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PART II.

THE
INDIAN FOREST
RECORDS

**On some new and other Species of Hymenoptera in the
collections of the Zoological Branch of the Forest
Research Institute, Dehra Dun**

BY

P. CAMERON



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TABLE OF CONTENTS.

PART I.

	PAGE.
INTRODUCTION	1
CHALCIDIDÆ—	
CHALCIDINÆ.	
<i>Centrochalcis</i> , gen. nov.	2
<i>Centrochalcis</i> , <i>ruficaudis</i> , sp. nov.	2
<i>Chalcis tachardiæ</i> , sp. nov.	3
TORYMINÆ.	
<i>Paroligosthenus</i> , gen. nov.	4
<i>Paroligosthenus trichiophthalmus</i> , sp. nov.	5
CYCLOPLEURINÆ.	
<i>Cyclopleura</i> , gen. nov.	6
<i>Cyclopeura fumipennis</i> , sp. nov.	7
<i>Cyclopeura claripennis</i> , sp. nov.	7
EURYTOMINÆ.	
<i>Eurytoma pallidiscapus</i> , sp. nov.	8
EUPELMINÆ.	
<i>Brasema annulicaudis</i> , sp. nov.	8
ENCRYTINÆ.	
<i>Lissencyrtus</i> , gen. nov.	9
<i>Lissencyrtus troupi</i> , sp. nov.	10
<i>Copidosoma</i> ? <i>clavicornis</i> , sp. nov.	11
APHELINÆ.	
<i>Hadrothrix</i> , gen. nov.	13
<i>Hadrothrix purpurea</i> , sp. nov.	13
SCELIONIDÆ—	
<i>Caloteleia rufipes</i> , sp. nov.	13
<i>Immsia</i> , gen. nov.	14
<i>Immsia carinifrons</i> , sp. nov.	15
EVANIIDÆ—	
<i>Evania appendegaster</i> , Lin.	16

	PAGE.
BRACONIDÆ—	
BRACONINÆ.	
<i>Bracon tachardiæ</i> , sp. nov.	16
<i>Iphiaulax sal</i> , sp. nov.	17
<i>Iphiaulax Immsii</i> , sp. nov.	17
<i>Ectadiophatnus</i> , gen. nov.	18
<i>Ectadiophatnus tachardiæ</i> , sp. nov.	19
MICROGASTERINÆ.	
<i>Apanteles tachardiæ</i> , sp. nov.	19
—————	
PART II.	
INTRODUCTION	21
TENTHREDINIDÆ.	
<i>Lophyrus indicus</i> , sp. nov.	21
MUTILLIDÆ.	
<i>Mutilla sex-maculata</i> , Swed.	22
POMPILIDÆ.	
<i>Salix flavus</i> , F.	22
<i>Salix (Prionemis) dehraensis</i> , sp. nov.	22
<i>Pseudagenia tinctoria</i> , Sm.	23
SPHEGIDÆ.	
<i>Sceliphron tibiale</i> , Cam.	23
<i>Liris nitidus</i> , sp. nov.	23
<i>Ampulex compressa</i> , Fab.	24
<i>Trypoxylon ornatipes</i> , sp. nov.	24
DIPLOPTERA.	
<i>Polistes stigma</i> , F.	25
<i>Icaria annulipes</i> , sp. nov.	25
<i>Ancistrocerus sikhimensis</i> , Bing.	26
<i>Odynerus ornatus</i> , Smith	26
<i>Rhynchium argentatum</i> , F.	27

	PAGE.
ANTHOPHILA.	
<i>Ceratina Binghami</i> , Cook	28
<i>Megachile stirostoma</i> , sp. nov.	28
<i>Cœlioxys sulcispina</i> , sp. nov.	29
<i>Cœlioxys fulvitaris</i> sp. nov.	30
<i>Cœlioxys tenuilineata</i> , sp. nov.	31
<i>Cœlioxys fuscipes</i> , sp. nov.	31
<i>Cœlioxys ruficaudis</i> , sp. nov.	32

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[Part II.

PART I.

On the Parasitic Hymenoptera reared at Dehra Dun, Northern India, from the Lac (*Tachardia*) and Sal Insects.

By P. CAMERON.

Introduction.

IN this paper I have enumerated and described the Insects sent me by Dr. A. D. Imms, Forest Zoologist, from Dehra Dun, where they were mostly reared or collected by himself. The most important, as they may prove to be of economic importance, are those reared from the Lac and Sal Insects. There can be no doubt that the small insects belonging to the Chalcid groups of the *Aphelinæ* and *Encyrtinæ* are direct parasites of the Lac and Sal Insects, but as regards some of the other *Chalcididæ* and the *Braconidæ*, it is probable that they prey on moth larvæ which feed on the Coccids. That a Tineid larva does feed on the lac insects is certain from the observations of Mr. E. E. Green (*cf.*, *Proc. U. S. Nat. Mus.*, XVIII, 633) in Ceylon.* If it be the case that they destroy Tineid larvæ which kill the Lac insects they, *i.e.*, the Braconidæ, etc., must be looked upon as beneficial insects, while the *Encyrtinæ* and *Aphelinæ* are injurious, as they kill useful insects. From the systematic point of view the most interesting is the species of *Cyclopleura*, of which I had received a species from Borneo previously.

As bearing on the Lac Insect, it may be useful to note that Mr. E. E. Green reared from *Tachardia albizzii* in Ceylon: *Encyrtus tachardiæ*, How.; *Anastatus tachardiæ* How. (*Eupelminæ*); *Holcopelte*, sp. (*Entedoninæ*); *Tetrastichus*, sp. (a hyperparasite no doubt); *Bracon greeni*, How. and *Aphrastobracon flavipennis*, How., the last two being probably parasitic on moth larvæ.

* Two species of Lepidoptera, *e.g.*, *Eublemma amabilis* and *Holocera pulvereæ* are common parasites of *Butea* lac in India. A. D. Imms.

The lac was obtained by Mr. R. S. Troup from Bishanpur in the Saharanpur District, and a number of trees of *Butea frondosa* were infected with it. The experiments were carried out at Ranipur in the Siwalik Forest Division. Samples of the lac were sent from time to time by Mr. Troup to the Forest Zoologist at Dehra Dun who reared the parasites described in this paper.

CHALCIDIDÆ.

Chalcidinae.

Centrochalcis, gen. nov.

Antennæ, 11-jointed, placed opposite the end of the eyes, slender, of uniform thickness, the scape narrow, reaching to the ocelli. Eyes bare; the malar space not quite so long as them. Apex of scutellum rounded. Metanotum with the sides broadly rounded, without projections—abdomen sessile, the basal segment as long as the following 3 united—about one-third shorter than the others united; the ovipositor broad, nearly as long as the abdomen. Hind femora with about 10 short, blunt, clearly separated teeth, which are almost hidden by the dense hair. Apical nervures thick; the stigmal curved, as long as the post-stigma, which is gradually narrowed towards the apex. The abdomen in the ♀ ends in a stout, broad stylus, which almost, or quite, equals it in length. Head, thorax and legs and the apices of the abdominal segments densely covered with silvery pubescence. There is only one ring joint in the antennæ; it is bare; the flagellar joints are elongate. Malar space half the length of the eyes. Base of abdomen rounded.

The antennæ are not placed quite so high up on the face as in some species of the group, but the genus can hardly be placed in the *Haltichellini*. In the arrangement of Ashmead (*Mem. Cairn. Mus.*, i, 248) it would run near to *Trigonura* and *Thaumatella*, both neotropical genera, with which it cannot be confounded.

Centrochalcis ruficaudis, sp. nov.

