti primi striis lateralibus magis numerosis et crebrioribus, pedum articuli primi angulo infero externo obtuso facile distinguenda.

***Apiomeris (Hyleoglomeris) zonifera*, sp. n.**

Corpus cremeum trunci tergitis 4-6 fuscis, tergito septimo antice fusco, postice gradatim pallidior, margine postico cremeo, antennis articulis 3-7 brunneis, pedibus cremeis.

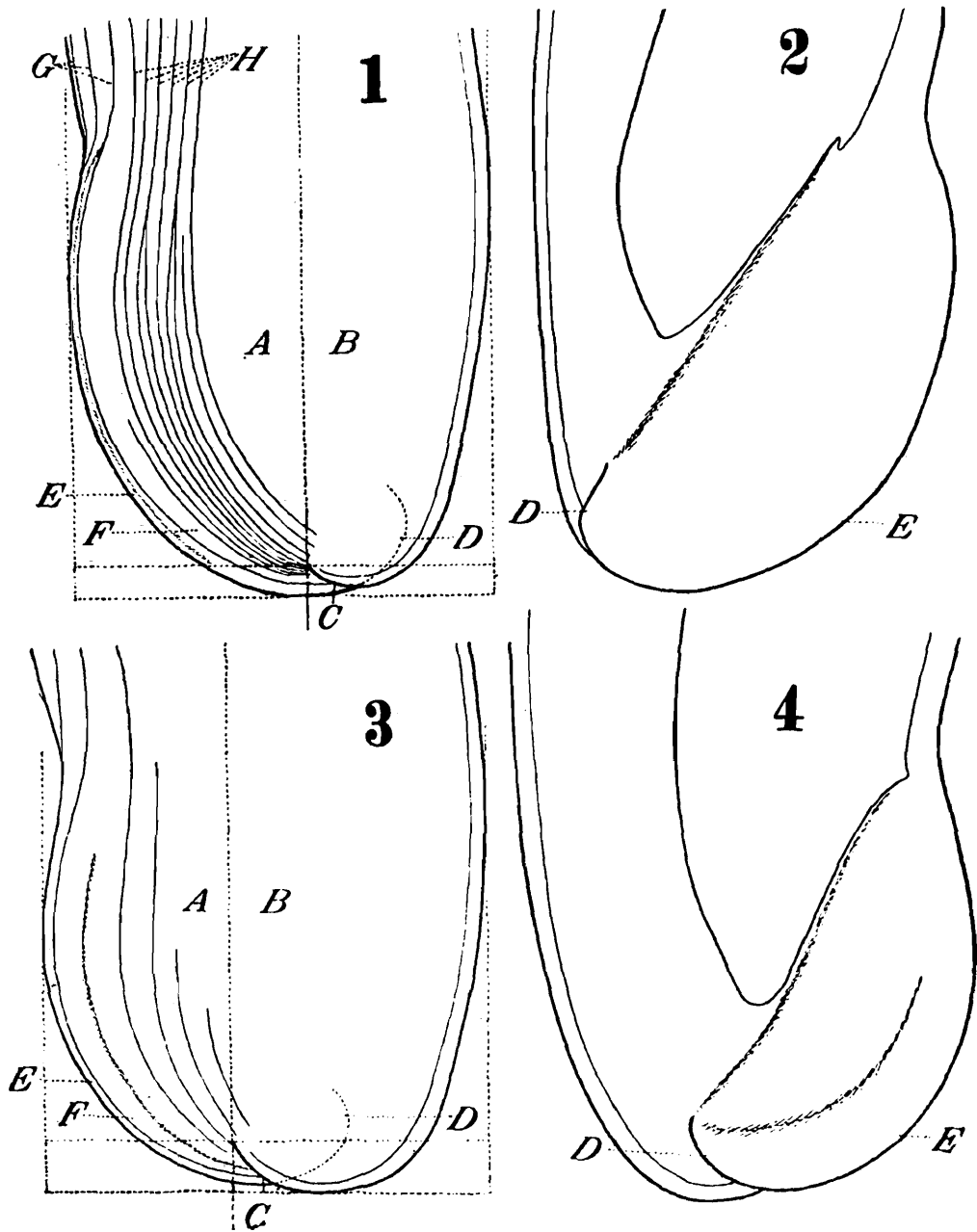


FIG. IV

1-2. *Apiomeris (Hyleoglomeris) multilineata*: trunci dimidium tergitem primum lateraliter externe et subtus inspectum; 3-4. *Glomeris connexa paucistriata*: trunci dimidium tergitem primum lateraliter et subtus inspectum.

A. tergiti pars praeincisuralis; B. pars supraincisuralis; C. linea supraincisuralis; D. linea subincisuralis; E. margo anterior; F. lamina antica; G. striae anticae medianae postmarginales; H. striae medianae superae lateraliter continuantes.

Caput media fronte convexiuscula postice subcarinata, oculis ocellis 7+1 vel 6+1 compositis, antennis (Fig. VIII, 1) articulo sexto fere duplo longiore quam ad apicem latiore.

Truncus. Tergitum primum (Fig. VIII, 2) area mediana striis superis 4-5 lateraliter continuantibus, margine antico sublaterali latissime rotundato, lamina antica parva, area postlami-

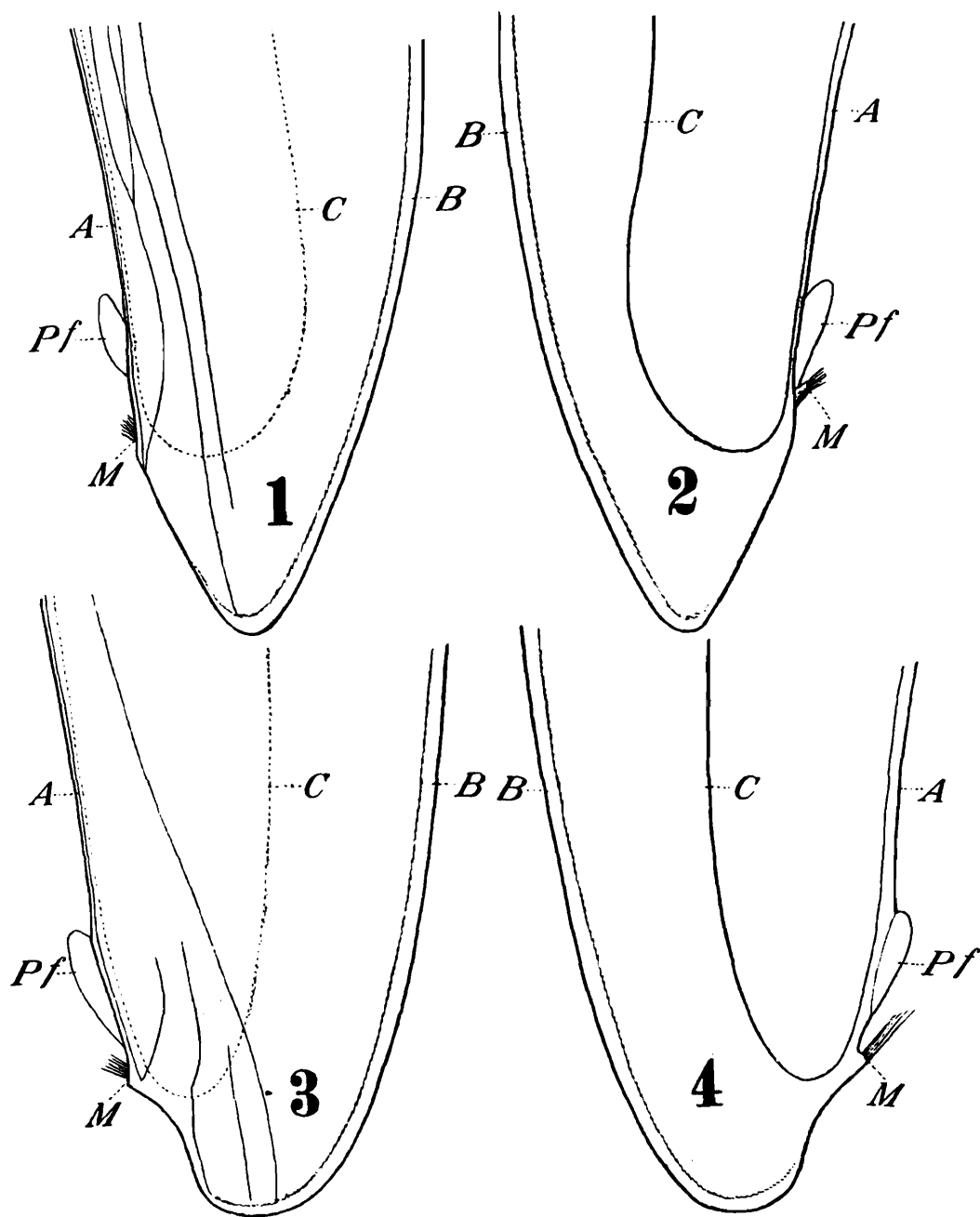


FIG. V.

1-2. *Apiomeris (Hyleoglomeris) multilineata*: trunci dimidium tergiti secundum lateraliter externe et subtus inspectum; 3-4. *Glomeris connexa paucistriata*: trunci dimidium tergiti secundum lateraliter externe et subtus inspectum.

A. margo anterior; B. margo posterior; C. margo posticus internus; M. apophysis praezonitica; Pf. praeapophyseal fovea.

nari convexiuscula striis 8 instructa. Tergitum secundum (Fig. VIII, 3) lateribus angustatis striis duabus integris instructis. Tergita cetera lateribus parum latioribus, praeter striam postmar-

ginalem stria alia instructis, et a tergito sexto angulo postico acute parum producto; tergitem ultimum postice latissime rotundato.

Pedes (Fig. VIII, 4) articuli primi angulo infero externo obtuso, articuli sexti spinis vide figuram.

Long. corp. mm. 9, lat. 4.8, long. antennarum 2.20, pedum paris decimi 3.

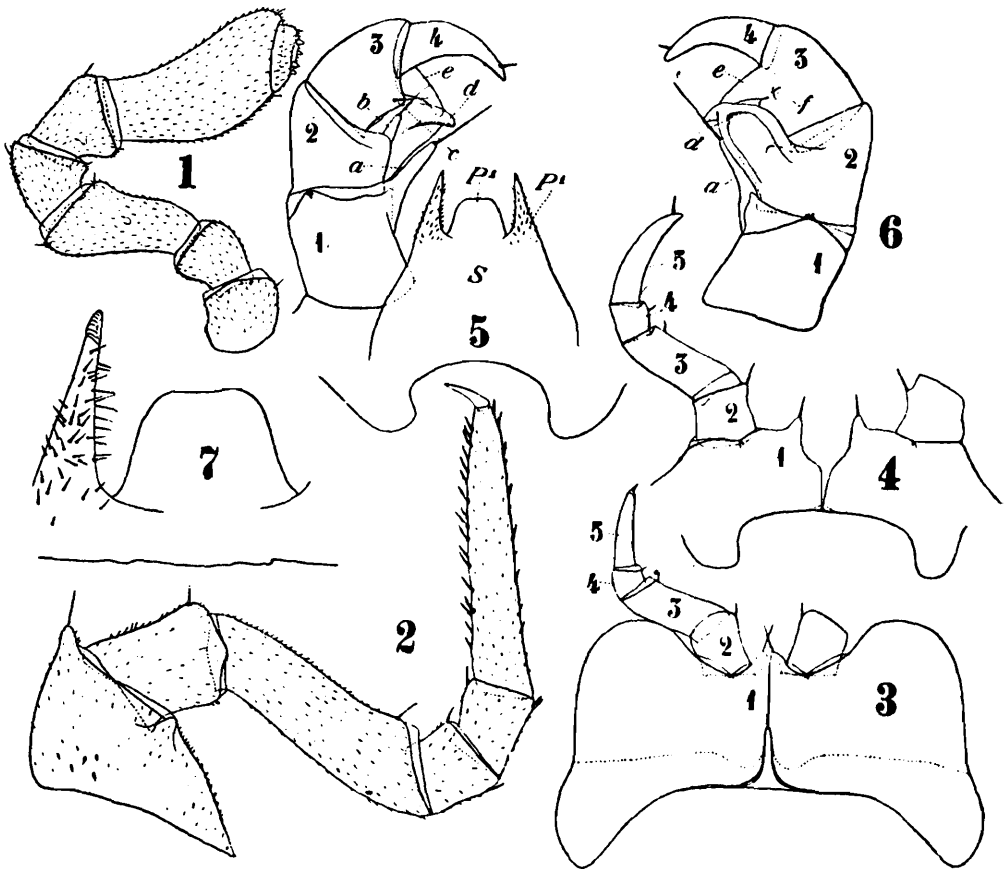


FIG. VI.—*Apiomeris (Hyleoglomeris) multilineata*.

1. antenna; 2. pes par. decimi; 3. maris pedes par. 17ⁱ; 4. maris pedes par. 18ⁱ; 5. maris pedes par. 19ⁱ antice inspecti cum sterno; 6. pes alter par. 19ⁱ postice inspectus; 7. sterni praeanal. processus medianus et processus alter lateralis.

Nos. 1-5 in figuris 3-6 articulos indicant; *a*. processus apicalis internus anticus articuli primi; *b*. processus apicalis internus anticus articuli secundi; *c*. seta apicalis interna antica articuli tertii; *d*. processus internus posticus articuli secundi; *e*. processus internus posticus articuli tertii; *f*. tuberculus posticus articuli tertii; *P*¹. sterni processus laterales; *P*². sterni processus medianus; *S* sternum.

Habitat. Borneo: Mt. Matang.

Observatio. Species haec ad *A. (H.) crebristriata* et *atricornis* proxima, sed colore distinctissima est.

Apiomeris (Hyleoglomeris) atricornis, sp. n.

Corpus totum ochroleucum antennarum articulis 3-5 fulvo-umbrinis, apice articuli quinti praesertim et ariculis 6° et 7° atris.

Caput ocellis $7+1$, antennis (Fig. IX, 1) aliquantum elongatis, articulo sexto paullum magis quam duplo longiore quam latiore.

Truncus. Tergitum primum (Fig. IX, 2) area mediana striis 4 lateraliter continuantibus, quarum posticae partim confluentes sunt, lamina laterali antica minima, area postlaminari convexiuscula striis 8-10 instructa. Tergitum secundum (Fig. IX, 3) lateribus angustatis, striis integris duabus instructum; tergita cetera praeter striam postmarginalem lateribus bistriatis, angulo antico rotundato, postico gradatim corporis partem posticam versus, magis acuto. Tergitum ultimum antice lateraliter striis duabus instructum, margine postico late rotundato.

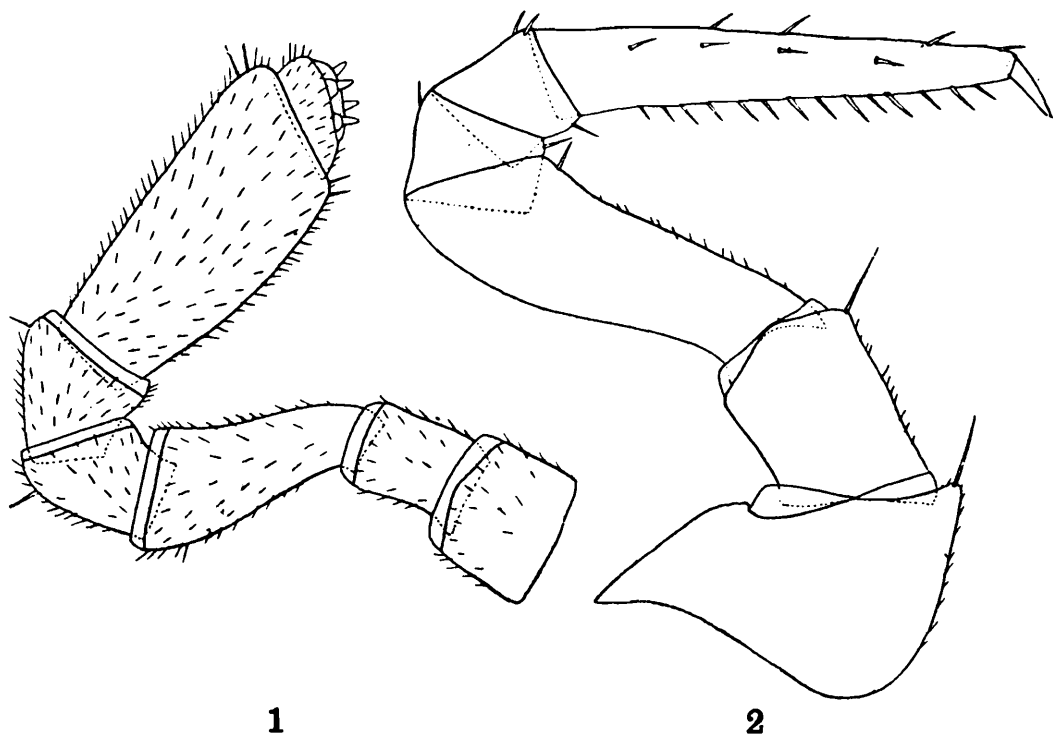


FIG. VII.—*Apiomeris (Hyleoglomeris) crebristriata*.

1. antenna; 2. pes parvis decimi.

Pedes (Fig. IX, 4) articuli primi angulo infero externo rotundatim aliquantum producto, articuli sexti spinis vide figuram.

♂ Pedes parvis 17ⁱ, 18ⁱ et 19ⁱ vide fig. IX, 5-9.

Long. corp. mm. 13, lat. 6, long. antennarum 2.5, pedum parvis decimi 3.

Habitat. Borneo: Mt. Mulu (*Baram*).

Observatio. Species haec ab *Hyl. multilineata*, Verh., magnitudine, antennarum colore, trunci tergiti primi striis superis magis numerosis, tergitis II-XI lateraliter praeter striam postmarginalem, striis duabus instructis (in *Hyl. multilineata* stria una), pedum articuli primi, angulo infero externo infra rotundatim producto (in *Hyl. multilineata* obtuso) bene distincta est; tergitorum striarum numero ad *Hyl. concolor*, Poc. similis est, sed ocellorum numero et forsan antennarum colore (Pocock antennarum colorem ab eodem corporis diversum haud notat) saltem distinguenda.

***Apiomeris (Hyleoglomeris) paucilineata*, sp. n.**

Corpus alutaceum tergitorum parte postica parum obscuriore.

Caput ocellis $6+1$, antennis (Fig. X, 1) articulo sexto *c.* $3/5$ longiore quam latiore.

Truncus. Tergitum primum area mediana striis 4 lateraliter continuantibus, lamina laterali perparva, area postlaminari striis 5-6, quarum 4 supra continuant. Tergitum secundum lateribus angustatis praeter striam postmarginalem, stria abbreviata et stria integra instructum, tergita cetera lateribus praeter striam postmarginalem stria alia; tergитum ultimum postice late rotundatum.

Pedes (Fig. X, 2) articuli primi angulo infero externo valde obtuso, articuli sexti spinis vide figuram.

Long. corp. mm. 22, lat. 10, long. antennarum 5, pedum paris decimi 6.

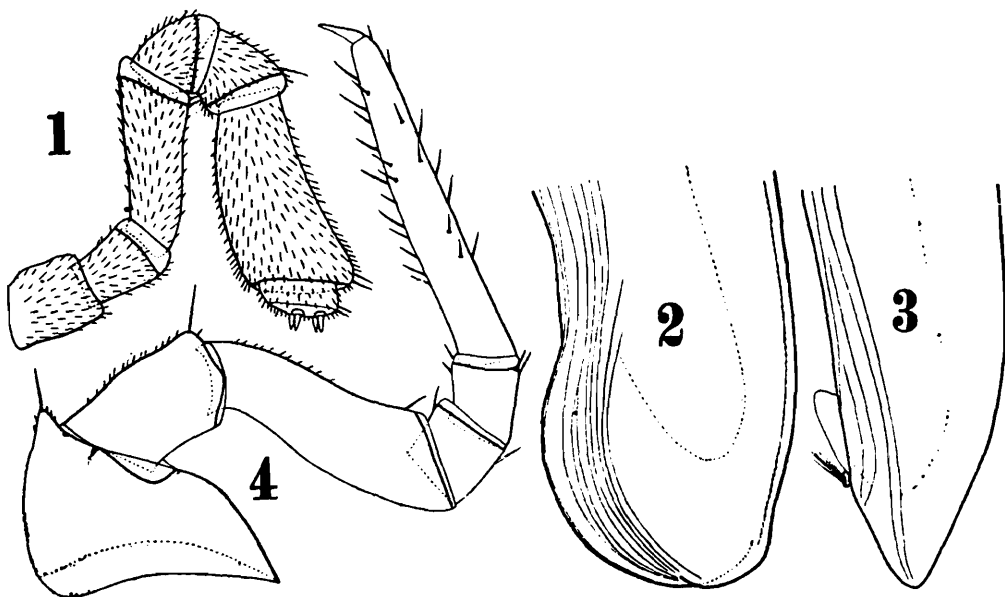


FIG. VIII.—*Apiomeris (Hyleoglomeris) zonifera*.

1. antenna; 2. trunci dimidium tergитum primum et 3. trunci dimidium tergитum secundum lateraliter externe inspecta; 4. pes paris decimi.

Exemplum juvenile corpore toto stramineo ocellis $5+1$. Long. corp. mm. 15, lat. 7.5.

Habitat. Borneo: Kari Orang, Kutei (Borneo merid.-orient., *M. Schmidt* legit. Mus. Berlin).

Observatio. Species haec ad *Hyl. multilineata*, Verh., proxima est, sed magnitudine, ocellorum numero, trunci tergiti primi striis distincta est.

***Apiomeris (Hyleoglomeris) minuta*, Verh.**

Sitz. Ber. Ges. nat. Freunde 1910, p. 248, taf. ix, abb. 3-4.

Corpus totum cremeum. Caput ocellis $6-7+1$, antennis (Fig. XI, 1) articulo ultimo parum minus quam duplo longiore quam latiore.

Truncus. Tergitum primum (Fig. XI, 2) area mediana striis superis 4 lateraliter continuantibus, lamina laterali antica parva, area postlaminari striis 8-9; tergитum secundum (Fig. XI, 3) lateribus angustatis stria integra instructis; tergитum ultimum postice late rotundatum.

Pedes (Fig. XI, 4) articuli primi angulo infero externo subrecto, articuli sexti spinis vide figuram.

Long. corp. mm. 8, lat. 5, long. antennarum 1.7, pedum paris decimi 2.4.

♂ Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XI, 5-10.

Habitat. Borneo: Mt. Radjang, Klawang (Mus. Berlin).

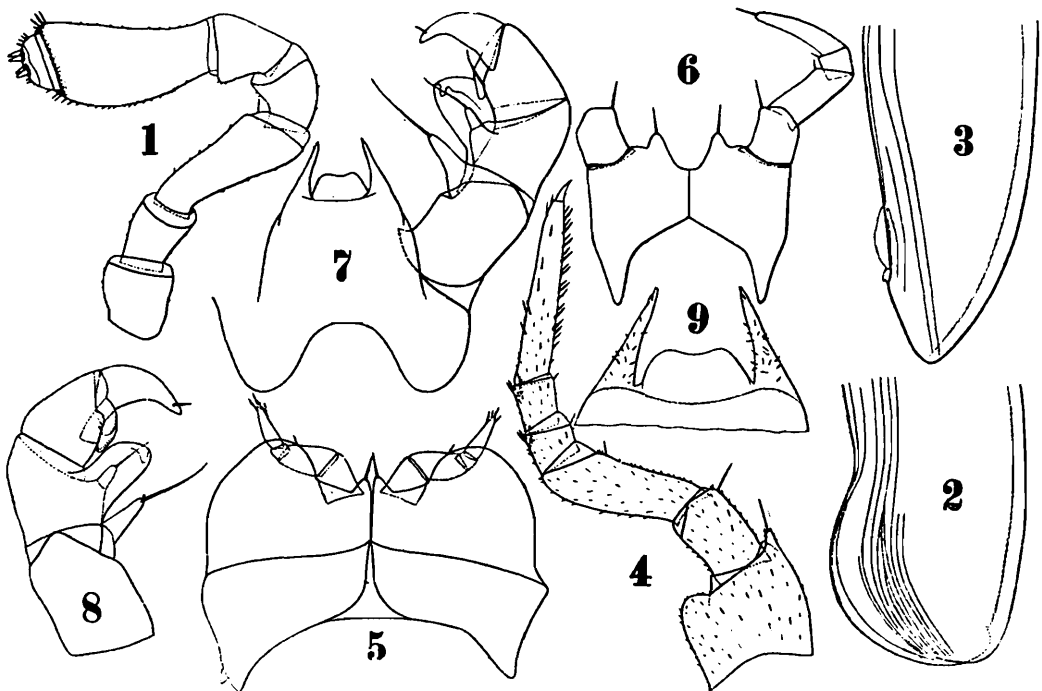


FIG. IX.—*Apiomeris (Hyleoglomeris) atricornis*.

1. antenna; 2. trunci dimidium tergитum primum et 3. dimidium tergитum secundum lateraliter externe inspecta; 4. pes paris decimi; 5. pedes paris 17ⁱ; 6. maris pedes paris 18ⁱ; 7. maris pedes paris 19ⁱ cum sternum antice inspecti; 8. pes paris 19ⁱ postice inspectus; 9. maris sterni inter pedes paris 19ⁱ pars infera.

Apiomeris (Hyleoglomeris) siamensis, sp. n.

Corpus fuscum cremeo marmoratum et trunci tergito primo, praeter lineam submarginalem posticam et maculas duas submedianas posticas fuscas cremeo, tergitorum sequentium 2-10 medio dorso fere toto, spatio lato, cremeo, tergito ultimo, praeter maculas duas laterales anticas et lineam posticam submarginalem, cremeo, faciei parte infera, ventre et pedum articulis 1-3 cremeis, antennis et pedum articulis 3-6 plus minusve fuscis.

Caput media fronte convexiuscula postice vix carinata, oculis ocellis 7 + 1, antennis (Fig. XII, 1) articulo sexto c. 1/4 longiore quam latiore, articulo septimo brevi.

Truncus. Tergitum primum (Fig. XII, 2) area mediana striis superis tribus lateraliter continuantibus, margine antico sublaterali perlate rotundato, lamina laterali minima, area postlaminari convexiuscula striis 7 instructa. Tergitum secundum lateribus angustatis, praeter striam postmarginalem stria abbreviata et stria integra instructis; tergita sequentia praeter striam postmarginalem stria alia integra laterali instructa. Tergitum ultimum margine postico late rotundato.

Pedes (Fig. XII, 3) articuli primi angulo infero externo exciso, obtuso, articuli sexti spinis vide figuram.

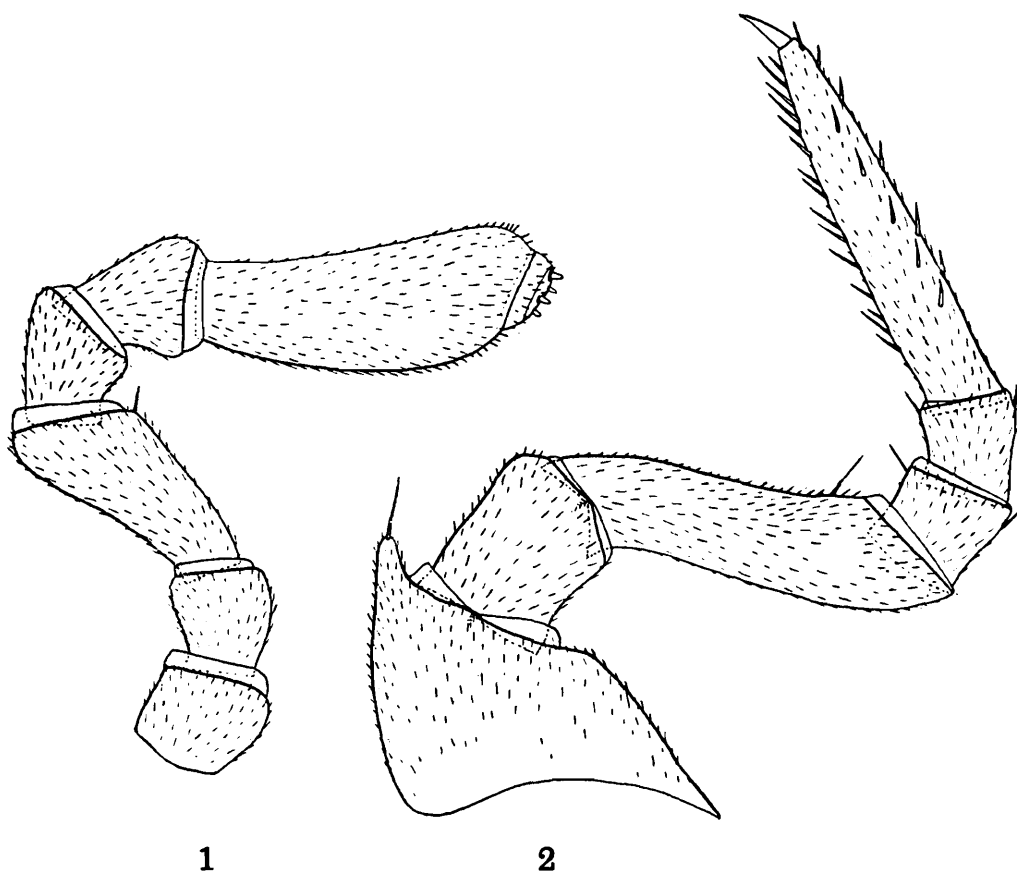


FIG. X.—*Apimeris* (*Hyleoglomeris*) *paucilineata*.
1. antenna; 2. pes par. decimi.

