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THE AUSTRALIAN HYDROBIOSINAE

(Trichoptera: Rhyacophilidae)

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Abstract: This paper deals with the systematics of Australian caddis-flies of the subfamily Hydrobiosinae. Four new genera and 28 new species are described. The genus *Anachorema* is suppressed as synonym of *Ulmerochorema*, which now includes all species of the former genus, with the exception of *evansi*, which is referred to genus *Austrochorema*.

In Australia 45 species of the subfamily Hydrobiosinae are now recognized, placed in 11 genera of which 10 genera are endemic, and only *Apsilochorema* extends beyond the boundaries of the continent. The main area of distribution is located on the eastern and south-eastern part of the continent, inclusive of Tasmania. The principal concentration of species is located on the highlands of E. and NE Victoria, where up to 21 species are now recorded. Number of species rapidly decrease towards the north and west; with only 2 species known from SW Australia and 2 from N. Queensland.

INTRODUCTION

Since the publication of "The Trichoptera of Australia and New Zealand" by Mosely & Kimmins (1953) additional information grew rapidly, numerous specimens were collected and interesting results obtained. Customary day collecting was supplemented at night with mercury vapor light trap, which resulted in large number of individuals from certain localities. It is interesting to note that the number of species is far greater than was expected some years ago, and shows that many areas still offer unlimited fields for taxonomic research. Another noteworthy factor discovered is, that the adults are active during winter months not only in the warmer northerly localities, but also in Victorian mountain areas, where they are plentiful and continue to emerge from May to August even in snow-fed mountain streams.

The majority of species in this subfamily is associated with streams in mountain areas, with cool and well aerated water supply. Nonetheless there are species which inhabit streams of flat, open country with rather slowly flowing water, mostly reduced to mere trickles or a few stagnant pools during hot summer months, with water temperatures often 25° C or

higher for lengthy periods. It was most surprising to find some species (*Apsilochorema gisbum* and *Taschorema evansi*) living under each extreme condition; some variation in size (Neboiss, 1957, p. 85) and intensity of color were observed, but no structural changes were obvious.



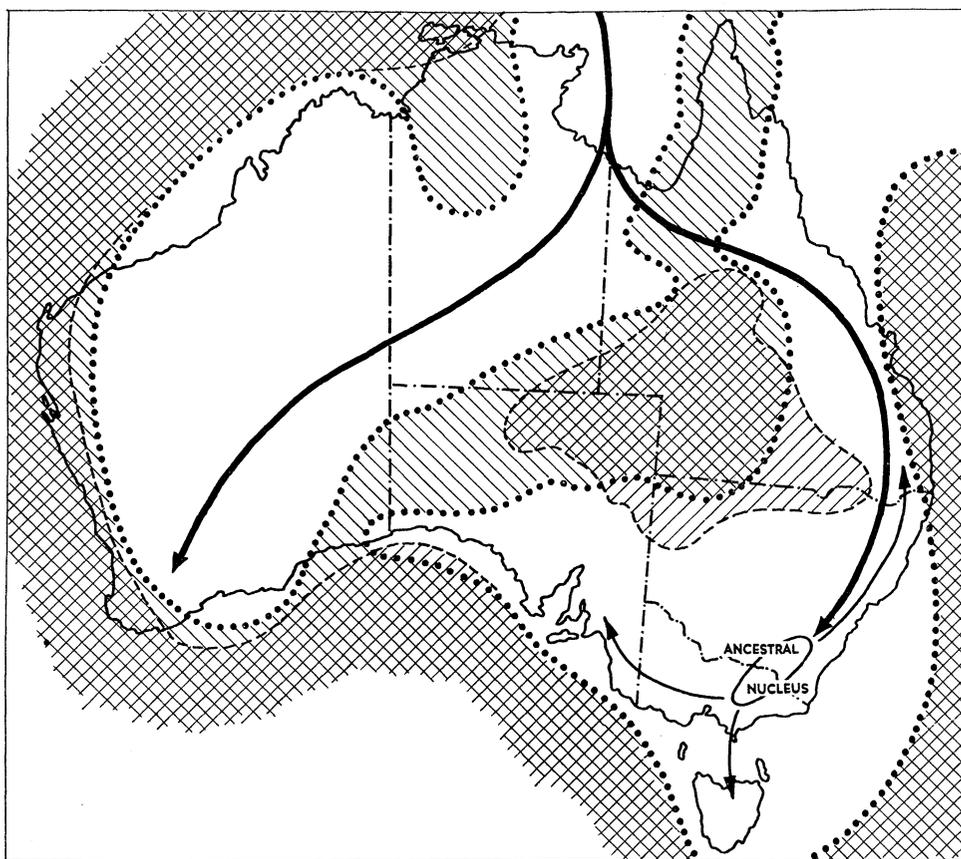
Map 1. Map showing main areas of distribution; numerals indicate number of species found in respective areas.

Life histories of none of the Australian species have yet been described or figured although some have been bred through to the adult stage. It will probably be some time for sufficient data to be accumulated and warrant publication. Larvae are all free living, but when mature they construct rigid dome-like coverings of small stones. Each then spins a cocoon which is attached at both ends to its outer covering. In the process of pupation the larval skin is pushed posteriorly and there remains. Fragments of the cast skin can often be used as a guide to identification and association of larvae and adults.

Main areas of distribution are limited to the eastern and southeastern parts of the continent as shown in Map 1, only 2 species (*Apsilochorema urdalum* and *Taschorema pallidum*) being known from SW Australia. Both of these appear to be long separated from

the other species of their respective genera. Only 2 species are at present known from N. Queensland; number of species increasing to 9 in S. Queensland, 10 in N. New South Wales, to 18 in S. New South Wales, but the majority of species totalling 21 appear to be located in Victorian alpine country E. and NE of Melbourne. The number of species then rapidly decreases towards the west with but 10 species in Victoria W. of Melbourne, and 4 in S. Australia near Adelaide. 14 species are so far recorded from Tasmania. 10 of the 11 genera are endemic to Australian continent, while one (*Apsilochorema*) also occurs in SE and E. Asia.

Possible phylogenetic relationships were discussed by Ross (1956), but although knowledge of the species and their distribution has grown considerably in the meantime, it is felt that final discussions on phylogeny should be delayed until more complete information becomes available on larval and pupal characters. One noteworthy discovery is that larvae of *Apsilochorema gisbum* possess simple and not chelate anterior legs, and thus is an



Map 2. Map showing possible movement of ancestral population in Australia (heavy lines). Shaded areas indicate changes in expanse of water from Lower Cretaceous (Tambo Sea) to early Upper Cretaceous (Winton Lake), after David 1950. Small arrows indicate 3 main directions of expanding population from ancestral nucleus.

exception to the phylogenetic diagram of Rhyacophilidae given by Ross (1956, chart 26).

Nevertheless it has been thought advisable to add 2 diagrams, one postulating relationships of Australian genera of Hydrobiosinae (Fig. 1), the other detailing phylogenetic relationships of the species of the genus *Taschorema* (Fig. 91); also a map (Map 2) indicating the possible movements of the ancestral population after entering the Australian region from the north. It seems certain that the separation of the two W. Australian species (*Apsilochorema urdalum* and *Taschorema pallescens*) must have occurred rather early in their history while climatical conditions were favorable in the country between Gulf of Carpentaria and the far southwest. Research in recent years has shown that tropical to subtropical conditions were widespread in Australia during Cainozoic times (Gill, 1961) and so would afford easy access to the southwest at that period.

With the gradually receding Tambo Sea in N. and central Queensland during Cretaceous times, a new passage opened towards the east and the ancestral population then found

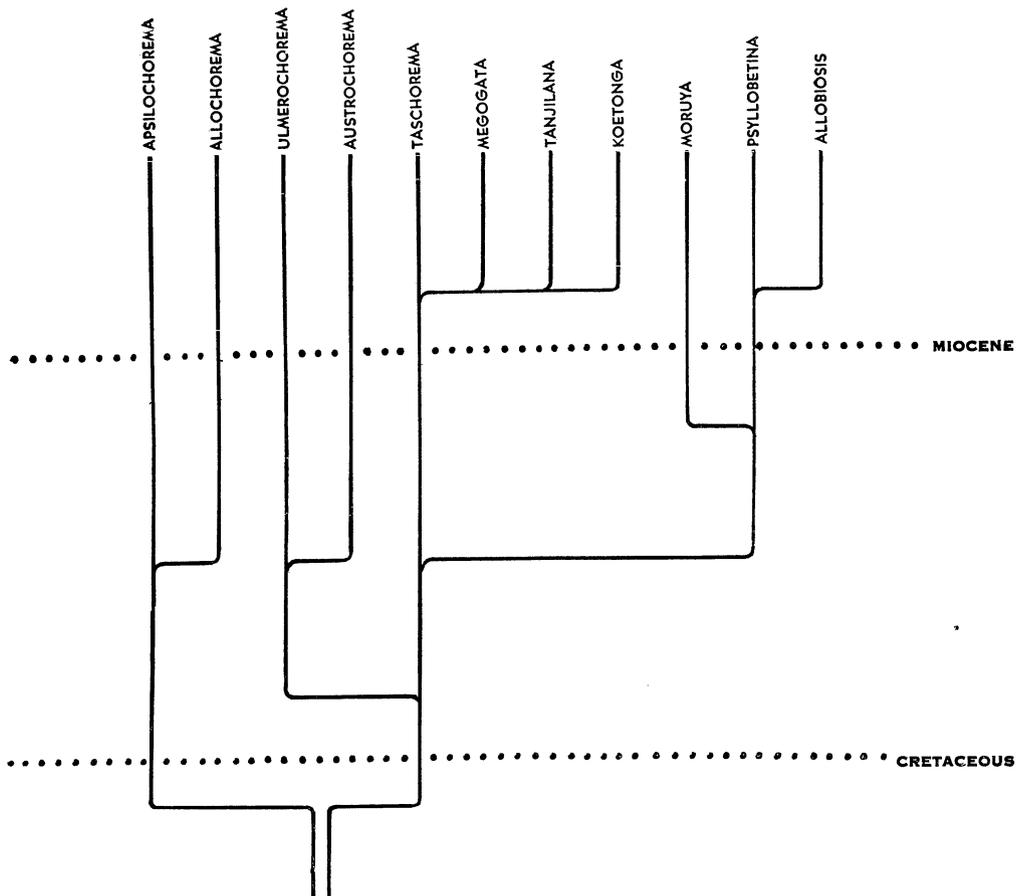


Fig. 1. Relationship diagram of Australian genera of subfamily Hydrobiosinae. (Possible geological times indicated by dotted line).

its way southward along the eastern seaboard. During this migratory movement there was probably little basic change in the stock, but this quiescence was soon followed by rather rapid evolutionary change synchronizing with a radiation of the ancestral nucleus from a base in the southeastern highlands. Small or large groups diverged in this way in 3 main directions; back toward the north (*Psyllobetina*), westward to S. Australia (*Taschorema* and *Austrochorema*), and southward to Tasmania (*Moruya*, *Ulmerochorema*, *Taschorema* and *Austrochorema*), the latter movement being interrupted during Miocene when Tasmania was finally separated from the mainland.

It should be borne in mind, however, that many important areas of N. Queensland, Tasmania and W. Australia are insufficiently explored and it is certain that other species will be discovered in the future. Modification of the above hypothesis is therefore not unlikely.

Various institutions have made available their material for study and location of specimens are listed in text under the following abbreviations:

- AM —Australian Museum, Sydney.
 BMNH—British Museum (Natural History), London.
 CSIRO—Division of Entomology Museum, CSIRO, Canberra.
 MACL—Macleay Museum, Sydney University, Sydney.
 MCZ —Museum of Comparative Zoology, Harvard University.
 NMV —National Museum of Victoria, Melbourne.
 NRS —Naturhistoriska Riksmuseet, Stockholm.
 QM —Queensland Museum, Brisbane.
 QU —Queensland University, Brisbane.
 SAM —South Australian Museum, Adelaide.

A number of alterations were necessary to specific names, because the Greek word "chorema" is of neuter gender and not feminine as used by Mosely.

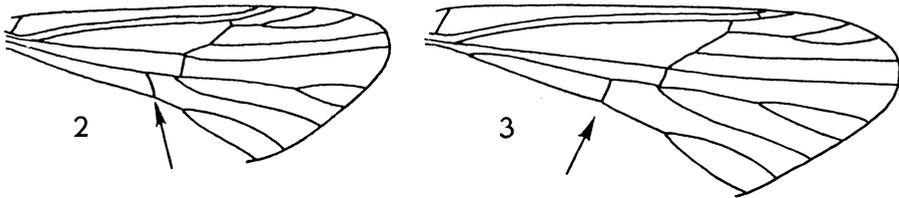
Family RHYACOPHILIDAE

A number of subfamilies has been in use for various groups, the major ones being Rhyacophilinae and Hydrobiosinae, whereas Glossosomatinae is now recognized as a separate family (Ross, 1956). The subfamily Rhyacophilinae is almost entirely absent from areas south of the equator where its place is taken by Hydrobiosinae; other subfamily names in use at one time or other have not been directly attached to taxonomic problems of Australian species, and the latter subfamily is the only one represented here. Family and subfamily characters have been recently discussed in detail by various authors (Ulmer, 1951; Mosely & Kimmins, 1953; Ross, 1956), and therefore not repeated here.

KEY TO AUSTRALIAN GENERA OF SUBFAMILY HYDROBIOSINAE

1. In posterior wings fork 2 with footstalk..... 2
 In posterior wings fork 2 sessile 5
- 2 (1). In anterior wings fork 1 with footstalk..... 3
 In anterior wings fork 1 sessile..... 4
- 3 (2). Footstalk of fork 2 in posterior wings much shorter than fork itself; fork 2 distinctly longer than fork 3 **Apsilochorema**

- Footstalk of fork 2 in posterior wings longer than fork itself; fork 2 about as long as fork 3.....**Allochorema**
- 4 (2). Anterior wings with discoidal cell open.....**Austrochorema**
Anterior wings with discoidal cell closed.....**Ulmerochorema**
- 5 (1). Females without long oviscapt 6
Females with long upcurved oviscapt..... 9
- 6 (5). Males with narrow cell-like structure situated between Cu_2 and 1A in posterior wings.....**Taschorema**
Males without such structure..... 7
- 7 (6). Anterior wing with oblique cross-vein between 1A and 2A **Koetonga**
Anterior wing without oblique cross-vein between 1A and 2A.....8
- 8 (7). Posterior wings with cross-vein m-cu down and outward directed (Fig. 2); very long ventral process on sternite 7 in ♂, short triangular on sternite 6 in ♀; head from above only slightly wider than long **Megogata**
Posterior wings with cross-vein m-cu down and inward directed (Fig. 3); short ventral processes on sternites 6 and 7 in ♂, on 5 and 6 in ♀; head from above almost 2× as wide as long.....**Tanjilana**
- 9 (5). In posterior wings fork 1 present and with footstalk..... **Moruya**
In posterior wings fork 1 absent.....10
- 10 (9). In anterior wings fork 2 sessile, or at most with very short footstalk ... **Psyllobetina**
In anterior wings fork 2 with very long footstalk **Allobiosis**



Figs. 2-3. Portion of posterior wing showing direction of cross-vein m-cu: 2, genus *Megogata*; 3, genus *Tanjilana*.

Genus *Apsilochorema* Ulmer

Apsilochorema Ulmer, 1907, Trichoptera IN Genera Insectorum 60: 206.—Ross, 1956, Evol. & Class. of Mount. Caddis-flies: 124.—Kimmins, 1959, Ent. Monthly Mag. 95: 184.
Bachorema Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 493.

Type species: *Psilochorema indicum* Ulmer (1905).

Spurs 2 : 4 : 4. Wing venation differing in sexes, regular in ♀♀, irregular in ♂♂. Anterior wings with discoidal cell open or closed; forks 1, 2, 3, 4 and 5 present, forks 2 and 5 sometimes sessile, forks 1 and 3 always with footstalk; fork 4 in ♀♀ with footstalk, in ♂♂ sessile and joined to footstalk of fork 3. Males with small oblique pouch along footstalk between base of fork 4 and R_s . Cu_2 sometimes joined with 1A just above arculus. Posterior wings similar in both sexes; forks 1, 2, 3 and 5 or only 2, 3 and 5 present, all with footstalks. Lateral filament on abdominal segment 5 present in ♂♂. Short to moderate ventral processes in ♂♂ on sternites 6 and 7 or on 7 only; in ♀♀ on sternites 5 and 6.

Represented in Australia by 3 species, of which *A. urdalum* is described as new. Main area of distribution along eastern and southeastern part of the continent though one species (*gisbum*) occurs also in Tasmania, and another (*urdalum*) is located in SW Australia. Exotic species of the genus are distributed from Ceylon and India to Siberia, Japan and in Fiji Is. and New Guinea.

KEY TO AUSTRALIAN SPECIES OF APSILOCHOREMA

1. Posterior wing with apical forks 1, 2, 3 and 5..... **obliquum**
Posterior wing with apical forks 2, 3 and 5 only.....2
2. Cu_2 and 1A joined just above arculus (short cross vein in ♀ ; or contiguous for short distance in ♂)..... **gisbum**
 Cu_2 and 1A separate above arculus..... **urdalum**

Apsilochorema obliquum (Mosely)

Bachorema obliqua Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 494.—Neboiss, 1956, Nat. Mus. Vict., Mem. 21 : 84.

Apsilochorema obliqua, Ross, 1956, Evol. & Class. Mount. Caddis-flies : 124.

Type: ♂, National Park, Qld. 26. XII. 1921 (BMNH).

Plesioallotype: ♀ Kinglake West, Vic. em. 21. X. 1953, designated by Neboiss 1956 is now deposited in the Division of Entomology Museum, CSIRO Canberra.

In addition to previously recorded distribution it is now possible to add a number of new localities :

QUEENSLAND: Bunya Mts. (March); New South Wales: Styx River (Dec.); Brown Mt. (Jan.); Kangaroo Valley (March); Victoria: Bright (Jan.); Mt. Drummer (Dec.); Merrijig (collected at MV-light throughout the year); Tarra Valley, Gippsland (Oct.) one very large ♂, with anterior wing measuring 11 mm.

Apsilochorema gisbum (Mosely)

Bachorema gisba Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z. : 494.—Neboiss, 1956, Nat. Mus. Vict., Mem. 21 : 85.

Apsilochorema gisba, Ross, 1956, Evol. & Class. Mount. Caddis-flies : 124.

Type: ♂, Gisborne, Vic. 25. II. 1917 (BMNH).

Plesioallotype: ♀ Clunes, Vic 7. IX. 1953, designated by Neboiss 1956 is now deposited in the Division of Entomology Museum, CSIRO Canberra.

Numerous specimens collected during last few years have greatly extended the known range of this species; in addition to localities in central Victoria, it is now recorded from other states :

QUEENSLAND: Bunya Mts. (Feb.); Wyberba (March); New South Wales: Nundle (Apr.); Styx River (Dec.); Wellington (Oct.); Mt. Conobolas (Oct.); Upper Allyn River (Jan.); Minnamurra Falls (Nov.); Brown Mt. (Jan.); Upper Kangaroo Valley (Nov.); Canberra (June–Oct. MV-light trap); Victoria: Merrijig (Feb. Apr. Oct. MV-light trap); Chiltern (Aug.); Abbeyard (Jan.); Porepunkah (Jan.); Bacchus Marsh (Aug.); Stawell

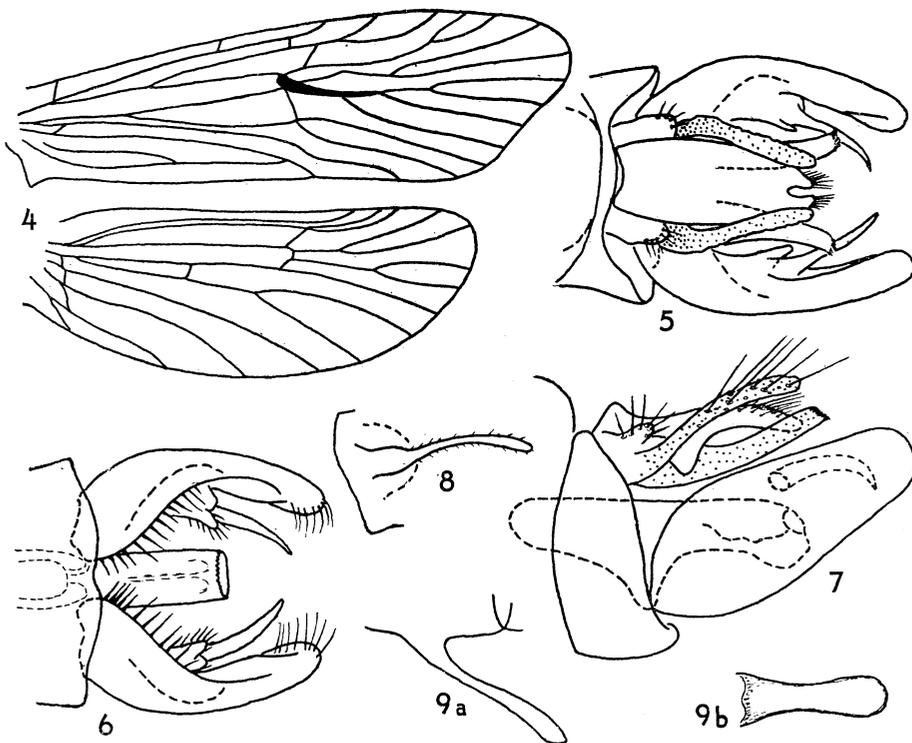
(Dec.); South Australia: National Park (Dec.); Blackwood (May, Oct.); Mambray Creek (Oct.); Tasmania: Ridgeway (May).

Similarly to *obliquum* this species also is found flying throughout the year.

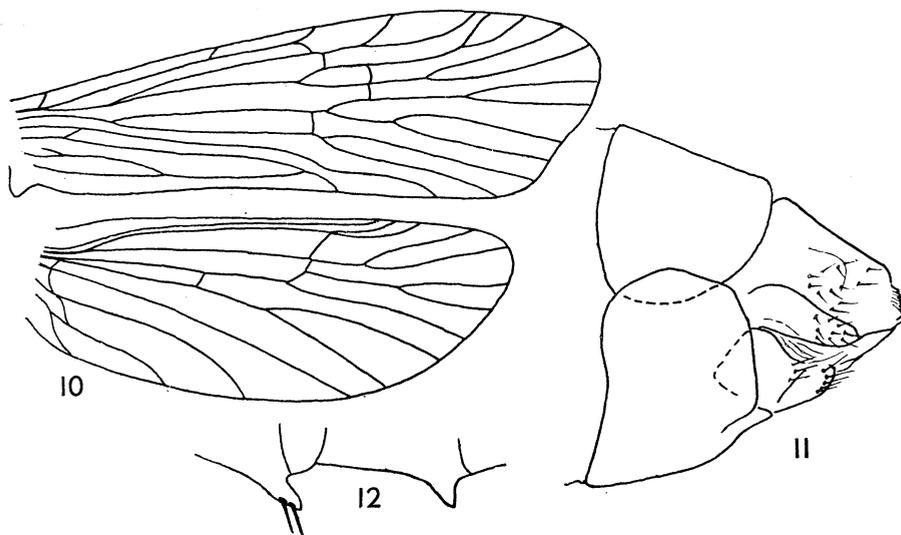
Apsilochorema urdalum Neboiss, n. sp. Figs. 4-12.

General appearance similar to but somewhat darker than *obliquum* and *gisbum*. Head, prothorax and metathorax black, covered with black hairs. Antennal segment 1 covered with semi-erect, other segment with decumbent black hairs. Palpi black, legs blackish brown, posterior tibia and femur yellowish brown. Anterior wings ochraceous, covered with black and whitish hairs; 2 small tufts of black and bright yellowish hairs, one just above arcus, other on 2A near anastomosis of 2A and 3A. In ♂♂ pencil of long white hairs on ventral surface of wing arising from basal end of pouch. Anterior wings in both sexes with forks 1, 2, 3, 4 and 5 present; fork 4 sessile in ♂; discoidal cell open in ♂, closed in ♀; Cu₂ above arcus not close to or joined with 1A. Posterior wings with forks 2, 3 and 5 present, all with footstalks.

♂ *genitalia*: Dorsal process elongate ovate with pair of tubercles near base, basal margin raised to distinct ridge, apex with narrow cleft; 2 long processes curved upward



Figs. 4-9. *Apsilochorema urdalum*, n. sp.: 4, ♂ wing venation; 5, ♂ genitalia dorsal; 6, ventral; 7, lateral; 8, lateral filament of segment 5; 9a, ventral process of sternite 7, lateral; 9b, ventral.



Figs. 10-12. *Apsilochorema urdalum*, n. sp.: 10, ♀ wing venation; 11, ♀ genitalia lateral; 12, ventral processes of sternites 5 and 6, lateral.

and outward arising on ventral margin basally. Superior appendages as long as dorsal process. Penis short and stout, middle ventral section produced downward to somewhat blunt triangular lobe. Inferior appendages broad, apex rounded, slender process curved downward and inward arising from inner margin at apical 1/2; row of stout spines situated along at basal 1/2 of ventral inner margin. Lateral filament on segment 5 slender, rather long, widened at base; slender part covered with short fine hairs. Moderately long spatulate ventral process on sternite 7.