Black, densely covered with longish glistening white pubescence, the abdominal segments fringed with longish white hair; a band on the apex

of pronotum broad laterally, narrowed in the centre, a line along the sides of the mesonotum, a broader one on the sides of the scutellum and the ovipositor, except at the base and apex above, dark rufous; the apices of the abdominal segments of a darker red; the under side of the flagellum of the antennæ, and its basal joints above, rufous; the pedicel black; legs black, densely covered with white pubescence, the anterior obscured with rufous, the middle femora, tibiæ and tarsi rufo-testaceous; the hinder tarsi appear white from being densely covered with white pubescence. Tegulæ rufous, wings clear hyaline, the nervures black. Head, pro- and mesothorax coarsely rugosely punctured, the head more finely than the thorax; the pronotum more finely than the mesonotum and the latter less coarsely than the scutellum—Propleuræ coarsely rugosely punctured; the basal half of the mesopleuræ rugosely punctured, thickly covered with longish white hair, the apical half depressed, flat, shining, bare, closely, rather strongly striated, the striæ stronger above than below. Metapleuræ coarsely reticulated-punctured. Metanotum irregularly reticulated; a small angled area in the centre of the base, with a large, irregular, almost semicircular one on either side of it, these bearing some irregular striæ. The 1st abdominal segment is punctured to near the apex, the others are punctured at the apex where the pubescence is, the apical are more coarsely punctured throughout. Ovipositor strongly punctured at the base, weakly at the apex. The hind femora closely denticulate throughout; the teeth are small, rounded and almost hidden by the dense pubescence. ♀ and ♂.

Length ♀ 6 mm., ovipositor 2 mm., ♂. 4 mm. Dehra Dun, June, "Out of sundri wood." (*Heritiera Fomes*, Buck.). The ♂ has the antennæ entirely black, the sides only of the pronotum are rufous, the central red line being almost obliterated; the mesonotum bears no red, and the ventral surface of the abdomen is red; the 4 front legs and the hind tarsi are rufous. Probably the amount of the red colour varies in both sexes. In one ♂ I can only count 9 distinct femoral teeth.

Chalcis tachardiæ, sp. nov.

Black, densely covered with white pubescence, the apex of the femora, base and apex of tibiæ more broadly and the tarsi yellowish white, as are also the tegulæ; wings clear hyaline, the nervures black. Hind femora with about 10 small teeth; the apical 3 smaller than the rest,

the 4th longer and more slender; the following 3 stouter, longer, triangular; the next two shorter, widely separated, bluntly rounded, the basal larger, longer, the apex depressed. Apex of scutellum broadly rounded, distinctly margined. Metanotum closely reticulated, without a distinct areola; the basal row of equal width, margined behind, the outer reticulations are larger than the central; the sides of the metanotum are broadly rounded. Abdomen not quite so long as the thorax, gradually narrowed to a sharp point from the apex of the 2nd segment, the 3rd and following segments densely covered with silvery hair—Sheath of ovipositor short, broad, acutely pointed at the apex, not projecting much. Frontal depression very smooth, bare and shining; there is an indistinct short triangular keel on the top. Temples narrow, margined. Between the antennæ and clypeus is a smooth plate, obliquely narrowed above and below, the lower part narrower than the upper. Clypeus smooth, except for 4 foveæ. Wings clear hyaline, the nervures black; the stigmal branch short, thick, narrowed slightly at the base, about twice longer than thick. The post-marginal vein twice its length. Antennal scape and pedicle, bare, shining, the flagellum opaque, densely covered with white pubescence. ♀.

Length 2.5 to 3 mm.

“Out of Lac.” November. It is probably a parasite on a moth caterpillar feeding on the Lac insects.

Toryminæ.

Paroligosthenus, gen. nov.

Eyes pilose. Scutellum with a transverse furrow near the apex, the part beyond it smooth. Metanotum with a keel down the centre. Apical margins of basal abdominal segments, not incised. Hind femora with one small tooth close to the apex; the hind spurs one-third of the length of metatarsus. Antennæ with one ring joint. Stigmal branch thickened, narrowed at the base, the apex cleft; it is placed in a narrow cloud; the post-marginal vein about one-third longer than it; the marginal one-third of the length of the basal. Mesonotal furrows distinct. Scutellum large, pyriform, the narrowed end at the base. Mesopleuræ with the base above separated by a furrow into a triangular

area having a foveainits centre ; it is not otherwise excavated. Occiput not margined.

The only genus of *Monodontomerinae* known with pilose eyes is *Oligosthenus*, Foer., but that has not a cross-furrow on the scutellum and differs in other respects. The pilose eyes separate it from the genera with a transverse scutellar furrow, *Physothorax* and *Pleseostigma* being further distinguished from it by the 1st abdominal segment being incised medially. It is more closely related to *Monodontomerus*, but that genus has bare eyes.

Paroligosthenus trichiophthalmus, sp. nov.

Green, with coppery and brassy tints, the apical segments of the abdomen rufo-violaceous, the antennal scape, pedicle, tibiae and tarsi rufo-testaceous, the flagellum of antennae black, fuscous below ; wings hyaline, the nervures black. ♀.

Length 3 mm. ; terebra 1 mm. or one-third of the length of the abdomen.

Dehra Dun. Out of Sal (*Shorea robusta*) and out of Sundari wood (*Heritiera Fomes*, Buck.) May and June.

The puncturation is weak and shallow on the thorax, there are indications of fine transverse striae on the pronotum ; the base of the apical part of the scutellum is finely and closely longitudinally striated. There is a triangular area on the base of the metanotum in the centre formed by furrows. Mandibles dark rufous. The basal half of the 2nd abdominal segment is finely and closely transversely striated. The pubescence on the head, thorax and legs is white and dense ; the abdominal segments are fringed with longer white hair. There is a fine keel on the malar space, which is one-third of the length of the eyes. The clypeus is clearly separated, is narrow above and becomes gradually roundly widened below. The basal joint of the flagellum is obscure green above ; it is longer than the ring joints ; the flagellar joints are densely covered with white pubescence.

The host of this species is not known, but it was bred from a cocoon collected out of a Sal tree, the cocoon being probably that of a moth. The European species of *Monodontomerus*, its closest ally, are known to be parasitic on *Anthophora* (a bee), caterpillars of moths and a sawfly.

Cyclopleurinae.*Cyclopleura*, gen. nov.

Head transverse behind, broadly rounded in front, the temples hardly developed, malar space distinct, one-third of the length of the eyes, which are narrower below than above. Antennæ placed immediately over the clypeus and below the eyes, their joints longish, the apical ending in a sharp point. Pronotum as long as the top of the head, gradually narrowed from the apex to the base. Mesonotum large, longer than wide, rounded at base and apex, without furrows. Scutellum large, as wide as long, rounded at base and apex, flat. Post-scutellum large, triangular, projecting over the metanotum, which is flat, large, its apex broadly rounded. Metapleuræ large, semicircular, projecting beyond the metanotum and on to the basal abdominal segment; the projection is thicker above than at the apex and below. Abdomen longer than the head and thorax united, gradually narrowed to a sharp point, the basal segment longer than the 2nd, the others of almost the same length. Legs long, the coxæ and femora large, thick, the latter flattened below, longish oval; tibiæ longish, spinose, the spurs of moderate length; the middle and hinder with 2; the tarsi longer the tibiæ, closely spinose the apical joint minute. The submarginal, marginal and post-marginal veins form one piece; there is no stigmal branch; there is a distinct marginal vein in the hind wings; it is lighter coloured in the centre than on the margins; wings are long and narrow and are placed on the middle of the thorax—a narrow furrow with 3 angled curves runs down the centre of the mesopleuræ, this furrow being more distinct than that which separates them from the metapleuræ; there is no mesosternal furrow. The antennæ are probably 9-jointed, but owing to the manner in which they are covered with gum I am not certain as to the exact number, nor can I make out the structure of the mandibles, except that they are broad and rounded at the apex. I cannot refer the type of this genus to any of the recognized tribes; in my opinion it should form the type of a new one: the peculiar structure of the metathorax, the large triangular post-scutellum, the long narrow wings with the nervures in one piece, the longish, sharp-pointed abdomen and the long spiny legs with their large coxæ and stout femora appear to warrant this. For the present I should place the tribe near the *Toryminæ*.

I am acquainted with 2 species, one of them being a parasite of the Lac insect in India. The differences between the 2 may be shown thus :

Wings smoky, the hind femora black, the abdomen not banded	. <i>fumipennis</i>
Wings hyaline, the hind femora not black, the abdomen with testaceous bands. <i>claripennis</i>

Cyclopleura fumipennis, sp. nov.

Black, the mesonotum blue, the scutellum dark purple, the post-scutellum yellow; the basal ventral abdominal segment testaceous; the front legs, the 4 hinder trochanters and the 4 hinder tibiæ and tarsi and the antennal scape, pallid yellow; wings hyaline to near the middle, dark fuscous beyond, the cloud becoming gradually obliquely narrowed from the hinder margin to the costa, which is pale in the lighter coloured basal part. Smooth, shining, the mesonotum densely covered with black pubescence, the base of the scutellum with a few long hairs, as have also the apical abdominal segments. ♀.