♂ Pedes par. 17ⁱ, 18ⁱ et 19ⁱ vide fig. XII, 4-7.

Long. corp. mm. 10, lat. 5, long. antennarum 1.90, pedum par. decimi 2.60.

Habitat. Siam: Meetaw, Raheng, 2000 ft. (C. S. Barton legit).

***Apimeris* (*Hyleoglomeris*) *venustula*, sp. n.**

Corpus atro-nigrescens collo macula plus minusve parva (vel nulla) transversa, mediana ochroleuca, trunci tergito primo utrimque macula magna semilunari antice a margine laterali usque ad dorsi partem submedianam extensa et retrorsum, interne tantum fere usque ad marginem posticum pertinente et macula parva

postica ochroleucis, tergitis 2-10 macula mediana postica et maculis duabus sublateralibus, quarum antica parva et segmentis contractis obiecta, postica transverse ovali, nec non macula parva antica laterali submarginali ochroleucis notatis, tergito ultimo macula magna mediana ochroleuca, marginem anticum breve spatio haud attingente, instructo, antennis nigrescentibus, ventre pedibusque fulvo-umbrinis.

Caput ocellis 7 + 1, antennis (Fig. XIII, 1) articulo sexto *c.* duplo longiore quam latiore.

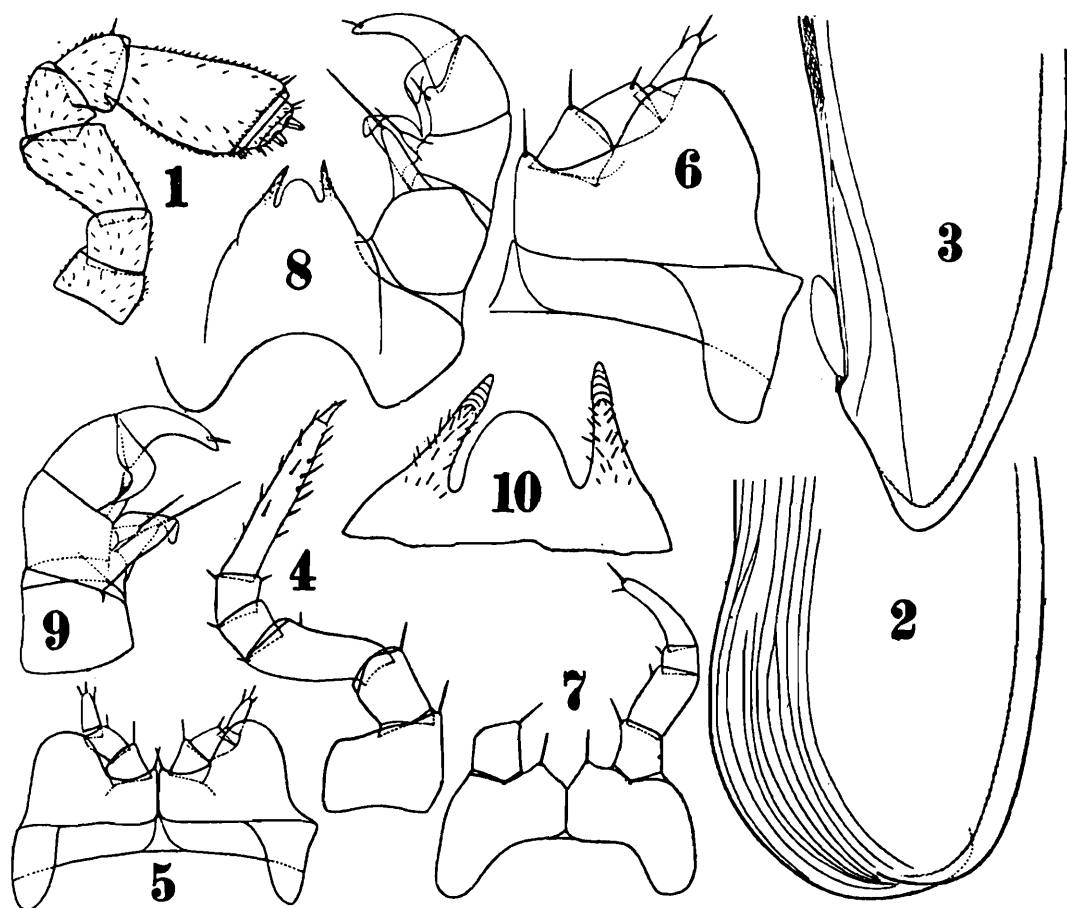


FIG. XI.—*Apiomeris (Hyleglomeris) minuta*.

1. antenna; 2. trunci dimidium tergum primum et 3. dimidium tergum secundum lateraliter externe inspecta; 4. pes paris decimi; 5. maris pedes paris 17ⁱ; 6. maris pes paris 17ⁱ magis ampliatus; 7. maris pedes paris 18ⁱ; 8. maris pes paris 19ⁱ cum sterni antice inspectus; 9. maris pes paris 19ⁱ postice inspectus; 10. maris sterni inter pedes paris 19ⁱ pars infera.

Truncus. Tergum primum (Fig. XIII, 2) area mediana striis tribus lateraliter continuantibus, margine antico sublaterali late rotundato, lamina laterali minima, area postlaminari convexiuscula striis 7-8, quarum 3 integrae sunt. Tergum secundum lateribus angustatis rotundatis, stria postmarginali una instructis, tergita cetera angulo postico in segmentis posticis gradatim parum magis acuto; tergum ultimum margine postico late rotundato.

Pedes (Fig. XIII, 3) articuli primi angulo infero laterali valde obtuso, articuli sexti spinis vide figuram.

♂ Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XIII, 4-8.

Long. corp. mm. 7, lat. 3.7, long. antennarum 1.90, pedum paris decimi 2.35.

Habitat. India: Sadiya (N.E. Assam; Abor Expedition, xi-1911).

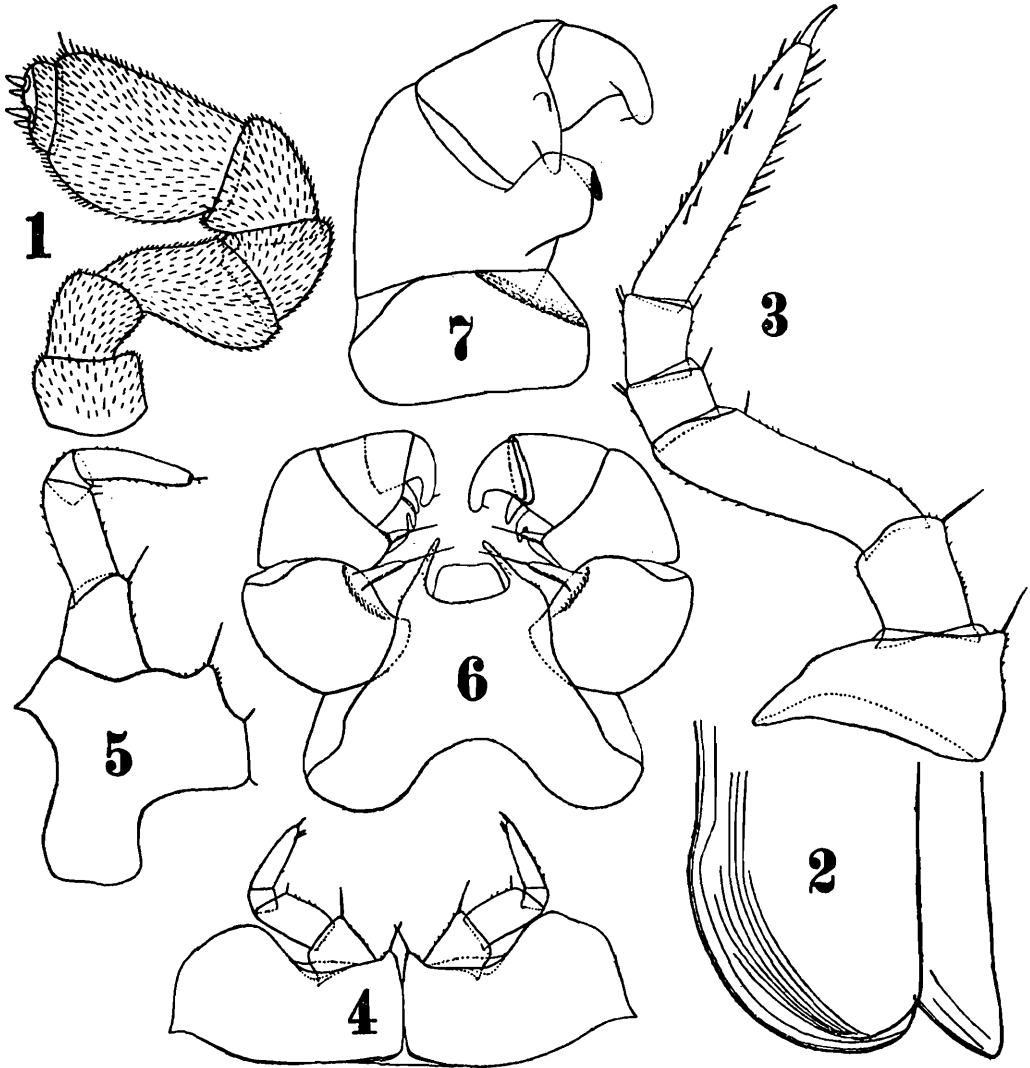


FIG. XII.—*Apiomeris (Hyleoglomeris) siamensis*.

1. antenna; 2. trunci dimidium tergiti primum et secundum lateraliter externe inspecta; 3. pes paris decimi; 4. maris pedes paris 17ⁱ; 5. maris pes paris 18ⁱ; 6. maris pedes paris 19ⁱ cum sterno antice inspecti; 7. maris pes paris 19ⁱ postice inspectus.

Observatio. Species haec ad *A. (Hyl.) siamensis*, Silv., proxima est et ab eadem colore, antennarum articuli sexti forma, nec non maris pedibus paris 17ⁱ et 19ⁱ bene distincta est.

***Apiomeris (Hyleoglomeris) electa*, sp. n.**

Corpus nigrescens trunci tergito secundo maculis duabus submedianis posticis nigrescentibus cremeo, tergitis 2-10 macula me-

diana obtriangulari crema in segmento quinto majore, a segmento sexto gradatim minore et macula sublaterali transversa, subpostica crema instructis, tergito ultimo macula mediana magna trapezoidea crema, faciei parte inferiore, ventre et pedum articulis 1-2 cremeis, antennis nigrescentibus, paratergitis et pedum articulis 3-6 fuscis.

Caput media fronte convexiuscula postice vix carinata, oculis ocellis 7 + 1 compositis, antennis (Fig. XIV, 1) articulo sexto $1/3$ longiore quam latiore.

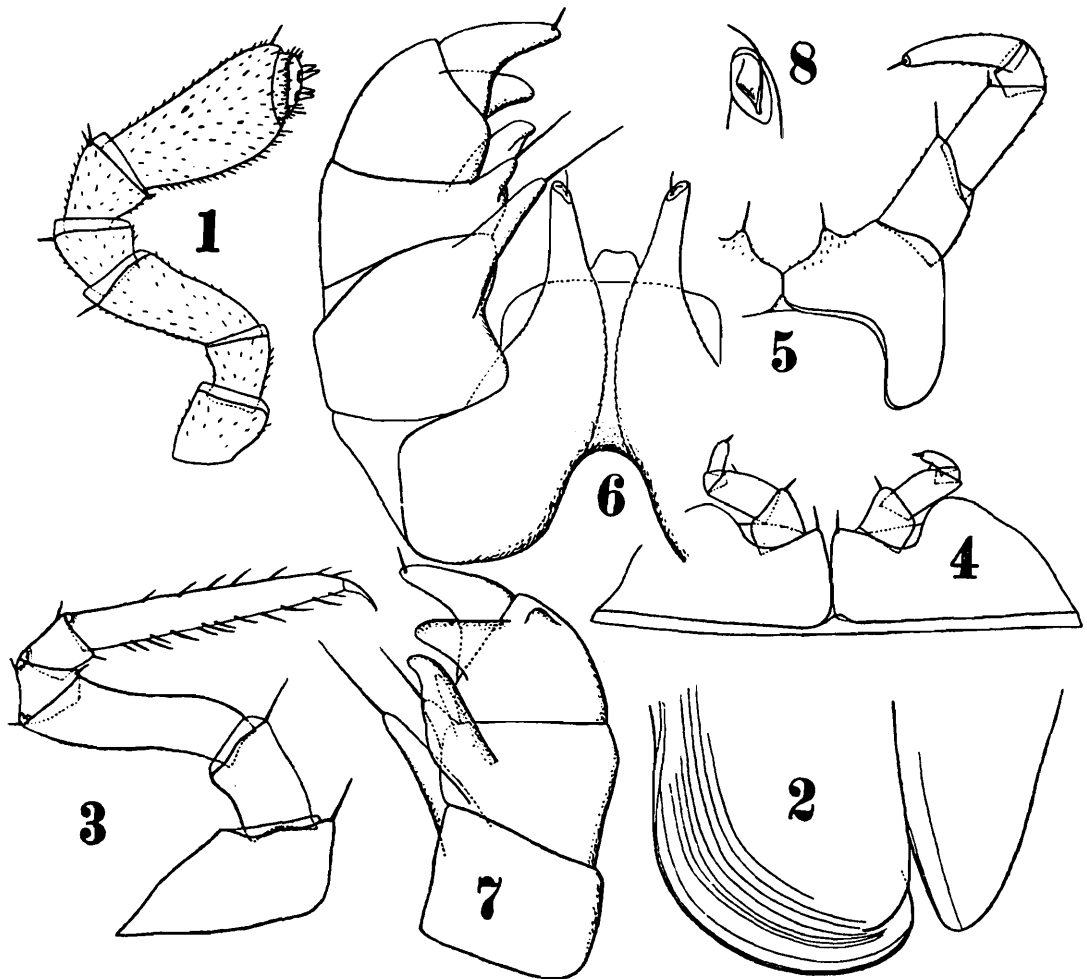


FIG. XIII — *Apiomeris (Hyleoglomeris) venustula*.

1. antenna; 2. trunci dimidium tergite primum et secundum lateraliter inspecta; 3. pes parisi decimi; 4. maris pedes parisi 17; 5. maris pes parisi 18; 6. maris pes parisi 19 cum sternite antice inspectus; 7. maris pes parisi 19 postice inspectus; 8. apex processus lateralis sterni inter pedes parisi 19.

Truncus. Tergite primum (Fig. XIV, 2) area mediana striis tribus lateraliter continuantibus, margine antico sublaterali perlate rotundato, lamina laterali minima, area postlaminari convexiuscula striis 8, quarum postica brevissima est. Tergite secundum lateribus angustatis, stria postmarginali et stria alia integra instructis; tergite ultimum margine postico late rotundato.

Pedes (Fig. XIV, 3) articuli primi angulo infero externo exciso, articuli sexti spinis vide figuram.

Long. corp. mm. 7.6, lat. 3.8, long. antennarum 1.82, pedum paris decimi 2.10.

Habitat. India: Ghumti, Darjiling distr., 1500-5000 ft. (*Carmichael* legit).

Observatio. Species haec ad *A. (Hyl.) siamensis* proxima est et ab eadem colore et praesertim antennarum articulo sexto longiore et minus lato facile distinguenda; ab *A. (Hyl.) venustula* etiam colore, trunci tergiti primi margine sublaterali latiore rotundato distincta est.

***Apiomeris (Hyleoglomeris) modesta*, sp. n.**

Corpus nigrescens facie, tergitorum fascia mediana longitudinali in segmento singulo antice et in segmento ultimo postice etiam

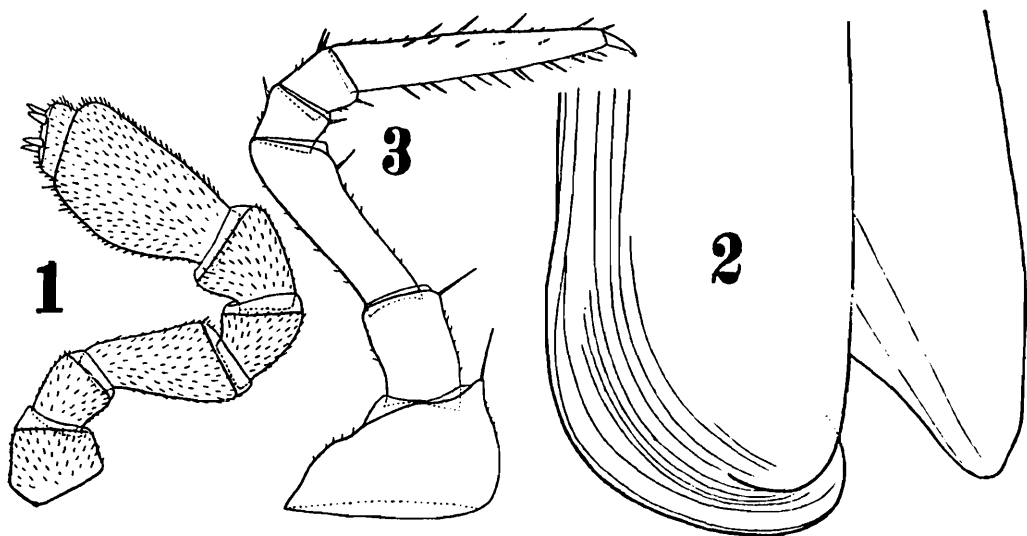


FIG. XIV.—*Apiomeris (Hyleoglomeris) electa*.

1. antenna; 2. trunci dimidium tergitem primum et secundum lateraliter inspecta; 3. pes paris decimi.

dilatata, macula sublaterali transverse subovali et marginibus posticis et inferis flavo-stramineis, colli parte mediana late flavo-marmorata, ventre pedibusque etiam flavo-stramineis.

Caput ocellis 4 + 1, antennis (Fig. XV, 1) articulo sexto $c. \frac{1}{3}$ longiore quam latiore.

Truncus. Tergitum primum (Fig. XV, 2) area mediana striis 5 lateraliter continuantibus, lamina laterali latiuscula, area postlamini parum convexa striis 7-8, quarum 5 supra continuant. Tergitum secundum lateribus angustatis rotundatis, stria postmarginali una abbreviata et stria integra instructis; tergita cetera angulo postico rotundato in segmentis IX-X subacuto; tergitem ultimum margine postico late rotundato.

Pedes (Fig. XV, 3) articuli primi angulo infero laterali obtuso, articuli sexti spinis vide figuram.

♂ Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XV, 4-9.

Long. corp. mm. 6, lat. 3, long. antennarum 1.56, pedum paris decimi 1.70.

Habitat. India: Kobo, 400 ft. (Abor Expedition, xi—xii-1911).

Observatio. Species haec ab *A. (Hyl.) venustula* colore, trunci tergiti primi striarum numero, ejusdem lamina antica latiore, maris pedum paris 17ⁱ articuli primi lamina infera majore et inter pedes paris 19ⁱ sterni processuum lateralium forma, pedum paris

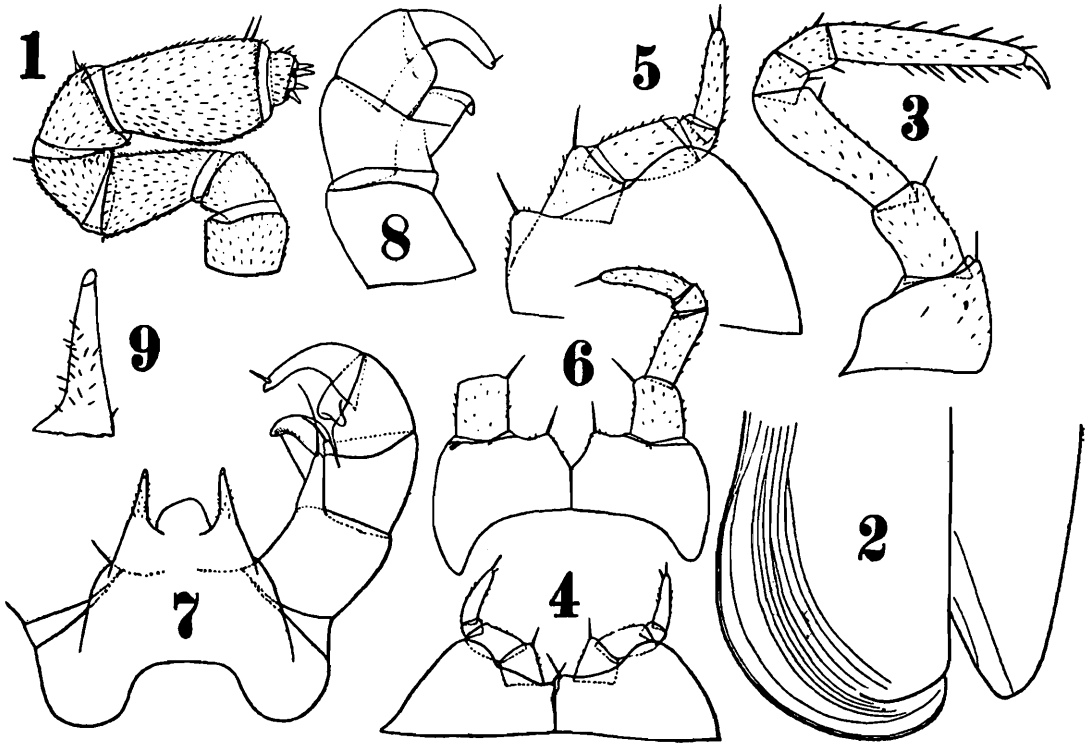


FIG. XV.—*Apiomeris (Hyleoglomeris) modesta*.

1. antenna; 2. trunci dimidium tergitem primum et secundum lateraliter inspecta; 3. pes paris decimi; 4. maris pedes paris 17ⁱ; 5. maris pes paris 17ⁱ magis ampliatus; 6. maris pedes paris 18ⁱ; 7. maris pes paris 19ⁱ cum sterno antice inspectus; 8. maris pes paris 19ⁱ postice inspectus; 9. sterni inter pedes paris 19ⁱ processus lateralis.

19ⁱ articuli secundi processu postico simplici et articulo quarto magis elongato distinctissima est.

Apiomeris (Hyleoglomeris) jacobsoni, sp. n.

Corpus fuscum, tergitorum margine postico, ventre pedibusque isabellinis.

Caput media fronte convexiuscula postice vix carinata, oculis ocellis 6+1 compositis, antennis (Fig. XVI, 1) articulo sexto 1/3 longiore quam ad apicem latiore.

Truncus. Tergitum primum (Fig. XVI, 2) area mediana striis superis 4 lateraliter continuantibus, margine antico subla-

terali latissime rotundato, lamina antica parum lata, subplana, area postlaminari convexiuscula striis 10 instructa. Tergitum secundum lateribus angustatis et ut eadem tergitorum sequentium praeter striam postmarginalem stria alia instructis; tergитum ultimum margine postico late rotundato.

Pedes (Fig. XVI, 3) articuli primi angulo infero externo exciso rotundato, articuli sexti spinis vide figuram.

♂ Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XVI, 4-7.

Long. corp. mm. 6, lat. 3; long. antennarum 1.36, pedum paris decimi 1.82.

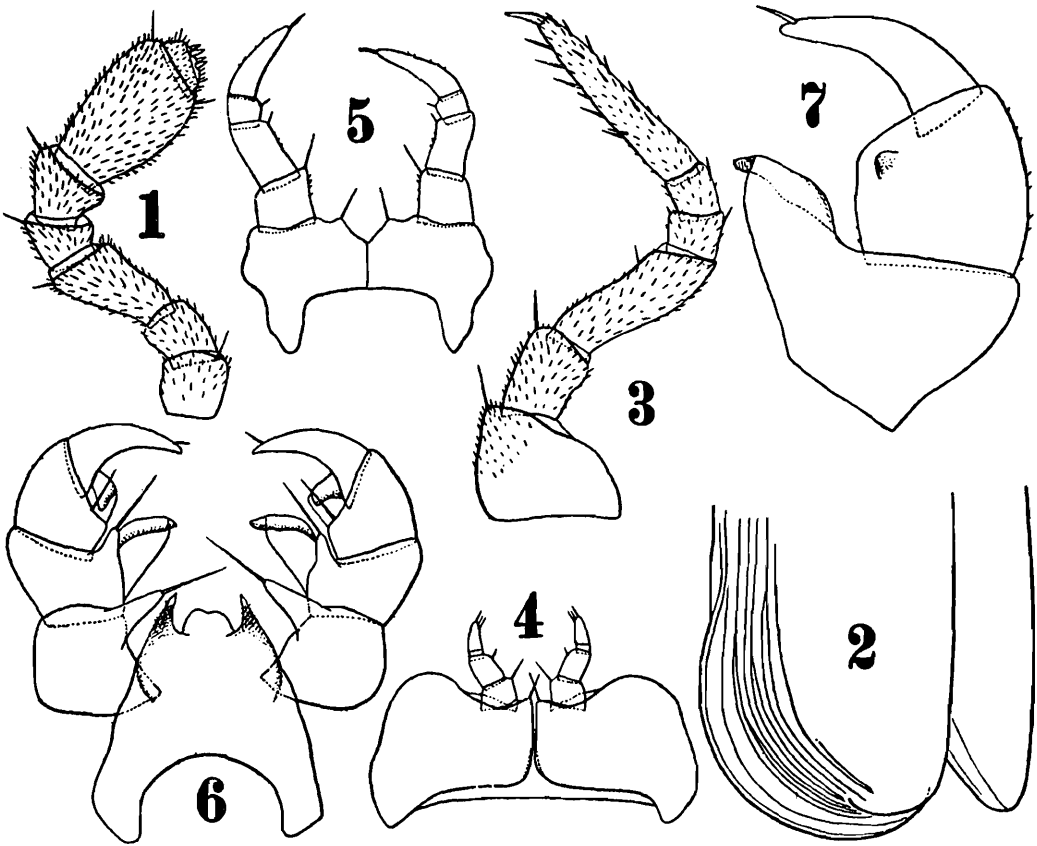


FIG. XVI.—*Apimeris (Hyleoglomeris) jacobsoni*.

1. antenna; 2. trunci dimidium tergитum primum et secundum lateraliter inspecta; 3. pes paris decimi; 4. maris pedes paris 17ⁱ; 5. maris pedes paris 18ⁱ; 6. maris pedes paris 19ⁱ cum sterno antice inspecti; 7. maris pes paris 19ⁱ postice inspectus.

Habitat. Java: Nongkodjadjar (*E. Jacobson* legit).

Observatio. Species haec ad *A (Hyl.) modesta*, Silv., proxima est et colore, ocellorum numero, nec non pedum paris 17ⁱ articuli primi forma facile distinguenda est.

***Apimeris (Hyleoglomeris) modiglianii* (Silv.).**

Glomeris modiglianii, Silvestri, *Ann. Mus. Genova* (2) XIV, p. 720 (1895).

Corpus flavum tergitis 3^o et 4^o macula singula mediana, lata nigra signatis (an semper? vel conservationis haud optimae

causa? exempla typica in 1894 descripta corpore, ut scripsi, colore affecto, in 1915 valde diverse colorata sunt: exemplum alterum corpore ochraceo toto, antennis fuscis, exemplum alterum corpore ochraceo tergitis 3° et 4° macula nigra latiore tergita tota fere occupante, in medio dorso interrupta).

Caput ocellis 6+1, antennis (Fig. XVII, 1) articulo sexto $c. \frac{1}{3}$ longiore quam latiore.

Truncus. Tergitum primum area mediana striis tribus superis lateraliter continuantibus, angulo antico sublaterali late rotundato,

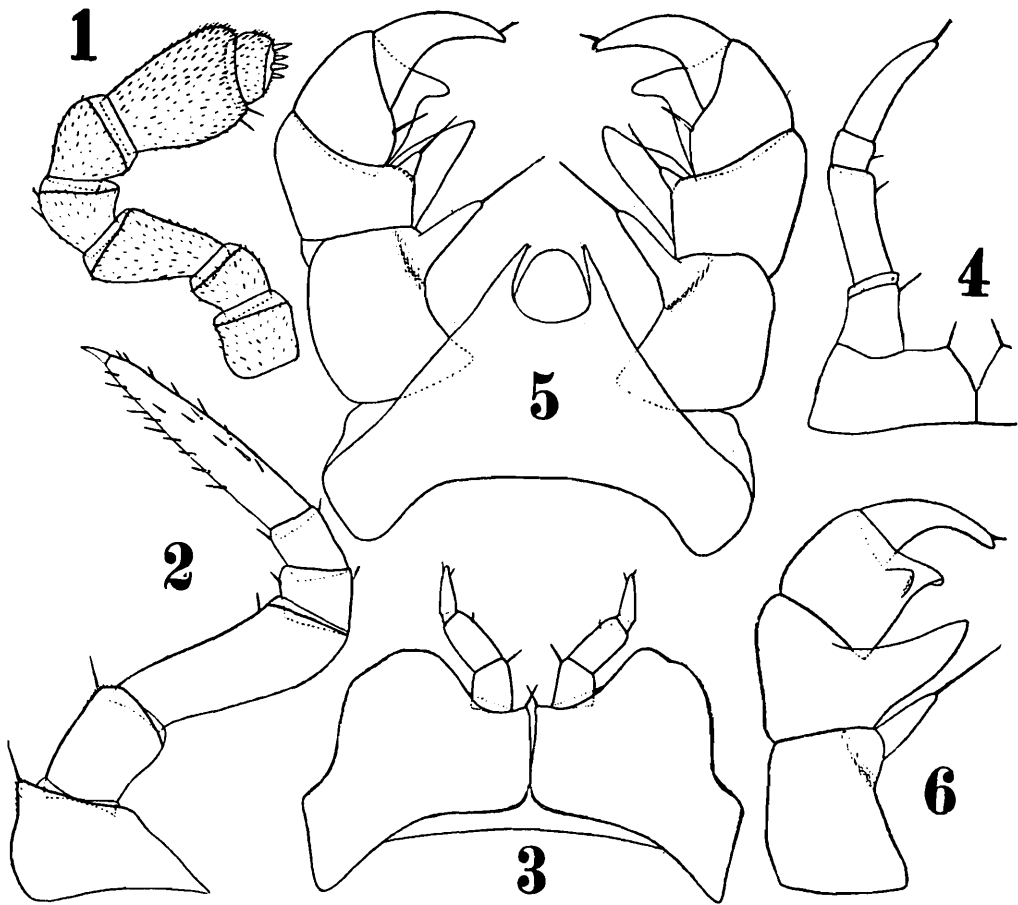


FIG. XVII.—*Ap omeris* (*Hyleoglomeris*) *modiglianii*.

