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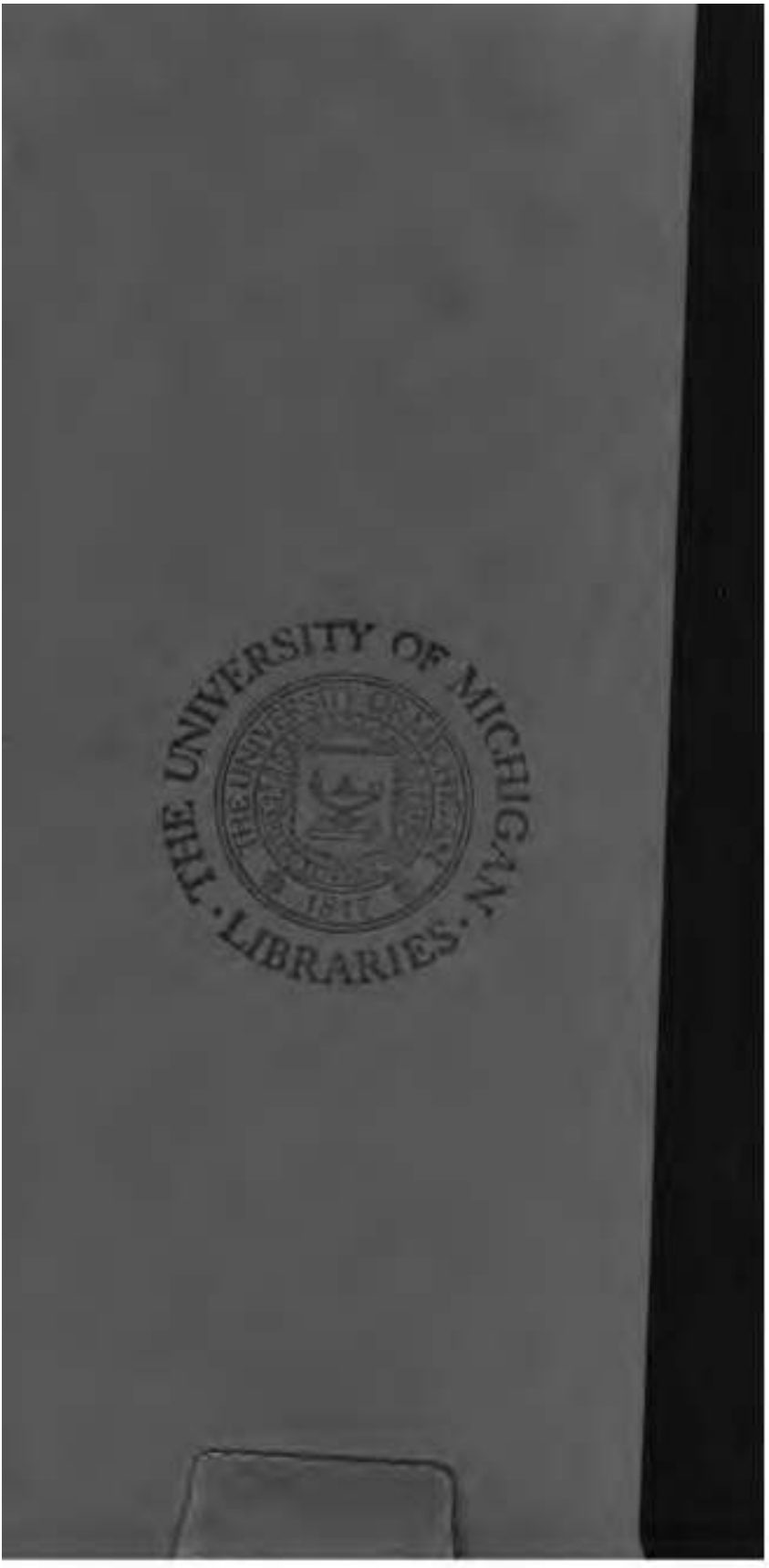

THE SCALY WINGED COPEOGNATHA (*Monograph of the Amphientomidæ, Lepidopsocidæ, and Lepidillidæ in relation to their Morphology and Taxonomy*).

By Dr. GÜNTHER ENDERLEIN.

(*Stettin.*)

With Plates A–G and six text figures.

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ERRATUM.

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Introduction.

In India, the Wonderland of Antiquity, there may yet remain many a secret unrecognized and unsuspected. It is my good fortune to raise the curtain upon an admirable nature-play ; minute insects, in appearance resembling microlepidoptera and not second to these in elegance and beauty of tint of the scaly covering, and yet only simple* "woodlice," a series of forms of the most varied description, of which only scanty fragments have hitherto been reported upon, here enjoy their obscure existence.

I am indebted to Mr. E. Ernest Green, the Government Entomologist at Peradeniya, Ceylon, for the opportunity of examining a rich collection of these exquisite animals from Ceylon. Doubtless numerous other species will still be found in the Indian Region, and the specimens which have occasionally reached my hands from the tropical regions of other parts of the world only indicate what a wealth of forms may yet be expected.

For a long time I had contemplated a monographic investigation of the scale-bearing Copeognatha, so that I gladly seized the opportunity to realize this idea, the more so because the abundant material from Ceylon put me into a position to finally establish and accurately illustrate a series of types described by Hagen from Ceylon in 1858 and 1859.

My hearty thanks are due to my friend and esteemed colleague, Professor F. Karsch, since I have only been able to carry this work through by the use, at home, of his excellent Zeiss-microscope.

In the following pages the morphological details will be found under the several families.

Preservation and Preparation.

For the preservation of scaly Copeognatha and of scaly insects in general the use of alcohol or of other fluids is in no case to be recommended, because the scales are mostly detached in the fluid and the design of the scale-covering can therefore no longer be recognized.

The scale-bearing Copeognatha are best preserved dry, and should be mounted upon minute needles of hard nickel and fixed on cubes of pith or better still upon small cardboard slips, the so-called

* The term 'woodlice'—as used by Dr. Enderlein—must not be confused with the crustacean animals popularly known by that name in England. The subjects of this paper are true insects, belonging to a family of which the commoner species are recognized in England by the name 'booklice.'

minimal labels [Minutienklebzettel], according to the system of Ortner, Vienna. Morphological details can be studied in examples which have been softened in caustic potash, so that, on the whole, alcoholic material can be dispensed with. Before softening a unique specimen a precise description of it must be provided. Above all, the wings should be carefully removed before the softening process; one pair should be preserved dry between two cover-glasses rimmed with wax; the other pair can, if necessary, serve for a Canada balsam preparation.

As I have indicated on a former occasion* and then again, in greater detail, later,† the method of softening is as follows :—

The insect is transferred carefully into a mixture of one part of moderately strong caustic potash and about 8–10 parts of water; (winged insects after removal of the wings); except when dealing with very delicate animals, in which case the solution of caustic potash should be weaker. According to size and delicacy of the object it remains from ten minutes to several hours in the fluid, until it recovers approximately the natural form; then it is transferred to water, where it must be watched since it now begins to swell. The larger air-bubbles are next carefully removed with a fine brush, and eventually the object is again placed in the dilute caustic potash. Here it can remain, at convenience, a longer or a shorter time; even delicate examples can be left in the fluid for several days if the caustic potash is not too strong.

If the object presents black and dark-coloured chitin, it is often necessary to leave it in the solution for a long time in order to dissipate the pigment completely.

Finally, after the object has been washed out with water, it is transferred gradually into alcohol, where the smaller air bubbles can be easily removed. The animal can now be preserved in 96 per cent. alcohol, and it retains perfectly the natural form which it had regained in the caustic potash. If a permanent microscopic preparation is desired, the contents of the body should be removed as far as possible by pressure with a fine brush, and the object having been properly orientated, is treated first with absolute alcohol, then with cedar oil, and finally mounted in Canada balsam. Cedar oil is to be preferred to clove oil, xylol, or benzol because the diffusion of fluids takes place much slower and consequently shrinkages rarely occur.

* Günther Enderlein. Eine Methode, kleine getrocknete Insecten für mikroskopische Untersuchung vorzubereiten in Zool. Anz. Bd. 27, 1904, pp. 479–480.

† Enderlein, Monographie der Coniopterygiden, Zool. Jahrb. Syst. Bd. 23, 1906 (pp. 173–242), see pp. 174–176.

When however the chitinous cuticle is very thin, it is impossible to avoid shrinkage if the object is mounted in Canada balsam; in such cases it should be transferred from the water into glycerin.

For permanent glycerin preparations the following is the best method :—The cover-glass, over which no glycerin must be allowed to escape, is fastened to the slide by means of a rim of wax which is applied by a wax taper or wax match which has been lighted and immediately extinguished ; the wax border can then be covered over with Canada balsam or gold size.

Teasing up the object with needles can only be effected successfully in Canada balsam or glycerin.

In dealing with delicate objects, the dilute caustic potash should not be heated, as the chitin is liable to change to a tenacious substance which will cling to the needles used in the preparation.

Geographical Distribution.

The Amphientomidæ, Lepidopsocidæ, and Lepidillidæ belong almost exclusively to the Tropics. Only two species occur in the sub-tropical region, namely, an Amphientomid, *Stimulopalpus japonicus*, nov, gen., nov. spec., in Japan, and one Lepidillid, *Lepidilla Kelloggi*, Rib., in California. One species only occurs in the Temperate zone, namely, *Echmepteryx Hageni*, Pack., in the United States.

The three families contain together nineteen genera; of these, three were described by Hagen (1859–1866), one by Ribaga (1905). one by Aaron (1886), and fourteen by me.

Up to the present, forty-four species belonging to these nineteen genera are known, of which one was described by Packard, one by Ribaga, nine by Hagen, and thirty-three by me. Of the last, twenty-two species are established in the present work.

Table of the Recent and Fossil Scaly Copeognatha.

Fam. AMPHIENTOMIDÆ, Enderl. 1903.

Sub-fam. Tineomorphinæ, m.

I.—*Tineomorpha*, nov. gen.

1. *Greeniana*, n. sp. Ceylon.

II.—*Cymatopsocus*, Enderl. 1903.

2. *opalinus*, Enderl. 1903. Further India.

Sub-fam. Amphientominæ, *Enderl.* 1903.

III.—*Syllysis*, Hag. 1866,

3. *caudata*, Hag. Ceylon.
4. *erato*, n. sp. Ceylon.
5. *rilusamhara*, n. sp. Ceylon.

IV.—*Amphientomum*, Hag. 1856.

6. *paradoxum*, Pict. Hag., 1856. in amber.
7. *leptolepis*, Enderl., 1905, in amber.

8. *colpolepis*, Enderl., 1905, in amber.

V.—*Paramphientomum*, n. g.

9. *Nietneri*, n. sp. Ceylon.

VI.—*Stimulopalpus*, n. g.

10. *japonicus*, n. sp. Japan.

VII.—*Seopsis*, n. g.

11. *vasantasena*, n. sp. Ceylon.
12. *superba* (Hag., 1865). Ceylon.
13. *metallops*, n. sp. Ceylon.

VIII.—*Hemiseopsis*, n. g.

14. *Fülleborni*, Enderl. 1902. East Africa.

IX.—*Stigmatopathus*, Enderl. 1903.

15. *Horváthi*, Enderl. Further India.

Fam. LEPIDOPSOCIDÆ, Enderl. 1903.

Sub-fam. PERIENTOMINÆ, Enderl. 1903.

X.—*Soa*, Enderl. 1904.

16. *Dahliana*, Enderl. 1904. Bismark Archipelago.
17. *flaviterminata*, n. sp. Ceylon.

XI.—*Perientomum* Hag. 1865.

18. *trichopteryx*, Hag. 1859. Ceylon.
19. *chrysargyrium*, n. sp. Ceylon.
20. *gregarium*, Hag. 1865. Ceylon
21. *Greeni*, n. sp. Ceylon.
22. *morosum*, Hag. 1865. Ceylon.
23. *triste*, Hag. 1865. Ceylon.
24. *ceylonicum*, n. sp. Ceylon.
25. *argentatum*, n. sp. Ceylon.
26. *acutipenne*, n. sp. Ceylon.
27. *incultum*, Hag. 1865. Indian Copal.

XII.—*Lepium*, n. g.

28. *chrysochlorum*, n. sp. India.
29. *luridum*, n. sp. Ceylon.

XIII.—*Nepticulomima*, n. g.

30. *Sakuntala*, n. sp. Ceylon.
31. *Essigkeana*, n. sp. Ceylon.
32. *Hösemanni*, Enderl. 1903. Cameroons.
33. *brasiliensis*, Enderl. 1906. Brazil.
34. *Birói ana*, Enderl. 1903. New Guinea.
35. *chalcomelas*, n. sp. Ceylon.
36. *mortua* (Hag. 1865) Zanzibar Copal.

Sub-fam. LEPIDOPSOCINÆ. Enderl. 1903.

XIV.—*Echmepteryx*, Aaron. 1886.

37. *Hageni* (Packard, 1870). North America.
38. *mihara*, n. sp. Ceylon.
39. *sericea*, n. sp. Ceylon.

XV.—*Lepidopsocus*, Enderl. 1903.

40. *Nepticulides*, Enderl. 1903. Further India.

Sub-fam. ECHINOPSOCINÆ, m.

XVI.—*Echinopsocus*, Enderl. 1903.

41. *erinaceus*, Enderl. 1903. New Guinea.

XVII.—*Scolopama*, n. g.

42. *halterata*, n. sp. Ceylon.

Fam. LEPIDILLIDÆ (Ribaga, 1905).

XVIII.—*Lepidilla*, Rib. 1905.

43. *Kelloggi*, Rib. 1905. California.

XIX.—*Lepolepis*, n. g.

44. *ceylonica*, n. sp. Ceylon.

TABLE OF COMPARISON OF THE AMPHIENTOMIDÆ, LEPIDOPSOCIDÆ, AND LEPIDILLIDÆ.

	AMPHIENTOMIDÆ.	LEPIDOPSOCIDÆ.	LEPIDILLIDÆ.
Head ..	Glabrous or nearly so	With long hairs generally close-set	With long and shaggy hairs
Occipital margin	Sharp	Sharp	Sharp
Eyes ..	Glabrous (except in Tineomorphinæ)	Pubescent	In front or also in the middle finely pubescent
Ocelli ..	0, 2 or 3	0, or 3	0
Joints of antennæ	13	About 21–47	More than 50
Inner lobe of maxilla	Spatulate, irregularly toothed	With 3 apical points	With 3 apical points
Terminal joint of the maxillary palp	Long and slender	Short, strongly widened, truncate at the end, like an axe	Short, strongly widened, truncate at the end, like an axe
Maxillary palp-organ	In the form of a sense-papilla; in the Tineomorphinæ a long sense-hair	In the form of a short sense-papilla	In the form of a short sense-papilla
Prothorax ..	Small, concealed below the mesothorax	Large and broad, visible from above	Large and broad, visible from above
Scales on the legs	Femora tibiæ and first tarsal joint	Femora and tibiæ	Ends of the femora and bases of the tibiæ
Teeth on the claws	1–2; also about 1–10 fine hair-like or thorn-like denticulations	1, rarely traces of more, without hair-like denticulations	1
Hind-tibiæ (over the entire length)	Beset with very short and fine spur-like thorns	With a great number of unusually long and strong bristles on the outer side, some of them nearly half the length of the tibia	With numerous long and strong bristles; middle tibiæ also with long and strong bristles
Thorn-shaped anal appendages on the lateral valves of the telson	Absent	Present	Present
Fore wings ..	With veins; on the outer side usually rounded, rarely drawn out to a point at the front edge; sometimes with a tail-like appendage in the middle of the outer margin	With veins; usually more or less strongly acuminate, sometimes with long thin apex; only in *Soa*, Enderl., is the outer margin rounded.	Small, scale-like; without veins

	Amphientomidæ.	Lepidopsocidæ.	Lepidillidæ.
Scales of fore wing (excluding the marginal scales)	Equal; in the Tineomorphinæ only are there ground-scales and covering scales	Ground-scales and covering scales; or asymmetrically knife-shaped	Equal
Between the scales of the fore wing.	Numerous very fine and short hairs	No fine and short hairs but only scattered long and strong hair-like scales	Neither hairs nor hair-like scales
Marginal vein ..	Scarcely perceptible; without cross rows of hair-cupules; chiefly scaled	Sharply demarcated; with cross rows of projecting round hair-cupules; chiefly hairy	Absent
Analis and Axillaris	End in one point (Nodulus) as in all other Copeognatha	Never end in one point	—
2. Axillaris ..	With the exception of *Stigmatopathus*, Enderl., constantly present	Absent	—
Very long and strong bristles (macrochætæ), which stand vertically upon the marginal zone (especially the subcostal cell) and on the veins	Absent	Present	—
Hind wings ..	Front and outer border scaly, as well as the apical membrane usually; in the Tineomorphinæ almost the whole surface	Without scales, only pubescent; in the Echinopsocinæ they are strongly reduced or absent	Absent
Media ..	Simple, only in the Tineomorphinæ forked	Two distinct branches	—
Radius and median trunk	Widely separated; a large cell intervening	Coalesced or only an extremely narrow and long cell between	—
Radial ramus and Media	United by a cross vein which serves as the basis of both	Fused at the base r_1 therefore appears to arise from the media or the radial ramus	—

Fam. AMPHIENTOMIDÆ.

[Enderlein. Ann. Mus. Nat. Hung., Bd. I, 1903, p. 206.]

Head, large, hairless, or with very short hairs; eyes and clypeus very slightly projecting. Occiput very steeply declining and sharp-edged; the margin somewhat rounded. Eyes moderately large, hairless, except in the Tineomorphinæ, where they are compactly and shortly pubescent.

The three ocelli of the Amphientominæ are rather far apart, but always form a small triangle; the anterior ocellus generally smaller (only larger in *Seopsis metallops*, n. sp.); the ocelli are sometimes absent (*Stigmatopathus*, Enderl.); the Tineomorphinæ have only two ocelli which lie more or less close in front of the border of the compound eyes. Maxillary palp 4-jointed, the first joint very short, the last long and slender. Inner lobe of the maxilla strongly widened at the end and very irregularly notched and flatly dentate. Organ of the maxillary palp, in the Amphientominæ, in the form of a short sense-club; in the Tineomorphinæ it has the form of a remarkably long sense-hair on the inner side of the second joint of the palp. Labial palp 2-jointed, but the two joints grow to a large roundish disc-like structure close together (as figured in the case of *Cymatopsocus*, Enderl., in Ann. Mus. Nat. Hung., Bd. I, 1903. Plate XII., fig. 56 *i*).

Flagellum of the antenna thin to very thin, rather closely beset with long to very long hairs. Antenna short, two-thirds to three-quarters the length of the fore wing. The number of the long antennary joints is in all cases, recent and fossil, thirteen. Hagen (Ent. Zeit. Stettin, 1882, p. 268) states that the antennæ of *Amphientomun paradoxum*, Hag., from amber, are 15-jointed. I have however been able to convince myself by examination of Hagen's material that the species which occur preserved in amber have also only 13 antennary joints (*cf.* Enderlin, *l.c.*, 1905, p. 576). In consequence of the extraordinary and unusual length of the very thin antennary joints it is very difficult to count them with certainty in the amber.

Prothorax small, compressed below the mesothorax, and not visible from above; mesonotum beset with scales. Femora, tibiæ, and first tarsal joint beset with slender scales. Hind tibiæ with very short and fine spur-like thorns scattered along the entire length. Hinder tarsal joints with a series of *ctenidiobothria* (fig. 123) on the inner side. Tarsi 3-jointed. Claws with one tooth before the apex (*Stimulopalpus*, Enderl.; *Seopsis*, Enderl.; *Stigmatopathus*, Enderl.); or with two teeth (*Amphientomum*, Hag., 1859,

Paramphientomum, n. g., *Syllysis*, Hag., and in the Tineomorphinæ); between the tooth or teeth and the basal angle a row of about 4–6 or more (about 10 in the Tineomorphinæ), bristle-like, partly expanded or almost tooth-like chitinous processes, like the teeth of a comb; these are more or less strongly inclined towards the apex.

Fore wing normally rounded on the outer side, sinuous (*Cymaopsocus*, Enderl., 1903), or the apex is more or less produced, or in front of the middle of the outer border there may be a thin tail-like process. Subcosta moderately long, its distal portion shutting off the pterostigma at the base may be absent (*Seopsis Fülleborni*, Enderl., 1902, and *Paramphientomum Nietneri*, n. sp.); according to the size of the pterostigma, it is more or less long.

R_2, straight; the triangular pterostigma may be narrow and long, or broad and short, sometimes very small; it is cell-like, not strongly chitinised but membranous. The distance between the place of branching from the radial ramus and the pterostigma is long to very long. The stigma-sac is a more or less thickened spot on the lower side of r_1 in front of the pterostigma or at the base of the distal portion of the subcosta. Radial ramus united with the media by a short cross vein which meets the media inside of the three median branches or between the second and third median branch (Tineomorphinæ). Areola postica large to very large, usually elongate; cu_2, more or less long; analis (*an*) and *axillaris* (ax_1) constantly end in one point called the nodulus; there are two axillary veins.

Hind wings:—In *Amphientomum* and in the Tineomorphinæ, r_1 terminates near the end of r_{2+3} at the anterior border, but is absent from all other recent forms (except the Tineomorphinæ) where the radius ends at the point of ramification of the radial ramus. The basal portion of the radial ramus, which appears as a cross vein may, as well in fossil (*Amphientomum*) as in recent forms (*Seopsis*, n. g.), be present or absent; in the latter case it is frequently feebly indicated. Media and cubitus simple, the latter forked in the Tineomorphinæ, axillaris rather long. Radial ramus and media united by a cross vein which serves as the base of both.

Fore and hind wings without prominent marginal vein. Membrane of fore wing closely scaled; between the scales numerous very fine and short hairs (absent from the Lepidopsocidæ). Outer margin of hind wing scaled and at the same time bearing long hairs, generally a more or less broad zone at the outer border also scaled (in *Amphientomum metallops*, n. sp. alone the scaling of the membrane is completely absent); hinder margin with very long hairs.

in the Tineomorphinæ the scaly zone is very broad and extends along the entire hind border.

The scales of the fore wing may have parallel sides, or the latter may converge towards the base; they are more or less slender, slightly curved at the end, generally truncate or emarginate, differing according to the species. Marginal scales slender to hair-like, thin and long, rounded at the end, directly truncate or more or less deeply bidentate. In the Tineomorphinæ the scales of the fore wing have become still further differentiated; in addition to the ground scales there are at various points still larger covering scales.

The scaleless *Empheriinæ* and *Psyllipsinæ*, which I formerly placed with the Amphientomidæ, constitute together a special family which I name the *Empheriidæ*. Perhaps the *Thylacinæ* (Enderlein, 1903) also belong to this family as a third sub-family, *cf.* page 77, footnote.

TABLE FOR THE DETERMINATION OF THE SUB-FAMILIES OF AMPHIENTOMIDÆ.

	TINEOMORPHINÆ.	AMPHIENTOMINÆ.
Cross vein between radial ramus and media in the fore wing	Discharging between m_2 and m_3 .	Discharging basalwards from m_3.
Media in hind wing ..	Forked	Simple.
Eyes	Pubescent	Glabrous.
Ocelli	Two, immediately in front of the eyes	None or three, placed relatively close together.
Organ of maxillary palp	Long sense-hair	Short sense-club.
Scales of fore wing excluding the marginal scales	Ground-scales and cover-scales	Equal.
Scaling of hind wing..	Nearly the entire surface, front border and outer border	The membrane of the wing-apex (the latter being scaleless), the front margin and outer margin.

Sub-fam. TINEOMORPHINÆ.

TABLE FOR DETERMINATION OF THE GENERA OF TINEOMORPHINÆ.

Outer margin of the fore wings smooth; the ocellus lying in front of each eye nearly touches the border of the eye .. *Tineomorpha*, n. g.

(Type *T. Greeniana*, n. sp.).

Outer margin of the fore wings with two sinuous emarginations; the ocellus in front of each eye is farther removed from the eye-border than the length of its diameter .. .. *Cymatopsocus*, Enderl., 1903.

(Type *C. opalinus*, Enderl., 1903.

Tineomorpha, n. g.

Two ocelli close in front of the eye-borders, nearly touching the latter. Terminal joint of the maxillary palp long, not thickened at the end; organ of the maxillary palp not in the form of a sense-club but a long sense-hair (fig. 97 *sh*). Inner lobe of the maxilla (fig. 100) strongly expanded at the end, with strong flattened and blunt teeth. Eyes closely and shortly pubescent. Claws with two powerful teeth before the apex and behind these a row of 9–10 acute, very fine denticles curved backwards.

Wings (fig. 25 and 26) with smooth border, particularly the outer border is perfectly smooth, neither emarginate nor sinuous. The portion of the subcosta which shuts off the pterostigma at the base is clearly formed and long. The cross vein between media and radial ramus in the fore wing discharges between the points of insertion of the second and third median branches (m_2 and m_3). Two axillary veins (ax_1 and ax_2) in the fore wing.

Fore and hind wings scaly. Scales of the fore wing more or less long, round, and truncately bent at the end, or rounded; scales of two kinds, smaller ground-scales and larger cover-scales. Marginal scales slender, emarginate at the end. Scales of the hind wing slenderer, often emarginate in front; marginal scales very slender, at the hinder border hair-like.

The form of the scales agrees completely with the genus *Cymatopsocus*, Enderl., 1903.

One very large species from Ceylon.

Tineomorpha Greeniana, n. sp. (figs. 1, 25, 68, 94, 97, 100).

Head reddish brown, with close and flat silver gray pubescence. Occiput sharply declivous, rounded, somewhat concave. Suture of the vertex fine; suture very distinct between vertex and front, terminating laterally at the antennary groove which lies close in front of the eyes. The two ocelli relatively large, brown, nearly touching the borders of the eyes to the inner side of the antennary grooves. Front (forehead) rather long, flat. Clypeus moderately projecting. Upper lips fairly smooth, blackish-brown. Cheeks somewhat

expanded in a lobe-like manner, brownish yellow. Antennæ short, about two-thirds the length of the fore wing, 13-jointed, blackish gray, the two basal joints and the third and fourth joints reddish brown, the pubescence gray, oblique and moderately close; in the male compact, fairly erect and longer. Eyes closely and extraordinarily shortly pubescent, standing off somewhat laterally, in the male rather more so; temples displaced by the eyes. Inner lobe of the maxilla (fig. 100) strongly expanded at the end with strongly flattened and blunted teeth. Maxillary palp (fig. 94) blackish brown, apex of the terminal joint brownish yellow; third and especially the second joint with slender scales between the hairs, particularly at the outer side (fig. 97); the palpal organ of the second joint which is here developed as a sense-hair (fig. 97 *sh*) is shorter than half the length of the joint.

Mesothorax black above, covered with glistening straw-coloured scales. Parapsidal furrows very indistinct. Abdomen pale brownish, rather closely beset with silvery gray hairs; without scales. Legs brownish yellow, the brown colour as follows:—Anterior border of the coxæ, a broad diffused ring in the middle and the apex of the upper side of the femora, the tibiæ with exception of the base, the apex, and a ring before the centre, in the anterior and mid-tibiæ a small spot upon the upper side of the extreme base; the base of the first tarsal joints, as well as the second and third tarsal joints. The anterior femora are more strongly expanded than the rest.

Claws (fig. 68) large, slender; between the two powerful teeth before the apex, a smaller; between the inner angle and the first tooth a series of 9–10 acute, backwardly curved, very fine denticles.

Length of hind tibia 1½ mm.; on the inner side six spurs, and in addition on the inner side at the end four spurs, on the outer side two spurs, all spurs without ctenidiobothria. The length of the first, second, and third joints of the posterior tarsi is 1·16 mm., 0·13 mm., and 0·15 mm. respectively, *i.e.*, in the approximate ratio $8\frac{1}{2} : \frac{4}{5} : 1$. The first posterior tarsal joint with 43 short and small ctenidiobothria. Femora and tibiæ beset throughout their whole length with narrow, truncate scales which are silvery on the clear areas, brown on the brown tract.

Fore wings dull straw colour to grayish white, marbled with labyrinthine design (fig. 1). Front margin with 8–9 strongly marked dark brown spots interrupted by clear spots. Veins brown.

Hind wings with exception of the centre rather closely scaled whitish gray to pale brownish, hind border densely pubescent. *Membrane of the hind wing* brightly iridescent green to red.

Membrane of the fore wing dull opaque grayish white. The remarkable opalisation of the wings of *Cymatopsocus opalinus*, Enderl., 1903, is quite absent here.

The veins (fig. 25) are explained in the diagnosis of the genus.

Length of fore wing 4¾–5 mm. Wing expanse 11–11½ mm.

Ceylon, Peradeniya, on tree-trunks. January, 1905, two males and one female. March, 1905, two females. Collected by Mr. E. Ernest Green.

var. *major* n. (fig. 26).

One male differs from the five specimens recorded above by its greater size. The colour is somewhat more whitish, but there are no further differences, so that it probably represents a second more highly developed generation.