Length 2·5 mm.

Kuching (John Hewitt, B.A.)

The ovipositor has a broad, pilose sheath and projects slightly beyond the apical segment. The apex of the middle coxæ reaches to the apex of the 1st abdominal segment, the 3rd to the apex of the 2nd.

Cyclopleura claripennis, sp. nov.

Antennæ black, the head dark purple, the thorax dark blue, the abdomen black, the basal segment narrowly blue at the base, almost the apical half of the 2nd and 3rd segments and the base of the 2nd narrowly in the centre, more broadly laterally, and the greater part of the basal 4 ventral segments rufo-testaceous; legs pallid yellow, the femora above, and the tibiæ above and below, narrowly lined with black; the tarsi are darker coloured than the tibiæ; both are densely covered with short, blackish hair. Wings hyaline, the nervures pale, there is a small faint triangular cloud at the stigmal vein; the surface is densely pilose and the edges are fringed with short hair. ♀.

Length 2·5 mm.

Bred from Lac.

Smooth and shining, except the mesonotum which is finely, closely punctured, almost as if reticulated.

Eurytominae.*Eurytoma pallidiscapus*, sp. nov.

Black densely covered with white pubescence, the antennal scape, trochanters, more than the apical half of the anterior femora, apical third of middle and apical fourth of posterior, the tibiae and tarsi pale testaceous, the tibiae at the base behind tinged with fulvous; wings hyaline, the nervures whitish testaceous. ♀.

Length 2 mm. Dehra Dun. Out of Lac. November.

Head and thorax umbilically punctured, the mesonotum more strongly than the head, the propleuræ less strongly punctured, the puncturation becoming gradually weaker below, where it is bounded by a stout, rounded keel; mesonotum with a longish triangular, smooth and shining space above, the apex irregularly longitudinally striated. Metapleuræ coarsely rugosely punctured, bounded at the apex by an irregular keel, beyond which it is irregularly reticulated above, below smooth with 3 or 4 stout irregular striæ. Centre of metanotum with 3 longitudinal keels, the outer stouter and diverging above; between them are a few irregular transverse striæ; the rest closely, finely, but distinctly punctured, almost reticulated, the top and sides with a row of areæ, the top with an upper row of stronger areæ. The mesopleura is divided into 3 parts by 2 keels, the basal keel is shining and shorter than the middle or posterior; there is a fine keel at the apex of the apical crenulated furrow. Hind coxæ opaque, sparsely covered with long, soft white hair; closely and finely reticulated. Stigmal nervure long, slightly dilated at the apex, narrower and almost as long as the post-marginal vein.

Euplemineæ.*Brasema annulicaudis*, sp. nov.

Dark green tinged with brassy, the head in front and the pleuræ largely violaceous, the abdomen entirely violaceous, the antennal scape fulvous, the flagellum black; the fore legs dark blue, the tibiae below and their apex and base above and the tarsi testaceous, the middle legs testaceous, their femora infuscated; the hinder testaceous, their coxæ

except at the apex, the femora and slightly more than the basal half of the tibiæ, black; wings hyaline, the nervures pale testaceous; ovipositor half the length of the hind tarsi; broadly banded with white, the black basal part half the length of the apical; the spurs are almost white; the spines on the underside of the middle tarsi black. ♀.

Length 2 mm.; terebra $\frac{1}{2}$ mm.

Bred from Lac in November.

The marginal vein is slightly longer than the submarginal and is thickened at the apex; the stigmal branch is a little thickened at the apex where there is a short projection on the upper side. Parapsidal furrows distinct, as is also the transverse furrow at the base of the scutellum. Abdomen not quite so long as the thorax; its apex broadly rounded. In certain lights the flagellum of the antennæ is seen to be metallic blue. The pubescence is short, sparse and white. The antennal scape does not reach to the ocelli; the 3rd and 4th joints are about equal in length; the apical are dilated and compressed.

A species of an allied genus of *Eupelminæ*, *Anastatus tachardiæ*, Howard, is, in Ceylon, parasitic on *Tachardia abbiziæ*.

Encyrtinæ.

Lissencyrtus, gen. nov.

Slender, as long as the head and thorax united, antennæ, clearly separated from the apex of the clypeus, opposite the lower edge of the eyes, the scape slender, longish, not quite half the length of the flagellum, not reaching to the ocelli; the pedicel about 3 times as long as thick, the 2nd joint of flagellum nearly as long as it, the next twice longer than thick, the following about as long as thick, the apical 4 forming a club, not very clearly separated. Ocelli in a triangle, the lateral close to, but not touching the eyes, which are large, hardly converge above and are separated above by twice the length of the antennal pedicel. Malar space half the length of the eyes, a narrow, but distinct furrow down it. Front, face and clypeus continuous, forming a broad rounded keel. Labrum only visible when viewed from below. Mandibles short, broadly rounded at the apex; the teeth indistinct. The front forms a triangular depression in the centre. Mesonotum as long as the scutellum, which becomes gradually narrowed

from the base to the apex ; it is slightly longer than it is wide at the base ; there is a distinct transverse furrow at the base ; the ancillæ are longish transversely triangular. The mesosternum is bounded, on the outside, by a distinct furrow. Abdomen not quite as long as the thorax, broadly triangular, from the base of the 2nd segment, becoming gradually narrowed, the back depressed ; the ovipositor projecting distinctly. Front and vertex with weak scattered punctures ; the thorax smooth and shining, almost bare ; the abdomen is more shining than the thorax. Apex of wings shortly ciliated ; the marginal vein about twice longer than thick, shorter than the stigmal with which it forms an acute angle, the stigmal vein is knobbed at the apex, the post-marginal vein is thickened at the base, and becomes gradually thinner. The head is metallic, but not the thorax, the abdomen is less metallic than the head. The head, seen from the front, is as wide as long ; the few punctures on it are thimble-like. The apical 3 antennal joints, seen laterally, appear in some examples, to form a 3-jointed club.

In Ashmead's classification this genus comes nearest to *Hymencyrtus* and *Coccophoctonus*, both of which may be known by the eyes being pilose. Compared with Ashmead's figure of the former, the scutellum is larger, and does not become narrowed towards the apex and is more distinctly longer compared with the width at the base, the abdomen, in the figure, is shown to be longer, and the antennæ more robust ; the pronotum, too, is larger. In shape it is more like Ashmead's figure of *Parencyrtus*, but that genus has hairy eyes.

Lissencyrtus troupi, sp. nov.

Thorax and legs reddish orange, the latter paler than the former, the head dark blue, the mandibles and palpi reddish testaceous, the pronotum of a dark, the base of the mesonotum of a bright metallic blue, the abdomen dark violaceous ; antennæ testaceous, the scape lighter in tint, more yellowish than the flagellum ; the apical club fuscous ; wings hyaline, the nervures fuscous, the margin shortly fringed. Entirely smooth, shining, the mesonotum covered sparsely with a short blackish pile. ♀.

Length 2 mm.

Dehra Dun ; bred in November out of Lac.

Antennæ as long as the head and thorax united, not much dilated towards the apex, the apical joints not forming a club; the pedicle not quite 3 times longer than wide. Ocelli in a large equilateral triangle, the hinder clearly separated from the eyes; these are of equal size. Malar space about as long as the eyes; it is, as is also the outer-side of the clypeus, finely, but distinctly, punctured; the clypeus is bluntly keeled down the middle.

Copidosoma ? clavicornis, sp. nov.

Black, the head tinged with bluish-violaceous, the mesonotum darker coloured than the scutellum, which is distinctly brassy, the pleuræ coloured like the mesonotum, the abdomen violaceous, distinctly blue-tinted at the base, the antennæ with the scape yellowish testaceous, the flagellum fuscous, legs fulvo-testaceous, the base of the coxæ broadly, the base of the femora and a broad line on the outside of the tibiæ nearer the base than the apex, black; wings hyaline, the nervures fuscous.

Length nearly 2 mm.

Dehra Dun. Bred from Lac.

