

- Sixth dorsal segment not or only slightly angulated at sides, smaller insect; length up to 10 mm. *octodentata* Say.
6. *Transverse depression on segment 2 widely interrupted in middle*; apical felt bands on segments 2 to 4 wide at sides, very narrow across middle on segment 1, very wide and triangular at sides and widely interrupted in middle; punctures on segments 2 to 4 larger and less close; punctures on mesonotum far enough apart to give it a slight shine; hair on basal part of segment 1 adpressed; last dorsal segment about $1\frac{1}{4}$ times as long as wide; *tibial spurs more or less ferruginous*. *lucrosa* Cr.
- Transverse depression on segment 2 not or scarcely interrupted in middle*; apical felt bands on segments 2 to 4 less wide at sides, less narrow in middle; on segment 1 much less wide at sides and uninterrupted in unrubbed specimens; punctures on segments 2 to 4 smaller and closer; mesonotum so closely punctured as to appear dull; hairs on basal part of segment 1 upstanding; last dorsal segment about twice as long as wide, *tibial spurs black* *moesta* Cr.

A CONTRIBUTION TOWARDS THE TAXONOMY OF THE DELPHACIDÆ.

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When working out some Malayan Delphacidæ the writer found it expedient to tabulate as many of the genera of the family as possible; unfortunately many of these genera are unknown to him except through the descriptions, which, in many instances, do not give characters necessary to locate them with accuracy. For this reason the present table has many defects, well recognized by the writer, but as it has been of great use to him he believes it will be of use to others, and for this reason alone he publishes it.

The Spur. As this organ is the characteristic feature of the family it is not surprising that its shape should be of taxonomic value; unfortunately many species have been described with only a mere reference to its existence. The writer is not aware of any one making a primary use of it for dividing the family into divisions or subfamilies before Kirkaldy, who was followed by Crawford.

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The spine-like, subulate spur is the most primitive and some of its possessors show the more generalized form of tegmina. The solid cultrate spur with both surfaces convex (Delphacini, Section A) appears to be the next stage, which is followed by the inner surface becoming concave (Section B) and eventually laminate (Section C). Section A is of interest as, with the exception of *Proterosydne** with one Australian and one American species, all the genera at present known are Hawaiian. With the exception of three species off grasses and sedges which are placed in Kelesia, all the native Hawaiian Delphacidæ belong to this section and are not attached to grasses. Swezey† has shown that *Nesodryas freycinetiæ* has but an apical tooth on the spur in first instar, those on the hind edge appearing at later instars. Section B contains six genera; of these, five, of which the habits are known, are attached to grasses. It is highly probable that further study will add several more to this section.

The antennæ. These organs come next to the spur for usefulness in taxonomic work; there appears to be but little specific variation and an absence of the sexual differences found in some of the other families of Fulgoroidea. The terete form is probably the more primitive, and the short basal joint more primitive than the longer basal joint.

The mesonotal carinæ. These are of great utility as they are always mentioned by describers and of their presence or absence there is little dispute.

The pronotal carinæ. Among some of the more difficult genera of section C of the Delphacini it is necessary not only to recognize the presence of these carinæ but also their shape and extension. Unless this is done it will be difficult to keep apart several genera containing different forms, and it will lead to the formation of one or more unwieldy genera of polymorphic character, whose species it will be more difficult to locate than are the present genera. This has been the case with Crawford's work on the north American forms and it will be still worse if the same methods are applied to the genera of the world.

It is generally possible to recognize two forms, those divergingly

*Crawford wrongly states this genus to be Hawaiian.
†Proc. Haw. Ent. Soc., II., 13.

curved posteriorly, or following, to a great extent, the contour of the hind margin of the eye, and which plainly do not reach the hind margin; and those which, although diverging posteriorly, are straight or convergently curved, and meet the hind margin or approach it exceedingly closely.