Length of fore wing 5·6 mm.; wing expanse 12½ mm.

Ceylon, Maskeliya; on the stem of a bamboo; April, 1905, one male. Collected by Mr. E. E. Green.

Cymatopsocus, Enderl. 1903.

[Ann. Mus. Nat. Hung. Bd. I., 1903, p. 314.]

Cymatop. opalinus, Enderl., 1903 (fig. 98).

[*l.c.* p. 315, fig. 56 *a–m.*]

The palpal organ of the second joint of the maxillary palp is—as in the preceding genus—developed not in the form of a sense-club but as a sense-hair (fig. 98 *sh.*). It reaches in this species a remarkable length, being longer than the second joint of the palp.

Further India.

Sub-fam. AMPHIENTOMINÆ.

[Enderlein. Ann. Mus. Nat. Hung. Bd. I., 1903, p. 207 and p. 310.]

TABLE FOR DETERMINATION OF THE GENERA OF AMPHIENTOMINÆ.

1. With 3 ocelli; 2 axillary veins in fore wing .. .. 2.
   Without ocelli; 1 axillary vein in fore wing; r_1 and *sc* of the ptersotigma lie close together. .. .. *Stigmatopathus*, Enderl., 1903.

Type :—St. Horváthi, Enderl., 1903.

2. Outer border more or less strongly acuminate in front or with a thin, more or less long and acute tail-like appendage in the middle; claws with 2 teeth before the apex; r_1 absent from hind wing .. .. *Syllysis*, Hag., 1865.

Type :—*S. caudata*, Hag., 1865.

Outer border quite rounded .. 3.

3. Claws with one tooth before the apex .. 5.
Claws with two teeth before apex .. 4.

4. R_1 present in hind wing (fossil in amber) *Amphientomum*, Hag., 1856.

Type :—*A. paradoxum*, Hag., 1887

R_1 absent from hind wing (recent) .. *Paramphientomum*, n. g.

Type :—*P. Nietneri*, n. sp.

5. R_1 present in hind wing (recent) .. *Hemiseopsis*, n. g.

Type :—H. *Fülleborni*, Enderl., 1902.

R_1 absent from hind wing (recent) .. 6.

6. Maxillary palp without spur, hind tibiæ with few spurs; very small forms .. *Seopsis*, n. g.

Type :—*S. Vasantasena*, n. sp.

Second, third, and fourth joints of the maxillary palp with stout spurs; hind tibia with numerous spurs; very large species .. *Stimulopalpus* n. g.

Type :—*St. japonicus*, n. sp.

Syllysis, Hag., 1865.

[Hagen. Ent. Mo. Mag., Vol. II., 1865, p. 150; and Verh. Zool. Bot. Ges. Wien., 1866, p. 203.]

(Type :—*S. caudata*, Hag., 1865).

Occipital border sharp edged, the edge rounded. Front long; antennæ thin and short; three ocelli placed relatively close together. Terminal joint of the maxillary palp slender, not acute; palpal organ of the second joint of the maxillary palp in the form of a sense-club. Claws with two teeth before the apex. Tarsi *3-jointed.*

Outer border of the wings between the ends of m_1 and m_2 with an outgrowth (*ó*), which in the female is produced into a more or less long and acute tail-like process. It is remarkable that in this case the female is characterised in such a marked manner.

There is no pterostigma since the distal portion of the subcosta is lacking. Stigma sac distinct. Median branches very long. Areola postica elongated. Two axillary veins.

In the hind wing, *an* and *ax* end rather near to one another; media simple. In the fore wing between the scales are numerous very fine hairs.

Scales slender, sides nearly parallel, ends rounded (fig. 42). Marginal scales (fig. 42, *rs*) very slender, truncate at the end. Scales of the hind wing (fig. 43) very slender, with two long acuminations at the end, which become shorter towards the margin of the wing.

Three relatively large species from Ceylon.

It is thus established with certainty that this important genus does not belong to the Lepidopsocidæ (*cf.* Enderlin, 1903); it is, on the contrary, a typical Amphientomid.

TABLE FOR DETERMINATION OF THE SPECIES OF THE GENUS SYLLYSIS.

1. Fore wings with some broad silver cross bands, gold markings, and a large orange yellow or gold spot in the anterior half of the apical quadrant .. .. 2.
   Fore wings with numerous fine, sinuous, closely arranged golden cross-bands; over the front and vertex two broad dark brown longitudinal bands .. *ritusamhara*, n. sp.
2. Vertex with a broad black cross band between the eyes .. .. *caudata*, Hag., 1865.
   Vertex with two fine parallel dark brown cross bands between the eyes .. *erato*, n. sp.

Syllysis erato, n. sp. (figs. 2, 37, 38, 42, 43, 55, 95, 102).

Head whitish grayish yellow, glabrous. Across the vertex, uniting the eyes, are two narrow parallel dark brown bands, leaving an equally broad tract between them; the anterior band placed at the front margin of the vertex, runs through the two posterior ocelli and is feebly notched (concave forwards) in the middle; the hinder band is indistinctly concave forwards. Occipital border, sharp edged, the edge rounded, somewhat concave. Suture of vertex very fine, sometimes almost invisible; suture between vertex and front distinct. Front remarkably elongate and very flat. Clypeus relatively small

and unusually flat (only feebly convex), with three wide brown longitudinal streaks, which frequently coalesce, not quite reaching the hinder border and sometimes confined to the anterior half (in poor specimens not be seen). Cheeks lobe-like, expanded below with almost circular margin; at the point of junction with the forehead a diffuse brownish line. Antennæ brownish yellow, the two basal joints and the third joint pale grayish yellow, becoming darker towards the apex. Antennæ approximately half the length of the wing, in the male with close-set long hairs on all sides, in the female only thickly hairy forwards, beset behind sparsely with long hairs. Antennæ inserted close in front of the eye-border.

Ocelli small, reddish brown; interval between the posterior ocelli almost equal in length to the interval between them and the eye-borders.

Eyes smooth, dark brown, with darker bands, generally a golden sheen in the male, glabrous, very slightly convex; the borders are not angulately set off from the vertex, but the eyes pass quite flatly into the vertex; scarcely different in male and female. Temples quite ousted by the eyes.

Upper lip small, strongly retracted. Apical third of the second, the third, and fourth joint of the maxillary palp, pale brown; approximate ratio of the palpal joints as $\frac{1}{5}$: $1\frac{2}{3}$: 1: $1\frac{1}{2}$ (fig. 95). Sense-club (fig. 95, *sk*) of the second joint of the maxillary palp short and stout. Inner lobe of the maxilla (fig. 102) with irregular, strongly flattened, and rounded teeth.

Thorax pale, brown-scaled above, with gold coloured scales at the sides. Abdomen, in spirit-specimens, very pale; diffuse grayish brown cross streaks at the segmental junctions; finely and moderately closely pubescent, without scales; apex of abdomen brown. Legs yellowish gray white; the brown colour is distributed as follows:—apex of the coxæ and on the underside of the femora, in each case, a spot in the middle, before the base and before the apex; the latter spot is very feeble in the mid legs and is generally absent from the hind legs; on the upperside of the femora the extreme border of the apex; the fore and mid tibiæ are annulated in the centre by two brown bands in such a manner that three approximately equal uncoloured tracts remain free; in the hind tibiæ these rings expand so that only the extreme apex and base and a narrow uncoloured ring at the end of the second third remain free; the three tarsal joints with the exception of a clear ring in the middle of each and except the extreme apex of the first joint.

Femora compressed, especially the expanded anterior pair. *Claws (fig. 55)* slender, apex moderately acute; between the two

stout teeth before the apex there is an indication of a minute blunt denticulation; between the base and the first tooth, on the inner side, a row of bristly hairs.

Hinder tibiæ 1·12 mm. long; outside with 3 spurs, inside with 7 spurs, in addition to the terminal spurs of which there are 4 inside and 2 outside; each spur with a ctenidiobothrium which exhibits the same structure as in the first posterior tarsal joint. The length of the first, second, and third hinder tarsal joints is 0·67 mm., 0·07 mm., and 0·09 mm., the ratio being as $7\frac{1}{2} : \frac{7}{9} : 1$. First joint of the posterior tarsus with about 25 ctenidiobothria, which are very broad and arcuate; the marginal bristles are fine hairs; along the arcuate margin there is a row of very small black pigmented points, with two terminal spurs.

Femora and tibiæ, in their whole length, beset with narrow silvery scales (coloured brown on the brown tracts), which are abruptly truncate behind.

Fore wing with a tail-like outgrowth at the outer margin between m^1 and m_2, which is short and rounded in the male (fig. 37), long and acuminate in the female (fig. 38).

The extraordinarily dense and differentiated scaling of the fore wing occasions an unusual likeness to the marking of a moth's wing, as can be seen from figure 2. The colouration is essentially as follows:—The ground colour is brown; four narrow silvery cross bands, which are acutely notched outwards in the middle, divide the wing into four quarters, the two first bands occurring close beside one another at the end of the first quarter, the third in the middle, the fourth approximately at the end of the third quarter. The posterior halves of the two first bands are golden, much reduced and interrupted, the first not reaching the fore margin; the third is interrupted in the middle, and is considerably wider in the posterior half; the fourth is golden in the posterior half, thin and linear, usually much diffused in the middle. The third and fourth bands are distinctly seamed with black brown in the anterior half; between them about 5 golden streaks run from the anterior margin, in front interrupted nearly equally by brown streaks which soon fuse and disappear behind (hardly $\frac{1}{4}$ of the wing breadth), only the most external of them runs into the angle of the notch of the fourth silver cross band. Between the posterior halves of the third and fourth bands occur irregular golden spots, here and there also silver scales. The anterior half of the outer quarter of the wing is occupied by a roundish reddish golden spot into which a prominent silvery wedge-shaped spot projects from the end of the fore margin, the base of the wedge lying upon the fore margin and its cathetus

seamed with black. This seam proceeds inwards into a narrow wedge-shaped spot lying at the margin and is prolonged outwards into a seam at the outer margin which bends inwards at the caudate process and merges into the brown colour of the posterior half of the outer quarter of the wing, which is only interrupted by a roundish golden spot in its outer moiety, two silver marginal spots behind the latter, the inner of which becomes towards the inner side gradually golden, and by a narrow golden spot placed parallel to the end of the fourth cross band; in the inner half occur scattered groups of silver scales and in front at the limit of the golden spot, a deep blackish brown longitudinal spot, which is bounded behind by a diffuse golden line. The scaling of the outer margin is yellowish golden; the caudate process is silvery, its hinder margin black. The base of the wing is yellowish golden. The membrane is tinted pale brownish. Hind wing hyaline, apical angle with very slender scales; ends of the veins and the analis beset with scales. Hind margin hairy; veins and scales pale brownish. Venation and scaling of both wings are described in the diagnosis of the genus. Membrane of the hind wing intensely iridescent, green to red.

Length of fore wing in male 3 mm., in female 4 mm.; expanse of wings in male 7 mm., in female 9 mm.

Ceylon. Peradeniya; on tree trunks, February, 1905. Eighteen males (7 in alcohol) and five females (1 in alcohol); collected by Mr. E. E. Green.

Syllysis caudata, Hag. 1865.

Amphientomum caudatum, Nietner in litt.; Hagen Ent. Mo. Mag., vol. II., 1865, p. 150.

Syllysis caudata, Hagen. Ent. Mo. Mag., vol. II., 1865, p. 151.

Syllysis caudata, Hagen. Verh. Zool. Bot. Ges. Wien, 1866, pp. 204, 210, and 219.

Syllysis caudata, Hag. Enderlein Ann. Mus. Nat. Hung. Bd I., 1903, p. 320.

Hagen, *loc cit.* :—

" Head bright yellow, with a broad black band between the eyes; ocelli distant; palpi grayish brown; antennæ grayish brown, the three basal joints yellow; thorax brown, bordered on each side and posteriorly with golden scales, brown in the middle; abdomen black; superior wings elongated, the apex prolonged into a point truncated posteriorly, brown, with the scales forming very pretty [illegible] viz., the base golden, with silvery bands, on the middle [illegible]terior margin a golden band between two silvery lines [illegible]*ith black*; at the apex an oblique comma-shaped silvery

mark bordered with black, behind this mark an orange spot partially encircling a black pupil, placed after the apical prolongation; inferior wings hyaline, brown; legs yellow, femora with two black rings nearly obsolete on the posterior pair, posterior tibiæ black with a yellow ring before the apex, first tarsal joint with two black rings, the two following brown.

Long. cum alis 4¼ mill.; exp. alar. 9 mill. Ceylon. Rambodde (Nietner), in woods.

I have seen but one specimen of this extraordinary species. In all the others the superior wings are oval, the apex scarcely acute, but in *A. caudatum* they are prolonged into a sort of tail. The colours are very bright and the markings very pretty. Probably it will be advisable eventually to place *A. caudatum* in a distinct genus. I propose the name *Syllysis*."

Syllysis ritusamhara, n. sp. (Fig. 3, 39, 40, 54, 96, 111.)

Head clear brownish yellow, with extremely short, fairly dense, fine, silken, recumbent hairs. Along the front and vertex run two parallel dark brown bands which touch the somewhat concave eye-borders laterally and the hinder ocelli inwardly, leaving between them an equally broad clear longitudinal tract free. Occipital margin sharp edged, the edge rounded; somewhat concave. Suture of the vertex very fine. Suture between front and vertex distinct. Forehead long and flat. Clypeus rather small, prominent, blackish brown. Clypeolus narrow, yellow. Upper lip blackish brown, strongly diverted towards the lower side and posteriorly. Cheeks expanded lobe-like below, with arcuate border; separated from the front by a roundish brown spot in which, close in front of the eye-border, the insertion of the antennæ occurs. Antennæ brownish yellow, becoming blackish beyond the middle; in the male on all sides with close and fairly erect long pubescence, in the female with sparser and more oblique pubescence which, on the hinder side, is still sparser and shorter. Ocelli small, dark reddish brown; interval between the posterior ocelli slightly shorter than the distance between them and the eye-borders. Eyes smooth, brownish yellow to reddish brown, generally dark spotted or banded, in the male with reddish gold sheen, glabrous, as in *S. erato*, n. sp., hardly differing in male and female. Temples quite displaced by the eyes. Maxillary palp scaleless, brownish yellow, apex of the third and the fourth joint pale brown; sense-club (fig. 96, *sk*) of the second joint relatively short and stout. Inner lobe of maxilla figured in fig. 111.

... parapsidal furrows and hind border ... places golden. Abdomen, in spirit- ... the segmental junctions brown on the ... brown at the sides, apex brown: finely and ... without scales.

... grayish white. tarsi brownish yellow. The ... is distributed as follows:—The anterior ... the basal half of the femora on the under ... before the apex, the latter sometimes very ... on the hind legs; on the upper side of the ... and the extreme margin of the apex; a ring before the ... tibiæ, the hind tibiæ with exception of the base, ... a narrow ring in the middle; the base and the apex ... joint and the second and third tarsal joints.

... especially the somewhat expanded anterior ... (fig. 34) slender, apex moderately acute, the tooth ... apex much stouter than the other; between base and ... in the middle a ridge-like prominence, between this and ... row of bristly hairs.

... hind tibia 1·34 mm.: this carries on the outside three ... the inside nine very short spurs in addition to the ter- ... (four on the inside, two on the outside); each spur with ... which presents the same peculiar structure as ... the first posterior tarsal joint. The length of the first, ... and third posterior tarsal joint is 0·83 mm.: 0·07 mm.: ... their ratio is as $8\frac{1}{3}$: $\frac{7}{10}$: 1. First posterior tarsal joint ... 20 ctenidiobothria and two end spurs: each ctenidio- ... very broad and arcuate, overlapping its neighbour, margin ... Second posterior tarsal joint with one end spur. ... and tibiæ in their whole length beset with narrow silvery ... (brown on the brown parts), posteriorly abruptly truncate.

... wing tipped with a somewhat elongated but rounded apex ... male (fig. 39), which in the female is drawn out into a long ... tail-like acumination (fig. 40). The marking of the wing ... is produced by the dense scaling is shown in fig. 3 and is ... as follows:—The ground colour is deep brownish black: ... wing is traversed by numerous, irregular, much interrupted, ... thin cross bands with golden sheen, the base of the wing, a ... at the hinder border and at the outer border and a central ... band interrupted in the middle remaining free. The ... outermost cross bands is silvery. The tail-like elon- ... silvery, in the middle at the anterior margin a ... and also posteriorly behind and

inwards seamed with black; parallel to the inner seam a golden band which turns inwards and ends shortly before the re-entering angle ["einspringende Ecke"] of the outer margin, in which a silvery white spot bordered with golden scales occurs; the black hinder border of the wing apex with fine golden seam. Hinder border except middle and base seamed with gold; wing base golden.

Hind wing hyaline, apical quarter with very slender pale brown scales; the ends of r_{4+5}, *m*, *cu*, and *an* scaly; hinder border long and densely pubescent. Membrane of the hind wing iridescent from green to intense red. Venation and scaling are explained in the diagnosis of the genus.

Length of fore wing in male 4 mm., in female 4·2 mm.; wing expanse in male 9 mm., in female 10 mm.

Ceylon. Peradeniya; on tree trunks; February, 1905. Seven males (6 in alcohol) and eight females (1 in alcohol). Again in March, 1905, seven males and one female; collected by Mr. E. E. Green.

Amphientomum, Hagen. 1856.

Hagen. in Berendt. Benst. Org, 1856., Taf. II., p. 61. Taf. VII., fig. 21. Taf. VIII., fig. 10.

Hagen. Ent. Mo. Mag., vol. II., 1865., p. 148. *Id.* Verh. Zool. Bot. Ges. Wien., 1866, p. 203. *Id.* Ent. Zeit. Stettin., 1882, pp. 268–276. Taf. I., fig. VI., 1–8.

Enderein, Ann. Mus. Nat. Hung. Bd. I., 1905, p. 310. *Id.* Zoolog. Anz. Bd. 29, 1905, pp. 576–580, fig. 1–5.

Large forms, only known fossil in amber. Differs from the nearly related recent genera *Paramphientomum*, n. g., *Stimulopsis*, n. g., and *Seopsis*, n. g., by the absence of the radial branch r_1 from the hind wing; from the two last-named genera it also differs in the fact that the claws carry two teeth before the apex. Maxillary palp without spurs.

Table of the Species.

1. Scales of fore wing abruptly truncate at the end 2.
   Scales of fore wing emarginate at the end .. *colpolepis*, Enderl. 1905.

2. These scales shorter and broader, lateral borders converge towards the base .. *paradoxum*, Hag. 1856.

   These scales longer and narrower, lateral borders parallel .. .. *leptolepis*, Enderl. 1905.

Amphientomum colpolepis, Enderl. 1905.

A. paradoxum, Hag. 1856. Hagen. Ent. Zeit. Stettin, 1882, p. 268 partim.

A. colpolepis, Enderlein, Zool. Anz. Bd. 29, 1905, p. 577, figs. 2 and 3.

In the fore wing the cross vein between radial ramus and media is longer and more oblique than in *A. paradoxum*, Pick. Hag. The pterostigma appears to be shorter and narrower. In the hind wing the base of the radial ramus is absent so that the latter appears to arise from the media; r_1 reaches the anterior margin near the end of r_{2-3}.

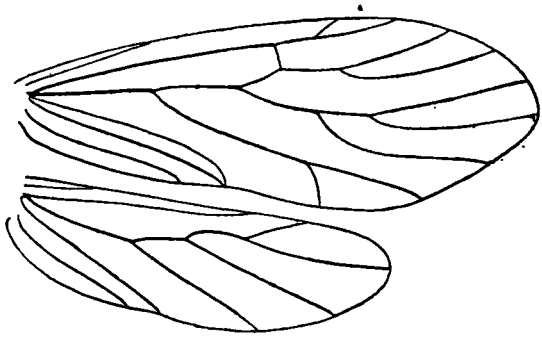

Fig. 1. *Amphientomum colpolepis*, Enderl.
Venation of fore wing and hind wing, × 27.

The distal portion of the subcosta, which forms the basal boundary of the pterostigma, is clearly recognisable and fairly distant from the point of origin of the radial ramus.

Terminal joint of maxillary palp relatively slender. First joint of posterior tarsus with about 27 ctenidia; the same joint 0·7 mm. long, second joint 0·06 mm., third joint 0·11 mm.

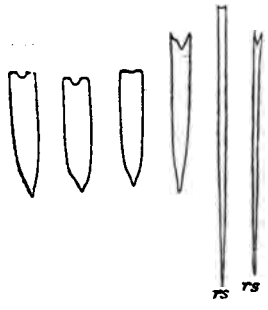

Fig. 2. *Amphientomum colpolepis*, Enderl.
Scales of fore wing; *rs* marginal scales × 280.

Scales of fore wing slender, at the end smoothly truncate, and in the middle more or less deeply emarginate; the marginal scales (*rs*) have two more or less long apices. Some scales near the margin, which are somewhat elongated, sometimes show an indication of a third denticulation. The scaling of the fore wing appears blackish with only a few small marginal spots between the ends of the veins.

Length of fore wing about 3·15 mm.

Found in amber of East Prussia. One specimen, No. 91 of the Künow Collection in the possession of the Paleontological Institute of the Royal Museum of the Natural History; also one of the specimens which Hagen assigned to *Amph. paradoxum*, Hag., in his new monograph on the Psocidæ in amber (Stett. Ent. Z., 1882, pp. 217–237 and 265–300).

Amphientomum paradoxum, Pict. Hag. 1856. *A. paradoxum.* Hagen im Berendt. im Bernst. bef. Organismen II., 1856, p. 61, Taf. VII., f. 21. Taf. VIII. f. 10; Hagen. Ent. Z. Stettin., 1882, pp. 268–276. Taf. I., fig. VI., 1–8; Enderlein, Zoolog. Anz. Bd. 29, 1905, p. 579, figs. 1, 4, and 5.

In all the available material examined by Hagen in 1882, the base to the radial ramus of the hind wing is constantly present. Hagen omits this stretch of vein from his figure and has presumably selected the hind wing of object No. 91 (*A. colpolepis*, Enderl.), which is preserved rather favourably, and has correlated it with

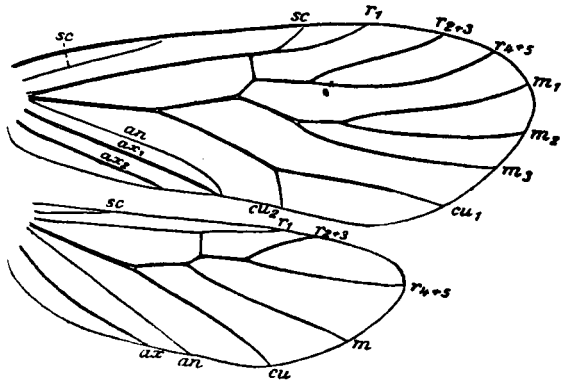

Fig. 3.—*A. paradoxum*, Hag. × 27.

Venation of fore wing and hind wing.

the fore wing of the typical *A. paradoxum*, Hag. It is clear with what caution the combination of several fragments should be undertaken.

r_1 always reaches the margin of the hind wing near the end of $r_2 \times_3$.

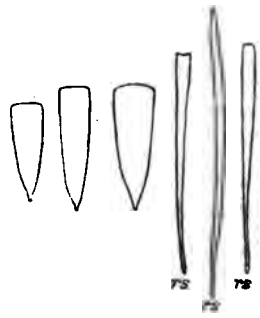

Fig. 4.—*A. paradoxum*, Hag.
Scales of fore wing × 280; *rs* = Marginal scales.

The scales are moderately slender, and usually expand feeble towards the end, where they are directly or somewhat roundly truncated. The slender marginal scales (*rs*) rarely show an extremely shallow emargination at the end (*cf.* fig. 4). The distal part of the subcosta, which closes the pterostigma in the fore wing, appears to be partly present in this species, and partly absent. It is certainly present in Nos. 81, 84, 85, and 95, whereas otherwise it is apparently lacking (Nos. 87, 89, 92).

Fig. 5.—*A. paradoxum*, Hag. Claw × 280.

Claw with two teeth before the curved apex; before the teeth three or more bristle-like hairs (fig. 5 from No. 89). The length of the first joint of the posterior tarsus varies from 0·85–0·88 mm.; that of the second joint from 0·08–0·09 mm.; that of the third from 0·1–0·12 mm.; the number of ctenidia on the first hind tarsal joint varies between 29 and 32; one specimen has 34 (No. 95).

The above statements supplement Hagen's detailed description (*l.c.* 1882). *Locality*: In East Prussian amber.

I had at my disposal Nos. 81, 82, 84–87, 89, 92, 93, 95, and 162 (nymph) from the Künow Collection. Nos. 81 and 85 present a quite colourless gold gleaming scaling; these animals had probably been sun-dried and bleached before they were completely saturated *with the resin.*

Amphientomum leptolepis, Enderl. 1905. A. paradoxum, Hagen. Ent. Z. Stettin, 1882, p. 268, partim. A. leptolepis, Enderlein Zool. Anz. Bd. 29, 1905, p. 580, fig. 6.

One specimen, closely resembling *A. paradoxum* in size and wing marking, differs in the very long, slender, and narrow form of the scales of its fore wing (fig. 6); the sides appear to be quite parallel.

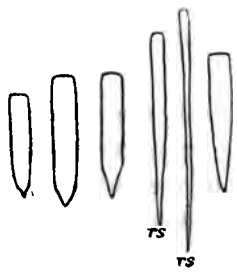

Fig. 6.—*A. leptolepis*, Enderl. Scales of fore wing × 280 *rs*= Marginal scales.

In addition, the number of the ctenidiobothria of the first hind tarsal joint reaches the number of about 36, which I have not observed in *A. paradoxum*. The length of the first hind tarsal joint is about 0·8 mm.; of the second 0·1 mm.; of the third 0·11 mm.

I leave it doubtful whether the specimen under reference represents a separate species or whether it is to be regarded as a variety of *A. paradoxum*, Hag.

In East Prussian amber. No. 94 of the Künow Collection.

Paramphientomum, n. g.

Type: *P. Nietneri*, n. sp.

Closely related to the fossil genus *Amphientomum*, Hag., from which it differs by the absence of the first radial branch (r_1) in the hind wing. Claws with two teeth before the apex. Maxillary palp (2nd–4th joints) with spurs.

A large form which is extraordinarily similar in marking to *A. paradoxum*.

One species from Ceylon.

Paramphientomum Nietneri, n. sp. (figs. 7, 27–29, 34, 56, 112.)

Head clear brownish yellow, dull, and glabrous, almost hemispherical since all parts (eyes, clypeus, &c.) are developed without convex projections and without projecting edges; the occipital margin is very sharp, steeply descending; the sharp edge slightly rounded and straight. Suture of vertex very fine, middle of the

vertex with two broad brownish longitudinal streaks, leaving free only a very fine yellowish line along the suture. Temples absent. Eyes relatively small, not prominent, hairless, brownish, with red-golden sheen. Cheeks strongly arched, expanding below, whitish yellow. Clypeus relatively small, set off by a fine groove, slightly convex. Clypeolus narrow, pale. Upper lip smooth, black. Maxillary palp pale yellowish, end joint slender and brown; second joint with two spurs, third with three, fourth with two strong and relatively long spurs.

Ocelli (fig. 34) very small, the anterior ocellus half the diameter of the posterior ocelli; the interval between the latter about half as great as the interval between them and the eye-borders. Suture between forehead and vertex absent.

Antennæ thin, about three-fourths the length of the fore wing, brown, the three first joints clear brownish yellow, fairly closely and fairly long pubescent, at the base chiefly pubescent in front only (probably all specimens female). Inner lobe of maxilla represented in fig. 112.

Mesothorax brown above, beset with gray scales which have mostly dropped off. Abdomen of dried specimens brown. Legs clear brownish yellow to whitish yellow. The following parts are dark brown :—The extreme upper apex of the femora; the tibiæ with exception of the apex and of a ring in the middle, in the hind tibiæ with exception of the base also; the first tarsal joints except the apical third in the fore leg, and the apical half and more in the middle and hind legs. Femora little expanded, the hind femora not expanded. Hind tibiæ with a great number of almost upright, short (long in comparison with *syllysis*, &c.) spurs which are distributed on all sides of the tibia. The length of the anterior tibia is 0·57 mm., of the middle 0·63 mm., and of the posterior tibia 1·23 mm. Claws (fig. 56) slender with two teeth before the apex and inwardly outside the edge with fine hairs. The length of the first, second, and third fore tarsal joints respectively is 0·42 mm., 0·08 mm., 0·01 mm.; of the mid tarsal joints 0·45 mm. 0·07 mm., 0·09 mm.; of the hind tarsal joints 0·85 mm.; 0·1 mm. 0·14 m.m. The ratio of the hind tarsal joints is therefore as $8\frac{1}{2} : 1 : 1\frac{2}{5}$. First hind tarsal joint with about 27 ctenidiobothria. Femora, tibiæ, and first tarsal joints scaly.