Shining, the abdomen more so than the thorax, smooth, the scutellum finely and closely punctured, the punctures only visible with a good magnification, the sides apparently closely, finely transversely striated. Mesonotum closely, the scutellum more sparsely covered with longer black hair. There are a few scattered punctures on the front. The front ocellus is separated from the hinder by a greater distance than these latter are from each other; they almost touch the eyes, which are slightly longer than the malar space. Antennal scape about two-thirds of the length of the flagellum; it does not reach much above the bottom of the eyes; the flagellum stout, thickened towards the apex, the pedicle is about 3 times longer than wide; the other joints of the flagellum are as wide as long; the apical 4 joints form a club but not a very prominent one; the apical 2 joints are smaller than the preceding 2. The abdomen forms a longish triangle, it becoming gradually narrowed from the base to the apex; it is shorter than the thorax, the ovipositor distinctly projects and has a broad sheath.

The pronotum is small, the scutellum large, triangular, becoming gradually, rather roundly narrowed from the base to the apex, longer

than it is wide at the base ; the basal bordering furrow is shallow, but distinct. The antennæ and legs are covered with short white, close pubescence. Wings ciliated, the marginal vein thickened, about twice longer than thick, about one-third of the length of the stigmal.

As I am not quite certain if this species is a true *Copidosoma* I give a generic description of it. The sculpture is certainly weaker than in that genus, in which the front and vertex are stated to be thickly and sharply thimble-like-punctured, while in the species I have described there are only a few that could be so described. The puncturation, however, seems to vary ; probably some specimens are more mature than others. Antennæ placed half way between the eyes and the apex of the clypeus ; the scape one-third of the length of the flagellum, which is dilated towards the apex, the apical third forming a compressed club ; pedicel twice longer than wide, eyes distinctly converging above, the malar space about one-third of their length. Ocelli in a longish triangle ; the hinder separated from each other by a clearly greater distance than they are from the eyes. The lower part of the front face and clypeus form a raised longish conical continuous projection, the narrowed part above, the apex almost obliquely depressed, transverse, the middle keeled. Mesonotum nearly as wide as long, slightly longer than the scutellum, which is larger, a little longer than it is wide at the base, gradually roundly narrowed to the apex, which is rounded and one-third of the width of the base. Post-scutellum convex, keeled at the base and apex, the latter roundly narrowed. Abdomen not quite so long as the thorax, triangular, becoming gradually narrowed from the base to the apex, the base with a broad, rounded keel, the back largely depressed ; the ovipositor broad, as long as the longer middle spur. Marginal nervure thickened, about 4 times longer than thick, as long as the stigmal vein, which is curved and is thickened towards the apex. Apex of wings ciliated shortly and closely. In the ♀ the antennal joints are not much longer than wide, the flagellum is closely pilose ; the antennæ are as long as the head and thorax united ; the 1st joint of the flagellum is not much longer than the 2nd ; in the ♂ the flagellum joints are much longer compared with the width, are more clearly separated and are densely covered with long hair, almost as long as the joints, and which forms a fringe on the outside, the abdomen is triangular as in the ♀ ; but is slightly shorter. The whole body is shining ; the head and thorax are weakly sparsely punctured.

Alphelinæ.*Hadrothrix*, gen. nov.

Antennæ 8-jointed, the club 3-jointed, not quite so long as the preceding joints united, the scape short, not reaching to the ocelli; the basal joints to the club armed at the base with a long stiff bristle, which is longer than the joint; the antennæ originate from shining tubercles placed clearly above the lower part of the eyes. Head compressed laterally, lenticular, transverse behind, the temples only very slightly developed. Wings shortly closely ciliated, without a transverse hair line; marginal vein thicker and clearly longer than the submarginal; stigmal vein thin longish, about one-fourth of the length of the marginal. Parapsidal furrows clearly defined. Scutellum wider than long, transverse at the base, base broadly rounded at the apex.

In the "Revised Table of Genera" given by Dr. L. O. Howard, (Technical Series, No. 12, Part IV, U. S. Dept. of Agric., 1907, p. 71), this new genus runs to *Aneristus* and *Crecophagus*. Characteristic are the long, stiff bristles on the antennæ and the long, thin stigmal vein, which is longer than in any of the described genera. There are no stiff bristles on the hind tibiæ behind. The thin head is somewhat as in *Prospalta murfeldti* as figured by Howard, (l.c., p. 39), but is more transverse behind.

Hadrothrix purpurea, sp. nov.

Dark purple, shining, the basal segment of the abdomen, except the centre of the basal slope, dark testaceous; the antennæ dark testaceous, the apex of femora, the tibiæ and tarsi whitish yellow; wings clear hyaline, the nervures pallid testaceous, the apex fringed with long ciliæ. ♂

Length 1 mm.

Dehra Dun. Bred out of Lac.

Scelionidæ.*Caloteleia rufipes*, sp. nov.

Black, the antennal scape, basal, narrowed joints of the flagellum, apical half of basal abdominal segment and the legs, red; wings hyaline,

the marginal vein black, the sub-marginal and stigmal paler. Head and thorax opaque, smooth, the abdomen smooth and shining. Antennal scape as long as the club, the basal narrowed part of flagellum shorter, the 2nd and 3rd joint narrowed at the base, the pedicle of equal width. ♀.

Length 1 mm.

Dehra Dun. At light. 5th September (*V. S. Iyer*).

Caloteleia was formed on a species occurring in fossil gum copal. The species described above may belong to a different genus, but it appears to belong to *Caloteleia*, Brues, (*Gens. Ins. Sceleonida*, 32). *Cf.* Keiffer, *Ann. de la Soc. Scientifique de Bruxelles*, XXXII, (2) 122. I give a generic description of it.

Antennæ placed close to the mouth, the scape above stout, about one-third of the length of the flagellum; pedicle narrowed at the base, twice longer than wide, the apical 6 joints forming a stout, clearly separated club. Head large, wider than the thorax, rounded in front, not quite transverse behind; the lateral ocelli placed close to, but not touching the eyes. Parapsidal furrows absent. Scutellum not much raised, wider than long. Post-scutellum small, flat. Metanotum small, flat, its sides margined. Abdomen longer than the head and thorax united, its basal segment forming a raised rounded tubercle, projecting on to the metanotum and with a straight oblique slope towards the apex, the basal tubercle becomes narrowed gradually towards the apex, which is flat above and of equal width; it is twice longer than wide; the 2nd is wider than long, the 3rd is the largest and is square. Marginal vein twice longer than thick, punctiform; the post-marginal distinct, hardly so long as the stigmal which is dilated at the apex.

Immsia, gen. nov.

Antennæ placed close to the mouth, the scape as if 2-jointed, the apical part thicker and twice the length of the basal, the 2 being clearly separated; the flagellum 10-jointed, the pedicle twice longer than thick, the following joint is twice its length, the apical 5 joints in the ♀ form a club. Lateral ocelli received close to the eyes. Head wider than the thorax, the temples short, the occiput curved inwardly. Scutellum large forming a semicircle transverse at the base, the apex rounded.

Post-scutellum large, unarmed, wide, metanotum short, the sides at the base bordered by a stout keel. Abdomen in ♀ shorter than the

thorax, broadly ovate, almost as wide as the thorax, the 2nd segment as large as all the others united, as wide as long, the base crenulated, the rest closely longitudinally striated to near the apex. The sub-marginal and marginal nervures are not clearly separated; the former is curved, the latter straight, not half its length; the stigmal vein is long, almost as long as the marginal; the post-marginal is longer than the stigmal.

There are no parapsidal furrows. The edges of the abdomen are somewhat acute, but can hardly be called keeled; the ovipositor does not project. The outer eye orbits and the malar space bear a stout keel; there is also a keel down the middle of the front. The keel on the malar space is curved and reaches to the base of the mandibles. Malar space longer than the eyes. Clypeus short, its apex rounded, broadly margined. Legs normal, the femora not dilated, the hind tarsi slightly larger than the tibiæ, 5-jointed, the basal joint of the hinder as long as the following 2 united. Mesonotum bordered laterally by a crenulated furrow. Prothorax small, not visible from above.

A genus easily recognised from anything known by the peculiar form of the antennal scape, which looks as if it were 2-jointed from the base, being abruptly narrowed.

Immsia carinifrons, sp. nov.

Black, the dilated apical part of antennal scape and the legs, except the coxæ, red, the basal joints of the antennal scape of a duller red; wings hyaline, the edges shortly ciliated, the nervures pallid. ♀.