1. antenna; 2. pes par. 19ⁱ; 3. maris pes par. 17ⁱ; 4. maris pes par. 18ⁱ; 5. maris pes par. 19ⁱ cum sterno antice inspecti; 6. maris pes par. 19ⁱ postice inspectus.

lamina laterali perparva, area postlaminari convexiuscula striis 8-9 instructa. Tergitum secundum lateribus angustatis, praeter striam postmarginalem stria alia instructis, tergita cetera praeter striam postmarginalem stria alia integra et a quinto etiam stria brevior instructa, angulo antico rotundato, postico subrecto, in corporis parte posteriore parum acuto; tergitem ultimum margine postico medio vix sinuato.

Pedes (Fig. XVII, 2) articuli primi angulo infero externo obtuso, articuli sexti spinis vide figuram.

♂ Feminae similis.

Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XVII, 3-6.

Long. corp. mm. 8, lat. 3.5, long. antennarum 1.62, pedum paris decimi 2.28.

Habitat. Nias: Lelemboli (Mus. Genova).

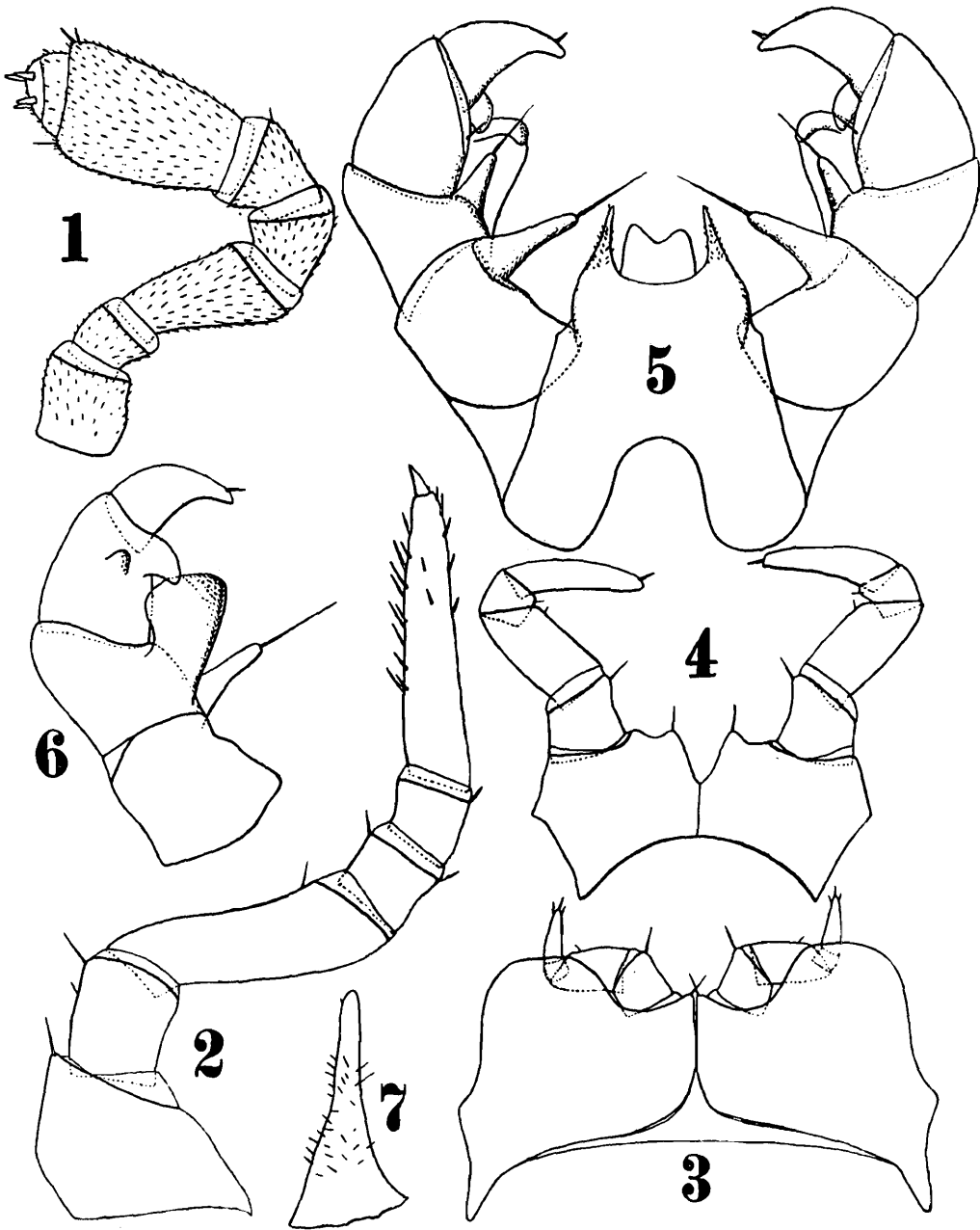


FIG. XVIII.—*Apiomeris (Hyleoglomeris) formosa*.

1. antenna; 2. pes paris decimi; 3. maris pedes paris 17ⁱ; 4. maris pedes paris 18ⁱ; 5. maris pedes paris 19ⁱ cum sterno antice inspecti; 6. maris pes paris 19ⁱ postice inspectus; 7. maris sterni inter pedes paris 19ⁱ processus lateralis.

***Apiomeris (Hyleoglomeris) formosa*, Silv.**

Glomeris formosa, Silvestri, *Ann. Mus. Genova* (2) XIV, p. 720 (1895).

Corpus nigrescens, colli margine postico, trunci tergito primo toto, tergiti ultimi macula mediana postica latiore ochraceis, tergi-

torum ceterorum margine postico umbrino, ventre pedibusque pallide umbrinis.

Caput ocellis 6+1, antennis (Fig. XVIII, 1) articulo sexto *c.* $\frac{1}{3}$ longiore quam latiore.

Truncus. Tergitum primum area mediana striis 4 lateraliter continuantibus, angulo antico sublaterali latissime rotundato, lamina laterali minima, area postlaminari convexiuscula, striis 8-9

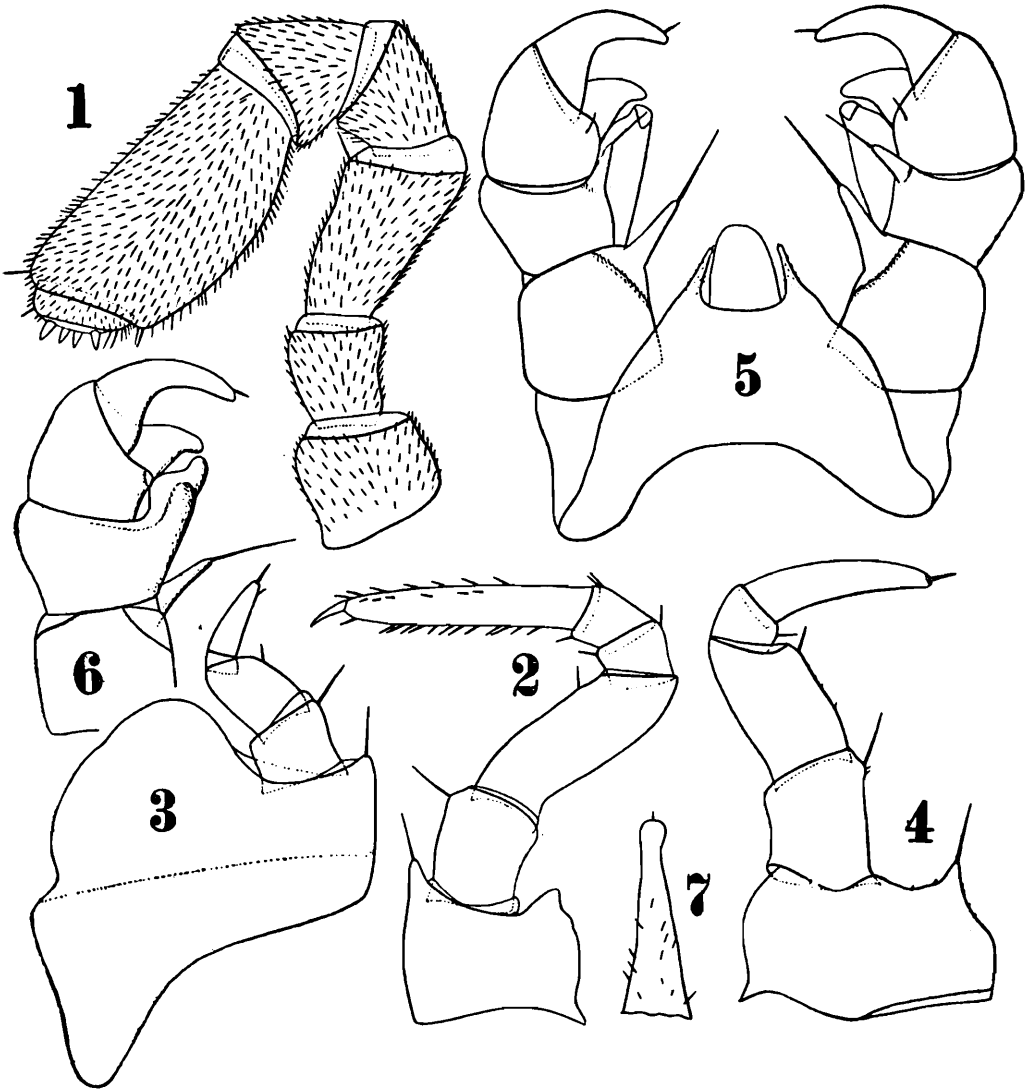


FIG. XIX.—*Apiomeris (Hyleoglomeris) diversicolor*.

1. antenna; 2. pes paris decimi; 3. maris pes paris 17ⁱ; 4. maris pes paris 18ⁱ; 5. maris pedes paris 19ⁱ cum sterno antice inspecti; 6. maris pes paris 19ⁱ postice inspectus; 7. maris sterni inter pedes paris 19ⁱ processus lateralis.

instructa. Tergitum secundum lateribus aliquantum angustatis praeter striam postmarginalem stria alia instructis; tergita cetera praeter striam postmarginalem stria alia integra et stria brevissima instructa, angulo antico rotundato, postico a tergito 8^o ad 10^{um} parum acuto. Tergitum ultimum margine postico medio paullum sinuato.

Pedes (Fig. XVIII, 2) articuli primi angulo infero externo obtuso, articuli sexti spinis vide figuram.

♂ Tergitum ultimum margine postico parum magis quam idem feminae sinuato.

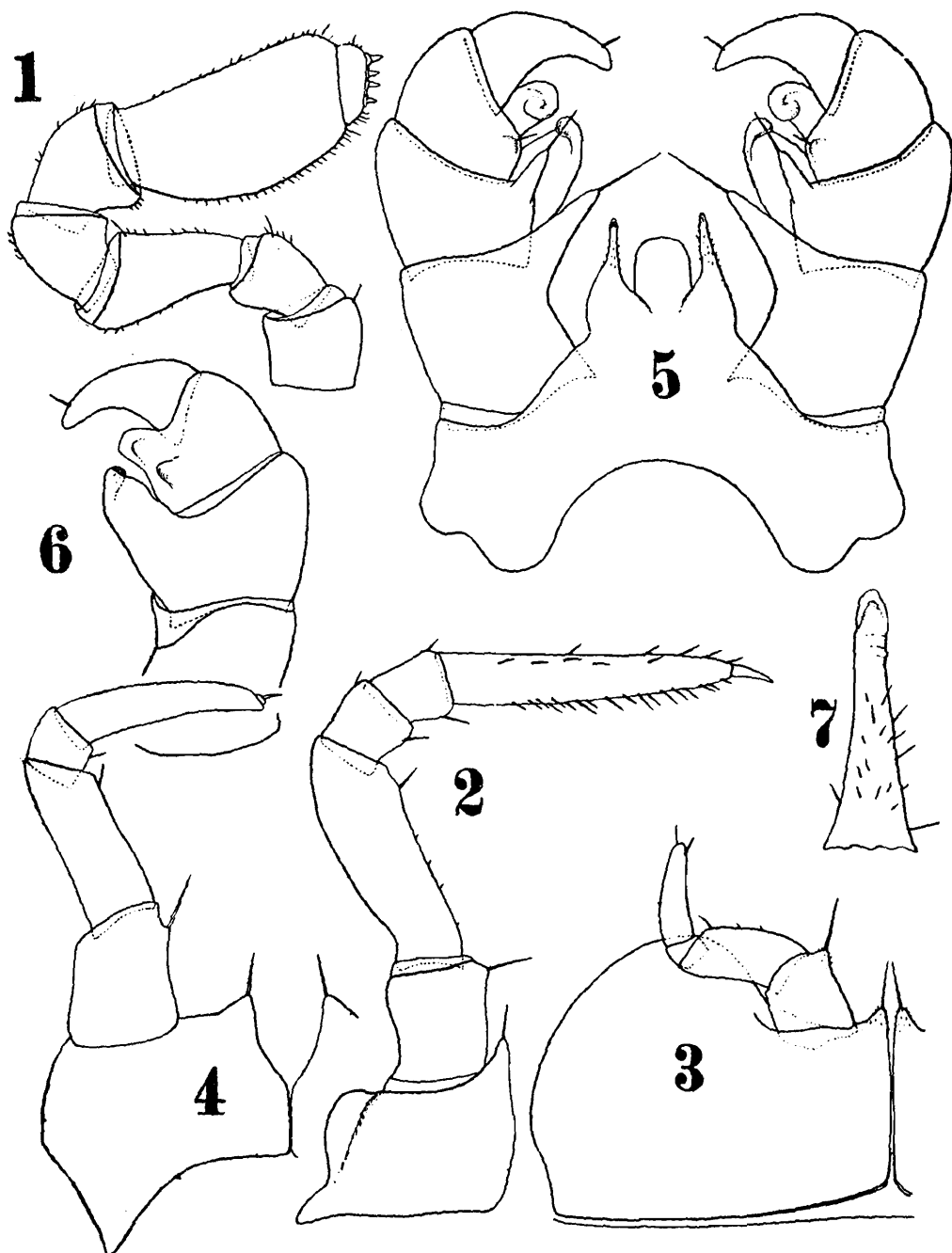


FIG. XX.—*Apiomeris* (*Hyleoglomeris*) *beccarii*.

1. antenna; 2. pes paris decimi; 3. maris pes paris 17ⁱ; 4. maris pes paris 18ⁱ; 5. maris pedes paris 19ⁱ cum sterno antice inspecti; 6. maris pes paris 19ⁱ postice inspectus; 7. maris sterni inter pedes paris 19ⁱ processus lateralis.

Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XVIII, 3-7.

Long. corp. mm. 10, lat. 4.2, long. antennarum 1.95, pedum paris decimi 2.73.

Habitat. Sumatra : Benkoelen (Mus. Genova).

Apiomeris (Hyleoglomeris) diversicolor (Silv.).

Glomeris diversicolor, Silvestri, *Ann. Mus. Genova* (2) XIV, p. 721 (1895).

Corpus subtestaceum, tergitorum margine postico et parte laterali infera, antennis, ventre pedibusque subcremeis.

Caput media fronte convexiuscula postice vix carinata, oculis ocellis 8+1 compositis, antennis (Fig. XIX, 1) articulo sexto fere duplo longiore quam latiore.

Truncus. Tergitum primum area mediana striis 10 superis

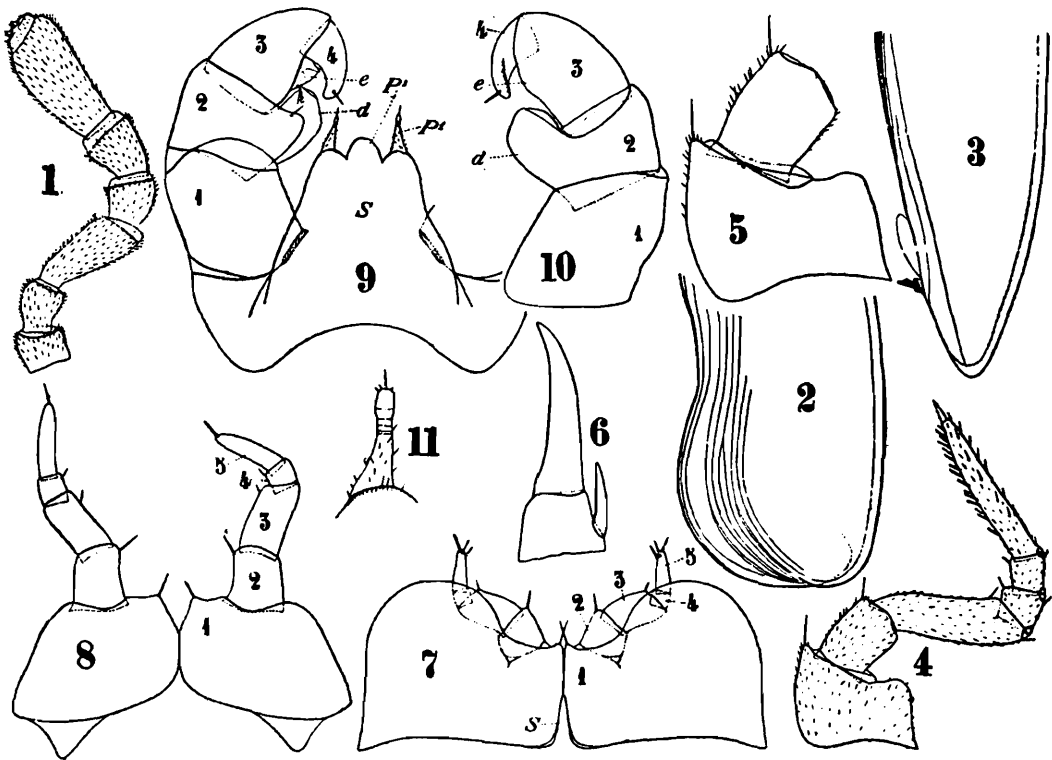


FIG. XXI.—*Apiomeris (Apheromeris) partialis*.

1. antenna; 2. trunci dimidium tergite primum et 3. tergite secundum lateraliter inspecta; 4. pes parisi decimi; 5. ejusdem articuli primus et secundus; 6. ejusdem pars apicalis; 7. maris pedes parisi 17ⁱ; 8. maris pedes parisi 18ⁱ; 9. maris pes parisi 19ⁱ cum sterno antice inspectus; 10. maris pes parisi 19ⁱ postice inspectus; 11. maris sterni inter pedes parisi 19ⁱ processus lateralis.

Litterae ut in fig. VI, pag. 113.

lateraliter continuantibus, angulo antico sublaterali late rotundato, lamina laterali perparva, area postlaminari convexiuscula striis 11-12 instructa. Tergitum secundum lateribus angustatis, praeter striam postmarginalem, stria alia instructis; tergita cetera angulo postico in medio corpore subrecto, in corporis parte postica acute parum producta, facie laterali infera striis duabus instructa. Tergitum ultimum margine infero medio vix sinuato.

Pedes (Fig. XIX, 2) articuli primi angulo externo plus minusve acute infra aliquantum producta, articuli sexti spinis vide figuram.

♂ Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XIX, 3-7.

Long. corp. mm. 14, lat. 6, long. antennarum 3, pedum paris decimi 4.

Habitat. Sumatra: Si-Rambè (Mus. Genova).

Observatio. Species haec inter ceteras mihi notas pedum articuli primi angulo externo acute producto distinctissima est.

***Apiomeris* (*Hyleoglomeris*) *beccarii*, sp. n**

♂ Corpus nigrescens tergitorum margine postico anguste, eorumdem parte infera spatio fere mm. 1 aequante, antennis, ventre pedibusque pallide isabellinis.

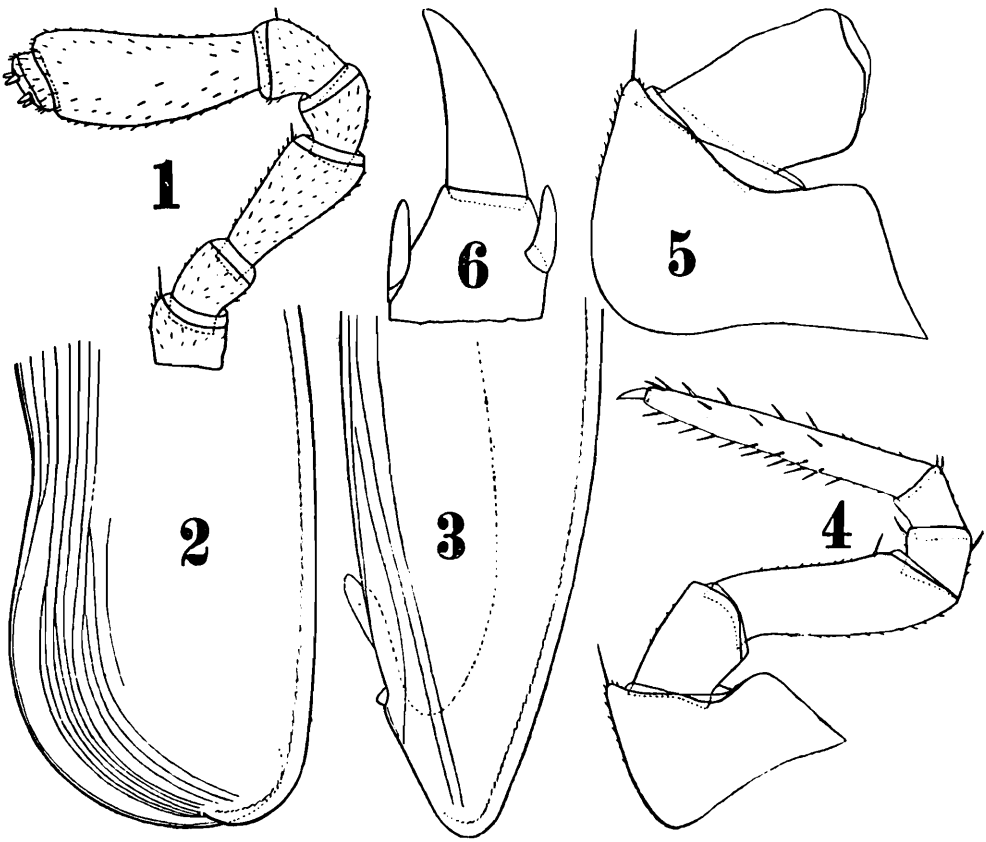


FIG. XXII.—*Apiomeris* (? *Apheromeris*) *totalis*.

1. antenna; 2. trunci dimidium tergite primum et 3. tergite secundum lateraliter inspecta; 4. pes paris decimi; 5. ejusdem articuli primus et secundus; 6. ejusdem pars apicalis.

Caput media fronte postice paullum carinata inter antennis convexiuscula, oculis ocellis 7+1 antennis (Fig. XX, 1) articulo sexto parum minus quam duplo longiore quam latiore.

Collum pone marginem anticum striis transversis consuetis duabus et stria alia transversali profunda lateraliter bifurcata instructum.

Truncus. Tergite primum area mediana striis 5 superis lateraliter continuantibus, angulo antico sublaterali late rotundato, lamina laterali perparva, area postlaminari convexiuscula striis 9 instructa. Tergite secundum lateribus angustatis, praeter striam

postmarginalem stria alia instructis; tergita cetera lateribus gradatim latioribus et angulo postico gradatim a forma rotundata ad rectam et in corporis partem posteriorem ad acutam evoluta Tergitum ultimum margine postico medio vix sinuato.

Pedes (Fig. XX, 2) articuli primi latere externo subrecto, parum rotundato, articuli sexti spinis vide figuram.

Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XX, 3-7.

Long. corp. mm. 12, lat. 5.6, long. antennarum 3.2, pedum paris decimi 3.8.

Habitat. Sumatra: Mt. Singalan (Mus. Genova).

Observatio. Species haec ad *A. (Hyl.) diversicolor*, Silv., proxi-

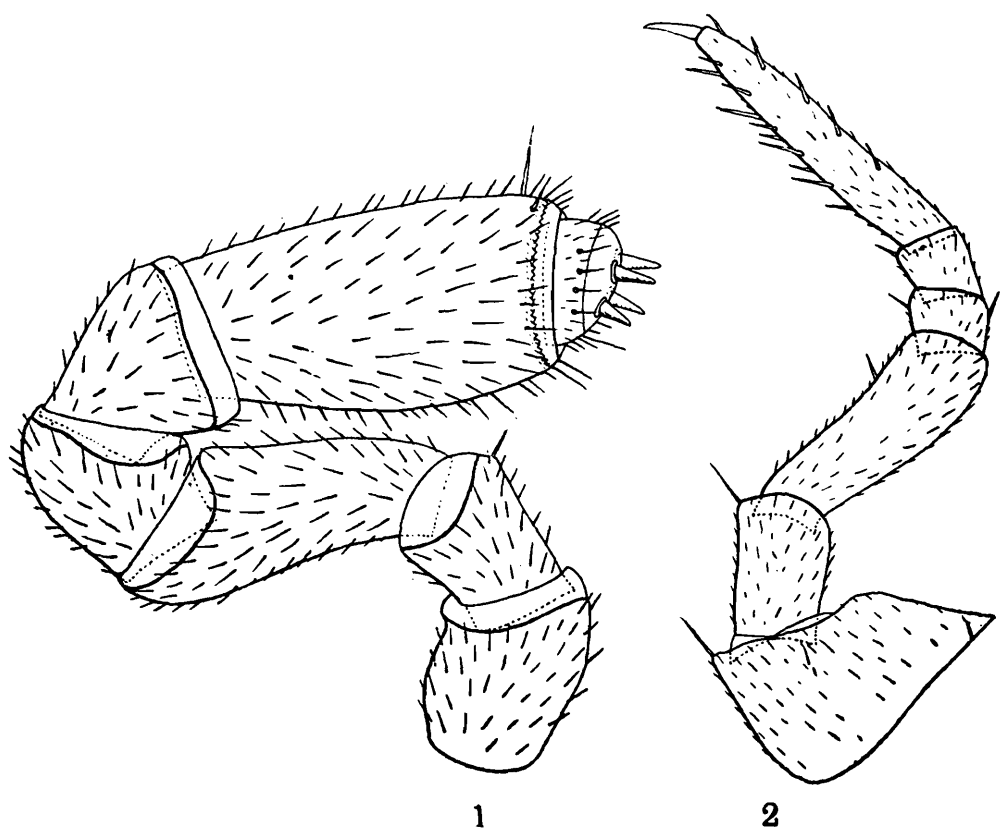


FIG. XXIII.—*Apiomeris* (? *Apheromeris*) *parvella*.

1. antenna; 2. pes paris decimi.

ma est, sed pedum articuli primi angulo externo subrecto et tergiti primi striis minus numerosis facile distinguenda est; ad *A. (Hyl.) albicornis* (Poc.) secundum ejusdem descriptionem proxima videtur, sed ad veram differentiam vel identitatem statuendam exempla typica comparanda sunt.

Subgen. *Apheromeris*, nov.

Mas. Pedes paris 18 articulo primo ab opposito sejuncto; pedes paris 19 4-articulati, articulis omnibus distinctis, articulis 2-3 tantum processu carnoso postico interno instructis.

Apiomeris (Apheromeris) partialis, sp. n.

Corpus atrum lateribus parum pallidioribus, dorso a tergito quinto ad decimum macula parva mediana postica ochroleuca, tergito ultimo immaculato, ventre pedibusque alutaceis.

Caput ocellis 7+1, antennis (Fig. XXI, 1) articulo sexto *c.* duplo longiore quam latiore.