The closure of the pterostigma fails through the absence of the distal piece of the subcosta (fig. 27). Stigma sac well developed, short and thick. Membrane of fore wing brown, apical angle almost hyaline. Veins brown, those of the apical third dark brown. *In consequence of* the scaling, a gray silver ground colour is present,

which is interrupted by black brown marking (fig. 7), rather variable; the veins are generally seamed with yellow, feebly golden scales, which more or less disappear in dark specimens, but numerous yellow scales are always found. The brown marking is illustrated in fig. 7, and is very similar to that of *Amphientomum paradoxum*, Hag., from the amber; frequently it spreads still more over the wing, sometimes it becomes somewhat reduced especially in the apex. In the hind wing the scaling of the outer margin is only slightly continued in the apex into the membrane, the latter iridescent intense violet, red to golden.

The scales of the fore wing are long, slender, with parallel sides and moderately emarginate ends (fig. 28); marginal scales slender, rather narrow, with two generally very long apices. Scales of the outer margin of the hind wing similarly deeply bifid at the end.

Length of fore wing 2·6–3·4 mm.; expanse of wings 6–8 mm.

Ceylon, Peradeniya, on moist walls. January, 1905, sixteen specimens, probably all female. June, 1905, one specimen. Collected by Mr. E. E. Green.

I have dedicated this species to Mr. Nietner, who collected, with so much interesting material of other orders in Ceylon, the examples of the Amphientomides and Lepidopsocids diagnosed by *Hagen*.

Stimulopalpus, n. g.

The first radial branch is lacking in the hind wing. Maxillary palp (fig. 130) with spurs at the second, third, and fourth joints. Claws (fig. 128) with one tooth before the apex. Hind tibia with numerous spurs.

One large species from Japan.

Scales of the fore wing (fig. 129) deeply emarginate, especially the marginal scales (*rs*), which have two long to very long apices; scales of hind wing resembling the latter.

Stimulopalpus japonicus, n. sp.

Plate C., Figs. 127–130.

Head pale grayish white; upper lip and clypeus dark brown, as are also the sides of the forehead and a narrow median cross bar before the anterior ocellus upon the forehead.

The vertex is brown except for a large round spot in the middle of each half, and the distinct suture of the vertex. The neighbourhood of the ocelli is grayish white.

Antennæ very thin, about three-fourths the length of the fore wing; dark brown with exception of the first three joints, sparsely

longitudinal bands are continued upon the relatively narrow forehead, but never coalesce there. Over the middle of the convex clypeus passes a broad brown band divided into two parts in the middle line by a fine yellow line. Clypeolus yellowish. Upper lip black-brown, at the sides brown. Cheeks whitish. Inner lobe of maxilla shown in fig. 103. Maxillary palp without spurs, whitish, the first joint and basal half of second joint brown. Eyes relatively small, black, frequently pale speckled or banded, hairless. Ocelli (fig. 35) very small, very near together. Occiput steeply descending, occipital margin rounded and emarginate in the middle. Antennæ thin, about two-thirds the length of the wing, black-brown, the three first joints reddish brown; rather sparsely pubescent, somewhat more densely towards the apex; the lengths of the eleven (antennary) joints of the flagellum in millims. are: 0·09, 0·12, 0·14, 0·12, 0·11, 0·09, 0·08, 0·08, 0·05, 0·05, 0·06.

Thorax brown, with golden scales in the middle, some silver scales at the side, most of the scales lost. Abdomen of dried specimens brownish. Legs brown, the following parts clear brownish yellow: the apices of the coxæ, the trochanters, the extreme apex of the femora below, the extreme base of the tibiæ, the apices of the tibiæ and first tarsal joints, and the very short spurs standing out on all sides of the posterior tibiæ. The length of the anterior tibia is 0·47 mm., that of the middle tibia 0·47 mm., of the hinder tibia 1 mm.

The lengths of the tarsal joints of the fore foot in millims. are 0·3, 0·05, 0·08; of the mid foot 0·33, 0·05, 0·07; of the hind foot 0·52, 0·06, 0·08. The ratio of the hind tarsal joints is therefore as $6\frac{1}{2} : \frac{3}{4} : 1$. First hind tarsal joint with about 18 ctenidiobothria. Claws (fig. 58) relatively small, one tooth before the apex, which is very long and acute, before the tooth about 7 setiform hairs. Femora, tibiæ, and first tarsal joints squamous.

The venation is illustrated in fig. 30. Pterostigma very short and small, far removed from the ramification of the radial ramus, the distal portion of the subcosta remote. Peduncle of the radial fork nearly equal to the length of r_{4+5}. The basal portion of the radial ramus is lacking in the hind wing, and the radial ramus apparently arises from the media; r_1 is absent (r ends at the place where the radial ramus should have been given off). The marking of the fore wings produced by the scaling is as follows:—Ground colour silvery, a golden longitudinal band through the centre of the wing which spreads out in the apical half as far as the hinder margin and is interrupted by two or three silver spots; in the anterior half of the wing, in front of the line joining the most anterior portion of

the root of the wing to the wing apex, occurs near the middle a clear, gray brown, rather broad cross band which runs from the anterior margin obliquely backwards and ends directly truncate. In the anterior half of the wing the following places are dark brown :—A narrow brown longitudinal band from the anterior margin of the wing base, in the first half lying against the anterior border, in the second half directed obliquely backwards and towards the wing apex ; close beside the gray brown cross band on the inner side of it a nearly equally broad parallel cross band, outside the gray brown band and also close beside it another very narrow parallel cross band. Outside the latter a dark brown marginal spot produced acutely backwards, outside this again a minute marginal spot over the apex. Hinder border with a dark brown zigzag seam, broad at the base, expanding at the end of the first third to an acute triangle, the apex of which reaches to about the middle joint between posterior and anterior margin, then becomes strongly attenuated ; it is interrupted in the middle and, before ending before the apex, encloses one or two golden spots. Hind wings hyaline, veins pale brown, apical border with long scales, hinder border with very long hairs ; in the membrane scales only occur at the anterior margin of the apex upon a very narrow zone (fig. 5) ; membrane blue to intense red violet iridescent to golden yellow.

The scales of the fore wing (fig. 31 *a*) are relatively slender, the sides parallel, feebly emarginate at the end ; the marginal scales are very narrow and long, strongly bifid at the end (fig. 31 *β*); the scales of the hind wing are slenderer and attenuate gradually toward the base and are at the end usually more or less emarginate or smoothly truncate (fig. 31. *γ*. *δ*. *ε*.), the marginal scales (fig. 31. *ξ*.) like those of the fore wing, though usually less strongly bifid at the end.

Length of fore wing 2 mm., wing expanse 4½ mm.

Ceylon. Peradeniya. January, 1905 ; on the outer surface of walls and verandahs ; 13 specimens ; collected by Mr. E. E. Green.

Seopsis superba (Hag., 1865).

(Figs. 6, 32, 36, 123.)

Amphientomum superbum, Hagen, Ent. Mo. Mag., vol. II., 1865, p. 150.

Perientomum superbum, Hagen, Verh. d. Zool. Bot. Ges. Wien., 1866, p. 210.

Perientomum superbum, Hag., Enderlein, Ann. Mus. Nat. Hungar., Bd. I., 1903, p. 322.

Seopsis superba (Hag.) *m.*

Vertex yellowish brown to reddish brown, in the middle a dark brown longitudinal band which is sometimes crossed in the centre by a more indistinct transverse band; a narrow seam at the inner borders of the eyes. Suture of the vertex fine. Ocelli relatively close together, the interval between the two posterior ocelli one-third to one-fourth of the interval between them and the eye-borders. Forehead dark red-brown, with delicate gray pubescence. Clypeus black-brown with very fine gray pubescence, moderately convex. Clypeolus usually clear yellowish, short. Labrum black. Maxillary palp without spurs, black; end-joint, except its extreme base, whitish yellow. Antennæ about two-thirds the length of the fore wing, black-brown, the four first joints dark red-brown, the apex of the third and fourth joint, sometimes also the apex of the second joint (second basal joint), very pale brownish yellow. The length of the eleven (antennary) joints of the flagellum are in millims.: 0·15, 0·17, 0·2, 0·2, 0·16, 0·13, 0·1, 0·1, 0·07, 0·06, 0·07. Eyes fairly large, black, sometimes with golden lustre, glabrous. Temples displaced.

Thorax black above, covered with golden scales, especially behind. Abdomen in the dried animal blackish. Legs black, ends of the coxæ, the trochanters, the apices of the femora, tibiæ, and first tarsal joints clear brownish yellow to whitish yellow with golden lustre; the apices of the first tarsal joints are often only at the extreme tip pale coloured; in the hind legs this clear colour becomes sometimes almost entirely obliterated. In clearer specimens the three tarsal joints incline to a pale colouration. The length of the anterior tibiæ is 0·5 mm., of the middle tibiæ 0·48 mm.; and of the hind tibiæ 0·95 mm. The lengths of the tarsal joints of the fore foot in millims. amount to: 0·28, 0·05, 0·08; of the middle foot, 0·32, 0·07, 0·08; of the hind foot 0·6, 0·08, 0·1. Ratio of the posterior tarsal joints as 6 : $\frac{4}{5}$: 1. Claws slender, with one rather stout tooth before the apex. First hind tarsal joint with 23 ctenidiobothria. Femora, tibiæ, and first tarsal joints squamous. The posterior femur is shown in fig. 123.

Venation illustrated in fig. 32. Pterostigma very short and small, distal portion of the subcosta distinct. The basal part of the radial ramus in the hind wing is lacking (the ramus apparently arising from the media); r_1 is absent and r ends at the place where the radial ramus should begin. The pattern produced by the scaling of the fore wing (fig. 6) is the following:—Black brown to brown with golden marginal spots between the ends of the veins, a narrow golden band (which is often broken up into points) near the outer *margin, and parallel* to the latter; in the middle of the anterior

margin a large golden spot which radiates diffusely through the wing to the hinder margin ; at the nodulus a large golden spot which usually radiates indistinctly and diffusely towards the middle of the anterior margin ; wing base golden ; at various places isolated golden scales ; the marginal spot of the middle of the anterior margin and that between the ends of r_1 and r_{2+3} are generally the largest of the wing, sometimes the remaining golden marking decreases in proportion to these, with the exception of the outer marginal spots. In the hind wing the membrane of the apical zone with clear brownish scales ; membrane red to intense golden yellow, with greenish golden yellow iridescence.

Scales of the fore wing (fig. 36 *a*) relatively broad and short, at the end smoothly truncate, the marginal scales (fig. 36 *β*) slender, relatively broad and emarginate at the end ; scales of the hind wing (fig. 36. *γ*. *δ*. *ε*.) similarly emarginate.

Length of fore wing 2·2 mm., wing expanse 4½ mm.

Ceylon, Peradeniya, January, 1905, one specimen on a tree trunk ; February, 1905, two specimens on tree trunks ; March, 1905, one specimen on a tree trunk ; collected by Mr. E. E. Green.

Seopsis metallops, n. sp.

(Figs. 4, 33, 57, 92, 93, 121.)

Head deep dull sammet black, rarely brownish black ; clypeus, forehead, and frontal margin of the vertex rather thickly covered with a microscopic pubescence having a strong metallic green lustre ; on the clypeus this pubescence forms very fine closely packed parallel longitudinal streaks. Over the middle of each half of the vertex passes a flat but very distinct longitudinal impression, which is continued upon the not very long forehead, where it marks off a roundish median prominence which carries in the middle a small roundish clear yellowish brown spot ; in the middle of each of the impressions of the vertex occurs an equally large and similarly coloured spot. These three clear round spots lie in the angles of an imaginary isosceles triangle, whose apical angle is little short of 60°, and they are extraordinarily deceptive, resembling the ocelli when examined with a low power lens. The actual ocelli are very small and shine like orange yellow glass beads ; the anterior is a little larger ; the distance between the two posterior ocelli is about half as great as their distance from the eyes. Clypeolus clear yellowish brown. Upper lips glossy brown black, rarely brown. Occiput steeply descending, but at the same time strongly rounded. Suture of the vertex very fine, sometimes pale brown behind. Eyes fairly large, hardly prominent. Antennæ moderately thin,

ends (fig. 33. β.), rarely, towards the outer wing margin, very shallowly emarginate at the end (fig. 33. γ.). Marginal scales (fig. 33 δ) hair like. In the hind wing the hyaline membrane and the pale grayish brown veins are completely scaleless and hairless; outer and hinder margin long haired, only at the outer margin between the hairs occur single slender scales (fig. 33, $\varepsilon.\zeta$), which are incised at the end. Membrane of hind wing with dull gray lustre.

Length of fore wing 2·4 mm., wing expanse 5½ mm.

Ceylon, Diyatalawa. April, 1905; on rocks; ten specimens probably female; collected by Mr. E. E. Green.

Hemiseopsis, n. g.

Type:—H. Fülleborni, Enderl. 1902.

First radial branch (r_1) present in hind wing. Claws with one tooth before the apex.

One large species from Africa.

Hemiseopsis Fülleborni, Enderl. 1902.

Amphientomum Füllebornii, Enderlein. Mitt. Zool. Museum, Berlin. Bd. II., 2 H., 1902, pp. 14-15. Taf. 5, figs. 1, 4, 6, 8, 10, and 11.

Head reddish brown. Eyes large, somewhat prominent. Antennæ with nearly hairless joints of usual size; perhaps 13-jointed; the ends are broken off, but they appear to be shorter than the fore wing. Upper lip fairly large. Clypeus convex, feebly emarginate in front; with the microscope a meshwork can be seen whose more compact places are beset with very small round clear spots. Clypeolus not marked out. The two mandibles highly asymmetrical. Inner maxilla of a complex shovel shape. Anterior ocellus nearly at the anterior margin of the rather broad forehead, the two posterior ocelli in the extreme anterior angles of the vertex, close beside the eyes. Vertex quite hairless, suture rather fine. Occipital margin rather steeply descending. Maxillary palp brown, first joint very short, second longest, third very short, fourth nearly as long as second; second and third joints with narrow hair-like scales.

Prothorax rather broad and clearly visible from above, very pale brown. The remaining thorax clear brown with pale sutures. Abdomen pale brownish white, the two last segments clear brown. Legs clear brown, apices of the femora, tibiæ, and of the first tarsal joints pale, likewise the middle of the tibiæ. Fore legs beset

scales. Claws with a large acute tooth before the apex, the rest of the anterior margin of the claws beset with long delicate hairs. First hind tarsal joint with a row of 22 setæ with slightly developed ctenidiobothria. Ratio of the hind tarsal joints as 6 : 1 : 1¼.

Wings hyaline, feebly brown; fore wing with brown tinted basal half, only at the anterior margin of the base and along the analis clearer; the brown colour becomes gradually fainter towards the outer margin. Veins brown, analis and veins of the apical half dark brown. The second axillaris long and distinct. In the hind wing the media, ramus radialis, and cubitus are brown, the remaining veins pale; the axillaris is very long. The base of the fore wing is sparsely beset with scales, which are arranged fairly symmetrically on both wings. Head, body, and legs (apart from the fore legs) without scales. The distal end of the scales is only slightly convexly truncate.

Length of fore wing 3¼ mm., wing expanse 7½ mm.

German East Africa. Lagenburg on Lake Nyassa. Captured at lantern, November 24, 1899. One female; collected by Dr. Fülleborn.

A nymph which doubtless belongs to *Hemiospis Fülleborni* is yellowish with faint brownish wing sheaths in which the definitive venation shows through and is particularly distinct in the distal half. The antennæ are distinctly 13-jointed; the last joint presents at the end an extremely short and faint constriction, which however does not represent an articulation. The hairs of the antennæ are moderately dense and long. The tarsi are 2-jointed, as in the larvæ and nymphs of all species with 3-jointed tarsi in the adult, nevertheless one sees through the nymphal skin two distinct joints lying within the second joint, the first of which is beset with setæ, the second being destitute of these structures, but having ctenidibothria. The inner lobes of the maxillæ are primitively bifid.

Length of fore wing 1¼ mm., of hind wing 1 mm. Body length 2½ mm.

German East Africa. Mararupia, Ukinga. In a forest ravine, on leaves, September 22, 1899, collected by Dr. Fülleborn.

Stigmatopathus: Enderl. 1903.

Enderlein, Ann. Mus. Nat. Hung., Bd. I., 1903, p. 312.

Ocelli absent. Only one axillary vein in the fore wing. R_1 and *sc* of the pterostigma lie close beside one another. In the hind *wing* r_1 *is absent*. Claws with one tooth before the apex.

Stigmatopathus Horváthi, Enderl. 1903.

Enderlein, Ann. Mus. Nat. Hung., Bd. I., 1903, p. 313.

Taf. 57 *a–e*.

In the marking of the fore wing this species reminds somewhat of *Seopsis vasantasena*, Enderl.

Further India, Malacca.

Fam. LEPIDOPSOCIDÆ.

Enderlein, Ann. Mus. Nat. Hung., Bd. I., 1903, pp. 206 and 319

Head large but very short ; forehead and vertex very densely and shaggily hairy, rarely thin-haired but always long and shaggy. Eyes and clypeus very little convex. Occiput very steeply descending and sharp-edged, the edge usually little rounded. Eyes moderately large with very dense and short sammet-like pubescence. The three ocelli far asunder, the anterior ocellus sometimes smaller ; they are only absent in *Echinopsocus*, Enderl., 1903. Maxillary palp 4-jointed, first joint very short, the last strongly expanded and cut off at the end like an axe. Inner lobe of maxilla narrow at the end, with three long apices. Organ of the maxillary palp in the form of a short sense club on the inner side of the second joint of the palp. Labial palp 2-jointed, both joints distinctly separated. Antennæ usually thin, with sparse and rather long pubescence, which towards the base becomes long and shaggy ; the number of antennary joints amounts in the Perientominæ to about 20–25, in the Lepidopsocinæ and Echinopsocinæ about 30–47. The (antennary) joints of the flagellum are relatively long in the Perientominæ, in the Lepidopsocinæ and Echinopsocinæ very short (moniliform) or at most about twice as long as thick.

Prothorax large, very short but lying in front of the mesothorax (not concealed under the latter), distinctly visible from above and free ; mesonotum densely scaly. Femora and tibiæ beset with slender scales. Hind tibia (fig. 117) with a great number of very long stout setæ on the outer side distributed along the whole length. Tarsi 3-jointed. First hind tarsal joint with a row of ctenidiobothria (ctenidia). Claws with one tooth before the apex, rarely traces of two others ; without hair-like denticles. Empodial appendix setiform.

Fore wing more or less broad to narrow ; on the outer side usually more or less strongly acuminate, sometimes drawn out into a long thin apex. The subcosta bounds a much thickened, strongly chitinised, narrow area, which extends along the anterior margin from the base approximately up to the middle of the wing and is densely beset with very long and thick upright setæ (macrochætæ). The distal piece of the subcosta which bounds the pterostigma is very long and never wanting ; in the Echinopsocinæ it is unusually

long. The pterostigma is large, cell-like, not strongly chitinised (as it is in most Copeognatha), but thin-walled; in the Echinopsocina it is a very long triangular cell projecting deep into the wing. Stigma sac at the basal part of the distal stretch of *sc*. In the genus *Soa*, Enderl. 1903, the subcosta (*sc*) is not divided into two parts, as in all the other Copeognatha; a cross vein between the end of the proximal part of the subcosta and the stem of the radius effects the union (fig. 41). The pterostigma (branch r_1) is united with the peduncle of the radial fork by a cross vein, or fused with it over a certain extent; by this means a small 5–6 angled cell is enclosed which is absent in *Lepidopsocus* and the Echinopsocinæ. In the Echinopsocina the radial ramus is not bifurcated but simple. Media triramous or biramous (*Echinopsocus*, Enderl., 1903). Radial stem in *Lepidopsocus*, Enderl., 1903, and the Echinopsocina strongly reduced in the basal portion, so that only one row of setæ or insertion-cupules indicate its course. Radial ramus constantly fused with the media over a greater or lesser extent. Areola postica long, peduncle usually short; cu_1 and cu_2 very long. Analis and axillaris never end at one point, but always separated from one another by an interval.

In the hind wing the radial stem and the median stem coalesce (Lepidopsocinæ), or are only separated by a long and extremely narrow cell (Perientominæ). Radial ramus concrescent with the media in the basal part, consequently r_1 apparently arises from the media or radial ramus. Media with two quite separate branches. In the Echinopsocinæ the hind wing is absent or only developed in miniature.

Fore wing and hind wing with pronounced sharp and broad marginal vein. Membrane of fore wing densely scaled; no delicate short hairs between the scales but only scattered very long stout hair-like scales. Veins and a narrow marginal zone of the fore wing with some stout setæ (macrochætæ). The wing margin is beset with very long hairs which are inserted upon plug-shaped cupules which are closely arranged in numerous transverse series on the marginal veins. Hind wing entirely scaleless. At the border of the fore wing occur some moderately long spindle-shaped marginal scales whose edge in the apical half is finely spinose or serrate (fig. 51 *rs*).

In the Perientominæ the scales are strongly differentiated. Besides the slender fusiform sometimes more or less serrate marginal scales in the dorsal half of the fore wing there are two forms of scales on the membrane of the fore wing, the one kind is much larger and relatively longer (COVER SCALES), the other smaller and relatively shorter (GROUND SCALES). The former are present

in fewer numbers than the latter. Both are usually shorter or longer fusiform, frequently with acutely produced apex; rarely are they oval or elongate elliptical; sometimes the ground scales are more or less faintly truncate at the end with rounded angles or feebly emarginate (*Perientomum Greeni*, Enderl., fig. 53); in *Perientomum triste*, Hag. (fig. 63) the ground scales are fusiform, the cover scales spatuliform with concave end (rarely with rounded end); in *Nepticulomima chalcomelas*, Enderl., all the scales are spatuliform with straight cut or feebly concave end. In the Lepidopsocinæ the scales are uniformly asymmetrical with produced apex (fig. 107), only the marginal scales are symmetrically fusiform; in the Echinopsocinæ similar scales occur, but they are intermingled with symmetrical fusiform (*Echinopsocus*, Enderl.) or spatuliform and fusiform (*Scolopama*, Enderl., fig. 109). The margin of the fore wing is in the majority densely beset with very long hairs. There are never any scales on the hind wing.

TABLE OF THE SUB-FAMILIES OF LEPIDOPSOCIDÆ.*

1. Fore wing with stout macrochætæ only in the costal area; hind wing with distinct but very narrow closed radial cell (*R*); scales of the wings, the body, and the legs all symmetrical. Antennæ with about 20 to 25 joints, the individual joints relatively long .. .. .. PERIENTOMINÆ.

*Where the scaleless genus *Thylax*, Hag., 1865 (which is probably the representative of a special sub-family, Thylacinæ) is to be placed, cannot be established on the basis of Hagen's description. I have just received the work of Meunier, entitled "Perientomum mortum, Hag. (Meun.), archiptère Psocide du Copal fossile de Zanzibar; Le Naturaliste No. 456, 1906." A comparison with the species of the genus *Perientomum* shows that the venation of the hind wing diverges from that of all Perientomidæ in the union of the two median branches (m_1 and m_2) to a fork. Meunier says nothing about scales, and since the long hairs of the fore wing are inserted in fig. 3 the scaling would certainly have been mentioned. Now, as the Empheriidæ (*cf.* p. 18) have constantly a median fork in the hind wing, and Hagen's description (Ent. Monthly Mag., vol. II., p. 172) fully agrees with the description and illustration of Meunier, especially in comparison with *Empheria*, Hag., and finally the wings are destitute of scaling, it seems to me to be very probable that Meunier has had *Thylax* before him.

Even if it should turn out that this animal is in fact scaly, I think it highly probable that *Thylax madagascariensis* and *Perientomum mortuum* are identical and that the former has only been strongly rubbed; then *Thylax* would have to be placed near *Perientomum* among the Perientominæ. Against this, however, there is the fact that the Lepidopsocidæ never possess a median fork in the hind wing, and it seems to me therefore in the highest degree probable that my view expressed above on p. 48 is the correct one, namely, that *Thylax* Hag., represents the type of a distinct sub-family, the Thylacinæ, which is to be classified under the Empheriidæ.

Fore wing with usually very long macrochætæ on the costal area and also on the veins, sometimes also on the membrane of the marginal seam. Hind wing without radial cell (without a closed cell); sometimes greatly reduced or absent. The wing scales all asymmetrical (Lepidopsocinæ) or at least predominantly so. Antennæ moniliform, with more than 30–47 very short joints, or at most the joints are as much as twice as long as thick .. .. .. 2.

2. Radial ramus bifurcated. Hind wing without radial cell, otherwise normal .. LEPIDOPSOCINÆ.
Radial ramus not forked. Hind wing much reduced, without veins; or quite absent .. .. ECHINOPSOCINÆ.

Sub-family PERIENTOMINÆ.

Enderlein, Ann. Mus. Nat. Hung. I., 1903, p. 208.

TABLE OF THE GENERA.

1. Wing broad, strongly rounded at apex. Subcosta not broken up into two parts; the ramus communicans is a cross vein towards the stem of the radius .. .. *Soa*, Enderl. 1904.

[Type :—*S. Dahliana*, Enderl. 1904.]

Wing more or less narrow, more or less acuminate; subcosta as in all other Copeognatha broken up into two parts, the ramus communicans being absent .. .. 2.

2. In the hind wing r_1 arises between the points of origin of m_1 and m_2 .. 3.
In the hind wing r_1 arises between the origins of m_1 and r_{4+5}. (In the fore wing r_1 coalescent with the peduncle of the radial fork for a short distance or at one point) .. *Nepticulomima*, n. g.

[Type :—*N. Sakuntala*, n. sp.]

3. In the forewing r_1 (posterior border of pterostigma) coalescent with the peduncle of the radial fork for a short distance or at one point .. *Perientomum*, Hag. 1866.

[Type :—*P. trichopteryx*, Hag. 1859.

In the forewing r_1 united with the peduncle of the radial fork by a cross vein .. .. .. *Lepium*, n. g.

[Type :—*L. chrysochlorum*, n. sp.]

Soa, Enderl. 1904.

Enderlein, Zool. Jahrb. Syst., Bd. XX., 1904, pp. 109–110. Taf. 7. f. 2–9.

Type: *Soa Dahliana*, 1904.

Wing broad, strongly rounded at apex. Subcosta not divided into two parts, as it is in all other Copeognatha; the ramus communicans is a cross vein towards the stem of the radius. Claws with two teeth before the apex. Scales (fig. 44) oval, partially roundly truncate at the end. Marginal scales narrow, truncate at the end. End joint of maxillary palp large, more or less axe-shaped. The three ocelli fairly close together, the anterior ocellus very small. Head very sparsely hairy. Antennary joints long.

TABLE OF THE SPECIES.

Hair of the outer margin brown. Maxillary palp brown; end joint relatively narrow, rather rounded at the end .. *Dahliana*, Enderl. 1904.

Hair of the outer margin bright yellow. Maxillary palp brilliant black; end joint broad, at the end obliquely truncate .. .. *flaviterminata*, n. sp.

Soa flaviterminata, n. sp. (Figs. 8, 41, 44, 59).

Head brilliant dark brown, sparsely beset with long and short black hairs; labrum and clypeolus yellowish. Clypeus remarkably small, hemispherical. Forehead very long. Ocelli fairly close together, the anterior ocellus very small. Suture of vertex very delicate. Eyes moderately convex, large, black; pubescence extremely short, close and fine. Occipital margin sharp like a knife edge and descending at an acute angle; in the middle somewhat excavated. Antennæ thin, brown, about two-thirds length of fore

wing, then broken off; 18 joints present. Antennary joints of the flagellum long, as in *Perientomum*, sparsely beset with long hairs. The lengths of the existing antennary joints in millims. are: 0·06, 0·08 (basal joints), 0·19, 0·15, 0·14, 0·12, 0·09, 0·09, 0·08, 0·09, 0·08, 0·09, 0·1, 0·09, 0·1, 0·09, 0·08, 0·09. Maxillary palp brilliant black, pubescence gray; end joint thick, broad, obliquely truncate at end.

Thorax dark reddish brown; mesonotum, as it appears, has been covered with dark brown scales which, however, in the present specimens have been rubbed off. Legs brown to black-brown, ends of the tibiæ and tarsi brownish yellow. The length of the anterior tibia is 0·57 mm., of the middle tibia 0·65 mm., of the posterior tibia 1·05 mm. The lengths of the tarsal joints in the fore foot are respectively 0·24, 0·07, 0·08 millims.; in the middle foot 0·25, 0·07, 0·08; in the hind foot 0·42, 0·07, 0·08. The ratio of the hind tarsal joints is therefore as $5\frac{1}{4} : \frac{7}{8} : 1$. First hind tarsal joint with about 17 ctenidiobothria. Claws (fig. 59) large, with large stout tooth rather distant from the thin apex, long setiform semi-circular empodial appendix curved inwards and a small tooth between this and the tooth before the apex.