Carination of head. In these we have the most unsatisfactory taxonomic characters, for in so many species they are obscured at the junction of vertex and face, and there is considerable variation in such characters as the furcation of the median frontal carinae. In Homoptera such variation is common in all characters which undergo a great alteration at the last ecdysis*. In all nymphs of Delphacidae with which the writer is acquainted there are two medio-longitudinal carinae on the face which, in certain species amalgamate to a greater or lesser extent, the extent of amalgamation being variable. For this reason it has been necessary to place certain genera in two or three locations. With a wider knowledge of the species of certain genera, and their variations, than the writer possesses it is highly probable that more definite characterisation can be constructed.

Tibial spines of the hind legs have been used for taxonomic purposes, but they do not appear to be of great value for there is great specific variation; usually there is one at the base, one about middle and several at apex. It is possible that the proportional length of the first joint of hind tarsus and the absence or presence of one or two spines near the middle can be used more than they have been, also the proportional length of the front tibiae.

For specific work it is absolutely necessary that the male genitalia be examined, and a use of it for generic distinction is possible in certain groups.

In the orismology the writer has used the term vertex as indicating that portion of the head, excluding the eyes, which can

*An extreme case of this nature is found in the Derbid genus *Zoraida* in which the face is only a narrow carina (composed of two carinae more or less amalgamated) between the eyes; in the nymph the face is broad with two median carinae well separated. In the adult the wide face still exists but is invaginated medio-longitudinally, the outer carinae of the nymph forming the narrow face of the adult. This can be demonstrated by boiling a head of *Z. insulicola* (perhaps any other species) in caustic potash when the face will open. Several genera have been erected upon slightly widened faces (i.e. *Shirakia* and *Zoraidoides*) some of which are likely to be found to be imperfectly developed *Zoraida*.

be seen in a true dorsal view, irrespective of any carinae which may appear to separate the vertex from frons. The term apex indicates the most anterior portion, considering the labrum as the most anterior of the dorsal portion of the head, irrespective of its deflexion.

With the increase in the number of known species and of our knowledge, it becomes necessary to divide and subdivide the groups of species included in the various sections of the Fulgorids; whether we consider the main divisions as families or subfamilies is a matter of personal opinion. Personally the writer thinks it is more natural and expedient to consider the Delphacids as a family, and the divisions as subfamilies. He holds the same opinion in regards to the Derbids, a group not so well defined as the Delphacids. It is more likely that future workers will follow Kirkaldy in this matter than those who wish to contain the whole of the Fulgorids (sens lat.) in one family.

The classification of this family, whatever arrangement we may use, shows parallel development and convergence. Arranged in the present order we see parallel development in carination of head and thorax, in lengthening and broadening of vertex and in the proportional length of joints of legs in each of the divisions. Another point clearly shown is the improbability of most or all of the characters used for taxonomic purposes being of vital importance to the individual or species. The spur is sometimes stated to be of use in jumping, but other Homoptera jump equally well without a spur; even if this argument be allowed can it be shown that one form of spur is superior to another?

The fact that a genus is included in the table does not imply that the writer considers it a good genus, there are several he considers it advisable to sink, but not without greater knowledge of the variation within the genera than he possesses at present.

The genera not located are:—*Calligypona*, placed by Ashanin after *Chlorionidea*, but not mentioned by Melichar in his Homoptera of middle Europe; *Epeuryssa*, placed after *Euryssa* by Matsumura; *Dichoneura*, a South American genus which Crawford places, probably correctly, in the writer's Section B of the Delphacini; *Mestus*, the specimens marked *morio* (type species) that the author possesses do not agree with the original description; *Zuleika* placed by Distant near *Dicronotropis*.

The writer's knowledge of the genera is as follows:—

A. Examination of the type species:—

Aloha, *Anectopia*, *Asiraca*, *Bambusibatus*, *Belocera*, *Chlorionidea*, *Conomelus*, *Copicerus*, *Criomorphus*, *Delphacinus*, *Delphax*, *Dictyophorodelphax*, *Eocurysa*, *Eurybregma*, *Eurysa*, *Gelastodelphax*, *Haplodelphax*, *Kormus*, *Laccocera*, *Lanaphora*, *Liburnia*, *Magemelus*, *Melanesia*, *Metropis*, *Nesodryas*, *Nesorestias*, *Nesosydne*, *Nesothoe*, *Pentagramma*, *Perigrinus*, *Perimeccera*, *Perkinsiella*, *Phyllodinus*, *Proterosydne*, *Pseudarceopus*, *Punana*, *Saccharosydne*, *Smicrotodelphax*, *Sogatopsis*, *Stenocranus*, *Stobaera* (?).

