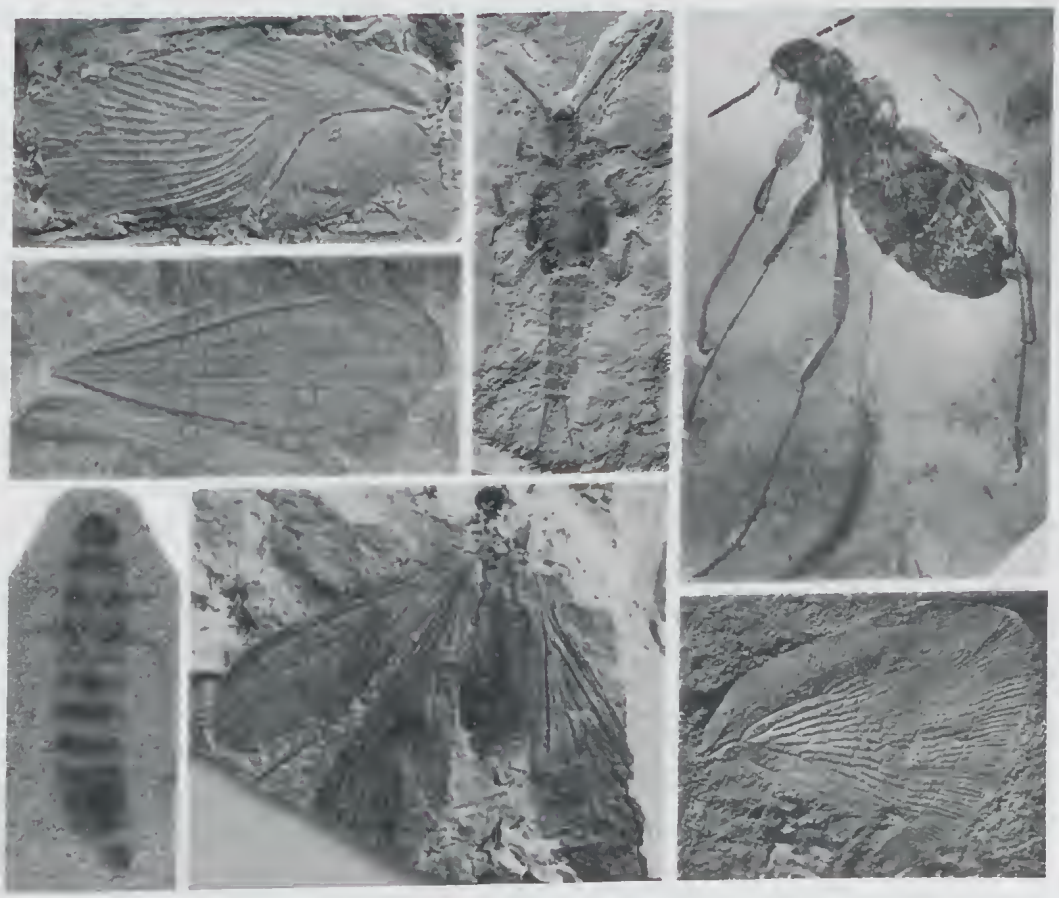
FOSSIL INSECTS OF AUSTRALIA



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THE FOSSIL INSECTS OF AUSTRALIA

P.A. JELL

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A taxonomic catalogue of the known fossil insects of Australia provides illustrations of at least one species of every genus so far identified. Every known species is recorded with the age, rock unit (formation) and location (sedimentary basin). Some synonymies and updated taxonomic placements are included but this has not been an exhaustive review of taxonomy. The principal sources for fossil insects are described as the Upper Permian Boolaroo Formation in the Newcastle Coal Measures adjacent to Lake Macquarie, the Hawkesbury Sandstone at Brookvale in Sydney, the Mt Crosby and Blackstone Formations in the Upper Triassic Ipswich Coal Measures of southeastern Queensland and the Lower Cretaceous Koonwarra Fossil Bed in South Gippsland, Victoria. Other minor sites are discussed and potential for further research is outlined. *Austroscarites* is introduced to replace the preoccupied *Scarites* Hamilton not Fabricius. ❐ *Fossil insects, Australia, Permian, Triassic, Cretaceous, catalogue.*

Peter A. Jell, Queensland Museum, PO Box 3300, South Brisbane, Queensland 4101, Australia; 1 August 2004.

The living insect fauna of Australia is obviously abundant and diverse to inhabitants and visitors alike. The importance of the insect fauna to our way of life and our economy has been documented by many people since the first arrival of Europeans. Assuming living diversity is an indication of the insect fauna at any instant of the geological past and in view of the known evolution of insects during geological time we can project an enormous number of species that must have inhabited this continent since the origin of insects during the early Palaeozoic. However, the majority of these were almost certainly never fossilised and have left no record. Marine faunas have a better fossilization potential than terrestrial ones. It is estimated that overall less than 1% of living species at any one instant in time will be fossilized and collectable to enter the palaeontological literature. Thus the known fossil insect record of more than 400 species in approximately 250 genera is only a small fraction of the insect species that have lived in Australia.

In each edition of 'The Insects of Australia' a chapter was devoted to their fossil history. Riek (1970c) and Kukalova-Peck (1991) gave good overviews of the fossil history of Australia and fitted it into the broader story of insect evolution across the globe. The aim of this publication is to complement those accounts with a comprehensive listing of the fossil insect species described from Australia along with illustration of at least one species from each genus.

GEOLOGICAL SETTING OF FOSSIL INSECT SITES

Compared to the number of Australian fossil sites or to the number of insect fossil sites worldwide only a few sites around Australia have yielded fossils of insects (Fig. 1). These sites provide imperfect data for only a very few instants of geological history (Fig. 2).

HELLYER GORGE SITE IN UPPER CARBONIFEROUS WYNYARD TILLITE.

The earliest known insect from Australia comes from the Hellyer Gorge district of northwestern Tasmania where the single, almost complete specimen, with 50mm wing span, was found in a 1m fossiliferous band of varve-like sediments within the Wynyard Tillite. Tillites occur in the formation both above and below the finegrained fossiliferous section. The co-occurring fossil plant, *Botrychiopsis plantiana*, and Stage I microflora indicate a Late Carboniferous age and the primitive insect structure suggests early Late Carboniferous. The sedimentary environment and paucity of associated insects indicate deposition in cold conditions close to glacial ice. Riek (1976) erected the Psychroptilidae and Suborder Neosecoptera as monotypic taxa for this insect, *Psychroptilus burrettae* Riek, 1976 within the Order Megasecoptera. He outlined the difficulty of classifying this species by indicating features it shares with the Megasecoptera (wing venation except Sc ends abruptly on the costal margin just beyond the midlength of the wing) others it shares with the Palaeodictyoptera (wings

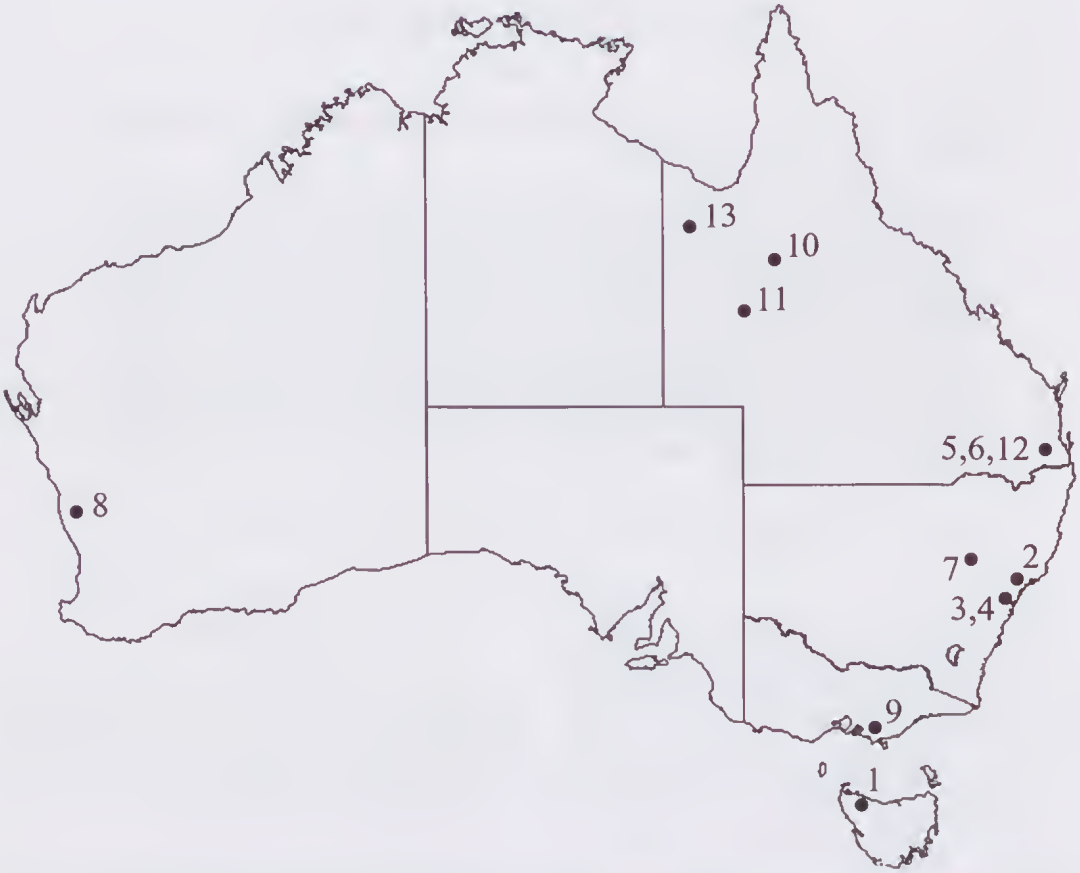


FIG. 1. Distribution of main fossil insect sites. 1=UCarboniferous Wynyard Tillite at Hellyer Gorge; 2=UPermian Newcastle Coal Measures at Belmont just south of Newcastle; 3=MTriassic (Anisian) Brookvale Shale in Hawkesbury Sandstone near Manly in suburbs of Sydney; 4=MTriassic (Anisian) Ashfield Formation in Wianamatta Group at St Peters near Newtown, suburban Sydney; 5=UTriassic (Carnian) Mt Crosby Formation in lower Ipswich Coal Measures just north of Ipswich; 6=UTriassic (Carnian) Blackstone Formation at top of Ipswich Coal Measures on Denmark Hill in suburban Ipswich; 7=LJurassic Talbragar Fish Bed in the Purlawaugh Formation near Gulgong; 8=LCretaceous Cockleshell Gully Formation in Hill River area, northern Perth Basin; 9=LCretaceous (Aptian) Koonwarra Fossil Bed on the South Gippsland Highway near Tarwin in the Gippsland Basin; 10=LCretaceous Wallumbilla Fm near Richmond, Great Artesian Basin; 11=UCretaceous Winton Formation near Winton, Great Artesian Basin; 12=Palaeocene Redbank Plains Formation east of Ipswich; 13=Late Oligocene/Early Miocene Upper Site in Riversleigh Limestones north of Mount Isa.

broad at the base) and others not previously known in either of those orders. By comparison to the Northern Hemisphere faunas the Carboniferous insect fauna of Australia is virtually unknown.

BELMONT INSECT FAUNA IN UPPER PERMIAN NEWCASTLE COAL MEASURES. The Upper Permian insects from the Newcastle Coal Measures described mainly by Tillyard came from an area of 10-20km^2 between the town of Belmont and Warners Bay on the eastern side of Lake Macquarie some 10km southwest of Newcastle. A sand and conglomerate fan was probably braiding through coal swamps along the southeastern flank of the Hunter Trough in the Late Permian, sourcing its clastic material primarily from higher land to the north and northwest (Engel, 1966). The widespread and persistent insect beds, which are fine grained volcaniclastic units (tuffs) associated with plenty of plant detritus mainly *Glossopteris* leaves and *Phyllotheca*, were apparently deposited during a brief, episodic event and fairly rapidly buried.

The insects were very likely a wing-float concentration, with the wings remaining buoyant until the waterbody was choked with ash, possibly enhanced by storm action during or just after the eruption. Adjacent coal seams, conglomerates and tuff beds indicate a dynamic environment with swamp conditions prevailing when and where short term quiet conditions became established. Details of stratigraphic relationships in the Belmont area are provided by Hawley & Brunton (1995) and Little et al. (1996). Rare insects have been found in the Lambton Formation adjacent to the Dudley Coal Seam (*Permoscarta mitchelli* Tillyard, 1918b, *Mitchelloneura permiana* Tillyard, 1921b and *Lophioneura ustulata* Tillyard, 1921b) at the base of the Newcastle Coal Measures but the major horizon is within the Boolaroo Formation in the upper half of the coal measures. As with many coal measure stratigraphies there is an extremely fine subdivision to reflect the various coal seams but these units are often of restricted extent so the listing below refers to the Newcastle Coal Measures as the provenance of the insects from this area. This fauna is rich in Homoptera, Psocoptera, Neuroptera, Mecoptera but lacks blattoids or palaeoptera.

MIDDLE TRIASSIC HAWKESBURY SANDSTONE AT BROOKVALE, SYDNEY. The Middle Triassic (Anisian) Hawkesbury Sandstone in the Sydney Basin envelops a lens of fine mudstone referred to as the Brookvale Shale lens (about 8m thick) which was best exposed in the Brookvale Quarry on Beacon Hill, Brookvale, near Manly, north of Sydney Harbour where it yielded many fish, many plants (*Dicroidium zuberi* flora), amphibians, unionid bivalves, crustaceans, insects, trace fossils and some enigmatic fossils. This mudstone lens may be interpreted as a lacustrine interval on a quartz sandstone coastal plain and from the fauna a freshwater environment is most probable. The insect fauna includes the large titanopteran, *Clatrotitan,* a mecopteroid, a protorthopteroid, orthopteroids and a stonefly.

MIDDLE TRIASSIC ASHFIELD FORMATION AT ST PETERS, SYDNEY. The Ashfield Shale (40-60m thick in the Wianamatta Group) overlies the Mittagong Formation (up to 15m thick) which in turn overlies the Hawkesbury Sandstone in the area immediately west and southwest of Sydney known as the Cumberland Basin. Outcrop of the Ashfield Shale defines the shape of the basin. Siltstone and

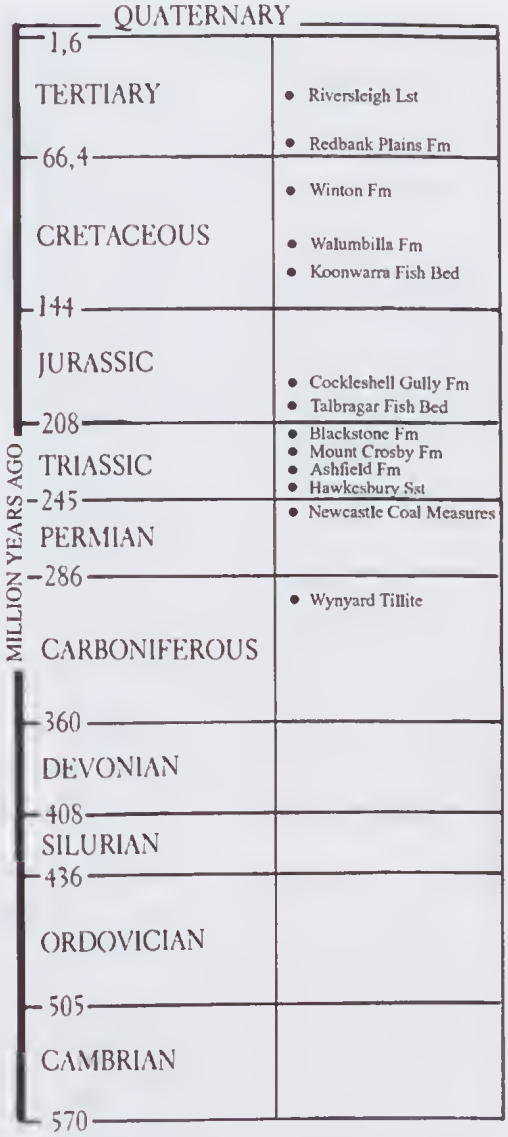


FIG. 2. Stratigraphic succession of important known insect sites.

clay from low in the formation was extensively quarried in the St Peters district for manufacture of house bricks. An extensive fauna of bivalves, fish, a shark, labyrinthodonts, an isopod, the insects and plants has been collected from these quarries and indicates a freshwater environment. Its age is Middle Triassic (late Anisian) based mainly on the floral components of the fauna. The insects are predominantly beetle elytra, a large blattodea and the large titanopteran, *Mesotitan*,

but nothing has been added to the work of Tillyard (1916). Tillyard (1918b) described another Ashfield insect fauna from a railway cutting at Glenlee, 6.5km south of Campbelltown on the main southern line with a very similar assemblage to that from St Peters i.e. dominated by beetle elytra, the same blattodean genus and a mecopteroid rather than the large titanoptera.

UPPER TRIASSIC MT CROSBY FORMATION, IPSWICH COAL MEASURES AT MT CROSBY, NORTH OF IPSWICH, SOUTHEASTERN QUEENSLAND. The Mount Crosby Formation, the oldest in the Ipswich Coal Measures occupies an area north of Ipswich adjacent to the Brisbane River of some 30km^2. It is 20-30m thick and consists mainly of polymictic, poorly sorted conglomerate but has 3 shale units, up to 6m thick near the bottom, middle and top of the unit. The upper two shale units are fossiliferous with prolific plant and insect remains. The conglomerates of the formation indicate rapid erosion from an adjacent highland (the Daguilar Block) and little transport. The shale units indicate restricted quiet lacustrine conditions at various times on this piedmont fan. The insect fauna is dominated by Blattodea and Homoptera with Mecoptera, Diptera, Orthoptera, Neuroptera, Coleoptera, Odonata, Plecoptera, and Hymenoptera represented.

UPPER TRIASSIC BLACKSTONE FORMATION, IPSWICH COAL MEASURES AT DENMARK HILL, IPSWICH, SOUTHEASTERN QUEENSLAND. At Denmark Hill very close to the centre of Ipswich the upper part of the Ipswich Coal Measures underlies an urban park reserve. In 1890 insects were first found in this locality and much geological interest followed. The richly fossiliferous horizon is a finely arenaceous siltstone about 15cm thick assigned to the Blackstone Formation, the youngest formation of the Ipswich Coal Measures. Coal seams are known above and below the fossiliferous sequence indicating a lacustrine environment. Plant fossils are prolific and among the fauna freshwater bivalves and estherid crustaceans accompany the insects while dinosaur footprints are known in the formation. Dunstan (1916) gave a detailed account of the small quarry in which the insects were collected. The fauna is dominated by beetle elytra, Blattodea and Homoptera and includes fewer Orthoptera, Phasmatodea, Neuroptera, and Mecoptera.

LOWER CRETACEOUS (APTIAN) KOONWARRA FOSSIL BED NEAR LEONGATHA, SOUTH GIPPSLAND, VICTORIA. During road widening excavations on the South Gippsland Highway between Koonwarra and Tarwin council workers recognised fossil fish in the spoil. A short succession of varved lake deposits is within a thick fluviatile succession, the Korumburra Group (=Strzelecki Group). The lacustrine sequence contains some beds with abundant fish (Waldman, 1971) and other beds with numerous insects, plants and a few other arthropods, some annelid worms (Jell & Roberts, 1986) and a few feathers (Talent et al., 1966), the earliest indications of birds in Australia. The insects include many aquatic larvae and numerous terrestrial adults. By analogy with present day lakes in western Victoria it was possible to identify representatives of the insect fauna that lived in the lake, a fauna of larvae that lived in a feeder stream and insects that lived on the surrounding land and then fell onto the surface of the water (Jell & Duncan, 1986). Mayfly nymphs from the stream fauna and dipteran and beetle larvae from the lake dominate the aquatic fauna while Hemiptera, Mecoptera, hymenopterans, beetles, flies and blattodea are common among the winged adults. The beds are dated palynologically (Dettmann, 1986) as Aptian and a fission track date (Drinnan & Chambers, 1986) of 116±5Ma has been obtained.

PALEOCENE REDBANK PLAINS FORMATION NEAR IPSWICH, SOUTHEASTERN QUEENSLAND. The Tertiary Booval Basin which overlies the Mesozoic Ipswich Basin extends over 50km^2 in the Ipswich-Bundamba-Dinmore area. The Palaeocene Redbank Plains Formation consists of about 70m of mudstone, claystone, shale and fine sandstone which were deposited in a freshwater lake in structural depressions on the eroding upper surface of the Ipswich Basin sediments. The fossil content includes fish, turtles, crocodiles, ostracodes, cladocerans, insects and plants. Riek (1952a) noted two different faunas: one at Redbank Plains in a hardened band of ferruginous mudstone is dominated by Homoptera and Coleoptera with a few Diptera, Mecoptera, Neuroptera, Orthoptera and Hemiptera and the other, at Dinmore in compact clays and clay shales, contains Orthoptera, Isoptera, Megaloptera, Homoptera and possibly Odonata.

POTENTIAL FOR FUTURE FOSSIL INSECT RESEARCH IN AUSTRALIA

CARBONIFEROUS. The nonmarine mostly Upper Carboniferous Joe Joe Formation in the Drummond Basin of central Queensland contains finegrained varved siltstones and mudstones in its upper part. In the varved units at a number of localities are arthropod tracks closely comparable to those which occur with the only known Australian Carboniferous insect in the Wynyard Tillite in Tasmania. Although no evidence of fossil insects in the Joe Joe Formation exists it is clear that the right sorts of environments existed and some further prospecting in the fine lacustrine sediments could be productive.

UPPER TRIASSIC BEDS IN NORTHERN ESK GRABEN. North of the Ipswich area in southeastern Queensland extends the Esk Trough, a NNW/SSE trending structurally controlled intermontane basin of mainly Middle Triassic (Anisian) sedimentation. The northern extent of this structure is not obvious and the more widespread sediments of this age in the Murgon- Gayndah area are probably northern deposits in the same large lake of that time. The whole belt from Wivenhoe to Gayndah had a dynamic environment with active degradation of adjacent highlands as indicated by abundant and widespread conglomerates and conglomerate/ sandstone/shale alternation vertically and laterally. Tuffs throughout and larva flows in the northern areas indicate contemporary volcanism. Through this large area of deposition, plant fossils are common with floras dominated by *Dicroidium*. A few insects have been collected from the Esk Formation in the Wivenhoe/ Bellevue area (*Steinhardtia* and a proto-elytroptera in the QM collection), an extensive collection of insects, dominated by blattodeans and beetles from the Mondure Formation in the region north of Murgon to Windera is in the Queensland Museum and insects are known (Lambkin, 1988) in the Gayndah Formation near Gayndah. The insects in these three ocurrences are Middle Triassic and thus older than the Denmark Hill and Mt Crosby faunas and of comparable age to the Brookvale and Ashfield faunas in Sydney. There is a very significant scope for further work in this region with the promise of significant results in piecing together Australian insect faunas of that age.

MESOZOIC INSECTS IN WESTERN AUSTRALIA. Two records of insects in the Mesozoic of Western Australia are in the Lower Jurassic Cockleshell Gully Formation (Riek, 1968c) and the Cretaceous (Santonian) Gingin Chalk (Etheridge, 1913).

Riek (1968c) described the tenebrionid beetle, *Mesothoris westraliensis* and noted two other indeterminate beetle elytra and a poorly preserved cockroach forewing possibly allied to *Austroblatulla*. Riek (1968c) speculated that the sediments were Triassic based on the ranges of various insect groups in Australia. However, Balme (1964a) determined an Early Jurassic age palynologically and the enclosing sediments are now considered part of the Cattamarra Coal Measures Member of the Cockleshell Gully Formation. The material was collected at 3 different localities in the Hill River region inland from Jurien Bay so the occurrence is not a restricted one. These insects occur in nonmarine finegrained shales and siltstones associated with widespread subsurface coal seams, an environment very conducive to insect fossilization. Riek (1968c) indicated that although they were too poorly preserved for identification, numerous other insects occurred in the same collection. There is every indication that a more comprehensive insect fauna remains to be found in this rock unit. Since our knowledge of Australian Jurassic faunas is almost non-existant, any futher results from this source could be extremely significant.

Etheridge (1913) illustrated a beetle elytron and indicated a myriapod sclerite in a collection of fossils sent to him from One Tree Hill, just north of Gingin. The small quarry on top of this hill is in the Upper Cretaceous Gingin Chalk, a white, friable slightly glauconitic chalk. It is a marine unit with foraminifera, corals, crinoids, bivalves, ammonites and other typical marine fossils. This is an extremely unlikely environment in which to find terrestrial arthropods fossilized and Etheridge's report must be examined cautiously. Apparently, no further insects or myriapods have been collected from this unit and my efforts in the same quarry produced no semblance of them so I am very skeptical of the 1913 report.

JURASSIC TALBRAGAR FISH BED NEW SOUTH WALES. The celebrated Talbragar Fish Beds in the Lower Jurassic Purlawaugh Formation between Gulgong and Mudgee in central New South Wales are best known for their

FIG. 3. *Cicada*? *lowei* Etheridge & Oliff, 1890; AMF35725; 20mm long. The only insect so far described from the Talbragar Fish Bed.

prolific fish and plant fossils but it has long been known that they contain a few insects. These fine cherty shales were deposited in a relatively small body of water near the southern margin of a very large freshwater lake that extended north into Queensland and west almost to South Australia. In 1889 soon after the fossil site was found Charles Cullen was sent by the Geological Survey of New South Wales to make a collection of the fish and plants. Among the very many specimens he procured was a single insect specimen. Etheridge & Oliff (1890) erected *Cicada*? *lowei* for this specimen (Fig. 3). Rick (1970c) noted this specimen as coming from the Jurassic but considered its identification as a cicada to be wrong. However, because he did not show any identified Jurassic occurrences of insects from Australia (Rick, 1970c, table 8.1) it may be assumed he considered the specimen unidentifiable. Other rare insects from the Talbragar Fish Beds are known to be in private collections and a study of this fauna is required as the only available Australian Jurassic insect fauna.

CRETACEOUS OF WESTERN QUEENSLAND. The marine Lower Cretaceous Walumbilla Formation of the Richmond-Hughenden area in the Great Artesian Basin has yielded several dragonfly wings of one species. The first of these was the first fossil insect recorded from Australia (Woodward, 1884). These are quite rare among a very diverse marine fauna and prospecting for these specific forms would be an extremely time costly exercise. They are more likely to be found coincidently by people collecting the marine fauna and usually at different times.