Wing large, very broad, and relatively short, strongly rounded at the apex. Membrane of fore wing blackish brown. Veins dark brown. Pterostigma very narrow, but deep. Peduncle of the radial cell short, m_1 ending below the apex. Scaling dark brown with intense red silken lustre (fig. 8); in a second specimen this lustre is dull dark greenish; it appears to be subject to great variation. Marginal hair rather short, that of the anterior margin up to the apex blackish, that of the outer margin up to the apex bright yellow with silken lustre (fig. 8). Hind wing hyaline, veins gray brown; marginal hair long, gray. Membrane of the apical third and a narrow zone at the anterior and posterior margin pubescent. Radial cell, R_1 fairly narrow. Membrane brightly iridescent from red to green.

Scales ovate (fig. 44), partly feebly truncate at the end, though strongly rounded. Marginal scales (*rs*) narrow and long, truncate at the end, but rounded at the angles.

Length of fore wing 2·4 mm. wing expanse $5\frac{1}{2}$ mm.

Ceylon, Peradeniya. On the wall of the bungalow verandah; April. 1905; two specimens, collected by Mr. E. E. Green.

Soa Dahliana, Enderl. 1904.

Enderlein, Zool. Jahrb. Syst., Bd. XX., 1904, pp. 110–111. Taf. 7, figs. 2–9.

Bismarck Archipelago. Ralum (New Britain).

Lepium, n. g.

Type: *L. chrysochlorum*, n. sp.

Wing more or less acuminate. The first radial branch (r_1) in the hind wing arises between the origins of m_1 and m_2. In the fore wing r_1 (the posterior border of the pterostigma) is united with the peduncle of the radial fork by a cross vein.

Claws with one tooth before the apex. Scales fusiform with more or less produced apex (figs. 61 and 65). Pterostigma relatively small and narrow.

TABLE OF THE SPECIES.

Wing broad, apex subacute. Scaling of fore wing brown-black with metallic green lustre with some golden scales intermingled ..	*chrysochlorum*, n. sp.
Wing narrow and strongly acuminate towards the apex. Scaling of fore wing blackish brown to dirty gray-brown ..	*luridum*, n. sp.

Lepium chrysochlorum, n. sp. (fig. 15).

Perientomum morosum, Hag. Enderlein, Ann. Mus. Nat. Hung. I., 1903, p. 323. Taf. XIII, figs. 64 and 64*a*; and Taf. XIV., fig. 64 *b*.

Head clear brown-yellow, closely beset with long, brownish, setiform hairs. Occiput moderately compressed lamelliform, fairly sharp. Maxillary palp with axe-shaped terminal joint, which is black-brown. Eyes rather large, somewhat prominent, brown; closely and finely pubescent. The posterior ocelli distant from one another, large, rather near the eyes; anterior ocellus small. Occipital margin fairly sharp. Upper jaws strongly asymmetrical. Inner maxilla with three long and widely separated main teeth which, in part, carry further indistinct teeth. Labial palp distinctly 2-jointed, first joint with two hairs above, second joint large, with some setæ, at the end closely beset with long taste bristles. Lobus externus of the labium rather small, lobus internus only occurring as a vestige. The two chitinous filaments of the paraglossæ of the hypopharynx join together far back. Antennæ short and thin, 16 joints are preserved, the rest broken off; pale brown, sparsely beset with long, almost setiform hairs.

Prothorax short but broad, clearly visible from above. Thorax and abdomen pale brown. Legs clear brown yellow, fore legs pale;

tibiæ strongly and thickly beset with narrow scales and with a number of very long, erect set, especially the hind tibiæ. Femora closely beset with broad scales and long, delicate hairs. Tarsi without scales. First tarsal joint closely beset with short setæ. First hind tarsal joint with about 19 ctenidiobothria, second hind tarsal joint with 3 ctenidiobothria, third hind tarsal joint almost hairless. The teeth of the ctenidiobothria are hair-like and each ctenidiobothrium consists of a large number of long and delicate hairs arranged in a row. Claws very long and narrow with a small stout, rather blunt tooth near the apex. Empodium with a seta on each side. Ratio of the hind tarsal joints as 5 : 1 : 1.

Fore wing closely beset with brown-black scales, among them evenly distributed golden and metallic green scales; the fore wing seen from a distance thus acquires an olive greenish golden hue. Between the scales occur long curved hairs which partly stand upon the veins. The hinder margin as far as cu_2 is hairless, the remaining border with very long, close set, brownish hairs. The marginal hairs are inserted upon long stalked hair cupules arranged in transverse rows on the marginal veins. The posterior area of the wing base is formed by a smooth clear brown tract, which carries about 30 large hair cupules but is without hairs. The area between costa and subcosta is strongly chitinised, without scales and beset with long erect dark setæ. The scales are symmetrical and bluntly acuminate in front. Radial ramus united with the media for a moderately long distance. Radial cell narrow somewhat shorter than the peduncle. The latter connected with the pterostigma by a short cross vein; cu_1 and cu_2 very long, cu_1 about 7 times as long as cu; cu_2 about 5 times as long as cu. The axillaris does not reach the analis at the end; the latter is accompanied by a very narrow hyaline seam. Stigma sac occurs as a strong tracheal expansion at the base of that portion of the subcosta which abuts upon the pterostigma, with few (about 7) regular, free, strongly enlarged and thickened portions of the tracheal spirals.

Hind wings hyaline; margin with very long and close set hairs with exception of the anterior margin of the costal cell. Anterior margin of the basal half of the costal cell with short hairs. Veins of the apical half biserially pilose, membrane of the apical zone with short hairs. The portion of r which shuts in the extremely narrow radial cell R in front, is feebly curved and is developed as a well marked vein. Hind wings intensely and brilliantly iridescent in all colours.

Length of fore wing 2½ mm., wing expanse 5½ mm.

India, Matheran near Bombay, at 800 metres elevation, July 10, *1902; one male* (Biró collection).

Lepium luridum, n. sp. (Figs. 16, 64, 65, 73.)

Head, thorax, and legs dirty yellow-brown to brownish yellow. The similarly coloured hairs on forehead and vertex shaggy. Eyes rather convex, spherical, brown-black; pubescence very short, fine and compact. Antennæ thin, brownish yellow, about three-fourths the length of the fore wing; pubescence fairly compact and long; antennæ incomplete, 24 joints present; the lengths of the individual joints in millims. are the following: the two basal joints, 0·05 and 0·07; the remaining joints, 0·09, 0·09, 0·1, 0·1, 0·07, 0·08, 0·07, 0·06, 0·07, 0·08, 0·07, 0·06, 0·07, 0·05, 0·06,0·06, 0·06, 0·07, 0·08, 0·06, 0·06, 0·06. Maxillary palp clear brownish yellow.

Mesonotum with gray brown scales. The length of the anterior tibia is 0·48 mm. of the middle tibia 0·53 mm., of the posterior tibia 0·9 mm. The lengths of the tarsal joints in millims. are: in the fore foot, 0·23, 0·05, 0·07; in the mid foot, 0·3, 0·05, 0·07; in the hind foot, 0·44, 0·06, 0·08. The ratio of the hind tarsal joints as $5\frac{1}{2}$: $\frac{3}{4}$: 1. First hind tarsal joint with about 19 ctenidiobothria. Claws (fig. 73) with stout tooth close before the apex; empodial appendix setiform.

Wing membrane hyaline, that of the fore wing very faintly brownish. Both wings rather strongly acuminate. Pterostigma relatively narrow. In the fore wing m_1 discharges over the wing apex. The scales of the fore wing dirty gray-brown to blackish brown with yellowish brown tints. The cover-scales darker, the ground-scales clearer. Shortly before the apex, both at the anterior and at the posterior margin, a somewhat pale very indistinct or hardly perceptible flat spot. Marginal hairs very long, standing off, pale brown. Hind wing with very long and pale marginal hairs; veins pale brown. Only the apical third pubescent. Radial cell very narrow. Membrane deep blue-green to violet and reddish iridescent.

Ground scales (fig. 65 *gs*) fusiform, apex strongly acuminate; cover scales (*ds*) slender, marginal scales (*hrs*) very slender.

Length of fore wing 2·2 mm., wing expanse 5 mm.

Ceylon, Peradeniya. Under dry leaves on the ground, March, 1905, one specimen; under dead bark of tree, May, 1905, one specimen; collected by Mr. E. E. Green.

Perientomum, Hagen., 1865.

Hagen, Ent. Mo. Mag., vol. II., 1865, p. 151; Verh. Zool. Bot. Ges. Wien., 1866, p. 210.

Enderlein, Ann. Mus. Nat. Hung. I., 1903, pp. 320–321.

Type: *P. trichopteryx*, Hag., 1859.

Wings more or less acuminate. The first radial branch (r_1) of the hind wing arises between the origins of m_1, and m_2; only in isolated cases does it arise at the insertion of m_1 (one example each of *P. chrysargyrium*, n. sp., and *P. trichopteryx*, Hag., 1859; *cf.* Hagen, Ent. Mo. Mag., II., 1865, p. 152, under *P. morosum*, Hag., and *Nepticulomima mortua* (Hag.) in the present work. In the fore wing r_1 (the hinder border of the pterostigma) is fused with the peduncle of the radial fork for a short distance or touches it at one point.

Claws with one tooth before the apex. Scales fusiform with more or less produced apex (figs. 46, 48–50, 67), the cover scales larger and slenderer, sometimes (*P. triste*, Hag.) straight cut at the end (with rounded angles) or faintly emarginate (fig. 63), sometimes also (*P. Greeni*, n. sp.) the ground and cover scales are more or less concave at the end (fig. 53). The three ocelli are far apart from each other. Forehead and vertex with very long and close-set hairs. Antennary joints of the flagellum relatively long. Suture of vertex always distinct.

I think it very probable that the *Thylax madagascariensis*, Kolbe (Berlin, Entomolog. Zeitschr., Bd. XXIX., 1885, p. 184, fig. 1 *a*, *b*, *c*) belongs to the Perientominæ, probably to the genus *Perientomum* or to an allied genus. It seems that Kolbe had before him a specimen from which the scales had been lost. The figures and description are entirely in favour of this assumption. Unfortunately the type has been lost and I therefore leave the question undecided until new material from Madagascar clears it up. (See p. 77, footnote 1).

TABLE OF SPECIES OF PERIENTOMUM.

1.	Wings very strongly acuminate. Pterostigma narrow. Fore wing brown. Legs brown-yellow	*acutipenne*, n. sp
	Wings moderately acuminate ..	2.
2.	Fore wing silvery and golden, only a narrow marginal seam in the apical half black, silver spotted. Pterostigma broad, basal half silvery, terminal half golden	*chrysargyrium*, n. sp.
	Fore wing with dark spots or chiefly dark	3.
3.	Fore wing with dark spots, dark pattern or dark ground interrupted by extensive golden or silver or both golden *and silver* spots	4.

Fore wing with dark brown to black brown ground with golden or silver marginal spots .. .. 8.

4. Ground silver with brown spots .. 5.
Ground brown or black with golden or silver and golden spots .. 7.

5. Legs brown, trochanters pale brownish yellow, as are also the apices of femora and tibiæ. Wing expanse about 6 mm. Head pale brown .. *argentatum*, n. sp.
Legs yellow, spotted brown or black .. 6.

6. Apices of femora and tibiæ brown. Wing expanse about 7½ mm. Head yellow *trichopteryx* (Hag. 1859).
Upper side of femora, base and a broad band before the apex of the tiibæ and the base of the first tarsal joint black. Head black. Fossil in East Indian copal *incultum*, Hag. 1865.

7. Ground black intermingled with golden and silver scales; two large silver marginal spots at the anterior margin, one at the posterior margin. Legs yellow. Base and apex of tibiæ, basal half of first tarsal joint, and the second and the third tarsal joint black .. *gregarium*, Hag. 1865.
Brown with golden spots and larger golden marginal spots, one between the ends of every two veins. Pterostigma moderately narrow. Legs brown-black, apices of the femora and tibiæ brown-yellow .. .. *Greeni*, n. sp.

8. Marginal spots golden, very small, at the end of each vein. Pterostigma broad. Legs brown-black, extreme apices of femora above and of the tibiæ brownish yellow .. .. *morosum*, Hag. 1865.
Marginal spots silver .. .. 9.

9. Marginal spots large, with offstanding hairs between the vein terminations; five at the anterior and five at the posterior margin. Pterostigma moderately narrow. Legs brown to black-brown. Head brown .. .. *triste*, Hag. 1865.

Two large spots at the anterior margin before the apex; at the hinder margin one such spot at the border of the cubital bifurcation and another at the border of the anal cell. Legs clear brown to brown. Head brown-black . *ceylonicum*, n. sp.

Perientomum chrysargyrium, n. sp. (Figs. 9, 48, 74, 101).

Head dark brown; very long and compact hair on forehead and vertex, inclined in a bunch below and forwards and having a yellowish brown colour. Eyes dark, large, with short, compact, and relatively stout pubescence. Antennæ thin, about one-half the length of the fore wing, black brown, basal third yellowish brown, with rather close-set and long pubescence. Maxillary palp yellow-brown. Inner lobe of maxilla shown in fig. 101.

Thorax black-brown above, mesonotum with gray-brown, shining scales. Legs more or less dark yellow-brown; femora (except their apices), trochanters, and coxæ clear brownish yellow, likewise the apices of the tibiæ, of the first tarsal joints, and the second tarsal joints. The compact scaling of the femora and tibiæ with a bright, yellowish silken sheen. The length of the anterior tibia is 0·47 mm.; of the middle tibia 0·66 mm.; of the posterior tibia 1·3 mm. The lengths of the tarsal joints in millims. are: in the fore foot, 0·19, 0·05, 0·05; in the mid foot, 0·25, 0·05, 0·06; in the hind foot 0·38, 0·06, 0·06. The ratio of the hind tarsal joints is therefore as $6\frac{1}{2} : 1 : 1$. First hind tarsal joint with about 17 ctenidiobothria. Claws small (fig. 74) with a fairly acute tooth relatively far from the apex and very thin broad empodial appendix, which expands and rounds to a circular form at the end.

Membrane hyaline; pterostigma broad; m_1 discharges close before the wing apex. Scaling of the fore wing in the basal half, with more or less of a silvery lustre, to gray white with silken sheen, behind often with faint coppery hue. Apical half with bright yellow golden, behind at the base a narrower silver seam, the rest of the margin narrowly seamed with sammet black; this black marginal seam is interrupted at the anterior margin by four silvery spots, at the posterior margin by two such spots; marginal hairs of the apical half remarkably long, pale yellowish gray-brown.

Hind wing hyaline, veins pale brown. Marginal hair very long, yellowish gray-brown. The narrow radial cell R is relatively broad. The point of ramification of r_1 lies more or less near to that of m_1, in one case the two points coincide in one of the two wings. Membrane of hind wing intense red iridescent to violet and green.

Ground scales (fig. 48 *gs*) shorter and longer elliptical; cover scales (*ds*) fusiform, marginal scales (*vrs*) usually very narrow.

Length of fore wing 2·4 mm., wing.expanse 5½ mm.

Ceylon, Peradeniya. On walls and ceilings of houses. January, 1905, fourteen specimens and twelve examples in alcohol; March, 1905, one specimen; collected by Mr. E. E. Green.

Perientomum gregarium, Hag., 1865.

Amphientomum ceylonicum, Nietner, *in litt.*

A. gregarium, Hagen, Ent. Mo. Mag., II., 1865, p. 149.

Perientomum gregarium, Hagen, Verh. Zool. Bot. Ges. Wien., 1866, pp. 204 and 210.

P. gregarium, Hag., Enderlein, Ann. Mus. Nat. Hung. I., 1903, p. 321.

Ceylon, Hagen, *l.c.* p. 149:

"Head reddish yellow, near the eyes, and on each side of the occipital suture darker, brownish; ocelli close together, the superior placed in a black point; palpi pale yellow, the two apical joints brown; antennæ shorter than the wings, blackish brown; the bases as far as the fourth joint, paler; thorax blackish brown; superior wings clothed with black scales, intermingled with silvery and golden; paler spots near the apex, two quadrangular silvery spots on the anterior margin near the apex, one spot opposite on the posterior margin; legs pale yellow, the tibiæ at the knees and before the apex, as also the basal half of the first tarsal joint and the two following, black.

Long. 2¾–3½ mm., exp. alar. 5½–7 mm.

Ceylon. Rambodde (Nietner). This species is found in troops of forty to fifty on the walls of houses. In two smaller individuals, probably males, the part between the eyes (which are more prominent) is narrower."

Perientomum Greeni, n. sp. (Figs. 10, 51–53, 71).

Head black; moderately long and compact hair on forehead and vertex; the hair is curved upwards above and downwards below; its colour is black-brown, with individual yellow-brown hairs. Eyes large, black, with very short, fine, and close pubescence. Antennæ thin, about one-half the length of the fore wing, black, pubescence relatively sparse and short. Maxillary palp black.

Thorax black, mesonotum behind and at the sides with golden scales. Legs brown-black, apices of the femora and tibiæ brown-yellow. Scales of femora and tibiæ gray yellowish with silken gloss.

The length of the anterior tibiæ is 0·54 mm.; of the middle tibiæ 0·6 mm.; of the posterior tibiæ 1 mm. The lengths of the tarsal joints in millims. are: in the fore foot 0·22, 0·06, 0·07; in the mid foot 0·3, 0·06, 0·07; in the hind foot 0·42, 0·08, 0·08. The ratio of the hind tarsal joints is therefore as $5\frac{1}{2}$: 1 : 1. First hind tarsal joint with about 17 ctenidiobothria. Claws (fig. 71) with stout tooth fairly distant from the apex and sharp basal angle; empodial appendix setiform.

Wing-membrane hyaline. Pterostigma (fig. 52) rather narrow; m_1 discharges into the wing-apex. Scales of fore wing brownish black with golden mottling (fig. 10). The ground scales are shining gray, the large cover scales dull and very dark. The golden spots are distributed as follows:—Hinder border with 6 marginal spots between the ends of the veins; the first of these spots (at the end of the first quarter of the wing) is drawn out to a narrow interrupted cross band; anterior border with 4 marginal spots between the ends of the veins, of which the first is again produced as a several times interrupted cross band which ends at the third posterior marginal spot; between these spots occur irregularly disposed smaller spots. Wing base golden, likewise the space between anterior margin and subcosta. Marginal pubescence moderately long, brown, at the golden spots yellowish and shining golden. Hind wing with narrow radial cell; r_1 arising midway between m_1 and m_2. Marginal hair long, pale brown. Membrane red violet iridescent to intense green.

Ground scales (fig. 53 *gs*) ovate, somewhat concave at end or rarely straight cut; cover scales attenuating towards the base, broad at the end, truncate with faint shallow concavity; marginal scales (fig. 51 *rs*) fusiform, border with fine microscopic serrations; macrochætæ (fig. 51 *mch*) tuberculate dentate in the apical half.

Length of fore wing 2·4 mm. wing expanse $5\frac{1}{2}$ mm.; Ceylon. Peradeniya; on tree trunk, February, 1905, one specimen, collected by Mr. E. E. Green.

Perientomum argentatum, n. sp. (Figs. 14, 50, 75).

Head pale brown; the long close-set hair on forehead and vertex is silver white, inclined downwards on the forehead, upwards on the vertex. Eyes brown, with very short, fine, and extremely compact sammet-like pubescence. Antennæ thin, about one-half length of fore wing, clear brown becoming gradually darker towards the apex;

pubescence rather long and moderately compact. Clypeus moderately convex with fine silver gray hairs. Labrum smooth shining dark brown. Maxillary palp brownish yellow, apical third of the end joint dark brown.

Thorax brown, mesonotum covered with silver white scales. Legs brown, the following parts pale brownish yellow :—Trochanters, usually also the base of the femora, apex of the femora and of the tibiæ. Scales of the femora, especially above at the apex, silver white. The length of the anterior tibia is 0·4 mm., of the middle tibia 0·54 mm., of the hind tibia 1 mm. The lengths of the tarsal joints in the fore foot, 0·16, 0·05, 0·06 mm. ; in the middle foot, 0·25, 0·05, 0·06 mm. ; in the hind foot 0·4, 0·06, 0·07. The ratio of the hind tarsal joints is therefore as $5\frac{5}{7} : \frac{6}{7} : 1$. First hind tarsal joint with about 16 ctenidiobothria. Claws (fig. 75) long and slender, with acute tooth rather far before the apex and a feeble tooth rudiment in the middle between this and the setiform empodial appendix.

Wing membrane hyaline. Pterostigma (fig. 14) broad and large. The pattern of the fore wing produced by the scaling is shining silvery gray-white with brown to gray-brown markings. The markings are distributed as follows :—On all the ends of the veins occurs a spot, those of the posterior margin larger ; through the middle of the axillary cell a narrow band passes obliquely outwards from the posterior margin to the anterior margin without however quite reaching the latter ; with this band the marginal spots at the ends of *an* and cu_2 are connected ; the marginal spot at the end of cu_1 communicates with a larger irregular spot in the wing centre, which encloses a small round silver white spot ; the marginal spots of the wing apex also partly anastomose among themselves. In the middle of the wing base a brown spot. Marginal hair relatively short, yellowish white, blackish at the brown spots. Hind wing with narrow radial cell (R) ; r_1 near the base of *cu*. Veins brown. Marginal hair of the anterior border relatively short and brown, that of the posterior border long and yellowish white. Membrane intensely iridescent in all colours.

Ground scales (fig. 50 *gs*) longish ovate, almost imperceptibly acuminate at the apex ; cover scales (*ds*) similar, though slenderer in the basal portion. Macrochætæ (fig. 50) finely pubescent in the distal half.

Length of fore wing 2·3 mm. ; wing expanse $5\frac{1}{4}$ mm.

Ceylon Peradeniya, on tree trunks ; January, 1905, two specimens ; February, 1905, two ; March, 1905, two ; collected by Mr. E. E. Green.

Perientomum trichopteryx (Hag., 1859).

Amphientomum trichopteryx, Hagen. Verh. Zool. Bot. Ges. Wien., 1859, p. 205.

Perientomum trichopteryx, Hagen. Ent. Mo. Mag., II., 1865, pp. 151 and 152 (notice under P. mortuum, Hag.).

Amphientomum trichopteryx, Hagen. Verh. Zool. Bot. Ges. Wien., 1866, p. 204.

A. trichopteryx, Hag., Kolbe. Einf. Kenntn. d. Ins., 1893, p. 44, fig. 43.

A. trichopteryx, Hag., Enderlein. Ann. Mus. Nat. Hung., Bd. I., 1903, pp. 311 and 325 (notice in Hagen's description of P. mortuum, Hag.).

Ceylon.

Although the "Psocinorum Syropsis synonymica" of Hagen (1866) appeared one year later than the work quoted above "On some Aberrant Genera of Psocina" (Ent. Mo. Mag., II., 1865, pp. 148–152), which was published in December, 1865, there seems to be no doubt that the former was compiled earlier; and the second work was only referred to by notes in the first review which Hagen made incorrectly and forgot to correct later. Otherwise the confusion as to the position of *P. trichopteryx* is unintelligible.

There is thus no doubt that *P. trichopteryx*, Hag., represents the type of the genus *Perientomum*, Hag., since Hagen introduces this species in the first place after the generic diagnosis (*l.c.*, *p.* 151).

It is also certain from Hagen's note under *P. mortuum*, Hag. (*l.c.* 1865, p. 152), that *P. trichopteryx* does not belong to the new genus *Nepticulomima* (*cf. N. mortua*, Hag., 1865, in the present work).

Perientomum morosum, Hag., 1865 (Figs 11, 47, 49, 69). P. morosum, Hagen., Ent. Mo. Mag., II., 1865, p. 152.

Amphientomum morosum, Hagen. Verh. Zool. Bol. Ges. Wien., 1866, p. 204.

(*non* Perientomum morosum, Enderlein. Ann. Mus. Nat. Hung., Bd. I., 1903, p. 323. *Cf.* chrysochlorum, n. sp.).

Head brown. On forehead and vertex moderately long (relatively short) hair; in the middle this is black, above and below brownish yellow, with silken gloss; that of the vertex is directed upwards in the middle vertical, somewhat combed towards the sides, the rest upright. Antennæ very thin, short, about one-half length of fore wing, black, the two basal joints brown; pubescence relatively sparse and short. Eyes black, shortly, closely, and stoutly pubescent. *Maxillary* palp brown, end joint black.

Thorax black, mesonotum with brown black scales. Legs brown-black, extreme apices of the femora above and of the tibiæ brownish yellow. Scaling of the femora and tibiæ with brown silken lustre. Length of the anterior tibia 0·52 mm., of the middle tibia 0·6 mm., of the posterior tibia 1·05 mm. Lengths of the tarsal joints in the fore foot 0·21, 0·06, 0·07 mm.; in the middle foot 0·27, 0·06, 0·07 mm.; in the hind foot 0·4, 0·08, 0·08 mm. The ratio of the hind tarsal joints as 5 : 1 : 1. First hind tarsal joint with about 19 ctenidiobothria. Claws long and slender (fig. 69), with stout tooth before the apex, basal angle rounded; empodial appendix setiform.

Wing membrane hyaline. Fore wing with broad pterostigma (fig. 47); m_1 ends close behind the wing apex. Scaling black-brown (cover scales); the ground scales gray-brown, with silken sheen; at the ends of the veins occur small, triangular yellow golden spots, at the anterior margin four, at the posterior margin seven (of which the third occurs *between* the ends of cu_1 and cu_2). Marginal hair moderately long, brown, at the golden spots yellow, with golden lustre. Hind wing with relatively very broad radial cell; r_1 in the middle between m_1 and m_2. Marginal hair long, pale brown. Veins brown. Membrane iridescent green to red violet.

Ground scales (fig. 49 *gs*) fusiform, end acuminate; cover scales (*ds*) elongate fusiform, expanding towards the end which is acuminate.

Length of fore wing 2·2 mm., wing expanse 5 mm.

Ceylon. Maskeliya. April, 1905, on the stem of a bamboo tree; one specimen, collected by Mr. E. E. Green.

Perientomum triste, Hagen., 1865 (Figs. 12, 62, 63, 70).

P. triste, Hagen., Ent. Mo. Mag., II., 1865, p. 152.

Amphientomum triste, Hagen. Verh. Zoo. Bot. Ges. Wien., 1866, p. 204.

Perientomum triste, Hagen, *l.c.*, p. 210.

(*nec*: P. triste, Enderlein. Ann. Mus. Nat. Hung., Bd. I., p. 325, *cf.* P. ceylonicum, n. sp.).

Head brown, forehead and vertex with close and moderately long pubescence, brown to black-brown. Eyes large, black, with short, close, and fine pubescence. Antennæ thin, black, about one-half length of fore wing, pubescence moderately close-set and rather long. Maxillary palp black.

Thorax black, mesonotum with dark gray-brown. scaling. Legs brown to black brown. The length of the anterior tibia is 0·46 mm.; of the middle tibia 0·54 mm.; of the posterior tibia 0·9 mm; The lengths of the tarsal joints in the middle foot 0·26, 0·6, 0·07 mm.

in the hind foot 0·4, 0·08, 0·07 mm. The ratio of the hind tarsal joints as 5 : 1 : $\frac{7}{8}$. First hind tarsal joint with about 16 ctenidiobothria. Claws (fig. 70) slender, with an acute tooth before the apex; empodial appendix setiform.

Wing membrane hyaline. Fore wing with moderately broad pterostigma (fig. 62); m_1 almost discharges into the wing apex, only a trace before it. Scaling blackish brown (cover scales), the ground scales are more gray and somewhat shining. On both the anterior and posterior margins there are five moderately large roundish silver spots, upon which, besides the scales, long silvery fairly erect hairs are inserted, directed at a very steep angle towards the margin; the innermost spot at the anterior margin lies at the end of the subcosta, the innermost at the posterior margin lies at the end of the analis; the other spots lie between the ends of the veins. Marginal hair rather long, blackish brown. The narrow radial cell (R) in the hind wing fairly broad; r_1 inserted somewhat near to m_1; marginal hair long; membrane iridescent green to red.

Ground scales (fig. 63 *gs*) fusiform, acuminate at the end; cover scales (*ds*) long, with nearly parallel sides, only slightly attenuating towards the base, the end truncate with strongly rounded angles or shallowly concave likewise with rounded lateral angles.

Length of fore wing 2·3 mm; wing expanse 5¼ mm.

Ceylon. Peradeniya. March, 1905, under loose bark on stems of *Artocarpus integrifolia*; two specimens, collected by Mr. E. E. Green.

Perientomum ceylonicum, n. sp. (figs. 13, 45, 46). Perientomum triste, Hag. Enderlein. Ann. Mus. Nat. Hung. I., 1903. p. 325. Taf. XIII., figs. 65–65 *a*. Text fig. 11.

Head brown-black, beset with fairly compact and long brownish gray hairs. Occiput compressed lamelliform, margin fairly sharp. Eyes gray-brown, closely and shortly hairy, little larger than in *P. morosum*, Hag. Antennæ brown, short and thin, 21 joints (complete); with sparse, moderately long and setiform hairs, the separate joints moderately long, shorter towards the end, the last joint about three or four times as long as broad. Each joint shows, with strong microscopic magnification, a very fine pubescence disposed in close-set rings. Ocelli far distant from one another.