Truncus. Tergitum primum (Fig. XXI, 2) area mediana striis 3-4 lateraliter continuantibus, lamina laterali perparva, area

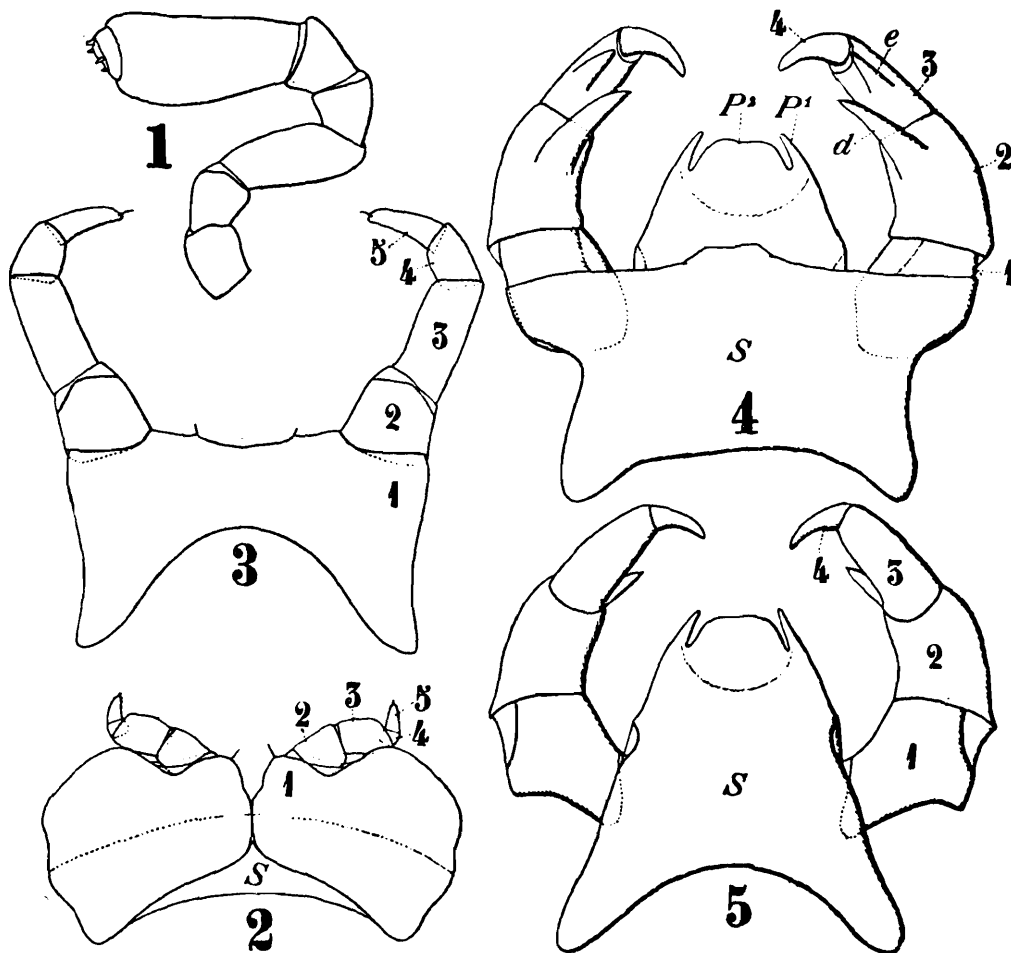


FIG. XXIV.—*Apiomeris (s.s.) infusata*.

1. antenna; 2. maris pedes parisi 17ⁱ; 3. maris pedes parisi 18ⁱ; 4. maris pedes parisi 19ⁱ cum sterno antice inspecti; 5. iidem postice inspecti.

Litterae ut in fig. VI, pag. 113.

postlaminari convexiuscula striis 7-9 instructa, quarum 3-4 supra continuant. Tergitum secundum (Fig. XXI, 3), ut tergita sequentia, lateribus praeter striam abbreviatam stria una instructis. Tergitum ultimum postice late rotundatum.

Pedes articuli primi angulo infero externo (Fig. XXI, 5) late rotundato, infra vix producto, articuli sexti spinis vide fig. XXI, 4, ungue terminali (Fig. XXI, 6) longo, attenuato.

♂ Pedes parisi 17ⁱ, 18ⁱ et 19ⁱ vide fig. XXI, 7-11.

Long. corp. mm. 11.5, lat. 6, long. antennarum 3, pedum paris decimi 3.90.

Habitat. Java: Pengalengan. Exempla duo ♀♀ ex Gedè cum exemplis ex Pengalengan bene congruunt.

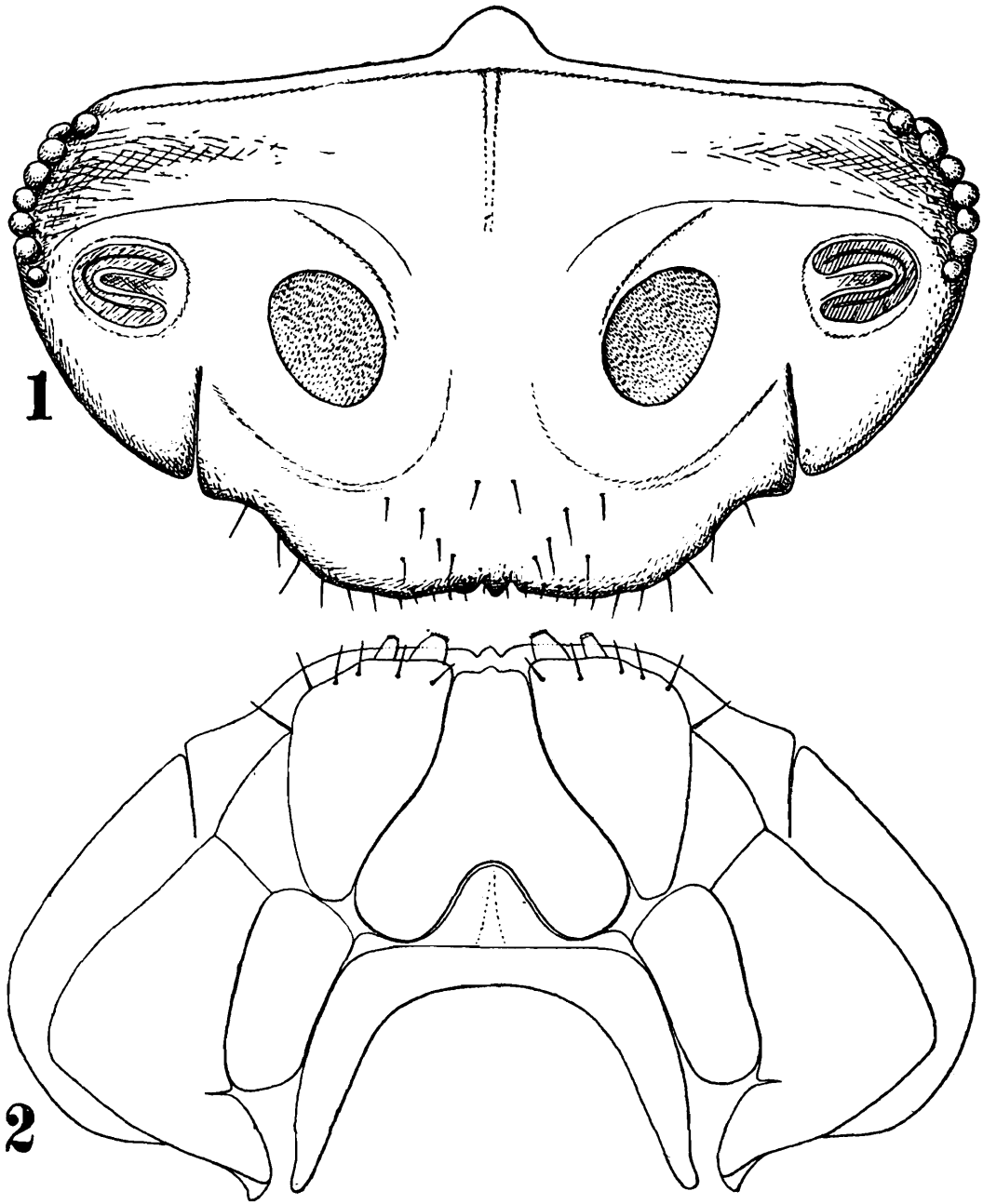


FIG. XXV.—*Apiomeris* (*Malayomeris*) *martensi*.

1. caput pronum; 2. caput supinum.

***Apiomeris* (*Apheromeris*) *totalis*, sp. n.**

Corpus atro-nigrescens trunci dorso serie mediana macularum obtriangularium plus minusve magnis et serie sublaterali macularum anticarum transverse ovalium, plus minusve manifestarum, mellearum ornato, tergito ultimo macula mediana magna subtri-

agularis luride mellea, tergitorum omnium marginibus melleis, ventre pedibusque articulis 3-6 plus minusve fuscis exceptis rufo-umbrinis.

Caput ocellis $7+1$, antennis (Fig. XXII, 1) articulo sexto paullo magis quam duplo longiore quam latiore.

Truncus Tergitum primum (Fig. XXII, 2) area mediana striis 5 lateraliter continuantibus, lamina laterali perparva, area postlaminari convexiuscula striis 9-10 instructa, quarum 5 supra continuant. Tergitum secundum (Fig. XXII, 3) lateribus angustatis et praeter striam postmarginalem striis duabus integris et

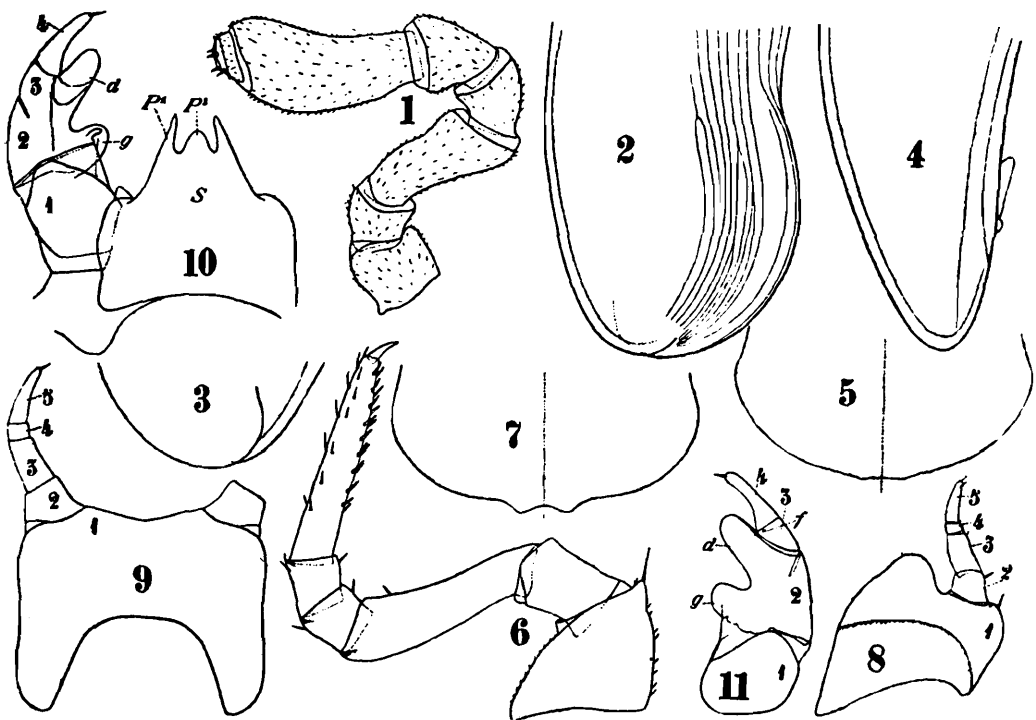


FIG. XXVI.—*Apimeris* (*Malayomeris*) *martensi*.

1. antenna; 2. trunci dimidium tergite primum lateraliter inspectum; 3. ejusdem pars inferior subtus inspecta; 4. trunci dimidium tergite secundum lateraliter inspectum; 5. feminae tergite ultimum postice inspectum; 6. pes parisi decimi; 7. maris tergite ultimum postice inspectum; 8. maris pes parisi 17^i ; 9. maris pes parisi 18^i ; 10. maris pes parisi 19^i cum sterno antice inspectus; 11. maris pes parisi 19^i postice inspectus.

Litterae ut in fig. VI, pag. 113.

stria altera abbreviata instructis, tergita cetera lateribus praeter striam postmarginalem stria una instructis; tergite ultimum postice late rotundatum.

Pedes articuli primi (Fig. XXII, 5) angulo infero externo infra parum rotundatim paulum productum, articuli sexti spinis vide fig. XXII, 4, ungue terminali (Fig. XXII, 6) robusto brevi.

Mas ignotus.

Long. corp. mm. 11, lat. 5.6, long. antennarum 1.80, pedum parisi decimi 3.75.

Habitat. Java: Pengalengan.

Observatio. Species haec ab *A. (Aph.) partialis*, Silv. colore, trunci tergiti primi striarum numero, pedum articuli primi angulo externo minus rotundato et ungue brevioris distincta est.

***Apiomeris* (? *Apheromeris*) *parvella*, Silv.**

Corpus atrum, trunci tergiti primi parte antica usque ad incisuram, tergitorum omnium marginibus et tergitorum serie sublaterali macularum anticarum melleis, ventre pedibusque alutaceis.

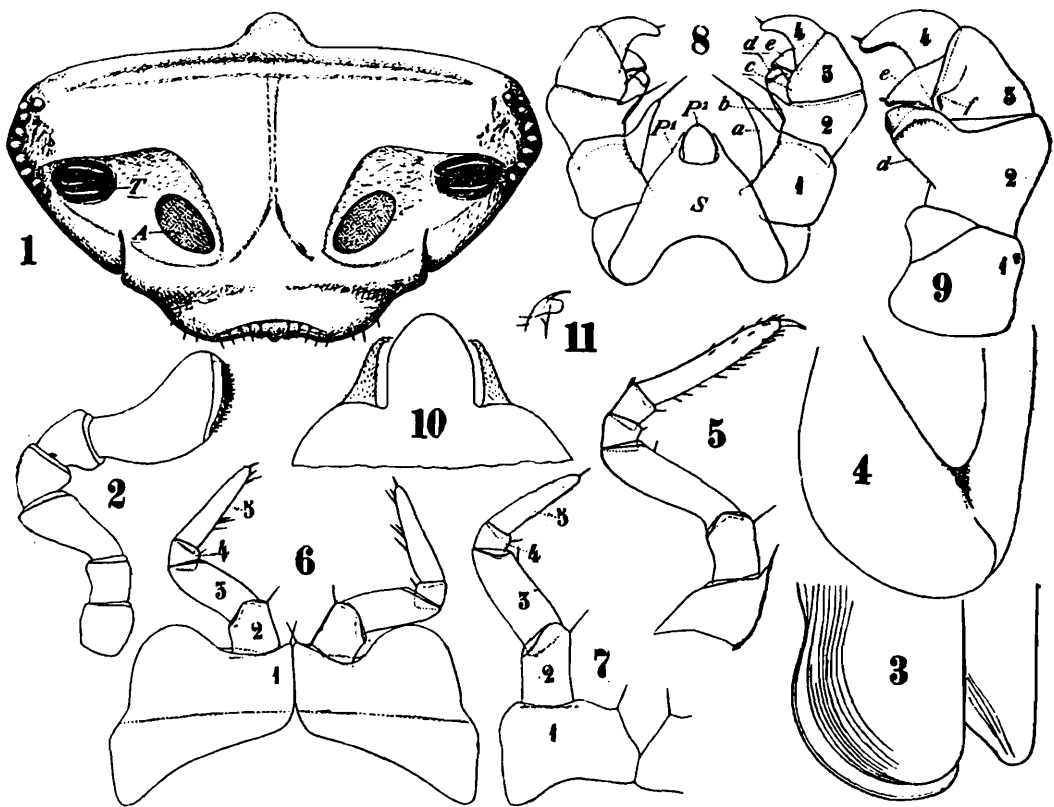


FIG. XXVII.—*Rhopalomeris carnifex*.

1. caput pronum; 2. antenna; 3. trunci dimidium tergite primum et secundum lateraliter inspecta; 4. trunci tergiti primi pars lateralis subtus inspecta; 5. pes parisi decimi; 6. maris pedes parisi 17ⁱ; 7. maris pes parisi 18ⁱ; 8. maris pedes parisi 19ⁱ cum sterno antice inspecti; 9. maris pes parisi 19ⁱ postice inspectus; 10. maris sterni inter pedes parisi 19ⁱ pars infera; 11. ejusdem processu laterali apex magis ampliatus.

Litterae ut in fig. VI, pag. 113.

Caput ocellis 7+1, antennis (Fig. XXIII, 1) articulo sexto fere duplo longiore quam latiore.

Truncus. Tergitum primum area mediana striis 7 lateraliter continuantibus, lamina laterali antica parva, margine antico sublaterali antrorsum late rotundatim parum producto (magis producto quam in *A. totalis* et *A. partialis*) area postlaminari striis 11-12 crebris, quarum 7 supra continuant. Tergitum secundum lateribus angustatis, praeter striam postmarginalem, striis duabus

instructum, tergita cetera praeter striam postmarginalem stria una instructa; tergitem ultimum postice late rotundatum.

Pedes (Fig. XXIII, 2) angulo infero externo parum obtuso vel vix rotundato, articuli sexti spinis vide figuram, ungue terminali longo, attenuato.

Long. corp. mm. 6, lat. 3, long. antennarum 1.56, pedum paris decimi 1.80.

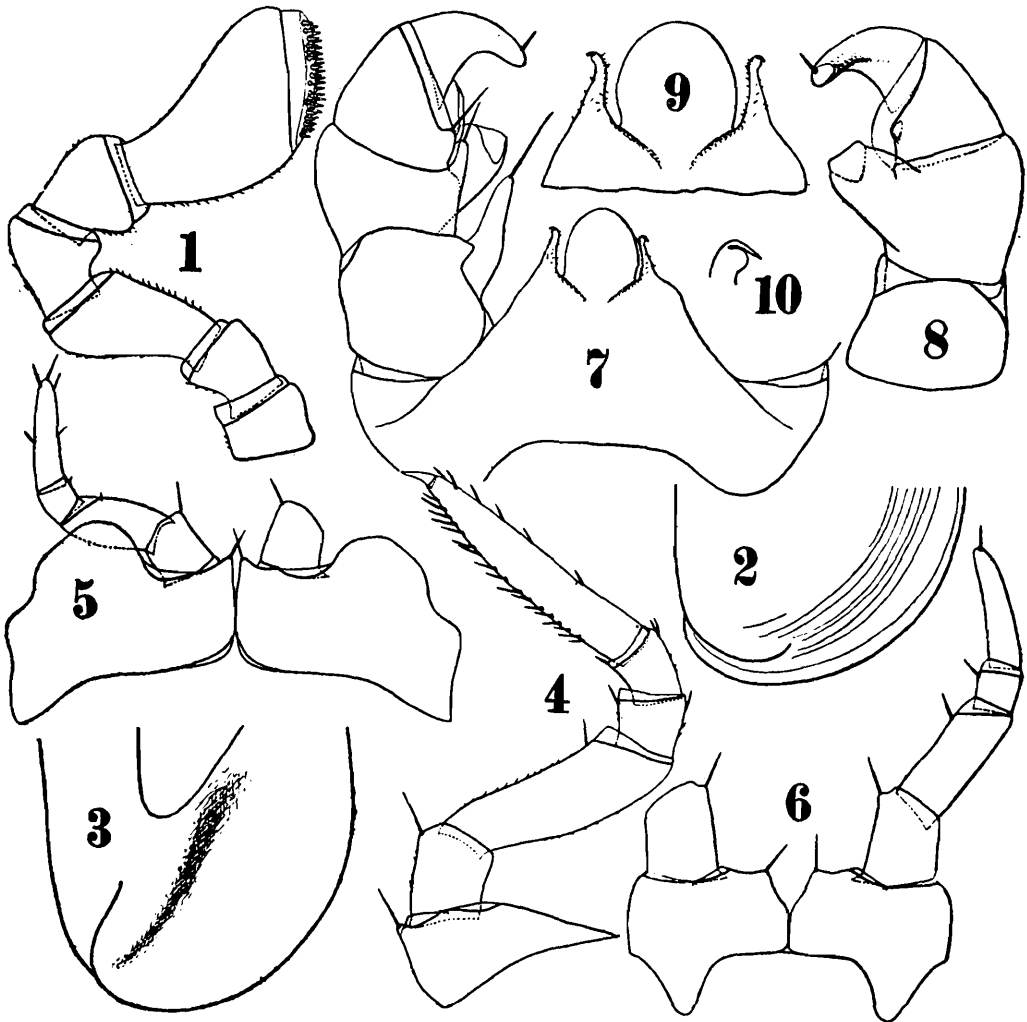


FIG. XXVIII.—*Rhopalomeris carnifex* v. *pallida*.

1. antenna; 2. trunci tergiti primi pars lateralis externe inspecta; 3. eadem subtus inspecta; 4. pes paris decimi; 5. maris pedes paris 17ⁱ; 6. maris pedes paris 18ⁱ; 7. maris pes paris 19ⁱ cum sterno antice inspectus; 8. maris pes paris 19ⁱ postice inspectus; 9. maris sterni inter pedum paris 19ⁱ pars infera; 10. ejusdem processu laterali apex magis ampliatus.

Mas ignotus.

Habitat. Java: Gedè.

Observatio. Species haec ab *A. totalis*, Silv. et *A. partialis*, Silv., magnitudine, colore, trunci tergiti primi margine antico sublaterali aliquantum magis producto et striis magis numerosis distincta est.

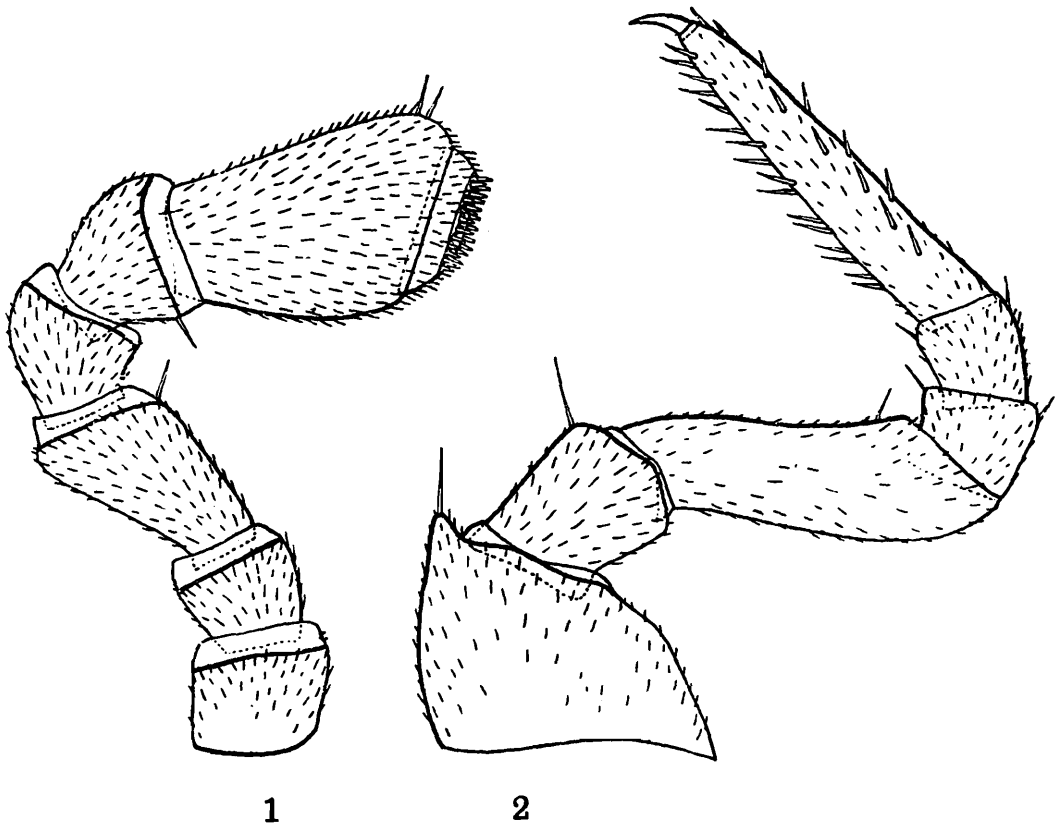
Subgen. **Apiomeris**, O. F. Cook.

Glomeris, Pocock, ex p., Max Weber's *Zool. Ergebn. Reise, Nederl. Ost.-Ind.* III, p. 323 (1894).

Apiomeris, O. F. Cook, *Brandtia* X, p. 45 (1896).

Subgenus hoc characteribus plerisque ad subgen. *Hyleoglomeris* aequale est, differt tergito ultimo margine postico medio vix sinuato, maris tergito ultimo margine postico medio sinuato, pedibus paris 18ⁱ articulo primo cum opposito coalito.

Pedes paris 19ⁱ articulis 4 omnibus inter sese distinctis, articulis secundo et tertio processu postico conico tantum instructis.



1 2
FIG. XXIX.—*Rhopalomeris monacha*.
1. antenna; 2. pes paris decimi.

Apiomeris (s.s.) infuscata (Poc.) O. F. Cook.

Glomeris infuscata, Pocock, ex p., Max Weber's *Zool. Ergebn. Reise Nederl. Ost.-Ind.* III, p. 324, pl. xix, fig. 10-10b (1894).

Apiomeris infuscata, O. F. Cook, *Brandtia* X, p. 44 (1896).

Speciei huius antennam et maris pedes paris 17ⁱ, 18ⁱ et 19ⁱ vidi et delíneo (Fig. XXIV, 1-5). Pococki descriptio haec est:

Colour.—The upper surface a dark slate grey, the extreme edges of the tergites paler; in the posterior half of the body there is a feebly marked pale spot in the middle of the hinder edge of the tergites; ventral surface pale; legs lightly infuscate.

Eyes composed of seven ocelli; six in a longitudinal series and one external to this series.

Nuchal plate (1st tergite) marked by two conspicuous arched grooves which cross it from corner to corner.

Second dorsal plate marked laterally with from nine to twelve striae, most of which cross the summit of the plate; the rest of the tergites marked laterally and inferiorly with two or three striae. All the tergites smooth but marked with exceedingly small, close-set punctures.

Anal tergite in the female convex from side to side, nearly straight from above downwards; in the male, with the hinder

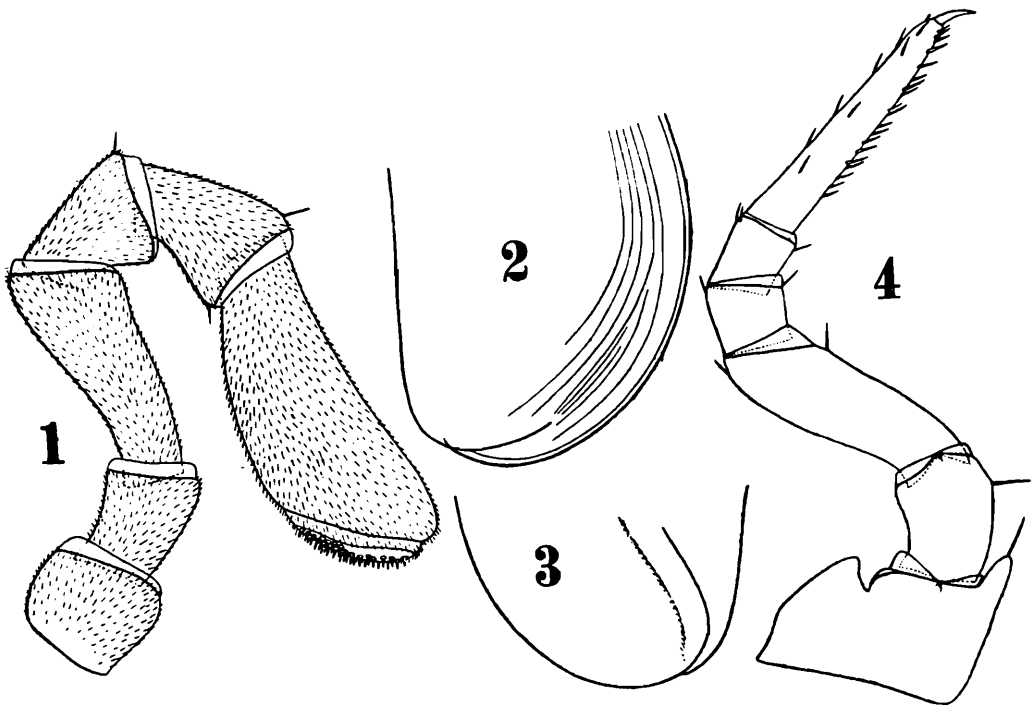


FIG. XXX.—*Rhopalomeris tonkinensis*.

1. antenna; 2. trunci tergiti primi pars lateralis externe inspecta; 3. ejusdem pars inferior subtus inspecta; 4. pes paris decimi.

border emarginate in the middle and with a conspicuous depression just above the emargination.

In the male the 17th pair of legs are exceedingly short, the 18th are much longer than the 17th but shorter than the 19th or copulatory pair; the coxal lamina is long and piriform, projecting as far as the distal margin of the second segment of the copulatory feet, with a short and slender process on each side; the first segment of the copulatory feet is long and bears no process, the second is produced posteriorly into a digitiform prolongation, the apex of which extends as far as the apex of a similar but much smaller digitiform prolongation from the third segment, which is somewhat compressed; the distal or fourth segment is spiniform, *i.e.*

stout at the base then abruptly narrowed, the distal three-fourths tapering gradually to a point.

Length 10.5 mm.

Sumatra: Mount Singalang, several specimens.

Subgen. *Malayomeris*, Verh.

