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BOOK NOTICES.

The Karanasa Butterflies, A Study in Evolution. By A. AVINOFF and WALTER R. SWEADNER. 8vo. *Ann. Carnegie Mus.* 32: 1-250, 17 pls., 1951. Limited edition (750 copies, 600 with col. pls.).

This is a posthumous publication, both authors having died before it appeared in print. It is a survey of the Asiatic butterflies of the genus *Karanasa* Moore, which is confined to the high mountain system centering on the Pamirs, and including parts of the Karakoram, the Hindu Kush, the Punjab Himalayas, the Alai-Tag and the Tian Shan.

The habitat is reviewed, followed by a full taxonomic study of the butterflies. As a start the seventy-seven subspecies are described, and are considered as "forms of the first category"; these are then assembled into higher categories by four stages, the last ("fifth category") corresponding generally to the species level. A systematic chart shows this classification graphically.

There are also general chapters on "Simultaneous Occurrence" and on "Coincident Variation and Intergradation," and a Summary. The plates show a large number of individual specimens in colour or in half-tone.

A Field Guide to the Butterflies of North America, East of the Great Plains. By ALEXANDER B. KLOTS. 8vo. Boston (Houghton Mifflin Co.), 1951. Pp. xvi + 349, 247 col. figs., 232 half-tone. Price \$3.75.

Part 1 (60 pp.) deals with general topics, including collecting and preserving; the butterfly and its environment; life histories and growth; the adult butterfly; and classification, with keys to families.

Part 2 deals with the butterflies by families, with general notes, followed by a particular account of each species: this includes larva, range, subspecies, and a note of similar species that may cause confusion. A good deal of information is condensed into a small space. The figures, both coloured and half-tone, are annotated, drawing attention to significant details of colour and pattern.

There is a separate section on casual and stray species and false and dubious records, followed by appendices dealing with the principles of classification; butterfly literature: a check list; and three indexes.

TWO NEW SPECIES OF AFRICAN *CERIAGRION* (ODONATA), THE TYPE OF *C. CORALLINUM* CAMPION, AND NOTES ON THE GENUS.

By Miss CYNTHIA LONGFIELD, F.R.E.S.

In March and April, 1941, Lt.-Col. F. C. Fraser published two papers on African Odonata (*Proc. R. ent. Soc. Lond.* (B) 10: 35-42; 61-66). In the first paper he comments on *C. corallinum* Campion and gives an illustration of what purports to be the anal appendages of the male. The second paper is devoted to an interesting account of the nine African species of the genus, including a description of three new ones, a key to the African species, and the illustrations of the male anal appendages of seven of them. Unfortunately, once again, the same insect has been drawn for *corallinum* Campion. I did not return to work on the Odonata until 1945, and even then I had no cause to question the accuracy of Fraser's illustrations. It was not until I was examining, in 1950, some *Ceriagrion* sent me by Mr. J. A. Whellan from Rhodesia that I discovered the mistake. The insect that Fraser has drawn is not Campion's *corallinum*, the type of which is in the British Museum (Natural History). I here illustrate the type male, by drawings done by Mr. D. E. Kimmins (fig. 1). There is no

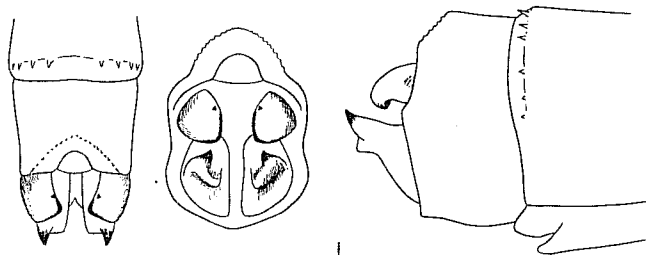


FIG. 1.—*Ceriagrion corallinum* Campion: Male anal appendages from above, behind and laterally. (Type ♂, Sierra Leone.)