Prothorax short but broad. Thorax and abdomen brown. Legs clear brown to brown. Femora thickly scaled as in *P. morosum*, Hag., and beset with fine long hairs. Tibiæ, especially the hinder *tibiæ, thickly beset* with narrower scales and with scattered, long,

thick, yellow setæ. Tarsi without scales. First hind tarsal joint with close-set and short setæ, with 20 ctenidiobothria, which however are composed of very delicate pale yellow hairs and so do not strike the eyes of the observer. Second hind tarsal joint without perceptible ctenidiobothria; the hairs may be so fine and short that they do not stand out from the fine pubescence of this joint. Third hind tarsal joint with only three long hairs at the end of the outer side, otherwise with extremely short, fine, and fairly compact pubescence. Claws long, narrow and acute, a stout tooth near the apex. Empodium with a seta on each side. Ratio of the hind tarsal joints as 5 : 1 : $\frac{2}{3}$.

Fore wing brown, closely beset with symmetrical scales bluntly acuminate in front, and amidst these long, thin, curved hairs, the latter occurring especially on the apical half and here particularly on the veins. Scales gray-brown to brown, intermingled with silvery scales; a streak in the costal cell, a marginal spot in each of cells R_1, R_{2+3}, Cu_1 and An with perfect silver lustre. Analis with hyaline seam. The hinder portion of the wing base is formed by a smooth pale brown area which carries about 27 hair cupules but is without hairs. The area between costa and subcosta pale brown, strongly thickened and chitinised, scaleless, with only individual long erect setæ; most of the setæ are relatively short and recumbent. Only the margin of the outer wing half with very long close-set and delicate hairs; the hairs inserted upon long stalked cupules arranged in cross rows. The rest of the anterior margin only shortly pubescent, still the single hairs are faintly expanded, scale like. The radial branch (r_1) of the pterostigma unites for a short distance with the peduncle of the radial fork, the radial ramus for a fairly long distance with the media. The radial fork nearly $1\frac{1}{2}$ times the stalk length; peduncle of the cubital fork $\frac{1}{2}$ of cu_2 and $\frac{1}{4}$ of cu_1. Stigma sac occurs as a strong tracheal expansion at the base of that portion of the subcosta which abuts upon the pterostigma, with many irregular, torn, and separated parts of the tracheal spirals.

Hind wing brownish hyaline; veins and membrane of the apical half fairly closely pubescent. Wing border with exception of the anterior margin of the costal cell with very long and compact hair. The two branches of the media without stalk. The portion of r which bounds the extremely narrow radial cell R in front is somewhat curved, with a little sharp trachea, expanded and represented by a fairly broad brown pigment seam.

Membrane of the hind wing in certain lights intensely iridescent deep red, red violet to blue, partly with deep black lustre. The

wing scales are shown in fig. 46 (*ds* = cover scale, *gs* = ground scale, *rs* = marginal scale).

Length of fore wing 3 mm., wing expanse 6½ mm.

Ceylon. Pattipola, 2,000 metres, February 22, 1902, one female (Biró coll.).

Perientomum acutipenne, n. sp. (Figs. 66, 67, 72).

Head reddish brown, occiput very pale; hair of forehead and vertex erect, moderately long, brown. Eyes red-brown, pubescence moderately compact, very short but stout. Antennæ reddish brown, about three-fourths length of fore wing, very long and sparsely pubescent. Maxillary palp brown-yellow, apex of end joint brown.

Thorax brown. Mesonotum covered with gray-brown shining scales. Legs brown-yellow. The length of the anterior tibiæ is 0·6 mm.; of the middle tibiæ 0·64 mm.; of the posterior tibiæ 1·05 mm. The lengths of the tarsal joints in the fore foot are 0·27, 0·07, 0·08 mm.; in the middle foot 0·35, 0·07, ?; in the hind foot 0·5, 0·08, 0·09. The ratio of the hind tarsal joints is therefore as 5½ : ⅝ : 1. First hind tarsal joint with about 22 ctenidiobothria. Claws (fig. 72) slender; tooth close before the apex, stout and acute; empodial appendix setiform.

Wings very narrow and strongly acuminate. Membrane hyaline; veins very pale brownish; pterostigma rather narrow (fig. 66). The scaling of the fore wing brown with faintly reddish tint and gray lustre. Marginal hair very long and strongly discrete, that of the anterior margin pale reddish brown, that of the hinder margin gray-black. The radial cell (*R*) of the hind wing very narrow. Marginal hair long and coloured as in the fore wing. Hind wing brightly iridescent blue green to violet.

Scales of fore wing fusiform, apex acuminate. Ground scales (fig. 67 *gs*) shorter, cover scales (*ds*) longer. Marginal scales (*hrs*) slender, but in part very broad.

Length of fore wing 2·5 mm., wing expanse, 5½ mm.

Ceylon, Maskeliya; under dead bark of tree. April, 1905, one specimen, collected by Mr. E. E. Green.

Perientomum incultum, Hag., 1865.

Amphientomum incultum, Hagen. Ent. Mo. Mag. II., 1865, p. 149.

A. lepidopterum, Hagen. Verh. Zool. Bot. Ges. Wien, 1866, p. 204.

Perientomum incultum, Hagen, *t.c.* pp. 204 and 211. P. incultum, Hag., Enderein. Ann. Mus. Nat. Hung. I., 1903, p. 322. Fossil in *East Indian copal.*

Nepticulomima, n. g.

(Type: *N. Sakuntala*, n. sp.)

Wings more or less acuminate. The first radial branch (r_1) in ıe hind wing arises between the origins of m_1 and r_{4+5}. In the re wing, r_1 is fused with the peduncle of the radial fork over a .ort stretch or in one point.

Claws with one tooth before the apex. Antennæ, in *N. Sakuntala*, ł-jointed (fig. 125). Scales fusiform (figs. 83, 87, 91), ovate ig. 85), spatuliform with more or less straight-cut or faintly ›ncave end (fig. 89), the cover scales larger and slenderer. The ree ocelli far apart from one another. Forehead and vertex with ›ry long and closely placed hairs. Antennary joints relatively ng.

TABLE OF SPECIES.*

Fossil in the copal of Zanzibar ..	*mortua* (Hag. 1865).
Recent	2.
Scales spatuliform. Head polished smooth, very shortly and sparsely hairy. Scaling of fore wing brownish black with deep metallic green lustre. Legs uniformly yellow-brown, apices of the femora brown above. Head brown	*chalcomelas*, n. sp.
Scales fusiform or ovate. Head dull, pale brownish; long and closely hairy ..	3.
Fore wing brown or gray-brown, with extensive silvery or brass-coloured marking	4.
Fore wing yellow-brown or gray-brown with small straw yellowish marginal spots between the ends of the veins ..	5.
Fore wing dark brown with brass yellow spots with metallic lustre, and transverse streaks; at the end of the basal third a moderately broad very dark brown cross band. Legs black-brown; the following parts pale brownish yellow:—Trochanters, a broad band before the apex of the femora, a narrower ring at the end of the first third of the tibia, apex of the tibia, distal half of the first tarsal join and last tarsal joint	*Essigkeana*, n. sp.

* *N. biroiana.*, Enderl., 1903, is not included in this table.

Fore wing relatively narrow ; gray-brown with large silvery marginal spots between the ends of the veins, which, in part, expand to large spots extending into the wing centre. Legs reddish brown-yellow, femora pale brownish yellow .. .. *Sakuntala*. n. sp.

5. Fore wing gray-brown; the three marginal spots of the hinder border roundish. Ocelli large, the space between one of the posterior ocelli and the eye-border is much less than one-third of the distance between a posterior ocellus and the anterior .. .. *Hosemanni*, Ende 1903.

Fore wing yellow-brown ; the three marginal spots of the hinder border flat and applied to the border. Ocelli small ; the space between a posterior ocellus and the eye-border is about one-third of the distance between a posterior ocellus and the anterior .. .. *brasiliensis*, Ende 1906.

Nepticulomima Sakuntala, n. sp. (Figs. 20, 77. 82, 83, 117, 12

Head pale brownish yellow, clypeus with faint reddish tir labrum brown to pale brown. On forehead and vertex long h pale brownish yellow to pale brownish, that of the vertex direct upwards in a tuft and somewhat curved backwards. Eyes larg dark red-brown to black, pubescence moderately close but relativ ly long and stout. Antennæ (fig. 125) thin, about two-thirds t length of the fore wing, pubescence moderately compact and fair long ; 24-jointed (complete). The lengths of the antennary join in millims. are : 0·05, 0·07 (basal joints) ; 0·07, 0·09, 0·08, 0·08, 0·0 0·06, 0·07, 0·06, 0·06, 0·05, 0·05, 0·04, 0·06, 0·06, 0·06, 0·08, 0·0 0·06, 0·07, 0·08, 0·08, 0·07. Maxillary palp brownish yellow, en joint somewhat brownish.

Thorax clear brownish yellow ; mesonotum thickly beset wit clear brownish yellow scales giving a strong silken glitter. Femo pale brownish yellow, tibiæ and tarsi reddish brown-yellow. Th compact scaling of femora and tibiæ, strong brownish yellow wit silken lustre. The length of the anterior tibia is 0·52 mm. ; of t *middle tibia* 0·63 ; of the hinder tibia 1·08 mm. The lengths

the tarsal joints in the fore foot are : 0·23, 0·05, 0·06 mm. ; in the middle foot 0·32, 0·06, 0·07 mm. ; in the hind foot 0·43, 0·07, 0·07 mm. The ratio of the hind tarsal joints is therefore as 6 : 1 : 1. First hind tarsal joint with about 20 ctenidiobothria. Claws (fig. 77) slender, with thin apex and stout tooth rather far before the apex : empodial appendix setiform. Hind leg represented in fig. 117.

Wings relatively narrow, acuminate. Wing membrane hyaline. Pterostigma rather narrow (fig. 82) ; m_1 enters precisely into the wing apex. Scaling of fore wing brown (cover scales), ground scales pale brown-yellow with strong silken lustre. At the margin between every two vein terminations large silvery to silken spots, likewise the distal half of the axillary and anal cells. The marginal spot between m_3 and cu_1 expands to a large acute angled triangle, which extends to the wing centre, its apex being directed towards the wing base (fig. 20). Marginal hair long and brown. Hind wing with moderately narrow radial cell (R) ; veins pale brown ; marginal hair (pubescence) long and brown, at the hinder border very long ; membrane of the apical half pubescent ; r_{4+5} ends exactly in the wing apex ; membrane strongly iridescent green to red.

Ground scales (fig. 83) somewhat ovate with the acuminate end strongly set off. Cover scales (*ds*) elongate with stout apex. Marginal scales (*vrs*) slender, fusiform.

Length of fore wing 2·6 mm., wing expanse 6 mm.

Ceylon. Peradeniya, under papers in a room ; January, 1905, four specimens ; February, 1905, two specimens, collected by Mr. E. E. Green.

Nepticulomima Essigkeana, n. sp. (Figs 17, 79, 84, 85).

Head pale brownish yellow ; small brown spots occur at the suture of the vertex, a row of 3 or 4 on each side approximately parallel to the inner eye-border, at the base of the antennæ, 2 on the forehead. The base of the ocelli and the upper lip are also brown. Clypeus sometimes faintly brownish. The long hair on forehead and vertex pale brown-yellow and shaggy. Eyes spherical, black-brown, pubescence stout, moderately compact and relatively long. The ocelli are placed far apart, and are arranged in a very flat triangle, so that the distance between the two posterior ocelli is almost twice as great as that between the anterior and a posterior ocellus ; the latter distance is more than twice as great as the space between a posterior ocellus and the eye-border. Antennæ pale brownish yellow, becoming gray towards the apex ; the anterior side of the two (in this species) very greatly developed basal joints brown.

Pubescence fairly long but tolerably compact. Maxillary palp clearer or darker brown-yellow, apex somewhat darker.

Thorax pale brownish, mesonotum covered with clear brownish yellow scales which give a brass-yellow lustre. Legs black-brown, the following parts pale brownish yellow :—Trochanters, a broad band before the apex of the femora, a narrower ring at the end of the first third of the tibiæ (in the hind tibiæ more towards the middle), apex of the tibiæ, distal half of the first tarsal joint (in the hind tarsi two-thirds of the length), and the last tarsal joints. On the upper side of the hind tibiæ six of the long seta are arranged in a longitudinal row and attain a considerable length, standing nearly parallel in an angle of about 45°. Scaling of the femora and tibiæ with yellowish silken lustre. The length of the middle tibia is 0·56 mm.; of the hind tibia 0·97 mm. The lengths of the tarsal joints in the middle foot are : 0·25, 0·05, 0·05 ; in the hind foot 0·38, 0·05, 0·06. The ratio of the hind tarsal joints is therefore as $6\frac{1}{3}$: $\frac{5}{6}$: 1. First hind tarsal joint with about 18 ctenidiobothria. Claws (fig. 79) slender, tooth rather far before the slender apex ; empodial appendix in the form of a narrow dermal ribbon strongly acuminate towards the apex.

Wing membrane hyaline ; pterostigma moderately broad ; m^1 discharges shortly before the wing apex. The wing pattern produced by the scaling is as follows :—Ground colour dark brown ; a pale brass-coloured and shining marking, consisting of smaller and larger spots, marginal spots, and interrupted cross bands, is distributed almost over the entire wing, attaining special development in the basal third of the wing ; only a moderately broad, very dark brown cross band, which occurs at the end of the basal third, is free from brass-coloured scales. To this cross band is applied a narrower brass-coloured cross band scarcely interrupted by a few brown scales. Marginal hair moderately long, black-brown, at the brass-coloured marginal spots clear brownish yellow. Hind wing with relatively broad radial cell (*R*) ; marginal hair very long, pale brownish ; veins clear brown ; membrane intensely iridescent violet to red, passing in some places to green.

Ground scales ovate (fig. 85 *gs*), cover scales (*ds*) longish to elongate elliptical, at the end round or barely perceptibly truncate, still rounded. Marginal scales as in the other species.

Length of fore wing, 2·3 mm ; wing expanse $5\frac{1}{4}$ mm.

Ceylon. Peradeniya ; on the outer surface of walls, January, 1905, one specimen ; March, 1905, one specimen, collected by Mr. E. E. Green.

I have dedicated this species to my friend Mr. Walther Essigke of Limbach near Chemnitz.

Nepticulomima brasiliensis, Enderl., 1906. (Figs. 19, 78, 86, 87).

Perientomum brasiliense, Enderlein. Zool. Jahrb. Syst., vol. 24, 1906, p. 88.

Head brown-yellow ; hair of forehead and vertex brownish yellow with silken sheen, compact and moderately long. In the place of the suture of the vertex occurs a faintly raised longitudinal keel. Ocelli small, black, bead-like, the ocellar triangle is fairly flat ; the distance of a posterior ocellus from the eye-border is about one-third of the space between a posterior ocellus and the anterior. Occipital edge sharp, in the middle shallowly emarginate. Eyes hemispherical, black ; pubescence moderately short and fairly stout. Maxillary palp, brown-yellow, end joint slightly darker.

Thorax brown yellow ; mesonotum with clear brownish-yellow scales, with strong silken lustre. Legs brown-yellow ; the scaling of the femora and tibiæ clear brownish yellow with silken lustre ; from the ground colour the tarsi appear somewhat darker. Length of hind tibia 1·08 mm. The lengths of the hind tarsal joints are 0·38, 0·06, 0·06 mm. The ratio of the hind tarsal joints is therefore as $6\frac{1}{3} : 1 : 1$. First hind tarsal joint with about 22 ctenidiobothria. Claws (fig. 78) with slender apex, a stout tooth before the apex ; empodial appendix setiform ; base broad.

Membrane of fore wing hyaline, with faint brownish tinge. Pterostigma narrow (Fig. 86) ; m_1 discharges close before the apex. The scaling is yellow-brown with silken lustre ; in the apical half four moderately sharp marginal spots occur at the anterior border, three at the posterior (the latter rather flat) of straw yellow colour with silken sheen. Marginal hair tolerably short, brown-yellow, at the clearer places straw yellow. Hind wing hyaline, veins pale brown ; marginal hair very long, pale brown, that of the apical half of the anterior border dark brown. Membrane intensely iridescent red to golden, at the base iridescent in all colours.

Ground scales (fig. 87 *gs*) fusiform with apex slightly or not pronounced. Cover scales (*ds*) elongate fusiform, apex not set off.

Length of fore wing 2·2 mm, wing expanse 5 mm.

Brazil. Pará, November 28, 1893. One specimen, in the collection of the Stettin Museum.

Nepticulomima Hösemanni, Enderl., 1903 (Figs. 18, 90, 91, 110).

Perientomum Hösemanni, Enderlein. Zool. Jahrb. Syst., Bd. XXIX., 1903, p. 3, Taf. I., figs 1–9.

Head brownish. Antennæ brownish, with sparse and fairly long hair ; more than 24 joints. Eyes large, black, pubescent. Suture of

vertex rather well defined. Forehead not separated from vertex. Ocelli large, the two posterior fairly close to the inner eye-borders, their distance from these being much less than one-third of the space between posterior ocelli and anterior ocellus (as is the case in *N. brasiliensis*, Enderl.). Maxillary palp pale brownish.

Thorax pale brown, mesonotum scaly. Legs brown-yellow. Ratio of the hind tarsal joints as 6 : 1 : 1. First hind tarsal joint with about 24 ctenidiobothria. Claws slender, a stout and acute tooth rather far before the apex. Empodial appendix setiform. The abdominal apex of the female with gonapophyses and appendices anales (*aa*) is reproduced in fig. 110.

Membrane of fore wing hyaline, with brownish tinge, especially in middle. Veins brown. Pterostigma fairly narrow; m_1 ends before the apex. Scaling gray-brown, margin of the apical half darker and in front with four small straw-yellowish spots, behind with three, the latter very small and roundish. Marginal hair fairly long, brown, at the clear spots straw-yellowish. Hind wing hyaline, veins pale brown; marginal hair pale brown and very long.

Ground scales fusiform; end acuminate, sharply and distinctly defined (fig. 91 *gs*); likewise in regard to the much larger cover scales (*ds*).

Hind wings brightly iridescent in all colours, especially red and yellow-red.

Length of forewing 2·4 mm., wing expanse 5½ mm.; length of body 2 mm.

Cameroon. Nojoko Station; four females, collected by Staff Surgeon Dr. Hösemann (Types).

Cameroon. Bipindi. October–December, 1898; one specimen, collected by Zenker.

The last specimen was well preserved in regard to the scales, in contrast with the earlier material which was preserved in alcohol. I have supplemented the diagnosis from it.

Nepticulomima chalcomelas n. sp. (Figs. 21, 76, 88, 89, 99).

Head polished smooth, shining dark brown; clypeus and labrum dark brown. The hair upon forehead and vertex is, in comparison with all other species, unusually scanty and short, but still always fairly long and shaggy; its colour is black-brown with gray lustre. Occipital edge particularly sharp, in the middle somewhat emarginate; this emargination is the remains of the suture of the vertex, which is otherwise not perceptible. Also the suture between vertex and forehead has completely vanished. Ocelli very small, shining like

orange yellow glass beads; the distance of the anterior ocellus from one of the posterior ocelli is equal to the space between the latter and the eye-border; the ocellar triangle is moderately flat, the angle at the apex being about 120°. Eyes brown-black, pubescence extremely short and very delicate. Antennæ relatively long, thin, approximately equal to the length of the fore wing; pubescence moderately long and tolerably compact; black-brown, the two basal joints brown; the antennal flagellum has 19 joints (complete) having the following lengths in millims. 0·15, 0·14, 0·16, 0·14, 0·1, 0·1, 0·08, 0·09, 0·09, 0·08, 0·08, 0·09, 0·09, 0·09, 0·09, 0·08, 0·07, 0·07, 0·07, 0·07. Maxillary palp (fig. 99) brown, end joint dark brown.

Thorax dark brown, mesonotum covered with brownish black scales, which mostly give a greenish lustre, certain of them frequently reddish. Legs evenly yellow-brown, femoral apices brown above. The setæ of the hind tibiæ relatively short and scanty. Scales of the femora and tibiæ dull yellowish with silken lustre. The length of the anterior tibia is 0·48 mm.; of the middle tibia 0·6 mm., of the posterior tibia 0·96 mm. The lengths of the tarsal joints in the fore foot are 0·24, 0·06, 0·07 mm.; in the middle foot 0·25, 0·06, 0·07 mm.; in the hind foot 0·37, 0·08, 0·08. The ratio of the hind tarsal joints is therefore $4\frac{5}{8} : 1 : 1$. The first hind tarsal joint with about 14 ctenidiobothria. Claws (fig. 76) very large and slender, tooth before the apex stout and acute; empodial appendix long and setiform.

Membrane of fore wing faint brownish gray hyaline; pterostigma rather narrow (fig. 88); m_1 enters the wing apex. The scaling is brownish black, with deep green metallic lustre: certain scales give also frequently a deep red metallic lustre. Marginal hair moderately long, black, with green metallic lustre. Hind wing hyaline, veins pale brown. Radial cell, *R*, relatively broad. Marginal hair long, pale brownish. Membrane intense red violet, iridescent red to golden, at the wing base iridescent green to blue.

Ground scales (fig. 89 *gs*) spatuliform, end broad and straight-cut or very faintly and shallowly emarginate; angles rather sharp. Cover scales (*ds*) similar, but much longer.

Length of fore wing 2·3 mm.; wing expanse $5\frac{1}{4}$ mm.

Ceylon. Peradeniya; on rotten wood on the ground; March, 1905, 15 specimens collected by Mr. E. E. Green.

Nepticulomima Biroiana, Enderl., 1903.

Perientomum Biroianum, Enderlein. Ann. Mus. Nat. Hung. I., 1903, *p.* 327. Taf. XI., f. 60b; Taf. XII., f. 60a and c.

The whole body clear yellow-brown. Head with compact and long hair. The three ocelli standing far apart, yellow, finely rimmed with black brown. Sutures distinct. Upper lip gray-brown, clypeus small, very faintly convex; clypeolus rudimentary. Eyes fairly large, finely pubescent, black. Occipital margin rather sharp angled.

Legs likewise clear yellow-brown up to the claws. Tibiæ, especially the hind tibiæ, with long setæ. The spiny comb of each seta of the inner setigerous row of the first tarsal joints little distinct, clear yellow-brown. First hind tarsal joint compactly but rather finely setigerous. Ratio of the hind tarsal joints as 5 : 1 : 1.

Fore wing pale brown, thickly beset with clear brownish scales. As the scales are much rubbed away the pattern of the fore wing cannot be recognised. Hind wing hyaline, colourless, with scanty but long hairs on the margin, on the veins of the apical half and the membrane. In the fore wing m_1, in the hind wing r_{4+5} enter exactly into the wing apex.

Length of fore wing 2¼ mm.; wing expanse 5 mm.

German New Guinea (northern portion). Lemien in Berlinhafen, one female (Biró coll.).

Nepticulomima mortua (Hagen, 1865); (*cf.* page 77, footnote 1.)

Perientomum mortuum, Hagen. Ent. Mo. Mag. II., 1865, p. 152. Nepticulomima mortua (Hag.), m.

"This species is similar to P. trichopteryx in form, size, and colouring. Thus I should not have separated it, but for a difference in the details of the venation. In the inferior wings the transverse vein on the anterior margin is emitted from the superior branch (1), while in *P. trichopteryx* it is emitted before the point whence this branch departs.

"I admit that this difference alone is perhaps too slight to justify the formation of a distinct species, especially as in one individual out of five of *P. trichopteryx* now before me, the transverse vein is emitted precisely from the point of departure of the superior branch (1); but as the determination of insects in copal is always rather difficult, I have thought it best to note the species as distinct until more material shall prove to the contrary.

"In gum copal (Animé), from Zanzibar. One specimen, received from Baron Osten-Sacken."

The description of the venation of the hind wing renders its *position in the* genus *Nepticulomima* certain.

Sub-fam. LEPIDOPSOCINÆ.

Enderlein. Ann. Mus. Nat. Hung. I., 1903, p. 208.

After I have eliminated the genus *Echinopsocus*, Enderl., 1903, from this sub-family, there remain for it the following characteristics.

Fore wing with long macrochætæ not only upon the costal area, but also on the veins and sometimes also on the membrane of the marginal seam. Radial ramus forked, united or fused with the pterostigma by cross vein; pterostigma moderately large and relatively flat. Hind wing without radial cell (without a closed cell), otherwise normal. Radial ramus of fore wing forked. Wing scales are all asymmetrical (fig. 107). Antennæ more than 30-jointed (Echmepteryx) to 47-jointed (Lepidopsocus); the antennary joints of the flagellum are very short (antennæ moniliform) or at most about twice as long as thick.

TABLE OF GENERA OF LEPIDOPSOCINÆ.

The radius developed up to the pterostigma. Between pterostigma (branch r_1) and radial ramus a cross-vein .. *Echmepteryx*, Aaron 1886.
(Type: E. Hageni Pack. 1870).

The radius up to the pterostigma completely reduced. The pterostigma (branch r_1) is fused with the radial ramus over a long stretch .. *Lepidopsocus*, Enderl. 1903.
(Type: L. nepticulides, Enderl. 1903).

Echmepteryx, Aaron., 1886.

Frank Aaron. Proc. Acad. Nat. Sci. Philadelphia, 1886, p. 17, figs. 4-9.

[Type E. Hageni (Packard 1870).]

Pterostigma connected with the radial ramus by a cross vein. Radial fork sometimes very small (*E. mihira*, n. sp.). Stem of the radius connected with the media by a fine and delicate cross vein which shuts in a longish pentagonal cell; this is wanting in Aaron's figure, but is presumably present also here. Radius well developed in its entire extent. In the hind wing r_1 arises before or close before the point of ramification of *cu*. Both wings more or less acuminate. Three ocelli.

TABLE OF THE SPECIES.

1. Wing short and broad. Head pale yellow with brown marking. Legs brownish yellow, tibiæ with two dark rings .. *Hageni* (Pack. 1870).
   Wing narrow and long, strongly acuminate. Head uniformly brownish yellow or brown-yellow .. 2.
2. Fore wing produced into a very fine apex. Peduncle of the radial fork more than twice as long as r_2+_3. Scaling pale brownish yellow to gray with golden marking. Legs pale brownish yellow; apex of the femora, two rings on the tibiæ and the tarsi gray-brown .. *mihira*, n. sp.
   Fore wing acute but not produced into a long apex. Peduncle of the radial fork little longer than r_{2+3}. Scaling yellowish gray-brown, with strong yellowish silken lustre. Legs clear brownish yellow.. .. .. *sericea*, n. sp.

Echmepteryx Hageni (Packard, 1870).

Amphientomum Hagenii, Packard. Proc. Boston. Soc., vol. XIII., 1870, pp. 405-407, figs. *a—d*.

A. Hageni, Pack. Enderlein. Mitth. Zool. Mus. Berlin II. Heft II., 1902, p. 15.

Echmepteryx agilis, Aaron. Proc. Acad. Nat. Sic. Philadelphia, 1886, p. 17, figs. 4–9.

Echmepteryx Hageni (Pack.), m.

Packard *l.c.* :—

"The body generally is of a pale yellowish horn colour. Head of the same colour with a few scattered hairs. Eyes full, round, prominent, sub-globose. Ocelli arranged in a very low flat triangle; the anterior one being on a line with the front edge of the eyes. Behind each of the two basal ocelli is a blackish brown line, so doubled as to form three sides of an oblong square, with the open side facing the anterior ocellus, the inner sides meeting midway between the ocelli. A dark brown narrow line extends from eye to eye, passing upwards in the middle, between the anterior and the other two ocelli. A dark broad line extends from the eyes to the clypeus. The anterior ocellus is surrounded with black, and there is a pair of divergent dark brown lines, a little curved, sending a

branch up to the anterior ocellus. Two curved dark brown broad short bands just above the clypeus. The clypeus is free, raised above the surface of the front, and is pale horn colour (testaceous) and unspotted. Labrum black. Mandibles pale, pitchy. Antennæ with the basal joint globular; the second a little longer, oval, both very much larger than the sixteen succeeding pale horn-coloured joints, the latter being slender, gradually increasing in length to the tip, each joint provided with four or five long stiff hairs, giving a verticillate appearance to the antennæ.

"Seen in front the difference between the eyes is equal to the distance from the vertex to the base of the clypeus, the front being equilaterally triangular. Legs testaceous, the femora pale at base; beyond a little dusky, the tibiæ twice broadly ringed with dusky tarsi pale.

"Prothorax very short, the tergum being transversely linear; mesoscutum cordate. Abdomen pale, almost whitish. Upper wings regularly oval lanceolate, the tips being acute, but not prolonged; densely covered with hairs and scales, with the fringe long on the outer half of the wings, and increasing in length towards the tip so that the outline of the fringe is oval. Under the microscope the wing membrane is covered with numerous dots, arranged in irregular wavy rows, the dots much thicker along the edges than elsewhere. In the middle and along the costa the hairs are developed into regular flat scales, like those of the Lepidoptera, and the Lepismatidæ and Poduridæ, varying greatly in form, some being long and narrow, with acute teeth on the outer edge, and a rather long point of attachment; others broad and short, with blunt teeth, and others more regular in outline; all with shaded lines proceeding from each tooth and fading out towards the base of the scale.