Malayomeris, Verhoeff, Sitz. Ber. Ges. nat. Freunde 1910, pp. 243 et 246.

Caput (Fig. XXV, 1-2) eidem subgen. *Hyleoglomeris* simile est.

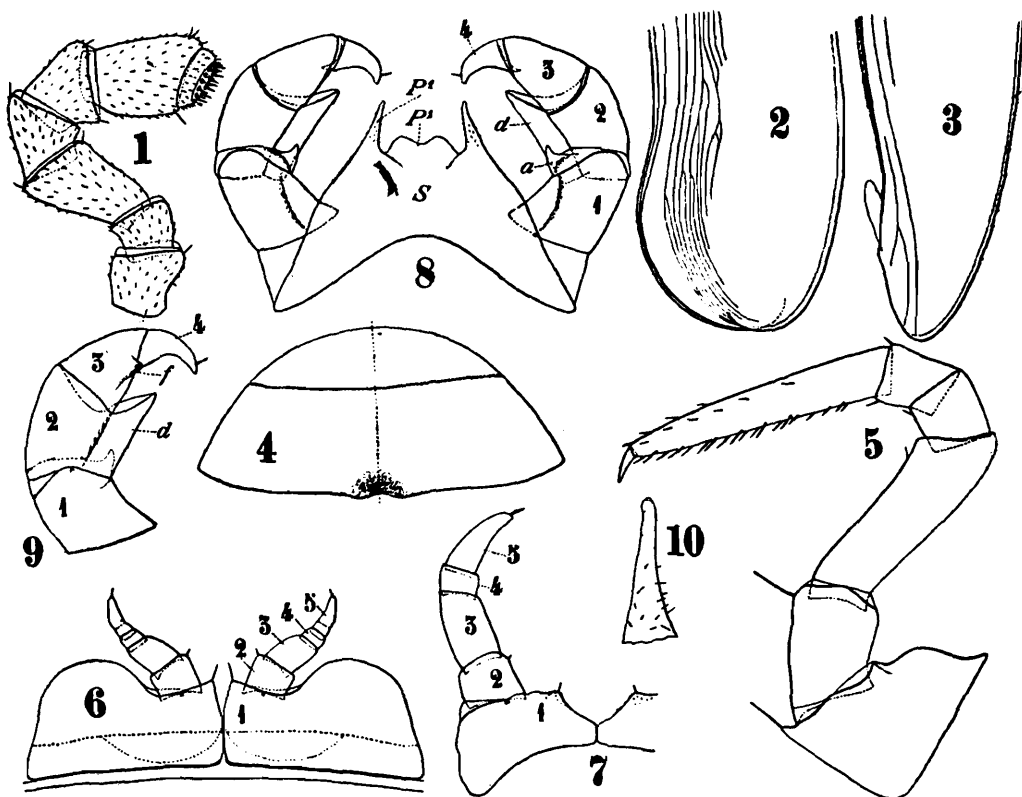


FIG. XXXI.—*Rhopalomeris (Peplomeris) demangei*, mas.

1. antenna; 2. trunci dimidium tergitem primum et 3. tergitem secundum lateraliter inspecta; 4. tergitem ultimum postice inspectum; 5. pes paris decimi; 6. pedes paris 17ⁱ; 7. pes paris 18ⁱ; 8. pedes paris 19ⁱ cum sterno antice inspecti; 9. pes paris 19ⁱ postice inspectus; 10. sterni inter pedes paris 19ⁱ processus lateralis.

Litterae ut in fig VI, pag. 113.

Feminae tergitem ultimum margine postico medio parum sinuato instructum.

♂ Tergitem ultimum margine postico medio quam idem feminae magis sinuato.

Pedes paris 18ⁱ articulo primo cum opposito coalito; pedes paris 19ⁱ articulo tertio a secundo antice tantum lateraliter separato, articulo secundo processu basali et processu apicali internis latis longis, articulo tertio tuberculo perparvo postico.

Apiomeris (Malayomeris) martensi, Verh.

Malayomeris martensi, Verhoeff, *Sitz. Ber. Ges. nat. Freunde* 1910, p. 244, taf. ix, abb. 5-7.

Corpus totum subochraceum. Caput ocellis 7+1, antennis (Fig. XXVI, 1) articulo sexto parum magis quam duplo longiore quam latiore, subtus parum convexo et supra parum concavo, articulo septimo brevi.

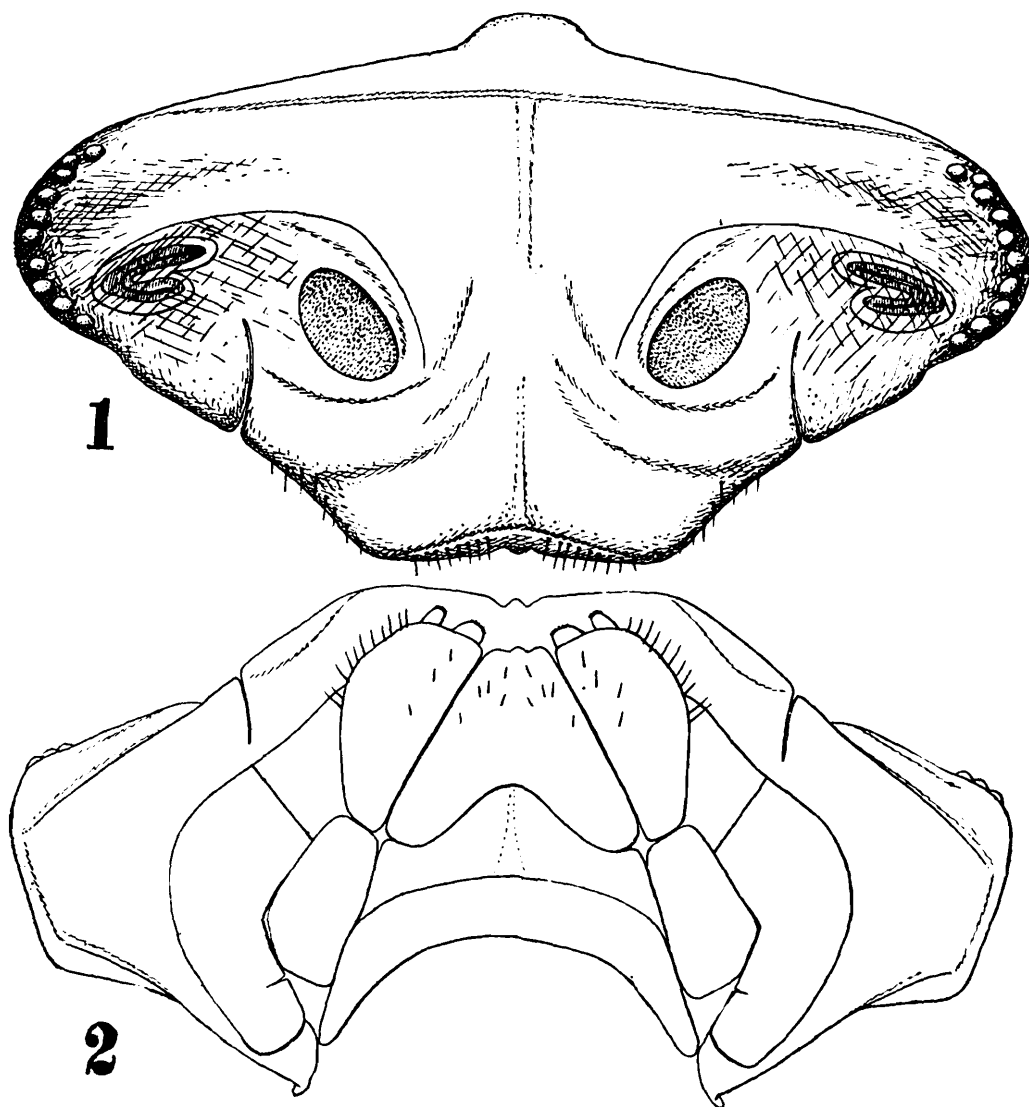


FIG. XXXII.—*Hyperglomeris lamellosa*.

1. caput pronum; 2. caput supinum.

Truncus. Tergitum primum (Fig. XXVI, 2-3) area mediana supra striis 6 lateraliter continuantibus, margine antico sublaterali late rotundato, lamina antica parva area postlaminari striis 9-10; tergite secundum (Fig. XXVI, 4) lateribus angustatis stria una integra instructis; tergite ultimum (Fig. XXVI, 5) margine postico medio parum sinuato.

Pedes (Fig. XXVI, 6) articuli primi angulo infero externo obtuso, articuli sexti spinis vide figuram.

Long. corp. mm. 17, lat. 8, long. antennarum 4.4, pedum paris decimi 4.6.

♂ Tergitum ultimum (Fig. XXVI, 7) margine postico medio quam idem feminae magis sinuato et ad sinum latera aliquantum producto.

Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XXVI, 8-11.

Habitat. Sumatra: Kepatiang (Mus. Berlin).

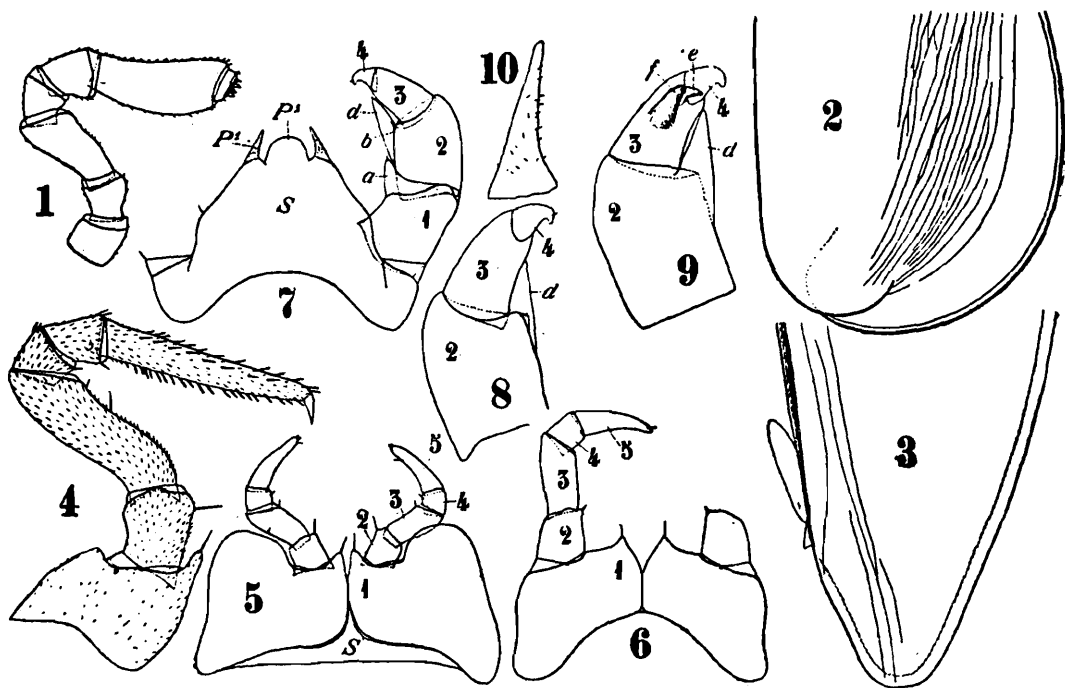


FIG. XXXIII.—*Hyperglomeris lamellosa*.

1. antenna; 2. trunci dimidium tergite primum et 3. tergite secundum lateraliter inspecta; 4. pes paris decimi; 5. maris pedes paris 17ⁱ; 6. maris pedes paris 18ⁱ; 7. maris pes paris 19ⁱ cum sterno antice inspectus; 8. maris pedis paris 19ⁱ articuli 2-4 antice inspecti; 9. iidem postice inspecti; 10. sterni inter pedes paris 19ⁱ processus lateralis.

Litterae ut in fig. VI, pag. 113.

Gen. *Rhopalomeris*, Verh.

Glomeris, Pocock, *Journ. Linn. Soc.* XXI, p. 290 (1889); *Idem*, *Ann. Mus. Genova* (2) X, p. 385 (1890).

Rhopalomeris, Verhoeff, *Archiv f. Naturg.* LXXII, p. 188 (1906); *Idem*, *Sitz. Ber. Ges. nat. Freunde* 1910, p. 241, taf. ix, abb. 8-9.

Characteres feminae (saltem exteriores) generis huius eisdem gen. *Apiomeris*, O. F. Cook aequales sunt antennarum forma excepta, quae apicem latiore habent et conis sensitivis numerosis instructum. Mares pedibus parium 17ⁱ, 18ⁱ ad eosdem subgen. *Hyleoglomeris*, Verh. aequales sunt, pedibus paris 19ⁱ aequales vel processibus diversi et ad subgenera duo referendi sunt:

- a. Pedes paris 19ⁱ ut in *Apiomeris* (Subgen. *Hyleoglomeris*) conformati... Subgen. *Rhopalomeris*, Verh. Typus: *Rh. carnifex* (Pocock).
- b. Pedes paris 19 articulo primo processu apicali interno brevi conico, articulo secundo processu triangulari postico interno, articulo tertio processu postico brevi instructis ... Subgen. *Peplomeris*, nov. Typus: *Peplomeris demangei*, sp. n.

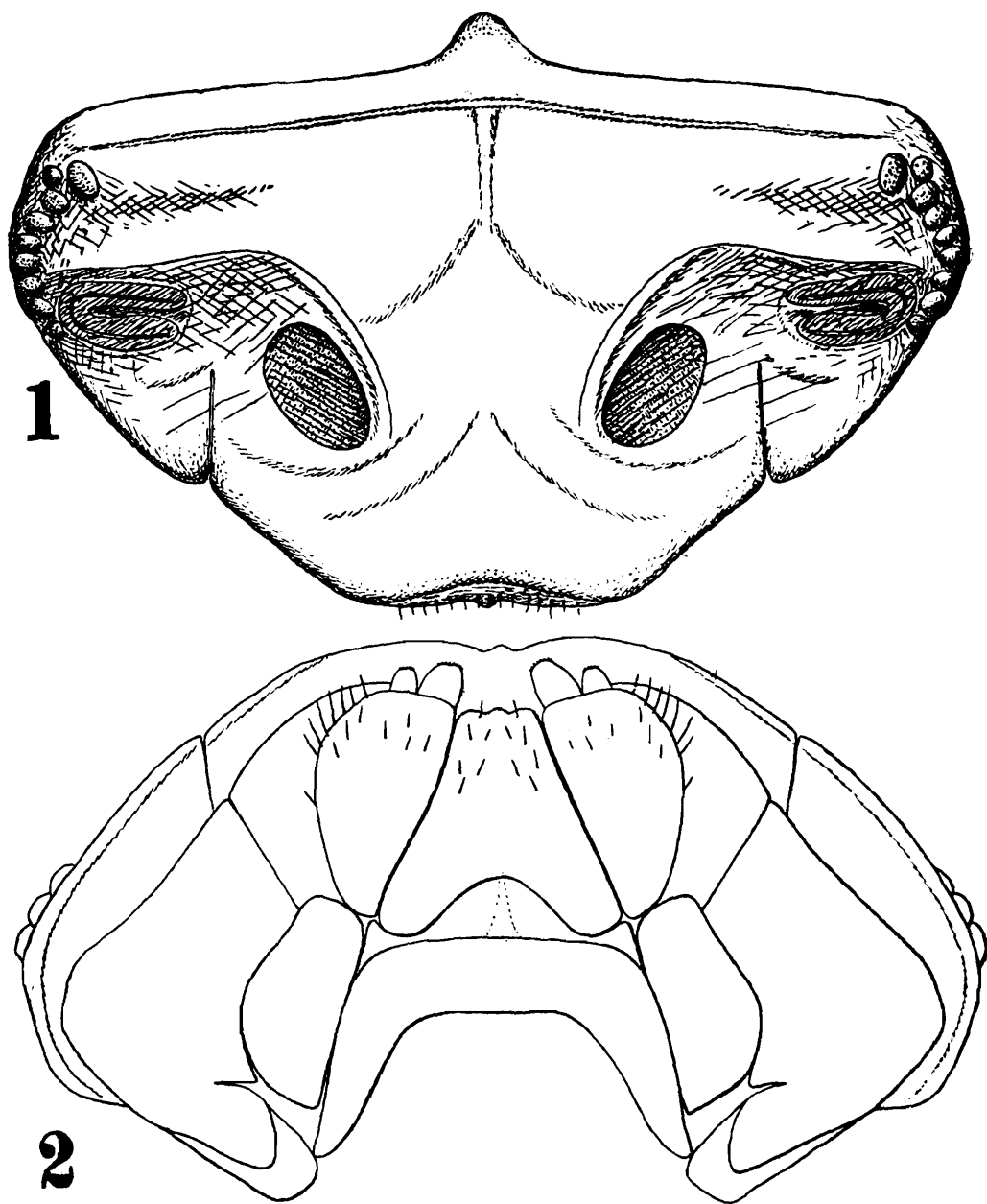


FIG. XXXIV.—*Dinoglomeris dirupta*.
1. caput pronum ; 2. caput supinum.

Rhopalomeris (s.s.) carnifex (Poc.).

Glomeris carnifex, Pocock, *Journ. Linn. Soc.* XXI, pp. 290 et 301 (1887);
Idem, *Ann. Mus. Genova* (2) X, p. 385 (1890).

Corpus atrum capitis facie testaceo aliquantum maculata, colli margine laterali et parte postica, trunci tergitorum margine postico, linea mediana et parte infera laterali, tergiti ultimi parte postica rubescentibus, antennis fuscis, ventre pedibusque testaceis.

Caput ocellis 8+1, antennis (Fig. XXVII, 2) articulo sexto c.

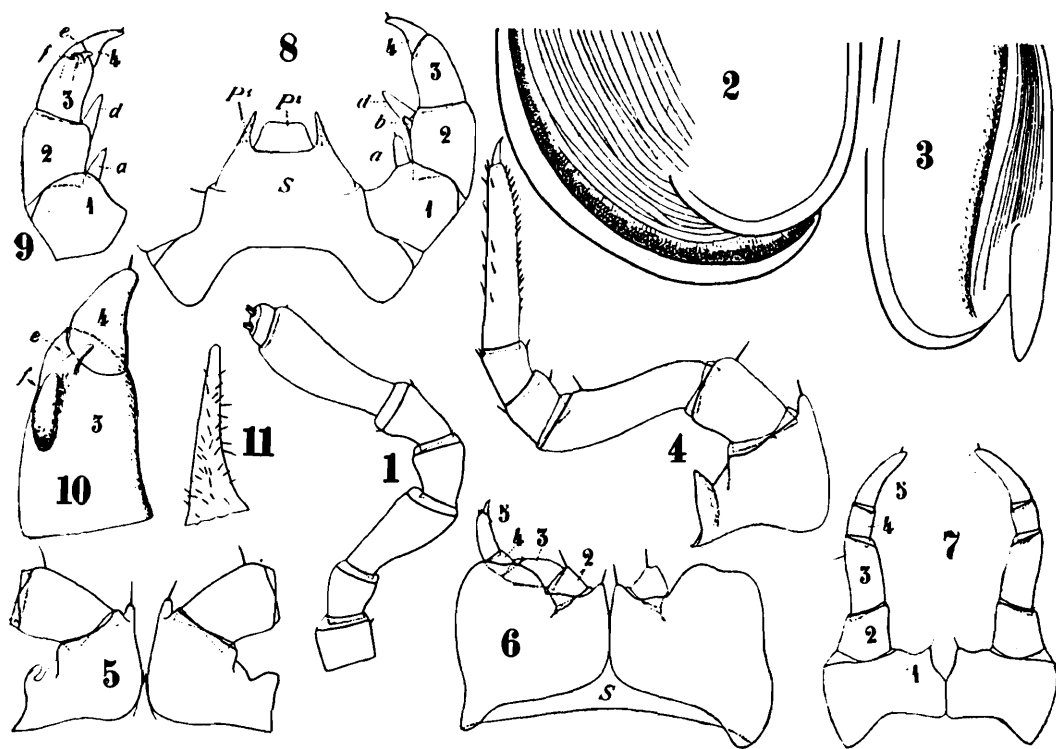


FIG. XXXV.—*Dinoglomeris dirupta*.

1. antenna; 2. trunci tergiti primi pars inferior a facie laterali inspecta; 3. trunci tergiti primi pars lateralis a facie antica-inferiore (haud interna) inspecta; 4. pes paris decimi; 5. pedes paris decimi primi, quarum alter articuli primi angulo externo anomalo; 6. maris pedes paris 17ⁱ; 7. maris pedes paris 18ⁱ; 8. maris pes paris 19ⁱ cum sterno antice inspecti; 9. maris pes paris 19ⁱ postice inspectus; 10. maris pedis paris 19ⁱ articuli tertius et quartus postice inspecti magis ampliati; 11. maris sterni inter pedes paris 19ⁱ processus lateralis.

1/3 longiore quam ad apicem latiore, apice quam basis magis quam duplo latiore, articulo septimo brevissimo, lato, conis sensitivis apicalibus numerosis brevibus. Collum pone marginem anticum striis duabus transversis instructum.

Truncus. Tergitum primum (Fig. XXVII, 3-4) area mediana antica striis tribus anticis abbreviatis et striis aliis 6-7 superis, lateraliter continuantibus, lamina antica perparva, area postlaminari striis 9. Tergitum secundum lateribus angustatis praeter striam postmarginalem striis duabus abbreviatis et duabus integris instructis; tergita cetera lateribus striis duabus integris et tergitorum antico-

rum etiam stria nonnulla abbreviata instructa; tergum ultimum postice late rotundatum.

Pedes (Fig. XXVII, 5) articuli primi angulo externo obtuso, articuli sexti spinis vide figuram.

♂ Tergum ultimum margine infero vix sinuato.

Pedes paris 17^i , 18^i et 19^i vide fig. XXVII, 6-11.

Long. corp. mm. 16, lat. 8, long. antennarum 4.50, pedum paris decimi 5.30.

Habitat. Tenasserim: Malwoon (Fea) et Tenasserim austr. (Oates).

***Rhopalomeris* (s.s.) *carnifex* (Poc.) var. *pallida*, Poc.**

Glomeris carnifex v. *pallida*, Pocock, *Journ. Linn. Soc. Zool.* XXI, pp. 290 et 300, pl. xxiv, figs. 7, 7a (1887).

Rhopalomeris bicolor, Verhoeff, *Archiv f. Naturg.* LXXII, p. 189 (1906) (nec *Glomeris bicolor*, Wood); *Id.*, *Sitz. Ber. Ges. nat. Freunde* 1910, p. 241, taf. ix, abb. 8-9.

Corpus atrum, capitis faciei maculis nonnullis, colli margine laterali et postico, trunci tergitorum margine postico, linea mediana et parte infera laterali, tergiti ultimi parte postica ochraceis, antennis nigrescentibus, ventre pedibusque subochraceis.

Caput ocellis 8+1, antennis (Fig. XXVIII, 1) articulo sexto aliquantum minus quam $1/3$ longiore quam ad apicem latiore, apice quam basis magis quam duplo latiore, articulo septimo brevissimo lato, conis sensitivis apicalibus numerosis brevibus.

Truncus. Tergum primum (Fig. XXVIII, 2-3) area mediana striis superis 5 lateraliter continuantibus, lamina antica perparva, area postlaminari striis 7. Tergum secundum lateribus angustatis praeter striam postmarginalem striis duabus abbreviatis et duabus integris instructum; tergita cetera lateribus striis 3-5 partim abbreviatis instructa; tergum ultimum postice late rotundatum.

Pedes (Fig. XXVIII, 4) articuli primi angulo externo obtuso, articuli sexti spinis vide figuram.

♂ Tergum ultimum margine infero vix sinuato.

Pedes paris 17^i , 18^i et 19^i vide fig. XXVIII, 5-10.

Long. corp. mm. 16, lat. 8, long. antennarum 4.5, pedum paris decimi 5.30.

Habitat. Mergui Archipelago: Ins. Elphinstone; Malacca: Ins. Salanga.

***Rhopalomeris* (s.s.) *monacha*, sp. n.**

Caput, collum, trunci tergum primum ochracea, tergita cetera nigrescentia, fascia mediana longitudinali ochracea, marginibus anguste ochraceis, tergito ultimo fascia mediana longitudinali lata ochracea, ventre pedibusque pallide ochraceis.

Caput ocellis in oculo altero 9+1, in oculo altero 11+1, antennis (Fig. XXIX, 1) articulo sexto c. $2/7$ longiore quam latiore, articulo septimo brevior, conis sensitivis apicalibus numerosis.

Truncus. Tergitum primum area antica mediana striis superis 5 lateraliter continuantibus, lamina laterali perparva, area postlaminari striis 9, quarum 5 supra continuant. Tergitum cetera lateraliter striis 3-4 instructa. Tergitum ultimum postice late rotundatum.

Pedes (Fig. XXIX, 2) articuli primi angulo infero externo obtuso, articuli sexti spinis vide figuram.

Long. corp. mm. 12, lat. 6, long. antennarum 2.48, pedum paris decimi 3.40.

Mas ignotus.

Habitat. Malay Peninsula: Perak (Mus. Berlin).

Observatio. Species haec a *R. carnifex* v. *pallida* (Poc.) saltem colore et antennarum forma distincta est.

Rhopalomeris (s.s.) tonkinensis, sp. n.

Corpus nigrum colli margine postico, trunci tergiti primi marginibus omnibus, tergitorum sequentium margine antico et postico sat anguste et in medio dorso breviter angulatim, macula transversali antica nigro marmorata, et parte laterali spatio latiusculo ochroleucis, tergiti ultimi margine postico parum late ochroleuco, antennis, praeter dimidiam partem distalem articuli sexti gradatim magis infuscatam, ochroleucis, ventre pedibusque ochroleucis.

Caput ocellis 8+1, antennis (Fig. XXX, 1) articulo sexto duplo longiore quam latiore, articulo septimo brevior, conis sensitivis apicalibus numerosis. Collum pone marginem anticum lineis duabus transversis parallelis instructum.

Truncus. Tergitum primum (Fig. XXX, 2-3) area antica mediana striis tribus abbreviatis marginalibus et striis aliis 4 lateraliter continuantibus, lamina laterali perparva, area postlaminari convexiuscula striis 7 instructa. Segmentum secundum lateribus aliquantum angustatis, praeter striam postmarginalem striis duabus instructis; segmenta sequentia lateribus ut eadem tergiti secundi striata angulo antico rotundato, angulo postico gradatim rotundato, subrecto et in segmentis VIII-X acuto; tergitum ultimum margine postico latissime rotundato medio vix sinuato, lateribus interne haud carinatis.

Pedes (Fig. XXX, 4) articuli primi angulo infero externo parum acute vel subacute (interdum anormaliter rotundatim) infra aliquantum producto, spinis vide figuram.

Long. corp. mm. 20, lat. 11, long. antennarum 5, pedum paris decimi 6.5.

Habitat. Tonkin: Montes Mauson, 2-3000 ft. alt. s/m.

Observatio. Species haec magnitudine et colore et antennarum forma a *Rhopalomeris carnifex*, Poc. distincta est.

Subgen. Peplomeris, nov.

Caput quam collum haud latius, antennis articulo septimo brevi, subcirculari, conis sensitivis apicalibus sat numerosis in-

structis. Collum pone marginem anticum striis transversalibus duabus instructum.

Truncus. Tergitum primum et secundum ut in gen. *Apiomeris*; tergитum ultimum margine postico medio paullum sinuato instructum et supra sinum aliquantum depressum.

Pedes paris 17ⁱ et 18ⁱ quam ceteri minores, articulo primo ab opposito sejuncto; pedes paris 19ⁱ 4-articulati, articulo primo processu apicali interno brevi conico, articulo secundo processu triangulari postico interno, articulo tertio processu postico brevi instructis.

Typus : *Peplomeris demangei*, sp. n.

Observatio. Subgenus hoc a *Rhopalomeris* (s.s.) maris tergiti ultimi forma nec non ejusdem pedibus paris 19ⁱ facile distinguendum est.

***Peplomeris demangei*, sp. n.**

♂ Corpus fuscum colli margine postico et trunci tergitorum omnium margine postico, margine laterali infero, tergitorum 1-10 macula mediana postica triangulari et macula submediana antica, tergiti ultimi macula mediana postica isabellinis, ventre pedibusque etiam isabellinis.

Caput media fronte convexiuscula postice vix carinata, oculis ocellis 7+1 compositis, antennis (Fig. XXXI, 1) articulo sexto apicem versus gradatim parum latiore, duplo longiore quam latiore, articulo septimo brevissimo, conis sensitivis apicalibus sat numerosis (c. 15) et sat longis. Collum pone marginem anticum striis transversis duabus instructum.

Truncus. Tergitum primum (Fig. XXXI, 2) area mediana antica striis tribus anticis abbreviatis et striis aliis 7+8 superis lateraliter continuantibus vel nonnullis posticis inter sese confluentibus, margine antico sublaterali late rotundato, lamina antica perparva, area postlaminari convexiuscula striis 8-9 instructa. Tergitum secundum (Fig. XXXI, 3) et tergita sequentia lateribus angustatis, praeter striam postmarginalem, striis duabus aliis abbreviatis vel integris instructis; tergитum sextum angulo postico subrecto; tergita cetera angulo postico parum subacute producto; tergитum ultimum (Fig. XXXI, 4) parum longe a basi transverse depressum, margine infero medium paullum sinuato, ad i latera rotundatim paullum producto et supra sinum aliquantum depressum.