Length 2 mm.

Dehra Dun, 3rd August (*V. S. Iyer.*)

Head and thorax opaque, closely rugosely punctured, the basal segment of abdomen strongly, longitudinally striated, the large 2nd finely and more closely to near the apex, the rest smooth and shining. Vertex closely rugosely punctured, the front transversely striated, the striæ in the centre stouter, more clearly separated and more or less curved; a stout keel down the centre. Cheeks margined, aciculated. Mesonotum closely, distinctly longitudinally striated, the striæ, interlacing; scutellum strongly longitudinally striated, the striæ almost forming reticulations. Scutellum strongly, irregularly striated. Metanotum strongly, regularly striated. Propleuræ irregularly longitudinally striated. Mesopleuræ aciculated, its base and apex with a row of foveæ, that on

the apex, more regular and stronger than the base. On the upper, basal half of the metapleuræ is a large earshaped area formed by smooth, shining keels; in its centre is a smooth keel; at its apex are 2 small semicircular areæ; the rest is irregularly reticulated. The ventral surface of the abdomen is more roundly convex—not so flat—as the dorsal; the apical 4 segments are of almost equal length.

Evaniidæ.

Evania appendegaster, Lin.

Schletterer, *Ann. K. K. Hof. Mus., Wien*, IV, 136; Bradley, *Trans. Am. Ent. Soc.*, XXXIV, 139.

Suraj Bagh, Dehra Dun. August. A common, cosmopolitan parasite of the cockroach.

BRACONIDÆ.

Braconinæ.

Bracon tachardiæ, sp. nov.

Rufo-testaceous, the legs paler, distinctly yellowish in tint, the antennæ metanotum and the 3rd and 4th dorsal segments of the abdomen, except narrowly on the sides, black; wings hyaline, iridescent, the costa, parastigma, stigma and nervures fuscous, the costa and stigma round the edges darker coloured, the apical nervures paler than the basal; the 2nd transverse cubital nervure fully one-third the length of the 2nd abscissa of radius. ♀.

Length 2 mm.; ovipositor 1 mm.

Bred from *Tachardia* (lac).

Antennæ 23-jointed in ♀. The ♂. has the mesothorax for the greater part black; the basal segment may be paler, more yellowish than the others. The 2nd and 3rd abdominal segments are finely, closely punctured, the former more strongly so than the latter; there is a not very distinct keel down the centre of the 2nd segment, its base slightly dilated, the suturiform articulation narrow, obscurely striated and without a lateral apical branch. In the ♂ the vertex, occiput and the apical dorsal abdominal segments may be black, in the ♀ the abdominal black marks vary in extent; there may be only narrow transverse lines

on the 2nd and 3rd segments, or the 2nd and following segments may be entirely black above. It is probably a common and variable species.

Iphiaulax sal, sp. nov.

Black, the basal 3 ventral segments, white; wings fuscous, the anterior paler to the transverse median and transverse cubital nervures, the stigma and nervures black, the 3rd abscissa of the radius fully larger than the basal two united; palpi white, covered with longish black hair, the base of the maxillary blackish. Head and thorax smooth, shining sparsely covered with longish black pubescence, the face and metanotum with the pubescence white. Tibiæ and tarsi densely covered with short white pubescence, the femora and coxæ more sparsely with longer white hair; the spurs are black. Abdomen longish oval, as long as the head and thorax united and clearly wider than the thorax; the 1st segment with the basal slope smooth, shining, bordered by wide oblique crenulated furrows, the apex is raised in the centre, closely, deeply reticulated punctured, bordered laterally by a stout keel which unites to the outer edge of the segment at the base. The 2nd segment in the centre is deeply, closely reticulated-punctured, margined outwardly and of equal width, its outer edge with some oblique striæ; the central area smooth longish triangular, twice longer than it is wide at the base, the outer edge irregularly longitudinally striated. The 2nd segment, closely, strongly sharply striated, the striæ slightly converging towards the centre. Suturiform articulation narrow, crenulated, converging towards the middle and without an outer apical branch. The 3rd and 4th segments are more finely, regularly and closely striated and are without oblique or transverse furrows. Sheath of ovipositor thickly covered with short white pubescence and thickened towards the apex. ♀.

Length 5 mm.

Kaluwala, near Dehra Dun, 3rd December, on Sal leaf.

Temples wide, nearly as long as the eyes above, the occiput transverse. Parapsidal furrows narrow, but clearly defined. Face opaque, closely punctured, densely haired. Mandibles rufo-testaceous, black round the edges.

Iphiaulax Immsii, sp. nov.

Rufo-luteous, the abdomen and legs paler in tint than the thorax; the antennæ and mandibles black; wings fuscous, yellowish hyaline to

the transverse basal and transverse median nervures; the part outside paler; there is a small conical hyaline cloud outside the 1st transverse cubital nervure at its junction with the cubitus and there is a smaller, clearer rounder hyaline spot in the 2nd discoidal cellule at the recurrent nervure; the basal nervures and the basal third of the stigma are rufotestaceous, the rest of the stigma and the parastigma black; the 2nd cubital cellule is 3 times longer than it is wide at the apex; the 1st cubital cellule is lighter coloured than the 2nd, with a darker fuscous triangular cloud at the base in front. The hinder wings are of a paler yellowish hyaline colour to shortly beyond the apex of the basal fourth of the stigma; the fuscous apical cloud is obliquely widened from the top to the bottom. Abdomen longish oval, clearly longer than the head and thorax united and as wide as the latter; the basal 5 segments closely reticulated-punctured, the 2nd more strongly than the others; suturiform articulation wide, crenulated and with a roundly curved outer branch; there are weaker, similar furrows on the base of the 4th and 5th segments, which have also apical furrows. ♂.

Length 7 mm.

Kaluwala, near Dehra Dun, 3rd December.

On Sal leaf.

Antennæ slightly longer than the body, about 57-jointed, densely covered with white pile. Temples roundly narrowed, the occiput not quite transverse. Face smooth, broadly raised in the middle, pale yellow.

A longish narrow insect.

Ectadiophatnus, gen. nov.

Eyes bare. Antennæ 18-jointed, the basal joints of the flagellum and the apical 2 longer than wide, the others slightly wider than long. Clypeus clearly separated from the face. Stigma large, the radius issuing from its centre and extending to the apex of the wing, there being thus a closed radial cellule, cubitus extending only shortly beyond the 1st transverse cubital nervure; there is no 2nd transverse cubital nervure; the transverse median nervure post-furcal. Parapsidal furrows distinct, reaching from the base to the apex where they unite; they are crenulated. There is no pleural furrow, nor is the metanotum areolated. Abdomen compressed and widened from above to the ventral

surface; the hypopygium short, bluntly cultriform; the ovipositor as long as the thorax and abdomen united. The hind spurs short, the longer not one quarter of the length of the metatarsus.

The head is large, cubital, with the temples well developed, longer than the top of the eyes; the occiput is not transverse. Ocelli in a wide triangle, the hinder separated from each other by a slightly greater distance than they are from the eyes, which are separated from the mandibles by one-third of their length. There are 2 keels down the middle of metanotum.

This genus has not quite the appearance of the *Microgasterinæ*, the head being too cubital, through the well-developed temples. Characteristic are the closed radial cellule and the well-developed parapsidal furrows; the antennæ, too, are shorter and stouter—more moniliform—than they are in, e.g., *Apanteles*.

Ectadiophatnus tachardiæ, sp. nov.

Black, smooth, shining, the legs rufo-testaceous, the hind femora in the middle and the hind tibiæ and tarsi infuscated; palpi white; the costa, parastigma and stigma fuscous, sparse, the nervures white. Pubescence short, sparse, white on the head and thorax, the abdomen bare, as long as the thorax; its 1st segment is longer than it is wide at the apex; its sides depressed; the 2nd is almost as long as it. ♀.

Length 2 mm., ovipositor 1.75 mm.

Bred from Lac, December 14.

The antennæ are not much longer than the head and thorax united and are covered by a microscopic pile; the scape is twice longer than wide and is as long as the 1st joint of the flagellum. The sheaths of the ovipositor are thin and are not thickened towards the apex.

Microgasterinæ.

Apanteles tachardiæ, sp. nov.