"The wings are glistening gray, and spotted irregularly with dark towards the tips. Venation: in the fore wings a minute, almost obsolete costal vein, four subcostal venules; the main vein at the origin of the second branch anastomoses with the median vein, forming a long, narrow discal cell; at one-third the distance between the anastomosis and the tip of the wing it sends off a third branch nearly equalling in length the two basal ones; the median vein has five branches; after sending off a branch to anastomose with the subcostal vein it subdivides, the upper branch again sub-dividing midway between the tip and the anastomosis. On the basal fifth of the vein a branch arises, which subdivides, forming the fourth and fifth median venules. A straight submedian vein is present.

"Hind wings similar in form to the fore pair, but a little narrower; a slightly marked subcostal vein, ending opposite the origin of the

first and upper branch of the median vein. The median vein subdivides into five branches, the three basal, lower ones arising at nearly equal distances apart, and of nearly the same length; the first and upper one arising on the outer fourth of the wing; a slightly marked sub-median vein. The wings are folded at a low angle over the back.

"Length of body, ·10; of body with the wings folded, ·14 inch.

"I first observed this insect under the loose bark of a stump, moving in groups of several, running swiftly when disturbed, like other Psoci, to a place of concealment, at Brunswick, Maine, early in July. I also found a specimen September 1st in Salem, Mass.

"Dr. Hagen, the founder of this genus, kindly drew my attention to the great interest attaching to the discovery of this insect in this country, indicating the genus, and that the species was undescribed."

Frank Aaron. *l.c.* :—

"Antennæ much shorter than the wings, pale fuscous; palpi fuscous. Nasus = clypeus fuscous, pilose; rest of head somewhat pilose, pale, with dark brown markings, a bent brown line across the head transversely, separating the anterior from the posterior ocelli; before the ocelli, in the middle, some irregular brown markings and bands (varying in different specimens), and between the ocelli, connecting with the transverse line, two convergent brown lines, extending to a brown patch on each side upon the occiput; on each side, within the margin of the eyes, another brown spot, becoming a line, and also joining the occipital patches. Ocelli black, each one within a small brown spot; eyes brown and golden yellow. Thorax brown, portions pale luteous, dorsum of mesothorax dark brown, somewhat scaled, and very pilose. Abdomen pale yellowish or luteous (in some specimens fuscous, probably discoloured by drying), with some brown markings. Legs fuscous, somewhat paler or luteous; tarsi luteous, fuscous towards base.

"Wings fuscescent or smoky when denuded, becoming hyaline towards the apex; veins darker, semi-transparent. Scales mostly fuscesent, paler towards the base; when upon the wing seemingly fuscous, and when thickly placed appearing almost black; other scales luteous upon the wing. These scales cause the wing to be covered with black, fuscous, and luteous patches. The long apical hair mostly fuscous, luteous in patches.

"Hind wings hyaline, slightly infuscated, no scales, the long apical hair fuscous. Length to end of wing about 3 millim.

"Pennsylvania. I found this species on the trunks of beech trees in a wood near Philadelphia. It is very active, quick and difficult to *secure*. *I believe* it represents a group entirely new to our fauna."

The *Amphientomum Hageni*, Packard, proved to be a true *Echmepteryx* from the figure of the fore wing and from the description. I had already pointed out in 1902 (*l.c.* p. 15) that it did not belong to the genus Amphientomum. A comparison of this description with that of *E. agilis*, Aaron, showed that both descriptions characterise extraordinarily similar forms; only Packard's figure of the scales did not agree with Aaron's. The former however are of such a high development (at the end with 5–6 acute teeth) as has not yet been demonstrated in any of the Copeognatha (even in the differentiated forms only bidentate scales occur) more especially in such a lowly organised genus, in which and in whose allies dentate scales never occur, mostly indeed only asymmetrical scales, that I consider it very probable that Packard, who has investigated every possible order of insects, accidentally admitted some Lepidopterous scales into the preparation which naturally did not surprise him among the slender scales of Echmepteryx (*cf.* fig. 107); moreover the Lepidopterous scales may have attached themselves to the Echmepteryx in the killing bottle. I have myself often received Psocidæ which were quite covered with adhering Lepidopterous scales.

In addition there is the fact that both Packard and Aaron captured the objects in the north-western part of the United States and that in both cases they were found living on tree trunks.

I believe therefore that I am right in uniting the two species, especially because Aaron was unaware of Packard's description. In Aaron's drawing, the distal portion of the subcosta which closes the pterostigma in the fore wing, and r_1 in the hind wing, are wanting; doubtless Aaron overlooked both.

As I was about to send off this manuscript, I received, through the kindness of Mr. Banks, some examples from the United States (Falls Church, Virginia, June) alleged to be *Amphientomum Hageni*, Pack. An examination of this material completely confirmed the view which I have explained above. The scales are exactly like those figured by Aaron.

Echmepteryx mihira,* n. sp. (Figs. 22, 81, 106, 122).

Head clear brownish yellow. Hair of forehead and vertex rather long, shaggy, brownish yellow. Antennæ thin and long, about equal to length of fore wing; antennary joints short, numerous; in one antenna there are 39 joints of flagellum (consequently 41 antennary joints) present, but it is imperfect; each joint with some

* Sanskrit, = Sun.

moderately long hairs. Eyes brown-yellow, finely and rather shortly pubescent. Maxillary palp pale, end joint a little darker.

Thorax pale brownish yellow or darker, mesonotum with golden scaling. Legs very pale brownish yellow, apex of the femora, two rings on the tibiæ (one near the base, the other broader before the end) and the tarsi gray-brown. The length of the middle tibia is 0·49 mm.; of the hind tibia 0·9 mm. (fig. 122). The lengths of the tarsal joints in the middle foot are 0·19, 0·04, 0·05 mm.; in the hind foot 0·3, 0·05, 0·06 mm. The ratio of the hind tarsal joints as 6 : 1 : $1\frac{1}{5}$. First hind tarsal joint with about 13 ctenidiobothria. Claws (fig. 81) slender, with acute thin tooth before the apex and with long hair-like empodial appendix which possesses a broad lamelliform base; between this and the tooth some minute obscure knob-like denticles.

Wings very narrow and acuminate; membrane hyaline; pterostigma (fig. 106) rather broad. Radial fork very short; m_1 and m_2 very short; m_1 ending below the apex. Scaling very pale brownish yellow to gray, some relatively broad and irregular golden bands and markings (fig. 22). Marginal hair very long, pale brownish yellow and golden mixed. Hind wing very narrow; veins very pale; marginal hair very long, standing off, that of the anterior margin pale brownish, that of the hinder margin yellowish. Membrane intensely iridescent red to violet, only here and there to green.

Scales asymmetrical elongate knife-shaped (like those of *E. sericea*, n. sp.; fig. 107), at the end strongly acuminate, single ones very narrowly symmetrical.

Length of fore wing 2 mm.; wing expanse $4\frac{1}{2}$ mm.

Ceylon. Peradeniya. January, 1905; inside a folded leaf on a tree, one specimen; on a tree trunk, one specimen; collected by Mr. E. E. Green.

Echmepteryx sericea, n. sp. (Figs. 23, 80, 104, 105, 107).

Head brown-yellow. Forehead and vertex with yellow-brown, moderately long, shaggy hair. Antennæ thin, nearly equal to length of fore wing, brownish; in an incomplete antenna I counted 31 joints; antennary joints of the flagellum short, with some fairly long hairs. Eyes black-brown, with rather long and stout pubescence. Maxillary palp pale.

Thorax brown; mesonotum covered with glistening gray-brown scales. Legs clear brownish yellow, with strong yellowish silken lustre. The length of the anterior tibia is 0·39 mm.; of the middle tibia 0·49 mm.; of the hind tibia 0·84 mm. The lengths of the

tarsal joints in the middle foot are 0·19, 0·04, 0·05 mm.; in the hind foot 0·29, 0·05, 0·06 mm. The ratio of the hind tarsal joints is as 5 : $\frac{5}{6}$: 1. First hind tarsal joints with about 14 ctenidiobothria. Claws (fig. 80) with stout tooth before the apex and setiform empodial appendix.

Wings strongly acuminate. Membrane hyaline. Pterostigma (fig. 105) moderately broad. Peduncle of the radial fork somewhat shorter than the fork; m_1 ends below the wing apex. Scaling yellowish gray-brown with strong silken yellowish lustre. Marginal hair long and compact, of same colour.

Hind wing pale, with very long hair on the hinder margin; veins pale brown; membrane iridescent red to violet.

Scales (fig. 107) elongate, asymmetrical, knife-shaped, the end strongly acuminate; some narrow symmetrical. Macrochætæ (fig. 104) almost in their entire length fairly closely beset with fine tooth like setæ.

Length of fore wing 2 mm.; wing expanse 4½ mm.

Ceylon. Peradeniya. Under loose bark on trunk of *Artocarpus integrifolia*; March, 1905, two specimens, collected by Mr. E. E. Green.

Lepidopsocus, Enderl., 1903.

Enderlein. Ann. Mus. Nat. Hungar. Bd. I., 1903, pp. 328–330.

Lepidopsocus nepticulides, Enderl. 1903.

Enderlein. *l.c.*, pp. 330–331, fig. 62 *a–g*. Singapore.

Sub-fam. *Echinopsocinæ*, m.

Echinopsocus, Enderl., 1903, and Scolopama, n. g., form a perfectly independent group beside the Lepidopsocinæ; I separate them on this account as sub-family Echinopsocinæ. In my opinion numerous forms belonging to this sub-family are still to be found in the Tropics; but in consequence of their great inconspicuousness only two species have hitherto been collected.

Fore wing with very long macrochætæ on the costal area and also on the veins and on the membrane of the marginal seam. Radial ramus simple (unforked); neither fused nor connected with the pterostigma. Pterostigma unusually large and very deep; both branches quite uncommonly long. Hind wings only very minutely developed (without venation) or absent. Antennæ multiarticulate (well over 30-jointed); the individual antennary joints of the flagellum are very short (antennæ moniliform) little *longer than thick*. The wing scales are predominantly asymmetrical

(fig. 109 δ), only isolated scales symmetrical, spatuliform (fig. 109 α-γ). Claws with a generally stout tooth before the apex and before this frequently one or several indistinct tuberculiform or acute and fine denticles. Three ocelli present or absent. Eyes pubescent.

TABLE OF GENERA OF ECHINOPSOCINÆ.

Media triramous. Hind wings only developed as minute rudiments. Fore wings rather strongly acuminate. Three ocelli present	.. *Scolopama*, n. g. Type: S. halterata, n. sp.
Media biramous. Hind wings absent. Fore wings produced into a long and very thin apex. Ocelli absent	..*Echinopsocus*, Enderl. 1903. Type: E. *erinaceus*, Enderl. 1903.

Scolopama, n. g. (Figs. 108, 109, 126).

(Type : S. halterata, n. sp.)

Media triramous. Fore wings rather strongly acuminate ; with very long macrochætæ on the costal area and also on the veins and on the membrane of the marginal seam. Radial ramus simple (unforked) ; neither fused nor connected with the pterostigma. Pterostigma unusually large and very deep ; both branches uncommonly long. Hind wings only very slightly developed, without veins ; hinder margin with some very fine hairs. Eyes pubescent. Three ocelli present, placed rather close together. Antennæ with very short joints of the flagellum, which are only a little longer than thick ; presumably multiarticulate (more than 30 joints). The wing scales are chiefly asymmetrical (fig. 109 δ) long, knife-shaped, strongly acuminate at the apex ; only certain scales are symmetrically spatuliform (fig. 109 α-β) or fusiform (γ). Claws with 3 acute and very fine denticles before the tooth which occurs before the apex, and one hair before the long setiform empodial appendix.

Scolopama halterata, n. sp. (Figs. 108, 109, 126).

Clear brownish yellow, hair of forehead and vertex long. Eyes lustrescent. Ocelli fairly close together forming a rather flat triangle. *tibia 0* ary joints of the flagellum very short, antennæ presumably

multiarticulate. The length of the anterior tibia is 0·47 mm.; of the middle tibia 0·57 mm.; of the posterior tibia 0·88 mm. The lengths of the tarsal joints in the fore foot are 0·17, 0·05, 0·05 mm.; in the middle foot 0·2, 0·05, 0·06 mm.; in the hind foot 0·33, 0·08, 0·09 mm. The ratio of the hind tarsal joints as $4\frac{1}{3} : 1 : 1\frac{1}{3}$. The first hind tarsal joint with about 14 ctenidia. Claws (fig. 126) slender, with thin curved apex, and a stout acute tooth rather far before it, a hair-like empodial appendix and between this and the tooth 3 small thorn-like elevations and one fine hair beside the empodial appendix.

Fore wing faintly brownish. Scaling very pale brownish gray. Hind wings very rudimentary, without veins (fig. 108), with only some fine hairs at the hinder margin.

Scales of fore wing chiefly asymmetrical, knife-shaped and elongate, end strongly acuminate (fig. 109 δ); only a few scales have the symmetrical spatuliform appearance shown in fig. 109 α-β. Some scales (fig. 109 γ) are small and narrowly fusiform.

Length of fore wing 1·4 mm.; wing expanse $3\frac{1}{4}$ mm.

Ceylon. Peradeniya; under dry foliage on the ground; March, 1905, one specimen, collected by Mr. E. E. Green.

Echinopsocus, Enderl., 1903.

Ann. Mus. Nat. Hungar. Bd. I. 1903, p. 331.

Echinopsocus erinaceus, Enderl., 1903.

Enderlein, *l.c.*, p. 332, figs. 63 *a–g*.

German New Guinea.

Family LEPIDILLIDÆ (Ribaga, 1905).

Lepidillinæ, Ribaga. Redia, vol. II. (1904) 1905, p. 100.

Head long with shaggy hair. Occipital edge sharp. Inner maxillary lobe with 3 terminal points. End joint of the maxillary palp axe-shaped. Organ of maxillary palp in the form of a short sense club. Eyes hairy in front and also in the middle. Ocelli absent. Antennæ more than 50-jointed. Prothorax large and broad, visible from above. Ends of the femora and bases of the tibiæ scaled. Claws with one tooth before the apex. Tarsi 3-jointed. Lateral valves of the telson with thorn-like appendices anales. Middle tibia with a number of very long stout setæ on the outer side. Fore wings reduced, developed as short elliptical squamæ, as in the Atropidæ. Hind wings absent. Long narrow scales occur upon

the wing squamae, on the sides of the abdomen. The [illegible] [illegible] [illegible] [illegible] at various places on the [illegible] sides of the abdomen.

In the type of *Lepidilla* the [illegible] of the [illegible] squamiform fore wings have been broken off.

Kellogg places this group as a sub-family of the Atelurinae. These however never have squamiform [illegible] [illegible] [illegible] [illegible] [illegible] among the Lepismatidae. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] place. The occurrence [illegible] of squamiform wings [illegible] them from [illegible] [illegible] [illegible] [illegible] approximates them to the [illegible]. I therefore the Lepismatidae and Atelurinae [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] compelled to regard the Lepidillinae as a distinct family. Until further species settle this question definitely I regard this group as the subfamily Lepidillinae.

Table of Genera of Lepidillinae.

Prothorax very short, much shorter than the mesothorax. Second and third joints of maxillary palp without external spur . . . *Lepidilla*, Silv. 1905.
(Type L. Kelloggi, Silv. 1906.)

Prothorax very long, longer than the mesothorax. Second and third joints of the maxillary palp with stout and long end spur . . . *Lepolepis*, n. g.
(Type L. ceylonica, n. sp.)

Lepolepis n. g.

Inner maxilla [illegible]; 2nd joint of maxillary palp axe-shaped, second and third joints with stout and long end spur. Antennae more than 40-jointed; the joints are 1-2 times as long as thick. Ocelli absent. Eyes large, pubescent in front and in the middle. Sagittal and frontal sutures distinct. Prothorax large and long, longer than the mesothorax. Fore wings squamiform. Hind wings not developed. Meso and metathorax and middle segment close together, the last very large. Abdomen 10-jointed including the telson. The latter trilobate, the lateral lobes each with a setiform appendix caudalis. Tibiae with 2 end spurs; those of the two posterior pairs of legs with numerous setae which are very stout on the middle

legs. Claws slender, with sharp tooth before the apex, before this in the hind foot traces of microscopic denticles. Empodial appendix in the form of a straight seta.

The following parts carry scales :—The anterior side of the ends of the femora, the outer side of the bases of the tibiæ, the mesothorax, the fore wing squamæ rather closely, further on the upper side of the abdomen, the sides of segments 3-7 and the 8th and 9th segments. Scales more or less slender or compressed fusiform.

Lepolepis Ceylonica, n. sp. (Figs. 24, 114–116, 118–120).

Ochreous yellow, the femora, tibiæ, and first tarsal joints somewhat darker. Eyes black, the ommatidia standing out glossy yellow. Wing squamæ clear brown, 9th segment and telson brown. Head shaggily hairy, especially in front and at the sides. Appendices anales very stout, very faintly curved inwards. Scaling brown The scales of the wing rudiments long and narrow, those of the abdomen short and compressed. Scaling of upper side of abdomen compact. Ratio of hind tarsal joints as $5\frac{1}{2} : 1 : 1$. Ctenidiobothria absent from the first hind tarsal joint.

Length of body 3–$3\frac{1}{2}$ mm. ; abdomen $1\frac{3}{4}$ mm. ; head length $\frac{3}{4}$ mm. ; antennæ about $2\frac{1}{2}$ mm.

Ceylon. Peradeniya. Two females, on walls and ceilings inside houses ; collected and preserved in alcohol by Mr. E. E. Green.

Lepidilla, Ribaga, 1905.

Ribaga. Redia, vol. II. (1904), 1905, p. 99, Taf. 9.

Inner maxilla three-tipped. End joint of maxillary palp axe-shaped ; second and third joints with external end spurs. Antennæ multiarticulate (?), the antennary joints are more than three times longer than thick. Ocelli absent. Eyes large, finely hairy in front. Sagittal suture and frontal suture distinct. Prothorax feebly developed, not pushed below the mesothorax, but very short. Fore wings presumably squamiform, but broken off. Hind wings not developed ; mesothorax, metathorax, and first abdominal segment (median segment ?) closely conjoined as in all Atropidæ ; the last named segment is as broad as the metathorax. Abdomen 10-jointed, including the telson. Telson trilobate, the side lobes each with a setiform appendix analis. Tibiæ with two end spurs, those of the two hinder pairs of legs with numerous setæ. Claws slender with sharp tooth before the apex and before the tooth numerous microscopic hairlets. Empodial appendix in the form of a curved seta.

The following parts are scaled :—The anterior side of the femoral ends, the outer side of the tibial bases, the mesothorax ; some scales occur also on the upper side of the 9th abdominal segment. The scales are fusiform, those of the 9th segment especially truncate-acuminate at the end.

Lepidilla Kelloggi, Ribaga, 1905 (Figs 113, 124).

Ribaga, *l.c.*, p. 100. Taf. 9. figs. 1–9, Taf. 10, figs. 10–11.

Ochreous yellow ; brownish markings with violet tint occur as follows :—A reticulate pattern on the clypeus, the marking of the forehead and vertex as shown in the illustration, the end joint and the outer side of the second and third joints of the maxillary palp, the apices of the two basal joints of the antennæ, the marking of the thorax as shown in the illustration, a small spot posteriorly before the end of the femora, two rather broad rings round the tibiæ, dividing the latter into three equal parts, the basal part of the first tarsal joint ; a longitudinal streak on each side of the 9th segment and the lateral valves of the telson. Appendices anales stout, somewhat curved inwards. Ratio of the hind tarsal joints as 5 : 1 : ⅔.

Length of body 3 mm. ; of abdomen 1·3 mm.

California. Stanford. Three females.

The above description of genus and species is based upon a type specimen which Dr. C. Ribaga had very kindly placed at my disposal for this purpose.

INDEX.

(Synonyma are *cursiv.*)

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* See page 77, footnote.

EXPLANATION OF THE PLATES.

(For Vol. III. on plates A–G, read Vol. IV.)

PLATE A.

Fig. 1. *Tineomorpha Greeniana*, Enderl., n. g. n. sp.
Right fore wing and hind wing, × 12.

Fig. 2. *Syllysis Erato*, Enderl., n. sp., ♀.
Right fore wing and hind wing, × 27.

Fig. 3. *Syllysis ritusamhara*, Enderl., n. sp., ♀.
Right fore wing and hind wing, × 27.

Fig. 4. *Seopsis metallops*, Enderl., n. sp.
Right fore wing and hind wing, × 27.

Fig. 5. *Seopsis Vasantasena*, Enderl., n. sp.
Right fore wing and hind wing, × 27.

Fig. 6. *Seopsis superba* (Hag.).
Right fore wing and hind wing, × 27.

Fig. 7. *Paramphientomum Nietneri*, Enderl., n. g. n. sp.
Right fore wing and hind wing, × 27.

PLATE B.

Fig. 8. *Soa flaviterminata*, Enderl, n. sp.
Right fore wing and hind wing, × 27.

Fig. 9. *Perientomum chrysargyrium*, Enderl., n. sp
Right fore wing and hind wing, × 27.

Fig. 10. *Perientomum Greeni*, Enderl., n. sp.
Right fore wing and hind wing, × 27.

Fig. 11. *Perientomum morosum*, Hag. ♀.
Right fore wing and hind wing, × 27.

Fig. 12. *Perientomum triste*, Hag.
Right fore wing and hind wing, × 27.

Fig. 13. *Perientomum ceylonicum*, Enderl., n. sp.
Right fore wing and hind wing, × 27.

Fig. 14. *Perientomum argentatum*, Enderl., n. sp.
Right fore wing and hind wing, × 27.

Fig. 15. *Lepium chrysochlorum*, Enderl., n. sp.
Right fore wing and hind wing, × 27.

PLATE C.

Fig. 16. *Lepium luridum*, Enderl., n. sp.
Right fore wing and hind wing, × 27.

Fig. 17. *Nepticulomima Essigkeana*, Enderl., n. g. n. sp.
Right fore wing and hind wing, × 27.

Fig. 18. *Nepticulomima Hösemanni*, Enderl., 1903 (Cameroon).
Right fore wing and hind wing, × 27.

Fig. 19. *Nepticulomima brasiliensis*, Enderl., 1906 (Brazil).
Right fore wing and hind wing, × 27.

Fig. 20. *Nepticulomima Sakuntala*, Enderl., n. g. n. sp.
Right fore wing and hind wing, × 27.

Fig. 21. *Nepticulomima chalcomelas*, Enderl., n. g. n. sp.
Right fore wing and hind wing, × 27.

Fig. 22. *Echmepteryx mihira*, Enderl., n. sp.
Right fore wing and hind wing, × 25.

Fig. 23. *Echmepteryx sericea*, Enderl., n. sp.
Right fore wing and hind wing, × 27.

Fig. 24. *Lepolepis ceylonica*, Enderl., n. g. n. sp. ♀.
The left wing squame as well as the legs and antenna of the l
side are supposed to be removed, × 27.

Fig. 127. *Stimulopalpus japonica*, Enderl., n. sp.
Right hind leg seen in front view, × 60.

a–h. Spurs of the first tarsal joint.

Fig. 128. The same. Claw, × 700.

Fig. 129. The same. Scales of fore wing, × 350.

a. Principal form. b. Form from the vicinity of the outer margi
rs. Marginal scales.

Fig. 130. The same. Right maxillary palp from above, × 1
sk. Sense club. *sp.* Spurs.

Plate D.

Fig. 25. *Tineomorpha Greeniana*, Enderl., n. g. n. sp.
Venation of the right fore wing and hind wing, × 12.

Fig. 26. The same. var. *major*, Enderl., n.
Venation of the right fore wing and hind wing, × 12.

Fig. 27. *Paramphientomum Nietneri*, n. g. n. sp.
Venation of right fore wing and hind wing, × 18.

Fig. 28. The same. Scales of fore wing, × 400. *rs.* Marginal scal

Fig. 29. The same. Scales from hind wing, × 400. *rs.* Margin
scale.

Fig. 30. *Seopsis Vasantasena*, Enderl., n. sp.
Venation of right fore wing and hind wing, × 27.

Fig. 31. The same. Wing scales, × 400.
α and *β*. Fore wing scales. γ–ζ. Hind wing scales.

Fig. 32. *Seopsis Vasantasena*, Enderl., n. sp.
Venation of right fore wing and hind wing, × 27.

Fig. 33. *Seopsis metallops*, Enderl., n. sp. Wing scales, × 400.
α–δ Fore wing scales, ε–ζ. Hind wing scales. *δ* and ζ Margin
scales.

Fig. 34. *Paramphientomum Nietneri*, Enderl. n. g. n. sp.
Ocelli, × 160.

Fig. 35. *Seopsis Vasantasena*, Enderl., n. sp.
Ocelli, × 160.

Fig. 36. *Seopsis superba* (Hag.). Wing scales, × 400.
α β. Fore wing scales. γ–ε. Hind wing scales. *β. δ* and *ε*. Margi
nal scales.

Fig. 37. *Syllysis Erato*, Enderl., n. sp. ♂.
Venation of right fore wing and hind wing, × 18.

Fig. 38. The same. ♀. Venation of right fore wing and hin
wing, × 18.

Fig. 39. *Syllysis ritusamhara*, Enderl. ♂.
Venation of right fore wing and hind wing, × 18.

Fig. 40. The same. ♀. Venation of right fore wing and hind wing, × 18.

Fig. 41. *Soa flaviterminata*, Enderl., n. sp.
Venation of right fore wing and hind wing, × 27.

Fig. 42. *Syllysis Erato*, Enderl., n. sp.
Fore wing scales, × 400. *rs*. Marginal scales.

Fig. 43. The same. Hind wing scales, × 400. *rs*. Marginal scales.

Fig. 44. *Soa flaviterminata*, Enderl., n. sp.
Fore wing scales, × 400. *rs*. Marginal scale.

Plate E.

Fig. 45. *Perientomum ceylonicum*, Enderl., n. sp.
Venation of fore wing and hind wing, × 27.

Fig. 46. The same. Fore wing scales, × 400.
gs. Ground scales. *ds*. Cover scale. *rs*. Marginal scale.

Fig. 47. *Perientomum morosum*, Hag.
Venation of fore wing and hind wing, × 27.

Fig. 48. *Perientomum chrysargyrium*, Enderl., n. sp.
Fore wing scales, × 400. *gs*. Ground scales.
ds. Cover scale. *vrs*. Anterior marginal scale.

Fig. 49. *Perientomum morosum*, Hag. Fore wing scales, × 400.
gs. Ground scales. *ds*. Cover scales.

Fig. 50. *Perientomum argentatum*, Enderl., n. sp.
Fore wing scales, × 400. *gs*. Ground scales. *ds*. Cover scale. *mch*. Macrochæta.

Fig. 51. *Perientomum Greeni*, Enderl., n. sp.
Fore wing scales, × 400. *mch*. Macrochæta. *rs*. Scale from the base of the anterior margin.

Fig. 52. The same. Venation of fore wing and hind wing, × 27.

Fig. 53. The same. Fore wing scales, × 400. *ds*. Cover scale. *gs*. Ground scales.

Fig. 54. *Syllysis ritusamhara*, Enderl., n. sp.
Claw from the hind foot, × 700.

Fig. 55. *Syllysis Erato*, Enderl., n. sp.
Claw from the hind foot, × 700.

Fig. 56. *Paramphientomum Nietneri*, Enderl., n. g. n. sp.
Claw from the hind foot, × 700.

Fig. 57. *Seopsis metallops*, Enderl., n. sp.
Claw from the hind foot, × 700.

Fig. 58. *Seopsis Vasantasena*, Enderl., n. sp.
Claw from the hind foot, × 700.

Fig. 59. *Soa flaviterminata*, Enderl., n. sp.
Claw from the hind foot, × 700.

Fig. 60. *Perientomum chrysochlorum*, Enderl., n. sp.
Venation of right fore wing and hind wing, × 27.

Fig. 61. The same. Fore wing scales, × 400.
gs. Ground scales. *ds*. Cover scale. *rs*. Marginal scale.

Fig. 108. *Scolopama halterata*, Enderl., n.g. n.sp.
Right fore wing and hind wing, × 60.

Fig. 109. The same. Fore wing scales, × 400.
α and *β*. Particular or intercalary scales. *γ*. Intercalary scal from anterior margin. *δ*. Predominant form of asymmetric scale.

PLATE G.

Fig. 110. *Perientomum Hösemanni*, Enderl., 1903, ♀ (Cameroon). Abdominal apex from below, × 120. *gp*. Gonapophyses. 9. Ninth segment. *te* Telson. *aa*. Appendices anales.