During excavations to collect sauropod dinosaurs in the Upper Cretaceous, fluviatile, nonmarine Winton Formation near Winton, western Queensland, three insect specimens have been collected. One is a dragonfly wing, the same or similar to that from the marine Walumbilla Formation and the other two are incomplete mecopteroid specimens. The insects are relatively rare in fine shales with prolific plant fossils. These sediments weather rapidly on exposure and the fossils were only found because fresh sediment was being excavated on a considerable scale to build a dam. Further excavation in these sediments in the same area is likely to produce more specimens and although the rate of discovery could be expected to be erratic and not guaranteed its continuation could be highly beneficial as the second Cretaceous site in Australia. The Winton Formation outcrops over wide areas of western Queensland on top of the marine sequence in the Artesian Basin and since it is now known to contain at least one fossil locality, further prospecting, especially of sites with fine lacustrine sediments and/or plant fossils should be undertaken.

TERTIARY LIMESTONES AT RIVERSLEIGH, NORTHWESTERN QUEENSLAND. Riversleigh, northwestern Queensland, has been made a household word in vertebrate palaeontology by the extensive etching of Tertiary limestones which has liberated diverse assemblages of bones from numerous Oligocene to Pleistocene horizons. Limestone from the Late Oligocene/early Miocene Upper Site yielded some 3D insect remains mentioned in preliminary lists in Archer et al. (1989, 1991). Duncan, Briggs & Archer (1998) studied the mechanism of preservation of these Riversleigh insects in which the cutiele has been replaced by phosphate and offered a preliminary taxonomy of the specimens used in their study. They referred to 4 different species of beetles (including a

eureulionid, a hydrophyloid and a eupidoid), a triehopteran larva and a juliid millipede and noted that other inseets are present in the fauna. Co-oeeurring taxa are one, possibly two, speeies of ants, an hemipteran, possibly a eieada, and millipedes The speeimen illustrated by Archer et al. (1991) as a millipede represents the same taxon as that deseribed as the tail assembly of a triehopteran larva by Dunean et al. (1998). Diseussions with various entomologists have unearthed a variety of different opinions as to the identifieation of several of these taxa. The Upper Site whieh yielded the faunule is interpreted as a shallow lime-rieh pool in a rain forest where anaerobie eonditions may have intermittently oeeurred. Etehing of the Riversleigh limestones is eontinuing and a detailed study of these inseets preserved in sueh a rarely seen way is neeessary as soon as possible.

FOSSIL INSECT THAT IS A CRUSTACEAN

Austrolestidion duaringae Tillyard, 1916 was ereeted for two speeimens (GSQI20) in a eore of Tertiary sediments from the Duaringa Bore in eentral Queensland that were identified as zygopterid dragonfly larvae. Rozefelds (1985) provided a good photograph of the speeimens and suggested that it probably represents a single juvenile parastaeid erustaeean. The ehelate appendages are eonfirmation of this identifieation. However, Riek (1970b), Kukalova-Pek (1991) and Carpenter (1992) still maintained it amongst the Zygoptera, apparently not having examined the speeimen and unaware of Rozefelds' paper.

FIG. 4. *Austrolestidion duaringae* Tillyard, 1916, GSQI20; body 20mm long. A juvenile parastacid crustacean.

INSECT THAT IS A FAKED FOSSIL

Austrodictya Tillyard, 1922e, with type speeies *A. corbouldi* Tillyard, 1922e, was based on a wing fragment (distal third) preserved in a erystal of selenite (or gypsum). The speeimen eame from the Mount Elliott Mine in Preeambrian terrane in northwestern Queensland. It was eolleeted 87m (260 feet) below the surfaee in the eopper lode being worked in the mine. Tillyard went to great pains to impress on his readers that the wing fragment was eompletely embedded in the erystal and eould not possibly have been meehanieally inserted. Tillyard eonsidered it an arehaie orthopteran quite unlike anything he had seen in the living or fossil fauna. He even sent a drawing of the venation to Mr A.N. Caudell, well known orthopterist of the day at the US National Museum, who eoneurred that it resembled nothing in the living fauna.

The speeimen whieh had been forwarded to the Geologieal Survey of New South Wales, Sydney in about 1912 by Mr Corbould, Manager of the Mt Elliott Mine, remains in the Mines Department eolleetions to this day (MMF25954). It next attraeted attention in 1952. Harry S. Ladd, U.S. National Museum, Washington DC who was eompiling a major work on the variety of types of fossilization of different fossils enquired about it as an unique speeimen. Mr H.F. Whitworth, Curator of the Geologieal & Mining Museum set out to photograph the speeimen for Ladd. He found the faee of the erystal somewhat seratehed over time and deeided it would be best photographed under water.

To his surprise, Mr Whitworth found that when he immersed it in water, air bubbles formed around the wing. This suggested a eavity. On further investigation he found a slit along the side and eoneluded that the wing fragment must have been inserted between the flexible laths of the erystal. Whitworth related how he had earried out the same exereise of spreading the laths with the blade of a penknife and inserting a wing. Indeed I have done the same thing and it is perfeetly aehievable.

Whitworth took Tillyard's speeimen to Mr A. Musgrave, entomologist at the Australian

Museum, who identified the wing as belonging to *Terpandrus horridus*, commonly known as the Great Gum-Tree Grasshopper and well known in northern Australia.

Clearly, someone had inserted the wing fragment into the crystal as a joke, but the joke went on too far and thus we have *Austrodictya corbouldi* as a junior synonym of *Terpandrus horridus* and one generic name is removed from the catalogue of Australian fossil insects.

INSECT TRACES

LEAF MINES As they are traces of insect activity, mention should be made of a series of papers by Andrew Rozefelds (1988a, 1988b; Rozefelds & Sobbe, 1987) on leaf mines in Triassic to Eocene leaves. Mesozoic examples are rarely recorded and probably not common. Further, the inference that the Late Jurassic to Early Cretaceous *Pachypteris* leaf mine is the work of a lepidopteran makes it a very early record for this order and the only record of a lepidopteran mining a gymnosperm. It has already raised expressions of doubt from the Northern Hemisphere (Zherikhin in Rasnitsyn & Cooke, 2002:360).

TAXONOMIC PLACEMENT

Taxonomic nomenclature applied to fossil insects is not yet generally agreed between all palaeoentomologists. The contents of many groups vary widely among authors (cf. the family classification of the Mecoptera between Willman (1989b), Carpenter (1992) and Novokshonov in Rasnitsyn & Quicke (2002)). In the taxonomic compilation herein I have worked from the original placement and applied what appear to me to be sensible amendments. In many cases I have inserted notes in [ ] to indicate some history of the taxon but this is not exhaustive and I acknowledge that many of the taxa are relatively poorly known and in need of careful revision. Part of the aim of this work is to collate the entire known fauna to promote some of the necessary revisionary work.

In the case of our earlier paper on the Koonwarra Fossil Bed fauna (Jell & Duncan, 1986) we made something of the same statement, acknowledging our shortcomings across all the insect orders and hoping that specialists would be able to improve on these placements. I am delighted to be able to report here on the work of Ansorge (1996), Borkent (1997), Hamilton (1992) and Nauman (1993) who have improved our knowledge of various taxa from that fauna.

A couple of areas of taxonomy are worthy of further discussion.

TINDALE'S THEORY OF PRIMITIVE LEPIDOPTERA IN THE TRIASSIC OF QUEENSLAND. Tindale (1945) erected *Eoses triassica,* on a specimen from the Upper Triassic Mt Crosby Formation, as a member of the Lepidoptera within a new suborder, the Eoneura. This claim had considerable significance as it would be the earliest known lepidopteran by a long way. Riek (1955) discussed this claim at length and concluded that *Eoses triassica* is a junior synonym of *Mesochorista proavita* Tillyard, 1916 from Denmark Hill (Riek (1955) identified numerous specimens of this species in material from Mt Crosby) and belongs to the Mecoptera. Tindale (1980) replied by stating further evidence for why he considered *Eoses* to be a lepidopteran and at the same time erected *Eocorona iani* as another lepidopteran in the Eoneura from the same Mt Crosby horizon. Sukhacheva (1982:9) considered *Eocorona* to be a junior synonym of *Prorhyacophila* Riek, 1955 within the Trichoptera. Thus there is considerable refutation of the ideas espoused by Tindale and apparently no other worker has supported, in print, Tindale's assertions of Triassic lepidopterans. Carpenter (1992) noted Tindale's work, discussed Riek's point and considered them unlikely to be lepidopterans. On that basis I have accepted the synonymies of these two genera.

MESOTITAN. Mesotitan giganteus Tillyard, 1916, the type species by monotypy, is based on a single large specimen, GSQI22a from brick pits in the Ashfield Formation (previously the Wianamatta Shales) at St Peters, Newtown, Sydney. *Clatrotitan* McKeown, 1937 (see below) was also assigned to the Mesotitanidae and several recent accounts (notably Sharov (1968), Carpenter (1992) and Gorochov & Rasnitsyn in Rasnitsyn & Quicke (2002)) have considered the two genera synonymous. On the otherhand Riek (1954c) considered that *Mesotitan* (i.e. *M. giganteus*) 'is a quite distinct genus [from *Clatrotitan*] most probably referable to the Homoptera'. The type specimen of *M. giganteus* is a difficult specimen to interpret and has never been adequately described or understood in the published literature. A preliminary examination indicates that an argument can be mounted to support Riek's claim of separate generic status

FIG. 5. *Mesotitan giganteus* Tillyard, 1916, holotype, GSQI22a, 15cm maximum width. The central axis of the body is more or less up and down the vetrical crack. This is apparently the counterpart and we are looking up at the underside of the wings. If any part of the body is preserved it would be expected on the opposing part which has not been located. On the left side, wing at 45° to the axis is the hindwing with the posterior cubital and anal areas still folded together with main veins extremely close together in a bundle just overlapping onto and concealing the proximal parts of the subcostal and costal areas of the forewing. The forewing is the long wing down the axis, probably in the position of rest. On the right side the two wings lie on top of each other at a very small angle as deduced by veins of the underlying forewing being pressed through the hindwing. The outer marginal or costal area of the forewing has flexed along the subcostal vein and been turned in under the subcostal area. This is why it appears the oblique crossveins of the outer part of the two wings are in two different directions.

for *Mesotitan* and *Clatrotitan* but there seems good reason to classify them in the one family. However, the considerable explanation and description of the specimen that will be necessary to fully understand this taxon is outside the scope of the present work and will be reserved for another publication. It is sufficient to say *Mesotitan* and *Clatrotitan* belong to the same family, currently classified under Titanoptera.

PERMOCEPHALUS & PERMOCAPITUS. Evans (1943a, 1943b) described these two genera as the heads of homopteran bugs. Although Evans (1957) later entertained some doubt about the specimens he continued to describe them as heads of Homoptera. Riek (1971) showed these specimens to be thoracic segments of small insects. Although he provided a detailed discussion of the possible relationships of these

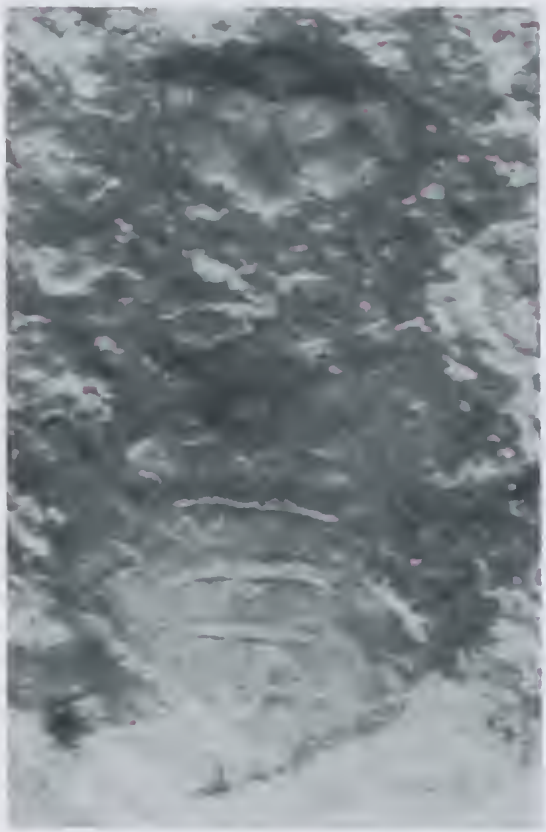


FIG. 6. *Permocephalus knighti*; holotype, AMF39865; 5mm long.

thoracic fragments he did not formally assign them to any group. The closest comparison he made was with recent Symphyta: Hymenoptera and with Neuroptera. In this state of uncertainty the two genera are not assigned within the following compilation. *Permocephalus knighti* Evans, 1943a (Fig. 6) based on the holotype AMF39865 and *Permocapitus globulus* Evans, 1943b based on holotype AMF40078 both from the Upper Permian Newcastle Coal Measures at Belmont, near Newcastle in the Sydney Basin.

CATALOGUE FORMAT AND REPOSITORIES

In the catalogue of Australian fossil insects that follows I have attempted to include all genera so far described along with most specimens in open nomenclature but the latter may not be entirely comprehensive. They are organised taxonomically by Orders and then in families arranged usually alphabetically under the order. There is no particular order to genera within the family headings. I have not attempted to diagnose any supragenerie taxa. Each generic entry has the "Name Author, date [type species]" on the first line. The next line has a diagnosis, usually quoted from the original work, or abbreviated where possible. After the diagnosis comes a list of "species Author, date; Age; Geological Formation (i.e. the rock unit); Sedimentary Basin or nearest town". Ages are abbreviated thus:- L, M, U for Lower, Middle and Upper, respectively; Carb=Carboniferous, Perm= Permian, Trias=Triassic, Jur=Jurassic, Cret= Cretaceous. Fm = Formation, FB=Fossil Bed, Sst=Sandstone, CM=Coal Measures. Sydney, Ipswich, Gippsland, etc are sedimentary basins.

Abbreviations for repositories are Australian Museum, Sydney (AMF), Geological Survey of Queensland, Brisbane (GSQI), Museum of Victoria (NMVP), Melbourne University Geology Department (MUGD), the Natural History Museum, London (BMNHIn) Queensland Museum, Brisbane (QMF), University of Queensland (UQF and UQC), University of Sydney, Geology Department (USGD). The Geological Survey of Queensland and University of Queensland collections have now been transferred to the Queensland Museum; the Melbourne University Geology Department collection is now in the Museum of Victoria; and the Sydney University collection is in the Australian Museum.

Order EPHEMEROPTERA (mayflies)

Family **BAETIDAE** Leach, 1815

Cleon Leach, 1815
Larva: small, shrimp-like; head very small; cerci short.
emmavillensis Riek, 1954b; Plioeene; Vegetable Ck, Emmaville, NSW.

Family **LEPTOPHLEBIIDAE** Banks, 1900

Atalophlebia Eaton, 1881 [*Ephemera australis* Walker, 1853]
Nymph dorsoventrally depressed, with widely flattened femora; head rectangular; eyes small, posterolateral, protruding slightly at margin, well separated medially; thorax slightly wider than head; insertions of foreleg close together, of mid and hindlegs well apart; femora 3 times as long as wide; tibiae not strongly flattened, not quite as long as femora; abdominal segments gradually increasing in length but narrowing, with 9th segment as long as wide; caudal cerci as long as abdomen.
culleni (Etheridge & Olliff, 1890); Plio; Vegetable Ck; Emmaville, N.S.W.

Family **SIPHLONURIDAE** Banks, 1900

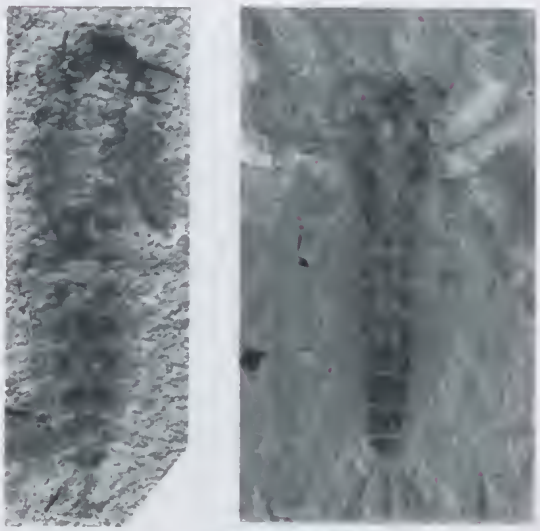
Promirara Jell & Duncan, 1986 [*cephalota*]
Nymph only. Similar to living *Mirawara* but with mouthparts less highly adapted for predation. Abdomen with 7 pairs of subequal gills, first pair not reduced. Cerci with hairs on the lateral as well as the median margin but hairs on lateral margins shorter and not extending to the base of cereus.
cephalota Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Australurus Jell & Duncan, 1986 [*plexus*]
Nymph only. Head elongate; mandibles large; antenna long; face above antennal insertions ridged. Legs long, thin; tibia shorter than tarsus; tarsal claw apparently long. Mesonotum raised, produced caudally; pronotum large. Abdomen with 7 pairs of unmodified lamellar gills; gill structure imperfectly known but each gill with a strengthened longitudinal ridge at or close to fore margin, possibly with a fibrillar tuft at base; segments 1-9 strongly produced posterolaterally into spines. Caudal filaments with dense fringes of fine hairs except on outer margins of each lateral filament.
plexus Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Cleon emmavillensis, AMD115, x5

Atalophlebia culleni, AMD113, x5

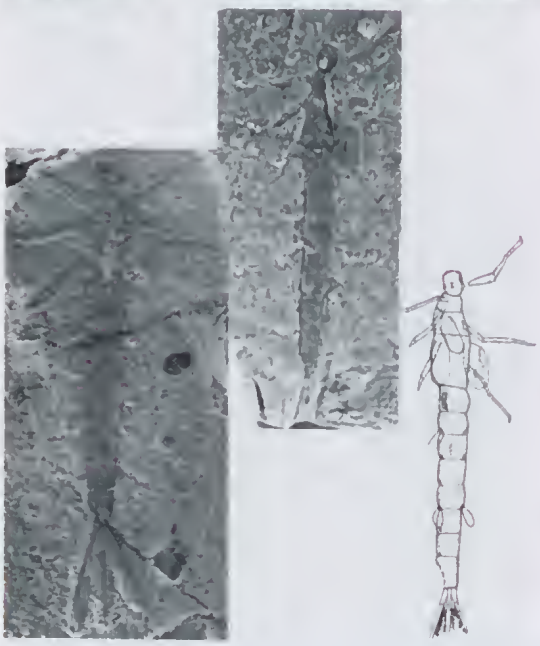
Promirara cephalota; large nymph NMVP 102472B (above), x3; immature nymph MUGD3757 (right), x9.



Australurus plexus; nymphs; MUGD3754 (far left), x8; NMVP102450 (left), x6; NMVP48610 (top, above), x8; NMVP103120 (above), x4.

Dulcimanna Jell & Duncan, 1986 [*sculptor*]
Nymph only, large, elongate body 10 times as long as wide. Head rounded, relatively small, with large bulging dorsal eyes, with entire margin on labrum. Legs with femora of approximately equal length from fore to hind legs, with tibiae and unsegmented tarsi becoming longer to hind leg, with strong curved relatively long tarsal claw. Abdomen with flat lobate gills on segments 1-7, with gently convex internal margins not spinose posterolaterally. Caudal filaments equal, with dense comb of fine long hairs along lateral margins exveept on outer edges of cerei.

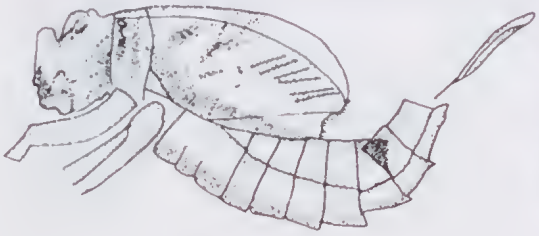
sculptor Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

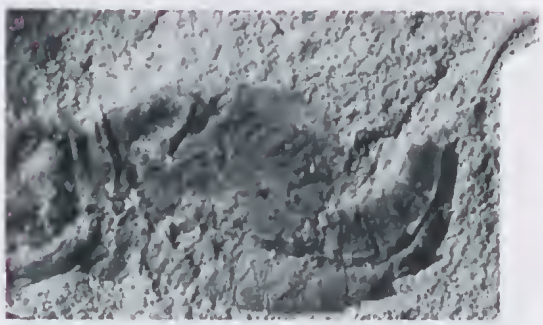


Dulcimanna sculptor; NMVP102507 (above centre) and AMF66758 (above left); x3. Line drawing (above right) of Jell & Duncan, 1986, fig. 2H

Siphlonuridae gen. nov. Jell & Duncan, 1986
Nymph only. Head rounded; mouthparts conspicuous; eye small; pleural spines at least on segment 9. Caudal filaments moderately long, slightly more than half length of abdomen.

gen. et sp. nov. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.





Siphlonuridae gen. et sp. nov., NMVP103210, x6. Line drawing (left) of Jell & Duncan, 1986, fig. 2E.

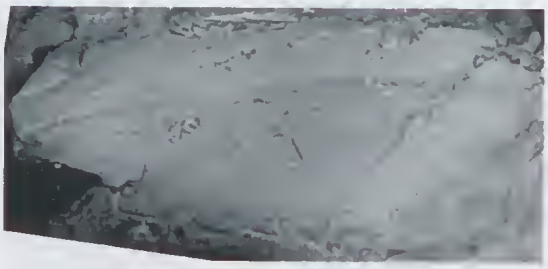
Order MEGASECOPTERA

Family **PSYCHROPTILIDAE** Riek, 1976

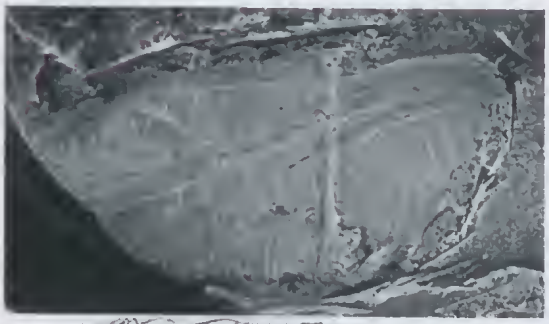
Psychroptilus Riek, 1976 [*burrettae*]
Hindwing slightly broader than forewing; Se ending on costa about 2/3 wing length from base; Rs 3-branched; MA, CuA and CuP simple; MP 2-branched;
burrettae Riek, 1976; UCarb; Wynyard Fm; ETas.

[Riek originally assigned this species to the Megaseeoptera noting that it combined features of that order and the Palaeodietyoptera. Subsequently it has been assigned to the Palaeodietyoptera by Carpenter (1992) and Rasnitsyn & Quieke (2002) among others.]

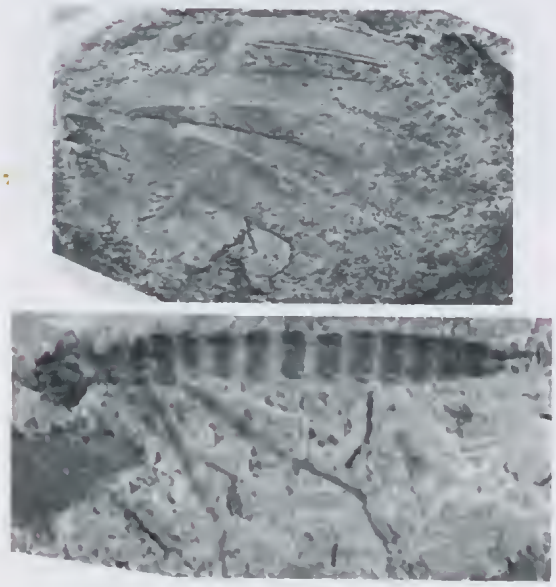
Psychroptilus burrettae, UTGD94563, 50mm wing span. Wing venation (left) from Riek, 1976, fig. 1.



Mesomantidion queenslandicum; GSQ11; x1.2. Line drawing from Tillyard, 1916, pl. 5, fig. 2.



Mesophlebia antinodalis; GSQ13; x2. Line drawing from Tillyard, 1916, pl. 4, fig. 2.



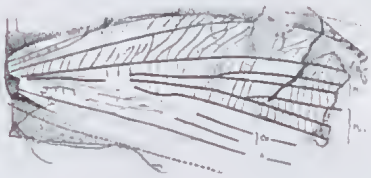
Peraphlebia tetrastichia; NMVP103212; x10.; immature nymph.

Order ODONATA (dragonflies)

Family **MESOMANTIDIIDAE** Tillyard, 1916

Mesomantidion Tillyard, 1916 [*queenslandicum*]

Forewing: large, elongate; C weak, reaching margin near base; preeostal area narrow, crossed by series of simple crossveins; Se long, simple; R strong, simple;



subcostal area large, with numerous irregular cross veins; M branching strongly; M1, M2 and M3 separating at level of end of C; M1 and M2 branching again distally; Cu2 2-branched; A1 present; cross veins in single rows.

queenslandicum Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.

[Riek (1956:110) considered this specimen may not represent an insect but offered no alternative].

Family **MESOPHLEBIIDAE** Tillyard, 1916

Mesophlebia Tillyard, 1916 [*antinodalis*]

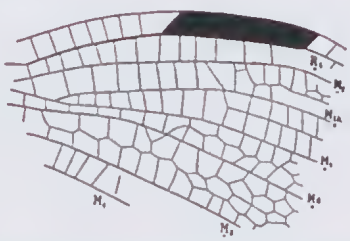
Hindwing: nodus distinct, transverse behind Se, not reaching R; pterostigma well formed parallelogram with lower side thickened; M1 arching up close to pterostigma; M3-branched; M4 very distant from Cu, separated by single row of long parallel cross veins; cross veins numerous between all veins; M4 distally indistinct, distally a zigzag division between cells.

antinodalis Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.

Triassophlebia Tillyard, 1922b [*stigmata*]

Wing with pterostigma elongate; costal veinlets beyond nodus numerous; M1 only slightly converging towards R; M1a arising from M2; no oblique vein between M2 and Ms; M4 not arching downwards.

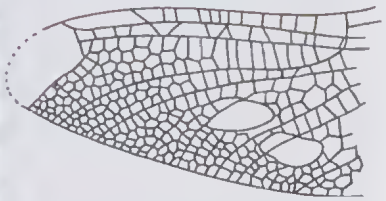
stigmata Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.



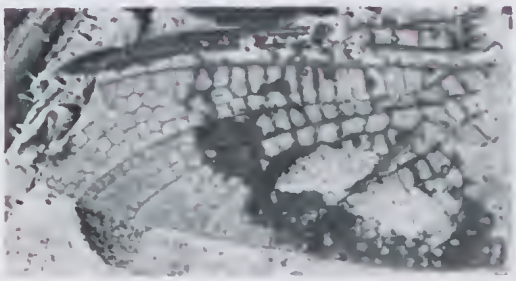
Triassophlebia stigmata; AMF29267; x4 (left). Line drawing from Tillyard, 1922b, text-fig. 76.