Black, the palpi and spurs white, the apex of the anterior femora, the anterior tibiæ and tarsi, the middle tibiæ to shortly beyond the middle, their tarsi and the hinder tibiæ and tarsi testaceous, the hinder darker in tint than the others; metanotum opaque, strongly aciculated, a longish oval shining depression in the centre, the sides margined by

a keel. Front and vertex finely, closely punctured, the mesonotum more opaque, more strongly punctured; the lower part of the mesopleuræ and the metapleuræ smooth, shining, bare, the rest of the pleuræ pilose, aciculated. Abdomen shorter than the thorax, the sheath of the ovipositor three-fourths of its length; the basal segment a little longer than it is wide at the apex, opaque and aciculated to near the apex, where there is a square shining space in the centre; the 2nd segment is wider than long; there is a curved transverse furrow near its base; the segments are fringed with white hair; the ventral are entirely black. Wings clear hyaline, the costa, parastigma and front of stigma fuscous, the rest and the nervures pallid white; the basal abscissa of the cubitus is thinner than the other nervures; the nervures bounding the apex of the 1st cubital cellule form an almost continuous curve; there is a short, but distinct stump of the cubitus. ♀.

Length 2 mm.

Bred out of Lac. 24th November.

PART II.

On some new and other species of non-parasitic Hymenoptera in the Collections of the Zoological Branch of the Forest Research Institute, Dehra Dun.

By P. CAMERON.

Introduction.

IN this paper I have enumerated and described the specimens contained in a collection of non-parasitic Hymenoptera sent to me by Dr. A. D. Imms, Forest Zoologist.

It includes a description of a new species of Saw-fly and an enumeration of the Aculeate Hymenoptera in the collection with description of the species which seem to be undescribed. The Saw-fly belongs to a genus, some species of which have proved very destructive to pine trees. I have also added descriptions of three new species from Simla and one Masuri (Mussoorree?) from my own collection. These are indicated by an asterisk.

Tenthredinidæ.

Lophyrus indicus, sp. nov.

Black, densely covered with short pale pubescence, the abdomen less densely so than the thorax; the labrum, palpi, apex of femora, that of the interior broadly, the tibiae and tarsi pallid testaceous; wings hyaline, the stigma and nervures black, the former streaked with black at the base, the black with a transverse, longish triangular white spot at the base. Head and thorax closely, rather strongly punctured, the pleuræ more strongly rugosely so than the mesonotum; the face, clypeus, labrum and a line, dilated at the base, down the centre of the basal half of the scutellum; there is also a broad triangular smooth space at the base of the scutellum; the furrow bordering the base of the scutellum smooth and shining. Cenchri narrow, curved, rounded behind.

♂ Length 4 mm.

Dehra Dun. September, (*Forest Zoologist's Collector*).

Antennal rami fringed with white hair. Apex of clypens transverse, the sides rounded. Mandibles piceous, black at base and apex. There is a roundly curved shallow furrow behind the ocelli, making the centre of the vertex semicircular. There is a shallow furrow down the middle the central lobe of mesonotum. Metanotum more coarsely punctured than the scutellum, the basal segment of abdomen more finely and closely so. Transverse median nervure received shortly beyond the middle, the posterior third of 1st transverse cubital nervure faint, the basal abscissa of radius broadly roundly curved; the 2nd recurrent nervure is received shortly beyond the apex of the basal third of the cellule

ACULEATA.

Mutillidæ.

Mutilla sex-maculata, Swed.

Bingham, *Fauna of Brit. India*, *Hym.* i, 25. ♀.

Dehra Dun. July.

For remarks of this species and its ♂, cf. Cameron, *Ann. Mag. Nat. Hist.* IV (7), 60.

Pompilidæ.

Salius flavus, F.

Bingham, *l.c.*,

Gorakpur.

Salius (Prionemis) dehraensis, sp. nov.

Black, the basal 2 abdominal segments all round and a curved band on the base of the 3rd above, ferruginous, wings hyaline, a fuscous cloud filling the radial cellule, the 2nd cubital, except for a triangular hyaline cloud at the base below, the 3rd entirely, these clouds extending into the discoidal cellule as a somewhat semicircular, fainter one on its apical half; 2nd abscissa of radius more than double the length of the 3rd, 1st recurrent nervure received near the base of the basal third, the 2nd nearer the middle. Claws unidentate, the base roundly dilated. Eyes slightly converging above, the hinder ocelli separated from each other

by a slightly less distance than they are from the eyes. Apex of clypeus broadly rounded. Third antennal joint about one quarter longer than the 4th. Metanotum transversely striated, more weakly at the base than elsewhere. Apex of pronotum bluntly, roundly angled in the middle. Long spur of hind tibiæ slightly more than one-third of the length of metatarsus and as long as the 2nd joint. ♂.

Length 8 mm.

Dehra Dun, July.

Metanotum gradually roundly sloped from the base to the apex, the metapleuræ opaque, pronotum large, rounded in front probably in fresh examples the head and thorax are densely covered with white pubescence, in the specimen examined it is dense on the mesopleuræ and coxæ.

Comes, in Bingham's work, nearest to *S. electus* Cam.

Pseudagenia tinctoria, Sm.

= *Mutabilis* Sm.—Bingham, *Fauna of Brit. India*, i, 116.

Dehra Dun. October.

Sphingidæ.

Sceliphron tibiale, Cam.

Ann. Mag. Nat. Hist., 1899, IV (7) 54.

Two damaged specimens taken at Rundali, Dehra Dun, in June are probably referable to this species of which *S. lineatipes* Cam. is perhaps a variety. The tibiæ in the Dehra Dun examples are only lined with black in front, not entirely black as in the type. *S. tibiale* is a variable species as regards the markings, a less rare form has 2 yellow marks in the centre of the metanotum. Its nearest ally known to me is the New Guinea species *S. Bruinjnii*, Maid. *S. lorentzi* Cam. being also related to it. *S. Bruinjnii* may be known from it by the post-petiole, and all the following abdominal segments being ferruginous, with the base of the 3rd to 6th lined with black, the apex of its clypeus, too, is broadly rounded, not bilobate.

Liris nitidus, sp. nov.

Black, smooth, shining, the metanotum opaque, the basal part with a narrow furrow having a keel down its centre, it is slightly shorter than

the rest of the thorax, its apex is rounded broadly above, the sides of the apical slope irregularly transversely striated, more strongly above than below. The head, base of mandibles and pronotum densely covered with golden pubescence, probably in fresh examples the whole thorax is so. Pygidium closely striated, the sides and apex covered with golden pile; no doubt in fresh examples the whole surface has a golden pile. There are indications of a golden or silvery pile on the apices of the abdominal segments. Wings black, tinged with violaceous, the stigma and nervures black, basal abscissa of radius as long as the following 2 united, the 2nd one-fourth of the length of the 3rd; the 2nd recurrent nervure received shortly beyond the apex of the basal third of the cellule. The space between the recurrent nervures is as wide as the 2nd abscissa of the radius. Pubescence on metathorax white. ♀.

Length 18 mm.

Dehra Dun, December (*J. W. Judd*).

Comes near to *L. nigripennis*, Cam., which may be known from it by the almost hyaline cubital cellules, by the apex of metanotum being abruptly truncate and by the head and thorax being, "dull, opaque, very minutely punctured," not smooth shining and impunctate, as in *L. nitidus*.

Ampulex compressa, Fab.

Bingham, *Fauna of Brit. India*, i.

Garhi, Dehra Dun, July (*Forest Zoologist's Collector*).

Trypoxylon ornatipes, sp. nov.

Black, the 2nd abdominal segment, the 3rd, and the basal fourth of the 4th above and the basal third of the sides rufo-testaceous; the anterior tarsi, basal 2 joints of the middle, the base of the 4 hinder tibiæ narrowly, the spurs and the apex of the trochanters more obscurely, whitish yellow, the fore tibiæ for the greater part pale testaceous, especially in front. Wings hyaline, the stigma and nervures black. Mandibles rufo-testaceous. A shallow furrow down the centre of the upper half of the front which is roundly bilobate, below it, on the lower half, is a distinct keel. Metanotal area with the central depression longish oval, narrower at the apex than at the base, irregularly transversely striated, the lateral bounding furrows with the striæ stronger and more

regular. Pubescence on the lower part of eye incision outer orbits, face and clypeus dense and silvery, on the pleuræ it is longer and sparser, more like hair than pubescence. Abdominal petiole nearly as long as the following 3 segments united, the apex not forming a distinct node, gradually, weakly widened towards the apex. Tegulæ piceous. Front and vertex closely, minutely punctured, the mesonotum shining, almost impunctate. ♂

Length 9 mm.