question of any distortion as there are three more males in the type collection, two of them labelled co-type. It is easy to see the marked difference in length of the superior anal appendages, from both the side and above. There are also slight differences in the shape and tooth of the inferior appendages and in the position of the latter when viewed from behind. There is a tiny tooth on the inner upper surface of the superior appendages which is not found on the new species described below. Fraser's attention was drawn to this error in identity and he found that he had made *camera lucida* sketches of the appendages of the three Campion types, *corallinum*, *citrinum* and *ignitum*, subsequently to the publication of his papers, and that his published drawings of *corallinum* were done from two mis-determined specimens taken at UGANDA, Lake Victoria, in

1923 by Prof. G. D. Hale Carpenter. He tells me that an examination of these shows that the appendages agree with those of the two males described below and named *whellani* after the collector (fig. 2). It is to be presumed that the single male, determined by Fraser as *corallinum*, from Dr. R. Paulian's collection from the French Cameroons also belongs to *whellani*.

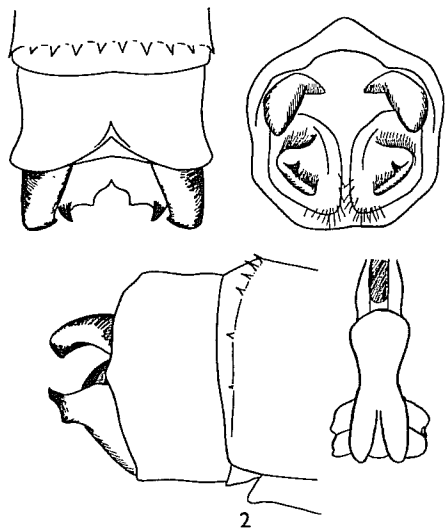


FIG. 2.—*Ceriagrion whellani* sp. n. Male anal appendages from above, behind and laterally. (Type ♂, S. Rhodesia.) Penis (paratype ♂).

Ceriagrion whellani sp. n.

Male holotype: abdomen 27.5 mm.; hind wing 17.5 mm. Head, legs and thorax green and yellow, abdomen scarlet and yellow.

Head: Labium and rear of head and eyes pale greenish-yellow. Base of mandibles, genae, labrum, olypeus and anterior portion of frons to ridge, citron-yellow. A black spot on either side of base of labrum, in suture. Eyes above, vertex and epicranium grass-green with rust in the depressions. Occipital ridge and postocular region orange-yellow fading into the pale rear of the head. Antennae with scape and pedicel yellow, flagellum black. **Prothorax:** Grass-green merging into citron-yellow laterally and with some orange colour in the sutures. Both anterior and posterior lobes low and smoothly curved. **Synthorax:** Bright green merging laterally into citron-yellow beneath. The green is darkest on the dorsum to the first lateral suture and also in a vertical band just distal to the second lateral suture. At the dorsal end of each suture is a small elongated rust-brown spot, and on the dividing ridge of terga and pleura is a small triangular black spot beneath each pair of wings. A small, elongated black mark divides the metepimerum from the abdomen.

These are the only markings on the thorax and are present in all the species of *Ceriagrion* that I have examined, but are only prominent on the pale-coloured ones. The green colour of the mesopleurum becomes citron-yellow as it nears the legs. **Legs:** Pale greenish-yellow with the following black: all spines; a fine apical edge to the femora, a less well defined one to the tibiae and a dorsal apical edge to each joint of the tarsi; also tips of claws. The longer femoral spines number 3-4-5. **Wings:** Tinged with pale yellow, more hyaline towards the tips. Venation mostly black, but radius dark brown. Postnodals 11 fore wings, 9 hind wings. Medio-anal link present. Anal bridge at anal crossing; arculus at second antenodal. Pterostigma dark pinkish-grey, elongate and covering one cell, the angle somewhat oblique in fore wings and pronouncedly so in hind wings, about twice as long as broad and from 0.75 mm. to 1 mm. in length. **Abdomen:** Dorsally scarlet-red and with no pattern, shading laterally to citron-yellow on first and second segments and progressively more orange from third to tenth segments. There is a fine black ring at the posterior border of second to sixth segments and short black spines in the same position on seventh to ninth segments. Anal appendages as in fig. 2, the superiors black, with dark red at extreme bases; the inferiors red, with a stout black tooth. This tooth is broad and triangular, curved upwards and inwards and with a single, slightly obtuse tip. (The tooth in *corallinum* is slightly notched at the tip, forming a double point.)