Pedes (Fig. XXXI, 5) articuli primi angulo infero laterali obtuso rotundato, articuli sexti spinis vide figuram.

Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XXXI, 6-10.

Long. corp. mm. 11, lat. 5, long. antennarum 2.5, pedum paris decimi 3.5.

Habitat. Tonkin: Hanoi (v. Demange legit).

Gen. *Hyperglomeris*, nov.

Caput (Fig. XXXII, 1-2) quam collum parum latius, epicranio lateraliter mandibularum stipites spatio sat magno superante,

oculis ocellorum serie arcuata et ocello alio compositis, Tömösvaryi organum bene evolutum, antennis conis sensitivis apicalibus 4 instructis. Collum pone marginem anticum striis tribus parallelis et aliis minoribus exaratum.

Truncus. Tergitum primum incisura postico-laterali modice profunda ita ut pars praeincisuralis quam supraincisuralis longior sit, superficie praeincisurali striis numerosis exarata, lamina antica fere ut superficies cetera subperpendiculari (haud introrsum vergente); tergum secundum lateribus modice angustatis, rotundatis stria integra instructis; tergum ultimum margine postico late rotundato, lateribus interne parum supra basim carinatis.

♂ Tergum ultimum margine postico medio vix sinuato.

Pedes paris 17ⁱ et 18ⁱ 5-articulati, articulo primo ab opposito sejuncto; pedes paris 19ⁱ 4-articulati, articulo primo processu subconico apicali, antico interno, articulo secundo pro processu apicali antico interno tantum seta brevi instructo et processu postico interno longo, articulo tertio processu apicali postico interno et processu postico brevibus.

Typus: *Hyperglomeris lamellosa*, sp. n.

Observatio. Genus hoc ab *Apiomeris*, O. F. Cook, colli et trunci tergiti primi striis magis numerosis, tergiti primi lamella magis evoluta et praesertim capite latiore et tergum ultimum interne lateraliter carinatum distinctissimum est.

***Hyperglomeris lamellosa*, sp. n.**

Corpus nigrescens, colli margine postico, trunci tergiti primi marginibus antico laterali et laterali spatio latiusculo, margine postico spatio angustiore, tergitorum sequentium margine postico spatio angustiore et parte laterali inferiore spatio latiusculo ochroleucis nec non tergitis II-X macula antica sublaterali brunnea nigro marmorata plus minusve manifesta, antennis atris, ventre pedibusque plus minusve pallide ochroleucis.

Caput ocellis 8+1, antennis (Fig. XXXIII, 1) elongatis, articulo sexto parum magis quam duplo longiore quam latiore, articulo septimo brevi, conis sensitivis apicalibus 4. Collum striis tribus transversis parallelis integris et pone has stria alia transversa integra vel subintegra et striis aliis minoribus abbreviatis irregularibus fere usque ad marginem posticum instructum.

Truncus. Tergum primum (Fig. XXXIII, 2) area mediana antica striis abbreviatis 3 et striis aliis numerosis crebris transversis usque fere ad medium segmentum pertinentibus, anticis 4-5 integris, ceteris plus minusve divisis et gradatim minus profundis, lamina antica laterali magna (majore quam in Glomeridarum speciebus hucusque mihi notis) aliquantum concava, margine late rotundato et extrorsum parum vergente, area postlaminari parum convexa striis c. 12-15 instructa. Tergum secundum (Fig. XXXIII, 3) lateribus angustatis praeter striam postmarginalem striis aliis duabus, infra et praesertim postice in striis minoribus divisis, media superficie dorsuali postica vix carinata, tergita

cetera medio dorso vix carinulato, striis secundo similia, angulo antico laterali rotundato, postico subacuto, gradatim retrorsum parum magis producto. Tergitum ultimum postice late rotundatum margine medio vix depresso et vix sinuato, lateribus interne carina longa robusta auctis.

Pedes (Fig. XXXIII, 4) articuli primi angulo infero externo lato, laminari infra rotundatim parum producto, articulo sexto infra spinis numerosis brevibus, robustis et supra spinis sat numerosis instructo, ungue sat longo, attenuato, parum arcuato.

♂ Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XXXIII, 5-10.

Long. corp. mm. 21, lat. 11, long. antennarum 6, pedum paris decimi 6.2.

Habitat. Tonkin: Montes Mauson, 2-3,000 ft. alt. s/m (*H. Fruhstorfer* legit).

Gen. *Dinoglomeris*, nov.

Caput (Fig. XXXIV, 1-2) quam collum haud latius, epicranio lateraliter mandibularum stipites spatio minimo superante, notis ceteris ut in *Hyperglomeris*.

Trunci tergitem primum lamina laterali magna, haud perpendiculari ut superficies cetera, sed introrsum directa ita ut facies lateralis antica sit; tergitem secundum et ultimum ut in *Hyperglomeris*.

Tergitem ultimum margine postico medio haud sinuato.

Pedes paris 19ⁱ ab iisdem generis *Hyperglomeris* articulo secundo processu brevi apicali antico interno instructo differunt.

Typus: *Dinoglomeris dirupta*, sp. n.

Observatio. Genus hoc ab *Hyperglomeris* capite quam collum haud latiore, trunci segmenti secundi laminae anticae forma differt.

Dinoglomeris dirupta, sp. n.

Corpus atrum vel nigrescens isabellino vel fulvo-ochraceo, antice parum postice magis, marmoratum, ventre pedibusque alutaceis.

Caput ocellis 8+1 (in exemplo uno oculo altero ocellis 9+1), antennis (Fig. XXXV, 1) elongatis, articulo sexto aliquantum magis quam duplo longiore quam latiore, articulo septimo brevi, conis sensitivis apicalibus 4. Collum pone marginem anticum lineis transversis tribus parallelis et pone lineam tertiam lineis aliis 1-2 medio collo in ramis minoribus plus minusve numerosis usque ad brevem spatium longe a margine postico divisus.

Truncus. Tergitem primum (Fig. XXXV, 2-3) valde singulare, area antica mediana striis tribus anticis abbreviatis et striis 5-6 integris vel subintegris et striis aliis numerosis crebris subtilioribus, divisus et confluentibus usque ad segmentum medium pertinentibus, lamina laterali magna, laevi, introrsum vergente, ita ut superficies lateralis antica sit, area postlaminari striis c. 16 instructa. Tergitem ultimum breve, latum, medium transverse

parum sinuatum, parte postica aliquantum declive, margine postico late rotundato, lateribus interne carina longa auctis.

Pedes (Fig. XXXV, 4) articuli primi angulo infero externo in processum conicum sat longum infra producto [in pede nonnullo processu dictu interdum plus minusve abbreviato vel abnormaliter (Fig. XXXV, 5) conformato] articulo sexto spinis vide figuram.

♂ Pedes paris 17ⁱ, 18ⁱ et 19ⁱ vide fig. XXXV, 6-11.

Long. corp. mm. 22, lat. 12, long. antennarum 6, pedum paris decimi 7.

Juvenis. Corpus nigrescens ochraceo multo marmoratum, ventre pedibusque ochroleucis; oculi ocellis 6+1 vel 5+1. Collum pone marginem lineis tribus parallelis instructum.

Truncus. Tergitum primum eidem adulti simile est; tergillum ultimum transverse haud sinuatum.

Long. corp. mm. 10, lat. 5.8.

Habitat. Tonkin: Montes Mauson, 2-300 ft. alt. s/m (H. Fruhstorfer legit).

CATALOGUS GLOMERIDARUM ORIENTALIU HUCUSQUE DESCRIPTARUM.

Gen. *Apiomeris*, O. F. Cook.

Brandtia X, p. 45 (1896).

Subgen. *Hyleoglomeris*, Verh.

Verhoeff, *Sitz. Ber. Ges. nat. Freunde* 1910, p. 245;

Silvestri, *Ibi*, p. 107.

albicornis, Pocock, Max Weber's, *Zool. Ergeb. Reise Sumatra. Niederl. Ost.-Ind.* III, 1894, p. 323 (*Glomeris*).

alticola, Carl, *Revue suisse Zool.* XX, 1912, p. 103 Celebes. (*Nesoglomeris*).

atricornis, Silvestri, *Ibi*, p. 113 Borneo.

beccarii, Silvestri, *Ibi*, p. 129 Sumatra.

concolor, Pocock, *Ann. Nat. Hist.* 1889, p. 474 (*Glomeris*). Borneo.

crebristriata, Silvestri, *Ibi*, p. 108 Borneo.

diversicolor, Silvestri, *Ann. Mus. Genova* (2) XIV, 1895, Sumatra. p. 721 (*Glomeris*); *Id.*, *Ibi*, p. 128.

electa, Silvestri, *Ibi*, p. 119 India.

eremita, Carl, *Revue suisse Zool.* XX, 1912, p. 102 Celebes. (*Nesoglomeris*).

formosa, Silvestri, *Ann. Mus. Genova* (2) XIV, 1895, Sumatra. p. 720 (*Glomeris*); *Id.*, *Ibi*, p. 125.

jacobsoni, Silvestri, *Ibi*, p. 122 Java.

kirropeza, Attem, *Abh. Senckenb. naturf. Ges.* XXIII, Celebes. 1897, p. 480 (*Glomeris*); Carl, *Revue suisse Zool.* XX, 1912, p. 102 (*Nesoglomeris*).

modesta, Silvestri, *Ibi*, p. 121 India.

- modiglianii*, Silvestri, *Ann. Mus. Genova* (2) XIV, Nias.
1895, p. 720 (*Glomeris*); *Id.*, *Ibi*, p. 123.
multilineata, Verhoeff, *Sitz. Ber. Ges. nat. Freunde* 1910, Borneo.
p. 248, taf. ix, abb. 1-2; Silvestri, *Ibi*,
p. 107.
minuta, Verhoeff, *Sitz. Ber. Ges. nat. Freunde* 1910, p. Borneo.
248, taf. ix, abb. 3-4; Silvestri, *Ibi*, p. 115.
paucilineata, Silvestri, *Ibi*, p. 115 Borneo.
sarasinorum, Carl, *Revue suisse Zool.* XX, 1912, p. 101, Celebes.
taf. vi, fig. 36 (*Nesoglomeris*).
siamensis, Silvestri, *Ibi*, p. 116 Siam.
venustula, Silvestri, *Ibi*, p. 117. India.
zonifera, Silvestri, *Ibi*, p. 111 Borneo.

Subgen. *Apheromeris*, Silv.

Silvestri, *Ibi*, p. 130.

- partialis*, Silvestri, *Ibi*, p. 131 Java.
parvella, Silvestri, *Ibi*, p. 134 Java.
totalis, Silvestri, *Ibi*, p. 132 Java.

Subgen. *Apiomeris* (s.s.), O. F. Cook.

- Brandtia* X, p. 45 (1896); Silvestri, *Ibi*, p. 136.
infuscata, Pocock, Max Weber's *Zool. Ergeb. Reise* Sumatra.
Niederl. Ost.-Ind. III, 1894, p. 324, pl.
xix, fig. 10-10b (*Glomeris*); O. F. Cook,
Brandtia X, p. 44 (1896); Silvestri, *Ibi*,
p. 136.

Subgen. *Malayomeris*, Verh.

- Verhoeff, *Sitz. Ber. Ges. nat. Freunde* 1910, p. 243, taf. ix, abb.
5-7; Silvestri, *Ibi*, p. 138.
martensi, Verhoeff, *Sitz. Ber. Ges. nat. Freunde* 1910, Sumatra
p. 244, taf. ix, abb. 5-7 (*Malayomeris*);
Silvestri, *Ibi*, p. 139.

Gen. *Rhopalomeris*, Verh.

- Glomeris*, Pocock, *Journ. Linn. Soc.* XXI, 1887, p.
290; *Idem*, *Ann. Mus. Genova* (2) X, 1890,
p. 385; *Rhopalomeris*, Verhoeff, *Archiv f.*
Naturg. LXXII, 1906, p. 188; *Id.*, *Sitz.*
Ber. Ges. nat. Freunde 1910, p. 241, taf.
ix, abb. 8-9; Silvestri, *Ibi*, p. 140.

Subgenus *Rhopalomeris*, Verh.

- carnifex*, Pocock, *Journ. Linn. Soc.* XXI, 1889, p. 290 Burma.
et 301 (*Glomeris*); *Id.*, *Ann. Mus. Genova*
(2) X, 1890, p. 385 (*Glomeris*); Silvestri,
Ibi, p. 142.

- carnifex* v. *pallida*, Pocock, Journ Linn. Soc. Zool. XXI, 1887, pp. 290 et 300, pl. xxiv, figs. 7, 7a (*Glomeris*); *bicolor*, Verhoeff (nec Wood), Arch. f. Naturg. LXXII, 1906, p. 189; *Id.*, Sitz. Ber. Ges. nat. Freunde 1910, p. 241, taf. ix, abb. 8-9; Silvestri, *Ibi*, p. 143. Ins. El-ph i n-stone et Ins. Sal-anga.
- monacha*, Silvestri, *Ibi*, p. 143. . . Perak.
- tonkinensis*, Silvestri, *Ibi*, p. 144 .. Tonkin.

Subgen. *Peplomeris*, Silv.

- Silvestri, *Ibi*, p. 144.
- demangei*, Silvestri, *Ibi*, p. 145 Tonkin.

Gen. *Hyperglomeris*, Silv.

- Silvestri, *Ibi*, p. 145.
- lamellosa*, Silvestri, *Ibi*, p. 146 Tonkin.

Gen. *Dinoglomeris*, Silv.

- Silvestri, *Ibi*, p. 147.
- dirupta*, Silvestri, *Ibi*, p. 147 Tonkin.

Gen. *Glomeris*, Latr.=in p. Gen. *Apiomeris* et *Rhopalomeris*.

- albicornis*, Pocock, =*Apiomeris* (*Hyleoglomeris*) *albi-cornis*
- bicolor*, Wood, Proc. Acad. Nat. Sci. Philad. 1865, p. 172=? China.
- carnifex*, Pocock=*Rhopalomeris carnifex*.
- carnifex* v. *pallida*, Pocock=*Rhopalomeris carnifex* v. *pallida*.
- concolor*, Pocock=*Apiomeris* (*Hyleoglomeris*) *concolor*.
- diversicolor*, Silv.=*Apiomeris* (*Hyleoglomeris*) *diversicolor*.
- formosa*, Silv.=*Apiomeris* (*Hyleoglomeris*) *formosa*.
- infuscata*, Pocock=*Apiomeris* (s.s.) *infuscata*.
- kirropeza*, Attems=?*Apiomeris* (*Hyleoglomeris*) *kirropeza*.
- modiglianii*, Silv.=*Apiomeris* (*Hyleoglomeris*) *modiglianii*.
- sinensis*, Brolemann, Mem. Soc. Zool France IX, 1896, pl. xiii, fig. 19-22=? Tibet et China.

Gen. *Malayomeris*, Verh.=Gen. *Apiomeris*, subgen. *Malayomeris*, Verh.

- martensi*, Verh.=*Apiomeris* (*Malayomeris*) *martensi*.

Gen. *Nesoglomeris*, Carl.

=Gen. *Apiomeris*, subgen. *Hyleoglomeris*, Verh.

alticola, Carl=*Apiomeris* (*Hyleoglomeris*) *alticola*.

eremita, Carl=*Apiomeris* (*Hyleoglomeris*) *eremita*.

sarasinorum, Carl=*Apiomeris* (*Hyleoglomeris*) *sarasinorum*.

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- „ „ 1889. A new species of *Glomeris* from Borneo.—*Ann. Mag. Nat. Hist.* 1889, p. 474.
- „ „ 1890. Viaggio di Leonardo Fea in Birmania e regioni vicine. XXX. On the Myriopoda of Burma. Pt. I. Report on the Oniscomorpha collected by Sign. L. Fea, by Mr. E. W. Oates and by the late Sign. G. B. Comotto.—*Ann. Mus. Genova* (2) X, p. 2.
- „ „ 1894. Chilopoda, Symphyla and Diplopoda from the Malay Archipelago.—*Zoologische Ergebnisse einer Reise in Niederlandisch Ost-Indien herausgegeben v. Dr. Max Weber*, Heft III, pp. 322-325, pl. xix, figs. 10-10b.
- Silvestri, F., 1895. I Chilopodi e i Diplopodi di Sumatra e delle isole Nias, Engano e Mentavei.—*Ann. Mus. Genova* (2) XIV, pp. 720-721.
- „ 1903. Classis Diplopoda. Vol. I. Anatome; in: Berlese: *Acari, Myriopoda et Scorpiones hucusque in Italia reperta*.—Portici, 1903.
- Verhoeff, C., 1906. Ueber Diplopoden. 4 (24.) Aufsatz: Zur kenntnis der Glomeriden (zugleich Vorläufer einer *Glomeris*-Monographie).—*Archiv für Naturgeschichte*, LXXII, pp. 188-193.
- „ 1910. Ueber Diplopoden. 41 Aufsatz: Indomalayische Glomeriden.—*Sitz. Ber. Ges. naturf. Freunde* 1910, pp. 240-249, taf. ix.
- „ 1912. Ueber *Nesoglomeris* n. g. J. Carl.—*Zool. Anzeiger* XL, pp. 150-151.

X. A REVISION OF THE INDIAN SPECIES OF *MERETRIX*

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(Plates IV-VII.)

PRELIMINARY.

The genus *Meretrix* was split off from *Cytherea* to accommodate a number of strongly marked species distinguished characteristically by the possession of an elongate and finely striate (or granulate) posterior lateral tooth—the *nympha* of older writers—in each valve. They frequent estuaries and none of those found on the coasts of Continental India live beyond the influence of land drainage; they have about an equal tolerance with the backwater oyster (*Ostrea virginiana*) for an occasional declension in the salinity of the water of their habitat. They can also endure considerable increase in salinity. This tolerance is of limited time-duration in both cases. Within my knowledge both of the common species can survive, at least for some days, a lowering of salinity to 1.010 S.G. and again can endure a concentration during the dry season that may reach as high as 1.030 S.G. How long such extremes can be borne we do not know, but it appears certain that vitality is lowered in either case and if the abnormal conditions be not modified within a certain period, widespread death supervenes in the beds. The optimum range of salinity favoured ranges from 1.025 to 1.027 S.G.

My attention was directed to this genus during an investigation of Indian mollusca of economic value; the examination of large numbers of these shells showed that great variation exists and when attempting to identify the various forms it became apparent that this liability to vary widely, both in form and colouration, has resulted in great taxonomic confusion and the undue multiplication of species. Examination of the Indian Museum collections, kindly placed at my disposal by Dr. Annandale, emphasized the need for a revision of Indian species and the consideration of what value and limits should be placed upon the many variations which obviously exist.

The material which has furnished the data for this revision was derived in the main from the shell collections in the Indian Museum, especially that obtained during the zoological survey of the Chilka Lake, and from extensive collections which I have

made specially for this enquiry at Sonapur (Ganjam district), Pulicat Lake, Palk Bay, Tuticorin, and the Tambraparni delta, and from the prolific backwaters of the Malabar district where these shells flourish in greatest abundance.

The chief conclusions at which I have arrived are that no multiplicity of species exists; that there are indeed only three really good species of *Meretrix* living in the waters of Continental India, namely *M. meretrix*, *M. attenuata*, and *M. casta*, and that while the two former exhibit great variation in colouration, they are remarkably stable in size and shape when mature, whereas the third species exhibits a marked susceptibility to the influence of environmental conditions, resulting in the production of numerous varieties and local races. The conditions in east coast backwaters being very different from those on the west coast, it results that the main varieties of *M. casta* are similarly divergent, those of the east coast being usually true to the type within narrow limits, whereas those of the west coast, even when living within the same estuary, may exhibit as many as three well-marked variations, connected by a host of intermediate forms, merging so insensibly into one another that it is practically impossible definitely to allocate many to one particular group.

Another notable fact brought out is the peculiar *discontinuity of distribution* shown by one of the species (*M. attenuata*) and by one variety of another (*M. casta* var. *ovum*). The former is known only from specimens from the Nicobar Islands and from Gwadar, on the Baluchistan coast; whereas in the case of *M. casta ovum*, we find it (*a*) widely distributed in the backwaters of the west coast of India, and (*b*) on the west coast of the Malay Peninsula and in Arakan. What may be the explanation in the case of *M. attenuata* we cannot at present say: possibly it is a decadent form once more widely distributed; if so, palaeontology may be able to assist. With regard to *M. casta ovum* the similarity of climatic and physical conditions between the west coasts of India and the Malay Peninsula probably supplies the reason. Between these two localities lies the east coast of India, an area differing greatly in climate, particularly in rainfall, from either of the other two. Hence I believe that the formation of the varietal form is due to the influence of divergent environment. That in two widely separated localities, having however similar physical features and climate, a parallelism of form should be maintained by the variety is significant, and seems to be an instance where the influence of similar environment in the production of identical varieties is indicated.

The following key to the Indian species and varieties summarises my conclusions:—

GENUS *MERETRIX*.

1. *Pallial sinus* very shallow and without an acutely projecting ventral horn.

A. Anterior cardinal tooth of left valve distinctly notched; size of shell large, usually attaining over 60 mm. in antero-posterior length.

	Species.	Characteristics.	Sections.
Valves trigono-sub-orbicular.	<i>Meretrix meretrix</i> (Linn.)	Valves with or without obscure and discontinuous broad rays; vulva obscure, margin indefinite.	1. Type.
		Valves without rays; vulva dark, very conspicuous, with clean-cut margin.	2. Var. <i>impudica</i> (Chemnitz).
		Colour uniform chestnut..	3. Var. <i>castanea</i> (Lamarck).
		Valves rayed with numerous continuous bands of dark colour, some broad, others narrow.	4. Var. <i>auro-ra</i> , var. nov.
		Valves rayed with two wide brown bands, often incomplete.	5. Var. <i>morphina</i> (Lamarck).
		Valves concentrically zoned either with solid or with zig-zag chevron-shaped dark bands.	6. Var. <i>zonaria</i> (Lamarck).

B. Anterior cardinal tooth in left valve entire; length of shell usually less than 50 mm.

Valves usually trigono-cordate; sometimes ovate to oblong.	<i>M. casta</i> (Chem.)	Shells large and ventricose, cordate; without colour bands, except rarely upon the umbones.	1. Type.
		Shell ovate to oblong with or without two obscure and often imperfect radial bands; hinges elongate; umbones nearly medium, curved straight inwards, usually eroded.	2. Var. <i>ovum</i> (Hanley).
		Shell corbiculariform; extremely thick; hinge short; teeth very stout. Sub-fossil only.	3. Var. <i>sativa</i> (Preston).

H. Pallial sinus deep, almost semi-circular, with a ventral horn ending in an acute point.

Valves sub-cuneate.	<i>M. attenuata</i> , Dunker.	Shell concentrically zoned with chevron-shaped markings.	1. Type.
		Shell unicoloured, except occasionally on the umbones.	2. Var. <i>flava</i> , var. nov.

1. *Meretrix meretrix* (Linn.).

1758. *Venus meretrix*, Linn., *Syst. Nat.*, 10th ed., p. 686.
 1782. " " seu *impudica*, Chemnitz, *Conch. Cab.*, Vol. VI, pl. 33.
 1835. *Cytherea meretrix*, Lamarck, *Anim. sans. Vert.*, 2nd ed., Vol. VI, p. 300.
 1835. " *impudica*, Lamarck, *ibid.*, p. 299.
 " " *castanea*, Lamarck, *ibid.*, p. 299.
 " " *zonaria*, Lamarck, *ibid.*, p. 299.
 " " *graphica*, Lamarck, *ibid.*, p. 300.
 " " *morphina*, Lamarck, *ibid.*, p. 300.
 1864. " *graphica*, *castanea*, *zonaria*, *impudica*, and *morphina*, Reeve, *Conch. Icon.*, XIV, *Cytherea*, figs. 1, 6, 9, 10 and 12.
 1869. *Meretrix meretrix*, Römer, *Monographie der Molluskengattung Venus*, Linne, Band I, Sub-genus *Cytherea*, p. 27, pl. viii, all figs.
 1915. " *casta*, Preston (in part), *Rec. Ind. Mus.*, Vol. XI, p. 300.
 " " *ovum*, Preston, *ibid.*, p. 300.
 1916. " *meretrix*, Annandale and Kemp, *Mem. Ind. Mus.* Vol. V, p. 351.
 1916. " *ovum*, Annandale and Kemp, *ibid.*, p. 352.

This species is easily distinguished from *M. casta* and its varieties by the greater superficial dimensions of its valves when fully grown, by its less ventricose and more compressed form, particularly marked in young specimens, and by the delicacy and comparative weakness of the hinge region. Apart from these differences, an unfailing distinction is found in the form of the anterior cardinal tooth of the left valve. In *M. meretrix* this tooth has the summit distinctly notched, recalling in some degree the bifid form characteristic of *Tapes*; in *M. casta* it is invariably entire. Apart from colouration, this species is remarkably stable in form and general proportions; how it could be confounded with *M. casta* and *M. casta satparaënsis* by Preston is difficult to understand. That it was, is shown by reference to the specimens identified by this authority now in the Calcutta Museum and by reference to the article cited above, where Preston gives the size of one individual as 73×67 mm., a size never attained by *M. casta*, whereas these are the normal adult dimensions in the case of *M. meretrix*.

Outline and size of the valves. The valves are sub-trigonal and vary from a broadly cordate to a sub-orbicular form, the anterior angle being always well-rounded while the posterior is distinctly but bluntly angular. It is exceedingly difficult to describe in words the form of the shell in the different species and varieties of this genus sufficiently clearly to convey an adequate comprehension of the differences between them. Hence reference must be made to the figures which accompany this note. The dimensions of the shell attained by *M. meretrix* when fully grown are remarkably constant; the largest noted (Tuticorin) is $77 \times 65 \times 42\frac{1}{2}$ mm. thick; others from the same locality measure $77 \times 64 \times 41$ mm. thick and $74 \times 65 \times 40$ mm., while three from the outer channel of the Chilka Lake measured respectively 73×67 mm. (M. 9582/2), $68 \times 60\frac{1}{2} \times 42$ mm. (M. 9762/2), and $65 \times 58 \times 40\frac{1}{2}$ mm. (M. 9763/2). The average of size at full maturity for the valves appears to range from 58 to 60 mm. in depth by 65 to 70 mm. in length. Shells of these dimensions are those most commonly found when collecting; the animal at this size has reached its limit of growth and this again coincides closely with the age-limit of its life. Having spawned after attaining this size, its vitality appears to ebb and I have noted the death of large numbers at Tuticorin after the September spawning; during October the sand flats in the lagoon are thickly dotted with dead and gaping shells of full-grown size. It is noteworthy that small and medium-sized dead shells are conspicuous by their absence, although living individuals are present in their usual numerical proportion beneath the surface of the sands. The average ratios between length, depth and thickness as deduced from the average of 20 large and medium-sized individuals from 8 localities is 100 to 85.56 (depth) and 57.89 (thickness).

Colour varieties. Of the various colour varieties, the three principal (apart from the type), viz. *impudica*, *castanea* and *aurora*, are all of very definite and stable colouration, and so well defined

in their respective markings that unless one has opportunity to examine a large number of individuals from one locality where the various colour forms are present, it can readily be understood how Lamarck and others came to make separate species of simple colour varieties. As long ago as 1835, Deshayes and Milne-Edwards pointed out that Lamarck was in error in doing so in regard to what are merely colour varieties of the large species of *Meretrix* which Linnaeus termed *Venus meretrix*. They pointed out that in any extensive collection of the large species of *Meretrix* gradations can be readily traced between Lamarck's species. To quote their own words:—

“ On nous demandera sans doute sur quoi nous nous fondons pour faire de tels changements, et nous répondrons sur l'observation: en examinant en effet un grand nombre d'individus parmi lesquels se trouvent toutes ces espèces de Lamarck, nous avons trouvé à la charnière et l'impression palléale des caractères spécifiques constants, et de plus nous avons vu de nombreux passages entre les variétés. Dans quelques individus, nous avons même observé sur une seule coquille les dispositions de couleurs d'après lesquelles Lamarck avait fait deux espèces.”

This conclusion is undoubtedly correct for even in the case of var. *impudica*, where in the vast majority of cases there is no difficulty in separating at a glance this variety from the type, there are occasional individuals where an intermingling of the colour designs proper to *impudica* and the type bridges the gap; others show hybrid markings connecting with varieties *morphina* and *zonaria*.

The least emphatic of the colour varieties is that which I term *morphina*. Occasionally a shell well-marked with two distinct rays is found, but the variety has none of the stability of *impudica* and *aurora* and gradations to the type and to the var. *impudica* are so frequently met with that it scarcely deserves to be treated separately; true *zonaria* is seldom seen in specimens from any Indian locality, but among immature shells of var. *impudica*, individuals are often to be found with well-zoned bands coinciding with Lamarck's description and the figures by Römer and by Reeve of *Cytherea zonaria*; Lamarck's var. *graphica* is also very rare in India and may, I consider, be fused with *M. zonaria*.

Habitat and distribution. *M. meretrix* has a restricted and most definite habitat. It is purely an estuarine and backwater species, never found to my knowledge in the open sea. Its home is in the sands adjacent to the main channels leading from backwaters to the sea. It lies buried in a shallow burrow or pit with only the extreme posterior point projecting above the surface when the tide is in, covering these sand flats. At low tide when the sands are uncovered it withdraws entirely below the surface and is then most difficult to locate.