♀ *genitalia*: Abdomen terminating in blunt somewhat triangular apex, and differing from other Australian species by somewhat flattened posterior margin of sternite 8 as shown in fig. 11. Short ventral processes on sternites 5 and 6 respectively, that of 5 being slightly larger and carrying several stout spines.

Length of anterior wing: ♂ 6-8 mm, ♀ 8-9 mm.

Type material: Holotype ♂, allotype ♀, Beedup Falls, W. A. 13. XI. 1958, E. F. Riek (CSIRO); 4 paratypes: 2 ♀♀, data as in holotype (CSIRO; NMV); 1 ♂, Kalamunda, W. A. 6. XI. 1958, E. F. Riek (NMV); 1 ♂, 15 mls. W of Pemberton, W. A. 13. XI. 1958, E. F. Riek (CSIRO).

DISTRIBUTION: SW Australia.

Name derived from aboriginal name "urdal", meaning "west", used by natives in SW Australia.

Genus *Allochorema* Mosely

Allochorema Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 491.—Ross, 1956, Evol. & Class. Mount. Caddis-flies: 124.

Type species: *Allochorema tasmanicum* Mosely (1953) (Original designation).

Easily distinguished from others in the subfamily by its characteristic wing venation. In anterior wing discoidal cell open, forks 1 and 2 very short; in posterior wing fork 1 absent, but fork 2 with long footstalk; venation similar in both sexes. Absence of dorsal plate in ♂ genitalia, and 2-segmented lateral filament on segment 5 are good characters of generic importance.

Wing venation of the new mainland species (*reclivatum*) is almost identical to that of the Tasmanian species (*tasmanicum*), except for the position of cross-vein m-cu closing thyridial cell in anterior wing, in *tasmanicum* it is closer to anastomosis of footstalk of fork 3 than in *reclivatum*. This character is still regarded as insufficient and unstable for specific separation, but differences in genitalia are found to be sufficient for this purpose. Discovery of this second species has provided very little additional evidence on phylogenetic position of the genus, and at this stage nothing new can be added to the discussion by Ross (1956).

KEY TO SPECIES OF ALLOCHOREMA

- Male: superior appendages short, not extending beyond apex of upper penis cover;
 ♀—posterior margin of sternite 8 uniformly convex, pair of stout lobes each with short, slender inwardly directed appendages not touching apically **tasmanicum**
 Male: superior appendages slender, extending beyond apex of upper penis cover; ♀
 —posterior margin of sternite 8 concave at center, lobes narrowed posteriorly, inwardly directed appendages touching apically **reclivatum**

Allochorema tasmanicum Mosely

Allochorema tasmanica Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 491, fig. 333.

Type: ♂, Mt. Wellington, 900 m, Tas. XII. 1937 (BMNH).

DISTRIBUTION: Tasmania.

No additional material studied.

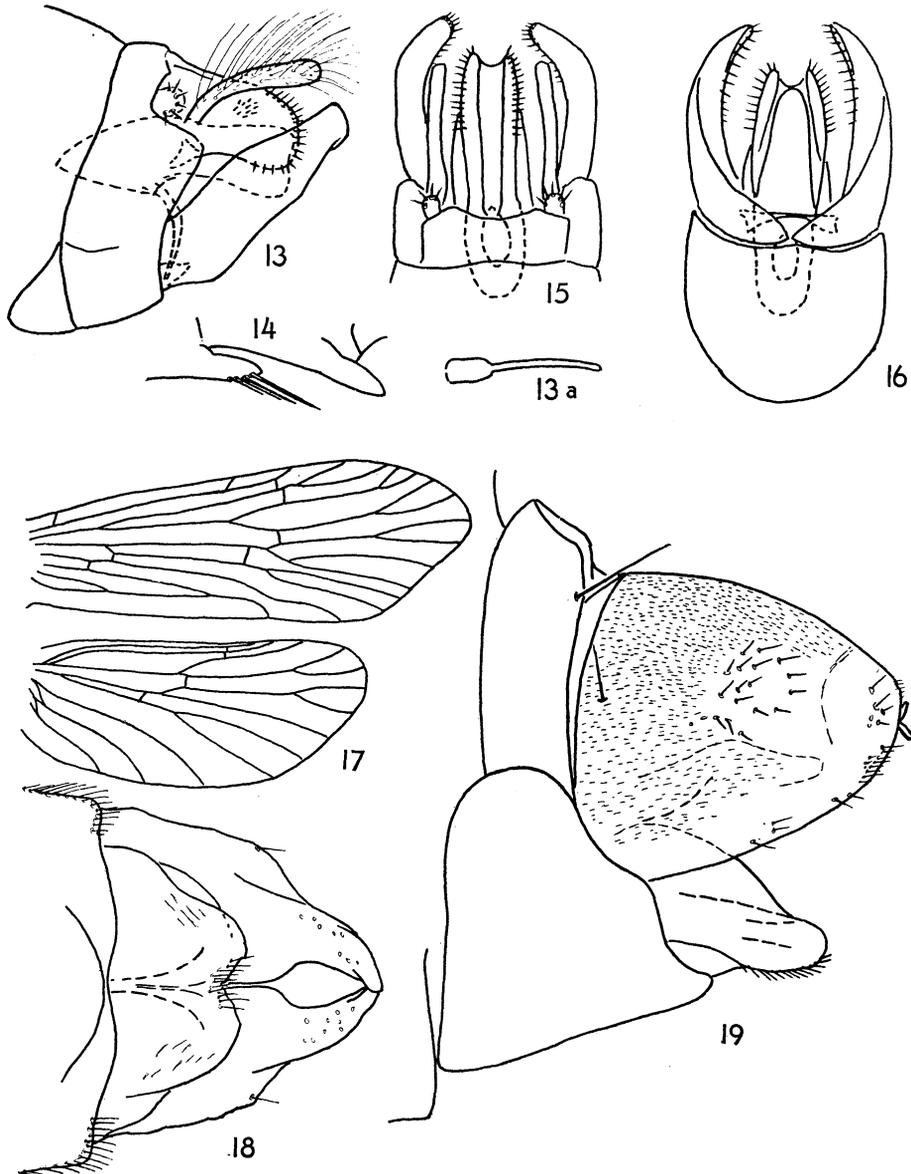
Allochorema reclivatum Neboiss, n. sp. Figs. 13–19.

Insect moderately small, yellowish to greyish brown, stigma very distinct, and much darker than the rest of wing, apically followed by distinct yellowish patch; extreme apex of anterior wing dark.

♂ *genitalia*: Principally follow that of *tasmanicum*, but differs in detail. Upper penis cover formed by pair of laterally flattened lobes which dorsally connected with transparent membrane, edges of lobes covered by row of short stout teeth. Superior appendages longer than in *tasmanicum*, slightly curved, densely covered with long hairs. Penis almost as long as upper penis cover, with only slightly broader base from beneath, apex rounded. Lower penis cover formed by pair of widely separated downturned lobes, thinly connected at their base. Inferior appendages robust, narrowed towards apex which is covered on inner surface with short, stout bristles. Short ventral processes on sternites 6 and 7, former with few stout hairs at apex.

♀: Abdomen terminates in comparatively large rounded apical segment; latter dense-

ly covered with fine, short, decumbent pubescence, a circular patch of stout bristles on either side, and ventrally a pair of posteriorly narrowed lobes, terminating in rather stout inwardly directed appendages. Tergite 8 narrow; corresponding sternite laterally somewhat triangular, ventrally with posterior margin concave at center. Short, pointed process



Figs. 13-19. *Allochorema reclivatum*, n. sp.: 13, ♂ genitalia lateral; 13a, lateral filament of segment 5; 14, ventral processes of sternites 6 and 7, lateral; 15, ♂ genitalia dorsal; 16, ventral; 17, ♀ wing venation; 18, ♀ genitalia ventral; 19, lateral.

on sternite 6, but slightly larger on sternite 5 bearing several stout hairs.

Length of anterior wing: ♂ ♀ 6 mm.

Type material: Holotype ♂, Clyde Mt. 730 m, N. S. W. 23. I. 1961, I.F.B. Common & M. S. Upton (CSIRO); allotype ♀, Cement Creek, nr. Warburton, Vic. 22. II. 1953, A. Neboiss (CSIRO) (in alcohol); 4 paratypes: 3♂♂, data as for holotype (BMNH; CSIRO; NMV); 1♂, Clyde Mt. N. S. W. 5. IV. 1960, E. F. Riek. (CSIRO).

DISTRIBUTION: S. New South Wales, Victoria.

Genus *Austrochorema* Mosely

Austrochorema Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 481.

Type species: *Austrochorema wentum* Mosely (1953) (Original designation).

Following the study of material accumulated in recent years, and placed under the name of *Austrochorema wentum*, it was noticed that specimens corresponding to the "variety" by Mosely (1953, p. 483) are quite uniform, and that a few other groups could be distinguished. Each of the above groups is now regarded as a separate species totalling six in all, the seventh species of the genus, *evansi*, being transferred from genus *Anachorema*, and presenting somewhat distinct characteristics, but agreeing favorably to the basic generic pattern of *Austrochorema*.

Main distinguishing characters of the genus *Austrochorema* are the open discoidal cell in anterior wing, and the sessile forks 1 and 2. In posterior wing forks 1, 2, 3 and 5 present, all with footstalks. Males with lateral filament on segment 5 long, apical section abruptly constricted, possibly 2-segmented. Ventral process present, on segment 7 in ♂♂, but on segment 6 in ♀♀.

KEY TO SPECIES OF AUSTRORCHOREMA (♂♂ only)

1. Inferior appendages with terminal segment shorter than basal segment **evansi**
 Inferior appendages with terminal segment longer than basal segment..... 2
- 2 (1). Terminal segment of inferior appendages with abruptly and broadly widened base 3
 Terminal segment of inferior appendages with gradually and only slightly widened base..... 4
- 3 (2). Superior appendages slender, curved, dilated at apex; penis sheaths with apices crossed, approximately of equal length **pegidion**
 Superior appendages short, rod-like, not dilated at apex; penis sheaths with one of the crossed apices very long upcurved, other short **alpinum**
- 4 (2). Posterior margin of sternite 9 without distinct process **nama**
 Posterior margin of sternite 9 produced to distinct process..... 5
- 5 (4). Process on sternite 9 very broad, angular at apex **patulum**
 Process on sternite 9 narrow, more or less rounded apex..... 6
- 6 (5). Basal segment of inferior appendages with posterior angle produced to long, acutely pointed tooth **concubium**
 Basal segment of inferior appendage with posterior angle produced to blunt rounded process **wentum**

***Austrochorema evansi* (Mosely), NEW COMBINATION**

Anachorema evansi Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 460; figs. 311, 312.

Detailed examination of characters given as means of separation from other former *Anachorema* species by Mosely (1953, p. 460) agree favorably to those found in genus *Austrochorema*, and therefore it is transferred to this latter position.

Anterior wing with forks 1 and 2 sessile, discoidal cell open, only hyaline streak simulates cross-vein, in other species of former genus *Anachorema* this cross-vein distinct. Posterior wing with forks 1, 2, 3 and 5 present, and all with footstalks; unlike former *Anachorema* species fork 2 is long with very short footstalk. In ♂ genitalia inferior appendages 2-segmented, terminal segment very short; penis sheaths present and asymmetrical. Long and possibly 2-segmented lateral filament on segment 5; ventral process on sternite 7. Female characters also resemble more closely those of *wentum* than any of former *Anachorema* species, particularly genitalia and small rounded processes formed by lateral margins of sternite 5; ventral process absent.

Type: ♂, Tasmania (without exact locality)—BMNH.

Length of anterior wing: (♂ ♀) 5 mm.

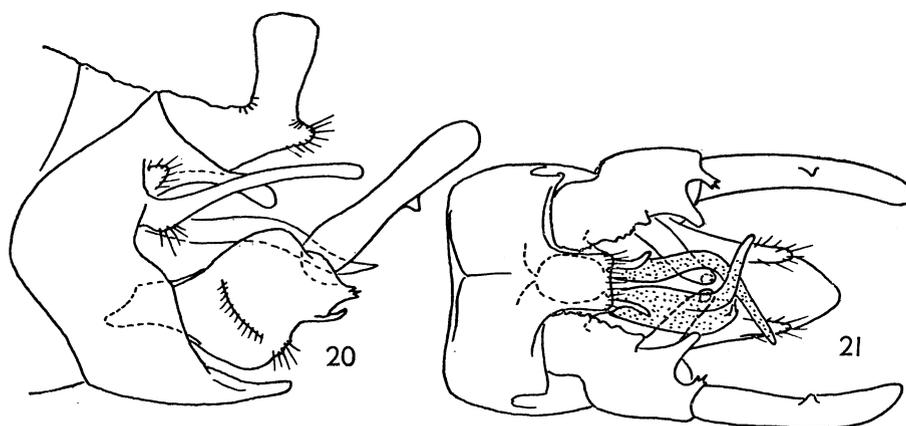
No new material has been available for study.

DISTRIBUTION: Tasmania.

***Austrochorema patulum* Neboiss, n. sp. Figs. 20-21.**

Insect of medium size, uniformly greyish brown in color, similar in general appearance to other species of *wentum* group. Male genitalia presents a number of very distinct features which allow easy separation on specific level.

♂ *genitalia*: Dorsal plate short, robust, apex turned upwards; pair of small tubercles at base. Upper penis cover robust, slightly downturned at apex, central apical cleft narrow. Superior appendages rather slender, slightly curved and widened ventrally at base. Penis obscure. Penis sheaths robust, approximately equal in length, apices pointed, turned



Figs. 20-21. *Austrochorema patulum*, n. sp.: 20, ♂ genitalia lateral; 21, oblique ventral posterior view.

inwards and crossing. Inferior appendages 2-segmented; proximal segment short, irregular in shape, ventral margin turned inwards irregularly dentate, apical margin 2 distinct processes, inner one with rounded apex, outer one with 3-cuspid apex; distal segment slightly depressed laterally, with short acute protuberance on dorso-ventral margin near middle. Sternite 9 produced to broad angular process, which has posterior margin slightly concave at center; spatulate process on sternite 7 and lateral filament on segment 5 both present, and somewhat similar to those of other species in this group.

♀: Unknown.

Length of anterior wing: (♂) 8 mm.

Type material: Holotype ♂, Tubrabucca, Barrington Tops, N. S. W. 8. I. 1956, R. Dobson (AM). 1♂ paratype, Barrington Tops, I. 1925, S. U. Zool. Exped. (AM).

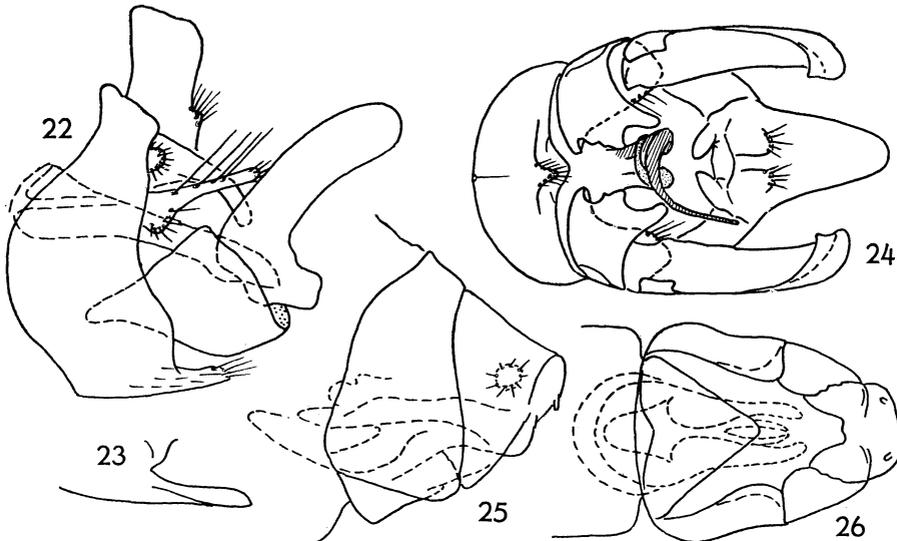
DISTRIBUTION: New South Wales.

Austrochorema alpinum Neboiss, n. sp. Figs. 22-26.

Austrochorema wenta variety Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 483, figs. 326 b, d.

Wing venation not separable from that of *wentum*, but differences are distinct in ♂ genitalia.

♂ *genitalia*: Dorsal plate short, stout, rounded at apex, pair of small tubercles at base. Upper penis cover more robust than in *wentum*, apices broad, bluntly rounded, and turned downwards. Superior appendages rod-like, dilated at base. Penis obscure. Penis sheaths slender, apices of different length, that on left side being much longer than that on right. Inferior appendages with proximal segment short, ventral margin turned inwards,



Figs. 22-26. *Austrochorema alpinum*, n. sp.: 22, ♂ genitalia lateral; 23, ventral process of sternite 7 lateral; 24, ♂ genitalia, oblique ventral posterior view; 25, ♀ genitalia lateral; 26, ventral.

irregularly dentate; distal segment elongate, lower margin at base forming somewhat angular lobe, apical ventral angle turned inwards and forming apically rounded tooth. Sternite 9 produced to distinct process; larger spatulate process on sternite 7.

♀ *genitalia*: As in figs. 25 and 26.

Length of anterior wing: (♂ ♀) 7–10 mm.

Type material: Holotype ♂, Tanjil Bren, Vic. 22. III. 1958, A. Neboiss (CSIRO); allotype ♀, Snobs Creek Falls, Vic. 15. XII. 1955, A. Neboiss (CSIRO); 7 ♂♂, 1 ♀ paratypes: 1 ♂, Snobs Creek, Vic. 26. III. 1958, A. Neboiss (CSIRO); 1 ♂, Timbertop nr. Merrijig, Vic. 12–20. IV, I. F. Edwards (BMNH); 3 ♂♂, 1 ♀ Timbertop nr. Merrijig, Vic. 5. VI. 1958, I. F. Edwards (AM; NMV) all the above specimens preserved in alcohol; 1 ♂, previously paratype of *Austrochorema wentum* Mosely, Mt. Kosciusko, N. S. W. 24. XI. 1921, R. J. Tillyard (BMNH), specimen referred in description as variety.

Other material examined: 1 ♂, 1 ♀, Clyde Mt. 730 m, N. S. W. 23. I. 1961; 1 ♀, 17. X. 1960 all collected by I. F. B. Common & M. S. Upton (CSIRO).

DISTRIBUTION: SE New South Wales, NE Victoria.

***Austrochorema pegidion* Neboiss, n. sp.** Figs. 27–28.

Similar in appearance to other species of *wentum* group, but differs in genitalia characters, and distribution limited to Tasmania.

♂ *genitalia*: Dorsal plate short, robust, with pair of distinct tubercles below it at base. Upper penis cover with apices narrow, rounded, central cleft small. Superior appendages long and slender, curved, apices slightly clavate, small rounded tubercles just above the base. Penis obscure; penis sheaths slender, crossing each other at apex, both of approximately equal length. Inferior appendages with proximal segment short and broad, ventral margin turned inwards, irregularly dentate; distal segment slender, abruptly widened to broad angular base. Posterior margin of sternite 9 produced to distinct process, rounded at apex; larger, spatulate process on sternite 7.

Length of anterior wing: (♂) 7 mm.

♀: Unknown.

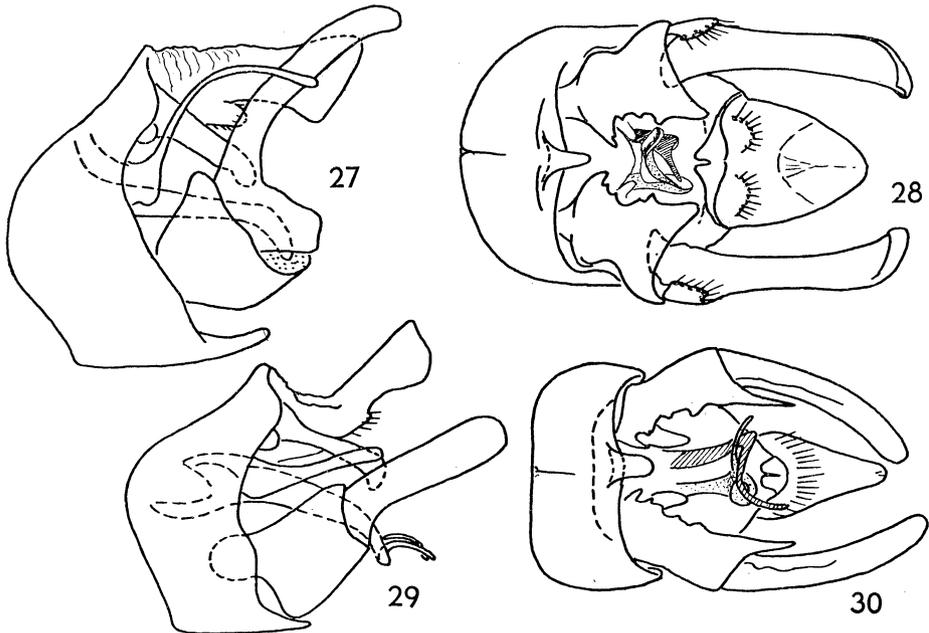
Type material: Holotype ♂, Broad River nr. Lake Dobson, Mt. Field National Park, Tas. 6. XI. 1955, T. E. Woodward (QM); 1 ♂ paratype, previously paratype of *Austrochorema wentum* Mosely, Mt. Wellington, Tas. II. 1938, J. W. Evans (BMNH).

DISTRIBUTION: Tasmania.

***Austrochorema concubium* Neboiss, n. sp.** Figs. 29–30.

In some respects very close to *alpinum*, and is found besides it in the same locality, nevertheless it is distinguished by much darker color, slightly smaller average size and distinctly formed genitalia.

♂ *genitalia*: Dorsal plate narrower than in *alpinum*, tubercles ventrally at base somewhat flattened and elongate. Upper penis cover with apices broadly rounded, central cleft narrow. Shape of superior appendages similar to *alpinum*, but somewhat more slender. Penis obscure; penis sheaths crossing each other at apex, both of approximately equal



Figs. 27-28. *Austrochorema pegidion*, n. sp.: 27, ♂ genitalia lateral; 28, oblique ventral posterior view. Figs. 29-30. *Austrochorema concubium*, n. sp.: 29, ♂ genitalia lateral; 30, oblique ventral posterior view.

length. Inferior appendages with proximal segment slightly longer than broad, ventral margin turned inwards, irregularly dentate, posterior angle produced to long acutely pointed tooth; distal segment elongate, rounded at apex and only slightly dilated at base. Posterior margin of sternite 9 produced to distinct process, rounded at apex; spatulate process on sternite 7 present.

Length of anterior wing: (♂) 8 mm.

♀: Unknown.

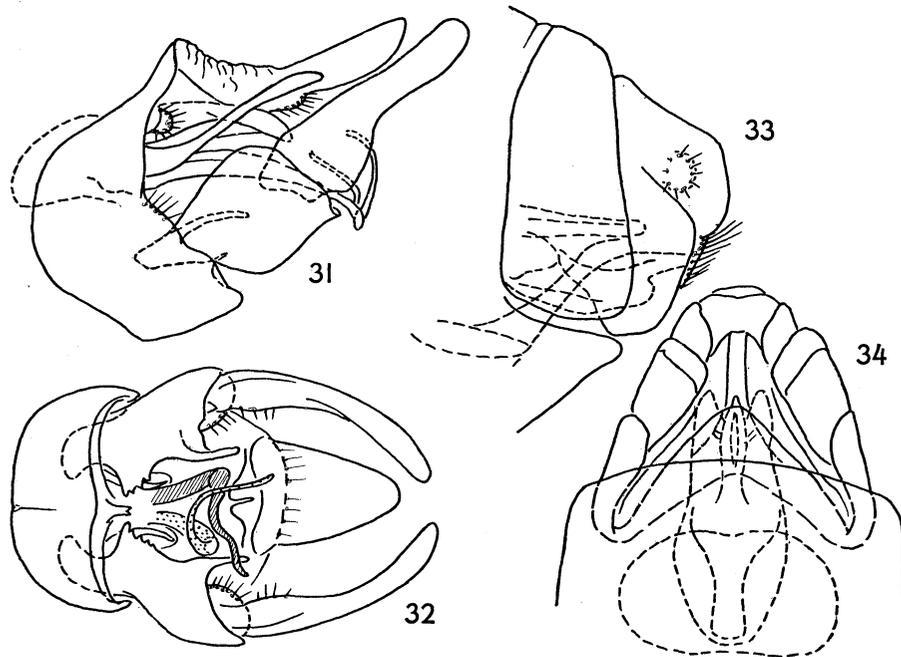
Type material: Holotype ♂, Timbertop nr. Merrijig, Vic. 5.VI.1958, I. F. Edwards (CSIRO); 2 ♂♂ paratypes, data as for holotype (CSIRO; NM; NMV); all specimens preserved in alcohol.

DISTRIBUTION: NE Victoria. (See Addendum, p. 581, for an additional new species).