The male paratype of *whellani*, from the type locality, only differs from the type by being half a millimetre longer in the abdomen and hind wing, and having 5 long spines on the right hind femur and 6 on the left. The penis is as drawn in fig. 2 and shows differences from that of *corallinum*. For a figure of the latter see Dr. E. Schmidt, 1951 (p. 160, fig. 17). In *whellani* there is a distinct "waist" to the apical lobe and a membranous flange laterally at the base. The stem is quite smooth, with no spines. Type and paratype: SOUTHERN RHODESIA, Melssetter District, Chibudzana River, 16.xi.1948 (B.M. Coll.).

Also belonging here and identical in shape of anal appendages is a male from BRIT. E. AFRICA, Kome Island, Lake Victoria, taken at the N.W. end of the lake by Prof. G. D. Hale Carpenter, 11.i.1919 (B.M. Coll.). This specimen has the superior anal appendages coloured dark red. The arculus is distinctly distad to the second antenodal (and this is also the position in Fraser's two from Uganda). The specimen also has only 10 postnodals in the left fore wing and 8 in the right hind wing. None of these characters are really important, but it may eventually be thought best to give the Uganda specimens a racial name.

Ceriagrion corallinum Campion.

The holotype male from Rowerre, two co-type males from Port Lokko and Kamakoni and the allotype female from Kamakoni were all named by H. Campion from a series of six males and one female collected by Dr. J. J. Simpson in SIERRA LEONE, West Africa, April and May, 1912 (1914, *Ann. Mag. nat. Hist.* (8) 14: 279-281). Another male, not seen by Campion, is also in the B.M. Coll. from SIERRA LEONE, Rosorse (Simpson, 27.xii.1912). I have seen a male from CAMEROONS, Tibati (Dr. Monard's coll., June, 1947). These six specimens are all that I can personally vouch for. It would, however, seem reasonable to suppose that the other two Sierra Leone males from the original series (wherever they are now) and a pair from the Belgian Congo (Tervuren Mus.) compared by Dr. Ris with the Sierra Leone series are true *corallinum*.

In a paper published in February, 1951, by Dr. E. Schmidt on the dragonflies of Portuguese Guinea (*Arqui. Mus. Bocage*, 20 (1949): 158-161) *corallinum* is correctly figured and described, showing an extension of its range. These specimens are several millimetres longer than those of the type series.

Campion's description is very accurate, but one or two additions can usefully be made. For instance, I doubt that the "golden yellow stripes" exist in life. They are so indefinite in some of the specimens (although prominent in the types) that they are probably only post-mortem changes. I believe that the dorsal bronze-green is darker along the dorsal carina, in the humeral region and between the first and second lateral sutures. The tiny black marks are as in *whellani*, but the dark russet mark at the dorsal end of the second lateral suture is wider. I would have called the colour on the top of the head a mixture of reddish-brown (or rust) and green, and the legs have a brownish stripe along the outer surface of the femora but are otherwise yellow. What Campion describes as "a rather long acute point above" on the inferior anal appendage is what both Fraser and I prefer to call a tooth; Campion omits to say that it is black. It undoubtedly is "acute" from many aspects but, nevertheless, under high magnification can be seen to be slightly notched and with a double tip. The whole tooth is not so broad and triangular as that in *whellani* and is not so decidedly curved upwards and inwards. Campion's "shorter blunter point below" is a description of the angled lower edge of the inferior appendage and does not refer to the tooth. Campion has also omitted reference to the minute tooth on the superior appendage, not found in *whellani*, but easily overlooked. I believe that the abdomen in the males is not such a deep shade of scarlet as it is in *whellani*; Campion called it "light red."

Ceriagrion moorei sp. n.