Dehra Dun. July, at light.

The furrow on apical slope of the metanotum is wide, with obliquely sloped sides, slightly roundly narrowed towards the apex and with a keel in the centre. The apex of the wings is faintly clouded.

Comes near, of the Indian species, to *T. bicolor*, Sm.

DIPLOTERA.

Vespinæ.

Polistes stigma, F.

Dehra Dun, 25th March. The example is of the race *stigma*, but darker coloured than usual for that form.

Icaria annulipes, sp. nov.

Rufous, or rufo-testaceous; the sides of the clypeus broadly, the apex more narrowly, the rufous central part widened towards the apex, a broad line on the inner orbits from the incision to the antennæ, the antennal keel for the greater part, a narrow line across the base and a less distinct one on the sides, a line on the base of scutellum, broader one on the base and sides of post-scutellum, 2 large lines on the metanotum, a line on the base and apex of mesopleuræ, one on the sternum extending on to the pleuræ, a mark on base of metapleuræ, gradually widened below, 2 oval marks on the apex of post petiole, a transverse oval one, near the centre of the 2nd segment, on the outer part, a broad line, of equal width, on the base of the 2nd, filling the outer two-thirds, a shorter one on the sides of the 3rd, a squarish mark on the sides of the 6th; 2 oval marks on the centre of the 2nd ventral, lines on the base of the 3rd or 5th, dilated laterally, and an oval mark on the sides of the

6th, pallid yellow. Legs coloured like the body, the hind tarsi darker in tint, the apex of femora and a line or spot near the apex of the tibiae pallid yellow. Wings hyaline, the apex of the costal and the greater part of the radial cellule smoky, the stigma and nervures black.

The ♂ has the yellow markings more widely extended, the face, clypeus and mandibles are entirely yellow, the 2nd ventral segment has one large mark, roundly incised at the base, and the femora and tibiae are yellow below.

Length ♀ 15, ♂ 13 mm.

Dehra Dun, March—July (*Forest Zoologist's Collector*).

Abdominal petiole longish, in ♀ as long as the 2nd segment, the apical half nodose, pyriform, twice longer than wide. There is a shallow furrow down the middle of the scutellum. Metanotal furrow wide and shallow, a weak keel down the middle. The eyes below in the ♀ are separated by the length of the antennal scape and pedicle united, in the ♂ by the length of the 3rd joint of the flagellum, the eyes strongly converging below; the clypeus in the ♂ is almost twice longer than wide, widened gradually towards the apex, which is broadly rounded. The 7th to 9th joints of the flagellum are broadly, but not much dilated below, the last is about one-fourth longer than the penultimate, is longish ovate, and simple, not curved, hollowed below and dilated as in *I. variegata*.

Comes near to *I. fuscipennis*. Cam. from the Khasias, which is dark chocolate in colour, and has the yellow markings much larger all over the body and legs and, more particularly, on the legs and pleuræ. The clypeus in the ♀ of *fuscipennis* is slightly longer as compared with the width and, more particularly, is bluntly rounded at the apex, not ending in a sharp point as in *annulipes*.

Odynerinæ.

Ancistrocerus sikhimensis, Bing.

Fauna of Brit. India, Hymen., i, 363.

Jaunsar.

Odynerus ornatus, Smith.

Bingham, *l.c.*, 364.

Dehra Dun, September (Butterwick).

Bingham, *l.c.*, refers this species to *Odynerus* (*sensu str.*) but Smith himself [*Ann. Mag. Nat. Hist.*, (2) IX, (1852), p. 49] calls it an *Ancis-*

trocerus. Bingham does not appear to have been actually acquainted with the species, for he, *l.c.*, only copies Smith's description. I have a ♂ from Bombay, which agrees with Smith's description of *ornatus*, except that it is not an *Ancistrocerus*. I give here a description of both sexes of the Dehra species.

♀ Ferruginous, a broad oblique line over each antenna, about one-half longer than wide and united below by a narrower black line, a large spot covering the ocelli, more developed below than above them, narrowed gradually from the bottom to the top, the bottom transverse, except for a shallow incision in the middle, the occiput except above, more than the lower half of the occiput, a large mark on the basal half of the mesonotum, dilated laterally at the base, the apex gradually slightly narrowed to a rounded point, a squarish mark on either side of the apex, the edges of the scutellum and post-scutellum, the base of the propleuræ, the base of the mesopleuræ, the mark becoming widened below, squarish mark on the upper apical half, the base of the 2nd, 3rd and 4th abdominal segments, their apices more narrowly, a mark narrowed towards the apex, on the 2nd ventral segment and a line bordering the apex of post-scutellum and going down the centre of metanotum, black. Legs coloured like the body, the base of 4 front femora and the hinder to near the apex, black. Wings yellowish hyaline, clear in tint behind, the radial cellule clouded. The puncturation on the head and thorax is strong and close, the post-scutellum more rugosely punctured than the scutellum, its apex above raised, crenulated, forming a segment of a circle. Sides of metanotum broadly rounded. First abdominal segment large, cup-shaped, the 2nd longer than it is wide at the apex.

The ♂ is similarly coloured except that the clypeus, mandibles, except at the edges, a triangular mark on the front, continued as a short line between the antennæ and a line on the lower part of the eye incision are bright lemon-yellow. The clypeum in the ♀ is longer than wide, closely distinctly punctured, its apex depressed, the sides forming shining reddish teeth; in the ♂ the clypeus is wider compared with the width less closely punctured and there is a rounded incision on the apex; the legs bear less black. No doubt the black markings vary in size and shape.

Rhynchium argentatum, F.

Bingham, *F. of B. India, Hymen.*, i, 358, 633.
Mussoorie.

Anthophila.

Ceratina Binghami, Cock.

Viridissima, Bing., *Fauna of Brit. India*, *Hymen*, i, 501.

Lachiwala, near Dehra Dun. May.

Megachile stirostoma, sp. nov.

Black, the pubescence, including the pollen brush, and bands on the base of the dorsal abdominal segments, white, the upper part of the ventral surface with black hairs. Wings hyaline, iridescent, the apex from end of the cubital cellules slightly smoky, the nervures black. ♀.

Length 14 mm.

Dehra Dun.

Head large, slightly wider than the thorax, closely punctured, a smooth narrow furrow running from the occiput to the ocelli, clypeus above forming a wide triangle depressed and punctured in the centre and bordered by flat shining broad keels; below this is a shallow transverse depression, followed by a larger deeper one, bordered below by 2 smooth wide transverse keels, of which the lower is the wider and is dilated slightly in the middle. Mandibles longish, covered with longish, interlacing punctures; the lower apical part furrowed, there are 2 broad, rounded teeth, the inner thinner and widely separated from the apical. Puncturation on mesonotum close, and running more or less into transverse striæ; there is a narrow, smooth irregular shining line down the middle apex of scutellum and post-scutellum fringed with longish black hair. Metanotal area opaque, smooth, clearly separated, a shallow furrow down the middle; the rest of the metanotum is not so strongly punctured as the scutellum. Apex of basal abdominal segment closely, regularly punctured, the 2nd and 5th with the apical half more or less irregularly punctured, the punctures becoming gradually weaker and sparser, the last much more closely, finely and regularly punctured and covered with short, stiff black hair; the apical ventral segments thickly covered with longer black hair. The base of the 2nd and 3rd segments distinctly, the 4th slightly depressed. The base of metatarsus is not much more than half the width of the apex of hind tibiæ. Front

between the antennæ broad, flat on the same level as the vertex, not projecting.

Belongs to Bingham's Section F (*Fauna of Brit. India*, I, 472) and runs to *M. cephalotes*. Bingham has omitted in his description the colouration of the wings; Smith, *Cat.* I, 179, calls them "subfuscous, hyaline towards their base."

Cælixys sulcispina, sp. nov.