***Austrochorema nama* Neboiss, n. sp. Figs. 31-34.**

Specific separation based entirely on genitalia characters, otherwise specimens similar to other species of *wentum* group.

♂ *genitalia*: Dorsal plate short, somewhat flattened gradually narrowed to rounded apex, pair of flattened tubercles ventrally at base. Upper penis cover with apices rounded, central cleft narrow. Superior appendages slender, slightly thickened at base and towards apex; small rounded tubercle just above base. Penis obscure; penis sheaths slender, crossing each other at apex, both of approximately equal length. Inferior appendages with



Figs. 31-34. *Austrochorema nama*, n. sp.: 31, ♂ genitalia lateral; 32, oblique ventral posterior view; 33, ♀ genitalia lateral; 34, ventral.

proximal segment short and broad; ventral margin turned inwards, basal section of latter dentate along margin, long pointed spine on the inside; posterior angle produced to slender, apically rounded process; distal segment slender, gradually widened towards base, apex rounded. Posterior margin of segment 9 slightly produced, but not forming a process, an additional bicuspid process on inner margin; spatulate process on sternite 7 present.

♀ *genitalia*: Terminal segment short, details as shown in figs. 33 and 34.

Length of anterior wing: (♂ ♀) 7-8 mm.

Type material: Holotype ♂, allotype ♀, Fourth Creek, nr. Adelaide, S. A. 2. II. 1952, A. Neboiss (CSIRO); 1 ♂ paratype Blackwood, S. A. 260 m (MV-light) 25. IX. 1956, N. B. Tindale (SAM). Other material examined: 3 ♂♂, 2 ♀♀, Clyde Mt. 730 m, N. S. W. and Canberra, A. C. T. (various dates) (CSIRO; NMV).

DISTRIBUTION: New South Wales, S. Australia.

Austrochorema wentum Mosely

Austrochorema wentum Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 481.

Type: ♂, Wentworth Falls, N. S. W. 18. XI. 1921, R. J. Tillyard (BMNH).

DISTRIBUTION: New South Wales.

No new material of this species has been available for study. The name *wentum* should be applied only to specimens identical with type ♂ and paratype ♀ from Wentworth Falls, N. S. W. Specimen described and figured by Mosely as variety of *wentum* (and label-

ed paratype of *wentum*) from Mt. Kosciusko, N. S. W is now bearing the name *alpinum*; and previous paratype ♂ of *wentum* from Mt. Wellington, Tas. is described in this paper as *pegidion*.

Genus *Ulmerochorema* Mosely

Ulmerochorema Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 432.

Anachorema Mosely, 1953, *ibid.* p. 453 **New Synonymy.**

Type species: *Hydrobiosis stigma* Ulmer (designated by Mosely, 1953).

Re-examination of type specimens of *stigma* showed narrow, hyaline area located from base of fork 2 across to fork 4; cross-vein present only in upper section, between R_5 and M_{1+2} , but in lower part between M_{1+2} and M_3 there is only a slight fold in wing membrane, thus median cell is open. Posterior wing clearly shows dark circular patch at base of forks 2 and 3. Anterior pair of legs has only 1 spur and spur formula for generic diagnosis should thus be changed to 1:4:4. The above characters supported by structure of ♀ genitalia, leave no doubt that genus *Anachorema* is synonymous to *Ulmerochorema*, a possibility already discussed by Ross (1956). It was also established that on grounds of differing wing venation, spur formula, structural differences in ♂ genitalia and characteristic lateral filament on segment 5 *Anachorema evansi* Mosely should be transferred to genus *Austrochorema*. The remaining 3 species of genus *Anachorema* (*breve*, *seona* and *tasmanicum*) described by Mosely, are now incorporated, together with 4 new species, in genus *Ulmerochorema*.

These changes necessitate amendment to generic diagnosis and a revised description is given hereunder:

Spurs 1:4:4. Anterior wing with discoidal cell closed; apical forks 1 and 2 sessile, 3, 4 and 5 with footstalk. Fork 1 in posterior wing sessile or with short footstalk, forks 2 and 3 with footstalks. In ♀♀ often dark circular patch consisting of mass of dark hairs, erect along veins, and located near apex of wing. Males with short, stout lateral filaments on segment 5; posterior margin of sternite 9 usually with long bifurcate process, latter reduced to pair of short triangular protuberances in *lentum*. In ♀♀ abdomen terminates into blunt apex, lateral pockets formed between segments 8 and 9 sometimes covered with short setae.

Distribution of genus *Ulmerochorema* limited to the eastern part of Australian continent and extends from N. Queensland to Tasmania.

KEY TO MALES OF ULMEROCHOREMA

(♂ of *luxaturum* unknown)

1. Footstalk of fork 2 in posterior wing very short..... **breve**
Footstalk of fork 2 in posterior wing long, as long or longer than fork itself..... 2
- 2 (1). Apical margin of sternite 9 with pair of short protuberances **lentum**
Apical margin of sternite 9 with long bifurcate process 3
- 3 (2). Process of sternite 9 forked along entire length, apical 1/2 ventrally finely serrate **seona**
Process of sternite 9 forked from about middle, not serrate..... 4

- 4 (3). Process of sternite 9 bulbose at base, tapering to long somewhat flattened apex **rubiconum**
 Process of sternite 9 gradually widened or almost parallel towards base 5
- 5 (4). Process of sternite 9 very long, extending beyond apex of inferior appendages **membrum**
 Process of sternite 9 not extending beyond apex of inferior appendages..... 6
- 6 (5). Upper penis cover with small inward and upward directed lobe on inner margin **tasmanicum**
 Upper penis cover without such lobe **stigma**

KEY TO FEMALES OF ULMEROCHOREMA

(♀ of *breve* unknown)

1. Anterior wings with freak cells on R₅ and M₂..... **luxatum**
 Anterior wings without such cells 2
- 2 (1). Posterior wings with dark circular patch near apex 3
 Posterior wings without such dark circular patch 6
- 3 (2). Lateral pockets between segments 8 and 9 deep..... 4
 Lateral pockets between segments 8 and 9 shallow.....5
- 4 (3). Sternite 8 with distinct transverse ventral ridge **rubiconum**
 Sternite 8 without such ridge..... **membrum**
- 5 (3). Terminal segments short and stout, patches of setae extend to 1/2 length of sternite 9 **stigma**
 Terminal segments narrow and more elongate, patches of setae extend to about 2/3 length of sternite 9..... **tasmanicum**
- 6 (2). Fork 1 in posterior wing with very short footstalk, or if sessile then on short distance only; no thickening of wing membrane between fork 1 and footstalk of fork 2..... **lentum**
 Fork 1 in posterior wing sessile with full width, oval thickening between fork 1 and footstalk of fork 2 **seona**

Ulmerochorema breve (Mosely), NEW COMBINATION

Anachorema brevis Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 456, fig. 308.

Distinct formation of ♂ genitalia, and complete absence of ventral processes together with extremely short footstalk of fork 2 in posterior wing almost give sufficient characters for erecting a separate genus, but as the ♀♀ are not yet known it was thought best to leave it in the present genus until more material is available.

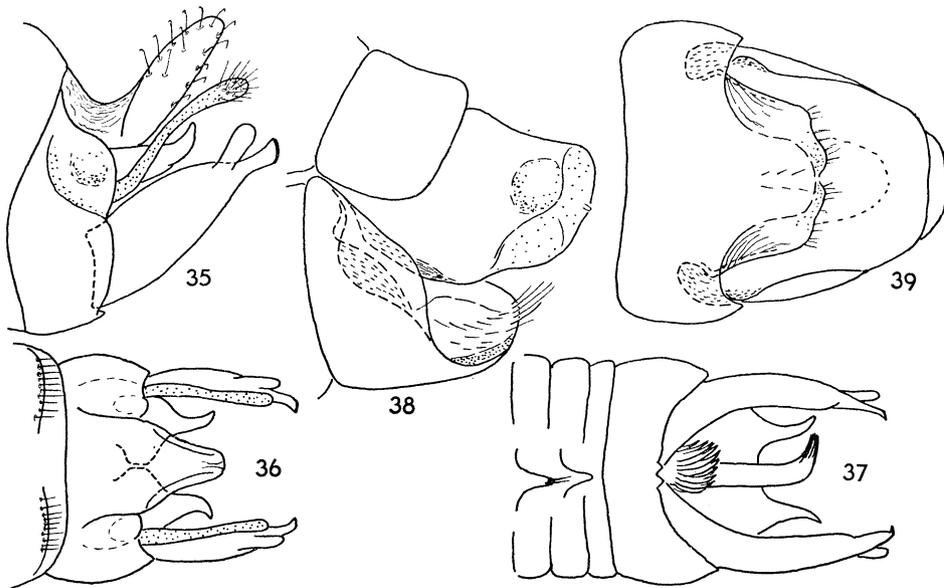
No new material has been available for study.

Type: ♂, Cradle Mts. 18. I. 1917 (BMNH).

DISTRIBUTION: Tasmania.

Ulmerochorema lentum Neboiss, n. sp. Figs. 35-39.

Insect of medium size. Head black with black and grey hairs. Antennal segment 1 almost black, remaining ones dark brown. Thorax and legs dark brown, maxillary palpi



Figs. 35-39. *Ulmerochorema lentum*, n. sp.: 35, ♂ genitalia lateral; 36, dorsal; 37, ventral; 38, ♀ genitalia lateral; 39, ventral.

darker than legs. Anterior wings blackish brown, venation similar to that in *stigma*, discoidal cell very short. Fork 1 in posterior wing with short footstalk; in ♀ circular patch of dark hairs absent.

♂ *genitalia*: Dorsal plate short, somewhat triangular, rounded at apex. Superior appendages about as long as inferior appendages, slightly clavate at apex. Upper penis cover formed by pair of plates, pointed and upcurved distally, broad at base. Penis slender with fringed laterally and ventrally pointing tip. Lower penis cover formed by small, heavily fringed 'plate.' Inferior appendages flattened somewhat bottle shaped from sides, proximal 2/3 broad, distal 1/3 narrow with flattened claw at end and short rod-like process arising from inner dorsal margin. Sternite 9 with 2 short, pointed, triangular protuberances at center. Ventral processes on sternites 6 and 7, of approximately equal size, but former with several stout spines.

♀ *genitalia*: Abdomen terminates in blunt somewhat rounded apex. Lateral pockets short rounded with small areas of short setae. Ventral plate short and broad. Ventral processes on sternites 5 and 6, that on 5 longer and bears several stout spines.

Length of anterior wings: (♂ ♀) 8-11.5 mm.

Type material: Holotype ♂, allotype ♀, Clunes, Vic. 9. VII. 1953 (pupa), em. 12. VII. 1953, A. Neboiss (CSIRO); 1 ♂, 1 ♀ paratypes, data as for holotype (NMV).

Further 25 specimens examined from Mt. Canobolas, N. S. W. and Canberra, A. C. T. all collected by Mr. E. F. Riek (BMNH; CSIRO; NMV).

Specimens collected April and from June to December.

DISTRIBUTION: New South Wales, Victoria.

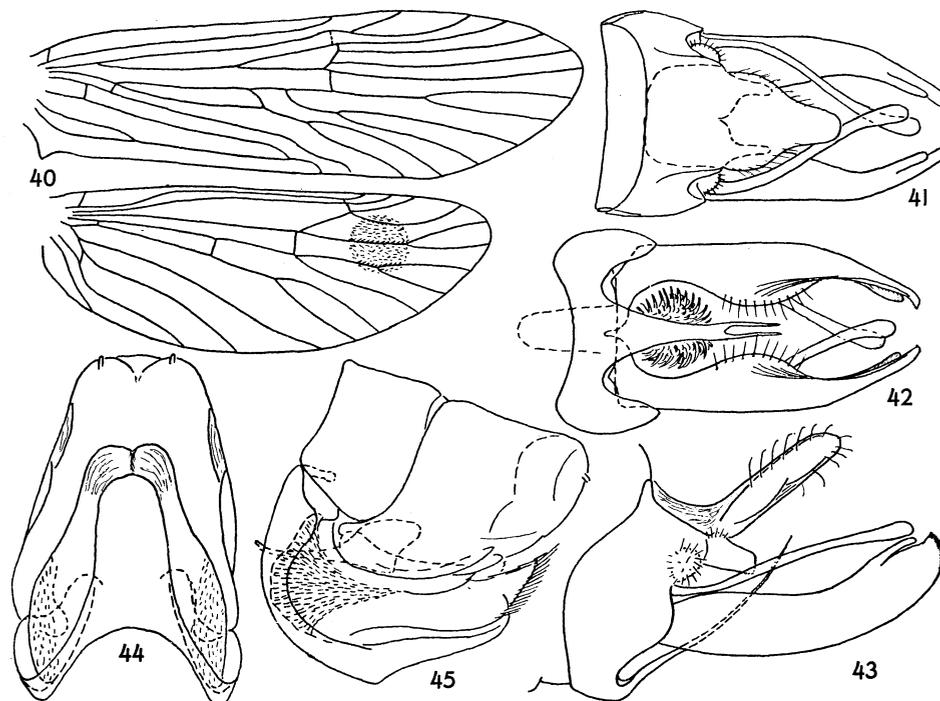
Ulmerochorema stigma (Ulmer) Figs. 40-45.

Hydrobiosis stigma Ulmer, 1916, Ark. f. Zool. 10: 2, figs. 1, 2.—Tillyard, 1924, N. Zeal. Inst., Trans. 55: 287.

Notiobiosis stigma Banks, 1939, Mus. Comp. Zool., Bull. 85: 499.

Ulmerochorema stigma Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 432, fig. 291.

For clarification of taxonomic position it was necessary to study the type specimen, which was kindly made available by the Naturhistoriska Riksmuseum, Stockholm. As a result of this examination it became clear not only that genus *Anachorema* is synonymous to *Ulmerochorema*, but that the type species—*stigma* is widely distributed and occurs from N. Queensland to SW Victoria. There is no additional material available from the type locality which is represented by single ♀—the type. Female specimens from Victorian localities appear to be identical except that fork 1 in posterior wing has short footstalk. Victorian ♀♀ are associated with ♂♂. To verify this interpretation it will be necessary to obtain and study ♂♂ from type locality. Description and figures of ♂ characters are given from specimen collected at Hopkins Falls near Warrnambool, Victoria. This specimen was forwarded to Mr. Kimmins who kindly compared it with type and paratypes of *tasmanicum* and arrived at the conclusion that it is specifically distinct from *tasmanicum* type but agreed favourably with 2 *tasmanicum* paratypes ♂ from Heathcote, N. S. W. which are not conspecific with *tasmanicum* type.



Figs. 40-45. *Ulmerochorema stigma* (Ulmer): 40, ♀ wing venation; 41, ♂ genitalia dorsal; 42, ventral; 43, lateral; 44, ♀ genitalia ventral; 45, lateral.

The otherwise excellent description of *stigma* is altered in only two points, namely the spur formula to 1 : 4 : 4, and the median cell in anterior wing as being open. Descriptions and figures of ♂ and ♀ genitalia are now added.

♀ *genitalia*: Distinguished from *tasmanicum* by smaller area of short setae which extends to only 1/2 length of sternite 9. Seen ventrally apex is almost rectangular. Ventral processes on sternites 5 and 6, that on 5 more pronounced, longer and carrying several stout spines.

♂ *genitalia*: Dorsal plate broad, somewhat bulbous at base, tapering abruptly to rounded apex, similar to but not as slender as in *tasmanicum*. Superior appendages long, slender, apices slightly clavate, small rounded tubercle above their base. Upper penis cover formed by 2 plates, inner margins forming wide U-shaped figure; seen laterally they are almost rectangular with slightly elevated tubercle and few hairs dorsally near base. Inferior appendages slightly narrower in lateral view, and teeth on inner surface less dense than in *tasmanicum*. Lower penis cover heavily fringed. Ventral processes on sternites 6 and 7, former larger and bearing several spines.

Length of anterior wings: (♂ ♀) 7-9.5 mm.

Type: ♀, Evelyne, Qld. Mjöberg (NRS).

Material examined: 32 ♂♂, 21 ♀♀; 1 ♂, Hopkins Falls, Hopkins River nr. Warrnambool, Vic. 19. I. 1953, A. Neboiss (NMV) specimen compared with *tasmanicum* paratypes—♂ genitalia drawn and description prepared. 1 ♂, 3 ♀♀, same locality; 19. I. 1953 and 28. X. 1955, A. Neboiss (NMV); 2 ♂♂, 2 ♀♀, Clunes, Vic. 6. I. 1956, A. Neboiss (NMV); 1 ♂, Greendale, Vic. 6. I. 1956, A. Neboiss (NMV); 1 ♂, Lal Lal Falls nr. Ballarat, Vic. 3. I. 1954, A. Neboiss (NMV); 1 ♂, Grampians, Vic. 1. X. 1954, A. Neboiss (NMV) (anomalous wing venation); 1 ♂, Wyberba Q. 27. III. 1957, E. F. Riek (CSIRO); 1 ♀, Wellington, N. S. W. 28. X. 1957, E. F. Riek (CSIRO); 24 ♂♂, 15 ♀♀, Canberra, A. C. T. (M. V. light trap) various dates throughout the year (AM; BMNH; CSIRO; NMV).

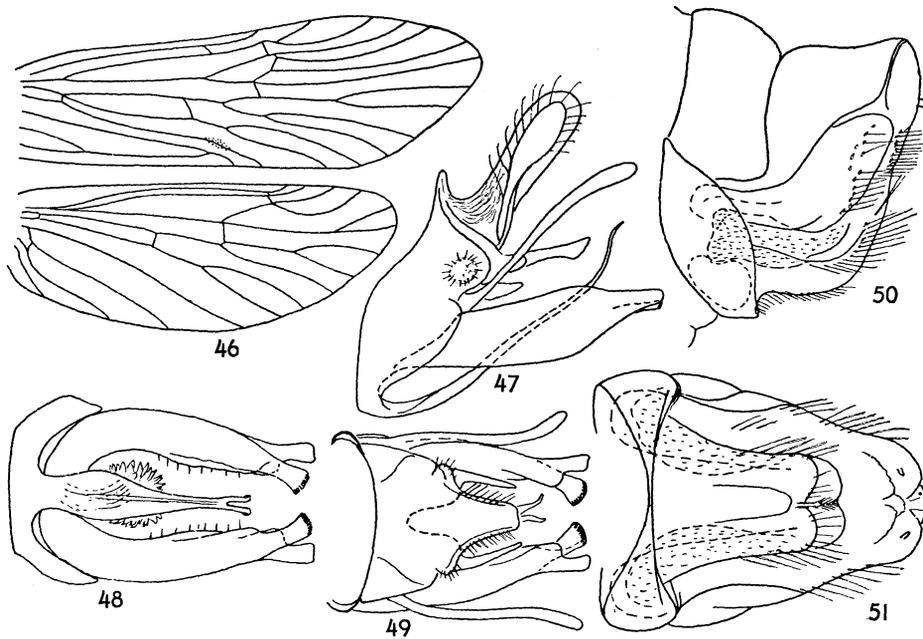
According to Kimmins (in litt.) here belongs also 2 ♂♂ (*Anachorema tasmanicum* Mosely, paratypes) Heathcote, N. S. W. 17. III. 1917 (BMNH).

DISTRIBUTION: Queensland, New South Wales, Victoria.

Umerochorema rubiconum Neboiss, n. sp. Figs. 46-51.

General appearance and color similar to other species of this group, wing venation as shown in fig. 46, fork 1 in posterior wing sessile.

♂ *genitalia*: Dorsal plate somewhat triangular, more or less gradually tapering towards rounded apex. Superior appendages slender, about as long as inferior appendages, distal ends slightly clavate, turned outward and downward. Upper penis cover formed by 2 pairs of lobes, dorsal one longer, depressed laterally, slightly extended downward at apex; ventral lobe short and pointed. Inferior appendages broad, narrowed distally and terminating in 2 lobes;—dorsal lobe turned outward and forming rounded lip on inner margin, ventral lobe of approximately same length and terminating with curved edge. Ventral process on sternite 9 long, flattened dorso-ventrally bifurcate at apex; proximal 1/2 somewhat bottle-shaped, distal 1/2 flat, ribbon-like, each furca tapering to pointed apex. Lower penis cover formed by heavily fringed plate. Short ventral process to sternite 7, larger one on 6 bears several spines.



Figs. 46-51. *Ulmerochorema rubiconum*, n. sp.: 46, ♂ wing venation; 47, ♂ genitalia lateral; 48, ventral; 49, dorsal; 50, ♀ genitalia lateral; 51, ventral.

♀ *genitalia*: Abdomen terminates into blunt apex. Lateral pockets short and rounded, covered with short setae. Ventral plate with distinct transverse ridge and thus very distinct from others in this genus.

Length of anterior wing: (♂♀) 7-10 mm.

Type material: Holotype ♂, Rubicon, Vic. pupa 15. XII. 1955, em. 2. I. 1956, A. Neboiss (CSIRO); allotype ♀, Rubicon Vic. pupa 15. XII. 1955 on 4. I. 1956, A. Neboiss (CSIRO); 17 ♂♂, 17 ♀♀ paratypes as follows; 1 ♀, data as for allotype (NMV); 2 ♂♂, Snobs Creek, Vic. 24. I. 1956, A. Neboiss (NMV); 1 ♂, Aberfeldy River Bridge, Vic. 5. IV. 1953, A. Neboiss (CSIRO); 1 ♀, Merrijig, Vic. 23. I. 1956, A. Neboiss (NMV); 5 ♂♂, 2 ♀♀, Porepunkah, Vic. 26. I. 1960, A. Neboiss (AM; BMNH; CSIRO; NHV); 9 ♂♂, 13 ♀♀, Timbertop nr. Merrijig, Vic. X. 1958 (M. V. light trap), I. F. Edwards (BMNH; CSIRO; NMV), all above specimens preserved in alcohol.

Over 250 additional specimens have been examined from various localities, but mainly from Timbertop nr. Merrijig where they were collected in M. V. light trap. Other localities include: New South Wales: Sawpit Creek, Kosciusco area; Canberra, A. C. T.; Victoria: Falls Creek, Bogong High Plains; Tasmania: Ouse River nr. Great Lake; Derwent River.

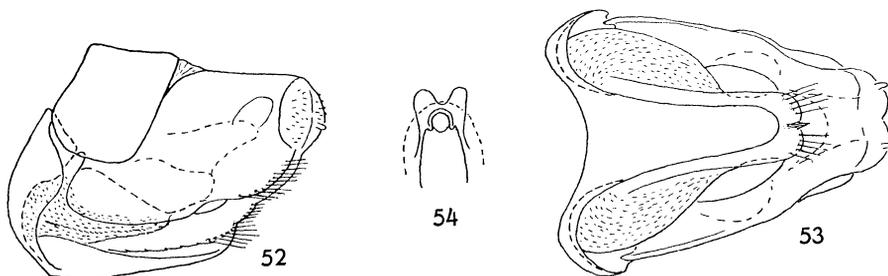
Specimens collected throughout the year.

DISTRIBUTION: New South Wales, Victoria, Tasmania.

Ulmerochorema tasmanicum (Mosely), NEW COMBINATION Figs. 52-54.

Anachorema tasmanica Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 453, figs. 306; 307.

On re-examination of types and paratypes of *tasmanicum*, Mr. Kimmins arrived at the conclusion that Mosely's paratypes from New South Wales are not conspecific with those from Tasmania. Material used for this study also did not contain any specimens of *tasmanicum* from anywhere else but Tasmania, and it could therefore be assumed that this species is restricted to that region.



Figs. 52-54. *Ulmerochorema tasmanicum* (Mosely): 52, ♀ genitalia lateral; 53, ventral; 54, vaginal structure, ventral.

This species is very close to *stigma*, but genitalia characters are sufficient to separate them on species level and genitalia of paratype ♀ from New Norfolk, Tasmania is illustrated in Figs. 52-54.

Type ♂: New Norfolk, Tas. III. 1938, J. W. Evans (BMNH).

Material examined: 1 ♂, Derwent River, Derwent Bridge, Tas. 1. IV. 1960, E. T. Smith (NMV); 1 ♂, Ouse River nr. Great Lake, Tas. 2. IV. 1960, E. T. Smith (CSIRO); both specimens preserved in alcohol.

DISTRIBUTION: Tasmania.

Ulmerochorema membrum Neboiss, n. sp. Figs. 55-60.