Male holotype: abdomen 29 mm.; hind wing 18 mm. Female allotype: abdomen 27 mm.; hind wing 18 mm. Red and yellow.

Type ♂. *Head*: Entire lower face and rear of head and eyes orange-yellow, the labrum particularly bright and shiny. Clypeus, frons and the top of head to the occipital region scarlet-red. The eyes are bright green in life. Antennae with scape and pedicel orange-red, flagellum black. *Prothorax*: Scarlet-red, the anterior and posterior lobes being broad and rounded. *Synthorax*: Scarlet-red, to at least as far as the first lateral suture, unmarked and merging into yellow below, with some white pruinosity between the legs. *Legs*: Orange-yellow, unmarked, with stout, black spines, the longer ones on the femora numbering 3-4-5. Claws black. *Wings*: Tinged with pale yellow, more hyaline towards the tips. Venation largely red, brown towards the posterior borders. Postnodal 12 fore wings, 10 hind wings. Medio-anal link present. Arculus a fraction distad to the second antenodal in all wings. *Ab at ac*. Pterostigma pale red, moderately elongate in fore wings and more elongate, and the angle more acute, in hind wings, covering one cell; about twice as long as broad and from 0.75 mm. to 1 mm. in length. *Abdomen*: Scarlet-red merging into yellow beneath, unmarked and only very slightly darker at the segment joints. Anal appendages as in fig. 3, and a light red, even to the spines and hairs, except for a black end to the rounded tip of the superior appendage and the large, shiny black tooth on the inferior appendage. Penis as in fig. 3, with a pointed end to the apical lobe similar to that in *suave* Ris (see Schmidt, 1951).

Allotype female: The head is duller and more yellow than the male, with no red clypeus and dull red-brown on top (part of which is obscured by some white incrustation). Red on prothorax and synthorax almost as extensive as in the male. The dorsum of the first

five abdominal segments scarlet-red, of the last five orange. Ovipositor and anal appendages orange, the left cercus entirely missing, the right one half as long as the tenth segment and only a narrow cone in shape.

Type male and female: GOLD COAST, Northern Territories, Yapi, 1916 (Dr. J. J. Stimpson). B.M. Coll.

Paratype male from type locality (headless) shows dorsal striping to the left of dorsal carina, proving that this appearance is due to post-mortem changes. Paratype female from type locality is larger than the allotype: abdomen

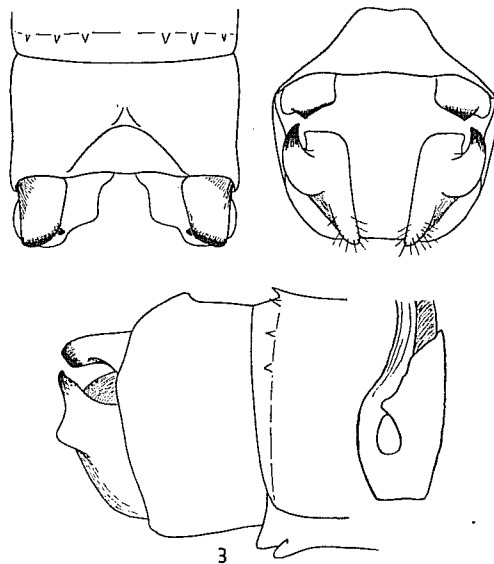


FIG. 3.—*Ceriagrion moorei* sp. n. Male anal appendages from above, behind and laterally. (Type ♂, Gold Coast.) Penis (♂, N. Nigeria).

30 mm., hind wing 19 mm.; also darker and greyer on thorax and abdomen. Other paratypes are 5 males: NORTHERN NIGERIA, S. E. Kano, Azare, 1925 (Dr. L. Lloyd), and 1 male: GAMBIA, Bathurst (no date), in B.M. Coll.; also 7 males and 7 females (two pairs *in cop.*) from GAMBIA, Kuntaur Post, Basse Casamance, July, 1948, and Wellingara, E. Casamance, August, 1948 (N. W. Moore, after whom the species is named). These specimens vary in age. Some are rather brighter red than the types (head, legs, thorax), some are yellower (legs, pterostigma, clypeus, front "shelf" of frons), some females are dorsally

browner or greyer. The position of the arculus is often distinctly distad to second antenodal, and the postnodals often number only 10 or 11 in the fore wings and 9 in the hind wings. The length of the abdomen varies between 27 and 30 mm. and hind wings 17-18 mm.