Peraphlebia Jell & Duncan, 1986 [*tetrastichia*]
R3 meeting R2 at level of nodal, continuing in smooth curve to costal margin; with wide area between R3 and R4, with brace vein between R1 and R2 oblique and strong.
tetrastichia Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

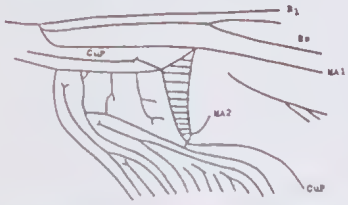
Peraphlebia tetrastichia; mature nymph; MUGD 3731; x3.



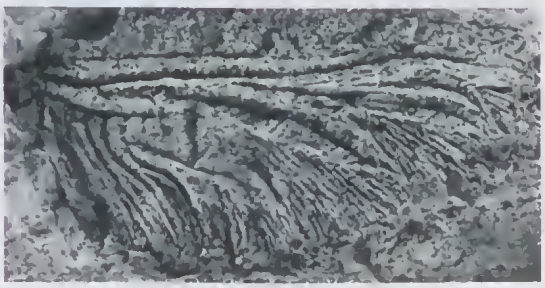
Peraphlebia tetrastichia; NMVP 103204; x2 (far left). Line drawing from Jell & Duncan, 1986, fig. 9B.

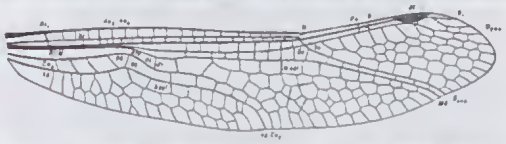


Family **AESCHNIDIIDAE** Handlirsch, 1906
Aeschnidiopsis Tillyard, 1918a [*flindersiensis*]
Triangles with strongly curved distal side; areulus not connected to CuP.
flindersiensis Woodward, 1884; LCret; Walumbilla Fm; Artesian.

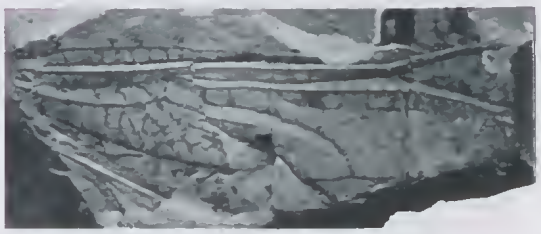


Aeschnidiopsis flindersiensis, UQF3162; 55mm long. Line drawing (left) of Rick, 1954d, text-fig.1



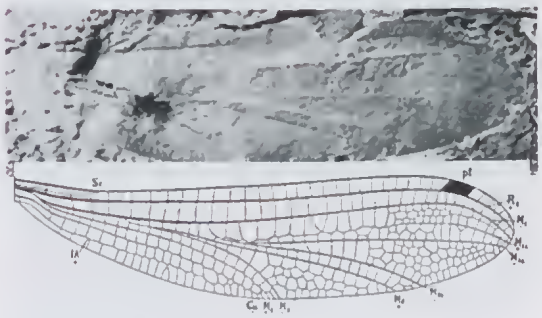


Family **PERMAESCHNIDAE** Martynov,1931
Polytaxineura Tillyard, 1935b [*stanleyi*])
Forewing:C and Sc areas narrow, towards nodus; C and R areas beyond nodus almost without cross veins; Cu2 and A1 with an anterior convexity about 0.3 of length from base; cubital space with 4 cross veins before the anterior convexity; polygonal network distally and posteriorly.
stanleyi Tillyard, 1935b; UPerm; Newcastle CM; Sydney.

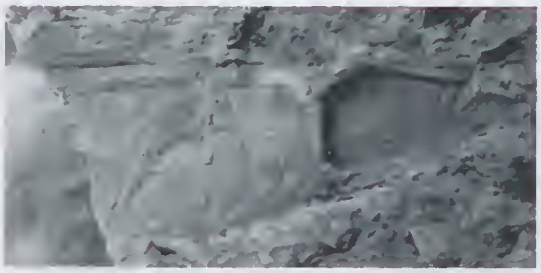


Polytaxineura stanleyi; S343; 40mm long. Line drawing (above) of Tillyard, 1935b, text-fig. 1.

Family **PROTOMYRMELEONTIDAE** Handlirsch, 1906
Triassagrion Tillyard, 1922b [*australiense*]
Forewing: pterostigma short, twice as long as wide; R1, M1, M1a and M2a finishing close together near apex; 24 cross veins between C and R1 after Sc finished and before pterostigma; M with 7 major branches at margin; Cu simple and zigzag; A1 zigzag distally and with only one row of cells behind it; triangular areas between M2a and M2b and between Ms and M3 with irregular polygonal veins.
australiense Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.



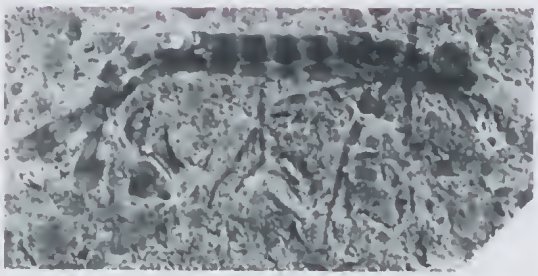
Triassagrion australiense; GSQ1290a; x3. Line drawing from Tillyard, 1922b, text-fig. 77.



Triassolestes epiphleboides; GSQl205a; x3. Line drawing (right) from Tillyard, 1918d, text-fig. 11.

Family **TRIASSOLESTIDAE** Tillyard, 1918d

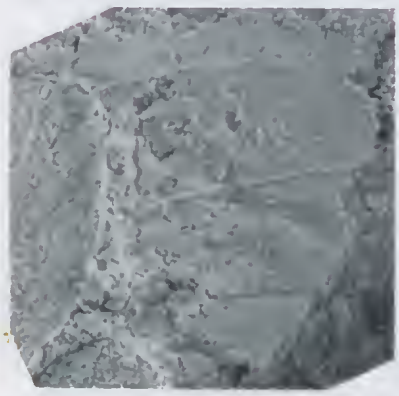
Triassolestes Tillyard, 1918d [*epiophlebioides*]
Wing: M 4-branched; M4 and Cu1 slightly divergent; single row of cells between Cu1 and Cu2 basally, irregular polygons distally; Cu2 curving back distally to margin; one row of cells between Cu2 and margin increasing to 2 distally
epiphleboides Tillyard, 1918d; UTrias; Blackstone Fm; Ipswich.



Coenagrionid indet.; NMVP102508; x7.

Family **COENAGRIONIDAE** Kirby, 1890

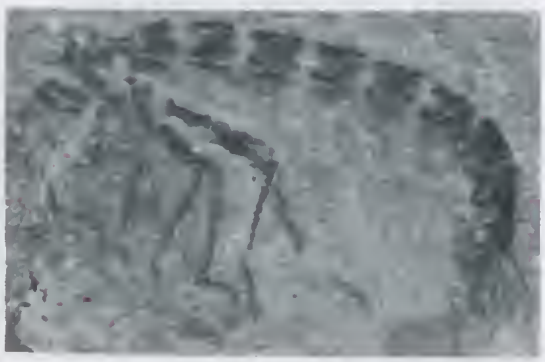
Coenagrionid indet.
Body long, thin, with moderately expanded gills and antenna, with pedicel not markedly lengthened; mask with medial projection; gills with rounded apex
coenagrionid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



Perrisophlebia multiseriata; GSQl203; x3. Line drawing from Tillyard, 1918d, text-fig. 13.

Family **UNCERTAIN**

Perissophlebia Tillyard, 1918d [*multiseriata*]
Wing with an irregular double row of cells between C and R beyond pterostigma; between R and M1 at same level an irregular triple row of cells proximally then a more regular double row; 3 cell rows below M1 a strong convex sector.
multiseriata Tillyard, 1918d; UTrias; Blackstone Fm; Ipswich.



Samaruura Brauer, Redtenbacher & Ganglbauer, 1889 [gigantea]
Nymph. long slender abdomen,long thin legs, lamellar gills.
Samarura sp. Rozefelds,1985; UTrias; Aberdare Conglomerate; Ipswich.

Samarura sp.; QMF12996; 10mm long.

Order PERLARIA (stoneflies)

Family **EUSTHENIIDAE** Tillyard, 1921

Mesonotoperla Rick, 1954c [*sinuata*]
Rs simple (if forked only as terminal twigging); Sc extending almost to apex; Cu1 2-branched; M 2-branched; m-cu1 and cu1-cu2 well separated; no r-m over basal half.
sinuata Riek, 1954c; MTrias; Hawkesbury Sst; Sydney.

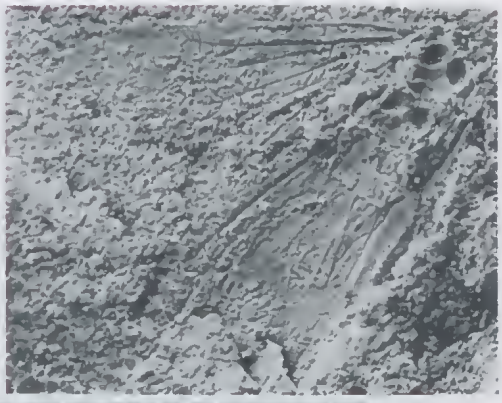
Mesonotoperla sinuata, AMF35877, x3 (upper right). Line drawing from Riek, 1954c, fig. 5.

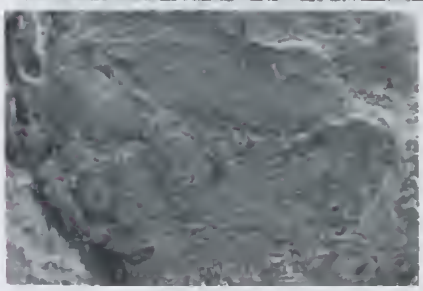
Stenoperlidium Tillyard, 1935c [*permianum*]
[=*Antitaxineura* Tillyard, 1935c; type *anomala*]
Forewing: very narrow; Sc short, ending just beyond midlength in short fork connecting with both C and R1; costal veinlets only moderately developed; Rs with 4 pectinate branches distally; M 2-branched, forking just before midlength; Cu1 strong, 3-branched distally; cu1-m strong; Cu2 simple.
permianum Tillyard, 1935c; UPerm; Newcastle CM; Sydney.
triassicum Riek, 1956; UTrias; Blackstone Fm; Ipswich.
anomala Tillyard, 1935c; UPerm; Newcastle CM; Sydney.

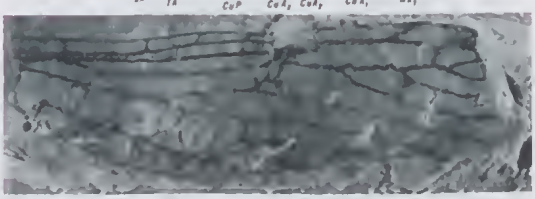
Family **GRIPOPTERYGIDAE** Enderlein, 1909

Eodinotoperla Jell & Duncan, 1986 [*duncanae*]
Nymph with typical anal gill tufts, long, thin, with small tenth abdominal segment, with expanded femora, with long fine cerci. Adult wing with small terminal branch on Rs, with fewer crossveins.
duncanae Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

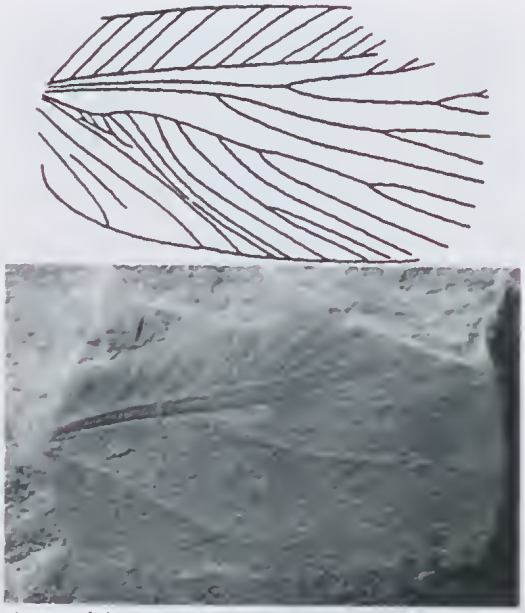
Eodinotoperla duncani; adult NMVP32285, x6 (right); nymph NMVP27040, x6 (far right); line drawing from Jell & Duncan, 1986, fig.15A.



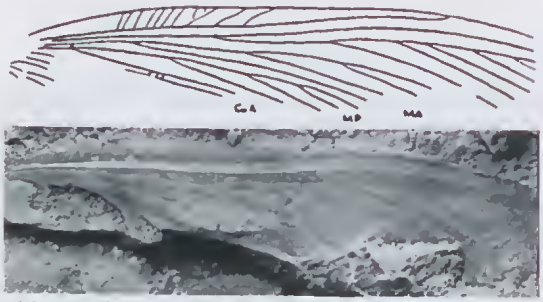




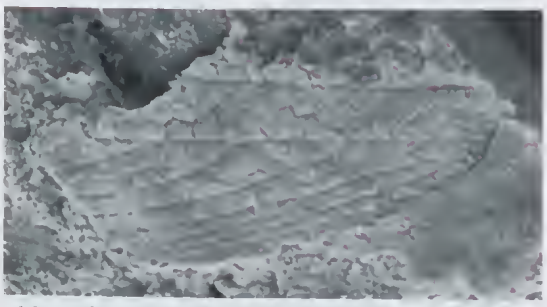
Stenoperlidium permianum; B77; 22.5mm long. Line drawing (2nd above) of Tillyard, 1935b, text-fig. 1. Nymph, AMF40701 (3rd above); x4.



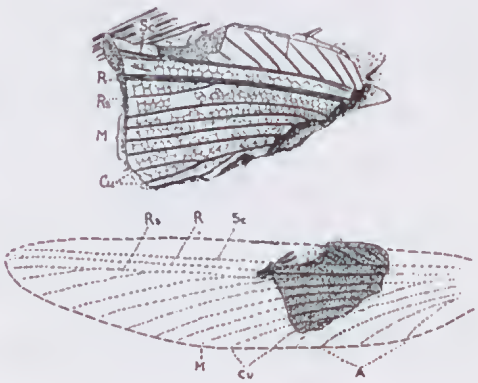
Austroidelia perplexa, AMF39179, 17mm long. Line drawing (above) from Riek, 1954c, fig. 1.



Mesacridites elongata; AMF30970; 55mm long. Line drawing (above) from Riek, 1954c, fig.2.



Mesorthopteron locustoides; GSQ172; 7mm long. Line drawings (right) from Tillyard, 1916, pl. 2, figs 5, 6.



Order PROTORTHOPTERA

Family **IDELIIDAE** Zalessky, 1929

Austroidelia Riek, 1954c [*perplexa*]
Forewing: Sc with numerous anterior branches; Rs arising near base; M forked before origin of Rs; M 3-branched; M3+4 simple; Cu1 sigmoidally curved near base, with many pectinate branches posteriorly, of which proximal 3 or 4 do not reach wing margin; Cu2 straight, simple; anals short, straight.
perplexa Riek, 1954c; MTrias; Hawkesbury Sst; Sydney.

Mesacridites Riek, 1954c [*elongata*]
Forewing: Costal area only slightly expanded; Sc short, ending well before apex; R1 simple; Rs with numerous pectinate branches.
elongata Riek, 1954c; MTrias; Hawkesbury Sst; Sydney.

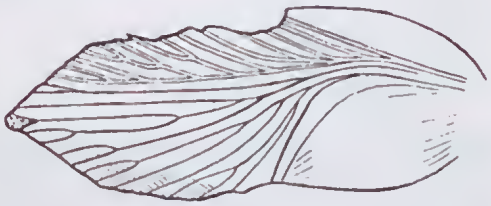
Family **MESORTHOPTERIDAE** Tillyard, 1916

Mesorthopteron Tillyard, 1916 [*locustoides*]
Forewing: narrow, densely veined, weakly thickened, forming weak tegmen; Sc strong, straight, sending series of oblique cross veins into costal space; costal space wide; R strong, parallel to Sc, giving off Rs; M weaker, giving off 3 branches before origin of Rs, with branches running forward from main stem; Cu 2-branched. Hindwing: not thickened, with less dense venation; Cu unbranched; A1 and A2 present.
locustoides Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.

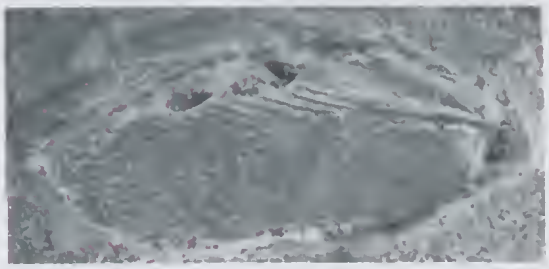
Order BLATTARIA (cockroaches)

Family **MESOBLATTINIDAE** Handlirsch, 1906

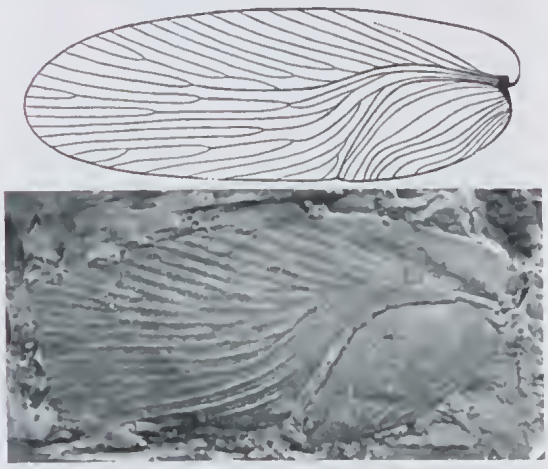
Austroblattula Tillyard, 1919c [*ipsviciensis*]
Tegmen; small; Sc fused with R basally, straight behind humeral area; R curved basally, straight for most of its length, curving forward distally; anal area very broad; anal veins apparently unforked.
ipsviciensis Tillyard, 1919c; UTrias; Blackstone Fm; Ipswich.



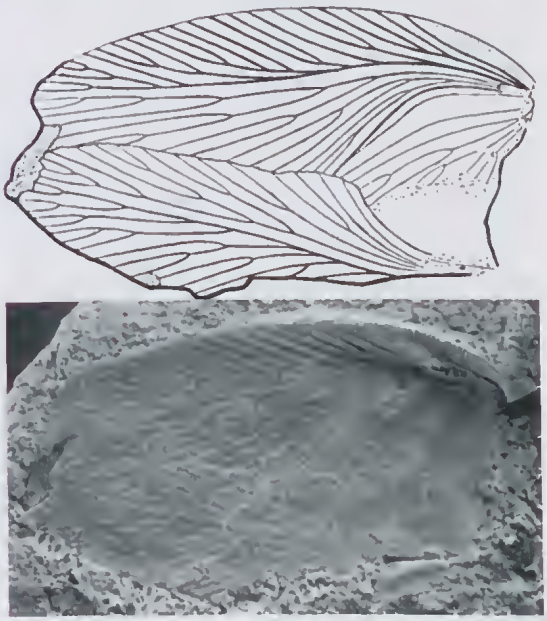
Samaroblatta Tillyard, 1919c [*reticulata*]
Tegmen: with wide humeral area, as long as clavus; Sc simple, strong, with or without weaker branch onto humeral area; R sigmoidally curved; anal area well defined; forkings of A, if any, as terminal twiggings.
reticulata Tillyard, 1919c; UTrias; Blackstone Fm; Ipswich.
triassica Tillyard, 1919c; UTrias; Blackstone Fm; Ipswich.
jonesi Tillyard, 1919c; UTrias; Blackstone Fm; Ipswich.
blatteloides Tillyard, 1919c; UTrias; Blackstone Fm; Ipswich.
intercalata Tillyard, 1919c; UTrias; Blackstone Fm; Ipswich.
Triassoblatta Tillyard, 1919c [*typica*]
Tegmen: Sc reduced; R strongly developed, sending numerous veinlets across the costal area, almost reaching apex; M dividing dichotomously and often; Cu similarly branched, curved posteriorly; Y-vein on clavus.
typica Tillyard, 1919c; UTrias; Blackstone Fm; Ipswich.
insignita Tillyard, 1919c; UTrias; Blackstone Fm; Ipswich.
intermedia Tillyard, 1919c; UTrias; Blackstone Fm; Ipswich.
tasmanica Rick, 1962; Trias; New Town Fm; Hobart, Tas.
jonesi Tillyard, 1919c; UTrias; Blackstone Fm; Ipswich.
denmeadi Tillyard, 1937; MTrias; Mt Crosby Fm; Ipswich.



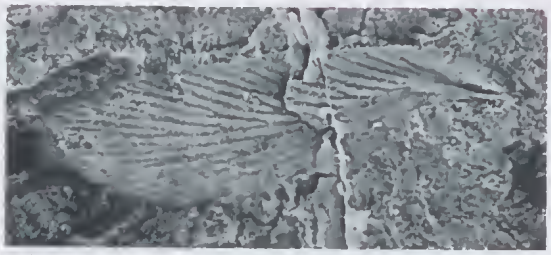
Austroblattula ipsviciensis; GSQ1105; 7.5mm long. Line drawing (left) of Tillyard, 1919c, text-fig. 39.



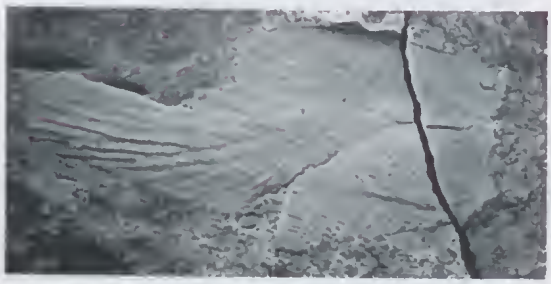
Samaroblatta reticulata; GSQ1155; 10.5mm long. Line drawing (above) of Tillyard, 1919c, text-fig. 34.



Triassoblata typica; GSQ1180; 11.5mm long. Line drawing (above) of Tillyard, 1919c, text-fig. 31.



Triassoblatta jonesi; UQC1861; 7mm long.

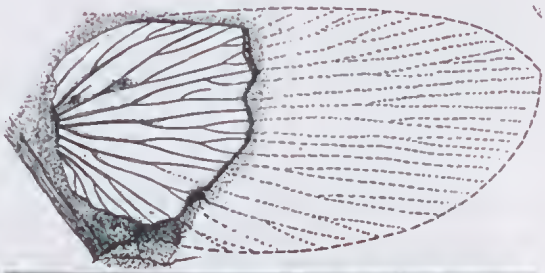


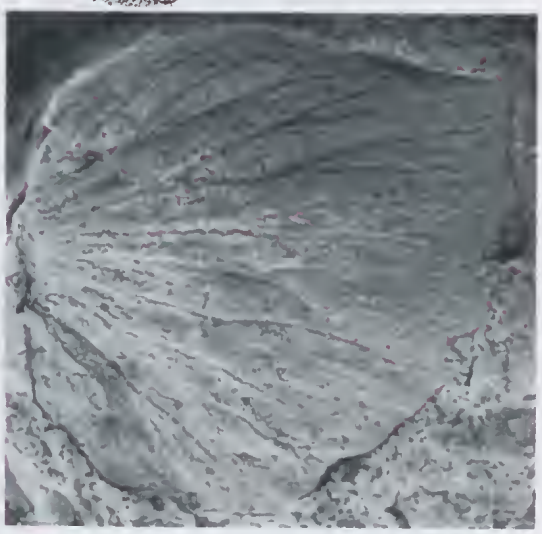
Samaroblatta reticulata; GSQ114; 12mm long.

Methana? sp., nymph, NMVP102532 (below left), x6; wings NMVP27045 (above), x5; incomplete adult NMVP103231 (below right), x6.

Family **MYLACRIDAE**

Austromylacrites Tillyard, 1916 [*latus*]
Forewing: broadly oval; numerous main veins diverging from base; all veins dichotomously branched; no cross veins.
latus Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.





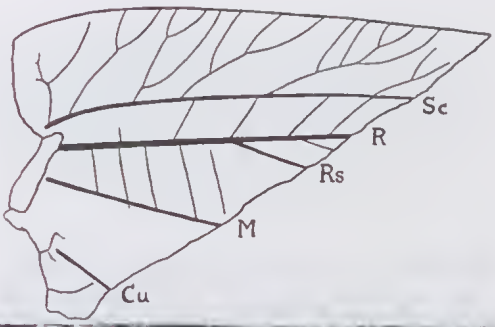
Austromylacrites latus, GSQ18; 11mm long. Line drawing (above) from Tillyard, 1916, pl. 2, fig. 1.

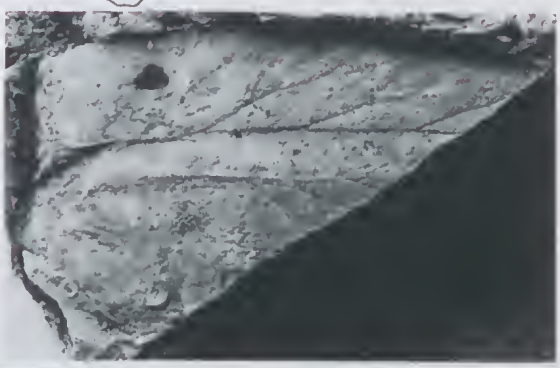
Family **BLATTIDAE** Stephens, 1829

Methana Stål, 1877
Wing with long costal cell more than half wing length; Sc simple; clavus with markedly curved margin.
Methana? sp. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

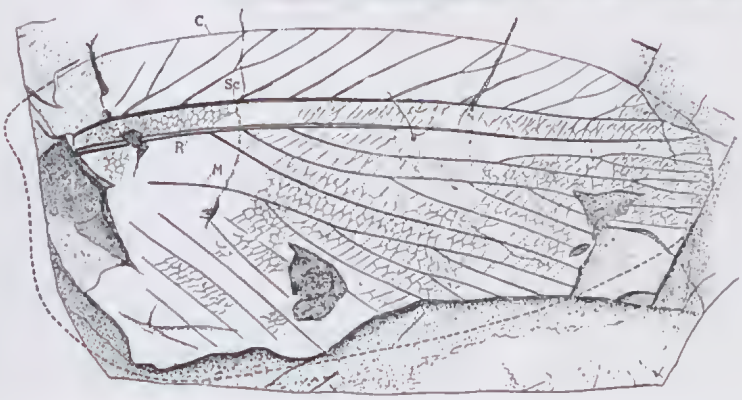
Family **INCERTAE SEDIS**

Notoblattites Tillyard, 1916 [subcostalis]
Tegmen: large, broad, oval; Sc strong and almost to wing tip; costal space broad, with simple or once-branched cross veins; costal border slightly convex; R very strong, parallel to Sc; R with 3 posterior branches, posterior one unbranched, second 3-branched, anterior one 2-branched; M 4-branched.
subcostalis Tillyard, 1916; MTrias; Ashfield Fm; Sydney.
wianamattensis Tillyard, 1918b; MTrias; Ashfield Fm; Sydney.
mitchelli Tillyard, 1918b; MTrias; Ashfield Fm; Sydney.