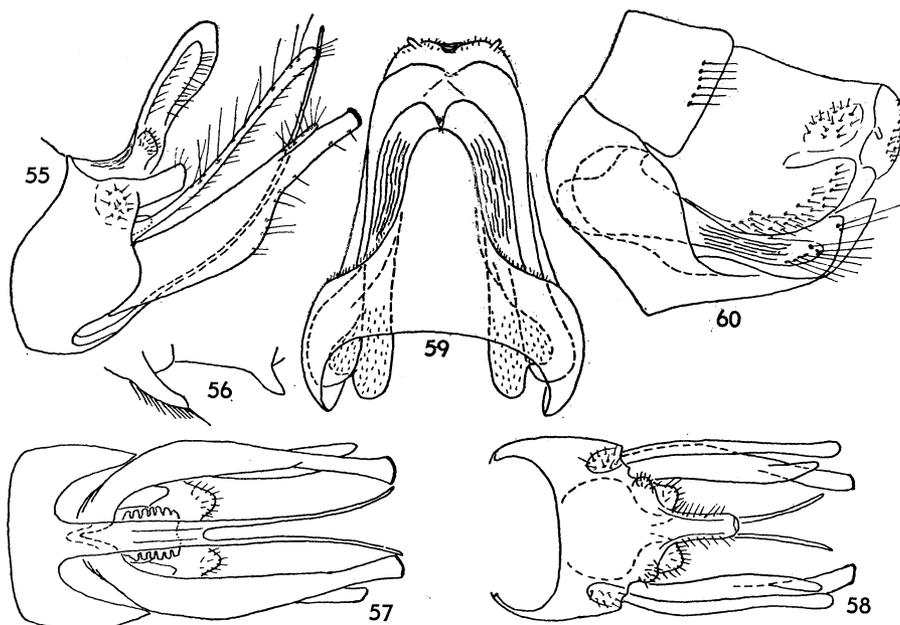
Insect in general appearance very similar to *stigma* and *lentum*, but differs in genitalia structures. Posterior wings in ♀♀ with circular patch of dark hairs near apex of wing.

♂ *genitalia*: Dorsal plate broad at base, then abruptly tapering to slender slightly clavate apex, as long as inferior appendages. Upper penis cover formed by a pair of stout rounded plates, laterally almost rectangular with pair of small lobes ventrally. Penis short, membranous. Inferior appendages broad proximally, narrowing from middle and ending in narrow bi-lobed distal section; dorsal lobes somewhat rod-like not reaching apex of appendages. Very long bifurcate ventral process on sternite 9, extending beyond apex of inferior appendages. Ventral processes on sternites 6 and 7 short, former slightly longer with several stout spines.

♀ *genitalia*: Abdomen terminates in a blunt apex, ventrally covered with rounded 'Y' shaped plate, above which a pair of elongate lateral plates showing distinct longitudinal grooves. Lateral pockets deep covered with short setae. Ventral process on sternite 5 with few stout spines, a shorter one without spines on sternite 6.

Length of anterior wing: (♂♀) 8-10 mm.

Type material: Holotype ♂, Merrijig, Vic. 15. VIII. 1958, I. F. Edwards (CSIRO); allotype ♀, same locality, X. 1958, I. F. Edwards (CSIRO); 25 paratypes: 12 ♂♂, 9 ♀♀,



Figs. 55-60. *Ulmerochorema membrum*, n. sp.: 55, ♂ genitalia lateral; 56, ventral processes of sternites 6 and 7, lateral; 57, ♂ genitalia ventral; 58, dorsal; 59, ♀ genitalia ventral; 60, lateral.

same locality, X. 1958; 1 ♂, 25. II. 1958; 2 ♂♂, 5. VI. 1958; all collected by I. F. Edwards (MV light) (AM; BMNH; CSIRO; NMV); 1 ♀, Lilydale distr. Vic. 3. VII. 1954, A. Neboiss (NMV), all type material preserved in alcohol.

Further 45 specimens examined from following localities: Queensland: Carnarvon Gorge; New South Wales: Childowlah, Canberra, A. C. T.; Victoria: Orbost, Abbeyards, Strathbogie, Whittlesea, Greendale.

Mr. Kimmins (in litt.) suggested that 4 ♂ paratypes of *Anachorema tasmanicum* Mosely from Heathcote, N. S. W., probably belong here.

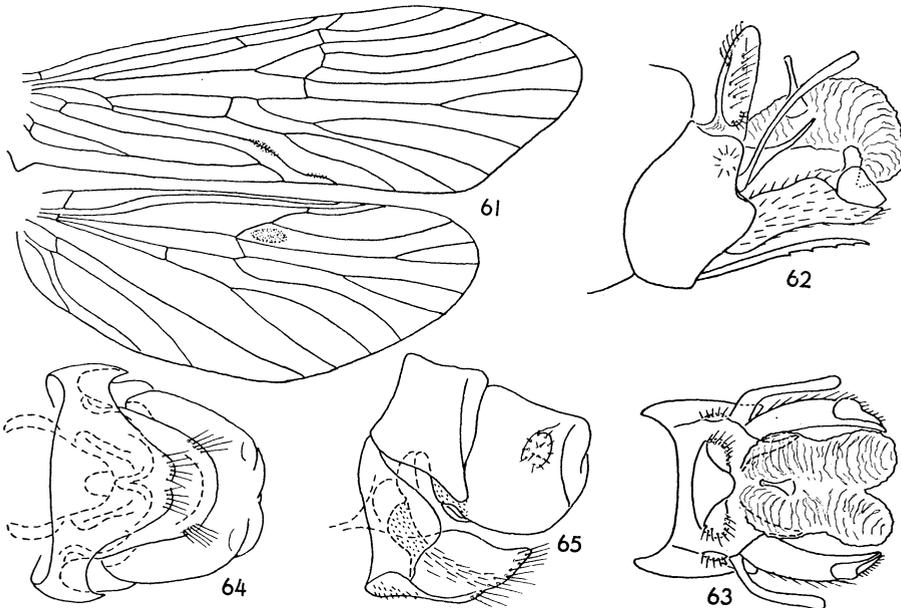
Specimens collected throughout the year.

DISTRIBUTION: Queensland, New South Wales, Victoria.

***Ulmerochorema seona*, (Mosely), NEW COMBINATION** Figs. 61-65.

Anachorema seona Mosely, 1953, In Mosely & Kimmins, Trich. Austr. & N. Z.: 458 figs. 309; 310.

Original description and figure 310 by Mosely & Kimmins (1953: 459) does not show fine dentation on spines arising from sternite 9 as was found to exist on all specimens from Australian mainland. Unfortunately type genitalia has been mounted on slide so that this particular character is not visible. Finally additional material from Tasmania showing similar dentation on ventral spines, settled doubts on specific identity. It is now possible to give a complete description of ♀ genitalia and record the distribution of spe-



Figs. 61-65. *Ulmerochorema seona* (Mosely): 61, ♀ wing venation; 62, ♂ genitalia lateral, showing expanded membranous sack; 63, dorsal; 64, ♀ genitalia ventral; 65, lateral.

cimens from as far north as Barrington Tops, N. S. W. In process of making ♂ genitalia preparations, under certain conditions leading to building up of osmotic pressure, dorsal part of penis was greatly enlarged to membranous sack (Figs. 62 & 63) figured specimen from Mason's Falls, Kinglake Nat. Park, Vic. 15. II. 1953, but not every specimen tested gave similar results as usually this part is folded and appears as wrinkled dorsal membrane.

♀ *genitalia*: Abdomen terminates in blunt, rounded apex, ventral plate short and broad; lateral pockets small, covered with fine setae. Wing venation similar to that of ♂. In posterior wing an oval thickening of wing membrane located between fork 1 and footstalk of fork 2. Figures and description of ♀ from specimen collected at Mason's Falls, Kinglake National Park 15. II. 1953.

Length of anterior wing: (♂ ♀) 5-8 mm.

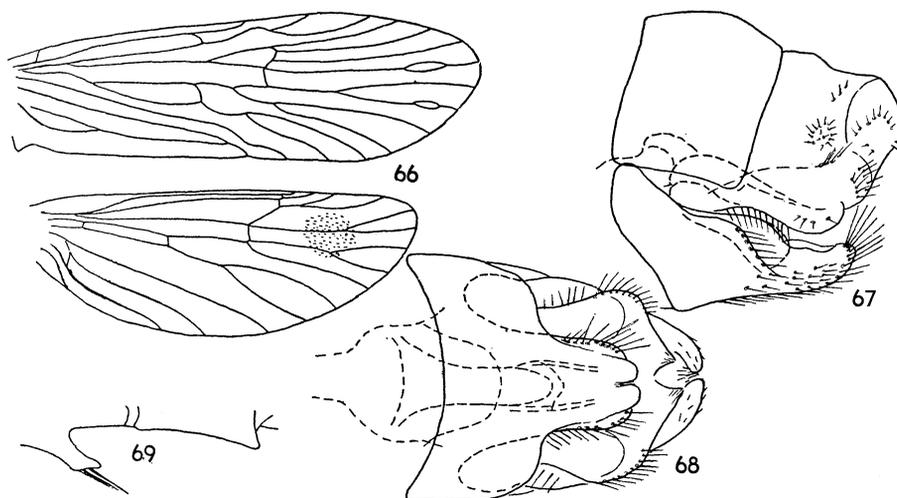
Type: ♂, River Ouse, Tas. 4. II. 1933 (BMNH).

Material examined: 70 specimens (♂ ♀) from following localities: New South Wales: Barrington Tops; Sawpit Creek, Kosciusco area; Victoria: Porepunkah, Aberfeldy, Merrijig, Noojee, Glenburn, Rubicon, Healesville, Warburton, Gould, Tarra Valley, Grampians. Tasmania: Derwent River.

DISTRIBUTION: New South Wales, Victoria, Tasmania.

***Ulmerochorema luxatum* Neboiss, n. sp. Figs. 66-69.**

General characteristics of wing venation and ♀ genitalia tentatively places this species in genus *Ulmerochorema*, but a decision on its true taxonomic position should be withheld until discovery of ♂♂. In anterior wings there are freak additional cells on R₅ and M₂,



Figs. 66-69. *Ulmerochorema luxaturum*, n. sp.: 66, ♀ wing venation; 67, ♀ genitalia lateral; 68, ventral; 69, ventral processes of sternites 5 and 6 lateral.

somewhat similar to those found in *Dolochorema irregularis* Banks from Peru, but otherwise venation is normal for the genus. Posterior wings with circular patch of dark hairs present. Female genitalia also follows main characteristics of the genus, but differs in detail as shown in Figs. 67 & 68. Ventral plate broad at base, abruptly tapering from middle to distal section which is only 1/2 width of base. Lateral pockets short and broad, not reaching basal margin of ventral plate. Ventral processes on sternites 5 and 6, former larger with several stout hairs.

Length of anterior wing: (♀) 6.5 mm.

♂: Unknown.

Type material: Holotype ♀, Upper Nariel, nr. Corryong, Vic. 29. I. 1957, A. Neboiss (CSIRO), specimen preserved in alcohol.

DISTRIBUTION: NE Victoria.

Genus *Megogata* Neboiss, n. gen.

Type species: *Megogata necopina*, n. sp.

Spurs 2 : 4 : 4. Wing venation regular and, except for anterior wing of ♀ with 2 additional cross-veins c-sc and sc-r, similar in both sexes. Anterior wing with discoidal cell closed, forks 1, 2, 3, 4 and 5 present, first 2 sessile, others with footstalk. Posterior wing with forks 1, 2, 3 and 5 present, fork 2 sessile, others with footstalk; cross-vein m-cu convex, although not as strongly as in *Psyllobetina*. The much narrower head distinguishes this genus from *Tanjilana* which could be difficult to separate by the very similar wing venation. Male genitalia presents rather unusual form and differs considerably from pattern found in other Australian genera; dorsal plate of segment 9 hoodshape, inferior appendages reduced to short rectangular lobes and considerably recessed. In ♂ ventral process on sternite 7 very long, broad and flat; lateral filament on segment 5 present; in

♀ short, flat and somewhat triangular ventral process on sternite 6, but only thickened ridge on sternite 5.

It is not yet possible to place this genus with certainty; wing venation is somewhat similar to that of *Taschorema*, but some head structures suggest an affinity with *Allochorema*.

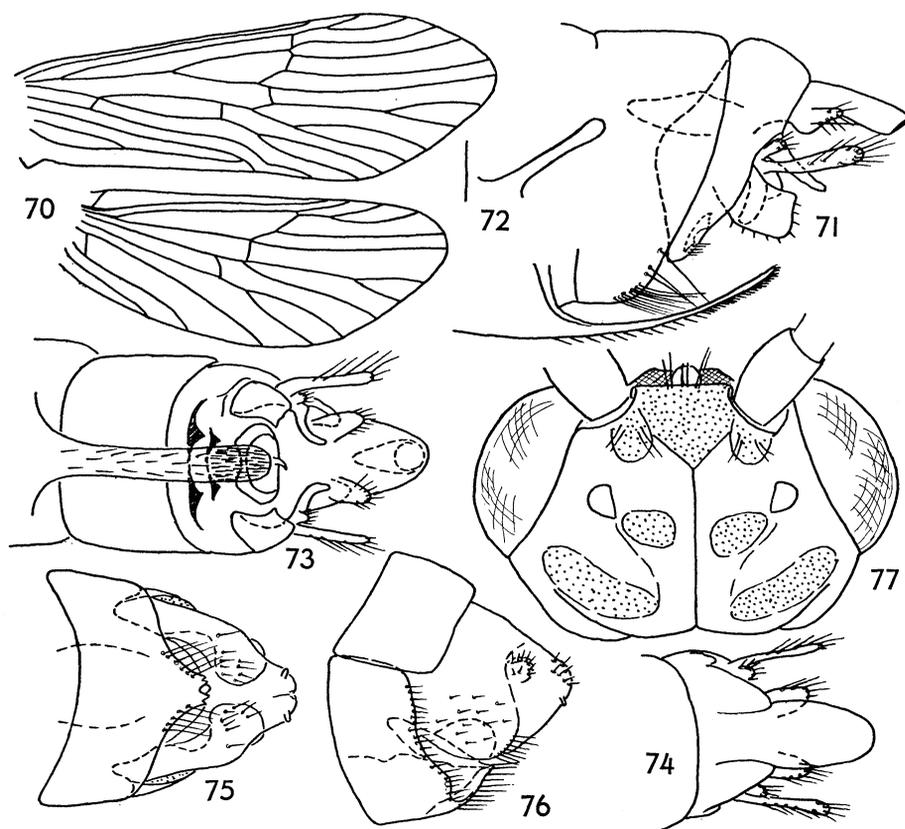
Only one species of this genus so far has been discovered.

The generic name is derived from an aboriginal word "megog" meaning "rock."

Megogata necopina Neboiss, n. sp. Figs. 70-77.

Insect of moderate size, yellowish brown, neither wings nor legs present any distinct color pattern.

♂ *genitalia*: As in generic description, but with following additional details. The hood-like dorsal plate of segment 9 with pair of elongate lobes at base; superior appendages about same length as dorsal plate, with small rounded tubercle dorsally at base. Upper penis cover bent downward at apex and encircling penis, latter thin, flattened later-



Figs. 70-77. *Megogata necopina*, n. sp.: 70, ♂ wing venation; 71, ♂ genitalia lateral; 72, lateral filament of segment 5; 73, ♂ genitalia ventral; 74, dorsal; 75, ♀ genitalia ventral; 76, lateral; 77, ♀ head dorsal.

ally, apex bent downward. Inferior appendages short, somewhat rectangular, in between and below them 2 pairs of short triangular projections. Ventral process on sternite 7 very long, apically covered with dense, short hairs.

♀ *genitalia*: As illustrated in figs. 76 & 77 with rather narrow and pointed lateral pockets; ventral plate with apical V-shaped incision.

Length of anterior wing: (♂ ♀) 7 mm.

Type material: Holotype ♂, Cement Creek, nr. Warburton, Vic. 22. II. 1953, A. Neboiss (CSIRO); allotype ♀, Cement Creek, nr. Warburton, Vic. 26. III. 1958, A. Neboiss (CSIRO), both specimens preserved in alcohol.

DISTRIBUTION: Victoria.

Genus *Tanjilana* Neboiss, n. gen.

Type species: *Tanjilana akroreia*, n. sp.

Spurs 2 : 4 : 4. Wing venation similar to that of *Taschorema* and *Megogata*, but distinguished from former by absence of cell like structure between Cu_2 and 1A in posterior wing of ♂♂, from the latter by position of cross-vein m-cu in posterior wing as shown in fig. 3, and by distinctly shorter and wider head.

Anterior wing with closed discoidal cell in both sexes, forks 1, 2, 3, 4 and 5 present, only first 2 sessile others with footstalk; cross-veins s-sc and sc-r just above discoidal cell. Posterior wing with forks 1, 2, 3 and 5 present, only fork 2 sessile, sometimes with an additional cross-vein r_4-r_5 thus enclosing extra cell; other forks with footstalks; cross-vein m-cu straight, with posterior end sloping proximally. Male genitalia characters present similarities to genus *Taschorema*, but differ in detail. Lateral filaments on segment 5 present. Ventral processes short, on sternites 6 and 7 in ♂, on sternites 5 and 6 in ♀.

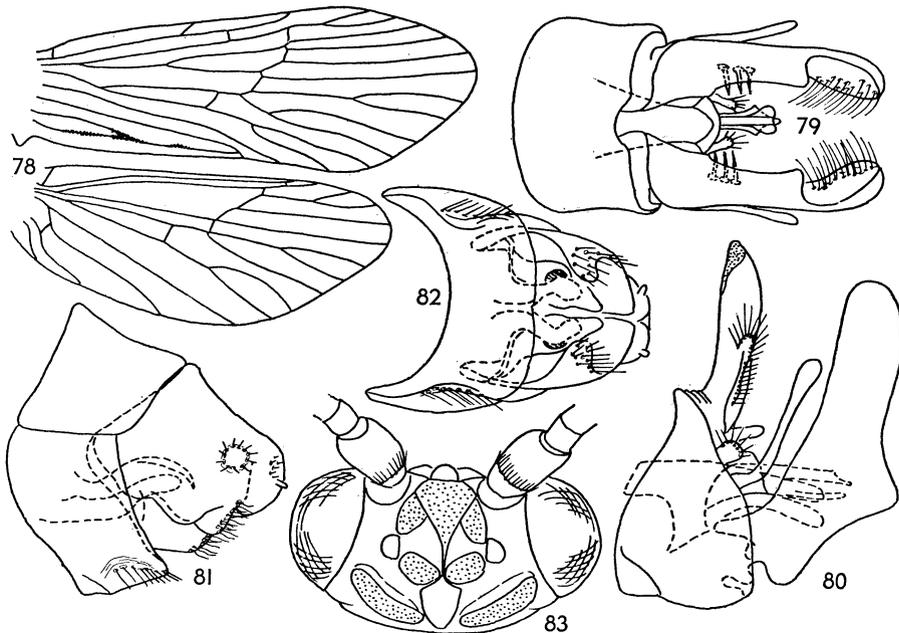
KEY TO SPECIES OF TANJILANA

- Male: inferior appendage without long finger-like process on inner upper margin; ♀:
 posterior wing fork 2 normal, without cross-vein r_4-r_5 **akroreia**
 Male: inferior appendage with long finger-like process on inner upper margin; ♀:
 posterior wing fork 2 with cross-vein r_4-r_5 enclosing additional cell **zothecula**

Tanjilana akroreia Neboiss, n. sp. Figs. 78-83.

Insect of moderate size, uniformly greyish brown, each tarsal segment of all 3 pairs of legs with darker band; head comparatively short and broad.

♂ *genitalia*: Dorsal plate of segment 9 upcurved, short lateral lobes on either side at middle; distal margin of sternite 9 with distinct concave incision at center. Upper penis cover formed by 2 small processes. Superior appendages moderately long, slender, apices clavate; short rounded tubercle at base. Penis of distinct shape, with dorsal section 3-cuspid, ventral section flattened and somewhat spatulate at apex; penis sheaths rod-like, flattened laterally; lower penis cover somewhat flattened, dilated and turned downward at apex. Inferior appendages large, with distinct lobe on ventral margin, apex rounded, inner surface with several long, robust spines on posterior 1/3, and long fine hairs on



Figs. 78-83. *Tanjilana akroreia*, n. sp.: 78, ♂ wing venation; 79, ♂ genitalia ventral; 80, lateral; 81, ♀ genitalia lateral; 82, ventral; 83, ♂ head dorsal.

distal end. Lateral filament on segment 5 very thin, slightly clavate at apex. Ventral processes on sternites 6 and 7, that on 6 slightly larger with several stout spines near apex.

♀ *genitalia*: Lateral lobes on segment 9 distinct, turned inwards ventrally, lateral pockets present. Ventral processes on sternites 5 and 6 present, that on 5 slightly longer with several stout spines near apex.

Length of anterior wing: ♂ 9.5-10 mm; ♀ 10-11 mm.

Type material: Holotype ♂, Tanjil Bren, Vic. 22. III. 1958, A. Neboiss (CSIRO); allotype ♀, Cement Creek nr. Warburton, Vic. 22. II. 1953, A. Neboiss (CSIRO); 3 paratypes: 1♂, Cement Creek nr. Warburton, Vic. 26. III. 1958, A. Neboiss (CSIRO); 2♀♀, Cumberland Falls nr. Marysville, Vic. 16. II. 1958, A. Neboiss (CSIRO; NMV); all above specimens preserved in alcohol.

DISTRIBUTION: E. Central Victoria.

***Tanjilana zothecula* Neboiss, n sp. Figs. 84-90.**

Insect of moderate size, anterior wings with dark brown to greyish brown and yellowish mottling. Head and thorax dark grey-brown, paler beneath; legs yellowish grey, with patches of greyish on femorae and tibiae. Wing venation in ♀ differs from that in ♂ only by having an additional cross-vein between R_4 and R_5 in posterior wing, thus forming an extra cell at base of fork 2, otherwise venation similar in both sexes.

♂ *genitalia*: To some extent resembles that of *Taschorema hesperium*, but differs in detail. Dorsal plate short and broad with pair of distinct lobes on either side. Upper

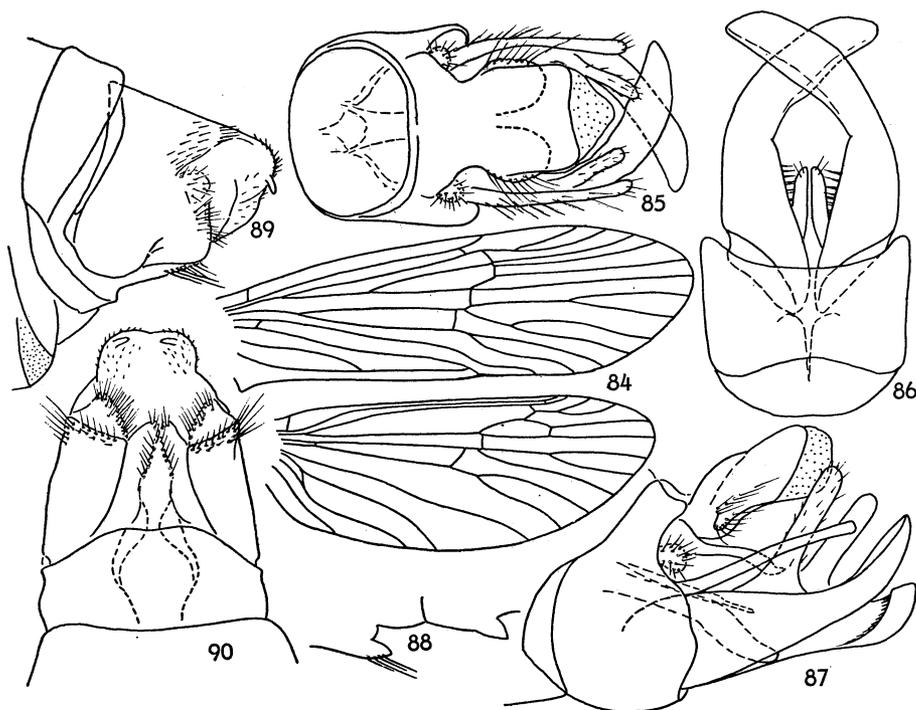
penis cover slender, slightly curved, apex somewhat flattened dorso-ventrally, twisted laterally and turned upwards. Superior appendage long, slender, almost reaching as far as apex of dorsal plate; short rounded tubercle above base. Penis thin, rod-like tapering to fine thread-like apex; lower penis cover formed by pair of lobes, which are turned downwards and rounded at apex. Inferior appendages rather robust turned inwards and upwards, crossing over at apical 1/3, large finger-like process arising from inner upper margin and directed upwards, inner surface near base with group of strong spines. Lateral filament on segment 5 short, rod-like; ventral processes on segments 6 and 7 short, former only slightly longer, with several stout hairs, latter 2× as broad, chisel-like.

Details of ♀ genitalia as shown in Figs. 89 & 90, lateral pockets absent, ventral processes present on sternites 5 and 6, in their form similar to those in ♂.

Length of anterior wing: ♂ 8–8.5 mm; ♀ 8.5–9.5 mm.

Type material: Holotype ♂, allotype ♀, Canberra, A. C. T. 14. IX. 1959, E. F. Riek (CSIRO); 6 paratypes: 2♂♂, 1♀, data as in holotype (CSIRO; NMV); 1♀, Canberra, A. C. T. 5. XI. 1957, E. F. Riek (CSIRO); 2♀♀, Canberra, A. C. T. 18. XI. 1960, E. F. Riek (BMNH; CSIRO).

DISTRIBUTION: Australian Capital Territory.



Figs. 84–90. *Tanjilana zothecula*, n. sp.: 84, ♀ wing venation; 85, ♂ genitalia dorsal; 86, ventral; 87, lateral; 88, ventral processes of sternites 6 and 7, lateral; 89, ♀ genitalia lateral; 90, ventral.