When young this *Meretrix* is extremely active, preferring to live in estuarine sands swept by rapid currents. The foot is large and very muscular; by a variety of movements it is able to make its way

rapidly over or through the sand and so is able to recover its position and foothold whenever dislodged from its temporary burrow. Its favourite mode of progression is to protrude the foot considerably, bend it into a deep curve with the point pressed against the sand close to the shell, then by suddenly straightening the foot the shell is jerked in the opposite direction. By a variation of the movement it can also throw its shell over upon the opposite valve.

With increase of size, individuals gradually move to more sheltered sands and become sluggish and sedentary in their habits.

Spawning occurs about the beginning of September at Tuticorin; probably also about May.

It is common in the outer channel of the Chilka Lake; in the Cuddalore estuary (S. Arcot), at the entrance to the Silavathurai Lagoon, Tuticorin, in the delta of the Tambraparni, and near the mouth of the river at Tellicherry in Malabar. I have also collected it in the sub-fossil condition from shell-pits in the Surla swamps of the Sonapur backwater, Ganjam, and from the sub-fossil shell strata at Korampalam, Tuticorin; there is little doubt that it lives at the mouths of the majority of estuaries and backwaters in Southern India. The type form and the variety *impudica*, both pale in colouring, are about equally common at Chilka and Tuticorin, *i.e.* on the East Coast. In the Tellicherry river the dark-coloured heavy-rayed variety *aurora* is the only form seen.

In addition to the foregoing, numerous examples of this shell from other localities are present in the Indian Museum collections submitted to me for identification; the particulars are as follows:—

Tavoy Coast, Burma (M. 398). 11 shells, comprising 6 of the type, 1 of var. *impudica*, 1 var. *castanea*, 2 var. *zonaria* and 1 var. *morphina*.

Malacca (M. 10487/2). All of type form.

Arakan (M. 10851/2 and M. 10855/2). 5 of var. *impudica*, and 1 small one of type form.

False Point, Orissa (M. 10845/2). 2 small specimens.

Trincomalie, Ceylon (M. 10842/2). 5 of var. *castanea*, 1 of var. *impudica*.

(?) Andamans (M. 10858/2). One fine example of var. *impudica*. There appears to be some doubt as to the origin of this shell as this is queried upon the label.

Bombay (M. 10836/2). 5 shells comprising 3 of var. *impudica*, 1 of var. *castanea*, and 1 of the type form.

(a) Type.

(Plate V, fig. 13.)

1835. *Cytherea meretrix*, Lamarck, *Anim. sans. Vert.*, 2nd ed., Vol. VI, p. 300.

By removal of all forms distinctively or peculiarly coloured, we get a numerous residue which may be considered as representing the generalised central form, the type assemblage of the species. When the periostracum is present, the ground colour varies usually from a pale to a dark grey; frequently as at Chilka Lake it is of a pale straw colour, at others a light rufous yellow. This

general colour is modified considerably in the majority of individuals by raying, zoning and staining upon the shell substance in the umbonar region, and by a more or less extensive and well-defined dark area on the upper posterior portion of the shell, where it often forms a lanceolate blotch termed the vulva by Lamarck. The colour of this area varies from a dark cloudy olivaceous brown to a livid purplish brown, exhibiting much variation in tint and in intensity. In all cases in the type the edges of this patch are indefinite, merging insensibly into the adjacent ground colour, which is usually rather darker than the remainder of the shell.

In many individuals the umbones are minutely spotted with pale brown, seen only with the aid of a hand lens. There may also be concurrently a couple of narrow divergent and usually discontinuous brownish rays. These are sometimes well defined and conspicuous and may be composed of short straight bars or of minute chevrons. This umbonar raying seldom extends further than half an inch from the hinge; beyond that distance the raying either disappears, or in colour variety *morphina* is continued as two dull and usually diffuse broad bands, having the appearance of a stain within the substance of the shell, rather than surface markings as in the case of the colouring upon the umbones. These distal bands are most variable; sometimes they form two broad fairly well-defined bands reaching to the ventral margin; more frequently they are discontinuous and form blotches having only a vague radial arrangement; often they are entirely wanting.

In yet another series of colour variations there is distinct concentric zoning of the umbonar region. This may or may not occur in individuals with spotted and rayed umbones; there is infinite variety in these combinations. The zones are usually formed by the alternation of very narrow chestnut or livid tinted zones with grey or yellowish ones.

Römer was of opinion that Lamarck's *C. impudica*, as represented by the form shown in Römer's figs. 1-1c, pl. viii, of a pale coloured shell with a dark vulva *having sharply defined margin* and without decorated umbones, should be regarded as the true colour type of Linnaeus' *Venus meretrix*. He considered Lamarck's *C. meretrix* to be a closely connected variation of the type. Taking Römer's pale type and Reeve's *C. impudica* (*loc. cit.* fig. 10, pl. iii) with similar vulva and bold chevron-shaped umbonar markings as representing two colour designs common to the form, Römer claims these to connote the central or true type. I am convinced after examining several hundred specimens that this view is incorrect. By far the greater number, usually slightly over 50 per cent. (*cf.* next paragraph), are of quite different colour scheme, characterized by a pale indefinite tint with dark vulva *fading gradually at its margin into the ground colour* and with the umbones generally minutely dotted with brownish yellow; the variety coloured as in Reeve's figure of *C. impudica* is much less numerous, averaging not more than 25 per cent. of the total number. Hence it is more reasonable and convenient to constitute the

former group as the type and the latter as a variety, especially as there is nothing in Lamarck's description to contradict this. Further, Römer's figs. 1 to 1b, pl. viii are not even typical of the *impudica* variety in India, although they agree exactly with Lamarck's description. They evidently represent a pale and comparatively rare variation of the true *impudica* of which Reeve's figure, though coarse, is a better rendering.

The type form is particularly plentiful in the Tuticorin lagoon. Out of 117 adult individuals examined therefrom, 65 belong to this group, 22 to the closely related var. *morphina*, while 29 belong to variety *impudica*, one only to variety *castanea* and none to var. *aurora*; while of 32 large specimens from the Tambraparni delta, exactly half belonged to the type form with 8 to *morphina* and 8 to *impudica*. Among 17 from the Chilka Lake, the majority (9) were of the *impudica* variety, and only 4 out of the whole lot were of the type form. The four remaining Chilka individuals consisted of two var. *morphina*, one most typical and very beautifully rayed, the other obscurely rayed, and of two bridging the differences between varieties *impudica* and *morphina*; both showed the typical sharply defined *impudica* vulva, together with two well-marked radial bands of the *morphina* type. A notable feature among the Chilka and Tuticorin shells is the frequency with which the *impudica* variety shows conspicuous chevron-shaped markings, boldly painted on the umbonal region as shown in plate vii, fig. 39. Also from Arakan, Tavoy (Burma), Malacca, and Bombay.

Of the shells from Tellicherry and Trincomalie, none belonged to the type, all being variety *aurora* in the former case and chiefly to *castanea* in the latter.

(b) Variety *impudica* (Chemnitz).

(Plate V, figs. 14-18; plate VII, figs. 39 and 40.)

- 1782. *Venus meretrix* seu *impudica*, Chemnitz, *Conch. Cab.*, Vol. VI, pl. 33.
- 1835. *Cytherea impudica*, Lamarck, *Anim. sans. Vert.*, 2nd ed., Vol. VI, p. 299.
- 1861. " " Reeve, *Conch. Icon.*, XIV, *Cytherea*, pl. iii, fig. 10.
- 1915. *Meretrix ovum*, Preston, *Rec. Ind. Mus.*, Vol. XI, p. 300.
- 1916. *Meretrix ovum*, Annandale and Kemp, *Mem. Ind. Mus.*, Vol. V, p. 350.

This is the variety by far the most abundant on the coasts of India. The periostracum is normally a pale grey colour, rarely pale cream or yellow; when removed, the shell appears porcelain white, except in the postero-dorsal region where the dark coloured lanceolate area, the vulva, occurs. This varies from very deep blackish brown to a more frequent bluish grey of varying intensity. Although albino individuals devoid of vulva and of umbonal marks are sometimes met with in the Chilka Lake, normally the vulva is well marked *with sharply defined margin*. The great majority of individuals show considerable decoration of the umbones; this most frequently takes the form of conspicuous chevron-shaped markings either arranged in zonal manner or limited

to two short radial lines. These markings are much more conspicuous in *impudica* than are the umbonal dots and rayed marks of the type. Fig. 39 shows a well-marked example of the zone pattern, while in fig. 18 we have a rare combination of the *impudica* colour scheme of clearly defined vulva with the discontinuous rayed blotching seen frequently in var. *morphina*. Young individuals of 15 to 18 mm. in length are frequently much decorated with dark chevron markings, such as are depicted in figs. 14 to 17, pl. V. Such conspicuously marked individuals are common in the outer channel of the Chilka Lake. They were incorrectly identified as *M. ovum* by Preston.

Localities.—Common in the outer channel, Chilka Lake (*Annandale* and *Kemp*); in the sands immediately within the mouth of Silavathurai lagoon, Tuticorin, and in the delta of the Tambraparni, Tinnevely district (*J. H.*). A sub-fossil valve from Surla shell-pits, Ganjam. Also Tavoy (Burma), Arakan, Trincomalie (Ceylon), Bombay and ? Andaman Islands; all in the Indian Museum collection.

Dimensions.—The largest Chilka specimen measures $65 \times 57\frac{1}{4} \times 40$ mm., while the largest of the Tuticorin ones is $74 \times 64 \times 40$ mm.

(c) Variety *castanea* (Lamarck).

(Plate IV, fig. 12.)

1835. *Cytherea castanea*, Lamarck, *Anim. sans. Vert.*, 2nd ed., Vol. VI, p. 299.

1906. *Meretrix castanea*, Standen and Leicester in *Ceylon Pearl Oyster Fisheries*, Pt. V, p. 293.

Distinguished from all other varieties by its uniform brown or chestnut colouration; the vulva is not sharply demarcated, but the colouring in this region is usually darker than over the rest of the shell. There are no definite umbonal markings to be made out. On some shells an obscure and irregular zoning can be observed due to some of the growth zones being darker in tint than adjoining ones.

This is a well-marked variety seemingly of rare occurrence as I have found a single specimen only at Tuticorin and another in the Tambraparni delta, while out of the whole Indian Museum collection of *Meretrix*, nine only are of this colouration. Of these latter two (No. 4788) are labelled Indian Ocean, one is included in a collection of 11 shells (M. 398) from the Tavoy Coast, Burma, another (M. 10836/2) is from Bombay, while so many as five (M. 10842/2) are from Trincomalie, Ceylon. Standen and Leicester also report this variety from Trincomalie and Tampalakam, so it would appear to be relatively more abundant there than in any other locality. Reeve records it from China and the Philippine Islands.

Dimensions.—The largest individual seen (Ind. Mus. coll. No. 4788) measures $68 \times 61 \times 42\frac{1}{2}$ mm. Five other large specimens measure respectively :—

	Millimetres.	Respective Ratios.
Trincomalie (M. 10842/2)	$64 \times 55 \times 39$	=100 to 85.94 to 60.94
	$60 \times 53\frac{1}{2} \times 36\frac{1}{2}$	=100 to 89.17 to 60.83
	$59\frac{1}{2} \times 50\frac{1}{2} \times 33$	=100 to 84.87 to 55.46
Tavoy (M. 398)	$49 \times 42\frac{1}{2} \times 31\frac{1}{2}$	=100 to 86.73 to 63.78
Bombay (M. 10836/2)	$55\frac{1}{2} \times 47\frac{1}{2} \times 31\frac{1}{2}$	=100 to 85.52 to 56.56
	No. 4788 (<i>ut sup.</i>)	=100 to 89.71 to 62.50
Average of ratios		=100 to 86.99 to 60.01

(d) Variety *aurora*, var. nov.

(Plate IV, figs. 9-11.)

This is a strongly marked colour variety which rises to the importance of a local race in Malabar in the estuaries of the Anjarkandi and Tellicherry rivers, Tellicherry. The colouring consists of continuous bands of varying width and number radiating from the umbo to the ventral margin. The primitive number of these radial bands appears to have been two, as this agrees with the number of vestigial bands seen in other varieties of *M. meretrix* as well as in certain varieties of *M. casta*; also because the banding system in many shells can be resolved into two band groups representing the two original bands. In such (figs. 9 & 10) the two original bands become very wide as they approach the ventral margin, and in addition a number of narrow non-widening rays are intercalated in the space between the two great rays. From this well-defined pattern we pass to shells where the whole surface is covered with closely-set rays. The colour of the latter is dark purplish brown when the periostracum is present, otherwise it is duller and more livid in tint. Internally these shells are yellowish beyond the pallial line; within this they have a pale pinkish tinge when quite fresh. Like so many other coloured shells, all the species of *Meretrix* fade considerably with time and exposure to light and this must be allowed for when examining shells from an old collection. Sometimes young individuals of var. *morphina* show a suffused pinkish tinge in the substance of the shell and it is probably from such a stock that *aurora* has been derived.

Occasionally a broadly-rayed large specimen of *M. casta* var. *ovum* shows raying and a general superficial resemblance to *aurora*, but the absence of a pink colour within, the acuter posterior angle and the absence of a bifid anterior cardinal tooth in the left valve are clearly-cut distinguishing differences.

The largest of the Tellicherry specimens is 55 mm. long by 49 mm. deep; the majority average $44 \times 39 \times 26\frac{1}{2}$ mm., equivalent to the ratios of 100 to 88.64 to 60.23.

(e) Variety *zonaria* (Lamarck).

1835. *Cytherea zonaria*, Lamarck, *Anim. sans. Vert.*, 2nd ed., Vol. VI, p. 299.
 " " *graphica*, Lamarck, *ibid.*, p. 300.
 1864. " " Reeve, *Conch. Icon.*, XIV, *Cytherea*, pl. i, fig. 1.

1864. *Cytherea zonaria*, Reeve, *ibid.*, pl. iii, figs. 9a and b.
 1869. „ *meretrix* var. *zonaria*, Römer, *Monog. der Molluskengatt. Venus*, Band I, sub-gen. *Cytherea*, pl. viii, fig. 1e. (*non* Römer's *graphica*, which I consider to pertain to the type form).

Lamarck's *zonaria* and *graphica* intergrade to such an extent that it is often impossible to differentiate between them, hence as they are at best merely colour varieties they are better merged into a single group. The main characteristic is that the more conspicuous markings form a zonal pattern characteristically of concentric rows of zig-zag lines, or more rarely, and this only in immature individuals, of concentric brown bands often broken and incomplete. In all cases these markings tend to be suppressed with increasing age.

(f) Variety **morphina** (Lamarck).

(Plate IV, figs. 5-8.)

1835. *Cytherea morphina*, Lamarck (in part), *Anim. sans. Vert.*, 2nd ed., Vol. VI, p. 300.
 1864. ? *Cytherea morphina*, Reeve, *Conch. Icon.*, XIV *Cytherea*, pl. iv, fig. 12.
 1869. *Meretrix meretrix* var. *morphina*, Römer, *Monog. der Molluskengatt. Venus*, Band I, pl. viii, fig. 1g.

This is, I consider, a variety so indefinite in its markings that it might well be suppressed, and included under the type form. However, as its main character, which I consider to be the presence of two narrow divergent dark radial bands extending from the umbo to the ventral edge, is sometimes distinctly shown, I retain it for convenience to include all shells marked more or less clearly with two radial bands of dark colour. As the posterior margin (vulva) of the shell is sometimes darkly tinted, the shell then appears to be marked in a triradiate manner, which explains why Lamarck put *Venus triradiata*, Gmelin, as probably synonymous. Usually the ground colour of this shell when denuded of its periostracum is either pale or dark grey, but occasionally the shell is tinted yellowish or orange pink and such shells agree fairly well with Reeve's description: "ash white and orange flesh colour radiately tinged with violet, especially on the posterior side." Strangely enough Römer considered Reeve's *morphina* to belong to var. *graphica* which in the absence of zig-zag markings would cause confusion.

2. ***Meretrix attenuata*, Dunker.**

1858. *Meretrix attenuata*, Dunker, *Beschreibung und Abbildung neuer oder wenig gekannter Meeres-Conchylien*, p. 53, t. xvii, figs. 7-9.
 1869. „ „ Römer, *Monog. der Molluskengattung Venus*, Band I, sub-gen. *Cytherea*, p. 36, t. x, fig. 4.

The two specimens (Nos. 4865 and M. 10833/2 of the Indian Museum collection) from the Nicobar Islands, and the larger one

(M. 10857/2) from Gwadar, Baluchistan, which have come under my notice, show this species to be a most interesting link between the species inhabiting the estuaries of continental India and those from further east, notably the giant Japanese *Meretrix* called "Hamaguri," *M. lusoria* (Chemn.). The true Indian species, except in the extreme forms of *M. casta ovum*, tend to assume shortness in the antero-posterior axis and incline either to a cordate or to a sub-orbicular outline. In *M. attenuata*, on the other hand, the shell is very definitely produced posteriorly into an acute angle, giving the shell a distinctly subcuneate outline, emphasized by the straightness of the sharply declivous margin between the hinge and the posterior extremity. In this elongation and straightness of the upper posterior margin *M. attenuata* approaches the large Japanese species, which however is considerably more elongated. These two species agree in nearly every detail of the hinge region; in both the anterior tooth is inserted on a shelf set at an angle of about 45 degrees to the ventral edge of the main hinge plate. No such great obliquity occurs either in *M. casta* or *M. meretrix*. Further, although the anterior cardinal tooth both in *M. attenuata* and the Japanese species is marked by a very slight striation on the apex, this is so obscure and weak as not to be observable except under a lens of considerable power; there is no approach to the sub-bifid form seen in *M. meretrix*.

This species is so rare in collections that the three specimens possessed by the Indian Museum deserve careful attention, especially as Dunker and Römer appear to have based their diagnosis upon a single specimen of unknown origin.

The smaller of the two Nicobar specimens agrees in almost all particulars with the described form and is almost of the same size, its dimensions being $53 \times 43 \times 25$ mm. against Dunker's $59 \times 40\frac{1}{2} \times 25$ mm. The colouration is almost identical with that of Dunker's and Römer's figures, the shell being covered with concentric bands or zones of broken chevron markings of a chestnut tint that remind one of the *graphica* form of var. *zonaria* in *M. meretrix*. The periostracum is thin, somewhat dull and olivaceous yellow. Internally the shell is white with violet staining along the posterior declivous margin. The hinge plates are malformed, due to the fusion of the anterior and median cardinals of the right valve. Apart from this, in one important point the hinge differs from the type description; Dunker states the nymphae are "*tenerrime granulatae nec denticulatae*," which Römer varies by saying "*tenerrime granulatae nec transversim sulcatae*." Now in this smaller Nicobar specimen the nymphae are quite distinctly marked by closely-set transverse ridges, each of which does however show signs of being composed of a row of fine granulations.

The larger of the Nicobar specimens and the single one from Gwadar in Baluchistan are quite differently coloured, but in all essential particulars otherwise agree. In both, the valves are virtually bereft of markings and are covered with a thin and pale

straw-coloured periostracum. Anteriorly there is a considerable amount of extraneous black staining, and on the umbones of the Gwadar shell are several imperfect zones of chevron marks. Internally the posterior declivous margin is characteristically stained violet.

In both, the nymphae conform more closely with Dunker's and Römer's descriptions than does the smaller Nicobar specimen; the transverse character of the striae has become obscured and the granulations are apparently irregularly disposed; only here and there can a faint suggestion of transverse disposition be seen. The second cardinal tooth of the left valve of the Gwadar shell is abnormally weak, and it is noteworthy that out of three specimens the cardinal tooth of two depart from the normal.

In all three specimens the pallial sinus is similar. It is strongly marked, deep and almost semicircular. The ventral horn ends in an acute and downwardly turned point approaching closely the form seen in *M. lusoria* but more inclined ventrally.

From the above it is obvious that both Dunker's and Römer's descriptions require amendment in two points, namely, sculpturing of the nymphae and the external colouration of the valves. From what I see in this species, reinforced by examination of a very large series of *M. meretrix* as also of several large *M. lusoria*, I am able to say that the sculpturing of the nymphae, in those species of *Meretrix* which attain relatively large size, undergoes distinct degeneration with increase of size and age. In young shells the nymphae are marked by coarse transverse ridges, very distinct and set comparatively widely apart. With advance in age the ridges decrease in prominence while increasing rapidly in number and become more closely set. Finally the ridges begin to break up into rows of granulations, and in the final stage, marking old age, the parallel arrangement in rows of the granulations may even disappear entirely, and nothing remain except an area closely set with extremely fine and exceedingly numerous minute granulations without pattern or order.

As there appear to be two distinct colour varieties of this species I propose to separate the nearly unicoloured form under the name *flava* diagnosed as follows:—

Var. *flava*, var. nov.

(Plate VII, figs. 41 and 42.)

Similar to the type in all particulars except in the external colouration of the valves, the zones of zig-zag markings characteristic of the latter being suppressed except sometimes partially upon the umbones; general tint pale straw colour due to the tint of the thin investing periostracum.

Habitat.—Nicobar Islands and Gwadar, Baluchistan (Indian Museum collection).

Dimensions.—The larger Nicobar shell, 63×50 mm.; Gwadar shell, $64 \times 52 \times 35$ mm., the latter giving the ratio of 100 to 81.25 to 54.69.

3. *Meretrix casta* (Chemnitz).

(Plate V, fig. 22 ; plate VI, figs. 30-33.)

1782. *Venus casta*, Chemnitz, *Conch. Cab.*, Vol. VI, p. 349, pl. 33.
 1835. *Cytherea casta*, Lamarck, *Anim. sans. Vert.*, 2nd ed., Vol. VI, p. 301.
 1845. " *ovum*, Hanley, *Proc. Zool. Soc. London*, 1845, p. 21.
 1869. *Meretrix casta*, Römer, *Monographie der Molluskengattung Venus*, Linne, Band I, subgenus *Cytherea*, p. 31, pl. xii, fig. 2.
 " " *ovum*, Römer, *ibid.*, p. 38, pl. xi, fig. 4.
 " " *exilis*, Römer, *ibid.*, p. 35, pl. xi, fig. 3.
 1914. *Corbicula (Velorita) satparaënsis*, Preston, *Rec. Ind. Mus.*, X, p. 306, figs. 22 and 22a, p. 308.
 1915. *Meretrix casta*, Preston, *ibid.*, XI, p. 300 (not his large valve 67×73 mm. which is *M. meretrix*).
 " " *ovum*, Preston, *ibid.*, p. 300.
 " " *morphina*, Preston, *ibid.*, p. 300.
 1916. " *casta*, Annandale and Kemp, *Mem. Ind. Mus.*, V, p. 351 (not their *M. ovum* which is *M. meretrix impudica* juv.).

This species is exceedingly variable and ignorance of this fact has caused great confusion over its nomenclature ; in *M. meretrix* the variation is limited largely to the colour design of the valves ; in *M. casta*, the form of the shell and the proportionate development of the hinge elements are subject to a wide range of variation, apart from and in addition to much diversity in the surface colour scheme of the valves.

The form described by Chemnitz and by Lamarck under the name *casta* may be considered the type of the species, as the latter's definition accurately summarises the characters of the predominant form found in east coast backwaters and estuaries from the Chilka Lake to Tuticorin. According to Lamarck the shell is " cordato-rotundata, gibba, crassa, alba ; pube anoque ovatis, convexis, glaucescentibus ; intus violaceo maculata." Shells agreeing with this description never have well developed radial bands, but on some medium-sized individuals from the Chilka Lake (M. 10589/2 A and B) two short unmistakable rays can be made out on each umbo, and in one case I can trace one of these bands continued as a faint dusky clouding for a considerable distance towards the margin. In variety *ovum* from Malabar the rays are less frequently suppressed (pl. IV, figs. 3 and 4). Hanley's *Cytherea ovum* is a subequilateral variation, whilst Römer's *M. exilis* is nothing but a young stage of the same variety.

The distributional range of the type form is limited to the east coast of India, where it is found, often in densely stocked beds, in the majority of the backwaters and estuarine channels from Orissa to Cape Comorin. The sub-species *ovum* on the other hand is not found except in occasional and rare individual cases within these limits, but is exceedingly common upon the west

coast of India from Cape Comorin to Bombay and again on the west coast of the Malay Peninsula.

The type form attains a larger size than any of the local races of the living sub-species to be described later; in the outer channel of the Chilka Lake, where conditions seem particularly favourable to its growth, it attains a length of 51 mm. by a depth of 47 mm. while its thickness, due to its ventricose shape, is as much as 33.5 mm.

The following measurements of individuals of different ages from the three chief localities where the type is found exhibit the great breadth (depth) of the shell as compared with the length. In variety *ovum* the ratio is considerably less owing to its frequent greater elongation. The thickness of the complete shell shows little difference in the two forms. The dimensions are :—

		Millimetres.	Respective Ratios.
Chilka Lake	...	51 × 47 × 33.50	=100 to 92.16 to 65.70
Pulicat	...	44 × 38 × 28	=100 to 86.36 to 63.63
"	...	40 × 33 × 23	=100 to 82.50 to 57.50
Madras	...	39 × 32 × 21.25	=100 to 82.05 to 54.48
"	...	21.5 × 17.75 × 12.50	=100 to 82.56 to 58.14
"	...	20 × 17.75 × 12	=100 to 88.75 to 60.00
Average of ratios			=100 to 85.73 to 59.91

The outline of each valve is distinctly cordate (as shown in figs. 30-31), but this varies considerably even in the Chilka Lake individuals and some show a distinct tendency to elongation posteriorly; these connect with Hanley's *M. ovum* (pl. V, fig. 23).

The periostracum in most of the Chilka specimens is olive grey, thin and strongly adherent; smooth and inclined to dullness, it never possesses the brilliant varnish-like polish characteristic of that of *M. meretrix*. In a few Chilka shells it appears much stained with a deep rufous brown, and in one this passes into a blackish brown. Shells from the bed of Pulicat Lake and Ennur backwater scarcely ever retain the olive grey tinge which I believe to be the natural tint of the periostracum in this species; they are almost all deeply stained with rusty brown. The single Tuticorin shell obtained alive was olive grey.

Very marked variation is noticeable in the thickness of the valves, in the strength of the hinge plate, and in the size of the cardinal and lateral teeth in specimens from the east coast of India; the series shown on plate VI, figs. 30-33, illustrate the range in form better than any verbal description. In no case, however, is the shell and hinge so massive as in the sub-fossil variety described below as var. *satparaënsis*.

On the west coast of India from Travancore as far north at least as Bombay, a variety of *M. casta* is found in every estuary and backwater in such immense numbers that it has acquired a position of considerable economic importance among the fishing community, of whom hundreds engage in its collection during the dry season when the level of water is low in the channels. The

lower classes esteem it because of its cheapness and tastiness, and its shells, owing to their solidity, have considerable value to the local lime-burners as a source of lime. The inherent variability already noted as of considerable range on the east coast is greatly intensified on the west coast. This is due to two factors: (a) the much more diversified conditions under which the species exists on the latter coast, and (b) the vastly greater numbers of individuals involved.

On the west coast the rainy season is much more prolonged and the rainfall much heavier than on the east; as a consequence the backwaters, even close to their seaward entrances, have a low salinity for months in the year—during the height of the floods it is difficult to conceive of the water in even the lowest reaches being anything but wholly fresh. Hence, to survive requires in any estuarine mollusc marked power of adaptability to rapidly altering physical conditions. This quality is considerable in *M. casta* and is assisted by its numerical abundance, which furnishes the requisite numbers for the successful intervention of natural selection in the problem. The struggle for existence under these conditions is obviously a hard one and the west coast races of *M. casta* show the effects thereof in several characteristics. They seldom exhibit vigorous growth; dwarfing is the rule; extreme variations in form are to be counted as favoured if not induced by these conditions. Malformations are numerous and corrosion of the umbonal region is nearly always present. Complete adaptability has not even yet been attained; mortality is excessive every flood season, and the vast majority of each generation do not survive to a second year of existence.

In the biological survey of such an estuary as that of the Balia-patam river in North Malabar, it is most significant to notice that only at the mouth are large and vigorous examples of *M. casta* found strictly comparable with the type form inhabiting the seaward channels of Chilka and Pulicat Lakes, where the duration of river floods is short and where tidal influence is never wholly lost except for a comparatively short period in each year. The most seaward beds in the Balia-patam estuary yield shells almost exactly similar to poorly grown east coast ones. In both, the ventricose and cordate form is emphasized; the colour of the Balia-patam shells is stained rufous red as in Pulicat shells, and the main distinctions to be noted in average shells are that the elongation of the posterior angle of the shell is slightly more pronounced, while neither the escutcheon nor the vulva or coloured area of the upper posterior region show more than a trace of the elevation or reflection in the median line, which is usually present in most east coast individuals. On the other hand, the differences between selected specimens of the east and the west coast forms are less than the differences between the extremes met with in purely east coast or in purely west coast shells.

In sheltered creeks where a fairly high salinity is maintained for several months after spawning, individuals grow rapidly and

retain their olive grey periostracum free of stain. These shells grow uninterruptedly, show no rest phases, become stout in substance, and show no corrosion of the umbones; not infrequently two radial lines, sometimes of chevron-shaped marks, are apparent in the umbonar region. The latter approximate to the colouration seen in young specimens of *M. meretrix* var. *morphina*, while the undecorated ones approach Hanley's *M. ovum*. These forms never seem to attain a larger size than 35 mm. in length, as they either die off when the great floods come or else become stained and corroded and pass thereafter as variations of the large form described from the seaward channels.