The female tenth abdominal segment is deeply notched dorsally in the centre, the notch being "open" and surrounded by a slightly raised edge. The conical cerci have a prominent tubercle below (and between), and the styles of the valves of the ovipositor do not extend beyond the end of the tubercle. In the female of *C. glabrum* (the only female compared) the notch on the tenth segment is narrow and there is no raised surround. The tubercle is small, very flat, and the styles project well beyond.

The mesostigmal lamina has lateral raised ridges and round black spots, similar to *suave*, but there is no mesotergal hollow. It might be helpful here to state that the allotype female of *ignitum* Campion has the black streak of *corallinum* and the shape closely similar, but with the mesotergal hollow slightly deeper. These thoracic structures may or may not be of use in identification as so few females are as yet known, but these particular structures should have specific value.

C. moorei must closely resemble *C. suave* Ris (BELGIAN CONGO, Katanga), the anal appendages of the male as drawn by both Ris and Fraser being very similar. However, the outer border of the inferior appendage is not angulated as it is in *moorei*. Ris describes the males of *suave* as 36 mm. long and of extreme slimmness, and the colouring as very pale.

I have analysed the characters of 28 of the 30 named species of the genus *Ceriagrion* with a view to finding some stable generic character for the whole genus, but, of those mentioned in published Keys I find only four to be completely reliable and none are confined solely to *Ceriagrion*. These four characters are: no horns on the female prothorax; no spine beneath the female eighth abdominal segment; an inferior tooth present on all the tarsal claws; a medio-anal link in all wings (M. A. Lieftinck gives his reasons for considering the medio-anal link an unreliable generic character in *Nova Guinea* (1935, 17: 235-236)). Fraser's new species from Madagascar, *madagasureum*, is the only one with well-defined postocular spots, although there is sometimes a change of shade in the colouring of the occipital region. This large blue species, *C. madagasureum*, has also the thorax mostly black dorsally; the European small red species, *C. tenellum*, is the only other species with such a thoracic pattern. I am, therefore, leaving these two species out of this examination, as I am doubtful that they should be included if we are going to get even a minimum of uniformity in the genus. I cannot include E. Schmidt's two new species from Madagascar, as the full descriptions are not yet available.¹ That leaves 26 species, either examined or taken from the type descriptions. The genotype *coromandelianum* (Fabr.) has the following characters: (1) Thorax green. (2) Abdomen lemon-yellow. (3) Unmarked by any pattern. (4) Stature long and slim or fairly so. (5) A sharply crested frontal ridge. (6) Anal bridge (*ab*) at anal crossing (*ac*). (7) Arculus distinctly distad to second antenodal, or slightly distad, or at the second antenodal. (8) Pterostigma rhomboidal. (9) Long and narrow inferior appendages in the male. (10) Wide

¹ Published late 1951 (1951, *Mém. Inst. Scient. Madag.* A, VI, 1: 264-273) and including a discussion on the sizes of *C. glabrum*.

occiput, with (11) a rolled-up posterior edge, and (12) distinctly concave posteriorly. (13) Labium cleft to half the total length, and (14) the cleft narrow. (15) Prothorax narrow. (16) Synthorax wide. (17) The longer leg spines on the femora sparse.