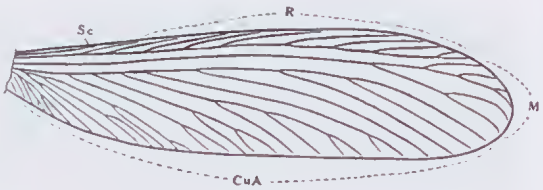




Notoblattites wianamattensis; AMF39324; 28mm long (right). Line drawing (right above) from Tillyard, 1918b, text-fig. 8.



Notoblattites subcostalis; GSQI24a; 46mm long. Line drawing (left) of Tillyard, 1916, pl. 6, fig. 1 [specimen obviously damaged after it had been drawn].

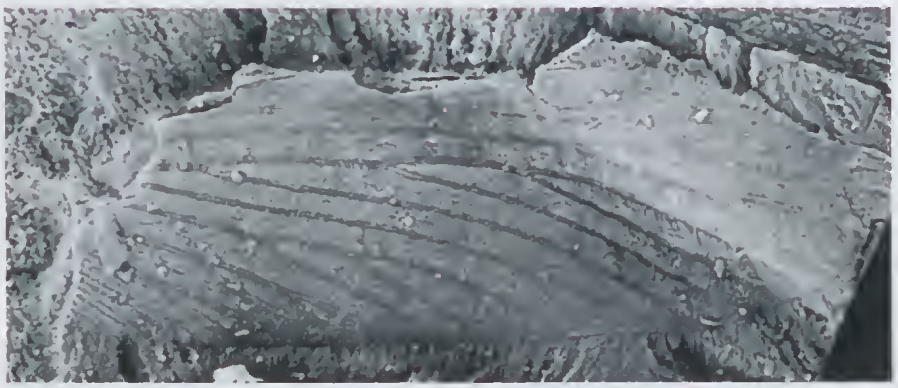


Order ISOPTERA(termites)

Family **MASTOTERMITIDAE** Desneux, 1904

Blattotermes Riek, 1952b [*neoxenus*]
Forewing: archedictyon strongly developed; Sc reduced, very short; M parallel to R, forking irregularly only in apical third; Cu1 with many pectinate branches, the basal one being further branched.

neoxenus Riek, 1952b; Palaeocene; Redbank Plains Fm; Ipswich.



Blattotermes neoxenus; UQF10431; 24mm long. Lime drawing from Riek, 1952b, fig. 1.

Order PROTELYTROPTERA

Family **PROTOCOLEIDAE** Tillyard, 1924

Austrelytron Kukalová, 1966 [*tillyardi*]
Forewing: small densely granulose, with isolated pointed tubercles in rows on the veins; costal expansion circular but not prominent; tapering from midlength; Sc with 2 or more parallel branches finishing well before apex; R sending several irregular branches towards Sc; Rs distinct, originating after midlength of wing; CuP long, concave forward; 3 unbranched anal veins; cross veins few, simple.

tillyardi Kukalová, 1966; UPerm; Newcastle CM; Sydney.

Phyllelytron Kukalová, 1966 [*folium*]
Forewing: tegminous, dark, densely granulose; proximal costal expansion circular, strongly projecting; tubercles distinct in anal area; apex curved back, only slightly prolonged, pointed; main veins not parallel; branches of R, M and CuA usually indistinct; Sc with 2 or more long branches with numerous veinlets; R with a series of weak irregular anterior branches; CuP long, branched; 4-5 anal veins broad, some directed anteriorly.

folium Kukalová, 1966; UPerm; Newcastle CM; Sydney.

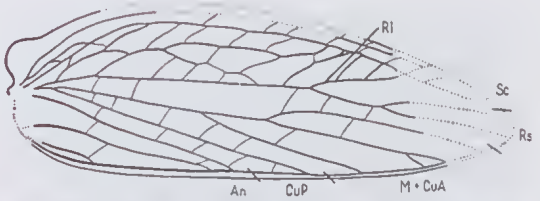
petalon Kukalová, 1966; UPerm; Newcastle CM; Sydney.

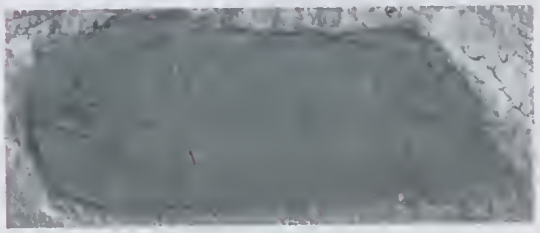
granulatum Kukalová, 1966; UPerm; Newcastle CM; Sydney.

melinum Kukalová, 1966; UPerm; Newcastle CM; Sydney.

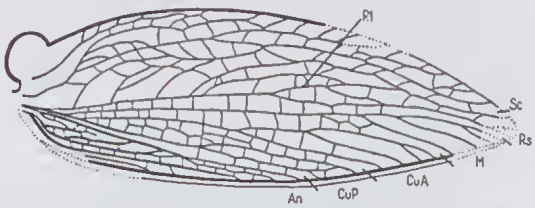
Protocoleus Tillyard, 1924 [*mitchelli*]
Forewing: tegminous, darkly pigmented, covered by flat regularly arranged tubercles (not on veins) and fine granules; apical part prolonged and tapering; main veins with almost parallel branches; Sc with several parallel branches almost to apex; R with series of long branches towards Sc; Rs similar to other branches of R; M and Cu with variable numbers of irregular branches; CuP long, branched; 5 anal veins; cross veins numerous and regular.

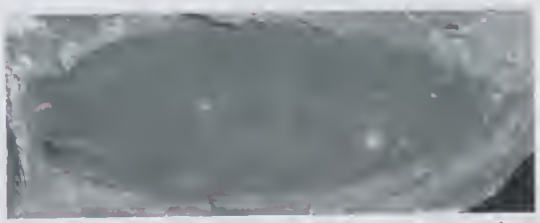
mitchelli Tillyard, 1924; LPerm; Newcastle CM; Sydney.



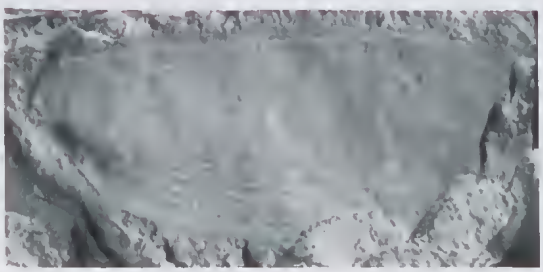


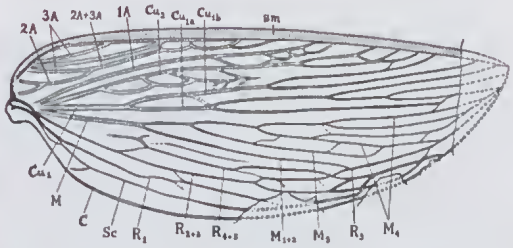
Austroelytron tillyardi; BMIn45525; 11mm long. Line drawing (above) of Kukalova, 1966, fig.5.



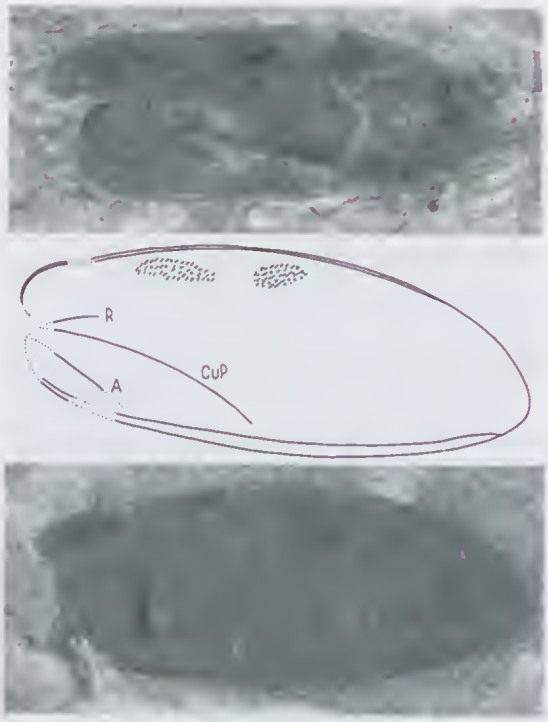


Phyllelytron folium; BMIn45364; 23mm long. Line drawing (above) of Kukalova, 1966, fig. 1

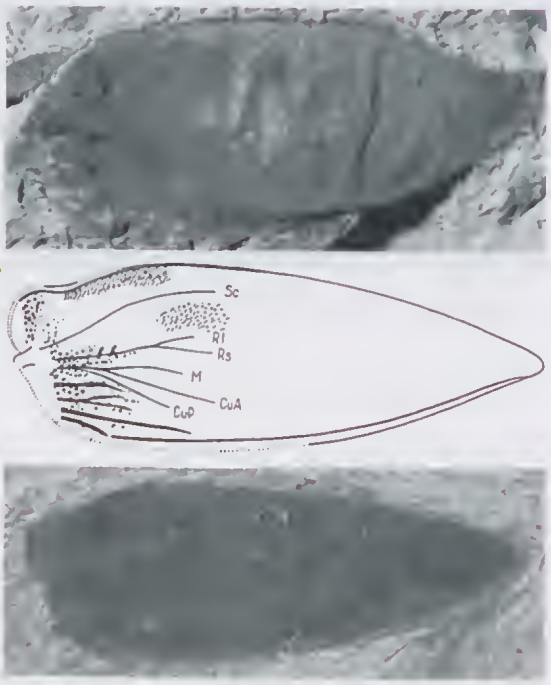




Protocoleus mitchelli; AMF41710; 21.5mm long (left). Line drawing of Tillyard, 1924, text-fig. 3.



Dermelytron conservativum; BMNHIn45725; 7.2mm long. Line drawing (above) of Kukalova, 1966, text-fig. 11.



Elytrathrix hirsuta; BMNHIn45503; 15mm long. Line drawing (above) of Kukalova, 1966, text-fig. 8.

Chanoselytron gingiva; BMNHIn45493; 7.5mm long (left). Line drawing of Kukalova, 1966, text-fig. 14.

Family **DERMELYTRIDAE** Kukalova, 1966

Chanoselytron Kukalová, 1966 [*gingiva*]
Forewing: convex, thin, narrow; costal expansion large, rounded, extending beyond base of wing proximally; posterior margin slightly concave in anal area; no veins evident.
gingiva Kukalová, 1966; UPerm; Newcastle CM; Sydney.

Dermelytron Kukalová, 1966 [*conservativum*]
Forewing: oval, little sclerotised; costal expansion projecting only a little; setae making a patch in subcostal area; apex directed posteriorly; CuP and one anal vein sometimes weakly indicated.
conservativum Kukalová, 1966; UPerm; Newcastle CM; Sydney.
pigmentatum Kukalová, 1966; UPerm; Newcastle CM; Sydney.

Psychelytron Kukalová, 1966 [*progressivum*]
Forewing: convex, thin, weakly sclerotised; apex directed anteriorly; posterior margin concave distally; CuP and A short, simple, not reaching margin.
progressivum Kukalová, 1966; LPerm; Newcastle CM; Sydney.

Psychelytron progressivum; BMNHIn45900; 8mm long (above left). Line drawing of Kukalova, 1966, text-fig. 13.

Family **PERMOPHILIDAE** Tillyard, 1924

Elytrathrix Kukalová, 1966 [*hirsuta*]
Forewing: densely granulose, with sparse indistinct tuberclesdistinct basally; setae bordering the yard in presence of conspicuous large tubercles in costal area; costal expansion projecting near base, with large tub- ercles; main veins strong in basal 1/3, absent distally.
hirsuta Kukalová, 1966; UPerm; Newcastle CM; Sydney.

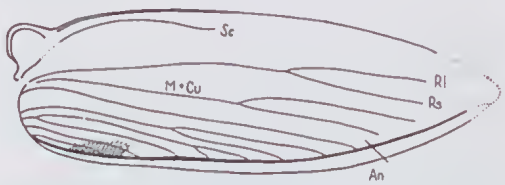
Permophilus Tillyard, 1924 [*pincombei*]
Forewing: surface densely granulose, with isolated indistinct tubercles; narrowed and prolonged apically; costal expansion projection; main veins strong in basal third but completely lacking in rest.
pincombei Tillyard, 1924; UPerm; Newcastle CM; Sydney.
minor Tillyard, 1924; UPerm; Newcastle CM; Sydney.
hirtus Kukalová, 1966; UPerm; Newcastle CM; Sydney.
capulus Kukalová, 1966; UPerm; Newcastle CM; Sydney.

Family **PERMOFULGORIDAE** Tillyard, 1918b

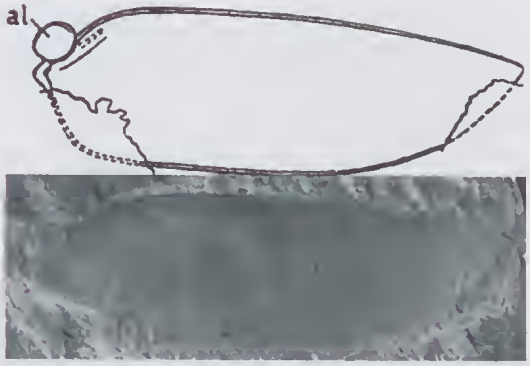
Permofulgor Tillyard, 1918b [*belmontensis*]
Tegmen: delicate, broadest near base, narrow, elongate; anal veins strongly developed; A1 and A2 both 2-branched from near their bases; Sc less than half wing length; R, M and Cu united near base; oblique cross veins between R, M, Cu and A veins; anal Y-vein absent.
belmontensis Tillyard, 1918b; UPerm; Newcastle CM; Sydney.
indistinctus Tillyard, 1922a; UPerm; Newcastle CM; Sydney.

Family **STENELYTRIDAE** Kukalova, 1966

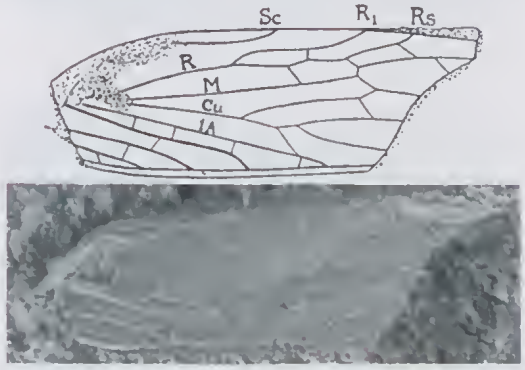
Labidelytron Kukalová-Pek, 1988 [*Stenelytron enervatum* Kukalová, 1966]
[replacement name for *Stenelytron* Kukalova]
Forewing: costal expansion subcircular; setae forming patch in subcostal area; apex directed anteriorly; Sc short not reaching margin; subcostal area broad; Rs originating beyond midlength, simple, weak; CuA short; CuP slightly concave forward; anal veins broad, 3-5, simple or forked.
enervatum (Kukalová, 1966); UPerm; Newcastle CM; Sydney.
Xenelytron Kukalová, 1966 [*ligula*]
Forewing: almost flat; costal expansion large, semicircular; R1 directed towards apex; Rs originating late, weak; M close to Cu, simple or forked; Cu long; 3-5 strong anal veins, simple or forked.
ligula Kukalová, 1966; UPerm; Newcastle CM; Sydney.



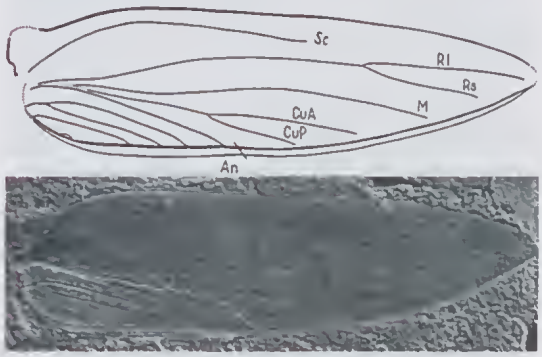
Xenelytron ligula; BMNHIn45526; 11.5mm long (right). Line drawing of Kukalova, 1966, text-fig. 10.



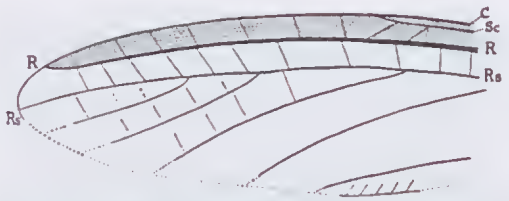
Permophilus pincombei; AMF19779; 21.5mm long. Line drawing (above) of Tillyard, 1924, text-fig. 1a.



Permofulgor belmontensis; AMF41758; 9.5mm long. Line drawing (above) of Tillyard, 1918b, text-fig. 3.



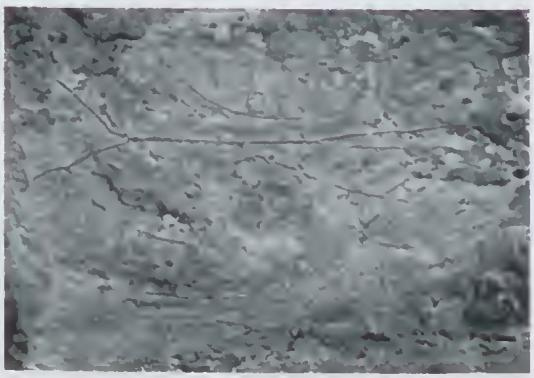
Labidelytron enervatum; BMNHIn45958; 14mm long. Line drawing (above) of Kukalova, 1966, text-fig. 9.



Elcanopsis sydneiensis; MMF15455; 7mm long. Line drawing of Tillyard, 1918c, text-fig. 1.

Mesogryllacris giganteus; UQC1920; 60mm long. Line drawing (right) of Riek, 1955, fig. 31.

Proparagryllacris crassifemur; AMF39251, x3. Line drawing (right) of Riek, 1956, text-fig. 2.



Neohagla sinuata; UQC2216; x2.

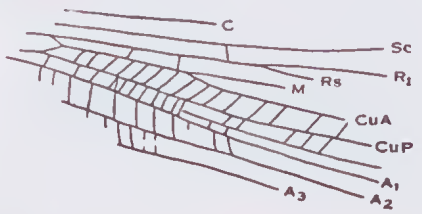
Order ORTHOPTERA (grasshoppers, crickets)

Family **ELCANIDAE** Handlirsch, 1906

Elcanopsis Tillyard, 1918c [*sydneiensis*]
Sc closer to C distally than to R; wing with brown pigment along costal space; Rs with few branches wide apart; cross veins not numerous, wide apart.
sydneiensis Tillyard, 1918c; MTrias; Hawkesbury Sst; Sydney.

Family **PROPARAGRYLLACRIDIDAE** Riek, 1956

Mesogryllacris Riek, 1955 [*giganteus*]
Forewing: costal margin expanded at base; C strong, 0.25 ing length; costal space with a number of costal veinlets; R1 with series of short branches to wing margin beyond Sc; Rs with series of pectinate branches over apical half; M 2-branched, forking in basal half of wing, not touching Rs; Cu 2-branched, not fused with posterior branch of M; Cu forking at same level as M.
giganteus Riek, 1955; UTrias; Mt Crosby Fm; Ipswich.
Proparagryllacris Riek, 1956 [*crassifemur*]
Forewing: Sc curving forward distally, 2 anterior branches; M arising from R close to base; stem of M fused with upper branch of Cu; M forking distally after separating from Cu; M and Cu both 2-branched.
crassifemur Riek, 1956; UTrias; Blackstone Fm; Ipswich.



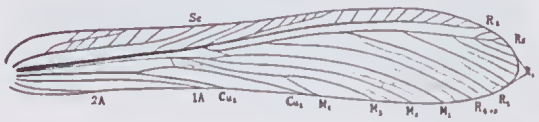
Family **HAGLIDAE** Handlirsch, 1906b

Neohagla Riek, 1955 [*sinuata*]
Forewing: costal space expanded over basal half; Sc with oblique veinlets to margin between which are many cross veins; R1 almost parallel to Sc, with 2 or 3 oblique anterior branches towing margin; Rs diverging rapidly from R1; M3+4 and Cu fusing only after origin of CuA2; r1-rs sinuous.
sinuata Riek, 1955; UTrias; MtCrosby Fm; Ipswich.

Prohagla Riek, 1954c [*superba*]
Forewing: C with numerous weak branches in expanded base of costal space; Sc extending towards apex with numerous anterior branches; Rs arising near middle, with a few pectinate branches; M 3-branched, forking early; M3+4 fused to CuA for short distance; M1 not sigmoidally curved; CuA1 multibranched; CuP arched away from CuA2. Hindwing: costal space narrower; no distinct costal vein; M 3-branched; m-cu present; Cu and anals branching from base.
superba Riek, 1954c; MTrias; Hawkesbury Sst; Sydney.
imperfecta Riek, 1955; UTrias; Mt Crosby Fm; Ipswich.

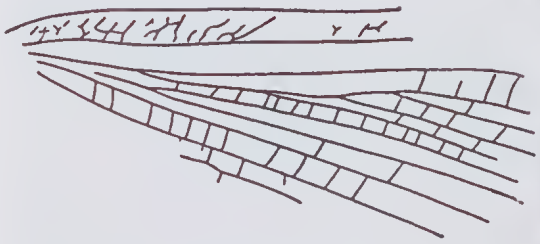
Family **LOCUSTOPSEIDAE** Handlirsch, 1906

Triassolocusta Tillyard, 1922b [*leptoptera*]
Forewing: very long and narrow; Sc less than half costal length, with shorter anterior branch; Rs 4-branched in pectinate series; M 3-branched from about level of origin of Rs; M3+4 forked distally; M5 short, connecting to Cu1; rs-m near base of Rs.
leptoptera Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.

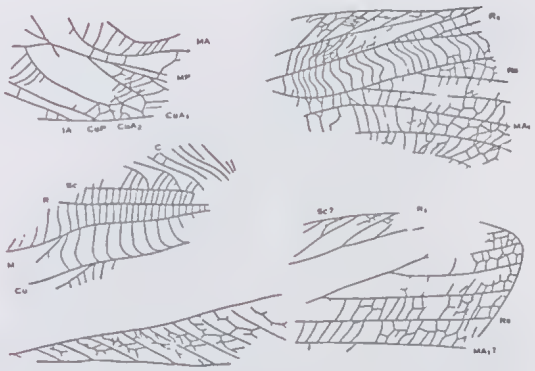


Family **GRYLLACRIDIDAE** Stål, 1874

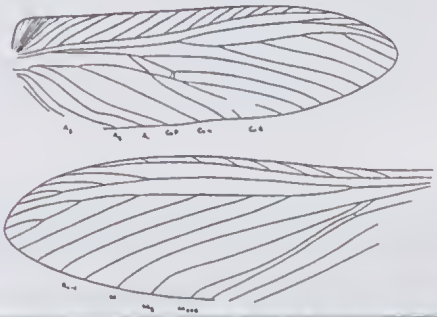
Xenogryllacris Riek, 1955 [*reductus*]
Forewing: costal space narrow, very slightly expanded near base; anastomosing network of cross veins between Sc and margin; Rs and M fused basally; M unbranched, arising from Rs near its first branching; CuA 2-branched; CuP straight.
reductus Riek, 1955; UTrias; Mt Crosby Fm; Ipswich.

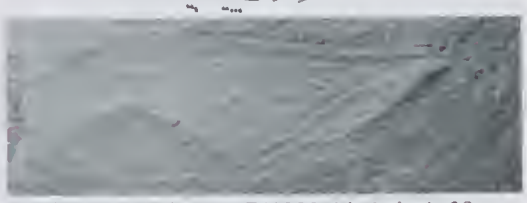


Xenogryllacris reductus; UQC2214; x1.5. Line drawing (above) of Rick, 1955, fig. 32.

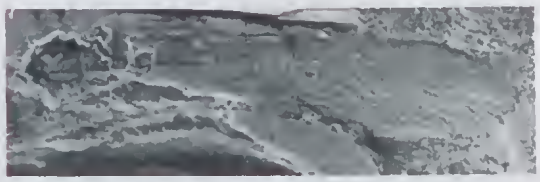


Neohagla sinuata. Line drawings of Riek, 1955, figs 26-30.

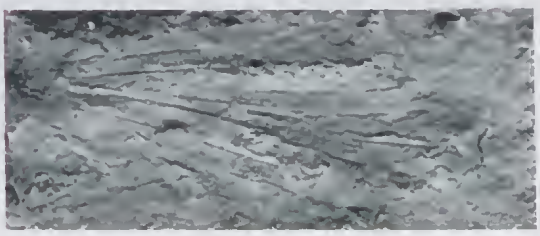


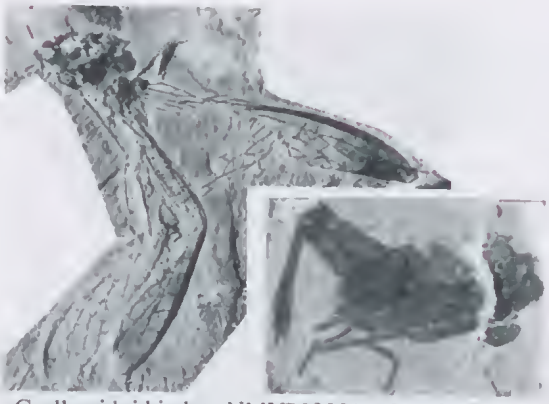


Prohagla superba; AMF41290 (hindwing); 38mm long. Line drawings (above) of Riek, 1954c, text-figs. 3 & 4.

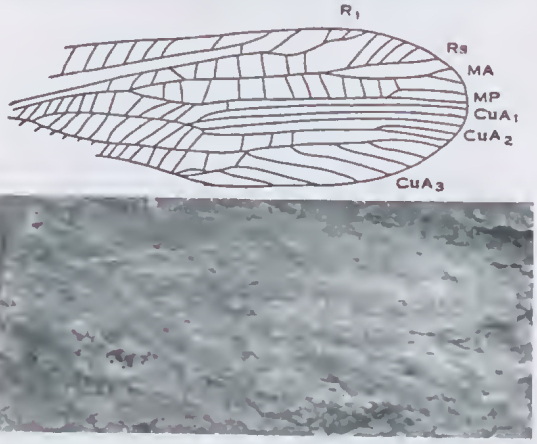


Triassolocusta leptoptera; GSQ199; 21mm long. Line drawing (above left) of Tillyard, 1922b, text-fig. 74.