Further up the backwater, conditions become less favourable for *M. casta*; the bottom is less sandy and more muddy, the action of the rapid flow of the river current becomes a new factor, low salinity continues over a greater length of time, while, finally, the appreciable amount of organic acids present in the drainage from the hills and adjacent rice fields causes rapid corrosion of the shell, especially upon and around the umbones. One of the most marked effects of these altered conditions, and of the efforts made to give accommodation to them, is a change in the form of the shell. From being cordate and ventricose, the shape changes to one which is distinctly compressed laterally and of pronounced elongation in the antero-posterior axis. The young shells are almost almond-shaped, so extreme is the compression and accompanying elongation. With age they become blunter at either end and in their extreme phase exhibit a distinct convergence in outline and general shape to that of the freshwater mussel (*Lamellidens marginalis*). The umbones show considerable modification during these changes; in typical *M. casta* they are set obliquely, their apices directed forwards and inwards; in the riverine forms, now being noted, they are usually straightly incurved (*cf.* Hanley's *M. ovum*—"natibus recte incurvatis"), and as their points usually disappear through corrosion, this distinction becomes still more emphasized; even in cases also where the umbones originally were curved forwards, this appearance becomes obscured and is eventually lost by the effects of corrosion.

So greatly specialised is this form that it appears worthy of being given a varietal name, for the sake of clearness. As Hanley's *M. ovum* occupies a fairly central position in the chain of gradations to be grouped in the new variety, I propose to retain *ovum* as a suitable name for this assemblage. I must say, however, that no clear line of distinction can be drawn between this and the more estuarine forms. Every gradation can be found between both sections, and a complete series of examples can easily be formed, showing every step in the change from a short ventricose cordate form through a roundly ovate stage to an elongated somewhat laterally compressed elliptical form, totally unlike that standing at the other end of the series.

The substance of shells from west coast estuaries is distinctly thinner than that of those from the east coast, due possibly to a

smaller lime content in the west coast rivers. Here I should mention that much of the variation found in the form and proportions of the umbones and hinge region of *M. casta*, is due to the effect upon the size and relative relationship of these parts, caused by the exceedingly variable rates at which the shell increases in thickness under different conditions. Exceptionally rapid growth in thickness tends to produce a humped and corbicular shape, while rapid growth in length and breadth with slow deposits of lime salts give a compressed form with flat umbonal region. Under certain conditions not now prevailing, but which existed at the very recent geological period when the shell-pits of swamps round the margins of the larger backwaters of the eastern coast were being formed, the deposit of lime salts must have progressed at a greater rate than the most rapid now existing, for in these sub-fossil deposits we got an immensely massive form of *M. casta*. This shell at first sight appears so different in hinge form and in general shape from the type of *M. casta* that one does not hesitate to treat it as a different species. Hence we find Preston describing it as a *Cyrenid* under the name of *Corbicula (Velorita) satparaënsis*. He saw cause to modify this opinion later and in *Rec. Ind. Mus.*, XI, p. 300, he rightly assigned it to *M. casta*. In this I agree with him, after a comparison of a long series of young individuals of the massive form as opposed to those of the type. This gave conclusive evidence of identity, as the extreme comparative solidity of the variety is rapidly lost as we descend in the series till at last among small individuals of the type and of the variety, of $\frac{3}{4}$ inch in length, we attain practical identity and it becomes impossible to differentiate the one from the other.

Another factor which has a determining influence in modifying the form of the shell is current action. In channels and creeks where the current is slow and weak, the inflated cordate and ovate forms persist; where the current is strong, the form tends to become abnormally elongate and flattened. Such condition and effect are seen wherever *M. casta* has managed to establish itself in the main channel of the west coast rivers at a relatively considerable distance from the sea. Elongation is particularly strong in case of young individuals. This change is an adaptation to counteract the danger which a rotund form such as that of the type would be subject to when exposed to strong current influence. The flattened form is less liable to be rolled along, just as this same general shape has similar utility in the case of *Donax cuneata* which lives in the surf-troubled sands of our beaches, where a rounded form would subject it to the peril of being rolled forwards and backwards on the beach with every alternate surfbreak and backwash.

Distribution of M. casta (type).—East coast of India, from the Chilka Lake to Tuticorin in backwaters and connecting canals. Also Ceylon and Singapore according to Römer; it certainly occurs in Ceylon, but I am very doubtful in regard to Singapore as all the specimens in the Indian Museum collection from this locality undoubtedly belong to var. *ovum*.

It also occurs sub-fossil at various places in the east coast of India from Ganjam to Tuticorin.

Below are descriptions of the two varieties which I now propose:—

(a) Variety **ovum** (Hanley).

(Plate IV, figs. 1-4; plate V, figs. 23-26; plate VI, figs. 34-38).

1845. *Cytherea ovum*, Hanley, *Pro. Zool. Soc. London*, 1845, p. 21.

1869. *Meretrix exilis*, Römer, *Monographie der Molluskengattung Venus*, Linn., Band I, p. 35.

Shell variable in form, ranging from elongate ovate to oblong, not usually inflated, moderately compressed, fairly solid, equi-valve, sub-equilateral, white, with or without two more or less complete narrow divergent brown bands radiating from the umbo to the ventral margin—these bands very frequent in young specimens but usually suppressed in the adult; covered with a thin, dull olive or yellowish grey periostracum often stained with brown; umbones centrally disposed, weak, not prominent, little curved or else bent straight inwards, the latter appearance commonly emphasized by corrosion which may extend to a considerable extent around each umbo; dorsal margin on each side of umbo inclined to convexity, thin and usually without reflected margin; ventral margin varies from convex to nearly straight, entire; anterior side rounded; posterior side produced rather more than the anterior, sometimes sub-angular, upper margin stained exteriorly with greenish grey; escutcheon ovate, sub-obsolete, interior surface white, stained violet along the upper posterior margin, also frequently along the ventral edge of the hinge plate, and sometimes above the anterior adductor scar; hinge as in the type except that it is weaker, narrower and more elongate in consonance with the lengthening of the entire shell; surface of the escutcheon flattened and not elevated along the median line as in the type; pallial sinus shallow as in type. Dimensions variable, usually not exceeding 43 mm. in length by 35 mm. in depth and 26 mm. in thickness in vigorously grown individuals, generally the size is smaller and $37 \times 30 \times 22$ mm. may be taken as a fair average.

The main points of difference between this variety and the type are: (a) the more pointed outline of the posterior angle of the shell; (b) the frequent presence of radial banding; (c) the narrower and more elongated form of the hinge; (d) the flattened surface of the escutcheon as opposed to its convex form in the type, whereby in the latter the edge of the shell immediately above the anterior lateral dental pit in the left valve is reflected outwards as a prominent lip.

Dimensions.—The following table gives particulars of the length and breadth of the valves in 13 individuals from 6 different localities, with in addition the maximum transverse diameter of the entire shell in 14 instances. The relative ratios of these

dimensions have also been worked out to permit of accurate comparison.

		Millimetres.	Respective Ratios.
Malacca	...	$\begin{cases} 31 \times 25 \\ 30 \times 25 \\ 30 \times 24 \\ 31 \times 25 \end{cases}$	$\begin{aligned} &= 100 \text{ to } 80.65 \\ &= 100 \text{ to } 83.33 \\ &= 100 \text{ to } 80.00 \\ &= 100 \text{ to } 80.65 \end{aligned}$
(M. 10847/2)			
Singapore	...	$49 \times 39 \times 28$	$= 100 \text{ to } 79.59 \text{ to } 57.14$
(M. 10837/2)			
Mahé	...	$\begin{cases} 35 \times 27\frac{1}{2} \times 20\frac{1}{4} \\ 30 \times 27 \times 21\frac{3}{4} \\ 41 \times 31 \times 25\frac{1}{4} \end{cases}$	$\begin{aligned} &= 100 \text{ to } 78.57 \text{ to } 57.86 \\ &= 100 \text{ to } 90.00 \text{ to } 72.5 \\ &= 100 \text{ to } 82.93 \text{ to } 61.58 \end{aligned}$
Tellicherry	...	$\begin{cases} 26\frac{1}{2} \times 19\frac{1}{2} \times 13 \\ 37\frac{1}{2} \times 29 \times 20\frac{1}{2} \\ 29 \times 21\frac{1}{4} \times 14\frac{1}{2} \\ 33\frac{1}{4} \times 26 \times 18\frac{1}{2} \end{cases}$	$\begin{aligned} &= 100 \text{ to } 73.58 \text{ to } 49.05 \\ &= 100 \text{ to } 77.33 \text{ to } 54.67 \\ &= 100 \text{ to } 73.28 \text{ to } 50.00 \\ &= 100 \text{ to } 78.20 \text{ to } 55.64 \end{aligned}$
Mangalore	...	$\begin{cases} 39\frac{1}{2} \times 31 \times 22\frac{1}{2} \\ 37 \times 32\frac{1}{4} \times 22\frac{3}{4} \\ 29\frac{1}{4} \times 24\frac{1}{4} \times 17\frac{3}{4} \\ 27\frac{1}{4} \times 22\frac{1}{2} \times 18 \end{cases}$	$\begin{aligned} &= 100 \text{ to } 78.48 \text{ to } 56.96 \\ &= 100 \text{ to } 87.16 \text{ to } 61.49 \\ &= 100 \text{ to } 82.91 \text{ to } 60.68 \\ &= 100 \text{ to } 82.57 \text{ to } 66.06 \end{aligned}$
Madagara	...	$\begin{cases} 39\frac{1}{2} \times 34\frac{1}{2} \times 26\frac{1}{2} \\ 38\frac{1}{2} \times 34\frac{3}{4} \times 25 \end{cases}$	$\begin{aligned} &= 100 \text{ to } 87.34 \text{ to } 67.09 \\ &= 100 \text{ to } 90.26 \text{ to } 64.94 \end{aligned}$
Average of ratios			$= 100 \text{ to } 81.49 \text{ to } 59.69$

The above figures bespeak a very considerable degree of variability among these shells, ranging in the ratios of the three dimensions from 100 : 73.28 : 50 to 100 : 90.26 : 64.94 in the case of two extreme forms. The average ratios deduced from the above 18 examples work out however at 100 : 81.49 : 59.69 which are not far removed from those of the type form—100 : 85.73 : 59.9. This approximation of the averages of the two groups furnishes contributory evidence in favour of the view that their differences are insufficient to warrant separation as distinct species; at the most, even when we take into consideration the divergences in outline, in the structure of the hinge and in the position of the umbones, the west coast group can be accounted only a variable variety of the type.

Localities.—The inner sections of tidal estuaries and backwaters on the west coast of India from Cape Comorin to Bombay. Very rarely from the east coast where higher saline conditions favour the predominance of the type form (No. 4792 Ind. Mus. coll., from Tinnevely, and some among No. 10588/2 from the beach at Vizagapatam; the latter are however probably of sub-fossil origin). It appears again on the western coastline of the Malay Peninsula, typical specimens coming from Malacca and Singapore (Ind. Mus. colln. M. 10847/2 and 10837/2). Further north, a specimen from Arakan (M. 10841/2), size 44×36.75 mm., appears to be intermediate between the type and this variety; in it the characters of the two seem fairly evenly balanced, but after careful analysis of each character, I am satisfied it should be assigned to var. *ovum*. Hence I expect that eventually it will be found that this variety is as characteristic of the whole of the eastern shores of the Bay of Bengal as it is of the west coast of Peninsular India.

(b) Variety *satparaënsis* (Preston).

(Plate V, figs. 19-21 ; plate VI, figs. 27-29).

1914. *Corbicula (Velorita) satparaënsis*, Preston, *Rec. Ind. Mus.*, X, p. 306.

Preston's description above cited is sufficiently accurate for the fully grown shell. Between this and the young form of about 25 mm. in length, where individuality as a variety is lost in identity with the type, there is a perfect series of gradations ; advancing from the early stage at which divergence begins we see the type form gradually altering in the ratio of length to breadth. With rapid increase in stoutness, the shell assumes a shorter and deeper form, the valves become highly convex or rather humped and the umbones strongly beaked, altering completely the general appearance.

Dimensions.—The largest valve I have seen is a water-worn one from False Point, Orissa (No. M. 10845/2 Ind. Mus.). This measures $57\frac{1}{2} \times 53$ mm., giving a ratio of 100 to 92'15. Another particularly large one I obtained from the Surla shell-pits in Ganjam. This measures 57 mm. long by over 50 mm. deep, equivalent to the ratio of 100 to 87'72 (deposited in the Calcutta Museum). Five other shells from Korampalam shell-pits, Tuticorin, with their valves undisplaced, measured :—

<i>Millimetres.</i>	<i>Respective Ratios.</i>
$39 \times 38 \times 30\frac{1}{2}$	=100 to 97'44 to 78'21
$38\frac{3}{4} \times 36\frac{3}{4} \times 30$	=100 to 94'84 to 77'42
$31 \times 29\frac{3}{4} \times 23\frac{1}{4}$	=100 to 95'97 to 75'00
$30\frac{1}{4} \times 27\frac{3}{4} \times 22\frac{1}{2}$	=100 to 91'74 to 74'38
$43 \times 40\frac{1}{2} \times 32$	=100 to 94'19 to 74'42
Average of Ratios	=100 to 94'84 to 75'89

Localities.—This variety is common everywhere in the shell deposits of sub-fossil age on the borders of Chilka Lake, Sonapur backwater (Ganjam), Pulicat Lake and Sadras backwater (Chingleput) ; in shell-pits in the Mandapam Peninsula (Ramnad district) and also at Korampalam near Tuticorin ; a water-worn valve from False Point, Orissa.

Variety *satparaënsis* is found only in the sub-fossil condition ; no living individuals appear to assume this excessively stout form. This would seem to indicate that the conditions favouring an extremely rapid deposit of lime salts have deteriorated appreciably since the time the sub-fossil deposits were formed, or that the variety had found it a disadvantage to be possessed of special ability to secrete large quantities of lime in its shells.

EXPLANATION OF PLATE IV.

Photographs of valves of the two Indian species of *Meretrix* to show the frequency and the range of radial colour banding.

Meretrix casta var. *ovum* (Hanley).

- FIGS. 1 and 2.—Two examples from Tellicherry with two narrow and widely separated rays. (These do not show clearly in the photographs.)
- FIG. 3.—A small shell from the same locality showing two strong widening rays, a common type among young individuals of this variety.
- FIG. 4.—A half-grown specimen showing two strong rays, which in the umbonal region have coarse chevron-shaped marks superadded. Baliapatam River, Malabar.

Meretrix meretrix var. *morphina* (Lmk.).

- FIGS. 5, 6, 7 and 8.—Four valves showing the wide variations in the typical colour scheme of two radial bands widening as they pass away from the umbo.

FIG. 5 is the most perfect, the two bands strongly marked throughout their course, and with the umbo conspicuously marked with linear brown markings more or less chevroned.

FIGS. 6 and 7 approach the pattern form of No. 5, but here the radii are discontinuous and strong only upon the umbones, where both show chevron-spotting superadded. Tuticorin.

FIG. 8. A typical valve from Tuticorin showing the modification of the rays found in fully adult individuals. Here the rays are discontinuous, blotchy and obscure, buried partly within the shell substance and showing chiefly as two dark clouded areas close to the anterior and posterior angles of the ventral margin. (These areas do not show well in the photograph).

Meretrix meretrix var. *aurora*, var. nov.

- FIGS. 9, 10 and 11.—Three shells from Tellicherry showing the multiple raying characteristic of this variety.

Meretrix meretrix var. *castanea* (Lmk.).

- FIG. 12.—A typical specimen from the Tambraparni delta, Tinnevely.

All the figures are natural size.



1.



7.



4.



2.



3.



5.



6.



9.



10.



8.



11.



12.

D. N. Bagchi, Photo.

INDIAN MERETRIX.

Photo-engraved & printed at the Offices of the Survey of India, Calcutta, 607.

EXPLANATION OF PLATE V

Meretrix meretrix (Linn.). Type.

FIG. 13.—An adult specimen from Tuticorin. Observe the faint spotting on the umbo, the absence of rays and the indistinct margin of the dark coloured posterior margin or “vulva.”

Meretrix meretrix var. *impudica* (Chemn.).

FIGS. 14, 15, 16 and 17.—These young shells show the rayed and zoned colouring characteristic of this variety in the very young condition.

FIGS. 14 and 15 (Chilka Lake) were identified with *M. ovum* by Preston, but comparison with fig. 39, pl. vii, shows clearly that they develop into typical *M. meretrix* var. *impudica*.

FIGS. 16 and 17 are from Tuticorin. The sharply margined dark vulva is clearly shown in all four figures.

FIG. 18.—A shell showing colouring hybrid between var. *morphina* and var. *impudica*. Locality, Chilka Lake.

Meretrix casta var. *satparaënsis* (Preston).

FIGS. 19, 20 and 21.—Three typical left valves from Korampalam shell-pits, Tuticorin. Note the emphatic “hooding” of the umbo in all, and the gradation of figs. 19 and 20 into the type of *M. casta* as seen in figs. 22 and 23.

Meretrix casta (Chemn.). Type.

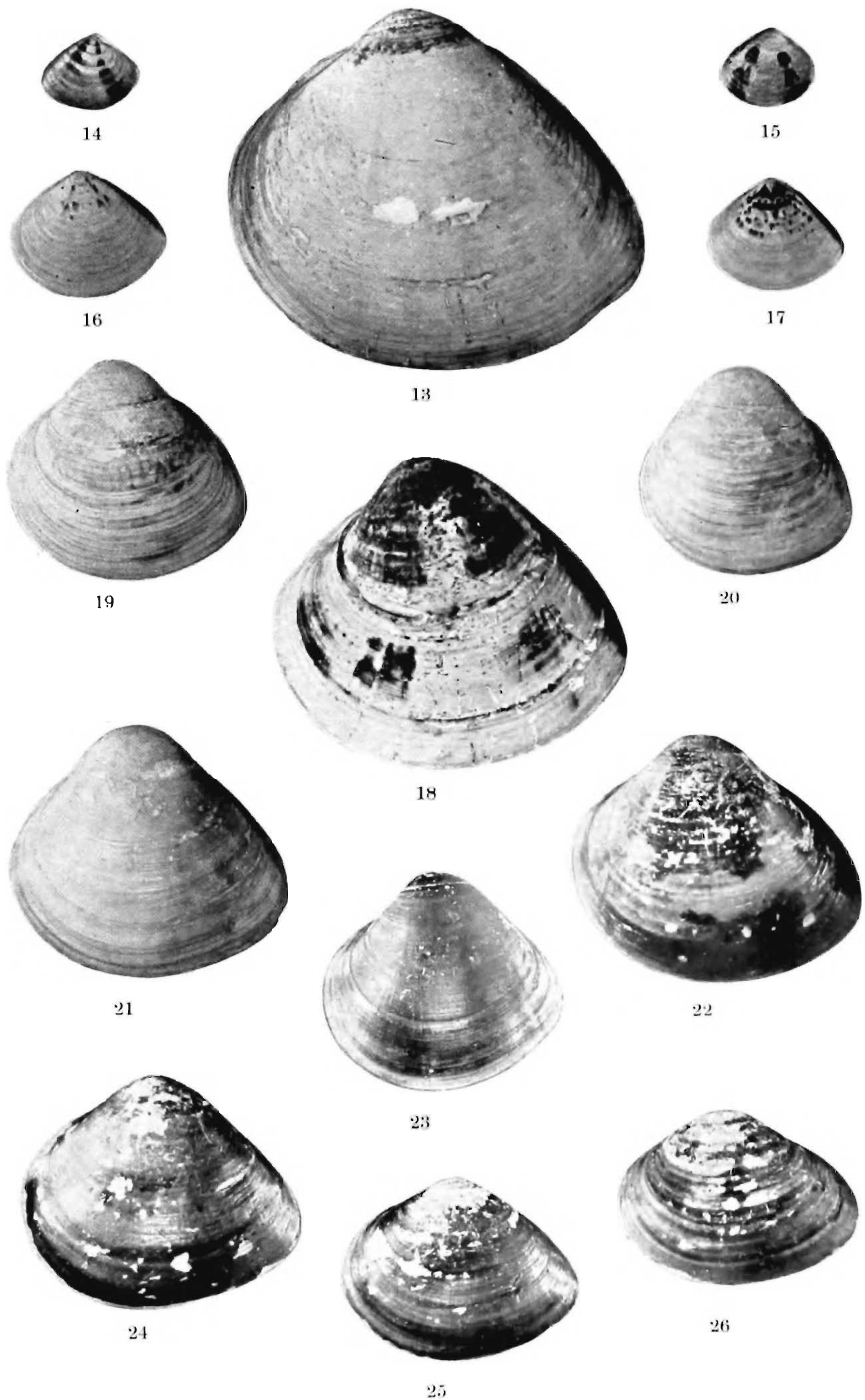
FIG. 22.—A large specimen from Pulicat Lake with elongated posterior suggesting transition to the var. *ovum* form seen in fig. 24.

Meretrix casta var. *ovum* (Hanley).

FIG. 23.—A stout shortened form from the mouth of the Baliapattam River, North Malabar. It approaches closely in outline to the central type as seen in Chilka and Pulicat Lakes.

FIGS. 24, 25 and 26.—Three forms of this variety exhibiting the gradual lengthening of the shell, and the ultimate assumption of an *Unio*-like outline, very different from the cordate form of fig. 23. All from Tellicherry.

All the figures are natural size.



D. N. Bagchi, Photo.

INDIAN MERETRIX.

Photo-engraved & printed at the Offices of the Survey of India, Calcutta, 1917.

EXPLANATION OF PLATE VI.

Meretrix casta var. *satparaënsis* (Preston).

FIGS. 27 to 29.—All from Korampalam, Tuticorin. Fig. 29 is a transition form to the true *casta*, the hinge being weaker than normal, but with the umbo typically hooded.

Meretrix casta (Chemnitz). Type.

FIGS. 30 and 31 are very typical, with heavy hinge and short cordate outline; the second is the more common form and shows some tendency to elongation posteriorly. (Fig. 30 is from Tuticorin, 31 from Pulicat).

FIGS. 32 and 33 (Pulicat and Ennur) show more emphatic elongation posteriorly and in fig. 33 we have a form approaching the *ovum* form such as is seen in fig. 34.

Meretrix casta var. *ovum* (Hanley).

FIGS. 34 to 38 show part of the range in shape shown by this very variable variety, extending from the comparatively short stout form of fig. 34, to the narrow elongated form of fig. 38. Compare with figs 23 to 26, pl. V All from Tellicherry except fig. 38, from Mahé, Malabar.

FIGS. 27-38 are all inner views of the right valve in *M. casta* and its two varieties, showing the great range in variation exhibited by these shells and the gradations linking together these three main forms.

All the figures are natural size.



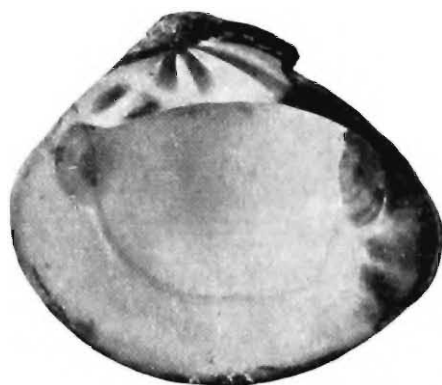
27.



28.



29.



31.



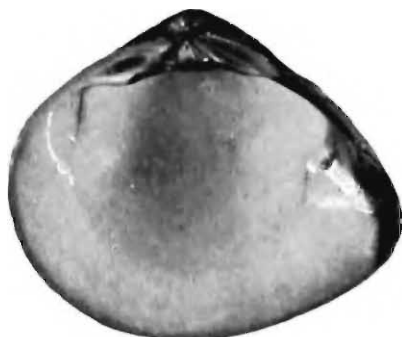
30.



33.



32.



34.



35.



36.



38.



37.

D. N. Bagchi, Photo.

INDIAN MERETRIX.

EXPLANATION OF PLATE VII.

Meretrix meretrix var. *impudica* (Chemn.).

FIGS. 39 and 40.—Outer and inner view of left valve. The former shows the coarse chevron marks upon the umbo so characteristic of this variety. The margin of the vulva does not show in this photograph. The inner view is to show the characteristic shallow form of the pallial sinus in *Meretrix meretrix* as distinct from the deep sinus of *M attenuata* and *M lusoria*.

Meretrix attenuata var. *flava*, var. nov.

FIGS. 41 and 42.—From the Nicobar Islands. No. 4865 of the Indian Museum collection. Note the total absence of the characteristic chevron markings described by Dunker and Römer.

Meretrix lusoria (Chemn.).

FIG. 43.—A left valve from Japan. This shell is occasionally more elongated posteriorly than in this specimen and this causes the pallial sinus to be less open than in the latter, where it is characteristically almost semi-circular in outline.

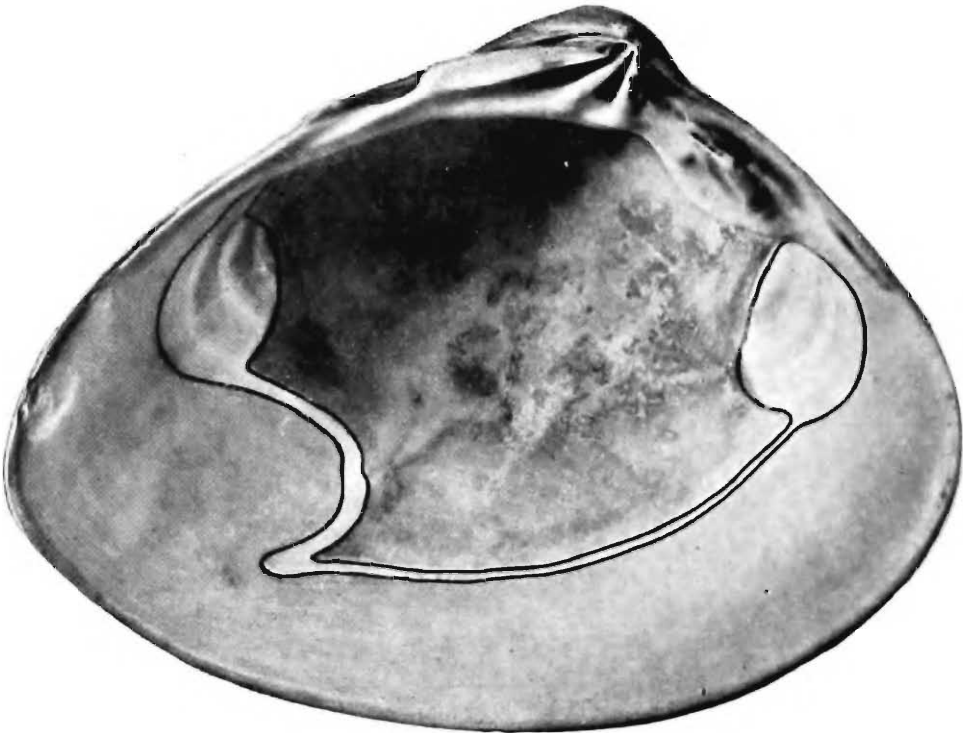
All the figures are natural size.



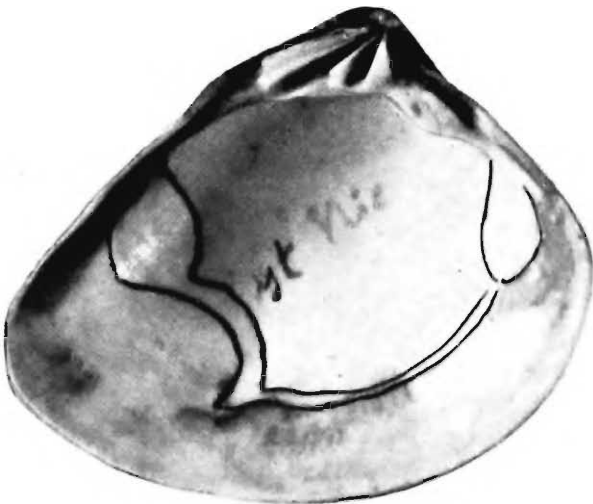
41.



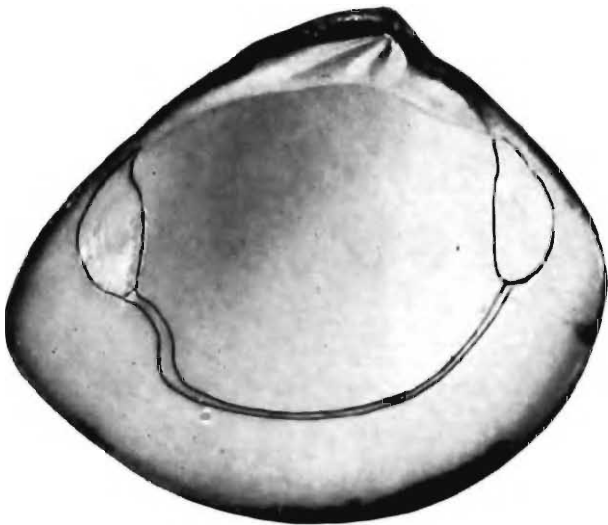
39.



43.



42.



40.

D. N. Bagchi, Photo.

INDIAN MERETRIX.