Characters for 26 Species (examined or taken from type descriptions):

- (1) Thoracic colour: 16 green or olivaceous, 6 red, 4 blue.
- (2) Abdominal colour: 19 red, 5 yellow, 2 blue.
- (3) Pattern: 15 unmarked, 11 marked with some black.
- (4) Stature: 8 long and slender (30-36 mm.), 8 medium length and slender, 3 long and not so slender, 4 small and slender (23-26 mm.), 3 of mixed stature.
- (5) Frontal ridge: 20 well defined, 4 moderate, 2 with very little of the ridge to be seen (and it is to be remembered that this does not include *tenellum* or *madagasureum*, neither of which have a sharply defined frontal ridge).
- (6) Position of anal bridge: 16 at anal crossing, 5 proximal to *ac*, 5 variable.
- (7) Position of arculus: 10 distad to second antenodal, 10 at second *an*, 6 variable.
- (8) Shape of pterostigma: 24 rhomboidal, 2 quadrate.
- (9) Shape of inferior appendage: 13 tapering to narrow tip, 8 broad all the way, 5 intermediate.

The following characters I have myself examined on 21 of the 30 species:

- (10) Width of occiput between eyes: 10 wide, 4 narrow, 7 intermediate.
- (11) Posterior edge of occiput: 11 rounded, 9 rolled up.
- (12) Posterior edge of occiput with a distinct concave depression in centre: 7 deep depression, 5 shallow, 1 variable, 8 with none.
- (13) Cleft in labium: 6 to half of total length, 11 to almost half, 2 to one-third, 2 variable.
- (14) Shape of cleft in labium: 14 narrow, 4 wide, 3 variable.
- (15) Width of prothorax: 6 wide, 8 narrow, 12 intermediate.
- (16) Width of synthorax: 9 wide, 7 narrow, 10 intermediate.
- (17) Femoral spines: 8 very sparse (2-3 foreleg, 4 mid, 5 hind), 6 fairly sparse (3.4.6), 3 moderately numerous (3.5.6), 2 numerous (3.6.6-8). In addition, *erubescens* Selys from Australia has 2-3.4.5, and from China and Annam 3.4.5-7; *olivaceum* Laidlaw from Burma has 3.4.7, and race *aurantiacum* Fraser from India 3.4.5.

In all these species only two are different from the type in as many as two characters, and neither the Oriental nor Ethiopian can be grouped by any set of characters. The nearest approach to grouping lies in the shape of the male inferior appendage, which is tapering in 12 out of 14 oriental species, and broad in 8 out of 12 Ethiopian species, with one West African definitely tapering, 3 West African and a Burmese and a Javanese species intermediate.

The widely spread and very common African species, *C. glabrum* Burmeister, would appear to be at its longest and stoutest, with large dark eyes, from most of its eastern and southern range, certainly from Abyssinia, Kenya, Tanganyika, Uganda, Belgian Congo (eastern plateau), S. Rhodesia, Transvaal, S. W. Africa and Angola. In the west, in Sierra Leone, Gold Coast and Nigeria, a form is found which is smaller and slimmer in stature, with smaller, light eyes. However,

in the latter country the larger, stouter and dark-eyed form seems to be equally common. Over the entire range the stout spines on the postero-lateral edge of the tenth abdominal segment number from 1 to 6 (3 or 4 being usual), and the male anal appendages show no variation in shape, even in those from the islands of Madagascar, Seychelles, Mauritius, San Thomé and Principe. Correctly named females of this species from Kenya and Abyssinia have the mesostigmal lamina almost identical with the drawing for *C. suave* by Schmidt (1951). Dr. Barnard figured the penis of this species, showing that it is another with spines on the stem (1937, *Ann. S. Afr. Mus.* 32 : 217). Some investigations on the ecology of this dominant species and on the rarer ones that it would appear to be supplanting would be of great interest.

BOOK NOTICES.

The Collecting and Preservation of Butterflies and Moths, with Practical Hints for Collecting in the Field. By CHAS. B. ANTRAM. Svo. Lymington (Charles T. King), 1951. Pp. 107, 6 half-tone pls., 12 line figs. Price 10s. 6d.

After a chapter "For the Absolute Novice," this book deals with apparatus and collecting methods, and gives a series of "Observations and Hints" on the arrangement and maintenance of a collection. There is a list of the food-plants of British butterflies, and notes on beating, rearing of larvae, assembling, sugaring, light-traps, and pupa-digging. A table gives the normal time of appearance and method of hibernation of the British butterflies, and there is a Glossary.