Fig. 111. *Syllysis ritusamhara*, Enderl., n. sp.
Inner lobe of left maxilla from above, × 160.

Fig. 112. *Paramphientomum Nietneri*, Enderl., n.g. n.sp.
Inner lobe of right maxilla from above, × 160.

Fig. 113. *Lepidilla Kelloggi*, Rib., 1905 (North America, California
Inner lobe of left maxilla from above, × 160.

Fig. 114. *Lepolepis ceylonica*, Enderl., n. g. n. sp.
Inner lobe of left maxilla from below, × 160.

Fig. 115. The same. Portion of right antenna, × 160.

Fig. 116. The same. Rudimentary right wing, × 60.

Fig. 117. *Nepticulomima Sakuntala*, Enderl., n.g. n.sp.
Right hind leg, × 60.

Fig. 118. *Lepolepis ceylonica*, Enderl., n.g. n.sp., × 400.
α–δ. Scales from the wing squama. *rs*. Scale from the abdomen

Fig. 119. The same. Right maxillary palp from below, × 16
sk. Sense club.

Fig. 120. The same. Claw of hind foot, × 400.

Fig. 121. *Seopsis metallops*, Enderl., n. sp.
Right hind tibia from behind, × 60.

Fig. 122. *Echmepteryx mihira*, Enderl., n. sp.
Right hind tibia from behind, × 60.

Fig. 123. *Seopsis superba* (Hag).
Right hind leg, × 60.

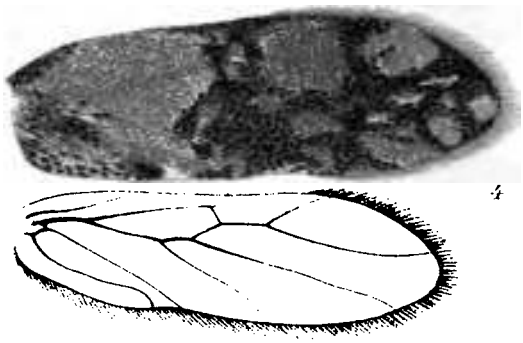
Fig. 124. *Lepidilla Kelloggi*, Rib., 1905 (North America).
Claw of hind foot, × 400.

Fig. 125. *Nepticulomima Sakuntala*, Enderl., n.g. n.sp.
Right antenna from above, × 60.

Fig. 126. *Scolopama halterata*, Enderl., n.g. n.sp.
Claw, × 700.

Fig. 127–130, *vide* Plate C.

[The foregoing paper by Dr. Enderlein was written by th author in German; was translated by Dr. Willey (while on leave England) and submitted to Dr. Enderlein for his approval. avoid further delay in publication, the author has foregone personal supervision of the proofs which have accordingly be corrected by me, in Ceylon. The difficulties of this divided labo must be our excuse for any small errors that may have been ov *looked.—E.E.G.*]



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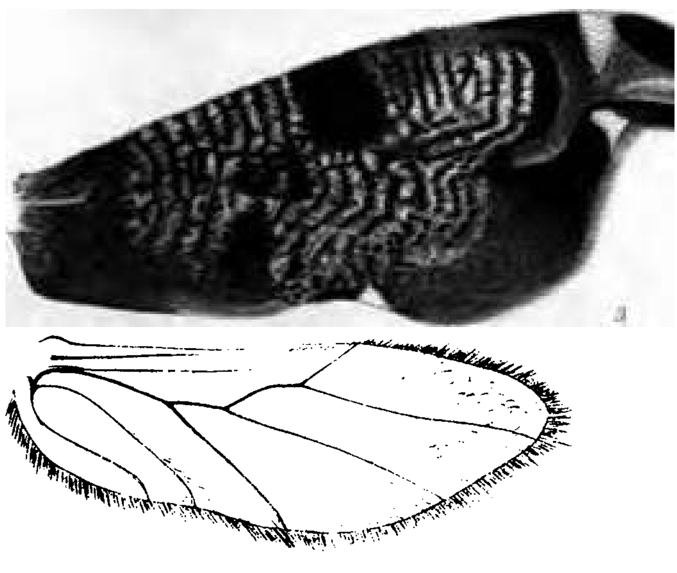

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1. Tineomorpha Greenia

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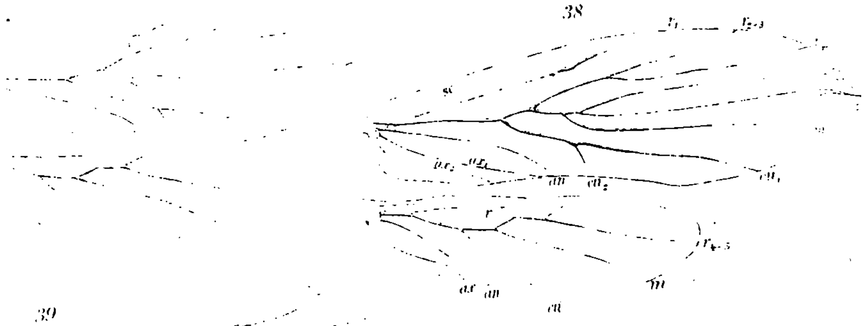

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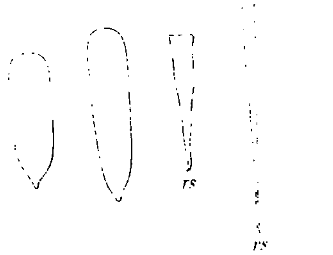

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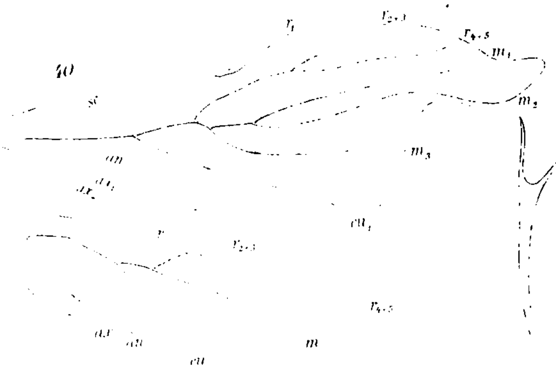

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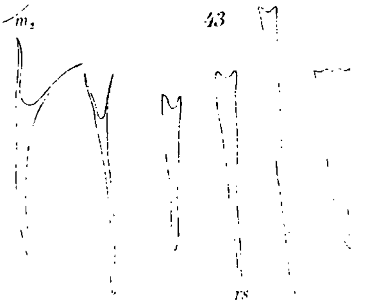

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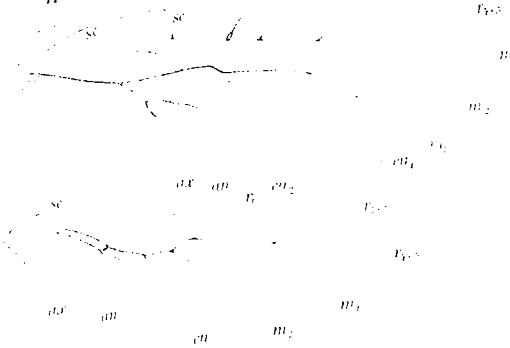

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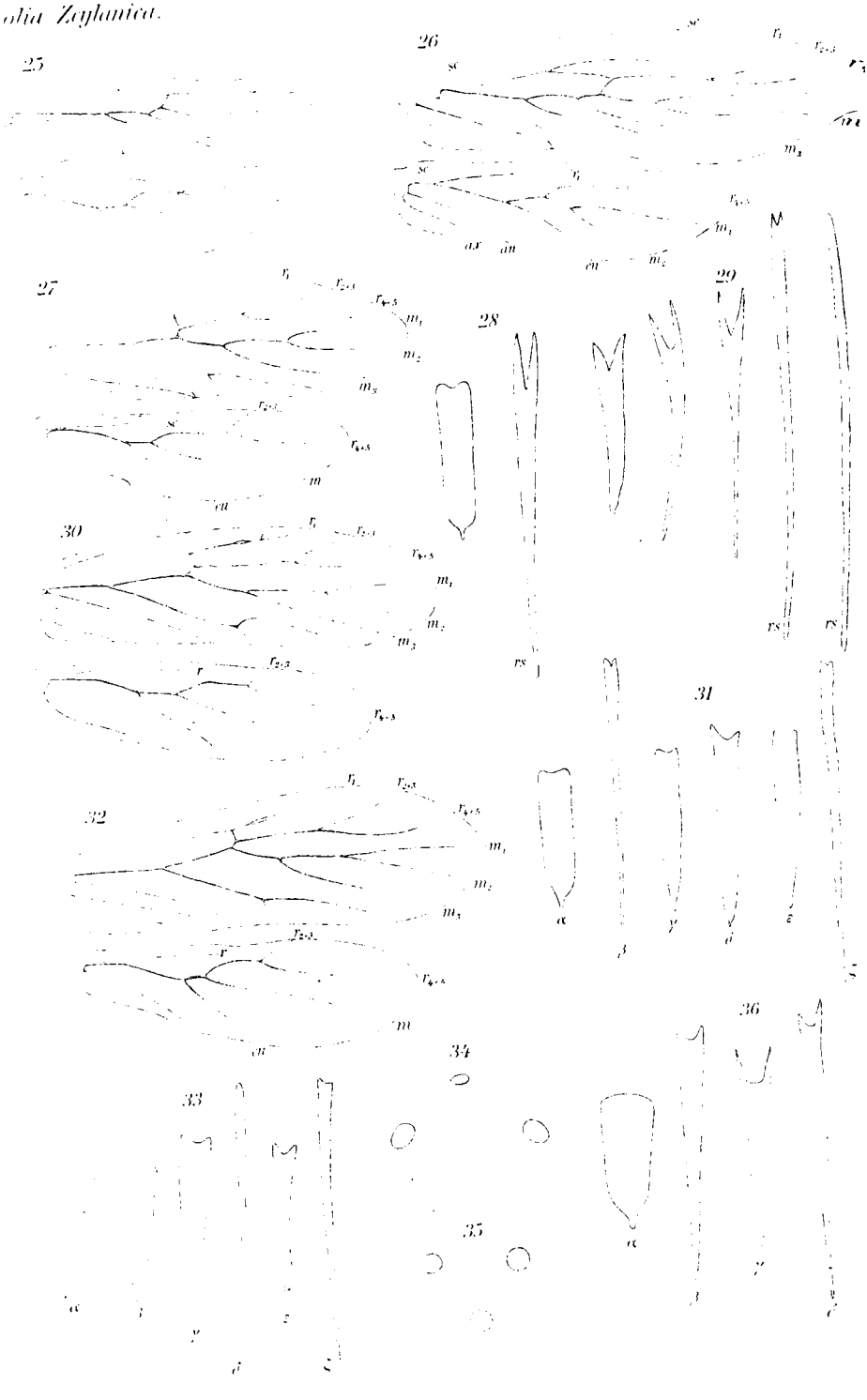
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SUPPLEMENTARY NOTE ON THE SCALY WINGED COPEOGNATHA.

By E. Ernest Green.

IN the foregoing paper Dr. Enderlein has given us very careful and elaborate descriptions of the remarkable little scaly-winged insects allied to the Psocidæ or "book lice." A few notes on the habits and appearance of these insects in life may be of interest to the general reader and of use to those who may wish to collect and study them. In this connection it may be mentioned that of the twenty-five species collected by me in Ceylon, all but three or four were taken in the Peradeniya Gardens. It is probable therefore that a careful search in other parts of the Island—to say nothing of the Oriental region in general—will bring to light numerous other species, and perhaps still more extraordinary and beautiful forms.

In general appearance they may be likened to minute moths, their wings and bodies being usually clothed with scales greatly resembling those of the Lepidoptera. Some species have a more hairy appearance, though most of these hairs are really elongated scales. Such species might perhaps be mistaken for the hairy-winged flies—Psychodidæ.

Several species are to be found frequenting buildings. They seem to prefer damp situations, such as outside walls, especially where minute algæ have obtained a footing. But there are others that I have taken only inside houses—either on the walls and ceilings or amongst books and old papers. The greater number of (and more interesting) species are to be found upon the trunks of trees and under loose bark.

They may be recognized by their movements. When disturbed, they run rapidly for a short distance and then come to a halt. The species that frequent the trunks of trees are practically invisible so long as they remain still, their colour harmonizing with the varied tints of the lichens and algæ on the bark. They appear to prefer such trees as have a comparatively smooth bark. I have seldom found them upon gnarled or corky stemmed trees. I do not think that the species of tree *per se* has anything to do with this preference. It is more a question of the vegetable growths on the

bark, upon which growths I am inclined to believe that they feed. though I have never been able to prove this by actual observation. My most fruitful hunting ground has been the stems of various palm trees, especially those of the "Royal Palm" (*Oreodoxa regia*). Partial shade is evidently essential to their comfort. The more exposed stems were always found to be untenanted. The best way to find the insects is to pass the hand slowly up the trunk without actually touching it. This will flush any individual within range and induce it to move off in a series of short jerks, when it can be located and—with practice—safely captured in the manner described below.

Though provided with functional and quite useful wings, the insects seldom take flight unless hard pressed. They are, nevertheless by no means easy to capture. An ordinary net is quite useless. Even if they should take flight, they are so small that the eye can scarcely follow them. I have found a small glass tube (containing a fragment of cyanide of potassium wrapped in tissue paper) the most successful instrument for their capture. It must be of not more than five-eighths inch diameter, otherwise it will not fit sufficiently close to the rough surface of a wall or the convexity of a tree trunk; and if there is the smallest crevice the little creature will most assuredly discover it and escape through it. Having located your specimen, the mouth of the tube must be cautiously approached and then suddenly placed over the insect. On the first and probably many successive attempts the insect will dodge out of the way, but with patience it can eventually be enclosed within the mouth of the tube. Then still further patience is required. Any attempt to force the insect to leave its support and enter the tube will meet with failure and probably afford further opportunities of escape. The tube must be held firmly in place until the captive is asphyxiated by the fumes of the cyanide, when it will drop off into the glass. This may take a minute or more to effect. Species that occur under loose bark or in decayed wood may be shaken off on to a piece of white cloth and bottled from there.

Attempts to keep the insects alive in captivity for any length of time have invariably proved unsuccessful. It is difficult to adjust the humidity to their requirements.

I have found the eggs of one species only (*Paramphientomum Nietneri*). I found this species in large numbers on a cement covered parapet; and in small cavities in the cement were numerous packets of eggs concealed beneath a crust of earthy particles. On

confining a few of the insects in a glass jar together with broken tiles and pieces of cement, similar egg packets were deposited. In this case the covering material appeared to be cement dust worked up into a paste. Each little nest contained about half a dozen eggs, packed side by side. The eggs are of a pale orange-yellow colour, irregularly oval, and measuring approximately 0·50 by 0·25 mm. I was unsuccessful in my attempts to hatch out these eggs. Some of them dried up without maturing and the remainder died and became mouldy.

The nymphs may often be found in the company of the adult insects. They resemble wingless species of Psocus, and in some species are more or less clothed with scales—like the adults.

ON TWO NEW ENTOMOSTRACA FROM CEYLON.

BY

ROBERT GURNEY.

With two Plates.

A COMPREHENSIVE survey of our knowledge of the freshwater Entomostraca of Ceylon was published in 1898 by Daday, and since then nothing has been added to it so far as I am aware. Combining the species recorded for the first time in his paper with those previously described by Brady (1886) and Poppe and Mrazek (1895), he gives a list containing one Phyllopod, twelve Copepoda, and thirty-six Cladocera. Thanks to the papers of Sars, Stingelin, and Richard, we have a list of Entomostraca from the Indo-Malayan sub-region comprising two Phyllopoda, forty-six Cladocera, and six Copepoda, but practically nothing is known at present with regard to India. We are also far from having a complete knowledge of the Entomostraca of the Ethiopian and Australian regions, so that at present the facts at our disposal are too limited to allow of satisfactory deductions being made with regard to geographical distribution. The difficulty is also much increased by the fact that many genera and some species have a world-wide distribution, and appear to be independent of barriers, which hinder the disposal of other forms. Whether this is due to an extreme adaptability, or indicates a distinction between primitive widely distributed forms and those of more recent origin (Moore, 1903), it is difficult to say. However, so far as the facts go it may be useful to summarize them. Taking the Cladocera as being the most numerous and best known group, we find that of the thirty-six species and varieties recorded from Ceylon thirteen are peculiar to it, so far as is known at present. The following are the numbers of species and varieties common to Ceylon and the various Zoogeographical Regions :—

Palæarctic	10
Nearctic	4
Neotropical	8
Ethiopian	5
Australian	10
Indo-Malayan Sub-region	18

If we exclude those species which are found both in Ceylon and in more than one other region*—that is, the widely distributed species—the numbers are as follows :—

Palæarctic	1
Nearctic	—
Neotropical	—
Ethiopian	—
Australian	—
Indo-Malayan Sub-region	4

The single species found only in the Palæarctic Region and in Ceylon is *Chydorus ovalis*, Kurz. It was recorded by Poppe and Mrazek, but they expressed some doubt as to its identity with the European species. Seeing that the genus Chydorus is peculiarly rich in Oriental species, differing but little one from another, this record cannot carry much weight.

From the figures given above it is evident that the Entomostracan fauna of Ceylon contains a large proportion of peculiar forms, and that, of the remainder, those that are limited to a single region are all Indo-Malayan species. There is no doubt therefore that there is a close relationship between the fauna of Ceylon and Indo-Malaya, but it is not safe to speculate on relationships with regions lying further afield.

Through the kindness of Dr. Willey I have recently received specimens of a *Diaptomus* and a *Streptocephalus* collected in Ceylon, and it is further evidence of the richness and peculiarity of the fauna that both species prove to be undescribed. They were collected by Mr. E. E. Green in a muddy stagnant pool on the Cotton Experiment Station at Maha Ilupalama in the North-Central Province of Ceylon when looking for Mosquito larvæ.

The following is a description of these species :—

Order : PHYLLOPODA.

Streptocephalus spinifer, n.sp. (Plate I.)

The body in both sexes is somewhat slender, the head and thorax together a little longer than the abdomen without the caudal rami ; the following are the measurements of three specimens :—

	Female.		Male.
	I.	II.	
Head and thorax ..	5·25 mm. ..	4· 5 mm. ..	5. 5 mm.
Abdomen ..	5· 0 mm. ..	3·75 mm. ..	5. 0 mm.
Caudal rami ..	2· 0 mm. ..	1· 5 mm. ..	2.75 mm.
Egg sac ..	3· 7 mm. ..	2· 5 mm. ..	—
Total length ..	12·25 mm. ..	9·75 mm. ..	13·25 mm.

* For the purposes of this comparison I consider Ceylon as a region by itself, distinct from the rest of the Oriental Region.

The head of the male is produced in front, beneath the frontal process, into a distinct, downwardly-curved, spiniform rostrum (fig. 4). The segments of the thorax are simple, as are also those of the abdomen in the female. In the male, on the other hand, each segment, with the exception of the first and the last, bears one or more spines. The second segment bears only a lateral pair, but the next five bear both a pair of long dorsal spines and a lateral spine on each side diminishing in size in the posterior segment. The seventh segment bears a pair of dorsal spines and a pair of very minute lateral spines, and the eighth a single median dorsal spine. The caudal rami in both sexes are long. In the male they are only slightly curved, ciliated at their base, but provided for about the distal two-thirds of their length with strong curved spines on either side (fig. 8). In the female they are more divergent, and fringed with setæ along both edges.

Unlike the majority of the genus Streptocephalus, the male has the frontal processes enormously developed. They are fused at their base into a single cylindrical process, but are distinct for the greater part of their length. Distally they divide again into dorsal and ventral branches. The ventral branch is short and simple, but the dorsal branch bears a row of papillæ along its ventral edge. The first pair of antennæ are long, in the male about equalling in length the first joint of the second antennæ, and in the female somewhat exceeding the length of the second pair. The second pair of antennæ in the female are short, narrow, triangular plates fringed with hairs, but without any terminal projection. Those of the male are long chelate appendages. The basal segment is about equal in length to the second segment and bears a long apophysis: the terminal portion is narrow and produced into two long sub-equal processes. Each of these has a small inner lobe at its base of somewhat variable form (fig. 5). The branchial legs are of the usual form (figs. 6 and 7). The basal plate (bract) has its edge serrated. The exopodite is much longer than the endopodite, the distal margin of the latter more or less squarely truncated. The penis of the male (fig. 9) scarcely extends beyond the third abdominal segment, the reversible part not spinous. The egg-sac of the female is narrow, cylindrical, and pointed at the extremity, reaching to the middle of the sixth segment of the abdomen.

Three males and three females of this species were collected by Mr. Green, who describes its appearance in life as follows:—"Prominent black eyes; body pale translucent, yellowish-greenish; a pair of brilliant scarlet cerci at extremity." One or two of the specimens have what appear to be large branching chromatophores

in the posterior part of the abdomen, which perhaps are the seat of the red pigment.

The species is one of peculiar interest in more than one respect. The female is of a perfectly normal type, but the male differs strikingly from any species of Streptocephalus hitherto described. In particular it is distinguished by the enormous development of the frontal processes, which about equal the second antennæ in size. In the majority of the species of this genus the frontal processes are reduced and fused into a small plate, sometimes showing traces of its originally paired origin by the presence of a small emargination of the tip; for example, *S. rubricaudatus*, Klunz. and *S. vitreus*, Brauer. In others they are almost entirely suppressed, as in *S. purcelli*, Sars. In only one or two cases are they very conspicuous. These are *S. proboscideus*, Frauenfeld, and *S. neumanni*, Thiele. The frontal processes of the latter are of almost exactly the same type and relative size as those of *S. spinifer*. They differ in that the main fused stem gives off on either side a branch, and is itself produced into a long recurved process. It is, in fact, a trifid frontal process.

The possession by the male of spines on the abdominal segments, which has suggested the name given to the species, is a striking, but not distinctive, feature of it. In *S. neumanni* also the abdomen is armed with spines in the male but not in the female, but in this case they are ventral and unpaired. It appears to be the rule among the Branchipodidæ that such spines, when present, should be possessed by the female and not by the male; for example, *Chirocephalus spinicaudatus*, Simon, and *Chirocephalus carnutanus*, Brauer (see Simon, 1886, p. 400). These two species are exceptions which prove that the spines have no accessory sexual function as one might perhaps otherwise assume.

A point of more morphological importance is the possession of a marked rostrum. Traces of a rostrum are indeed present in more than one species; for example, *Chirocephalus grubei* (Dybowski) and *Branchipus pisciformis* (Schaeffer). In the latter the rostrum is represented by a broad, truncated outgrowth, and I know of no species in which a definite pointed rostrum occurs like that of *Streptocephalus spinifer*.

Order: Copepoda.

Diaptomus Greeni, n. sp. (Plate II.)

Female; Cephalothorax stout, the greatest breadth falling about the first free segment. The last segment produced on either side into a large wing with two notches (fig. 1). Abdomen consisting of

three segments; the first, or genital segment, very asymmetrical, produced on the left into a simple finger-like process, and on the right into a wing-shaped process with a distinct notch on its anterior margin (fig. 2). Second segment much shorter than either the first or the third, the line of division between it and the latter very indistinct. Caudal rami half the length of the two last abdominal segments combined, very broad and ciliated internally. First antennæ not reaching beyond the cephalothorax. Fifth pair of feet (fig. 3) with the endopodite one-jointed, about two-thirds the length of the first joint of the exopodite, bearing two short spines at its apex. The spinous prolongation of the second joint of the exopodite is nearly straight, and provided internally with a row of minute denticles; a long spine springs from near the base of the joint. The terminal joint very small, having the appearance of a bifurcate spine. Genital operculum with the anterior margin slightly sinuate.

Length : 2·0 — 2·3 mm.

Male; Cephalothorax more slender than that of the female, the last segment not dilated laterally. Abdomen consisting of five segments. The furcal branches somewhat longer than the last segment of the abdomen, narrow, ciliated internally; the outermost seta of the right branch much thicker than the rest, not ciliated, and with a small tooth on its inner side (fig.6). The first antennæ do not reach beyond the cephalothorax. The last joint of the prehensile antenna armed with a small claw, as in *D. denticornis*, Wierz. The two preceding joints are simple, without prolongations (fig.7). The right fifth foot (fig. 8) has the endopodite two-jointed, somewhat longer than the first joint of the exopodite. The first joint of the exopodite is dilated, the last joint long and narrow, with a long terminal claw nearly straight at its base and curved at the end. Near the base of this claw is borne a long spine, bent downwards, and closely pressed to the side of the last joint in such a way as to be scarcely visible when the leg is viewed from in front. This spine, which corresponds to the lateral spine of the ordinary type, is found in this peculiar position in all the specimens, so that the position must be considered normal. In the left fifth foot the endopodite is one-jointed, shorter than the first joint of the exopodite and constricted at the tip. The first joint of the exopodite bears a strong lateral spine and is not distinctly separated from the last joint, which has a folded laminar appearance.

Length : 1·85 — 1·95 mm.

Mr. Green describes the colour : " Body blue, antennæ and forked hinder part extremely red."

The species is remarkable for the strongly asymmetrical expansions of the genital segment of the female, and for the modified seta of the right furcal branch and recurved lateral spine of the right fifth foot of the male. These characters, combined with the armature of the prehensile antenna of the male, make *Diaptomus greeni* a remarkably distinct species.

If we compare it with the four species of Diaptomus previously recorded from Ceylon, viz., *D. orientalis*, Brady, *D. lumholtzi*, Sars, *D. drieschi*, Poppe & Mrazek, and *D. singalensis*, Daday (Table 1), we find that, though these four species form a fairly homogeneous group themselves, *D. greeni* differs very markedly from all, though approaching nearest to *D. singalensis*. On the other hand, in the possession of a hook on the last joint of the prehensile antenna of the male it agrees with *D. denticornis*, Wierz., *D. alluaudi*, Guerne & Rich., and *D. chevreuxi*, Guerne & Rich., three "Circum Mediterranean" species. Tabulating the most important characters of the four species (Table 2) one finds a considerable further agreement, particularly with regard to the prehensile antenna and the fifth foot of the female. The vestigial condition of the third joint of the exopodite of the latter is common among the North American species of Diaptomus, but is otherwise rare. For systematic purposes *D. greeni* may, I think, be classed with the above-named species, and apart from the four remaining Sinhalese species.

TABLE 1.

	D. orientalis.	D. lumholtzi.	D. drieschi.	D.singalensis	D. greeni.
st segment of the Cephalothorax. × ♀	With small wings	With small wings	Scarcely winged	With small wings	With large wings
nitalSegment ♀	—	—	—	—	With wings
Antenna of ♀ reaches	End of genital segment	End of furca	End of furca	Second abdominal segment	End of Cephalothorax
st joint of the Prehensile antenna	—	—	—	—	With hook
st joint but two of ditto	With claw shaped process	With claw shaped process	With a short hook	—	—

	D. orientalis.	D. lumholtzi.	D. drieschi.	D.singalensis	D. greeni.
Endopodite of 5th foot of ♀ compared to 1st joint of Exopodite	Same length	Shorter	Shorter	Shorter	Shorter
3rd joint of Exopodite of ditto	Distinct	Absent	Distinct	Distinct	Vestigial
Endopodite of 5th foot of ♂ compared to joint of Exop.	Same length	Longer	Longer	Same length	Longer

TABLE 2.

	D. denticornis.	D. alluaudi.	D. chevreuxi.	D. greeni.
Last segment of the Cephalothorax. ♀	With large wings	With large wings	With large wings	With large wings
Genital segment ♀	Without wings	With ventral spine	With two dorsal elevations, asymmetrical	With wings asymetrical
1st Antenna of ♀ reaches	Furca	Furca	End of genital segment	End of Caphalo thorax
Last joint of the Prehensile antenna	With a hook	With a hook	With a hook	With a hook
Last joint but two of ditto	With a hyaline lamella	Unarmed	Unarmed	Unarmed
Endopodite of 5th foot of ♀ compared to 1st joint of Exopodite ..	Longer	Shorter	Shorter	Shorter
3rd joint of Exopodite of ditto	Reduced	Reduced	Absent	Vestigial
Endopodite of 5th foot of ♂ compared to 1st joint o Exopodite ..	Shorter	Shorter	Shorter	Longer

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EXPLANATION OF PLATES.

PLATE I.

Streptocephalus spinifer, n. sp.

Fig. 1—Side view of the female. × 10.

Fig. 2.—Side view of the male. × 10.

Fig. 3.—Frontal process and rostrum of male from the side. × 37.

Fig. 4.—Second Antenna of male. × 37.

Fig. 5.—Leg of 9th pair, male, from behind. × 37.

Fig. 6.—Leg of 6th pair, female, from in front. × 37.

Fig. 7.—Left caudal ramus, male, from above. × 37.

Fig. 8.—Penis of male. × 37

Plate II.

Diaptomus greeni, n. sp.

Fig. 1.—Side view of female. × 48.

Fig. 2.—Dorsal view of abdomen, female. × 57.

Fig. 3.—Fifth pair of legs, male. × 100.

Fig. 4.—Genital operculum, female. × 150.