Genus *Taschorema* Mosely

Taschorema Mosely, 1936, Zool. Soc. Lond., Proc. 1936: 422.—Mosely & Kimmins, 1953, Trich. Austr. & N.Z.: 434.—Kimmins, 1959, Ent. Monthly Mag. 95: 184.

Notiobiosis Banks, 1939, Mus. Comp. Zool., Bull. 85: 499.—Mosely & Kimmins, 1953, Trich. Austr. & N.Z.: 434 (partim).

Type species: *Taschorema asmana* Mosely (1936) (Original designation).

Only a few remarks should be added to the description of genus as published by Mosely & Kimmins (1953); all new species described in this paper fit well within generic limitations. Apex of anterior wing not always acute, e. g. *hesperium*; radius usually forked (except in *rugulum*). Posterior wings with forks 1, 2, 3 and 5 present (except *pallescens*, where fork 1 usually absent; although specimens with partly or fully developed fork 1 are known). In ♂♂ a narrow cell-like structure between Cu_2 and 1A, usually close to the latter, and sometimes even disfiguring it; in most species androconia of battledore or spatulate shape present on 2A and 3A; patches of various scale-like hairs in some species present on upper or lower wing surface. Lateral filaments on abdominal segment 5 present or absent according to species.

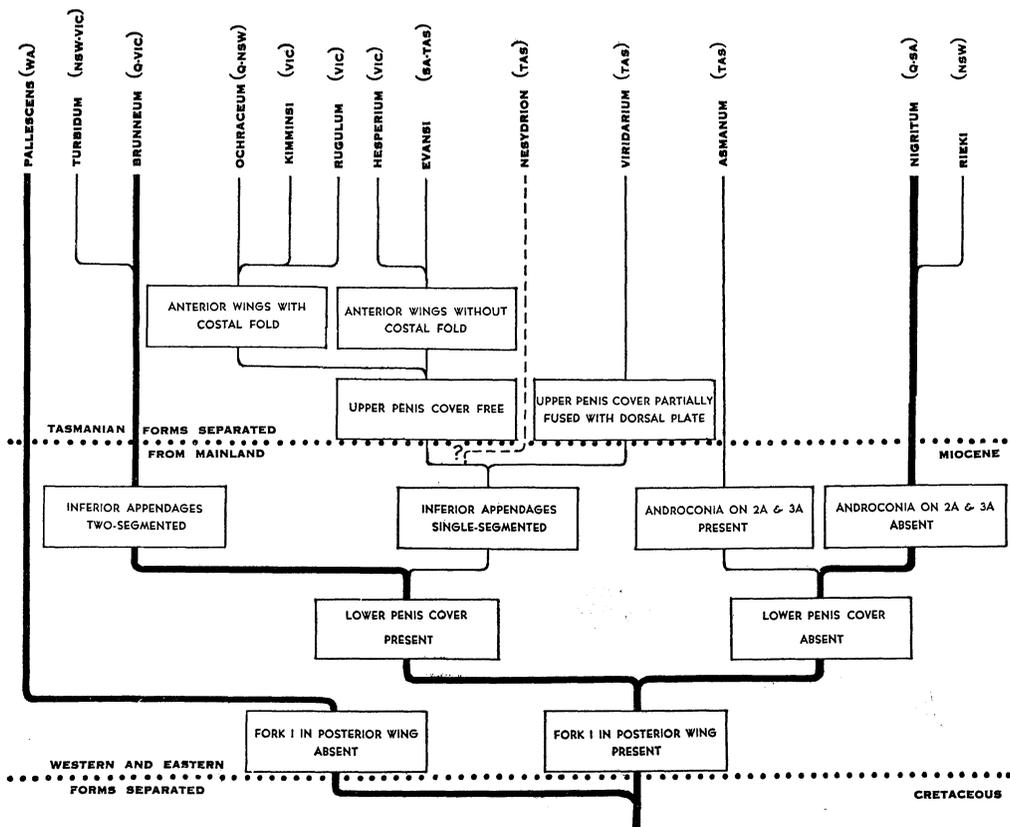


Fig. 91. Diagram showing possible phylogenetic relationships of the species of the genus *Taschorema*. Heavy lines indicate major lines of development.

This genus with distinctive ♂ characters is easily separated from other Australian genera, and now contains 13 species. However it is expected that the number could increase considerably when more collecting is done in suitable localities.

Possible phylogenetic relationships are shown in Fig. 91. One branch became isolated in W. Australia early in history of the genus, and developed distinctive characteristics (*pallescens*), losing fork 1 in posterior wing, and developing 2-segmented lower penis cover. Those located in eastern parts of the continent developed along 2 major lines. First the *nigritum* group, characterized by the absence of lower penis cover, and has only 3 known, closely related, species; the other—*brunneum* group, characterized by presence of lower penis cover, finally produced the majority of species. The position of *nesydrium* is doubtful because ♂ is as yet unknown.

KEY TO SPECIES OF TASCHOREMA

1. Fork 1 in posterior wing absent.....**pallescens**
Fork 1 in posterior wing present, and with footstalk..... 2
- 2 (1). Fork 1 in anterior wing sessile..... 3
Fork 1 in anterior wing with footstalk 9
- 3 (2). Lower penis cover absent 4
Lower penis cover present 6
- 4 (3). Upper penis cover in form of simple pair of plates..... **asmanum**
Upper penis cover more complicated, formed by 2 pairs of branched processes... 5
- 5 (4). Inferior appendages apically broadened and excised, not flattened dorso-ventrally **rieki**
Inferior appendages apically rounded, flattened dorso-ventrally **nigritum**
- 6 (3). Upper penis cover at apex forming distinct hook 7
Upper penis cover not forming hook 8
- 7 (6). Inferior appendages slender, longer than dorsal plate, without ventrally directed lobe..... **rugulum**
Inferior appendages about same length as dorsal plate, distinct, ventrally directed lobe near apex..... **kimminsi**
- 8 (6). Ventral process on sternite 7 short..... **evansi**
Ventral process on sternite 7 very long **viridarium**
- 9 (2). Anterior wing with footstalk of fork 1 very short, about same length or shorter than cross-vein closing discoidal cell..... **hesperium**
Anterior wing with footstalk of fork 1 at least 3× longer than cross-vein closing discoidal cell 10
- 10 (9). In ♀ ventral process on sternites 5 and 6 absent..... **nesydrium**
In ♀ ventral process on sternites 5 and 6 present..... 11
- 11 (10). Ventral process on sternite 6 in both sexes moderately long **ochraceum**
Ventral process on sternite 6 in both sexes very short 12
- 12 (11). Lower penis cover without lateral spines..... **brunneum**
Lower penis cover with 1 large and several small lateral spines **turbidum**

Taschorema pallescens (Banks) Figs. 92–99.

Notiobiosis pallescens Banks, 1939, Mus. Comp. Zool., Bull. 85: 499, fig. 40.—Mosely &

Kimmins, 1953, Trich. Austr. & N. Z.: 445, fig. 300.

Taschorema pallescens, Kimmins, 1959, Ent. Monthly Mag. 95: 184.

General description and colors as given by Banks in the original description were repeated by Mosely & Kimmins (1953), and are unnecessary for inclusion here; more attention is given to provide accurate figures of wing venation and genitalia.

Anterior wing presents 2 interesting points; fork 1 sessile and usually narrow, in ♂ its base lies on cross-vein R_1-R_2 just above discoidal cell, whereas in ♀ it lies on cross-vein closing discoidal cell; Cu_2 with sharp rounded angle just above arculus. Posterior wings with fork 1 absent in both sexes, although specimens are found where this fork is present on one side only or indicated with short incomplete branch of R_2 , in ♂ cell-like structure between Cu_2 and 1A small, battledore androconia on 2A and 3A present, oval patch of small semi-erect, clubbed rod-like hairs on upper surface of wing between Cu_1 , 1A and distally of cell-like structure.

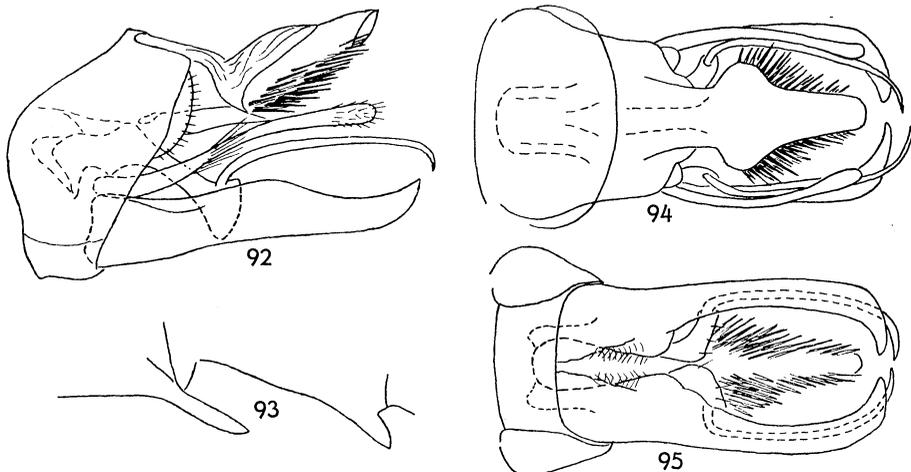
♂ *genitalia*: Dorsal plate in dorsal view somewhat pear-shaped, ventral surface covered with strong spines. Upper penis cover in form of 2 small lobes close to dorsal plate. Superior appendages long, rather robust, middle section slightly thinner, with band of long stiff hairs. Penis short and retracted. Lower penis cover formed by pair of plates widened at apex, long, down and inward curved spine (or segment 2) arising from dorsal margin. Inferior appendage slender, distal end turned inwards and pointed. Ventral processes on sternites 6 and 7, former slightly longer.

♀ *genitalia*: Abdomen terminates in somewhat triangular apex, structure show in Figs. 98 & 99. Ventral processes on sternites 5 and 6, former larger.

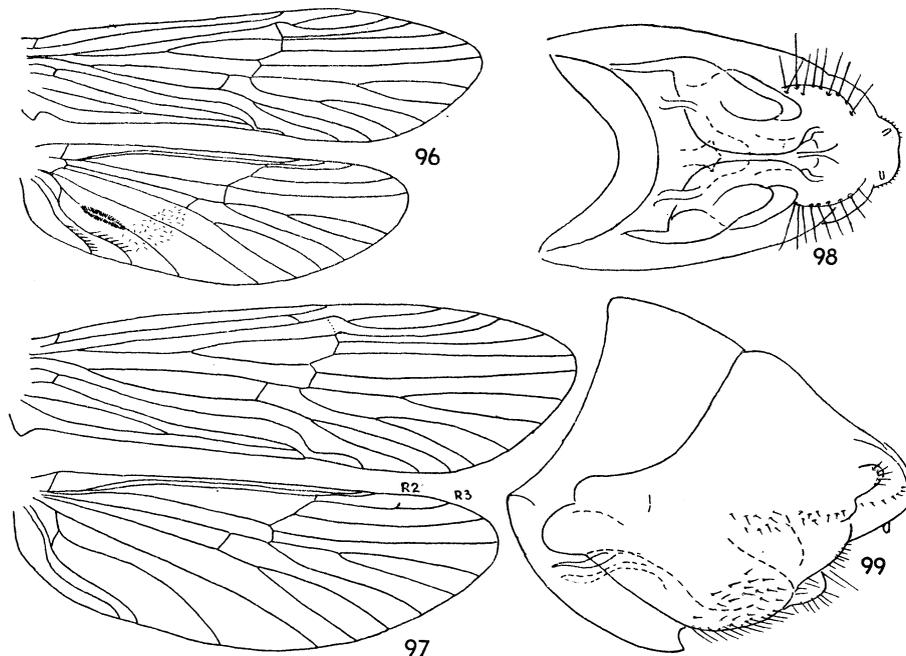
Length of anterior wings: (♂ ♀) 7-10.5 mm.

Type: ♀, Pemberton, W. A. 19. XI. (MCZ).

Material examined: 69 specimens—16 ♂♂, 2 ♀♀, 12 mls. E. Harvey, W. A. 8. XI. 1958, E. F. Riek; 2 ♂♂, 1 ♀, 8 mls. S Margaret River, W. A. 11. XI. 1958, E. F. Riek;



Figs. 92-95. *Taschorema pallescens* (Banks): 92, ♂ genitalia lateral; 93, ventral processes of sternites 6 and 7 lateral; 94, ♂ genitalia dorsal; 95, ventral.



Figs. 96-99. *Taschorema pallescens* (Banks): 96, ♂ wing venation; 97, ♀ wing venation; 98, ♀ genitalia ventral; 99, lateral.

1 ♂, Blackwood River, W. A. 12. XI. 1958, E. F. Riek; 8 ♂♂, 1 ♀, 15 mls. W of Pemberton, W. A. 13. XI. 1958, E. F. Riek; 23 ♂♂, 10 ♀♀, Beedelup Falls, W. A. 13. XI. 1958, E. F. Riek; 3 ♂♂, Nornalup, W. A. 17. XI. 1958, E. F. Riek; 2 ♀♀, 15 mls. NW Walpole, W. A. 15. XI. 1958, E. F. Riek (AM; BMNH; CSIRO; NMV; SAM).

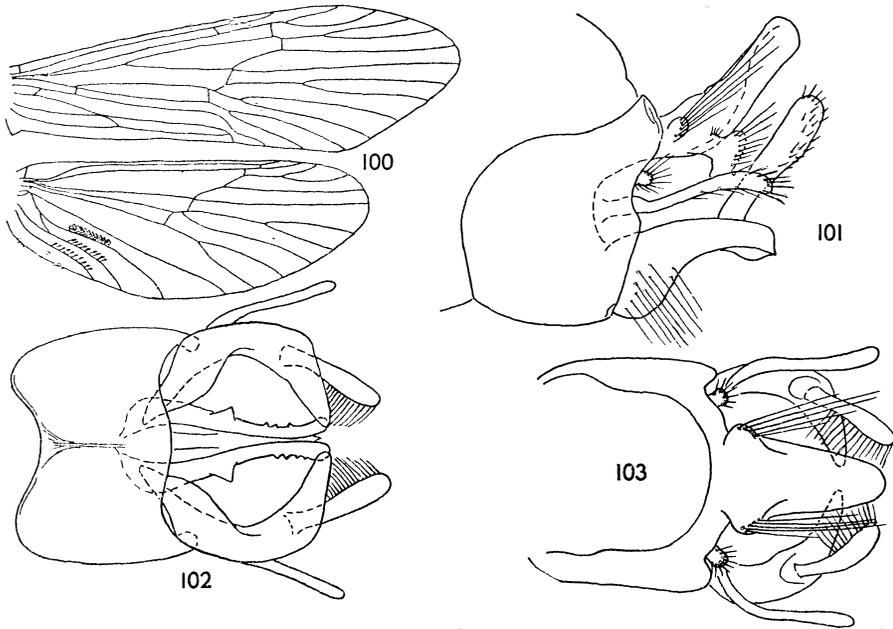
Present descriptions and figures prepared from specimens collected at Beedelup Falls.

DISTRIBUTION: SW Australia.

***Taschorema turbidum* Neboiss, n. sp.** Figs. 100-106.

Insect yellowish to greyish brown, mottled with pale yellowish, of medium size. Very similar to *brunneum*, from which it is separated only by distinctly formed genital characters, and slightly larger average size. Wing venation in both sexes alike, except for sex marks on ♂ posterior wings.

♂ *genitalia*: Dorsal plate rather narrow, broader proximally, gradually narrowing distally to rounded apex; pair of flat rounded lobes at base with very long hairs. Superior appendages slender, slightly clavate, small rounded tubercle at base. Upper penis cover similar to that in *brunneum*. Penis straight, enveloped by lower penis cover; latter formed by pair of slightly curved rods armed with few small spines near apex and larger one closer to base. Inferior appendages 2-segmented, proximal segment broad at base, curved inwards to almost right angle and gradually tapering, distal segment straight, directed upwards, slightly clavate. Posterior margin of sternite 9 slightly convex at center. Lateral filament on segment 5 present. Small pointed ventral process on sternite 7, longer one on



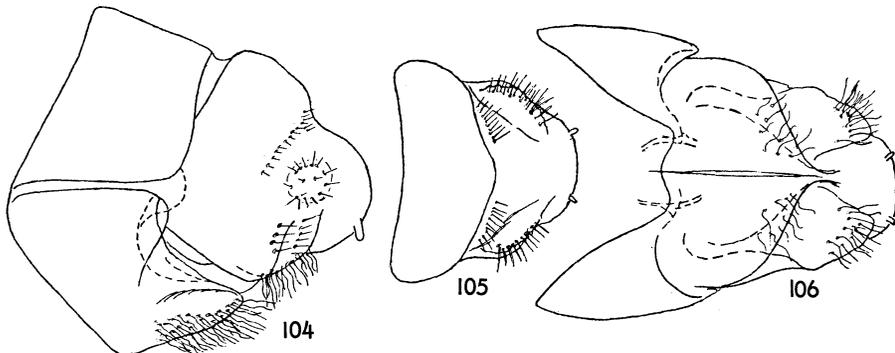
Figs. 100-103. *Taschorema turbidum*, n. sp.: 100, ♂ wing venation; 101, ♂ genitalia lateral; 102, ventral; 103, dorsal.

6 covered ventrally with number of short spines.

♀ *genitalia*: Abdomen terminates into blunt rounded apex. Dorsal plate sharply depressed in middle thus forming definite transverse ridge, posterior angles broad, somewhat flattened. Ventral plate broad, covered with long hairs. Small pointed ventral process on sternite 6, longer one on sternite 5.

Length of anterior wing: (♂ ♀) 11-15 mm.

Type material: Holotype ♂, Timbertop nr. Merrijig, Vic. 5. VI. 1958, I. F. Edwards (CSIRO); allotype ♀, Timbertop nr. Merrijig, Vic. 16-27. IX. 1958, I. F. Edwards (CSIRO);



Figs. 104-106. *Taschorema turbidum*, n. sp.: 104, ♀ genitalia lateral; 105, dorsal; 106, ventral.

20♂♂, 14♀♀, paratypes: 3♂♂, 1♀, Porepunkah, Vic. 26. I. 1960, A. Neboiss (NMV); 1♂, Timbertop nr. Merrijig, Vic. 15. I. 1958; 3♂♂, 3♀♀, 16–25. II. 1958; 2♂♂, 1♀, 25. III. 1958; 7♂♂, 12–20. IV. 1958; 1♀, 5. VI. 1958; 3♂♂, 16–27. IX. 1958; 1♂, 7♀♀, 2. X. 1958; 1♀, 11. XI. 1957. (AM; BMNH; CSIRO; NMV) (preserved in alcohol).

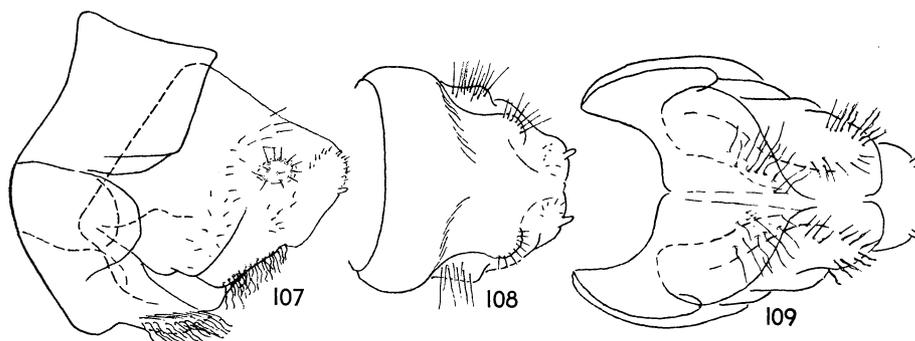
Further 42 specimens examined from above localities and 2♂♂, 1♀ from Brown Mt. N. S. W. 18. I. 1961, E. F. Riek (CSIRO). Specimens have been collected throughout the year.

DISTRIBUTION: New South Wales, NE Victoria.

Taschorema brunneum Mosely Figs. 107–109.

Taschorema brunnea Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 436 (♂ not ♀).

The original description as published by Mosely (1953) in a composite one. Section describing ♂ characters from type specimen is the only part which refers to *brunneum*, whereas section describing ♀ characters refers to a Tasmanian species which is described in the following pages as *Taschorema viridarium*.



Figs. 107–109. *Taschorema brunneum*, Mosely: 107, ♀ genitalia lateral; 108, dorsal; 109, ventral.

This species is closely related to *turbidum*, and particularly ♀♀ are very difficult to separate, but generally *brunneum* is slightly smaller in size and more distinctly mottled. In ♂ lower penis cover rod-like, truncate at apex, but otherwise smooth; inferior appendages proximal branch with apex bent inwards at right angle, sinuous, short and broad; apical margin of sternite 9 produced into broad triangular lobe.

♀ genitalia: Description and figures of ♀ genitalia are prepared from specimen collected at Bunya Mts. Qld., and associated with ♂♂ which fully agree with description.

Abdomen terminates in blunt somewhat rounded apex, ventral plate broad and rounded, dorsal plate depressed on sides only, posterior angles produced in small rounded warts. Short pointed ventral process on sternite 6, longer one on sternite 5. Wing venation similar to that in ♂.

Length of anterior wing: (♂♀) 8–13.5 mm.

Type: ♂, Queensland National Park, 900 m, 22. XII. 1921 (BMNH).

Material examined: 46 specimens from following localities: Queensland: Wyberba,

Bunya Mts. ; Carnarvon Ranges ; New South Wales : Mt. Canobolas, Rosebank, Upper Allyn River, Brown Mt., Canberra ; Victoria : Merrijig, S. Morang, Clunes, Ballan, Greendale.

Specimens collected from September to March and in June, but probably under favorable conditions present throughout the year.

DISTRIBUTION: Queensland, New South Wales, Victoria.

Taschorema ochraceum Mosely

Taschorema ochracea Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 440, figs. 298, 299.

Comparison of paratype ♀ from National Park, Queensland, with paratype ♀ from Cradle Mt. Tasmania, showed that they are not conspecific, the latter being specifically distinct, and is now described as *Taschorema nesydrion*. Mosely's figure of ♀ genitalia (Mosely & Kimmins, 1953, fig. 299) has been prepared from Queensland specimen and therefore refers correctly to *ochraceum*. Following this discovery, authentic type material is known only from National Park, Queensland, and Tasmanian locality should be omitted from the range of distribution. In recent collections which were available for study, 3 further specimens of *ochraceum* were found from the following localities: 1 ♂, Lamington National Park (Picnic Creek), Qld. 4. VII. 1955, J. C. Yeo (QM) (Specimen in alcohol); 1 ♂, 1 ♀, Minnamurra Falls, N. S. W. 16. XI. 1960, I. F. B. Common & M. S. Upton (CSIRO).

Type ♂, National Park, Qld. 25. XII. 1921 (BMNH); lecto-allotype ♀, National Park, Qld. 24. XII. 1921, R. J. Tillyard (BMNH) is now selected and red identification label attached.

DISTRIBUTION: SE Queensland, New South Wales.

Taschorema kimminsi Neboiss, n. sp. Figs. 110–114.

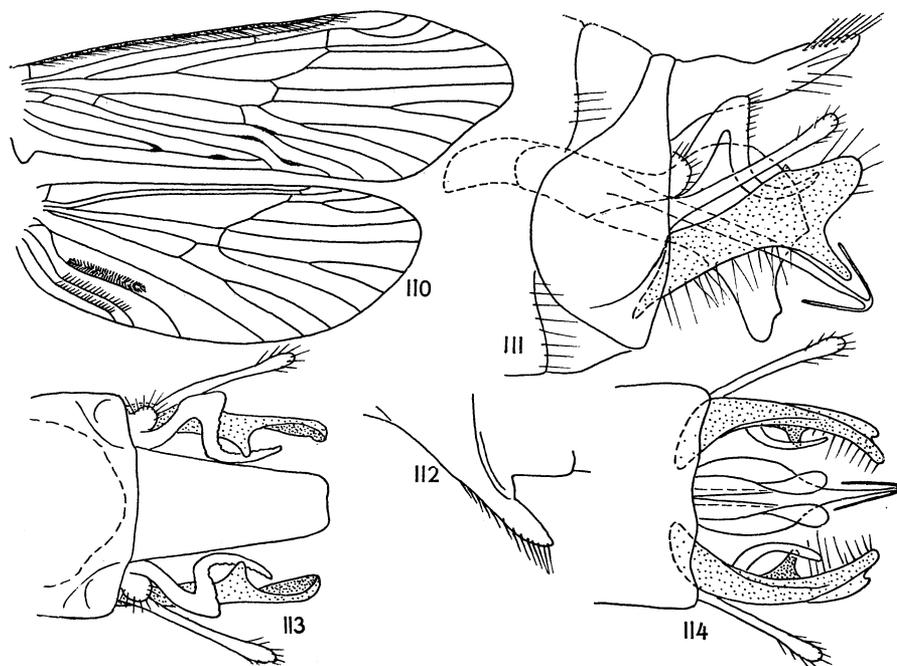
Insect dark, of medium size. Anterior wing with dorsal back fold along costa, bordered with fine long hairs. Discoidal cell somewhat fusiform; fork 1 narrow, sessile; some veins thickened in short sections as shown in Fig. 110. In posterior wing fork 1 with footstalk, cell-like structure between Cu_2 and 1A narrow and long, battledore androconia on 2A and 3A.