Entomology for Introductory Courses. By ROBERT MATHESON. Svo. Ithaca, New York (Comstock Publishing Company) and London (Constable & Co.). 2nd edition. 1951. Pp. xiv + 629, 500 figs. Price \$6.00.

It is stated that "though the structure of insects, both external and internal is reviewed and illustrated, the main emphasis is on the living insect." After a short general introduction there is a chapter on the Classes of arthropods, and an outline of insect morphology. Mouthparts have a separate chapter, and development, growth and metamorphosis are reviewed. Classification with a key to Orders (adults only) is followed by successive chapters on the respective Orders. Finally, under the general title of "Insects in Relation to Human Welfare," come four chapters dealing respectively with insects as benefactors, scavengers and in the balance of nature; as pollinators; as vectors of disease; and as plant pests. A Glossary and a Bibliography complete the volume.

Though general in scope, the book is mainly preoccupied with North American entomology; locusts, for example, receive about one and a half pages of the chapter on Orthoptera, and one page of this is about the Rocky Mountain Locust. The Bibliography, however, includes general works from many countries.

SOME NEW SPECIES OF GALL MIDGES (DIPTERA: ITONIDIDAE) FROM INDIA.¹

By S. N. RAO, M.Sc., Ph.D., F.R.E.S.

(U.P. State Research Associate, School of Entomology, St. John's College, Agra, India.)

THE type-specimens of the four new species of gall midges described here are deposited in the collections of the Zoological Survey of India, Indian Museum, Calcutta. My thanks are due to Prof. M. S. Mani for helpful criticism.

Subfamily Heteropezinae.

Haplusiella gen. n.

Eyes confluent above. Trophi elongate. Palpi four-segmented. 15 antennal segments; in ♂ all flagellate segments elongate-oval; first and second flagellate segments fused together, circumfila wanting. Wings unspotted, longer than broad, with three long veins, *R*₂ well developed and distinct; costa interrupted at its union with *R*₁, and the latter curved distally and reaching the wing margin well beyond the apex; *Cu-M*₁ forked. Legs long, slender, moderately setose. Claw pectinate, with five teeth. Basal clasp segment simple, long, slender; terminal clasp segment more slender and longer than the basal, evenly curved and with one blunt tooth apically; dorsal plate broad, deeply and broadly cleft with the lobes narrow and long; ventral plate narrower and a little shorter than the dorsal plate, deeply and broadly cleft with the lobes narrow; style equal to the ventral plate.

Type species.—*Haplusiella pectinoclava*, sp. n.

Haplusiella pectinoclava sp. n.

♂. Length 1.0 mm. Light brown. Eyes confluent above. Trophi elongate. Palpi (fig. 3) pale brown, four-segmented, long, sparsely hairy; first segment nearly cylindrical, slightly wider apically than at base, length four times the thickness at apex; second segment longer than first, length four and two-thirds the thickness, very slightly narrowed apically; third segment shorter and more slender than the second, length four times the median thickness, slightly bulging towards the apical three-fourths; fourth segment slightly shorter than the third, narrower basally than at apex, length four and two-thirds the maximum width. Antenna pale brown, a little longer than half the length of body, with 15 segments; flagellate segments elongate oval, sparsely setose, with very short stems, gradually becoming shorter and more slender towards the tip. Scape (fig. 4) subquadrate, one and a half times as long as broad, pale brown; pedicel (fig. 4) slightly longer than scape, length one and one-fourth the diameter, pale brown; first flagellar segment (fig. 4) fused with the second, longer than pedicel, length a little over twice the thickness, with a very short basal stem; second segment as long as the first, but somewhat more slender, length a little less than thrice the thickness, with a very short apical stem; third segment slightly shorter and more slender than the second, length two and a half times the thickness; fourth segment like the third; fifth slightly shorter than the fourth, length a little over twice the thickness; ninth segment twice as long as thick; fourteenth segment (fig. 5) shortest of all segments, twice as long as thick; terminal segment (fig. 5) with an apical knob of about one-third the

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