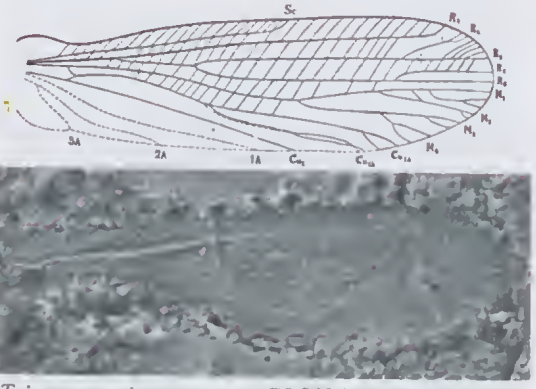




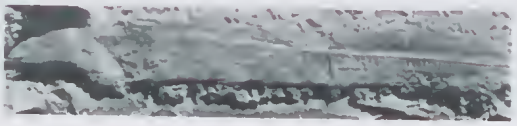
Gryllacridoid indet., NMVP32281, x3 (left); Tridactylid indet., NMVP103232, x6 (lower right).



Xenopterum crosbyi; UQC2066; 13mm long. Line drawing (above) of Riek, 1955, fig. 34.



Triassomantis pygmaeus; GSQ186a; 10mm long. Line drawing (above) of Tillyard, 1922b, text-fig. 73.



Gryllacridoid? indet.
Crumpled adult. Costal area markedly expanded; C, Sc and R parallel; C-Sc space pigmented; scattered crossveins over most of the wing
Gryllacridoid? indet. Jell & Duncan, 1985; LCret; Koonwarra FB; Gippsland.

Family **TRIDACTYLIDAE** Brunner, 1882
Tridactylid indet.
Head large, with vaulted upper area; eye rounded, moderately sized; antenna short, inserted close to anterior margin of head, with most segments longer than wide; pronotum as long as head. Foreleg with tibia not obviously expanded; tarsus with basal article shorter than middle. Middle leg with tibia not expanded, with tarsus 2-segmented, with first segment long. Hind leg with markedly expanded femur; tibia long, slender, with long ventral terminal spurs.
tridactylid indet. ; LCret; Koonwarra FB; Gippsland.

Family **TRIASSOMANTEIDAE** Tillyard, 1922
Xenopterum Rick, 1955 [*crosbyi*]
Forewing: curved sigmoidally almost to apex; M1+2 separating from Rs before Rs gives rise to the anterior pectinate branches; M3+4 simple or branched near margin; CuA 1 and 2 series of close spaced, parallel branches, rarely branched near margin; CuA 3 giving off a series of posterior pectinate branches.
crosbyi Riek, 1955; UTrias; MtCrosby Fm; Ipswich.
Triassomantis Tillyard, 1922b [*pygmaeus*]
Forewing: costal margin straight; C short; all veinlets and cross veins parallel and oblique; Sc and R1 both turn sharply forward near their apexes; Rs 4-branched; R3 straight; R2 running forward, parallel to R5; M 4-branched, all simple; Cu1 straight, with small terminal fork.
pygmaeus Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.

Family **TETTIGONIIDAE** Krauss, 1902
Tettigoides Riek, 1952b [*pectinata*]
Elytron very narrow; Sc long; RS arising at midwing; M nearly parallel to R.
pectinata Riek, 1952b; Palaeocene; Redbank Plains Fm; Ipswich.

Tettigoides pectinata; UQF10640; 32mm long (left). Line drawing of Riek, 1952b, fig.4

Order TITANOPTERA

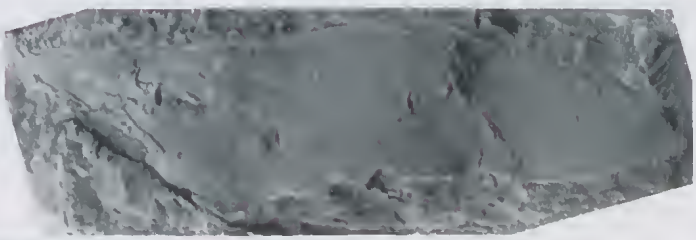
Family **MESOTITANIDAE** Tillyard, 1925

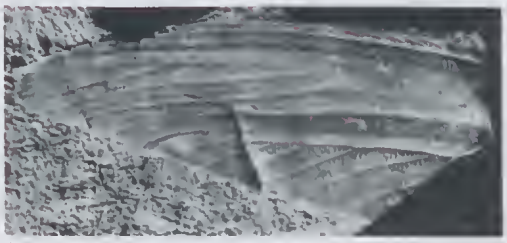
Clatrotitan McKeown, 1937 [*andersoni*]
[=*Mesotitan scullyi* Tillyard, 1925c]
Forewing: broadest at midlength; precostal area apparently absent; stridulatory area about half wing width; Rs 6-branched; M 2-branched; cubito-median Y-vein well-developed.
scullyi Tillyard, 1925c; MTrias; Hawkesbury Sst; Sydney.
tillyardi McKeown, 1937; MTrias; Hawkesbury Sst; Sydney.
andersoni McKeown, 1937; MTrias; Hawkesbury Sst; Sydney.

[*Mesotitan* is discussed above]
[Rick (1954c) considered *tillyardi* and *andersoni* to be junior synonyms of *scullyi*]

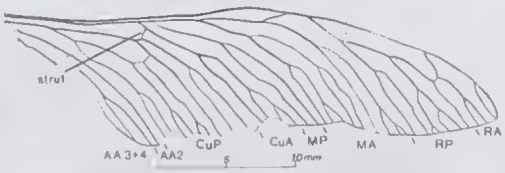
Family **UNCERTAIN** (probably new)

Steinhardtia Jell & Lambkin, 1993 [*maryae*]
Hindwing: Large (>40mm long); primary R fork well beyond that of M; RA, RP, MA, MP, CuA, CuP1+2 and CuP3+4 all deeply dichotomously forked; RA with 4 major branches, RP with 6, MA with 8, MP with 2, CuA with 4, CuP1+2 with 3 and CuP3+4 with 5; strut from CuA to CuP1 rather than CuP1+2; cellular network between veins absent or not preserved.
maryae Jell & Lambkin, 1993; MTrias; Esk Fm; Ipswich.

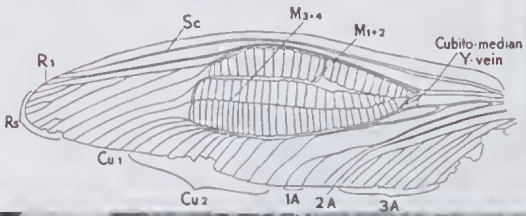


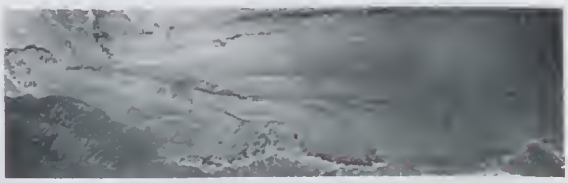


Clatrotitan scullyi; AMF20270; 86.5mm long

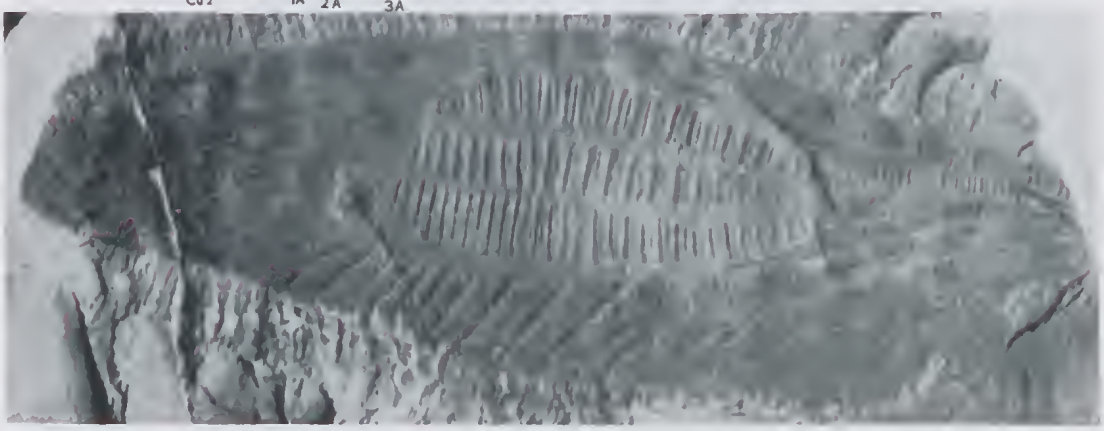


Steinhardtia maryae; QMF25507; 41mm long. Line drawing of Jell & Lambkin, 1993, fig.1C





Clatrotitan scullyi; USGD310; 131mm long.

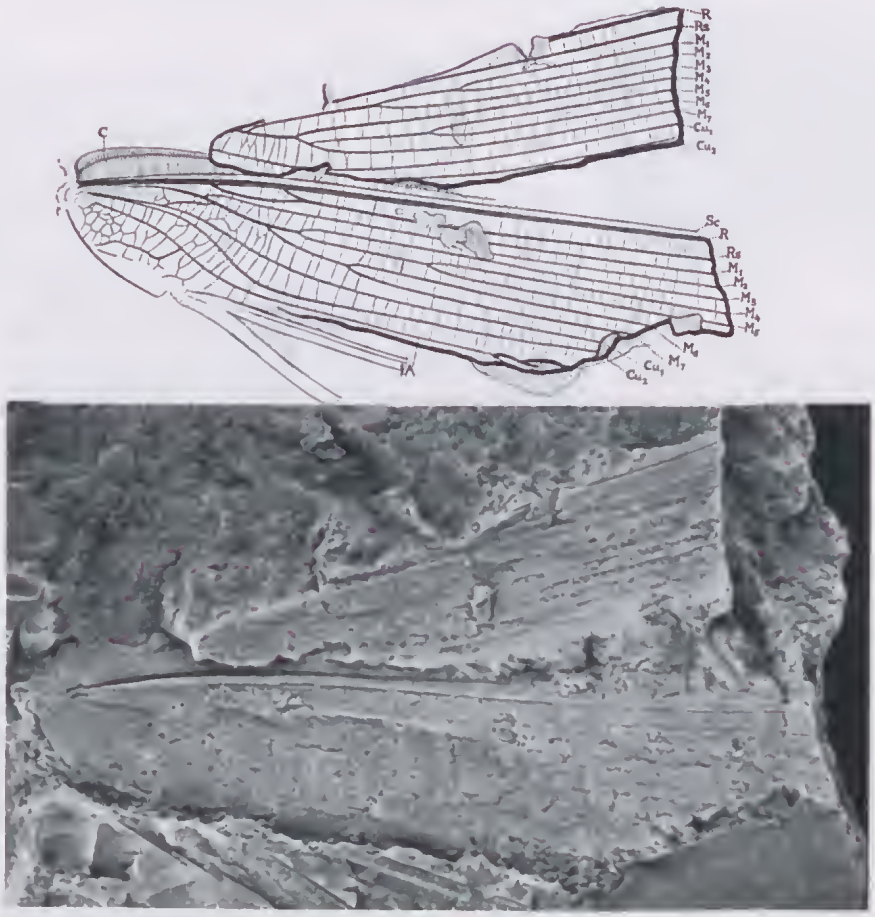


Clatrotitan andersoni; AMF36274; 138mm long.Line drawing (above left) of McKeown, 1937, fig. 3.

Order PHASMATODEA (stick-insects)

Family **AEROPLANIDAE** Tillyard, 1918b

Aeroplana Tillyard, 1918b [*mirabilis*]
Wings very long, narrow; parallel veins strong, close together; Sc weak; R 2-branched, strong; Rs arising near base by double root; M 7-branched; R + M fused at base; Cu1 and Cu2 arising near base and diverging; A1 in front of anal field with irregular veining. Forewing: M forking at same level as first origin of Rs; anterior branch giving 3 branches dichotomously; posterior branches into 3, middle one dividing again. Hindwing: anterior branch of M 2-branched distally; posterior branch dividing early then anterior of these dividing into 3.
mirabilis Tillyard, 1918b; UTrias; Blackstone Fm; Ipswich.

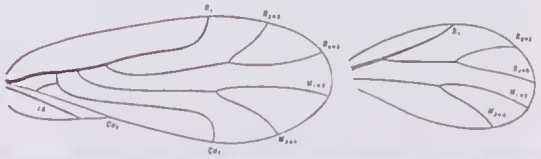


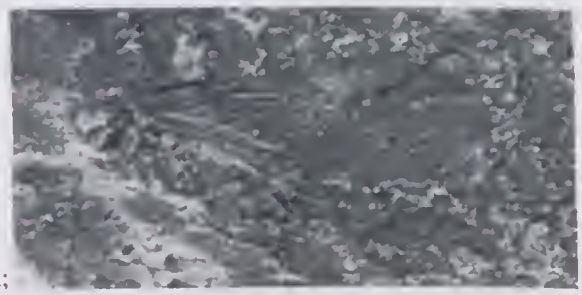
Aeroplana mirabilis; GSQ1126; 41.5mm long. Line drawing of Tillyard, 1918b, pl.44, fig. 12.

Order THYSANOPTERA (thrips)

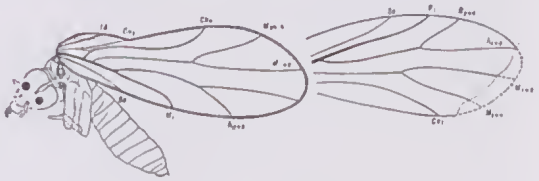
Family **LOPHIONEURIDAE** Tillyard, 1921

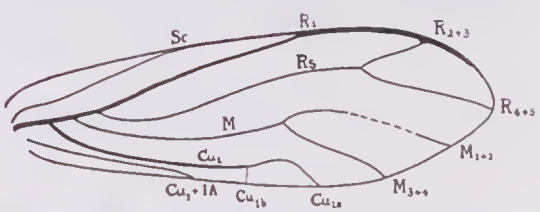
Austrocypha Tillyard, 1935a [*abrupta*]
Forewing: elavus well-developed, wedge-shaped; Cu2 running straight into margin distally; Se absent; costal area wide; R1 curved forward distally; Rs, M and Cu1 arising close together but independently; Cu1 and Cu2 connected by a basal piece.
abrupta Tillyard, 1935a; UPerm; Newcastle CM; Sydney.
baretti Tillyard, 1935a; UPerm; Newcastle CM; Sydney.
Lophiocypha Tillyard, 1935a [*permiana*]
Forewing: Cu1 unbranched, sigmoidal; M 2-branched; clavus well-developed, with A1 present; distinct break in margin at its end on Cu2.
permiana Tillyard, 1935a; UPerm; Newcastle CM; Sydney.
stanleyi Tillyard, 1935a; UPerm; Newcastle CM; Sydney.
thysanella Tillyard, 1935a; UPerm; Newcastle CM; Sydney.
maxima Davis, 1942; UPerm; Newcastle CM; Sydney.
Lophioneura Tillyard, 1921b [*ustulata*]
Forewing: small, elongate, oval, 3 times as long as wide; R and Cu1 high sharp strong ridges; M and Cu1 fused with R basally; R1 almost straight; Sc and R1 parallel; Rs weak, 2-branched; M 2-branched; Cu1 2-branched, anterior branch curved forward then back distally.
ustulata Tillyard, 1921b; UPerm; Newcastle CM; Sydney.
angusta Tillyard, 1935a; UPerm; Newcastle CM; Sydney.
conjuncta Tillyard, 1926a; UPerm; Newcastle CM; Sydney.





Austrocypha abrupta; AMF39809; 2.6mm long. Line drawing (above) of fore and hindwings from Tillyard, 1935a, text-fig. 10.

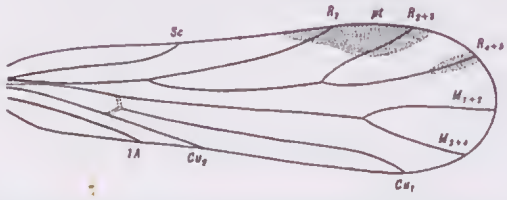




Lophioneura ustulata; AMF39344; 5.7mm long. Line drawing (above) of Tillyard, 1921, text-fig. 3.

Edgariekia una; NMVP103242; body 2mm long. Wing venation (above right) of Jell & Duncan, 1986, fig. 18C.

Undacypha Vishniakova, 1981 [*fumida*] [=*Edgariekia* Jell & Duncan, 1986; type *una*]
R, M and CuA with common stem; Rs and M 2-branched; CuA unforked, reaching posterior margin at marked break in smooth marginal curve but CuP marking off pigmented clavus; A very weak in clavus.
una Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



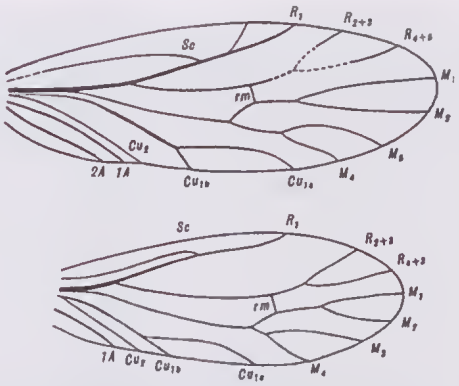
Zoropsocus delicatulus; BMNHIn46399; 2.5mm long (left). Line drawing (above) of Tillyard, 1935a, text-fig. 6.

Zoropsocus Tillyard, 1935a [*delicatulus*]
Wings narrow at base; sides straight; apex rounded; Sc short; R1 simple; Rs 2-branched, finishing before apex; pterostigma chitinised, covering both R1 and R2+3.
delicatulus Tillyard, 1935a; UPerm; Newcastle CM; Sydney.
stanleyi Davis, 1942; UPerm; Newcastle CM; Sydney.

Order PSOCOPTERA (psocids, booklice)

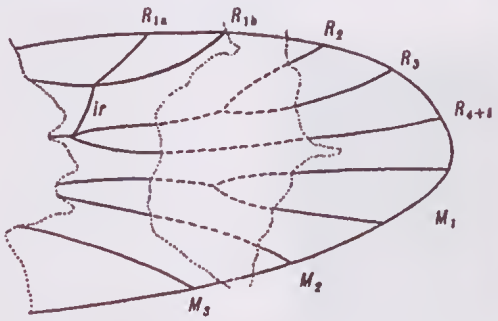
Family **PSOCIDIIDAE** Tillyard, 1926

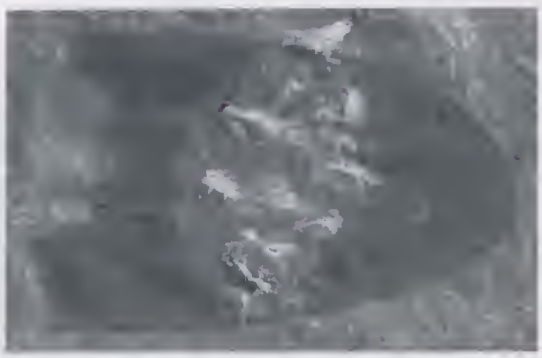
Austropsocidium Tillyard, 1935a [*pincombei*]
Forewing: elongate, oval; C gently curved; apex well rounded; Sc ending on R1; R well removed from C; Rs 2- or 3- branched, branches short; M 4-branched; r-m present; Cu1 arising just below M, with long flat fork not connected to M; Cu2 straight, weak, bounding small clavus with 2 veins; A1 straight, close to Cu2; A2 slightly sigmoidal.
pincombei Tillyard, 1935a; UPerm; Newcastle CM; Sydney.
stigmaticum Tillyard, 1935a; UPerm; Newcastle CM; Sydney.



Austropsocidium pincombei; AMF40318; 8mm long (below). Line drawings (abve) of fore and hind wings of Tillyard, 1935a, text-figs 1A, 1B.

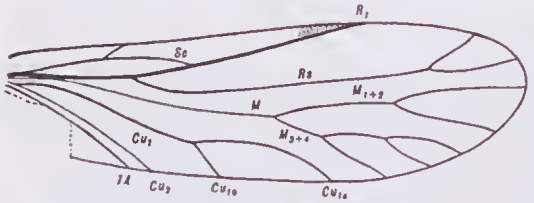
Megapsocidium Tillyard, 1935a [*australe*]
Forewing: R1 and Rs connected by cross vein below the fork of R1; Rs forking at this cross vein and again distally on upper branch; M1+2 3-branched; M3+4 unbranched.
australe Tillyard, 1935a; UPerm; Newcastle CM; Sydney.

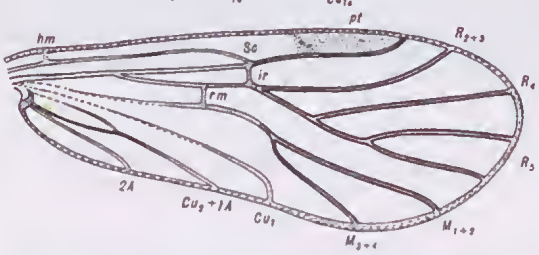




Megapsocidium australe; BMNHIn46396; 6mm long. Line drawing (above) of Tillyard, 1935a, text-fig. 3

Stenopsocidium elongatum; BMNHIn46397; 6.5mm long. Line drawing (below) of Tillyard, 1935a, text-fig. 4.



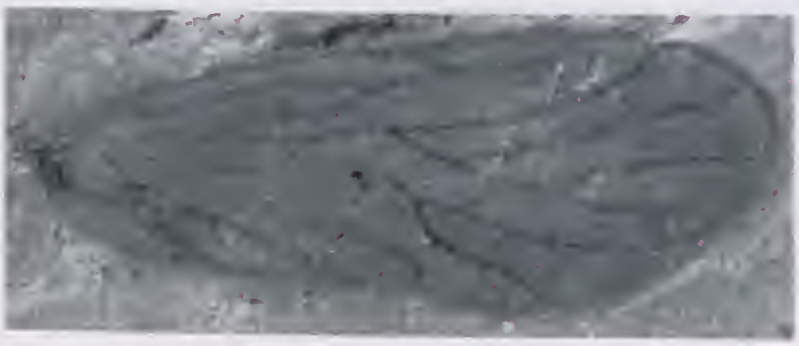


Zygopsocus permianus; BMNHIn46398; 4.7mm long (below). Line drawing (above) of Tillyard, 1935a, text-fig. 5.

Stenopsocidium Tillyard, 1935a [*elongatum*]
Wings narrow, elongate-oval; C nearly straight to end of R1; apex well rounded; Sc ending on R1 with branch veinlet to C also; R1 simple; Rs 2-branched; M 5-branched in forewing, 4 in hindwing; Cu1 with long flat fork, not connected with M at all; Cu2 faint; A1 strong, nearly straight.
elongatum Tillyard, 1935a; UPerm; Newcastle CM; Sydney.

Family **ZYGOPSOCIDAE** Tillyard, 1935a

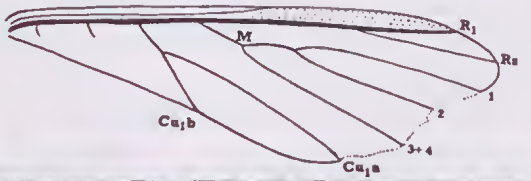
Zygopsocus Tillyard, 1935a [*permianus*]
Forewing: well rounded; Sc ending on R1 just before midlength; Rs arising near base; i-r beneath end of Sc; Rs forking just below this cross vein, with posterior branch again dividing into 3; M arising close to base; r-m present; M curving back sigmoidally distally, branching; Cu separate from M; Cu1 ending in strong posterior curve; Cu2 and A1 forming Y-vein finishing at margin near Cu1; A2 present; base of wing heavily chitinised; margin broadly chitinised all around.
permianus Tillyard, 1935a; UPerm; Newcastle CM; Sydney.

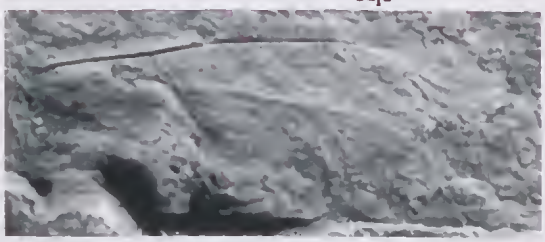


Order HEMIPTERA (bugs)

Family **APHIDIDAE** Latreille, 1802

?**Triassoaphis** Evans, 1956 [*cubitus*]
Forewing: very strong vein parallel to costal margin incorporating all veins basally except Sc; Sc terminating near midlength; Rs short; M 3-branched; Cu1 2-branched; anals incomplete.
cubitus Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.





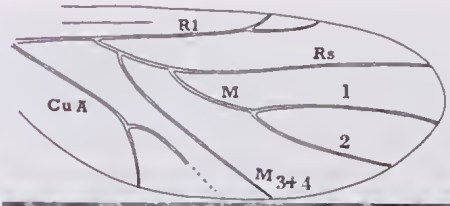
Triassoaphis cubitus; UQC2235; 6mm long. Line drawing (above) of Evans, 1956, fig. 26.

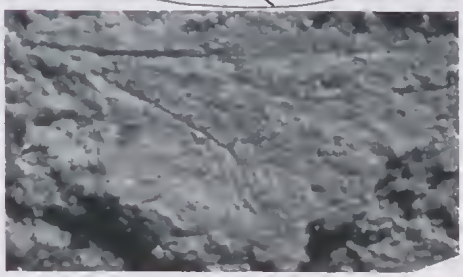
Crosaphis Evans, 1971 [*anomala*]
Wings broad; M basally incorporated in same vein as R so that M1+2 and M3+4 diverge separately from their common stem with Rs. CuA 2-branched, meeting R proximally at an acute angle. Clavus absent; anal veins lacking.
anomala Evans, 1971; UTrias; Mt Crosby Fm; Ipswich.

Family **ARCHESCYTINIDAE** Tillyard, 1926

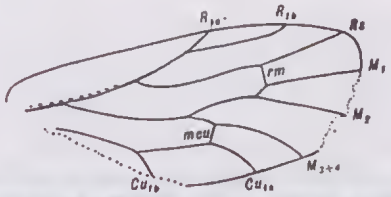
Austroscytina Evans, 1943b [*imperfecta*]
Hindwing: costal space narrow; R1a meets costal margin just beyond midlength; R1b not reaching apex; M 3-branched; M and Cu1 have separate origins.
imperfecta Evans, 1943b; UPerm; Newcastle CM; Sydney.