Fig. 5.—Dorsal view of male. × 47·5.

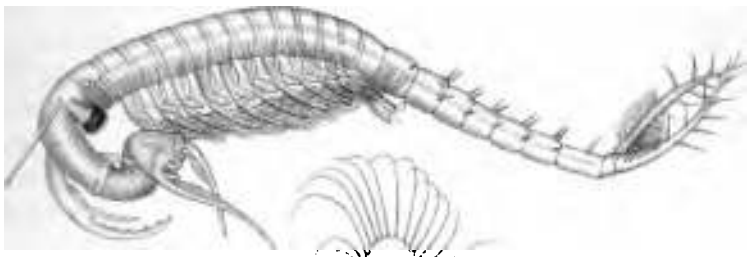
Fig. 6.—Furca of male, ventral view. × 100.

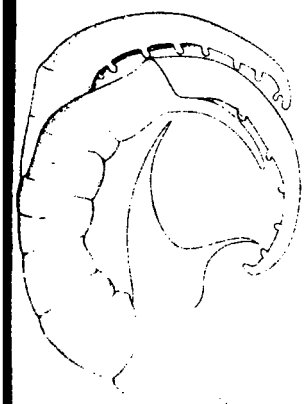
Fig. 7.—Part of prehensile antenna of male. × 105.

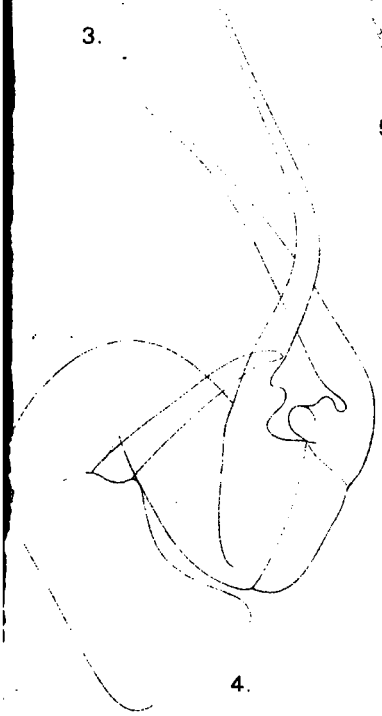
Fig. 8.—Fifth pair of legs. × 100.

Fig. 8*a*—Endopodite of right foot enlarged.

Fig. 9.—Fifth foot of male ; end of last joint of exopodite to show recurved lateral spine.

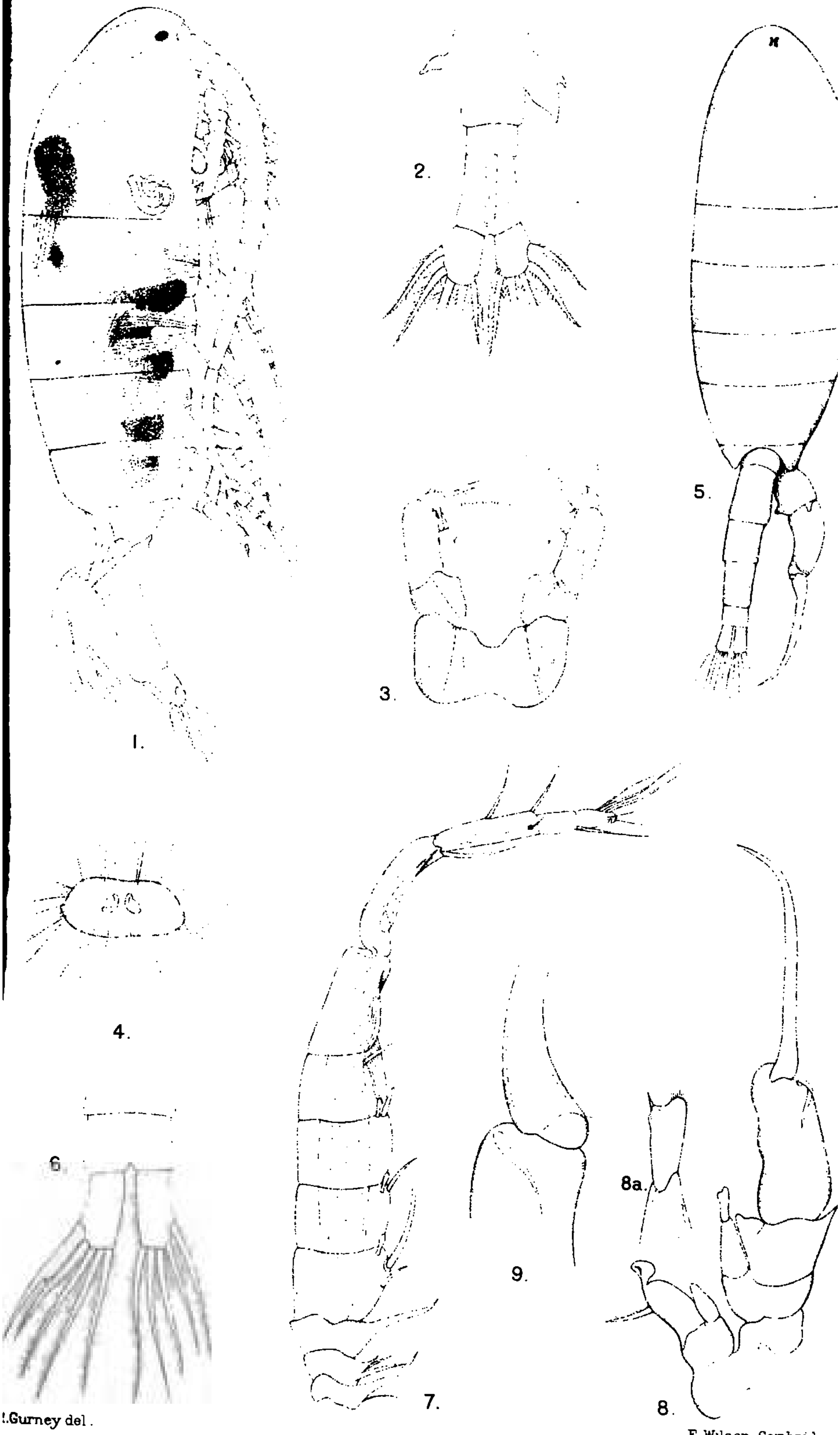






W Sexton and R.Gurney del. E.Wilson, Cambridge.

STREPTOCEPHALUS SPINIFER.



.Gurney del. E. Wilson, Cambridge.

DIAPTOMUS GREENI.

SINHALESE EARTHENWARE.

[Second Paper.*]

By Ananda K. Coomaraswamy, D.Sc.

MR. S. D. Mahawalatenna has kindly forwarded me some traditional verses describing the potters' art and craft. I believe that a knowledge of the crafts was often handed down in such mnemonic verses, preserving the continuity of tradition and ensuring adherence to well-tried and proved methods of work. Mat weavers have craft songs corresponding to this potters song; technical recipes (not only medicines) are sometimes recorded in mnemonic verses, as also are traditional fragments of history, dates of erection of buildings, &c.; instructions for building operations are given in *Mayimataya*, *Gewalshaḍwargaya*, *&c.*, and painting and image making are treated of in *Rúpavaliya* and *Sáriputra*. The two last are Sanskrit works, and the current versions of *Mayimataya* is doubtless a translation from a Sanskrit original. On the other hand I cannot find that any songs exist connected with iron smelting or steel manufacture and many other trades; but this may be because they have been forgotten, or because I have not been able to obtain them.

Of course a song like that here given is of quite a popular character; the Sanskrit works referred to are on a different footing in many respects.

I now give the pottery song, and after it a translation.

1. අරුණට පලමුව පිබිදී පැසගෙණ මැටිපොල දෙසට යැ තෙයි
පැස පිසදමලා මැටිපොල පායා ඉවුදෙවියන් වඳී තෙයි
දියකඩ ඇදලා තොසිනි අතටගෙණ වළ ඇතුලට බසි තෙයි
දෙඉවුර නොකඩා මැටිකද බිඳලා පැස පුරවා ගණී තෙයි

2. බිඳලා මැටිකද බැඳගණ බරටම බඩහැළ බිදුලේ ගොඩකර තෙයි
ලිහලා කැට එකවිතරට පොඩිකර මාපැදුරේ අවිවේ වණ තෙයි
වේලාගණ මැටි ගල්කැට වෙන්කර වතෙන් කොමා කුල්ලෙන් පොළතෙයි
පොළලාගත් පිටි එකපමණට දියගහලා අනලා කැවිකර තෙයි

* The first paper will be found in Spolia Zeylanica Vol. IV., pt. XIII., 1906, and should be consulted before the present one is read.

3. කැවිකළ මැවිගුළි එකදබඑක ගොඩකරම්හ් කොළඅතු ගෙණ වසතෙයි
වහලා තුන්දින හැර තුන්ගොඩකට නැවතත් ගෙණ අන තෙයි
දමලා පමණට කින් කුරුදුවැලි ආයෙත් දියගහලා අන තෙයි
අනලා ආයෙත් කැවිකර ගොඩකර තුන්දින හැර ගණී තෙයි

4. මෙසේ පදන්කළ මැවි පාගාගණ අතින් නැවත නැවතත් අන තෙයි
ලෙසෙ කතියා ඉවි අත ඇලෙනාකොට තරමට ඇති බව දනී තෙයි
විශේෂයෙන් කැවි එක එක තරමට බදුන් පමණ දුනලා කඩ තෙයි
එසේ කැවූ කැවි පවිටල ලඟ අහුරා සුරුකිව වහලා තඹ තෙයි

5. පසුදින වේවැල් ඉරුවෙන් එක එක කැවියේ මැවි වෙන වෙන ලියතෙයි
ලියලා කදිමට නැවතත් කැවිකර පෙරදින ලෙස අහුරා තඹ තෙයි
පසුදින අලියම නැගිවි පවිටල අතුපතුගා පිරිසිදුකර තෙයි
මැවිකැවි එක්කොම අතපස අහුරා පවිටලමුල ගොස් ඉදගණී තෙයි

6. එකින්එකට මැවිකැව සුරතට ගෙණ පෝරුව මතු තඹ තෙයි
වමතින් පෝරුව දුන පමණට කරකවමින් දකුණෙන් ඉදිකර තෙයි
බදුන් පමණ හැඩනිල දුනගණ විතරට විතරට අත තදකර තෙයි
ඉතින් මෙලෙස පමණට ඉදිවෙනකොට පන්නිල බිඳලා හැඩගස තෙයි

7. බිඳලා පන්නිල හැඩලා බදුනේ තදින්ම පෝරුව කරකව තෙයි
ඉදලා කිවලා වව්වම බලලා ඇඟිලිතුඩින් ඇදපැද හරි තෙයි
ගඟලා දියපොද බපලා කදිමට සිරුබලා දෙවතව ගණී තෙයි
නමලා පමණට ඉදිකර මෙලෙසට තිස්පැය පසුකරලා ගණී තෙයි

8. වමතින් ගලිහැඩ දකුණින් මැවිඅළු බදුන පයට තදකරගණී තෙයි
කමණින් පමණට අල්ලෙන් තලමින් පමණට ලොකුකරලා ගණී තෙයි
මෙලෙසින් විතරම ලොකුකර තලලා බපලා අවිවේ වණ තෙයි*
වේලා පමණක් ලියවැල් වල්වැල් මල්පෙති බදුනේ වට අඳි තෙයි

9. ඇඳලා වට ඉරි මල්පෙති කුකුලන් ගිරා පරෙයි සැලලිහිණියනු න්
බිඳලා පත් බෝපෙති වටු මල් ඉඳිවටු නාමල් බටු නෙලුම්මලු න්
සඳලා වන්දා සූරියමණ්ඩල මකරතොරන් රණ හංසයිනු න්
කුඹුලා ඇත් අස් ගව මෘග සිංහ දිවි වහවලසුන් නා පොලොං රුව න්

10. පිනන තිසරුන් ඉගිලෙන ලිහිණින් රූබර කිදුරන් මී බඹරු න්
දුර පිඹුරු නෙක ගෝර සපුන් ඇති මෝර කැසුප් සහ රණමසුර න්
මෝරණ රණහස සේම දිනෙන්දින අරණ තන ඇති කොමල උදු න්
නැර මෙරු සුරකල් ලම පැවියොත් බදුන් වමේ කරලා එතල න්

11. නාරි උතාවැල් ලියවැල් වට ඇඳ ගෝඩියෙකුරු පිල්ලම් ඇඳ ලා
ත්‍රිශූලම් මැද ඕං ශ්‍රීං සවර අරක්ෂාවට පිහිටුව ලා
වසුර නාග හංස උරහද ඇ ගිවි සුවිටු ගිවිකොණ ඇඳ නිව ලා
මණ්ඩල නවග්‍රහ රැහි දෙලස සත්විසි නැකතුත් එහි පිහිටුව ලා

12. පාට කදිම ගුරු මතුළු ගොයාගණ උතුපමණට දියකරගණී තෙයි
ඊට මාත්තුව තෙල්වලි දිලිසෙන පමණට බුබුකරලා ගණී තෙයි
මීට පසුව අවිවේ වණලා සොදවම වේලාගණී තෙයි
ඊට පසුව ගිනිපවිටලා අහුරා පලඹු දිනේ දුන්වද දව තෙයි

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* This line is short : some word seems to have been omitted.

13. දෙවඟු දිසෙ පමණක්දර දමලා පමණක් ගිනිදල්වා තබ තෙයි
තෙවඟු දිනේ තරමට ගිනිකරලා පදමට එන්නට පාදව තෙයි
ඊට පසුව ගිනි ඇදලා නිවලා නිවෙන්ඩ තුන්දින පසුකර තෙයි
ඔබ්වෙනි දින පව්වල නිවුනා දැන ඔදුන් එකින්එක ගෙණ බා තෙයි

1.

Waking before the dawn, carrying the basket, he fares to the place-of-clay ;
After cleaning the basket and clearing the place-of-clay, he worships his guardian god ;
Wearing (only) a loin cloth, and gladly taking (the basket) in hand he goes down into the pit ;
Not breaking down the two sides (of the pit) he digs the clay from the middle and fills the basket.

2.

Breaking up the clay, he takes a pingo-load and heaps it in the potter's yard ;
Separating the pieces of clay he breaks them to an equal size and spreads them on a big mat in the sun ;
After having dried the clay, and removed the stones, he pounds it in a mortar and in a *kulla* winnows it ;
Then taking up the powder, he adds an equal quantity of water and makes it into balls.

3.

Taking up the balls of clay and putting one upon the other, he covers them with leaves ;
Three days afterwards he divides them into three and kneads them again,
Knowing the right proportion he adds very fine sand and sprinkling water kneads again ;
After kneading, he makes into rounded balls again, and makes a heap of them ; and takes them up again after three days.

4.

After thus preparing it, he treads and kneads the clay again and again ;
When it is like sticky wax he knows that it is ready ;
Then according to the size of the vessels to be made he divides it into separate pieces ;
The pieces thus made he stores near the workshop and covers up carefully.

5.

Next day with a split cane he separates the pieces of clay one by one,
And having duly divided them, again makes them up in balls and keeps them in a heap as on the previous day ;
The next day, waking at dawn, he sweeps and tidies the workshop,
And having all the balls of clay close at hand, sits before the wheel.

6.

He takes with the right hand the balls of clay one by one and sets them on the wheel,
With the left hand he turns the wheel,* with the right hand he moulds (the vessel),
Knowing the size and shape (required), as required he presses down the hand;
Then when the right shape appears, he stays the form, and moulds the rim.†

7.

Having stayed the form and turned the rim, he turns the wheel very fast,
And looking now and then to see if it is smooth, he amends with the finger tip any unevenness,
Sprinkling a little water he polishes (the pot), then takes it carefully with open hand,
Duly keeps it standing by, and takes it up again after thirty hours from the time of making thus.

8.

(Then) taking the *galiheḍa* ‡ in the left hand and the *meṭi aluwa*§ in the right, holding the vessel tightly with the feet,
He beats it with the blade,‖ making it bigger as much as need be,
And after thus beating it to the required degree and having polished it, he sets it in the sunshine,
After it is partly dried, he draws leafy creepers (*liyawel*), garlands and flower-petals round the vessel;

9.

Having drawn round it lines, flower-petals, cocks, parrots, pigeons, *seḷalihiṇi*,
Separately (he draws) *bó* leaves, flower bunches, date bunches *ná* flowers, *ólu* and lotus flowers,
And makes the orbs of sun and moon, *makara toran* and golden *haṇsa*,
Elephants, horses, cattle, deer, lions, tigers, wolves, bears, cobras, (*poloṇgas*).

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* Usually the wheel is turned by a young assistant.

† *Heḍagahasteyi*; *i.e.*, he moulds the rim with a wet rag, turning it over.

‡ Stone held inside the vessel while the sides are hammered over till they meet; see previous paper, fig. 1.

§ *Méṭi aluwa*, evidently another name for the bat, *walantalana leḷla* of previous paper, fig. 1.

‖ *Alla*, lit. palm of the hand, doubtless means the blade of the bat or *walantalana leḷla*; the description previously given should be carefully read to make the meaning of this verse clear.

10.

Swimming cranes,* flying *lihiṇi*, fair *kiñduro*, and honey bees
Great boas, fierce serpents not a few, sharks, tortoises, and golden peacocks,
Beautiful damsels whose ever-swelling breasts are like growing golden swans,
Nor does he forget to draw dear delightful children.

11.

Having drawn round it *nári latá*, *liyawęl*, and also the letters of the alphabet with vowel signs,
And inserting in the midst a trident with the signs *óṇ hriṇ* as a talisman,
Having well drawn in the four corners *púṭṭu*†, peacock, cobra, swan, serpent.
The signs of the Zodiac, the nine planets, and the twenty-seven asterisms. ‡

12.

For this) he takes good (red) *gurugala* and (white) *makulu* and mixes them with water to a thick consistency,
Mingling them with the right amount of oil, that they may shine :
Thereafter he sets them in the sun to dry them well,
And after that having stocked them in the kiln, on the first day he dries them in the smoke.

13.

On the second day putting only a certain quantity of firewood he lights a moderate fire,
On the third day he makes the fire strong enough, and fires (the pots) till they are done ;
Afterwards he draws away § the fire and puts it out and leaves there three days for cooling,
On the fourth day ascertaining that the kiln is quite cool, he takes out the vessels one by one.

Before concluding these notes I make a few additions to and note a few errors in my former paper.

Earthen vessels occasionally made, beside those mentioned, are spittoons (*paḍikkam*) and one-handled mugs (*púkuru*).

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* *Tisaru*, cranes (?) ; *haṇsa* I have translated as swans.

† *Púṭṭuwa*, a symmetrical arrangement of two, three, or four animals with necks entwined.

‡ The poem mentions a long list of decorations, some of which could hardly be found room for on an earthen vessel. All the work referred to is of the kind done before firing, and does not include painting, which (except slip painting) is no part of the potters' art.

§ The firewood is in the form of long sticks which are pushed in as they burnt away ; hence the expression " to draw away the firewood " when the fire is to be put out.

A *kalaha* is a vessel open at both ends, and resembling a *kalagedi̯a* with an extended neck; *kalas* are used for holding sprays of coconut flower on auspicious and ceremonial occasions (weddings, *mangalya*, &c.) a pair being placed on the two sides of the doorway. This is however a special use of the word *kalaha* (*kalasa*, *kalaya*) which is equivalent to Sanskrit *kalasa* or *ghaṭa*, and generally applicable to vessels with only one opening, especially those of *kalagedi̯a* type.

A particularly interesting piece of earthenware is the *bummedi̯a* (which may be translated "bullfrog"). This is a vessel open at both ends like a *kalaha*, but the difference of diameter between the two ends is greater; there is a large belly as in a *kalagedi̯a*; the large end is covered with a *talagoya* skin (attached with paste made from *kabaralissa*, or from rice and plantain), and a strap is added for hanging over the shoulder. The drum so made is used at harvest times and for *likeliya*.

Large vessels with lids, formerly used for holding cloths (garments), are called *pilihe̤liya* and *habuhe̤liya* (the latter if smaller); cloths were considered to keep well in earthen vessels, and to be better protected from the attacks of insects than if kept in wood boxes.

Smaller vessels of the same general type, decorated with cobras, are used in Pattini Dewála to hold the *halamba*, and are called *halambahe̤liya*. Similar vessels without cobras are used for betel leaves and called *bulathe̤liya* or *heppuwa*.

A curious variety of *kotalaya* is the ring-shaped *walalu kotalaya*: these have to be inverted and filled from underneath. The same arrangement is sometimes found in the case of a *kotalaya* of the ordinary form, then called *yatura kotalaya*.

It is noteworthy that the Ke̤laṇi money boxes are in the form of a *mamma*. This is a world-wide and very old form for a money box, the idea being the suggestion of abundance and plenty. It is, in fact, sympathetic magic.

It should have been remarked that at Ke̤laṇi the white material is rubbed into the incised lines after firing. This is different from slip painting, which whether red or white (which last I have not seen, but which is referred to in the verses) is done before firing. The different patterns used at Ke̤laṇi have no special names.

New pots are generally seasoned before use, by inverting over a small fire and so smoking them, after which they do not communicate a raw taste to the water held in them.

Besides the big *pátras* used in vihára, smaller earthen alms-bowls are made, though the alms-bowls actually used by priests

are usually metal. Some potters (at Kelaṇi) make an alms-bowl for presentation to a priest, with every batch of pots turned out.

A good deal of pottery in Colombo is nowadays imported from Southern India. The Tamil earthenware is considered of very good quality.

The *Kárti Maṅgalya*, incorrectly spelt *Kaṭṭi* on page 4 of the previous paper, has no connection with the presentation of robes, but is the Siṇhalese festival corresponding to the Hindu Dípavali, when innumerable lamps are used.

For *púnákalé* (p. 16), *púnáwa* is a more usual term.

For *úrákoṭṭa*, (p. 11) read *úrákeṭa*; the *úrákeṭa* are usually of wood, hollowed segments of a large tree.

On page 4, note, the right word is no doubt *táliya*.

Finally, I shall be very grateful for any further corrections or additional information.

NOTES.

1. *Costume of Sinhalese Ladies before the Portuguese Period.*—What is now known in Ceylon as the Aryan dress was the costume of Sinhalese ladies before the arrival of the Portuguese. The adoption of Christianity and the free social intercourse which existed between the Portuguese and Sinhalese gentry in the sixteenth century led to its abandonment in the low-country, while the influence of the later Tamil dynasty on the Kandyan throne led to its modification in the Kandyan provinces.

The Sinhalese poem, "Selalihini Sandesa," written in the reign of Prakrama Bahu VI., early in the fifteenth century, likens the lake in Cotta to a lady in the following words (Macready's translation):

> "The basin there, lake Diawanta called,
> Aye represents the fair silk robe that wraps
> The lady city, with its heaving folds
> Of waves, with its long shaking girdle cloth
> Of splashing foam, with rows of lilies red
> Inwrought, and golden likeness of the swan."

Thus comments Macready:—

"The poet likens the sheet of water in front of the city to the dress of women, as it then was; which consisted of a long cloth (often figured with devices such as the lotus and the hansa) wound round the body and folded thickest at the waist. One end was drawn up, and allowed to fall in pleats over the portion that served as the waist band."

C. M. FERNANDO.

2. *Waterholes.*—The low-lying flat country which lies between the foot of the Matale hills and Jaffna, extending to the coast on either side, is almost entirely dependent on artificial irrigation and on wells for its water supply. Before its occupation by a race skilled in the building of tanks it was for half the year destitute of water, save that to be found in a few rivers which flow throughout

the year, in a few vil or natural lakes, in the sandy beds of rivers where the animals dig for water, and in a large number of rock water-holes. From their wide, almost universal, distribution, these last must be considered as the most important of the several sources.

Now that the great irrigation works of the Sinhalese have been breached and have lapsed into forest, the conditions of the wilder parts of the country is the same as it was 3,000 years ago; and the animal population of the forests is again largely dependent for its existence on the water which lies in the deep holes in the rocks. These holes, which are of so great importance to the animals, are not all alike; for some are large enough and shallow enough to permit of buffaloes wallowing, while others are so small that a bear can hardly crawl in far enough to slake his thirst. But the large shallow ones do not survive a prolonged drought, and eventually the thirsty denizens of the forest are reduced to seeking their drink in a few deep narrow holes, the area of which is so small proportionately to their cubic content that even the driest year leaves them unexhausted.

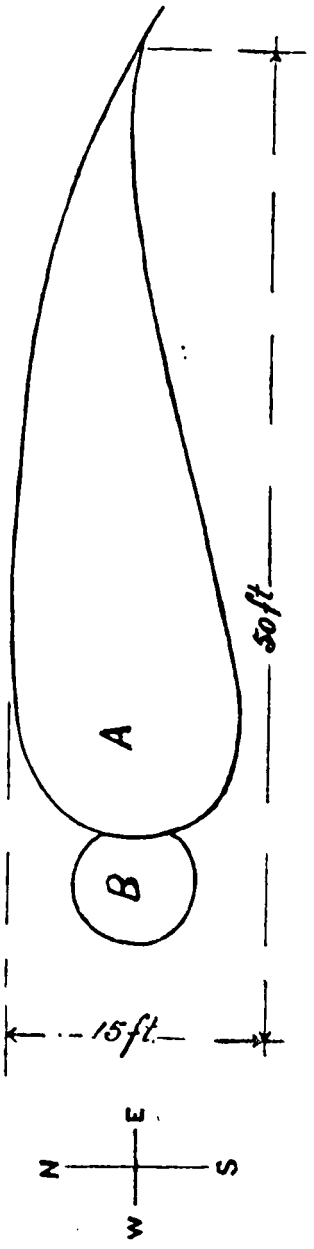
These holes are, as a rule, situated in the middle of great spaces of slab rock (gneiss), which provides a catchment area large enough to fill them from a few heavy showers. One side is generally higher and steeper than the other, so that access to the water is only possible at one or two spots.

Some of these holes are very deep with nearly precipitous sides, and when thirsty animals and evaporation have reduced the water below a certain level, it is exceedingly difficult for any animal to quench his thirst save at great risk of falling in. Into the traps thus formed animals do sometimes fall and are unable to escape.

I was once brought some of the teeth of a bear which had been found a mass of corruption in a nearly-dry water-hole. On another occasion I saw the bones of deer which had been dug up in the mud at the bottom of a hole which elephants had drunk dry. And during last year (1905) there were no less than three instances in the North-Central Province of elephants being thus entrapped. A cow elephant and her calf were successfully removed from one hole and led away captive, already half tamed by their trying experience. Of these captive elephants I was lucky enough to see one a young female about 5 ft. at the shoulder.

The hole which was her prison lay in the centre of a wide expanse of slab rock some two acres in extent. It was about 50 ft. long by some 15 ft. in breadth, and when I saw it contained 2 ft. of water.

The following diagram shows approximately the shape :—



The hole A was that in which the elephant was captured. B was a small pocket at a higher level and contained clear water. The north side or wall of the hole was some 12 to 15 ft. above the level of the water, and the south side about 6 ft. with a sloping lip. It was down this lip, polished by generations of thirsty beasts to a slippery smoothness, that the poor elephant had slid.

She walked ceaselessly up and down uttering little unhappy noises, and continually trying to grip the smooth uncompromising stone with her trunk, which was quite worn and torn by constant beating on the rock. Sometimes she got wedged into the narrow end, and with her feet against one wall and her back against the other tried to climb out. Occasionally she would succeed in rising a foot or two but always to fall back again more angry and miserable than before. By this climbing process her rump had become quite worn and sore. Although, judging by the droppings of the herd, she had been four or five days in captivity, she was no whit sobered, but charged to the end of her prison whenever I approached.

Any branches I gave her for food were immediately trampled under foot. Some attempt was made by the Ratemahatmaya to get her out, but after some ten or twelve days' captivity she died.

JOHN STILL.

Anuradhapura, August 9, 1906.

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3. *Eagle's Nest at Peradeniya.*—On April 10 I noticed a large nest composed of coarse sticks placed on the extreme top of a Bombax tree in the Botanic Gardens here. The tree was quite leafless, and the bird, an eagle of sorts, was perched on the edge of the nest. I believe the bird to be *Spizaetus ceylonensis* (the smaller crested eagle), examples of which have been seen about the Gardens not infrequently. I was rather surprised at the very open and conspicuous situation of the nest, but a fortnight later it was entirely concealed by the new growth of foliage. It seems probable that the site was chosen while the tree was in full leaf, the subsequent seasonal fall of leaf exposing the structure for a short time.

E. E. GREEN.

Peradeniya, June 19, 1906.

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4. *A Copy of the "Mahawansa" in Cambodian Characters.*—Ola manuscript C 7 of the Colombo Museum, being a copy of the Mahawansa in 13 parts in Cambodian characters,* was recently lent to Professor Geiger of Erlangen University for the purpose of compiling his critical edition of the older portion of the Mahawansa.

* Presented by the British Consul at Bangkok, Colombo Museum Catalogue of Manuscripts, 1901, p. 17.