B. Examination of species other than the type:—

Chloriona, *Dicranotropis*, *Eumetopina*, *Kelisa*, *Pissonotus*, *Purohita*, *Sardia*, *Tropidocephala*, *Ugyops*.

C. From literature only:—

Achorotile, *Amblycotis*, *Bakerella*, *Bergias*, *Bostera*, *Calligypona*, *Canyra*, *Dichoneura*, *Embolophora*, *Eodelphax*, *Epeurysa*, *Epibidis*, *Eucanyra*, *Euidella*, *Haplalomelus*, *Idiosemus*, *Idiosystatus*, *Ilburnia*, *Jassidaeus*, *Kalpa*, *Liburniella*, *Leimonodite*, *Livatis*, *Macrotomella*, *Malaxa*, *Meglamelanus*, *Micromasoria*, *Nesoplias*, *Nilaparvata*, *Ostama*, *Paranda*, *Platybrachys*, *Prokelisia*, *Pundaluooya*, *Rhinotettix*, *Sogata*, *Sparnia*, *Toya*, *Upachara* *Zuleika*.

The writer hopes to improve upon the present table when he is better acquainted with more of the genera, and for this reason he would be pleased to receive for examination or exchange any species in list C and the type species of list B.

The writer takes this opportunity to thank Dr. L. Melichar for the gift of many species representing most of the European genera upon which the classification of the family is chiefly based.

In using the table it will be necessary to run the genus down in each section, as we are ignorant of the characters employed in so many instances.

The writer regrets that he has not been able to procure specimens of any of Mr. Distant's Indian genera as he feels sure some are at present wrongly placed in his table, but the nature of the spur is not stated in any instance.

(To be continued).

THE BEE GENUS *THRINCIOSTOMA* IN INDIA.

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(This paper was submitted to Prof. Cockerell in March, 1915, who kindly added the valuable notes given in brackets.—F.W.L.S.)

Prof. T. D. A. Cockerell's description, on pages 35 and 36 of Vol. XLV of the Canadian Entomologist, as a new species, of a male and female of this curious genus that I recently sent him in a box of bees, has led me to examine the remainder of my specimens.

I find that the male and female described by Prof. Cockerell belong to two different species, for, besides a male that agrees fairly well with his description of *T. sladeni*, there is a male of a different species that evidently is the true mate of a female I possess that agrees fairly well with Prof. Cockerell's description of the female of *T. sladeni*.

My supposed male of *T. sladeni* agrees with Prof. Cockerell's description of the male in having the head and thorax clothed with white hairs, the margin of the clypeus cream-coloured, the legs red-brown, with the various creamy-white markings described, and in minor details, but it carries at the base of the 5th ventral segment of the abdomen, on either side of the middle, a cluster of three-hooked spines. The spines are arranged in a transverse line, the inner spine is the longest and the outer one the shortest. This remarkable and important structure is not mentioned in Prof. Cockerell's description.

The male of the other species, for which I propose the name *T. assamensis*, has also a transverse row of erect hooked spines at the base of the 5th ventral segment, but they number eight instead of six and are nearly equidistant and of equal length. This male, agrees with the female of mine that I refer to this species, and also with the female described by Prof. Cockerell under *T. sladeni*, in every important detail that is not sexual. In addition, it possesses in common with my female another remarkable character not mentioned by Prof. Cockerell. The second transverse cubital nervure does not reach to the radial nervure. [It does in my female, however.—T. D. A. C.]

The figure of *Halictus wroughtoni* Cameron, shown on page 432 of Bingham's Hymenoptera of India, Vol. I (Fauna of British

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