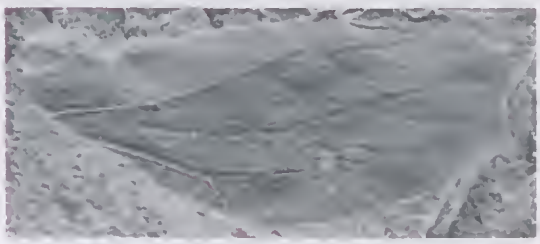
Bekkerscytina Evans, 1958 [*primitiva*]
Forewing: elongate, oval; costal space wide; R not parallel to costal border; Rs arises from R closer to junction with M rather than with R1; M 3-branched (M1, M2, M3+4); Cu1a not angulate and longer than straight portion of Cu1; Cu1b meets margin distal to Cu2; cu-m present; clavus small; 2 anal veins completely separate.
primitiva Evans, 1958; UPerm; Newcastle CM; Sydney.



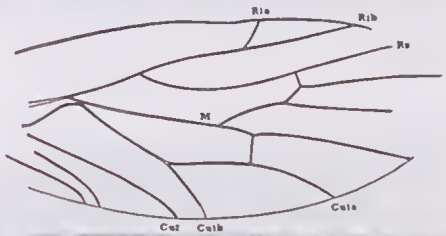


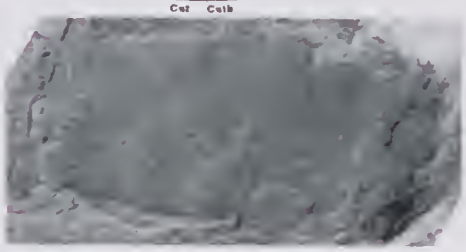
Crosaphis anomala; QMF6508; 3.5mm long. Line drawing (above) of Evans, 1971, fig. 3A.



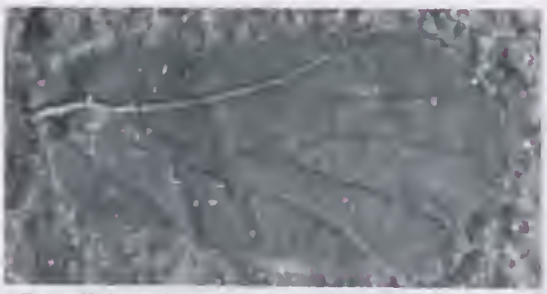


Austroscytina imperfecta; AMF40084; 8mm long. Lime drawing (above) of Evans, 1943b, fig. 3.



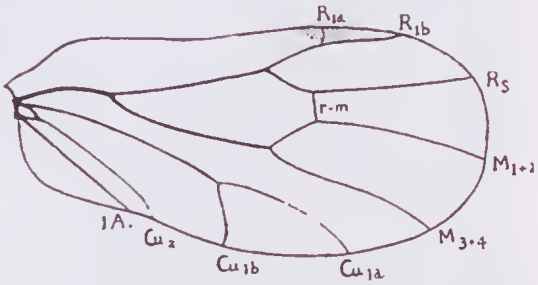


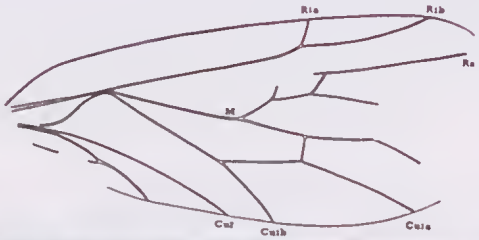
Bekkerscytina primitiva; AMF47190; 7.8mm long. Line drawing (above) of Evans, 1958, fig. 4.

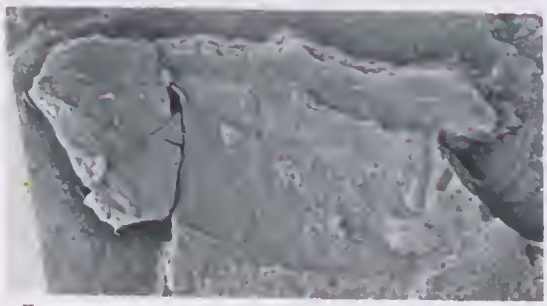


Eopsyllidium delicatulum; AMF39795; 2.8mm long. Line drawing (right) of Davis, 1942, fig. 5

Eopsyllidium Davis, 1942 [*delicatulum*]
Forewing: very small; Se absent; R anteriorly convex before junction with M; R1a mormal to R1b, running across base of well-developed pterostigma; Rs simple.
delicatulum Davis, 1942; UPerm; Newcastle CM; Sydney.

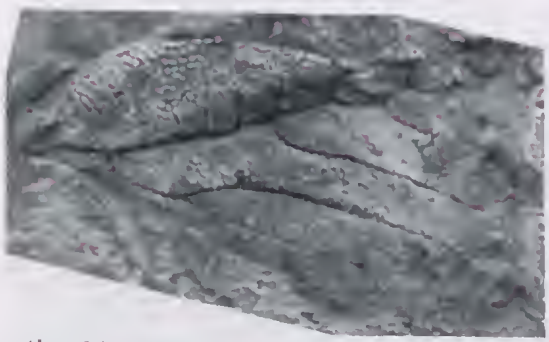






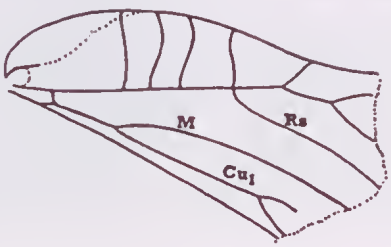
Eoscytina migdisovae; AMF47185; 9mm long. Line drawing (above) of Evans, 1958, fig. 1.

Eoscytina Evans, 1958 [*migdisovae*]
Forewing: expands distally; R parallels costal margin; Rs arises approx. midway between junction with M and R1 fork; Cu1 steeply bent at its point of apposition to R+M; Cu1a angulate, joined to M by cross vein; Cu1b meets margin distant from Cu2; clavus small; anal veins orm a Y-vein.
migdisovae Evans, 1958; UPerm; Newcastle CM; Sydney.
incompleta Evans, 1958; UPerm; Newcastle CM; Sydney.

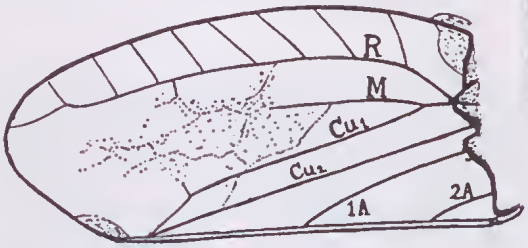


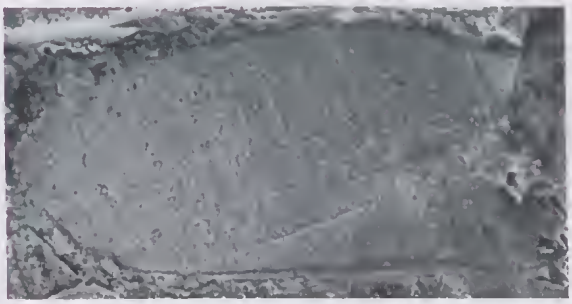
Alotrifidus interruptus; UQC347; 5mm long. Line drawing (right) of Evans, 1956, fig. 16D.

Family **CERCOPIDAE** Westwood, 1838
Alotrifidus Evans, 1956 [*interruptus*]
Costal margin arched; costal space wide; Rs arising from R nearer to the apex of the tegmen than its base; M and Cu1 a single vein proximally.
interruptus Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.



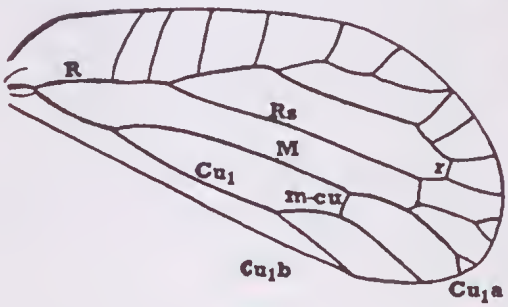
Triassoscarta Tillyard, 1919d [*subcostalis*]
Forewing: R unbranched; long series of transverse costal veinlets; M and Cu arising together by short stem; A2 finishing as distant from A1 as Cu2.
subcostalis Tillyard, 1919d; UTrias; Blackstone Fm; Ipswich.

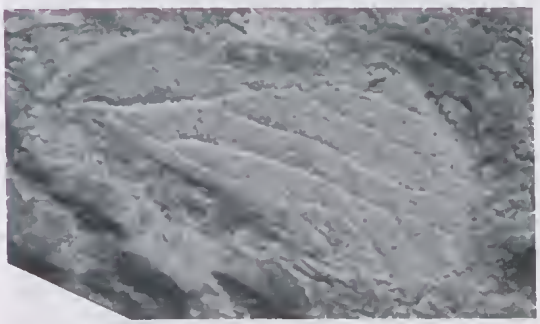




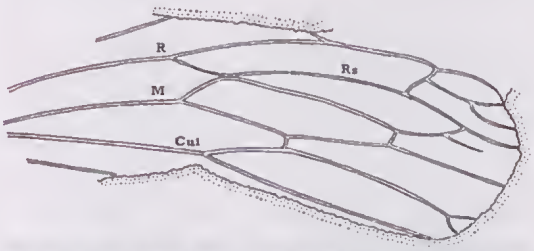
Triassoscarta subcostalis; GSQI116a; 8mm long. Line drawing (left) of Tillyard, 1919d, text-fig. 8.

Trifidella Evans, 1956 [*perfecta*]
Forewing: surface rugose; series of transverse accessory veins between R and C; costal margin nt arched; Rs originating proximal from midlength, oblique; M and Cu1 fused basally; M 2-branched, each with apical fork; cross veins r, r-m and m-cu present.
perfecta Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.

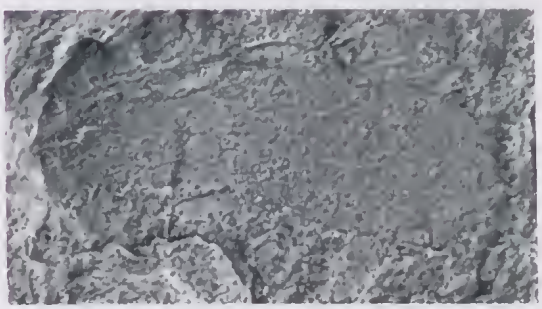




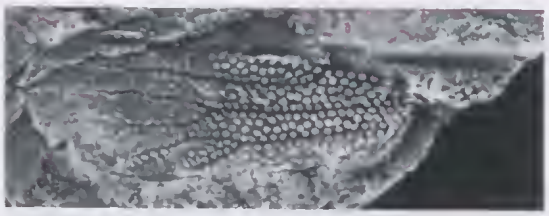
Trifidella perfecta; UQC945; 7mm long. Line drawing (left) of Evans, 1956, fig. 16C.



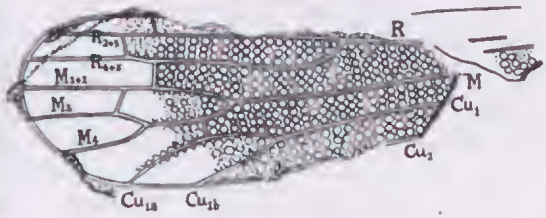
Tychticoloides Evans, 1963 [*belmontensis*]
Forewing: long, narrow; surface rugose; anterior margin curved; Rs leaving R 0.33 of tegmen length from base; R+Rs linked by a cross vein; M1+2 and Rs in contact at 2 points; Cu1 of 2 parallel arms; clavus unknown.
belmontensis Evans, 1963; UPerm; Eleebena Fm; Sydney.



Tychticoloides belmontensis; AMF50110; 7.2mm long. Line drawing (above) of Evans, 1963, fig. 4.

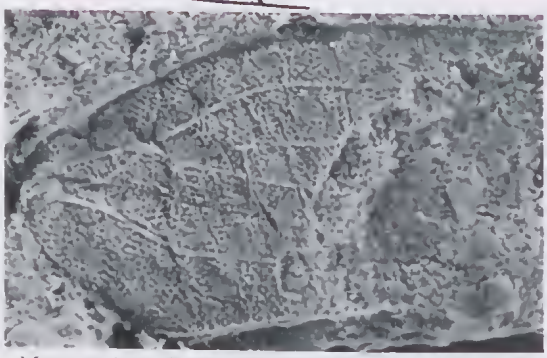


Chiliocycla scolopoides; GSQI158a; 6.4mm long. Line drawing (right) of Tillyard, 1919d, text-fig. 2.

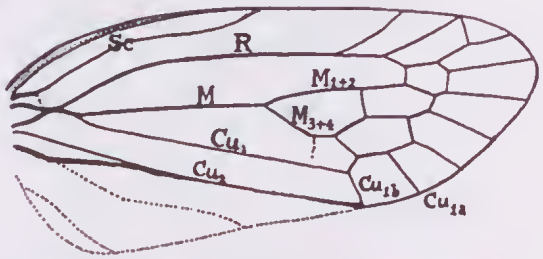


Family **CHILIOCYCLIDAE** Evans, 1956

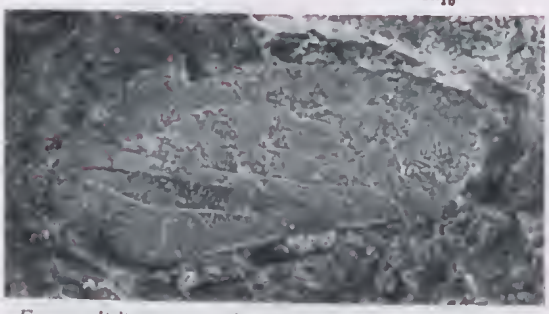
Chiliocycla Tillyard, 1919d [*scolopoides*]
Forewing: basal 0.6 of wing with strong sculpture of flat circular tubercles; R4+5 arising a little before half length; r-m above median cell; M 3-branched dichotomously; M1+2 joined to M3 by cross vein; Cu1 strong with distal fork; a cross vein joins Cu1a to M3+4 behind median cell.
scolopoides Tillyard, 1919d; UTrias; Mt Crosby and Blackstone Fm; Ipswich.
Mesoscytina Tillyard, 1919d [*australis*]
Forewing: Sc waved; R gives off first branch to costal margin 1/3 length from apex, then divided into 4 short branches; M branched at midlength; 2 crossveins from R4+5 and M1+2; cross veins between branches of M; Cu1 branched distally; Cu2 strong, straight.
australis Tillyard, 1919d; UTrias; Blackstone Fm; Ipswich.
affinis Tillyard, 1919d; UTrias; Blackstone Fm; Ipswich.



Mesoscytina affinis; GSQI235; 6mm long. Line drawing (above) of Tillyard, 1919d, text-fig. 6



Mesoscytina australis; GSQI112a; wing venation from Tillyard, 1919d, text-fig. 5.

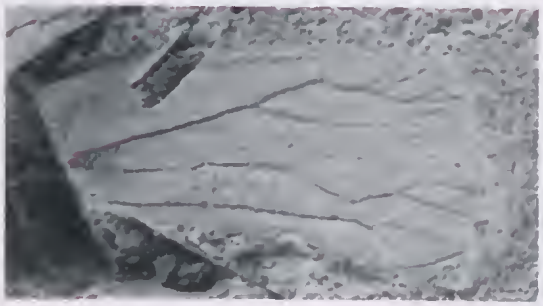


Eurymelidium australe; GSQI248a; 5mm long. Line drawing (above) of Tillyard, 1919d, text-fig. 16.

Family **CICADELLIDAE** Latreille, 1802

Eurymelidium Tillyard, 1919d [*australe*]
Forewing: Sc close to costal margin; R, M, Cu basally fused; R giving 1 costal veinlet before Rs then 2 more before apex; Rs incorporated with M1+2 in part; M branches about midlength of median cell and becomes stronger beyond the cell; Cu1 forked distally; A1 wavy; A2 encloses anal angle.
australe Tillyard, 1919d; UTrias; Blackstone Fm; Ipswich.

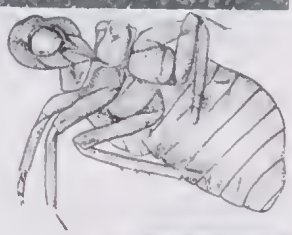
Mesothymbris Evans, 1956 [*perkinsi*]
Forewing: small posterior expansion distally; apex not evenly rounded; sides not parallel; R1 4- or more branched; Rs simple; M1+2 straight, parallel to margin; M3+4 curving sharply towards m-cu.
perkinsi Evans, 1956; UTrias; MtCrosby Fm; Ipswich.
woodwardi Evans, 1956; UTrias; MtCrosby Fm; Ipswich.

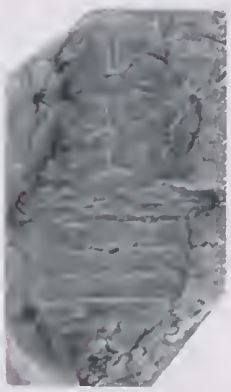


Mesothymbris perkinsi; UQC889; 7mm long (left). Line drawing of Evans, 1956, fig. 5d.

Austroscarites gen. nov. [=*Scarites* Hamilton, 1992 not Fabricius, [*femoratus*]
Head narrower than pronotum; frons large, inflated, with indications laterally of muscle impressions; clypellus short, broad; lora long, upper edge poorly defined but probably not reaching antennal pits. Antennae small, slender, set near frons well removed from eyes. Hind coxae large, transverse, not jointed by a mesal peg. Middle and hind femora of similar length, fore femur distinctly shorter. Hind tibia slender, 50% longer than femur. Abdomen robust; laterotergites wider than long; terminal 3 segments much narrower than basal segments
femoratus Hamilton, 1992; LCret; Koonwarra FB; Gippsland.

Austroscarites femoratus; MUGD3578; 5mm long. Line drawing (right) of Jell & Duncan, 1986, fig. 28C.

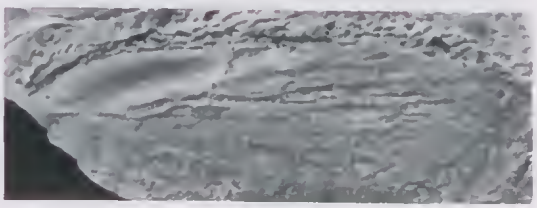


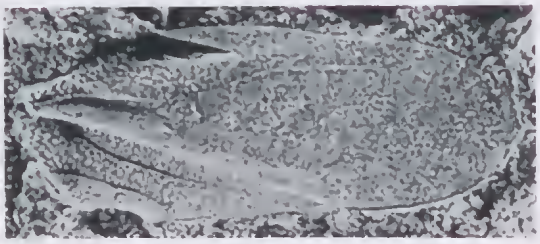


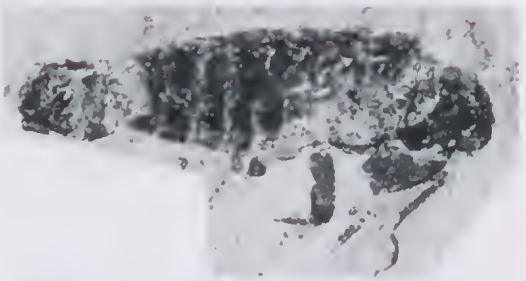
Austroscarites femoratus; NMVP32283; 5mm long (right). Line drawing of Jell & Duncan, 1986, fig. 20D.

Triassocotis Evans, 1956 [*australis*]
Tegmen: long, narrow; R1 4-branched; Rs simple; M 4-branched; enclosed cell between M1+2 and M3+4.
australis Evans, 1956; UTrias; MtCrosby Fm; Ipswich.
stricta Evans, 1961; UTrias; MtCrosby Fm; Ipswich.
amplicata Evans, 1961; UTrias; MtCrosby Fm; Ipswich.

Triassocotis australis; UQC1554; 11mm long (right). Line drawing of Evans, 1956, fig. 5L.

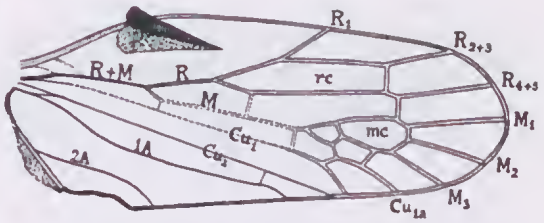






Homopterulum jelli; NMVP103103; x9. Line drawing (above) of Hamilton, 1992, fig.6.

Ligavena gracilipes; NMVP103350; 11mm long.



Triassojassus proavitus; GSQI191a; 5.8mm long (left). Line drawing of Tillyard, 1919d, text-fig. 18.

Triassojassus Tillyard, 1919d [*proavitus*]
Tegmen: costal margin arched basally; Se absent; Cu1 leaving R+M near base; R+M fused for more than 0.25 length; R 3-branched; cross vein between R2+3 and R4+5 closing radial cell; r-m weak; M 3-branched; small median cell enclosed; crossveins between branches of M and Cu1 forming 4 cells; 3 cross veins m-cu; A1 wavy; A2 enclosing anal angle.
proavitus Tillyard, 1919d; UTrias; Blackstone Fm; Ipswich.

Family **JASCOPIDAE** Hamilton, 1971

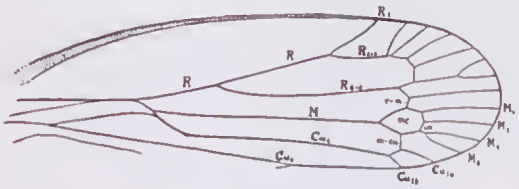
Homopterulum Hamilton, 1992 [*Cercopidium signoretti* Westwood, 1854]
Head narrower than pronotum; frons large, inflated, with indications laterally of muscle impressions; clypellus short, broad; lora long, upper edge poorly defined but probably not reaching antennal pits. Antennae small, slender, set near frons well removed from eyes. Hind coxae large, transverse, not jointed by a mesal peg. Middle and hind femora of similar length, fore femur distinctly shorter. Hind tibia slender, 50% longer than femur. Abdomen robust; laterotergites wider than long; terminal 3 segments much narrower than basal segments
jelli Hamilton, 1992; LCret; Koonwarra FB; Gippsland.

Family **LIGAVENIDAE** Hamilton, 1992

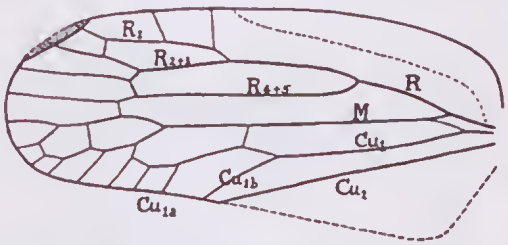
Ligavena Hamilton, 1992 [*gracilipes*]
Head much narrower than pronotum; frons with distinct muscle impressions; clypellus broad basally; lora not reaching antennal pits. Pronotum with divergent lateral margins. Tegmina with complex, weak, apical venation defining numerous apical cells. Hind wings nearly as long as tegmina. Abdomen large; laterotergites about as broad as long; pregenital sternite medially excavated; ovipositor slender, apex slightly exceeding pygofers.
gracilipes Hamilton, 1992; LCret; Koonwarra FB; Gippsland.
prosboloides Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.
dunstani Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.

Family **CIXIIDAE** Spinola, 1838

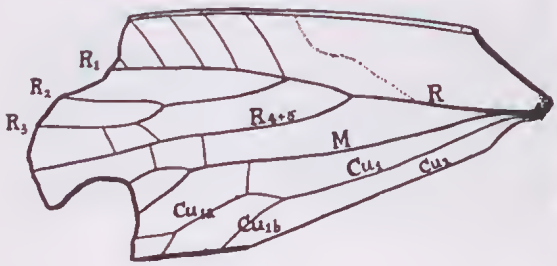
Mesocixiodes Tillyard, 1922b [*termioneura*]
Forewing: R1 unbranched; R2+3 sends a series of veinlets to the costa distally; costal area broad; median cell complete, small, placed distally; Cu1 with small distal fork.
termioneura Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.
orthoclada Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.
brachyclada Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.

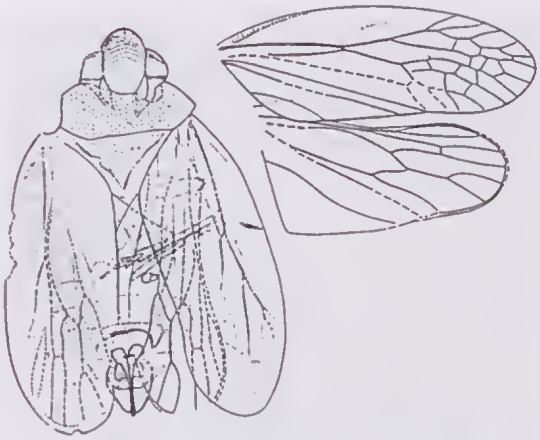


Mesocixius Tillyard, 1919d [*triassicus*]
Forewing: widest near base; R divides dichotomously twice; R1 connected to costal margin by 2 veinlets; R2+3 branches into 2 simple veins; M 6-branched; M3+4 4-branched; closed median cell defined by strong m-cu; Cu1 forked before midlength; crossveins present between R1-R2, R4+5-M1+2, M-Cu1a.
triassicus Tillyard, 1919d; UTrias; Blackstone Fm; Ipswich.

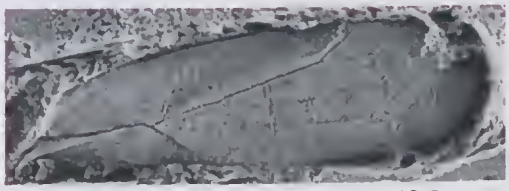


Triassocixius Tillyard, 1919d [*australicus*]
Forewing: series of oblique costal veinlets; first 2 branchings of R close together; r4+5-m and r3-r4+5; M 2-branched; m-cu present.
australicus Tillyard, 1920; UTrias; Blackstone Fm; Ipswich.



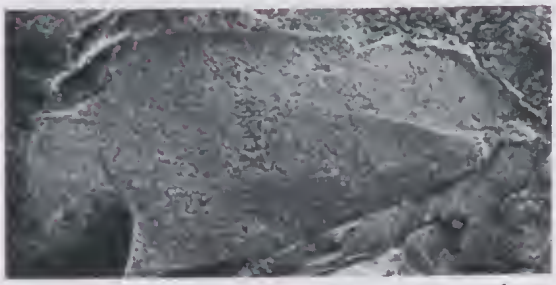


Ligavena gracilipes; NMVP103350; line drawings of Hamilton, 1992, figs 9, 10.

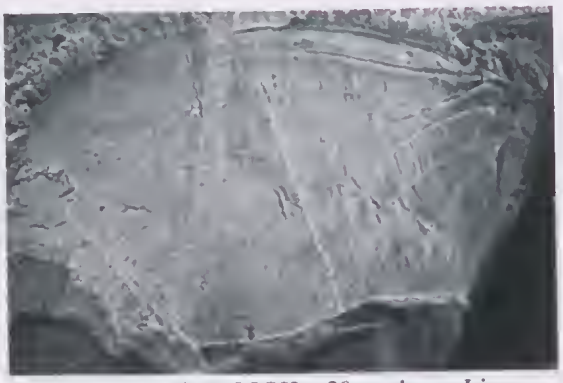


Mesocixioides termioneura; GSQ188a; 12.5mm long. Line drawing (above left) of Tillyard, 1922a, text-fig. 82.