♂ *genitalia*: Dorsal plate with lateral margins straight, tapering distally, slightly excised at apex. Upper penis cover formed by pair of hook-like processes. Superior appendages straight, apex slightly dilated, rounded tubercles at base. Penis slender, terminating in 2 fine backward deflected processes. Lower penis cover formed by 2 broad plates, twisted laterally at apex, ventral apical angle produced downward to rounded lobe. Inferior appendages as long as dorsal plate slightly curved with 1 dorsal lobe directed inward and 1 narrow ventral lobe near distal end. Lateral filament on segment 5 slender, slightly curved. Short and robust process on sternite 6 with several stout spines at apex, no ventral process on sternite 7. Posterior margin of sternite 9 slightly concave at middle.

Length of anterior wing: (♂) 9.5 mm.

♀: Unknown.

Type material: Holotype ♂, Sassafras gap nr. Carmody's Vic. 1400 m, 30. I. 1957, A. Neboiss (CSIRO).



Figs. 110-114. *Taschorema kimminsi*, n. sp.: 110, ♂ wing venation; 111, ♂ genitalia lateral; 112, ventral process of sternite 6 lateral; 113, ♂ genitalia dorsal; 114, ventral.

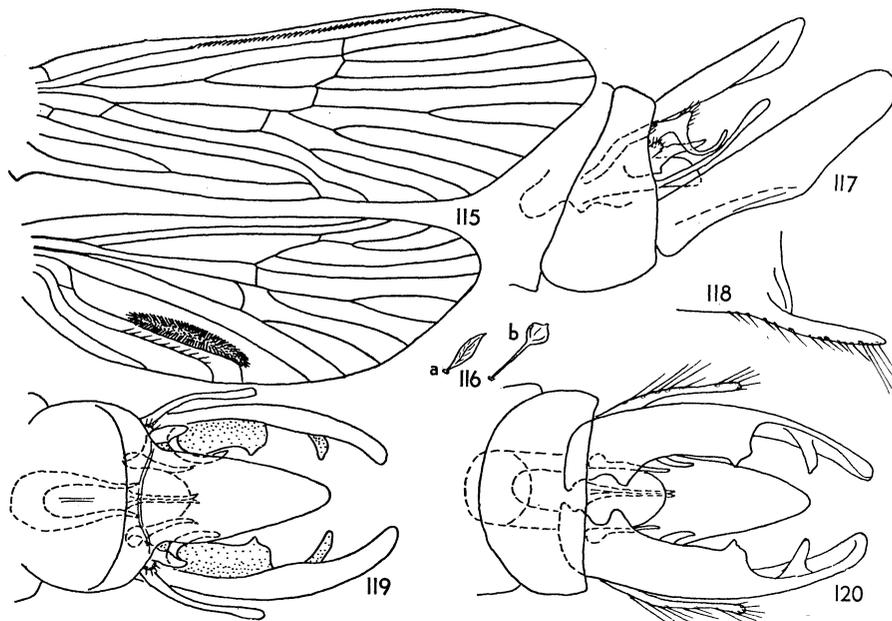
DISTRIBUTION: NE Victoria.

This species is dedicated to Mr. D. E. Kimmins of British Museum (Natural History) London, who generously supplied most valuable information on types, and co-operated in many other ways.

***Taschorema rugulum* Neboiss, n. sp.** Figs. 115-120.

Brownish, medium size insect. Wings present a few interesting characters. Anterior wing with somewhat incomplete fold between C and Sc; R appears to be without customary branching at apex; forks 1 and 2 sessile; on ventral surface between 2A and posterior margin proximally of arculus elongate patch of short lanceolate scales. Posterior wing with cell-like structure between Cu_2 and 1A very long, androconia on 2A only, distinctly spatulate, small lanceolate scales sparingly intermixed with normal hairs on dorsal surface of wing between C and M.

♂ *genitalia*: Slender. Dorsal plate semi-elliptic. Upper penis cover formed by pair of bispinose plates, upper spine hooked at apex, somewhat similar to that of *kimminsi* but much smaller, lower spine only slightly curved. Superior appendages slender but rather short, slightly dilated at apex, small rounded tubercle just above base. Penis straight, formed by 2 parallel lobes; pair of 3 pointed penis sheaths near base. Lower penis cover in form of broad, apically rounded plate. Inferior appendages slender, proximal 1/2 widened ventrally, distal 1/2 narrower, rounded at apex and with finger-like process at distal 1/3.



Figs. 115-120. *Taschorema rugulum*, n. sp.: 115, ♂ wing venation; 116a, scale from dorsal surface of posterior wing; 116b, androconia from 2A; 117, ♂ genitalia lateral; 118, ventral process of sternite 6 lateral; 119, ♂ genitalia dorsal; 120, ventral.

Posterior margin of sternite 9 straight. Ventral process on sternite 7 very tiny, that on sternite 6 much longer, bearing several stout spines at apex. Lateral filament on segment 5 present.

Length of anterior wing: (♂) 7.5 mm.

♀: Unknown.

Type material: Holotype ♂, Timbertop nr. Merrijig, Vic. 25. II. 1958, I. F. Edwards (CSIRO), preserved in alcohol.

DISTRIBUTION: NE Victoria.

***Taschorema hesperium* Neboiss, n. sp. Figs. 121-125.**

Insect dark, of medium size, very similar to *evansi*, but differs from it by distinct genital characters, and by having fork 1 in anterior wing with short footstalk. Wings rather short and broad, posterior margin of anterior wing with 2 long hairs near arculus. Cell-like structure in posterior wing large, very broad, battledore androconia on 2A and 3A.

♂ *genitalia*: Dorsal plate short and broad, almost rectangular, only slightly narrowed near base, apical angles rounded. Upper penis cover formed by 2 laterally flattened lobes which terminate in narrow rounded and upcurved apex. Superior appendages long and slender, only slightly dilated at apex, small rounded tubercle just above base. Penis thin, apex upcurved. Lower penis cover formed by 2 plates closing in from wide rounded base,

running parallel for short distance and widening to outward directed apices. Inferior appendages curved with broad rounded lobe at distal 1/2; inner margins densely covered with masses of larger and smaller spines. Posterior margin of sternite 9 straight. Small pointed process on sternite 7, longer and more slender one on sternite 6 with several stout spines at apex.

Length of anterior wing: (♂) 7.5 mm.

♀: Unknown.

Type material: Holotype ♂, Wannon Falls, 12 mls W of Hamilton, Vic. 28. X. 1955, A. Neboiss (CSIRO); 1 ♂ paratype, data as for holotype (CSIRO), both specimens preserved in alcohol.

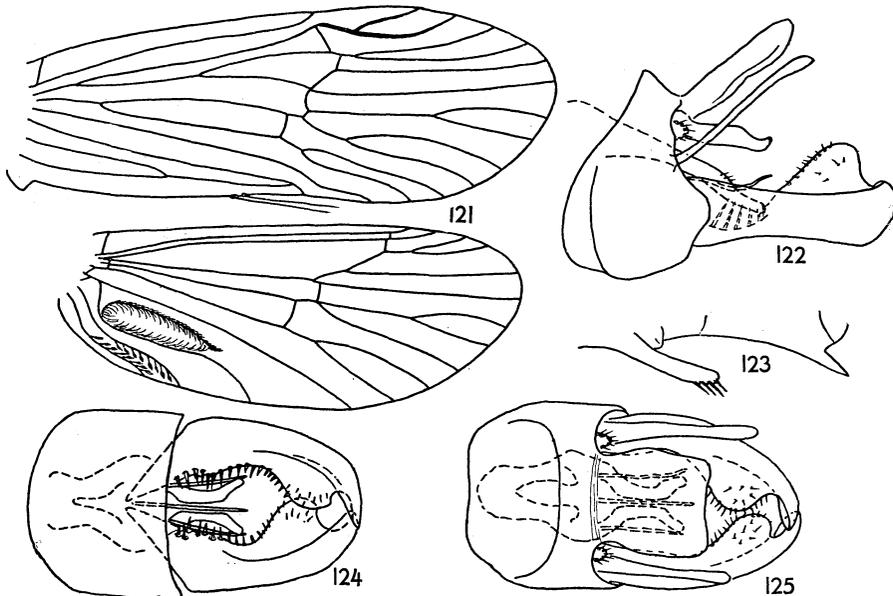
DISTRIBUTION: W. Victoria.

Taschorema evansi Mosely Figs. 126–127.

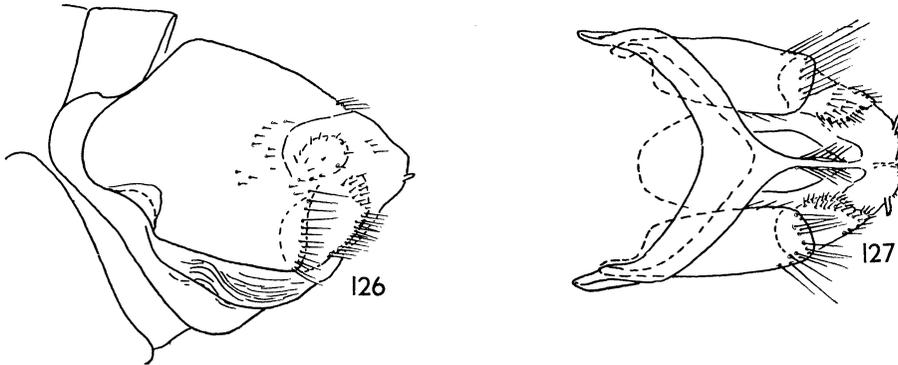
Taschorema evansi Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 440, fig. 297.

This species appear to be well represented in Victoria and the specimen compared with type proves beyond doubt its identity. As at the time of description only 2 damaged ♀♀ were available, figures and description of ♀ genitalia is given here prepared from a specimen collected at Porepunkah, Vic. 26. I. 1960 (CSIRO).

♀ genitalia: Terminal segment hood-shaped, darkly pigmented, posterior angles fringed with long stout hairs; ventral plate broadly "Y" shaped; structural details as in Fig.



Figs. 121–125. *Taschorema hesperium*, n. sp.: 121, ♂ wing venation; 122, ♂ genitalia lateral; 123, ventral processes of sternites 6 and 7 lateral; 124, ♂ genitalia ventral; 125, dorsal.



Figs. 126-127. *Taschorema evansi* Mosely: 126, ♀ genitalia lateral; 127, ventral.

127. Slender ventral process on sternite 5, shorter and broader one on sternite 6.

Length of anterior wing: (♂ ♀) 8-10 mm.

Type: ♂, Lake Leake, Tas. II. 1937 (BMNH).

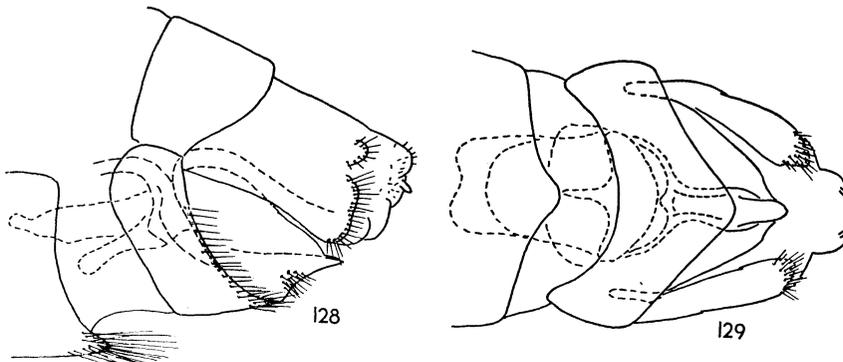
Material examined: 52 specimens (both sexes) from following localities: Victoria: Branxholme, Hamilton, Porepunkah, Cabbage Tree Creek nr. Orbost; S. Australia: Blackwood, Waterfall Gully nr. Adelaide.

Specimens have been collected throughout the year.

DISTRIBUTION: Victoria, S. Australia, Tasmania.

Taschorema nesydrion Neboiss, n. sp. Figs. 128-129.

Species described from single ♀ specimen which previously was designated by Mosely (1953) as paratype of *Taschorema ochraceum*. This specimen was found to have sufficient number of distinct characters to warrant its separation on specific level, although its placing in genus *Taschorema* should be regarded as provisional one, until the discovery of ♂ sex, and dependant on the presence of cell-like structure on posterior wings.



Figs. 128-129. *Taschorema nesydrion*, n. sp.: 128, ♀ genitalia lateral; 129, ventral.

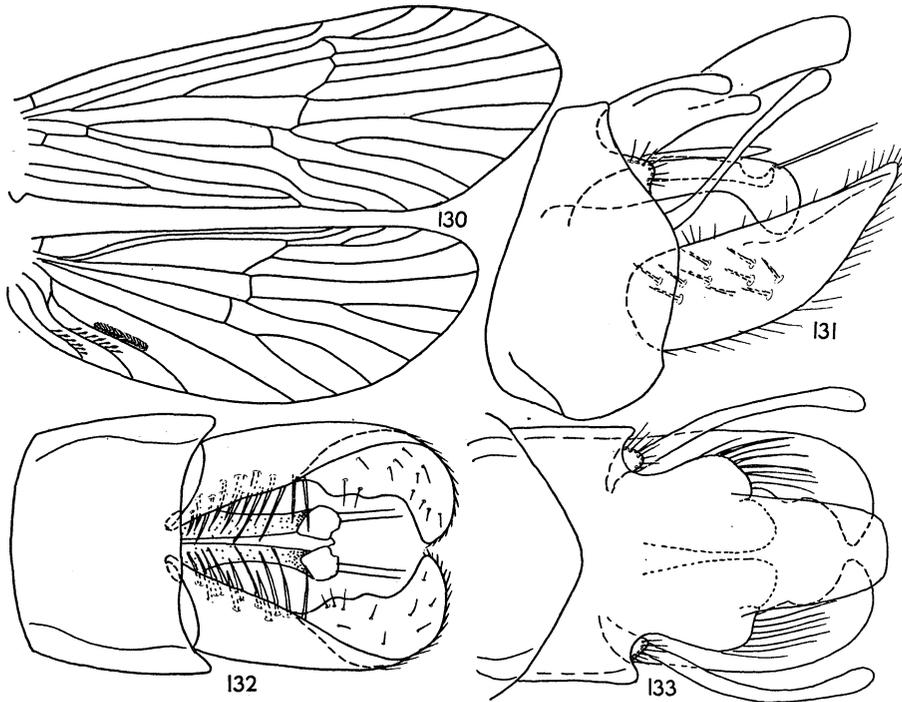
Wings of pale yellowish color, without any distinct pattern or markings, although majority of scales appear to be lost; anterior wing fork 1 with footstalk, fork 2 long, sessile; in posterior wing footstalk of fork 1 about as long as fork itself, fork 2 sessile. Genitalia as shown in Figs. 128–129; lateral pockets small; ventral processes on sternites 5 and 6 entirely absent; posterior margin of sternite 7 covered with long hair and forms rounded lobe in middle.

Length of anterior wing: (♀) 9 mm.

♂: Unknown.

Type material: Holotype ♀, Cradle Mt. Tasmania, 16. I. 1917, R. J. Tillyard (BMNH).

DISTRIBUTION: Tasmania.

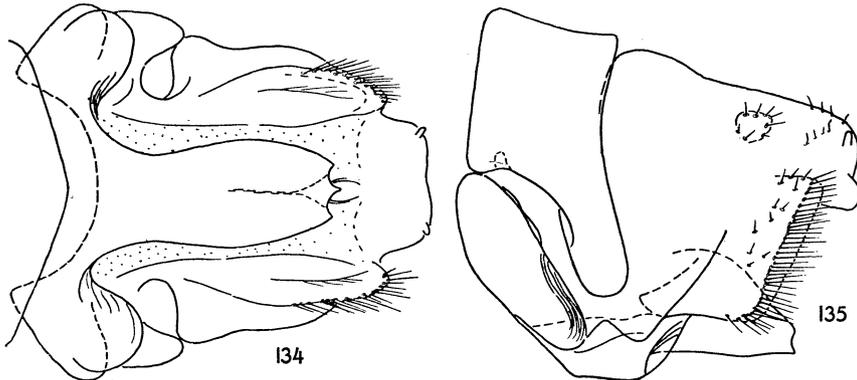


Figs. 130–133. *Taschorema viridarium*, n. sp.: 130, ♂ wing venation; 131, ♂ genitalia lateral; 132, ventral; 133, dorsal.

***Taschorema viridarium* Neboiss, n. sp. Figs. 130–135.**

Insect yellowish, of medium size. Wing venation similar in both sexes, except for sex marks in posterior wings of ♂♂; cell-like structure, which is small; androconia on 2A and 3A very narrow, almost spine-like.

♂ *genitalia*: Dorsal plate at proximal 1/2 with pair of broad lobes, posterior angles bearing strong hairs, ventrally with pair of lobes which could be transposed and fused upper penis cover; distal 1/2 slightly upturned, with rounded apical angles. Superior appendages slender, about as long as inferior appendages, slightly dilated at apex, round-



Figs. 134-135. *Taschorema viridarium*, n. sp.: 134, ♀ genitalia ventral; 135, lateral.

ed tubercle at base. Penis flattened laterally, forming rounded upcurved hook at apex ventrally, and short straight projection dorsally. Lower penis cover in form of 2 parallel stout rods, downturned apically, pair of long stiff bristles at posterior upper angles. Inferior appendages robust, proximal 1/2 broad with long, robust spines on inner surface, narrowed, twisted to dorso-ventrally flattened and inwardly curved distal end. Posterior margin of sternite 9 straight. Very long and slender ventral process on sternite 7, short and stout one on sternite 6, latter with several stout spines at apex. Lateral filament on segment 5 present.

♀ *genitalia*: Terminal segment hood-shaped, lateral margins apically long, covered with dense hairs. Ventral plate narrow, elongate oviform, tricuspid at apex. Short pointed process on sternite 6, longer one bearing several spines on sternite 5.

Length of anterior wing: (♂ ♀) 6-8 mm.

Type material: Holotype ♂, allotype ♀, Broad River nr. Lake Dobson, Mt. Field National Park, Tas. 6. XI. 1955, T. E. Woodward (QM); 42 ♂♂, 26 ♀♀ paratypes: 3 ♂♂, data as for holotype (CSIRO); 1 ♂, Tyenna River nr. Tyenna, Tas. 12. XI. 1955 (QM); 4 ♂♂, Dove River nr. Crater Lake, Cradle Mt. National Park, Tas. 21. XI. 1955, T. E. Woodward (QM); 34 ♂♂, 26 ♀♀, Dove River nr. Lake Dove, Tas. 20. XI. 1955, T. E. Woodward (AM; BMNH; CSIRO; NMV; QM; SAM). Specimens from the latter locality are with badly damaged wings; the above material preserved in alcohol.

One ♀ specimen from Cradle Mts. Tas. 15. I. 1917, figured and described by Mosely (Mosely & Kimmins, 1953: 439, fig. 296) as *Taschorema brunneum* ♀, belongs to this species.

DISTRIBUTION: Tasmania.

Taschorema asmanum Mosely Figs. 136-137.

Taschorema asmana Mosely 1936, Zool. Soc. Lond., Proc. 1936: 422, figs. 69-72.—Mosely & Kimmins, 1953, Trich. Austr. & N. Z.: 434, figs. 292, 293.

Full description of ♂ has been given by Mosely (1936 & 1953) but it should be noted that battledore androconia on 2A and 3A in ♂ posterior wing are present although not

shown in original figures. Description and figures of ♀ are now added. General appearance similar to that of ♂.

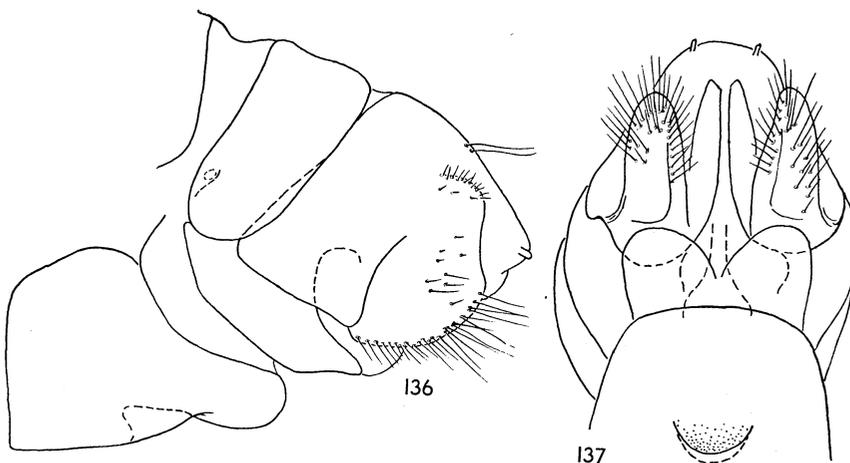
♀ *genitalia*: Abdomen terminates into blunt rounded apex. Dorsal plate hood-shaped, posterior angles rounded, covered with long hairs. Ventral plate formed by 2 rounded lobes. Sternite 7 with posterior margin thick, rounded and densely covered with hairs, deep rounded depression in middle. Latter undoubtedly serves for reception of ♂ ventral process distal end during copulation. Small pointed ventral process on sternite 6, and slightly longer on sternite 5 bearing several stout spines.

Length of anterior wing: (♂ ♀) 11–12 mm.

Type: ♂ Great Lake, Miena, Tas. I. 1931 (BMNH).

Material examined: 1 ♀, Derwent Bridge, Tas. 1.IV.1960, E. T. Smith (CSIRO), preserved in alcohol.

DISTRIBUTION: Tasmania.



Figs. 136–137. *Taschorema asmanum*, n. sp.: 136, ♀ genitalia lateral; 137, ventral.

***Taschorema nigratum* (Banks) Figs. 138–139.**

Notiobiosis nigrata Banks, 1939, Mus. Comp. Zool., Bull. **85**: 500–501, figs. 45, 46, 72.—
Mosely & Kimmins, 1953, Trich. Austr. & N. Z.: 446.—Ross, 1956, Evol. & Class.
Mount. Caddis-flies: 114, fig. 291 A, B.

Taschorema nigra Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 436.

Taschorema nigrata Kimmins, 1959, Ent. Monthly Mag. **95**: 184.

Combined descriptions as published by Banks (1939) and Mosely (1953) give good coverage of characters, and it is not necessary to add any further details of great importance. Nevertheless it should be noted that the ♂♂ of this species do not possess otherwise characteristic androconia on posterior wings. Although a ♀ sex has been mentioned by Mosely in the description of *nigra*, no figures have been published, and therefore they are added now. The material which has been available for study greatly increases the area of distribution as indicated below. One ♀ specimen from Clyde Mt. N. S. W. has fork 1 in anterior wing with short footstalk, but this should be regarded as an individual

aberration, because other characters agree favorably with typical specimens from the same area.

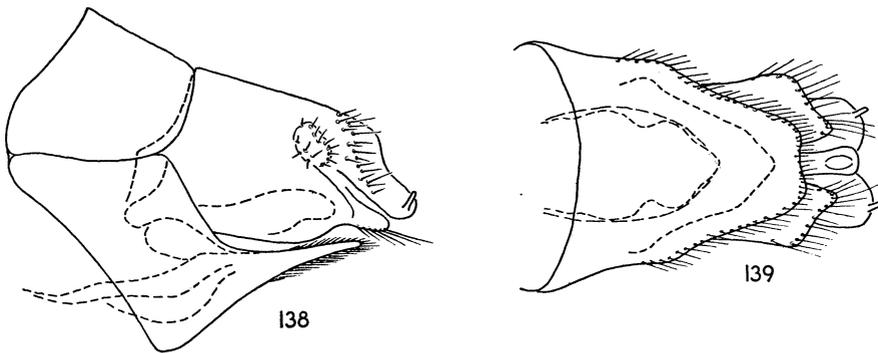
Length of anterior wing: (♂ ♀) 9–13 mm.

Type: ♂ Mt. Spurgeon, N. Qld. 1100–1200 m, 26. VII. (MCZ). Type of *Taschorema nigra* Mosely: ♂ National Park, Qld. 900 m, 21. XII. 1921 (BMNH).

Material examined: 40 ♂♂, 10 ♀♀— Queensland: Bunya Mts., Wyberba; New South Wales: Mt. Canobolas, Barrington Tops (Tubrabucca), Clyde Mt., Canberra; Victoria: Merrijig, Porepunkah, Bright, Grampians; S. Australia: National Park (Lofty Ranges).

Specimens collected throughout the year.

DISTRIBUTION: Queensland, New South Wales, Victoria, S. Australia.



Figs. 138–139. *Taschorema nigritum* (Banks): 138, ♀ genitalia lateral; 139, ventral.