Black, the face, lower part of front broadly at the eyes, the lower three-fourths of the outer orbits, a small tuft in the middle of the mesonotum at the base, the part at the base of tegulæ, a small patch behind them, 2 transverse tufts on the base of scutellum, the mesopleuræ and mesosternum, the upper and lower part of metapleuræ densely, the central sparsely, patches, narrowed inwardly, on the sides of the abdominal segments and continuous lines on the ventral of snow white pubescence; wings to the 2nd cubital cellule in front, to the 2nd recurrent nervure, hyaline, the rest fuscous, tinged with violaceous, the 1st cubital cellule and the greater part of the space between the recurrent nervures lighter in tint than the apical part, the nervures black. Apex of scutellum broadly rounded, the centre with a small rounded incision, the sides project into stout teeth, broad at the base, narrowed towards the apex, which is rounded, the sides are margined with a stout keel, the outer keel straight and commencing at the mesonotum, the inner shorter and rounded. Metanotal area semicircular, opaque, its base with a stout keel down the basal half in the centre, the base with a short striated border. Apical abdominal segment with 8 teeth, 2 short basal, 4 upper apical, of which the central 2 are stouter and broader than the outer and having a small flat shining keel in the centre and 2 longer sharper pointed ones below. Head, pro- and mesonotum with scutellum strongly punctured; the 1st abdominal segment and the 4th and following more finely and closely so, the 2nd smooth, the base with a row of scattered punctures followed by a curved line of punctures in a shallow furrow, on the apex is a regular row of furrows, with some scattered ones before it in a curve, the 3rd is irregularly punctured, almost smooth near the base and apex, its apex and that of the 4th with a regular row of small punctures in a shallow furrow. Ventral surface with the puncturation closer, finer and more regular than they are above. Legs

densely covered with snow-white pubescence, that on the under side of the tarsi tinged with rufous. ♂.

Length 9-10 mm.

Sabhawalla, near Dehra Dun. June.

Looked at laterally the scutellar teeth are broad and have the apex bluntly rounded. The tegulæ are piceous on the outer margin. The puncturation on the basal abdominal segment is finer, but not any closer than it is on the apical 2; on the 4th it is sparser than it is on the 5th. Mandibles coarsely punctured at the base, the lower part furrowed, the upper basal half with a longish oval furrow.

Coelioxys fulvitaris, sp. nov.*

Black, the sides of the clypeus above, the face, lower three-fourths of outer orbits, pronotum, pleuræ, metanotum, the base and sides of the 1st abdominal segment, narrow lines, triangularly dilated laterally, on the 2nd to 5th, and wider lines, widely interrupted in the middle, on the ventral basal 5th, of white pubescence; the hair on the face and clypeus tinged with fulvous; the pubescence on the legs white, on the underside of the tarsi bright rufo-fulvous. Wings fuscous-violaceous, the base to the transverse basal nervure paler in tint, but still tinged with violaceous, the nervures and stigma black. Face broadly rounded in the centre, smooth, clypeus with a distinct keel down the centre. Apex of scutellum broadly rounded, roughly margined, the teeth broad, about one-half longer than wide, slightly narrowed towards the apex, which is bluntly rounded. The ventral apical segment projects distinctly over the dorsal; which has the basal half closely punctured, more strongly on the apex than on the base, and with a smooth line down the centre, the apical half has a distinct keel down the centre, its base is depressed on either side of the keel; the apex laterally is margined; the surface is rugosely punctured, more coarsely and less closely on the base than on the apex; the ventral surface is closely, somewhat strongly striated, the striæ intertwining. ♀.

Length 14 mm.

Masuri (Mussoorree?).

The puncturation on the clypeus is coarse, irregular, closer above than below, where the punctures run into reticulations; on the face and front they are smaller, deep, round and clearly separated. Vertex strongly,

irregularly punctured. Mesonotum closely, rugosely punctured, more strongly at the apex than at the base; the scutellum as strongly punctured as the apex of the mesonotum, but closer and with the punctures running into reticulations. Metanotum closely, finely rugose, opaque. Abdomen closely, distinctly punctured, more sparsely towards the apex than at the apex, the puncturation less close in the centre of the apical half of the segments.

Comes near to *C. sex-maculata*, Cam.

Coelioxys tenuilineata, sp. nov.*

Black, shining, the face, clypeus, front, outer orbits, the base and apex of mesopleuræ densely, the centre sparsely, narrow bunds, not much dilated laterally, on the apices of the basal 5 abdominal segments, broader ones on the ventral and the legs covered with snow-white pubescence. Wings almost hyaline to the base of the stigma, fuscous violaceous beyond; the nervures black. Scutellum strongly, sparsely punctured, the punctures closer on the sides, in the centre sparser on the apex than on the base, the lateral spines about twice longer than wide, of almost equal width throughout, rounded at the apex, convex above; the apex laterally bluntly rounded. Apical half of last abdominal segment gradually narrowed to a point, closely punctured, a smooth keel down the centre, the apex of ventral long, acutely pointed, aciculated, the base finely punctured; it projects largely beyond the dorsal segment. Apex of clypeus bluntly rounded. Abdominal segments finely, closely punctured at the base and apex of the basal 5 segments; the basal half of the 6th smooth. ♀.

Length 10-11 mm.

Simla.

In certain lights the back of the abdomen is tinted with violaceous. Looked at from the mesonotum the apex of the scutellum is seen to be slightly reflexed and has an incision in the centre. The head and thorax have the usual puncturation.

Coelioxys fuscipes, sp. nov.*

Black, the legs brownish fuscous, darker behind than in front; the face, clypeus, front, outer orbits, a spot before and behind the tegulae,

2 small transverse spots on the scutellum, the greater part of the pleuræ and sterna, narrow bands on the apices of the dorsal and wider ones, mostly interrupted in the middle, on the ventral abdominal segments, of snow white pubescence, the legs clothed with similar pubescence. Scutellum more strongly and less closely punctured than the mesonotum, the punctures sparser on the centre of the apical half; the apical margin broadly rounded, slightly raised and with a rounded incision in the centre; the teeth short, not quite twice longer than wide, a small and a large fovea on the top. Wings hyaline to the 1st recurrent and 1st transverse cubital nervures, the 2nd recurrent almost interstitial. Basal 4 abdominal segments closely punctured, the punctures becoming weaker towards the apex; there is a smooth transverse line on the sides of the segments near the apex; the 5th segment weakly, closely punctured, the basal half of the 3th very weakly, the apical more distinctly, closely punctured; there is a fine smooth keel down the centre of the basal half; basal third of apical ventral segment smooth, the middle closely punctured, the apical third smooth; it projects, but not much, over the dorsal segment and becomes gradually narrowed towards the apex. ♀.

Length 12 mm.

Simla.

Apex of clypeus bluntly rounded; the clypeus large, longer than the face, roundly convex. The centre of the apex of the scutellum is almost bilobate, being separated from the sides and having a central incision; the apex of the last abdominal segment is not acute, but rather bluntly rounded. There is an indication of a keel on the front. There are no transverse furrows on the abdominal dorsal segments.

Coelioxys ruficaudis, sp. nov.*

Black, the apical abdominal segment from near the base red; the legs brownish red; mandibles rufous, the teeth black; flagellum rufo-fuscous below; wings hyaline, the stigma and nervures black. Apex of scutellum rough, broadly rounded, the lateral teeth large, bluntly rounded at the apex, the sides broadly roundly curved, the centre with a large deep hollow, widened and deepened at the base of the inner curve. Pubescence dense and silvery, almost covering entirely the outer orbits, pleuræ, sternum and legs; 2 small spots, longer than wide, on the base of mesonotum, one at the sides, near the base and apex of the tegulæ,

2 small, narrower, transverse ones on the base of scutellum, and bands, widened outwardly, on the apices of the abdominal segments above and narrower ones below of silvery pubescence. Ventral plate of apical abdominal segment broadly triangular, slightly longer than it is wide at the base. Front without a median furrow. Scutellum short, rounded behind. A wide transverse furrow on the apex of the 2nd abdominal segment. ♀.

Length 6 mm.

Simla.

Clypeus finely, the front and vertex coarsely rugosely punctured, the former not much raised, its apex transverse, narrowly rufous. Thorax coarsely rugosely punctured. Apical half of last dorsal segment of abdomen depressed laterally, projecting beyond the central basal part, which becomes, at the apex, gradually roundly narrowed to a fine point; this apical part is more coarsely punctured than the rest. The sides of the last ventral segment are broadly raised on the apical half, the centre appearing as a consequence depressed.