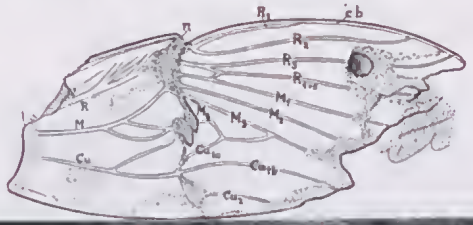
Mesocixius triassicus; GSQ1215; 10mm long. Line drawing (left) of Tillyard, 1919d, text-fig. 11.

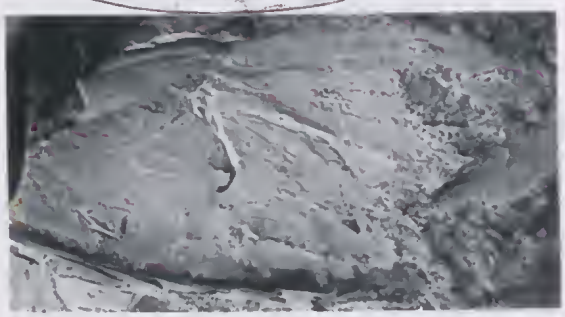


Triassocixius australicus; GSQ1267a; 10.5mm long. Line drawing (left) of Tillyard, 1919d, text-fig. 12.

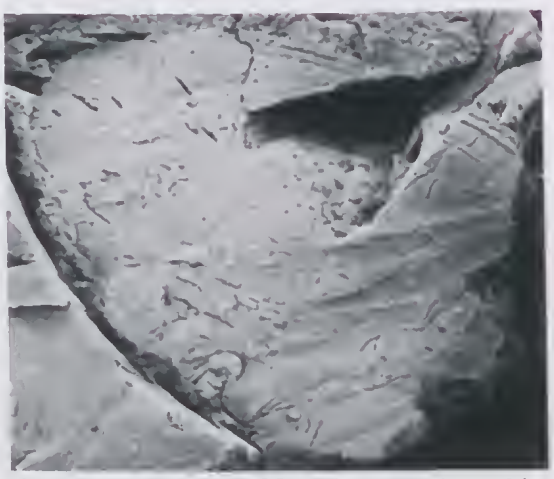


Dunstania pulchra; GSQI2a; 20mm long. Line drawing (right) of Tillyard, 1916, pl. 3, fig. 6.





Dunstaniopsis triassica; GSQ1107a; 31.5mm long. Line drawing (above) of Tillyard, 1918e, text-fig. 18.

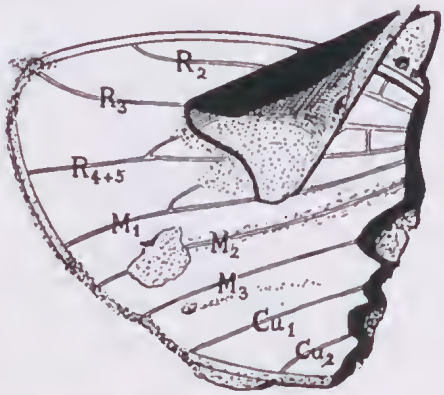


Paradunstania affinis; GSQ1147; 17mm long. Line drawing (right) of Tillyard, 1918e, text-fig. 20.

Family **DUNSTANIIDAE** Tillyard, 1916

Dunstania Tillyard, 1916 [*pulchra*]
Forewing: corium pitted all over; distinct break (node) in costal margin; R1 weak, 2-branched; R1b ending well before apex; Rs at apex; 2 closed cells just beyond node in wing, one between M1+2 and M3+4 the other between 2 branches of R1+2 which divides then reunites.
pulchra Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.

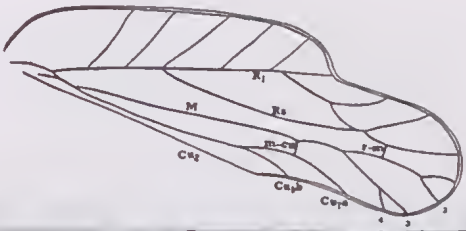
Dunstaniopsis Tillyard, 1918e [*triassica*]
Hemelytron: smooth corium; membrane lightly pitted; node less prominent than in Dunstania; R1 2-branched, long, parallel; Rs simple; r-m present; M 3-branched; Cu1 2-branched.
triassica Tillyard, 1918e; UTrias; Blackstone Fm; Ipswich.

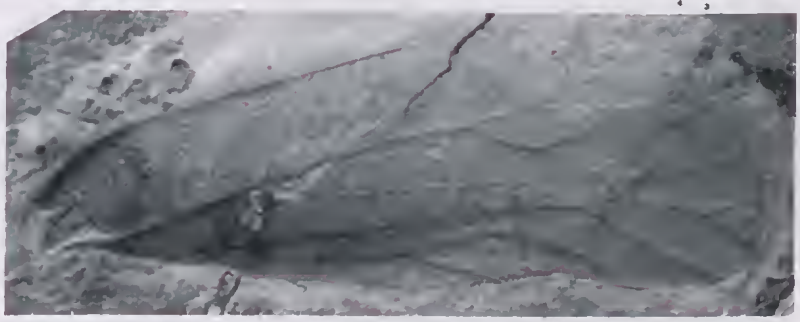


Paradunstania Tillyard, 1918e [*affinis*]
Hemelytron, larger than Dunstania. Crossveins basally between M1 and lowest branch of R absent; crossveins developed not far from dividing line between R1 and R2 and between R3 and R4+5; R4 and R5 unite distally; at same level M receives a curving branch from above.
affinis Tillyard, 1918e; UTrias; Blackstone Fm; Ipswich.

Family **DYSMORPHOPTILIDAE** Handlirsch, 1906

Dysmorphoptiloides Evans, 1956 [*elongata*]
Forewing: evenly punctate, narrow margin; costal border emarginate near apex of R1; apex narrowly rounded; R parallels costal margin and connected to it by series of parallel veins; R1 3-branched; Rs may be separate from or incorporated with R1; M 4-branched apically, joined basally to Cu1; Cu1a longer than Cu1b; cross veins r, r-m, m-cu may be present.
elongata Evans, 1956; UTrias; Mt Crosby Fm, Ipswich.
parva Evans, 1956; UTrias; Mt Crosby Fm, Ipswich.

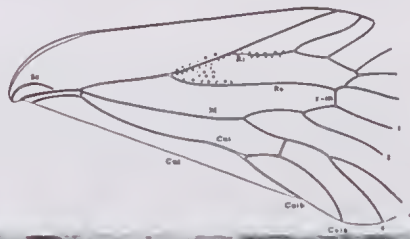


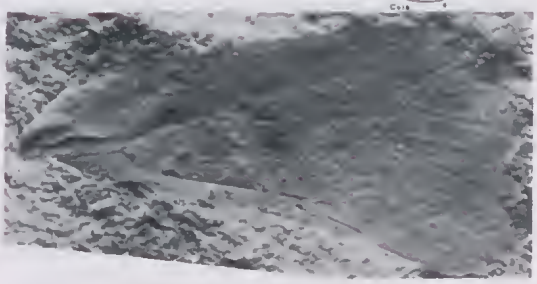


Dysmorphoptiloides elongata; UQC686; 16mm long. Line drawing (above) of Evans, 1956, fig. 17A.

Family **EOSCARTERELLIDAE** Evans, 1956

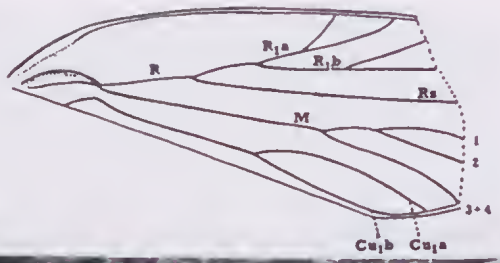
Belmontocarta Evans, 1958 [*perfecta*]
Forewing: rugose, expanding laterally; Se short, curved, at base of R+M; R1a single; R1b branched, linked to Rs by oblique cross vein; M 4-branched; Cu1 basally parallel with R+M, joined to base of M by short cross vein; Cu1 evenly arched; Cu1b aligned with margin; r-m and m-cu present.
perfecta Evans, 1958; UPerm; Newcastle CM; Sydney.
Eoscarterella Evans, 1956 [*media*]
Forewing: rugose, expanded distally; R1 with >2 branches; Rs arises 0.3 of distance from base; R and M fused basally; M 4-branched; Cu1 not fused basally with M and proximally straight; Cu1a arched, longer than Cu1b.
media Evans, 1956; UTrias; MtCrosby Fm; Ipswich.



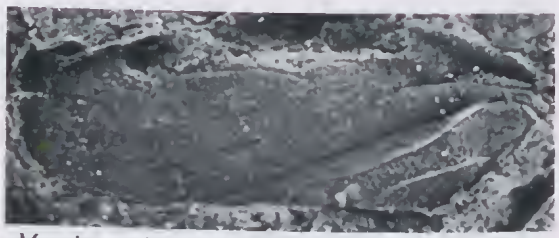


Belmontocarta perfecta; AMF47199; 10.5mm long. Line drawing (above) of Evans, 1958, fig. 5.

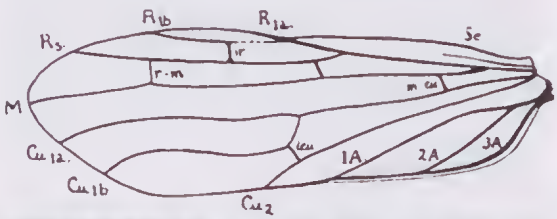
Eoscarterella media; UQC1110; 10.5mm long. Line drawing (left) of Evans, 1956, fig. 18C.



Eoscarteroides bryani; UQC172; 12mm long. Line drawing (above) of Evans, 1956, fig. 18A.



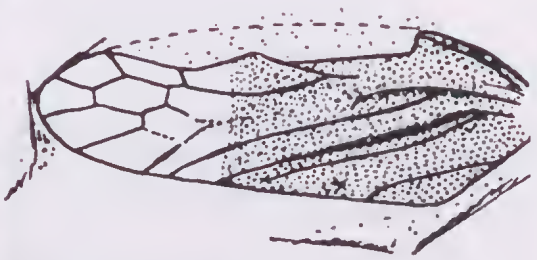
Mesojassus ipsviciensis; GSQ133; 6mm long. Line drawing (right) of Tillyard, 1916, pl. 2, fig. 7.



Eoscartoides Evans, 1956 [*bryani*]
Forewing: complete marginal border; R and M basally arched; R1a and R1b both forked; M 3-branched; M3+4 unbranched; Cuslightly arched basally, meeting Cu1b apically; Cu1a, Cu1b of equal length.
bryani Evans, 1956; UTrias; Mt Crosby Fm, Ipswich.

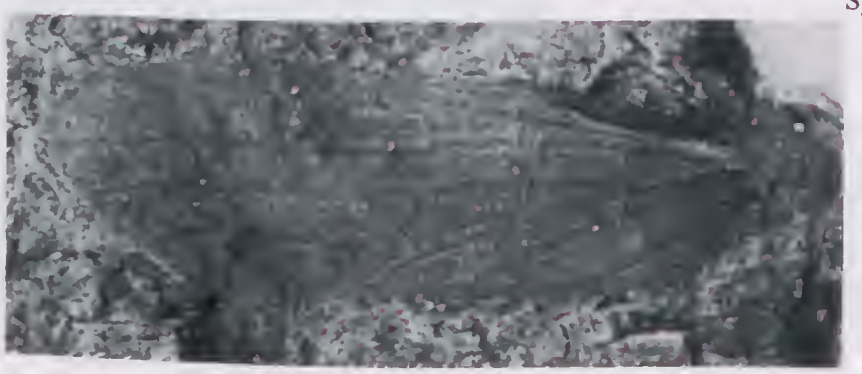
Family **EURYMELIDAE** Amyot & Serville, 1843

Mesojassus Tillyard, 1916 [*ipsviciensis*]
Forewing: R, M and Cu1 fused basally; Cu1 arising strongly; M arising weakly; R without longitudinal branches; 3 costal veinlets; M1+2 simple; closed cell formed by cross vein from M1+2 to M3+4; Cu1 forked distally; m-eu present; A1 wavy; A2 encloses anal angle.
ipsviciensis Tillyard, 1916; UTrias;Blackstone; Ipswich.



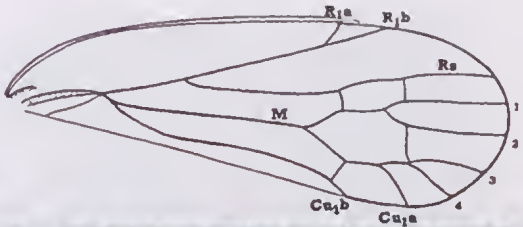
Family **HYLICELLIDAE** Evans, 1956

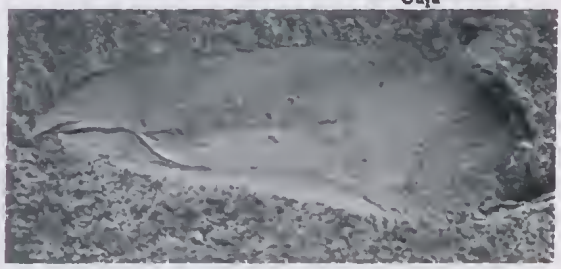
Eochiliocycla Davis, 1942 [*angusta*]
Forewing: Se weak, parallel to base of R; R1 straight, ending at a reentrant angle on costal marginal half wing length; R1b weak; Rs simple, arising from R1 just before it bifurcates; M simple, arising from base of R; 2 rs-m; between these a cross vein (ir) runs to R1b; Cu arises separately from M and R, forks immediately; m-eu present; Cu1b sigmoidal; 1eu crossvein joins Cu2 to Cu1b; 3 strong anal veins arise separately from Cu and distally confluent.
angusta Davis, 1942; UPerm; Newcastle CM; Sydney.



Eochiliocycla angusta; AMF39793; 5.7mm long.Line drawing (above left) of Davis, 1942, fig. 3.

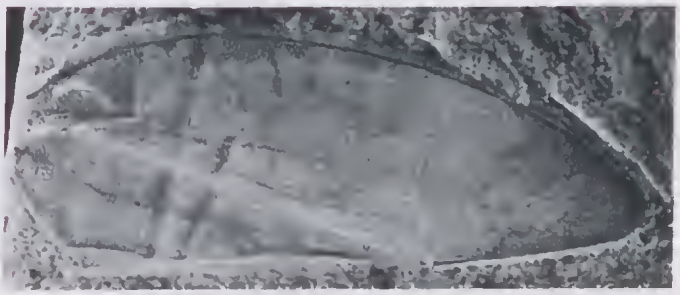
Hylicella Evans, 1956 [*colorata*] [=*Hylicellites* Becker-Migdisova, 1962 (type *Hylicella reducta* Evans, 1956)]
Forewing: M complete or reduced and with M3+4 in part incorporated with Cu1a; Cu1 with a steep basal bend; cross veins rs-m and one between arms of M.
colorata Evans, 1956; UTrias; MtCrosby Fm; Ipswich.
reducta Evans, 1956; UTrias; MtCrosby Fm; Ipswich.



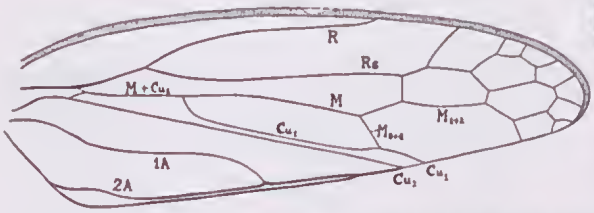


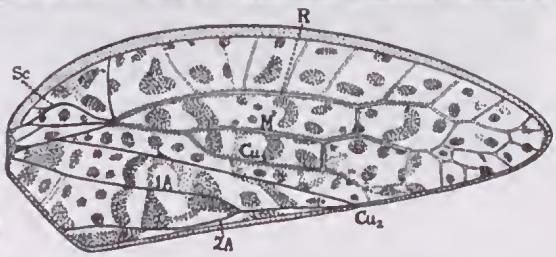
Hylicella colorata; UQC1841; 11mm long. Line drawing (above) of Evans, 1956, fig. 7A.

Family **IPSVICIIDAE** Tillyard, 1919d
Ipsvicia Tillyard, 1919d [*jonesi*]
Forewing: rugose, pitted, narrowing apically; lacking Rs; M and Cu1 form single vein; Y-vein in clavus; costal fracture usually present from fork of R+Sc and M+Cu1 to costal margin.
jonesi Tillyard, 1919b; UTrias; Blackstone Fm; Ipswich.
maculata Tillyard, 1919d; UTrias; Blackstone Fm; Ipswich.
acutipennis Tillyard, 1919d; UTrias; Blackstone Fm; Ipswich.



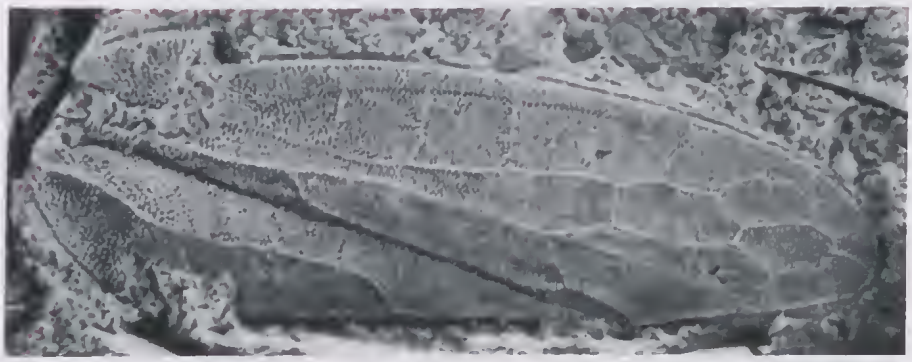
Ipsviciopsis Tillyard, 1922b [*elegans*]
like Ipsvicia but with Sc as a sigmoidal vein separate from R and joined to it by 3 cross veins.
elegans Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.
magna Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.

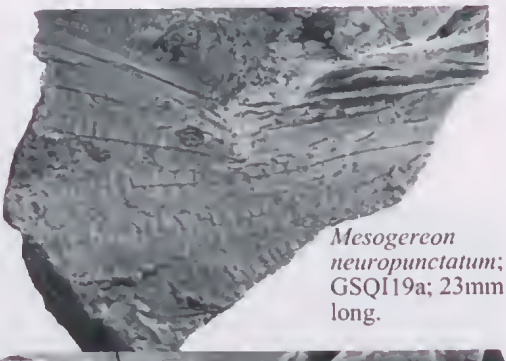




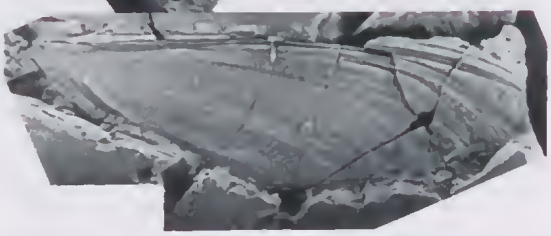
Ipsvicia jonesi; GSQ1122a; 14.2mm long (above). Line drawing of Tillyard, 1919d, text-fig. 13.

Ipsviciopsis elegans; GSQ1178a; 12.5mm long (right). Line drawing(above) of Tillyard, 1922b, text-fig. 85.

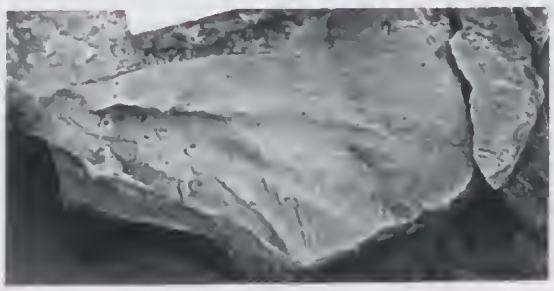


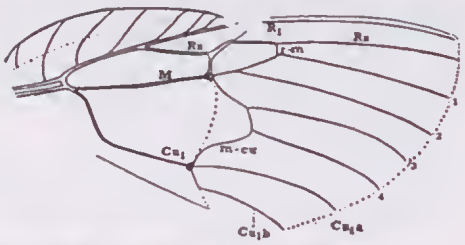


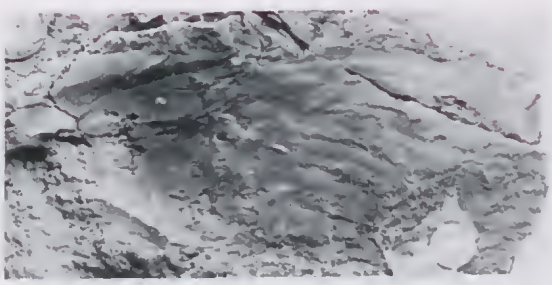
Mesogereon neuropunctatum; GSQI19a; 23mm long.



Mesogereon superbum; GSQI169; 44.5mm long. Line drawing (right) of Tillyard, 1922b, text-fig.



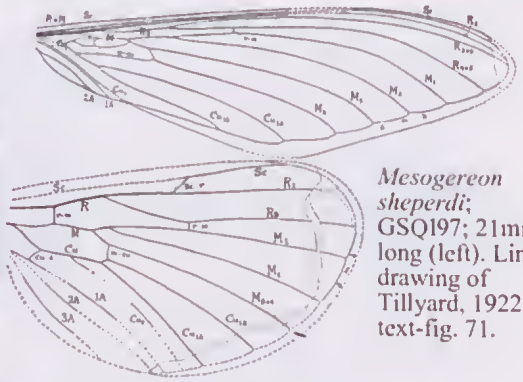




Fletcheriana triassica; forewing AMF39166 (above), 58mm long; hindwing AMF30971 (right), 40mm long. Line drawing (above) of Evans, 1956, fig. 21F.

Family **MESOGEREONIDAE** Tillyard, 1921

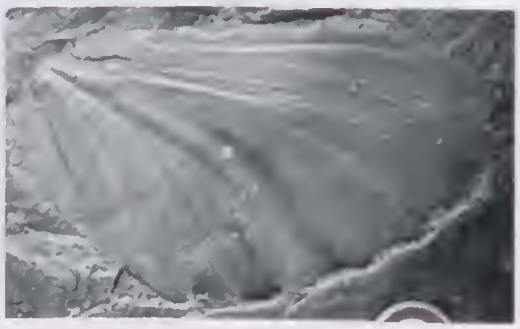
Mesogereon Tillyard, 1916 [*neuropunctatum*]
Forewing: R1 and Rs long, parallel, simple; M 4-branched; long cross vein m-cu joins M4; a closed cell above this cross vein; in the cell are remains of an archedictyon; Cu1 weak basally, Cu1a and Cu1b simple; Cu2 in deep groove, dividing off clavus; A1 and A2 simple; cross veins e-m and sometimes cu-a present.
neuropunctatum Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.
superbum Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.
compressum Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.
affine Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.
shepperdi Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.



Mesogereon sheperdi; GSQ197; 21mm long (left). Line drawing of Tillyard, 1922b, text-fig. 71.

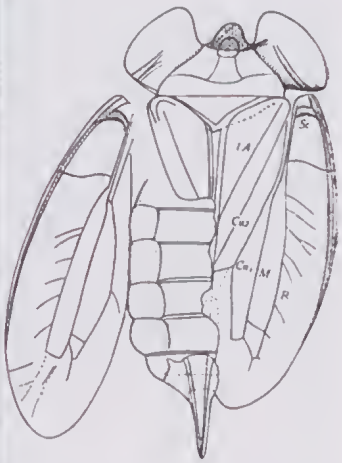
Family **PALAEONTINIDAE** Handlirsch, 1906

Fletcheriana Evans, 1956 [*triassica*]
Forewing: costal space wider proximally, with several oblique veinlets; nodal line thickened between Rs and M; M 4-branched; nodal line crosses M at its first fork; m-cu sinuate; r-m present; Cu1 sharply flexed basally.
triassica Evans, 1956; UTrias; MtCrosby Fm; Ipswich.



Family **PARAKNIGHTIIDAE** Evans, 1950

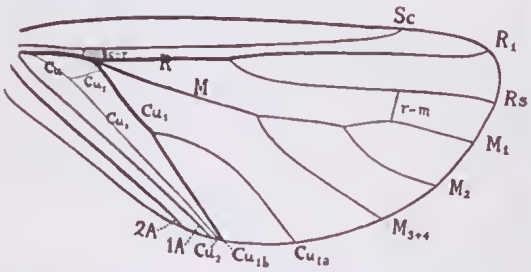
Paraknightia Evans, 1943b [*magnifica*]
Pronotum with large well-developed pronotal expansions, narrowly produced anteriorly. Forewing: Cu1 proximally parallel to M and R; C thickened; Sc short, transverse; nodal line from margin to R-M fork; R parallel to C most of way; A1 and A2 parallel: rugose except smooth area close to apex.
magnifica Evans, 1943b; UPerm; Newcastle CM; Sydney.

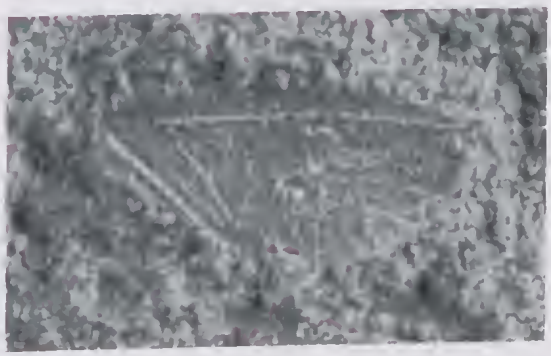


Paraknightia magnifica; AMF40450; 17mm long. Line drawing of Evans, 1943b, fig. 24b

Family **PINCOMBEIDAE** Tillyard, 1922

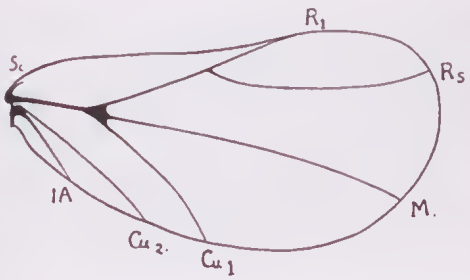
Pincombea Tillyard, 1922a [*mirabilis*]
Sc absent; R, M and Cu1 meeting basally; r-m present; R 2-branched; M 3-branched; Cu1 2-branched.
mirabilis Tillyard, 1922a; UPerm; Newcastle CM; Sydney.