***Taschorema rieki* Neboiss, n. sp.** Figs. 140–143.

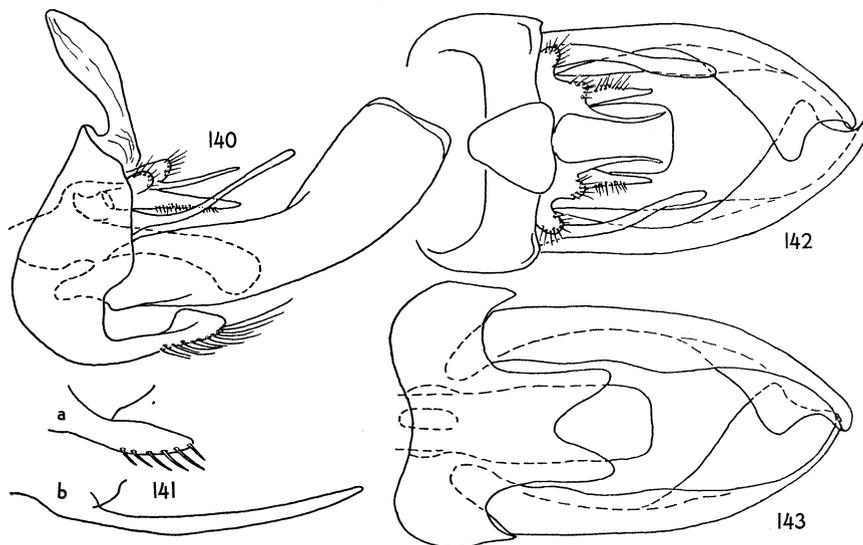
Insect blackish, of medium size, in general characters resembling *nigritum*, but can be separated mainly by distinct form of genitalia. Mottling or tufts of yellowish hairs on anterior wing appear to have more golden color. Androconia on 2A and 3A absent, both veins covered with long silky hairs.

♂ *genitalia*: Dorsal plate comparatively small, somewhat triangular, directed upwards. Upper penis cover formed by 2 pairs of processes, upper process thin with somewhat triangular lobe near base, lower process more robust, straight, gradually tapering to pointed apex, ventral margin covered with patch of stiff bristles. Superior appendages slender and comparatively short, rounded tubercle just above the base. Penis broad, turned downward, and clavate. Inferior appendages long, broad, concave, widening distally, curved inwards and crossing over at apex, inner surface covered with long stiff hairs. Posterior margin of sternite 9 produced to broad, elongate plate, deeply excised at apex, dorsal surface keeled. Very long, robust ventral process on sternite 7, rounded at apex; shorter pointed one on sternite 6 with several stout spines. No lateral filament on segment 5.

Length of anterior wing: (♂) 10–11 mm.

♀: Unknown.

Type material: Holotype ♂, New England Nat. Park, N. S. W. 9. I. 1958, E. F. Riek (CSIRO); 2 ♂♂ paratypes, data as for holotype (CSIRO; NMV). 1 ♂ paratype, Barrington Tops, I. 1925, S. U. Zool. Exped. (AM).



Figs. 140-143. *Taschorema rieki*, n. sp.: 140, ♂ genitalia lateral; 141, lateral view of ventral processes of sternite 6 (a); sternite 7 (b); 142, ♂ genitalia dorsal; 143, ventral.

DISTRIBUTION: New South Wales.

This species is named after Mr. E. F. Riek of Division of Entomology, CSIRO Canberra, to whom the author is indebted for close co-operation and advice.

Genus *Koetonga* Neboiss, n. gen.

Type species: *Koetonga clivicola*, n. sp.

Spurs 2 : 4 : 4. Wing venation regular in anterior wings, with forks 1 and 2 very long and sessile, discoidal cell closed, rather large, situated somewhat obliquely with apical end barely reaching middle of wing; additional oblique cross-vein located between 1A and 2A. Venation in posterior wings irregular and differing in sexes. Ventral processes in ♂ on segments 6 and 7, in ♀ on segments 5 and 6. Lateral filaments on segment 5 wanting.

The generic name is derived from an aboriginal word "koetong" meaning "frost."

***Koetonga clivicola* Neboiss, n. sp.** Figs. 144-151.

Insect robust, anterior wings dark brown with yellowish mottling, posterior wings concolorous yellowish grey; head grey-brown, eyes very dark, almost black; thorax dorsally dark brown, ventrally paler, yellowish brown; legs pale yellowish brown, first 2 pairs with darker bands.

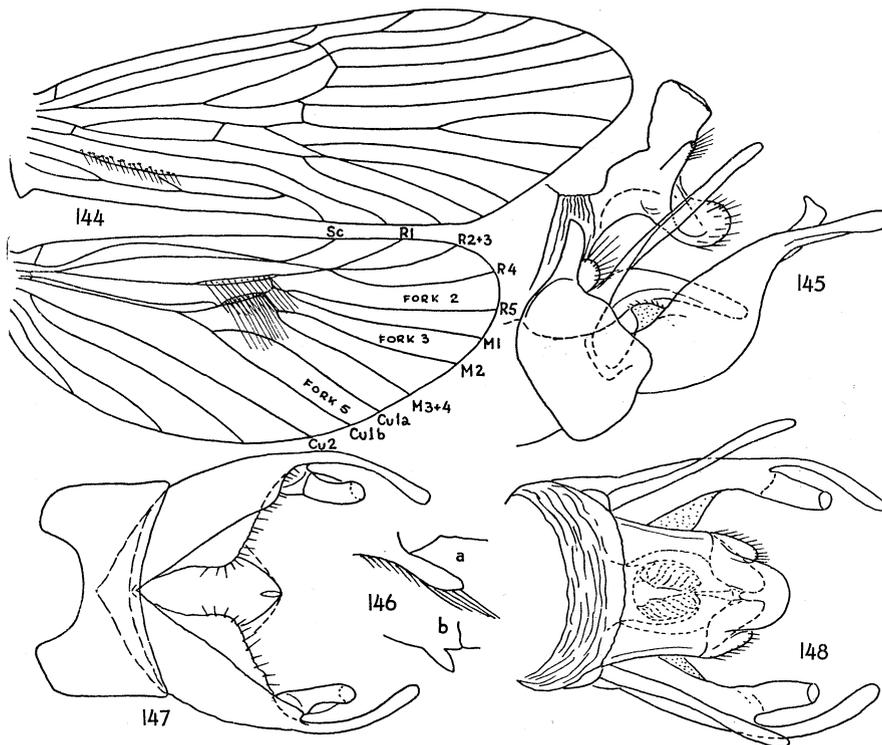
Anterior wings in both sexes similar; forks 1 and 2 very long, sessile; forks 4 and 5 contiguous for short distance near base; an additional oblique cross-vein between 1A and 2A; elongate patch of long hairs on ventral surface of wing along middle section of 1A. Posterior wing in ♂ with irregular venation, interpretation based upon comparison

with ♀ wing, show presence of forks 2, 3 and 5 as indicated in Fig. 144. Middle section of R and M with row of very long and fine hairs on ventral surface. In ♀ venation of posterior wing with irregularity forming an additional cell at base or R_1-R_{2+3} ; 2 elongate patches of short, yellow hairs on either side of footstalk of fork 3.

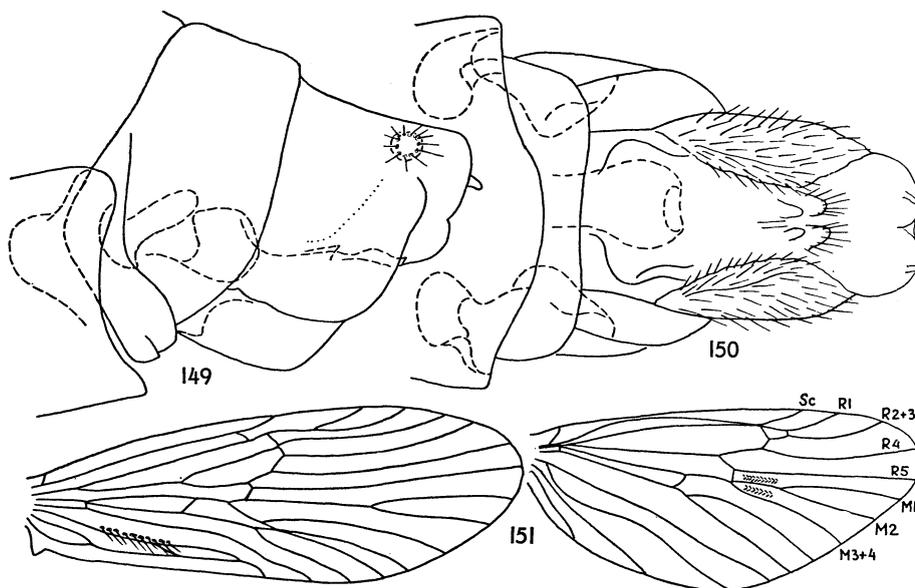
♂ *genitalia*: Apical margin of tergite 9 forms membranous dorsal plate, latter with pair of elongate tubercles on either side and large robust rounded projection, narrowly excised at apex ventrally. Superior appendages long and slender, not reaching apex of inferior appendages; small rounded tubercle above them at base. Penis broad, somewhat flattened dorso-ventrally, with apex bent downward. Inferior appendages 2 branched, very broad at base, then abruptly narrowed to slender, rounded apical section, and shorter inwardly directed branch. Short ventral process on sternite 7, larger one bearing several stout spines on sternite 6.

♀: Apical margin of sternite 7 strongly fringed. Cleared genitalia preparation show deep rounded pockets between segments 7 and 8; terminal segment hood-shaped with strongly fringed ventro-lateral margins. Short ventral process on sternite 6, slightly longer and stouter one bearing few spines on sternite 5.

Length of anterior wing: (♂ ♀) 11–14 mm.



Figs. 144–148. *Koetonga clivicola*, n. sp.: 144, ♂ wing venation; 145, ♂ genitalia lateral; 146, lateral view of ventral processes of sternite 6 (a); sternite 7 (b); 147, ♂ genitalia ventral; 148, dorsal.



Figs. 149-151. *Koetonga clivicola*, n. sp.: 149, ♀ genitalia lateral; 150, ventral; 151, ♀ wing venation.

Type material: Holotype ♂ and allotype ♀, Timbertop nr. Merrijig, Vic. 5. VI. 1958, I. F. Edwards (M. V. light trap) (CSIRO); 12 paratypes: 1 ♀, Mt. Mackay, Vic. 26. I. 1960, A. Neboiss (CSIRO); 1 ♂, Cumberland falls nr. Marysville, Vic. 16. II. 1958, A. Neboiss (NMV); 1 ♂, Wraggs Creek, Mt. Kosciusko, N. S. W. 11. IV. 1961, A. Neboiss (NMV); 1 ♀, Sawpit Creek, N. S. W. 11. IV. 1961, A. Neboiss (NMV); the above 7 specimens preserved in alcohol; 1 ♂, Brown Mt. N. S. W. 18. I. 1961, E. F. Riek (CSIRO); 2 ♂♂, Minnamurra, N. S. W. 6. XI. 1956, E. F. Riek (BMNH; CSIRO); 1 ♂, Clyde Mt. 16 mls S. E. of Braidwood, N. S. W. 29. III. 1960, I. F. B. Common (CSIRO); 1 ♂, Clyde Mt. 730 m N. S. W. 23. I. 1961, I. F. B. Common & M. S. Upton (BMNH); 3 ♂♂, Kangaroo Valley, N. S. W. 22. III. 1961, E. F. Riek (CSIRO; NMV).

DISTRIBUTION: SE New South Wales, Victoria.

Genus *Moruya* Neboiss, n. gen.

Type species: *Moruya charadra*, n. sp.

This peculiar genus is closely related to *Psylobetina* Banks, differing in asymmetrically formed ♂ genitalia, and by having fork 1 of anterior wing long with very short footstalk. It would not be surprising to find occasional specimens with this fork sessile, a possibility which should be considered whilst using key for separating genera.

Spurs 2 : 4 : 4. Anterior wings with discoidal cell closed in ♀♀, open in ♂♂; fork 2 sessile, others with footstalk, that of fork 1 very short. Posterior wing in both sexes with forks 1, 2, 3 and 5 present; fork 2 sessile, others with footstalk; cross-vein m-cu strongly convex. In ♀♀ abdomen terminates in long, slender, upcurved oviscapt, with

pair of small single segmented cerci at apex. Males, unfortunately known from but 1 species, present peculiar asymmetric formation of genitalia, which is not classified here as generic character, as it is possible that ♂♂ of other species may have normal bisymmetric genitalia. Another sexual character of ♂ is presence of large semicircular area of minute spine-like hairs on dorsal surface of posterior wing, and likewise is not yet classified as generic character.

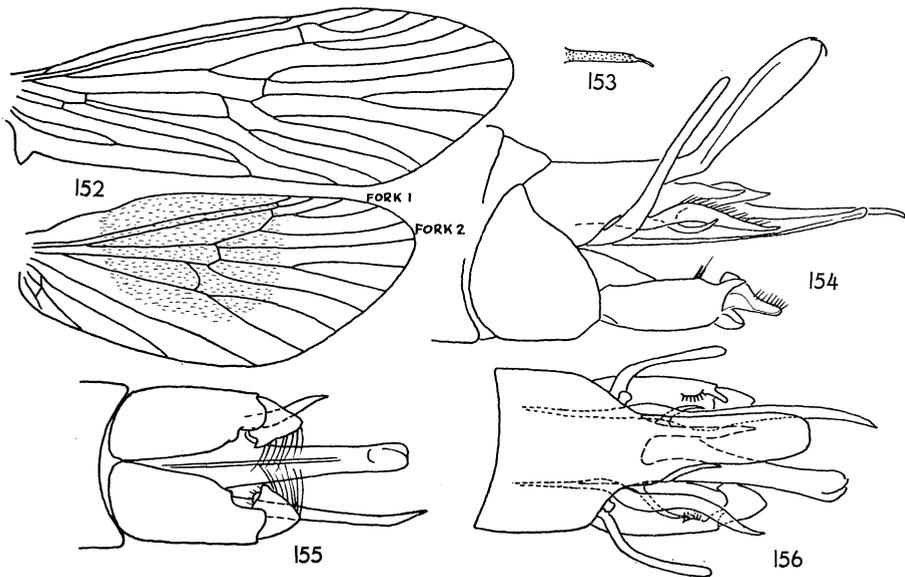
The generic name is derived from an aboriginal word "moruya" meaning "a place down south" used here in a broader sense and refers to land south of Australian mainland.

KEY TO SPECIES OF MORUYA

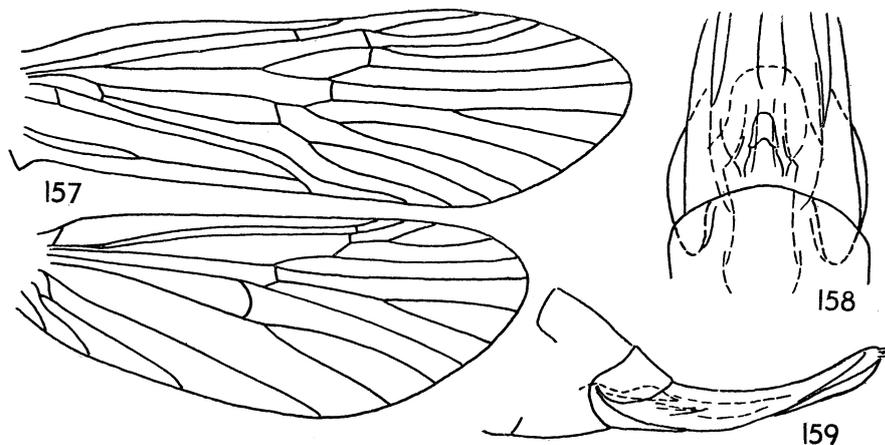
- Fork 5 in anterior wing gradually widening to full width of fork, footstalk less than 1/2 length of discoidal cell **charadra**
 Fork 5 in anterior wing with lower branch suddenly widened to full width of fork; footstalk about 2/3 length of discoidal cell **opora**

Moruya charadra Neboiss, n. sp. Figs. 152-159.

Insect pale yellowish brown, head and thoracic segments slightly darker, legs and wing membrane pale yellowish, concolorous. Wing venation in both sexes alike, with exception of discoidal cell being open in ♂♂, but closed in ♀♀, and large semicircular area of minute spinelike hairs on dorsal surface of posterior wings in ♂♂ as shown in Fig. 152. Anterior wings with forks 1, 2, 3, 4 and 5 present, all long except fork 3, which is but slightly longer than footstalk; cross-vein r-m located at anastomosis of fork 2, and ends at M_{1+2} , same distance distally from anastomosis with M_{3+4} . Section of M between cross-vein m-cu and anastomosis of $M_{1+2} - M_{3+4}$, only 1/2 length of vein forming discoidal cell



Figs. 152-156. *Moruya charadra*, n. sp.: 152, ♂ wing venation; 153, lateral filament of segment 5; 154, ♂ genitalia lateral; 155, ventral; 156, dorsal.



Figs. 157-159. *Moruya charadra*, n. sp.: 157, ♀ wing venation; 158, ♀ genitalia ventral; 159, lateral.

lower branch from anastomosis to cross-vein r-m. Fork 5 widening gradually to full width, footstalk very short, about or less than $1/2$ length of discoidal cell. Posterior wings with forks 1, 2, 3 and 5 present; fork 1 almost $2\times$ length of footstalk; fork 2 sessile; fork 3 only slightly longer than footstalk; footstalk of fork 5 very short.

♂ *genitalia*: Some features closely resemble those in genus *Psyllobetina*. Dorsal plate long, upcurved, rounded at apex. Upper penis cover formed by 2 pairs of pointed asymmetrical branches, larger dorsal branch, and thinner outward and upward pointing ventral branch; entire structure is twisted slightly towards right side on which both branches are longer. Penis long, flattened dorso-ventrally, apex spatulate, rounded and curved slightly downward. Penis sheaths long and somewhat cork-screw like, that on right side considerably longer than that on left. Inferior appendages 2-segmented, distal segment short. Lateral filament on segment 5 moderately long, stout, abruptly tapered to fine short apex. Ventral process on sternite 7 short, flat, somewhat triangular, without spines on apex.

♀ *genitalia*: Terminates into moderately long, slightly upcurved oviscapt, similar to but more robust than in *Allobiosis* and *Psyllobetina*. Ventral processes entirely absent, although posterior margin of sternite 6 somewhat thickened.

Length of anterior wing: (♂ ♀) 6-7 mm.

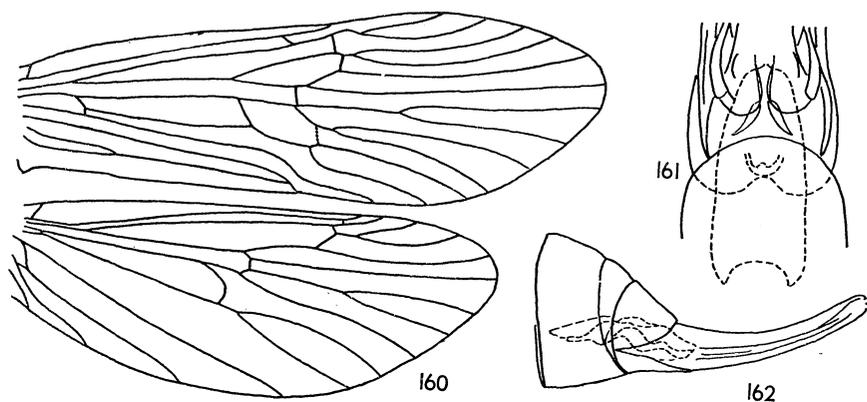
Type material; Holotype ♂ and allotype ♀, Broad River, nr. Lake Dobson, Mt. Field National Park, Tas. 6. XI. 1955, T. E. Woodward (QM); 10 paratypes: 1 ♂, 2 ♀ ♀, data as in holotype (NMV; QM); 5 ♂ ♂, 2 ♀ ♀, Dove River, nr. Lake Dove, Tas. 20. XI. 1955, T. E. Woodward (CSIRO; QM). Other material examined: 1 ♀, Hugel River, Lake St. Clair, Tas. 15. II. 1955, T. E. Woodward (QU); all specimens preserved in alcohol.

DISTRIBUTION: Tasmania.

Moruya opora Neboiss, n. sp. Figs. 160-162.

Insect yellowish grey, somewhat darker and slightly larger than *charadra*; wing membrane and legs concolorous.

Wing venation similar to *charadra*, but differing in some details. Cross-vein r-m located basally of fork 2 and joins M_{1+2} almost at anastomosis with M_{3+4} . Fork 3 comparatively longer than in *charadra*, footstalk only 2/3 of length. Section of M between cross-vein m-cu and anastomosis of M_{1+2} and M_{3+4} about equal to length of vein forming discoidal cell lower branch from anastomosis to cross-vein r-m. Footstalk of fork 5 about 2/3 length of discoidal cell, fork 5 abruptly widening to full width. Posterior wing with slight differences in shape of fork 2, and position of cross-vein r-m only. Oviscapt slightly more robust than in *charadra*, and differing in structural details as shown in Fig. 161.



Figs. 160-162. *Moruya opora*, n. sp.: 160, ♀ wing venation; 161, ♀ genitalia ventral; 162, lateral.

Length of anterior wing: 8-9 mm.

♂: Unknown.

Type material: Holotype ♀, Ouse River, nr. Great Lake, Tas. 2. IV. 1960, E. T. Smith (CSIRO); 3 paratypes: 2 ♀♀, data as in holotype (CSIRO; NMV); 1 ♀, Derwent Bridge, Tas. 1. IV. 1960, E. T. Smith (NMV); all specimens preserved in alcohol.

DISTRIBUTION: Tasmania.

Genus *Psyllobetina* Banks

Psyllobetina Banks, 1939, Mus. Comp. Zool., Bull. 85: 501.—Mosely & Kimmins, 1953, Trich. Austr. & N. Z.: 485.

Type species: *Psyllobetina plutonis* Banks (monobasic).

Genus *Psyllobetina* was established by Banks who described a single species, known at that time from ♀ sex only. During the last 2 decades numerous specimens were added to various collections; 5 species are now recognized, all known from both sexes, and their distribution is limited to eastern and southeastern mountain areas.

Spurs 2 : 4 : 4. Wing venation alike in both sexes. Anterior wing with discoidal cell open; apical forks 1, 2, 3, 4 and 5 present, all except fork 2 with long footstalks, latter sessile or at most with very short footstalk not exceeding width of fork. Posterior wing

with apical forks 2, 3 and 5 present; fork 2 sessile, others with footstalk (Fig. 187). Elimination of fork 1 in posterior wing is based on comparison of wing venation in closely related genus *Moruya* (Fig. 152) where position of fork 2 is almost identical, and fork 1 is present. Furthermore the instability of R_2 and R_3 is well demonstrated by specimens of *Taschorema pallescens* where in some cases fork 1 is present on one side, but absent on other, or R_2 is present only in short section (Fig. 97), ending blindly before reaching wing margin.

In ♂ short lateral filaments to segment 5 present. Inferior appendages 2-segmented. Females with long up-curved oviscapt consisting of 2 longitudinally separable parts, ventral section being notably smaller; pair of small divergent cerci at apex. Short ventral process on sternite 6 in ♀♀, and on 7 in ♂♂.

Separation of species based entirely on differences in genital characters, which in ♂♂ are quite distinct and reasonably visible without dissection; in ♀♀ finer structures at base of ovipositor, although sometimes visible on uncleared specimens, are more difficult to distinguish. Drawings from cleared specimens are self-explanatory and less confusing than lengthy verbal descriptions.

KEY TO MALES OF PSYLLOBETINA

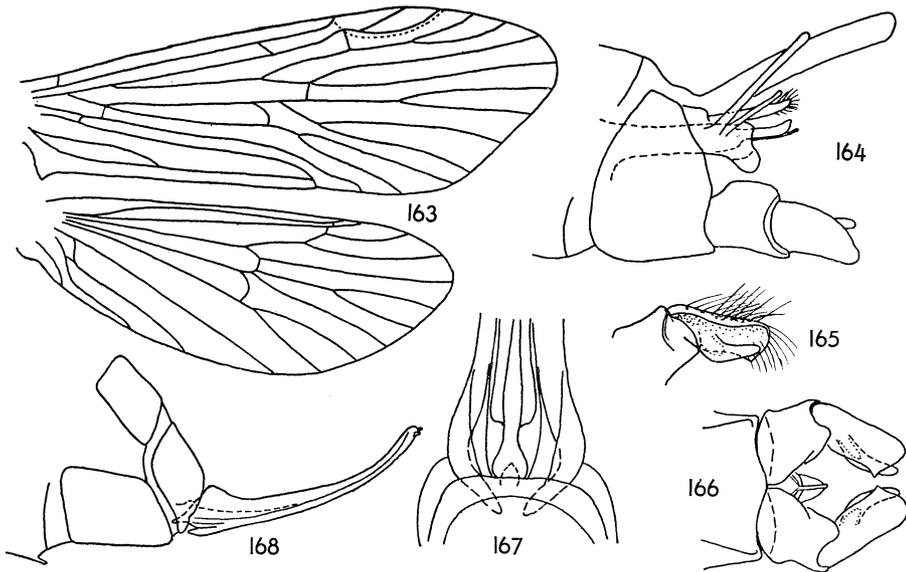
1. Distal segment of inferior appendage with inner lobe bispinose 2
Distal segment of inferior appendage with single finger-like lobe..... 3
2. Inner lobe flattened, spines very short **plutonis**
Inner lobe rounded, spines long **perkinsi**
3. Upper penis cover with dorsal process very broad, apex bent upward to almost right angle **attunga**
Upper penis cover with dorsal process straight, rod-like..... 4
4. Inner finger-like process of inferior appendage distal segment, not extending beyond apex of the segment itself **cumberlandica**
Inner finger-like process of inferior appendage distal segment very slender, extending beyond apex of segment itself **locula**

KEY TO FEMALES OF PSYLLOBETINA

1. Oviscapt comparatively short, and robust 2
Oviscapt very slender..... 3
2. Widened central markings at base of oviscapt with distinct dentations on outer edges..... **plutonis**
Widened central markings at base of oviscapt without dentations..... **perkinsi**
3. Central markings at base of oviscapt elongate triangular, somewhat hook-like... **attunga**
Central markings not such.....4
4. Proximal end of oviscapt round bulbous **cumberlandica**
Proximal end of oviscapt elongate..... **locula**

Psyllobetina cumberlandica Neboiss, n. sp. Figs. 163–168.

Insect of medium size and brownish color, distinguished from other species of genus by genitalia characters.



Figs. 163–168. *Psyllobetina cumberlandica*, n. sp.: 163, ♂ wing venation; 164, ♂ genitalia lateral; 165, inferior appendage dorsal; 166, ♂ genitalia ventral; 167, ♀ genitalia ventral; 168, lateral.

♂ *genitalia*: Dorsal plate of segment 9 straight, long and narrow. Upper penis cover formed by 2 pairs of rod-like processes, dorsal pair being thicker, ventral pair about same length but thinner. Superior appendages slender, shorter than dorsal plate, directed upwards, small rounded tubercle at base. Penis straight, apex slightly widened and with pair of flat rounded lobes directed downward; central duct rather thick, upcurved at extreme apex, ventrally with fine long spine. Inferior appendages 2-segmented, proximal short, distal elongate with moderately long finger-like process arising from inner ventral margin. Short and broad ventral process on sternite 7, sometimes also very small, triangular process to sternite 6.

♀ *genitalia*: Oviscapt slender; central section on ventral side very similar to *attunga* but not so distinctly triangular. Very small ventral process to sternite 5, slightly larger, and flat to sternite 6.

Length of anterior wing: (♂ ♀) 7–8.5 mm.

Type material: Holotype ♂, allotype ♀, Cumberland Falls Marysville, Vic. 16. II. 1958, A. Neboiss (CSIRO); 15 paratypes: locality as in holotype, 3 ♂♂, 6 ♀♀, 16. II. 1958; 5 ♂♂, 1 ♀, 9. II. 1955 (AM; BMNH; CSIRO; NMV; QM); all type material preserved in alcohol.

Further 100 specimens examined from following localities: Victoria: Warburton, Millgrove, Don River, Erica, Snobs Creek, Tanjil Bren, Acheron Gap.

Specimens collected from December to April.

DISTRIBUTION: Victoria.

The name refers to the type locality.

Psyllobetina attunga Neboiss, n. sp. Figs. 169-174.

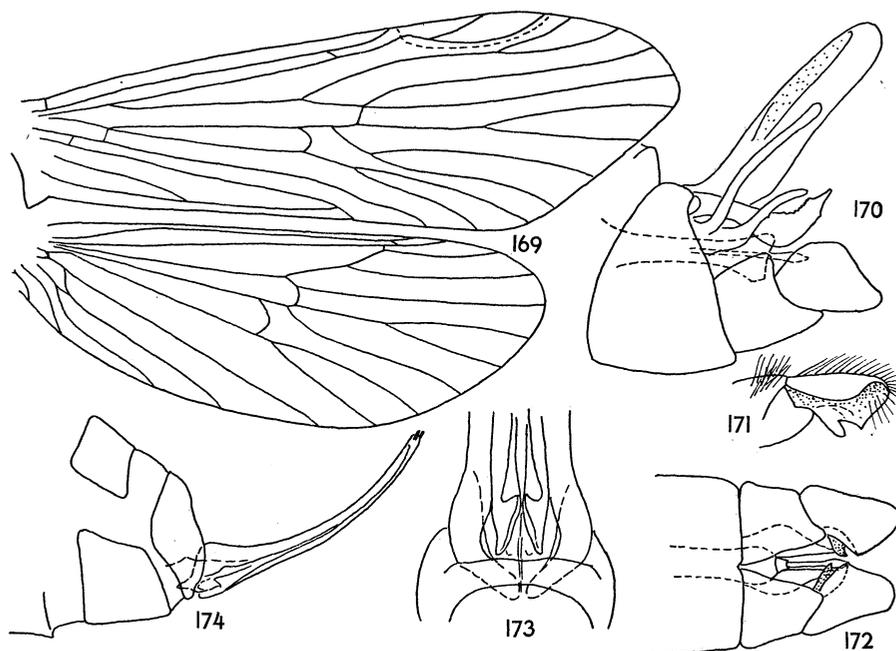
Yellowish brown color and size similar to other species of this genus, but with distinct genitalia structures.

♂ *genitalia*: Dorsal plate of segment 9 more robust than in *perkinsi*, directed upwards, apex rounded. Upper penis cover formed by 2 pairs of processes; dorsal pair broad, distal end bent upwards to almost right angle and tapered to acute apex; ventral pair rising upward from base and slightly curving backward. Superior appendages slender, slightly curved, small rounded tubercle at base. Penis straight, apex distinctly widened dorsoventrally, and to lesser degree also laterally; central duct straight, noticeably widened before terminating in pointed apex. Inferior appendages 2-segmented, both segments short, distal one with ventral margin widened acutely pointed inwardly, and short finger-like projection arising on inner ventral surface. Short and rather broad ventral process on sternite 7.

♀ *genitalia*: Oviscapt very slender, widened central section on ventral surface forming elongate triangular figures. Short and broad ventral process on sternite 6.

Length of anterior wing: (♂ ♀) 7-9 mm.

Type material: Holotype ♂, Bogong Village, Vic. 26. III. 1957, A. Neboiss (CSIRO); allotype ♀, Mt. Buffalo, Vic. 1370 m, 1. II. 1957, A. Neboiss (CSIRO); 15 paratypes: 2 ♂♂, data as for holotype (AM; BMNH); 5 ♂♂, 2 ♀♀, data as for allotype (NMV); 1 ♂,



Figs. 169-174. *Psyllobetina attunga*, n. sp.: 169, ♂ wing venation; 170, ♂ genitalia lateral; 171, inferior appendage dorsal; 172, ♂ genitalia ventral; 173, ♀ genitalia ventral; 174, lateral.

Falls Creek Ski Village, Bogong High Plains, Vic. 26. III. 1957, A. Neboiss (NMV); 2 ♂♂, locality as before 26. I. 1960, A. Neboiss (CSIRO); 2 ♂♂, 1 ♀, Rocky Valley, Bogong High Plains, Vic. 12. II. 1958, N. Dobrotworsky (NMV); all above specimens preserved in alcohol.

Further 62 specimens examined from following localities: Victoria: Homan's Gap, 1500 m; Mt. Mackay, 1700 m; Porepunkah, Woods Point, Snobs Creek Falls, Mt. Buller, Noojee. New South Wales: Sawpit Creek nr. Mt. Kosciusco.

Specimens collected from December to March.

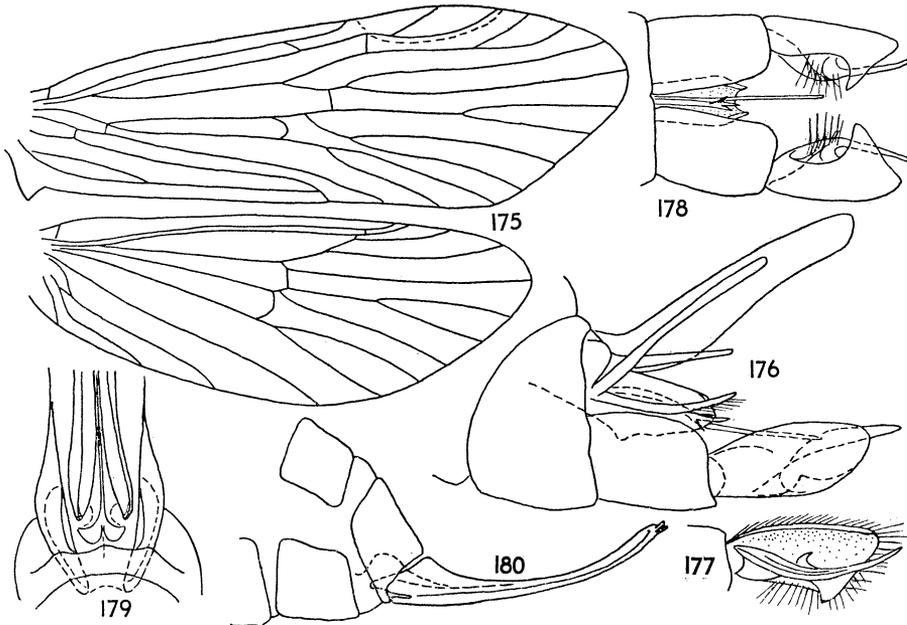
DISTRIBUTION: New South Wales, Victoria.

The name is derived from an aboriginal word "attung" meaning "high place" and refers to the occurrence of this species on high mountainous regions.

***Psyllobetina locula* Neboiss, n. sp.** Figs. 175–180.

Insect of medium size and similar general appearance to all other species of the genus, but differs considerably in genital characters.

♂ *genitalia*: Dorsal plate of segment 9 narrow and long, directed upwards. Upper penis cover formed by 2 pairs of slender processes, dorsal process straight, ventral process slightly longer, upcurved, with row of long hairs at apex. Superior appendages straight, directed upwards with rounded tubercle at base. Penis somewhat flattened laterally, small triangular lobe on ventral side; central duct thin, very long, extending beyond penis, with



Figs. 175–180. *Psyllobetina locula*, n. sp.: 175, ♂ wing venation; 176, ♂ genitalia lateral; 177, inferior appendage dorsal; 178, ♂ genitalia ventral; 179, ♀ genitalia ventral; 180, lateral.

slender slightly curved and trispinose process just above it. Inferior appendages 2-segmented, proximal segment robust, distal segment elongate, rounded, with prominent triangular spine on ventral margin, and long, pointed lobe arising from proximal ventral margin. Short and broad ventral process on sternite 7.

♀ *genitalia*: Oviscapt very slender, central section on ventral side forms a pair of club-like figures and pair of elongate round lateral lobes, not unlike those in *plutonis* and *perkinsi*, though more slender. Small ventral process on sternite 6, ridge on sternite 5 distinct but not produced into process ventrally.

Length of anterior wing: (♂ ♀) 7–9.5 mm.

Type material: Holotype ♂, allotype ♀, Bogong Village, Vic. 26. III. 1957, A. Neboiss (CSIRO); 28 paratypes: 17 ♂♂, 10 ♀♀, data as for holotype (AM; BMNH; CSIRO; NMV; QM; SAM); 1 ♀, Rubicon, Vic. 29. III. 1957 (NMV); all above specimens preserved in alcohol.

Further 25 specimens studied from following localities: Victoria: Tanjil Bren, Rubicon, Merrijig.

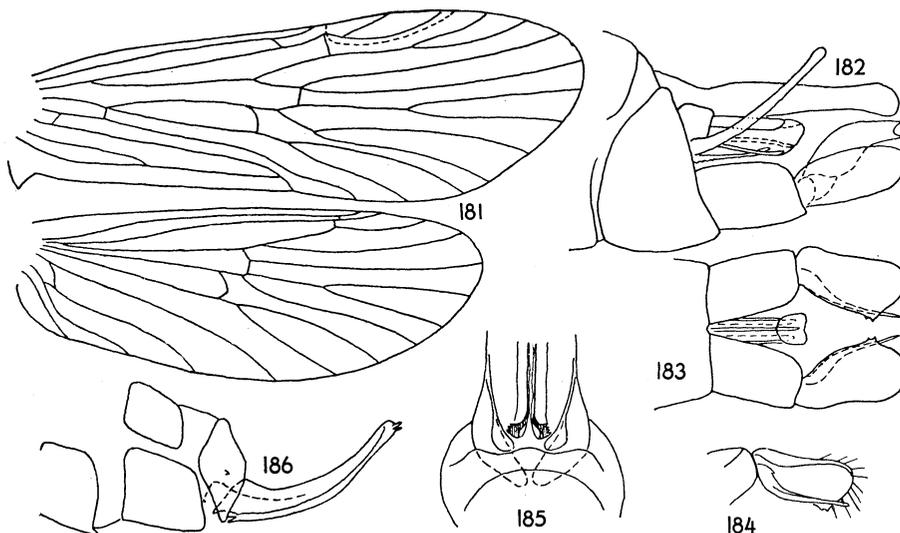
Specimens collected from January to March.

DISTRIBUTION: NE Victoria.

***Psyllobetina plutonis* Banks** Figs. 181–186.

Psyllobetina plutonis Banks, 1939, Mus. Comp. Zool., Bull. 85: 501.—Mosely & Kimmins, 1953, Trich. Austr. & N. Z.: 485.

A ♀ specimen from Barrington Tops, N. S. W. was forwarded to Dr. P. J. Darlington, Museum of Comparative Zoology, Harvard for comparison with type. He kindly inform-



Figs. 181–186. *Psyllobetina plutonis* Banks: 181, ♀ wing venation, specimen from Barrington Tops, N.S.W.; 182, ♂ genitalia lateral; 183, ventral; 184, inferior appendage dorsal; 185, ♀ genitalia ventral; 186, lateral.

ed me that this specimen agreed favorably with type and should be regarded as conspecific. Present description of ♂ and ♀ characters are prepared from specimens collected at the above locality.

♀ *genitalia*: Cleared preparation show small pointed protuberances on segment 8 near base of oviscapt; latter comparatively short and stout; central section on ventral side widened at base which is distinctly dentate on outer edges.

♂ *genitalia*: Dorsal plate of segment 9 narrow, as long as inferior appendages, slightly dilated downwards at apex. Upper penis cover formed by 2 pairs straight rod-like processes. Superior appendages slender, shorter than dorsal plate, somewhat flattened angular tubercles at base. Penis straight cylindrical; recessed ventrally at apex, straight central duct visible in middle. Inferior appendages 2-segmented, both segments about equal length, distal segment with large bicuspid, laterally flattened lobe arising from ventral margin. Small ventral process to sternite 7.

Length of anterior wing: (♂ ♀) 7-9 mm.

Type: ♀, Blackheath, Blue Mts., N. S. W. 18. I., Darlington (MCZ).

Material examined: 4 ♂♂, 3 ♀♀, Barrington Tops, N. S. W. 17. XI. 1953, A. Neboiss (CSIRO; NMV); 1 ♀, compared with type by Dr. Darlington (CSIRO); 1 ♂, drawings and description prepared from specimen labelled 65AN (CSIRO); 2 ♂♂, 1 ♀, Barrington Tops, N. S. W. I. 1925, Sydney Univ. Exped. (MACL); 1 ♂, Wyberba, Q. 24. III. 1957, E. F. Riek (CSIRO).

DISTRIBUTION: S. Queensland; New South Wales.

♀ specimen from Killarney, Qld. described and figured by Mosely & Kimmins (1953) p. 486 apparently belongs to another species (Kimmins in litt.).

***Psyllobetina perkinsi* Neboiss, n. sp. Figs. 187-192.**

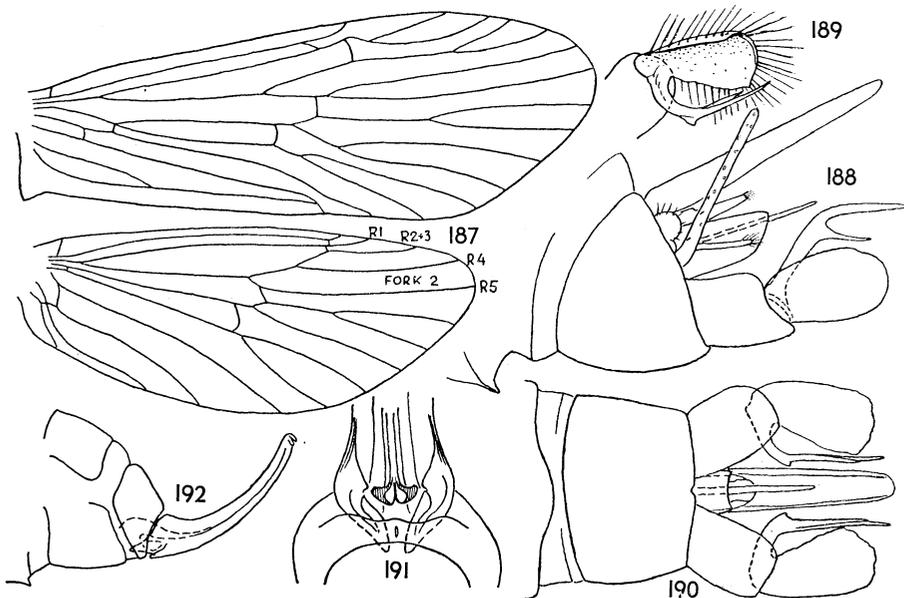
Insect yellowish brown, of medium size, general appearance similar to other species of this genus, but differs considerably in ♂ *genitalia*.

♂ *genitalia*: Dorsal plate of segment 9 long, narrow and straight extending slightly beyond inferior appendages. Upper penis cover formed by 2 pairs of straight processes, upper ones narrowed towards apex. Superior appendages straight, slender, directed upwards, with rounded tubercles at base. Penis stout, cylindrical, somewhat depressed laterally, apical ventral margin recessed, central duct straight extending beyond apex. Inferior appendages 2-segmented, proximal segment short, broad somewhat rectangular laterally, distal segment oval with long rounded bispinose inner lobe arising from basal ventral margin. Short and broad ventral process to sternite 7.

♀ *genitalia*: Oviscapt proportions similar to *plutonis*, but differs in having the widened central section on ventral side without dentations; and no protuberances on segment 8. Small ventral processes to sternite 6.

Length of anterior wings: 7-8 mm.

Type material: Holotype ♂, Binna Burra, Qld. 29. X. 1955, F. A. Perkins (QM); allotype ♀, Lamington Nat. Park, Qld. 15. XI. 1955, T. C. Yeo (QM); 4 paratypes: 1 ♂, National Park, Qld. 1-5. VI. 1955, F. A. Perkins and T. C. Yeo (CSIRO); 1 ♂, Lamington Nat. Park 4. VII. 1955, T. C. Yeo (NMV); 2 ♂♂, data as allotype (QM).



Figs. 187-192. *Psyllobetina perkinsi*, n. sp.: 187, ♂ wing venation; 188, ♂ genitalia lateral; 189, inferior appendage dorsal; 190, ♂ genitalia ventral; 191, ♀ genitalia ventral; 192, lateral.

DISTRIBUTION: S. Queensland.

It is a pleasure to name this species after Dr. F. A. Perkins, Department of Entomology, Queensland University, Brisbane, who has greatly facilitated this study and supplied rich and interesting material.

Genus *Allobiosis* Mosely

Type species: *Allobiosis erratica* Mosely.

Genus distinguished by having long footstalks of forks 1, 2 and 3, and characteristic formation of outward bowed footstalks of forks 4 and 5 in anterior wing. This genus appears to be the nearest to *Psyllobetina*. Only one species known in this genus.

Allobiosis erratica Mosely

Allobiosis erratica Mosely, 1953, IN Mosely & Kimmins, Trich. Austr. & N. Z.: 484, fig. 327.

Type: ♀, Wentworth Falls, N. S. W. 23.II.1916, R. J. Tillyard (BMNH).

♂: Unknown.

DISTRIBUTION: New South Wales.

No new material has been available for study.

Summary of distribution, and check list of Australian Hydrobiosinae

Species \ State	N. Qld.	S. Qld.	N. N. S. W.	S. N. S. W.	NE & C Vic.	W Vic.	SA	Tas.	WA	Page
<i>Apsilochorema gisbum</i>		+	+	+	+	+	+	+		527
<i>obliquum</i>		+	+	+	+	+				527
<i>urdalum</i>									+	528
<i>Allochorema reclivatum</i>				+	+					530
<i>tasmanicum</i>								+		530
<i>Austrochorema alpinum</i>				+	+					534
<i>concupium</i>					+					535
<i>evansi</i>								+		533
<i>nama</i>				+			+			536
<i>patulum</i>			+							533
<i>pegidion</i>								+		535
<i>wentum</i>				+						537
<i>Ulmerochorema breve</i>								+		539
<i>lentum</i>				+		+				539
<i>luxaturum</i>					+					546
<i>membrum</i>		+	+	+	+	+				544
<i>rubiconum</i>				+	+			+		542
<i>seona</i>			+	+	+	+		+		545
<i>stigma</i>	+	+		+		+		+		541
<i>tasmanicum</i>								+		543
<i>Megogata necopina</i>					+					548
<i>Tanjilana akroreia</i>					+					549
<i>zothecula</i>				+						550
<i>Taschorema asmanum</i>								+		564
<i>brunneum</i>		+	+	+	+	+				557
<i>evansi</i>					+	+	+	+		561
<i>hesperium</i>						+				560
<i>kimminsi</i>					+					558
<i>nesydrium</i>								+		562
<i>nigratum</i>	+	+	+	+	+	+	+			565
<i>ochraceum</i>		+		+						558
<i>pallescens</i>									+	553
<i>rieki</i>			+							566
<i>rugulum</i>					+					559
<i>turbidum</i>				+	+					555
<i>viridarium</i>								+		563

Koetonga clivicola				+	+					567
Moruya charadra								+		570
opora								+		571
Psyllobetina attunga				+	+					575
cumberlandica					+					573
locula					+					576
perkinsi		+								578
plutonis		+	+							577
Allobiosis erratica			+							579
	2	9	10	18	21	10	4	14	2	

ACKNOWLEDGMENTS

I express most sincere thanks to the institutions and collectors who made available their material for this study, particularly to Mr. D. E. Kimmins of British Museum (Natural History), London for his keen interest and effective help on many difficult problems, and to the Director of the Naturhistoriska Riksmuseum, Stockholm for the loan of a type specimen. Acknowledgments are here made also to Mr. E. F. Riek, C.S.I.R.O., Canberra, to Mr. E. D. Gill, National Museum of Victoria, Melbourne, and to Mr. R. A. Dunn, Melbourne, for their advice and criticism on various aspects.

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APPENDIX

Austrochorema spinosum Neboiss, n. sp. Fig. 193, a & b.

Among Trichoptera specimens received from Australian Museum, Sydney for identification, another new species of *Austrochorema* was discovered. The insect is of uniform yellowish brown color, and does not produce any distinct characteristics other than those

of ♂ genitalia. It closely resembles *concupium*, and keys out with this species in the couplet 6, but could be separated from the latter by having the 2 penis sheaths of unequal length, the longest one clavate and spinose at apex. Inferior appendages with proximal segment short, ventral margin turned inwards, irregularly dentate, posterior angle produced into long slightly curved acutely pointed tooth; distal segment elongate, somewhat lanceolate, rounded at apex.

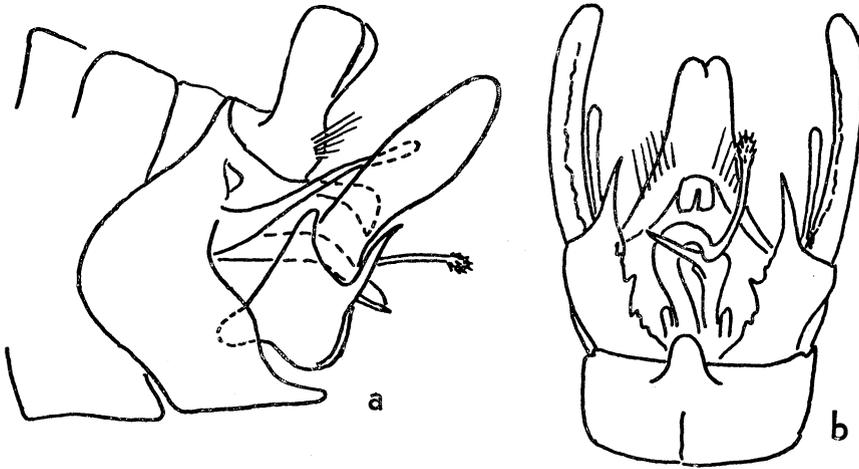


Fig. 193. *Austrochorema spinosum*, n. sp.: a, ♂ genitalia lateral; b, ventral.

There is also a ♀ specimen of an *Austrochorema* species from the same locality, but at this stage it is impossible to decide to which species it belong—*spinosum* or *patulum*. Both species for the time being, are known from Barrington Tops only.

Length of anterior wing: (♂) 7 mm.

♀: Unknown.

Type material: Holotype ♂ Barrington Tops, Jan. 1925. S. U. Zool. Exped. (AM).

DISTRIBUTION: New South Wales.