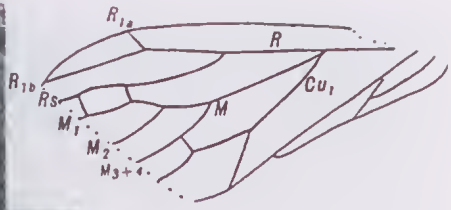


Pincombea mirabilis; AMF28464; 3mm long (right). Line drawing of Tillyard, 1922a, fig. 2.

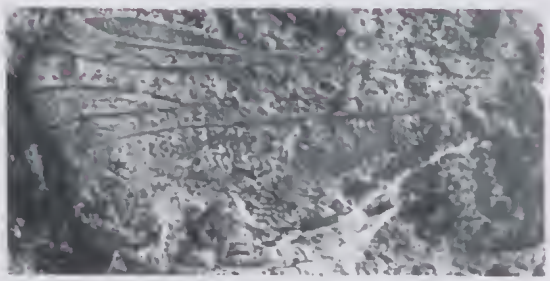
Eupincombea Davis, 1942 [*postica*]
Hindwing: very small; Sc short, near costa; R strong for basal quarter then divided into 3 namely R, M and Cu1; R1 runs forward to anterior margin; Rs concave forward; M+Cu1 simple, slightly convex forward; Cu2 and A1 arise together then diverge immediately.
postica Davis, 1942; UPerm; Newcastle CM; Sydney.



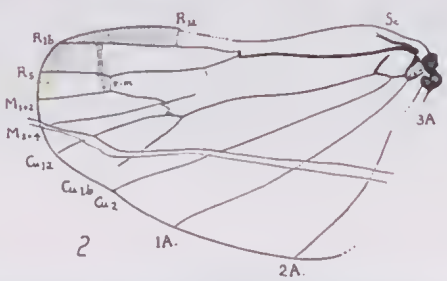
Eupincombea postica; AMF39794; 2.6mm long. Line drawing (left) of Davis, 1942, fig. 4.



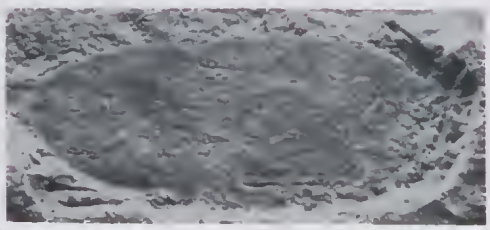
Protopincombea obscura; AMF40075; 4.2mm long. Line drawing (above right) of Evans, 1943b, fig. 44.



Anomaloscytina incompleta (hindwing); AMF40009; 10mm long.



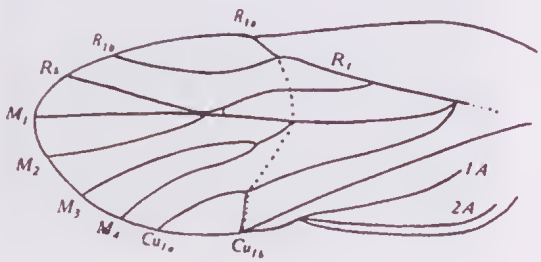
Anomaloscytina metapteryx (hindwing); AMF39792; 7.3mm long. Line drawing of Davis, 1942, fig. 2.

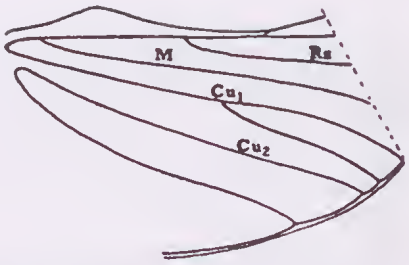


Austroprosbole maculata; AMF40048; 13mm long. Line drawing (right) of Evans, 1943b, fig. 2

Protopincombea Evans, 1943b [*obscura*]
Tegmen: broad; clavus short, narrow; R parallel to costal margin; 2 cross veins from Rs to M; m-cu present; M 3-branched; M and Cu1 arise from same point on R but lack common stem; anals forming Y-vein.
obscura Evans, 1943b; UPerm; Newcastle CM; Sydney.

Family **PROSBOLIDAE** Handlirsch, 1906
Anomaloscytina Davis, 1942 [*metapteryx*]
Hindwing: Sc short but distinct; R1 with an articulation at half wing length where Rs originates from it; R1a normal to R1 and weak; Rs simple, with possible crossvein to R1b; M 2-branched, connected to Cu1a by possible crossvein; Cu1 arising from base of R; Cu2 connected by 1 oblique vein to base of Cu1 and by another to A1; A1+A2 straight.
metapteryx Davis, 1942; UPerm; Newcastle CM; Sydney.
incompleta Evans, 1943b; UPerm; Newcastle CM; Sydney.
Austroprosbole Evans, 1943b [*maculata*]
Forewing: long, broad, delicate; a break in curvature of the costal margin occurs at R1a; costal space wide; Rs bent and in close contact with M1; M 4-branched; clavus broad; A1 and A2 meet distally; anal margin not in alignment with rest of hind margin.
maculata Evans, 1943b; UPerm; Newcastle CM; Sydney.

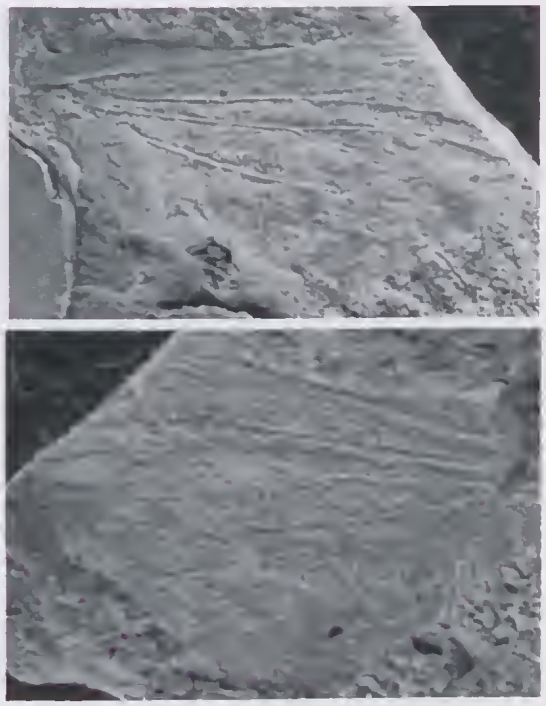




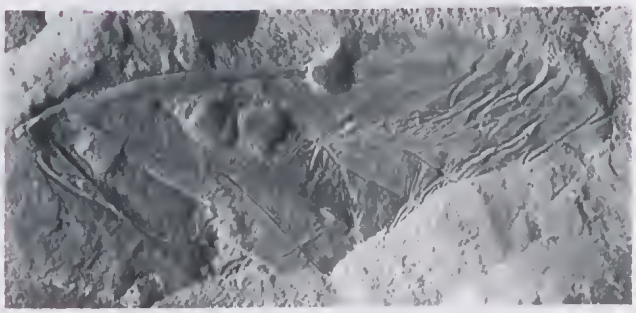
Mesojassula Evans, 1956 [*marginata*]
Forewing: costal margin with marked medial depression; R1a, R1b and Rs present; M unbranched; Cu1 has 2 equal branches; marginal vein present.
marginata Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.

Mitchelloneura Tillyard, 1921b [*permiana*]
Forewing: Sc short, fused with R1, ending halfway along costal margin; R1 strong; Rs branching 0.25 of distance from apex; R3+4 joining R1; 2 cross veins from R4 to R2+3 and R1; M arising from R near base, 3-branched; M3+4 unbranched; Cu1a 2-branched; r-m and m-cu present.
permiana Tillyard, 1921b; UPerm; Newcastle Fm; Sydney.

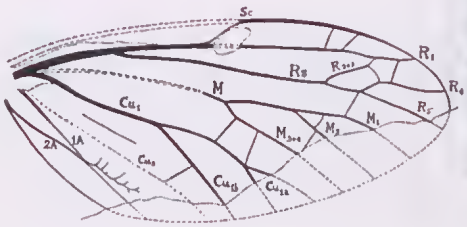
Permodiphthera Tillyard, 1926a [*robusta*]
Forewing: C strongly curved basally, then running fairly straight to R1a; apex well-rounded basal cell very small; Rs curved; nodal line anterior from fork in M; Cu1 strongly curved down to come close to Cu2.
robusta Tillyard, 1926a; UPerm; Newcastle CM; Sydney.

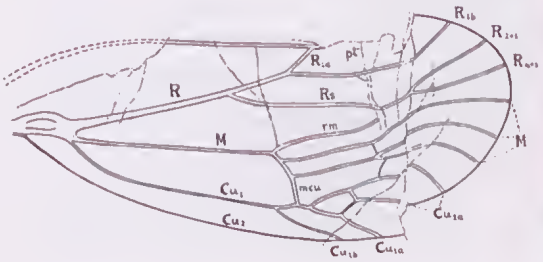


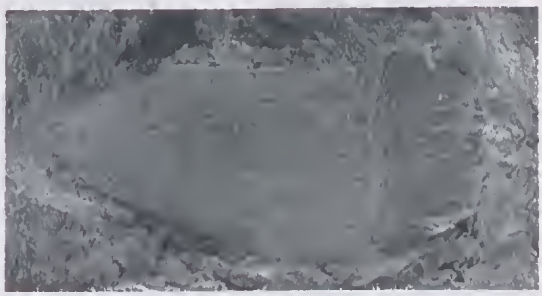
Mesojassula marginata (part and counterpart; UQC1933; 10mm long. Line drawing (above left) of Evans, 1956, fig. 3O.



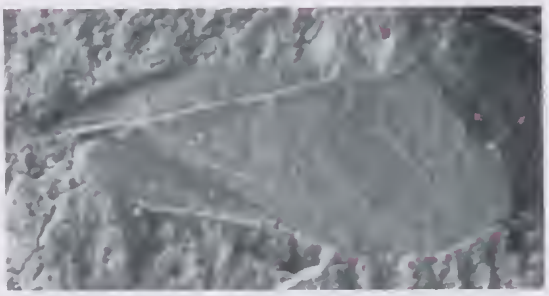
Mitchelloneura permiana; AMF39343; 17mm long.Line drawing (left) of Tillyard, 1921b, text-fig.1



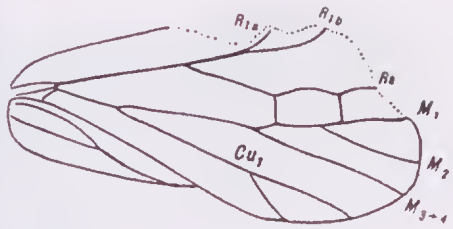


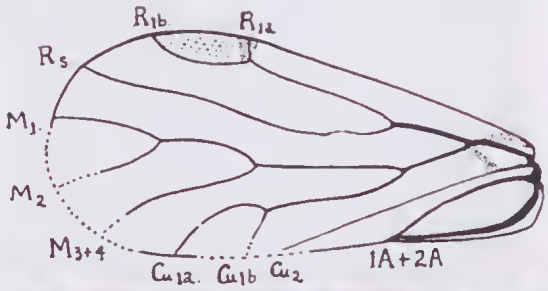


Permodipthera robusta; AMF28021; 11mm long. Line drawing (left) of Tillyard, 1926a, text-fig. 20.



Belpsylla reticulata; AMF39992; 3.8mm long. Line drawing (right) of Evans, 1943b, fig. 42.

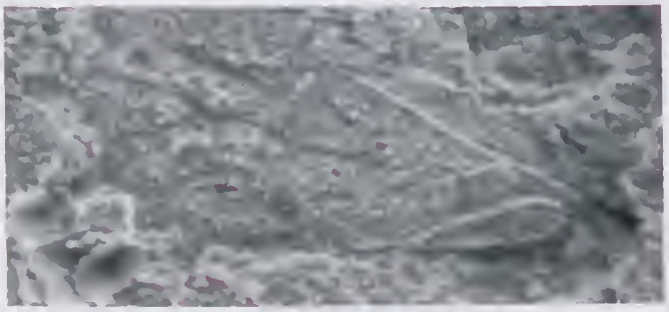




Family **PROTOPSYLLIDIIDAE** Carpenter, 1931

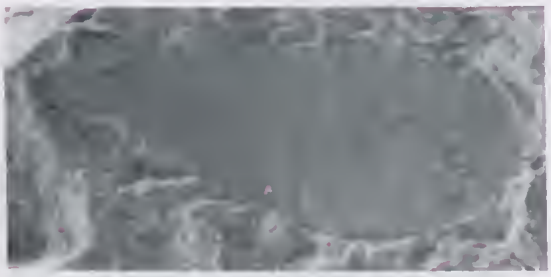
Belpsylla Evans, 1943b [*reticulata*]
Forewing: long, apically broad; R1a and R1b curve towards costa; 2 cross veins r-m; M r-branched, all straight; Cu1 narrowly forked; clavus with well-developed Y-vein.
reticulata Evans, 1943b; UPerm; Newcastle CM; Sydney.

Clavopsyllidium Davis, 1942 [*minutum*]
Very small. Forewing: Sc absent; Rs arising from R at 1/3 wing length; r-m absent; M+Cu1 arising from midlength of R; M 3-branched; Cu1a curved back, finishing closer to Cu1b than in most genera; Cu straight, narrow, independent of Cu1; A1+A2 with common origin, diverging then meeting again before margin.
minutum Davis, 1942; UPerm; Newcastle CM; Sydney.

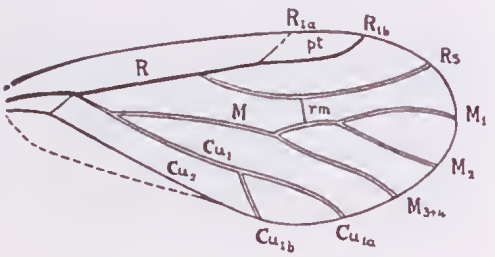


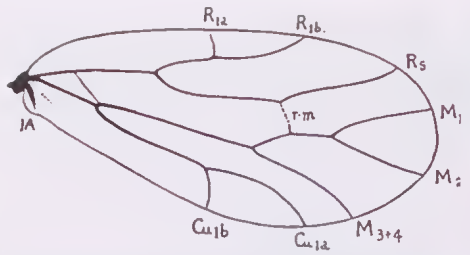
Clavopsyllidium minutum; AMF39800; 2.4mm long. Line drawing (above) of Davis, 1942, fig. 9.

Permopsyllidium Tillyard, 1926a [*mitchelli*]
Forewing: Sc absent; R+M scarcely arched; R 2-branched; Rs relatively short, curved; M 3-branched; r-m present; m-cu absent.
mitchelli Tillyard, 1926a; UPerm; Newcastle CM; Sydney.
affine Tillyard, 1926a; UPerm; Newcastle CM; Sydney.



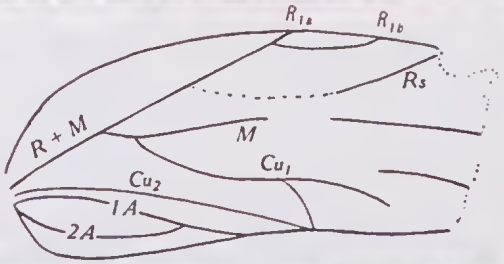
Permopsyllidium mitchelli; AMF28020; 3.7mm long. Line drawing (right) of Tillyard, 1926a, text-fig. 25.



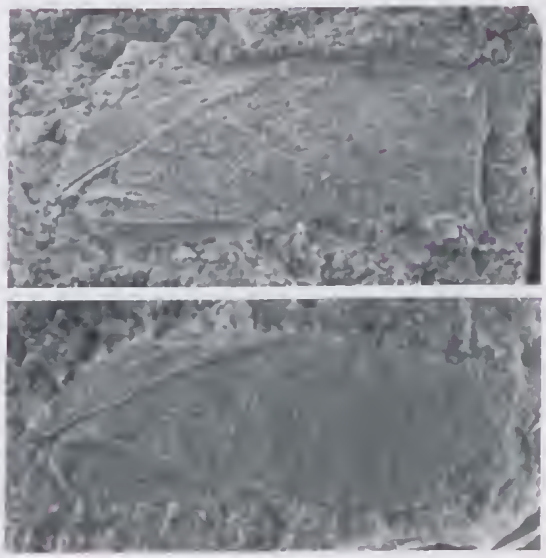


Permopsyllidops stanleyi; AMF39799; 3mm long (right). Line drawing (above) of Davis, 1942, fig. 9

Permopsyllidops Davis, 1942 [*stanleyi*]
Forewing: Sc absent; R divides at 1/3 wing length; R1a normal to R1; Rs simple but drawn out medially at r-m; M+Cu arising at base of R; weak vein running from fork of M and Cu1 to R1 (original M+Cu1); M forked before m-cu; Cu1a curved back; Cu2 absent; A1 short, posteriorly directed.
stanleyi Davis, 1942; UPerm; Newcastle CM; Sydney.

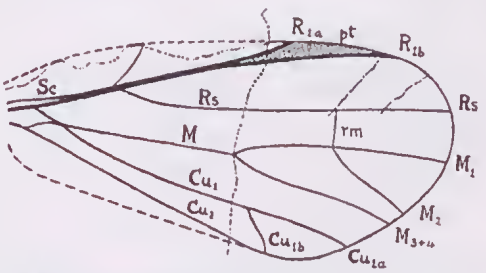


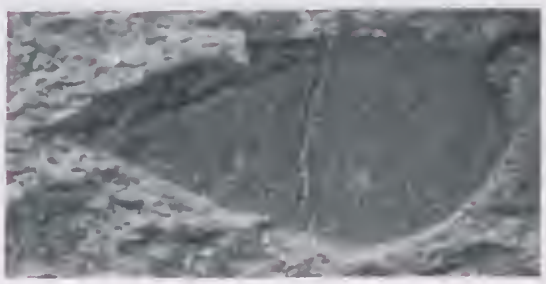
Permopsylloides Evans, 1943b [*insolita*]
Tegmen: uniform width; costal space wide; R1a meeting costal margin beyond midlength; Rs curved forward; clavus wide, long; anal veins form a Y-vein.
insolita Evans, 1943b; UPerm; Newcastle CM; Sydney.



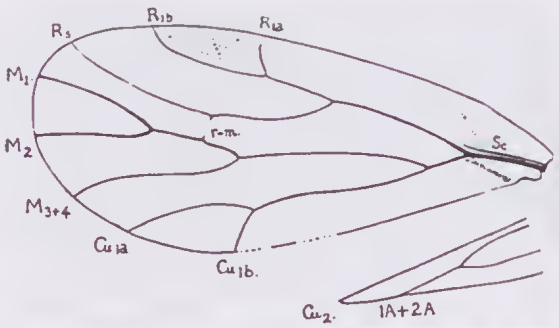
Permopsylloides insolita; AMF40727; 4mm long (part and counterpart). Line drawing (above) of Evans, 1943b, fig. 46.

Permothea Tillyard, 1926a [*latipennis*]
Tegmen: pterostigmatic area flatly triangular, strongly chitinised; Rs curved near base, then straight; r-m present; m-cu absent; M 3-branched; Cu1 curving forward to touch M near base, 2-branched.
latipennis Tillyard, 1926a; UPerm; Newcastle CM; Sydney.

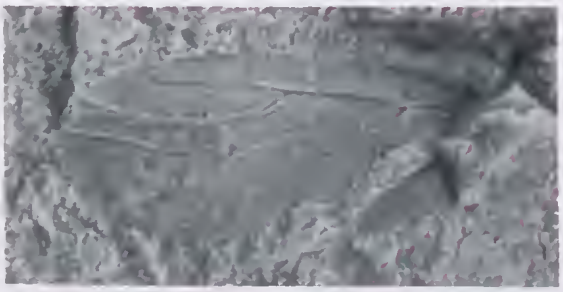




Permothea latipennis; AMF28022; 1.5mm long (right). Line drawing (above) of Tillyard, 1926a, text-fig. 27.

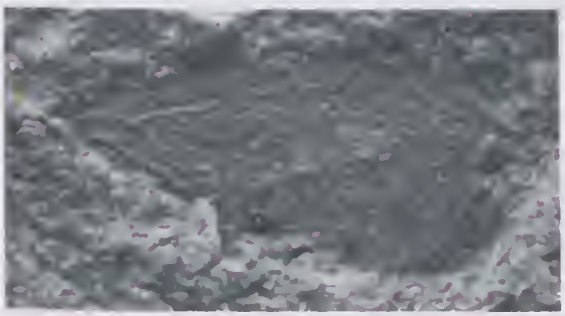


Permotheella Davis, 1942 [*scytinopteroides*]
Forewing: Sc short, faint, parallel to base of R; pterostigma and costal margin well-developed; Rs arising adaxial to midlength, curved forward distally; M+Cu1 arising at 0.16 wing length; M forking into M1+2 which is connected to Rs by r-m, then dividing into M1, M2 and M3+4, the latter a single sinuous vein. Cu1a curved; Cu2 separating a distinct clavus with A1 and A2; A1 and A2 diverging near base, coalescing for half length.
scytinopteroides Davis, 1942; UPerm; Newcastle CM; Sydney.

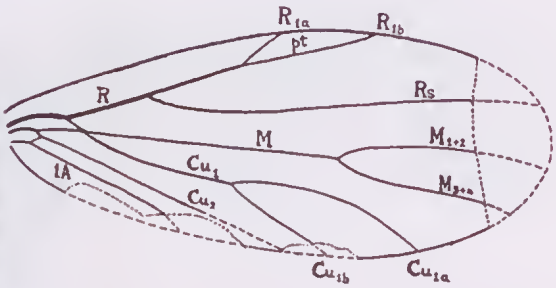


Permotheella scytinopteroides; AMF39797; 3.8mm long. Line drawing (above) of Davis, 1942, fig. 7.

Protopsyllidium Tillyard, 1926a [*australe*]
Tegmen: Sc absent; R+M arched; R straight to end of R1b; pterostigma 2.5 times as long as the oblique R1a; M and Cu1 2-branched; Cu2 straight; no cross veins except a short cu-a basally.
australe Tillyard, 1926a; UPerm; Newcastle CM; Sydney.
sinuatum Davis, 1942; UPerm; Newcastle CM; Sydney.

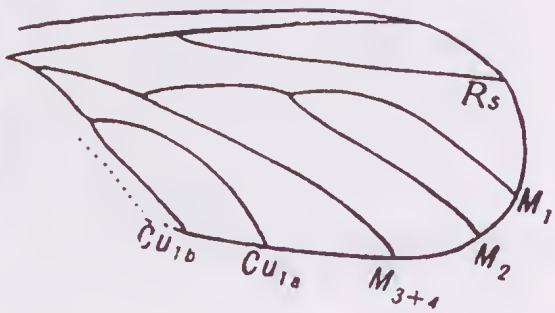


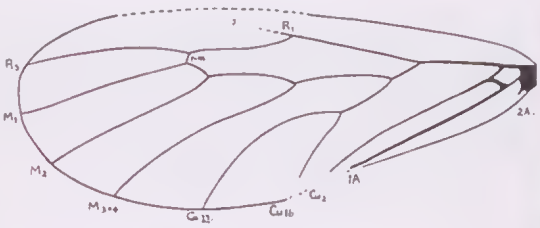
Protopsyllidium australe; AMF19790; 2.8mm long. Line drawing (right) of Tillyard, 1926a, text-fig. 24.

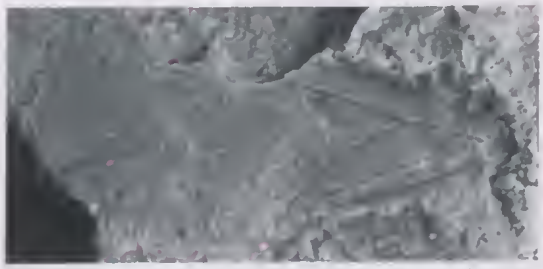


Protopsyllops Evans, 1943b [*minuta*]
Tegmen: short, wide; R1 close to costal margin, unbranched; Rs long; first branching of M close to junction of M and Cu1; M 3-branched; Cu1b parallel to Cu2.
minuta Evans, 1943b; UPerm; Newcastle CM; Sydney.

Protopsyllops minuta; AMF40005; 3.1mm long. Line drawing (right) of Evans, 1943b, fig. 37.

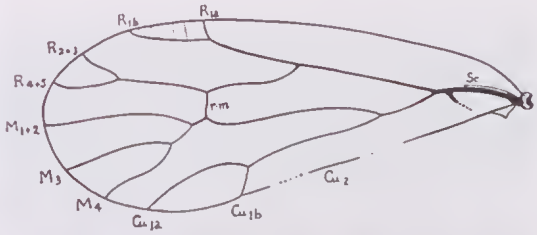






Psocopsyllidium media; AMF39796; 4.6mm long. Line drawing (left) of Davis, 1942, fig. 6.

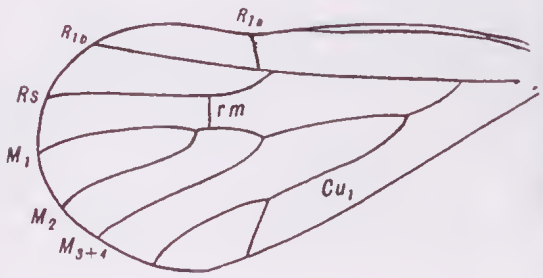
Psocopsyllidium Davis, 1942 [*media*]
Forewing: Sc absent; Rs from R at wing midlength; M+Cu1 arising from R at 0.25 winglength; M and Cu separate early; M dividing same distance further; M1, M2 and M3+4 present; r-m between Rs and M1; Cu1a curved backwards; Cu2 and A1 arising together, diverging initially, then parallel and converging gently distally; cu2-r present; A2 short.
media Davis, 1942; UPerm; Newcastle CM; Sydney.



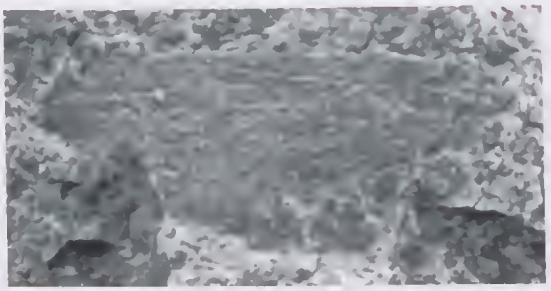
Psocoscytina Davis, 1942 [*bifida*]
very small. Forewing: Sc short, weak, parallel to base of R; R1a curving strongly forward; several obscure veinlets in pterostigmatic area between R1a and R1b; Rs arising just before midlength of wing, branching distally; M+Cu1 arising together near base of R1; r-m strong; M forked just beyond r-m to M1+2 and M3+4; Cu1 2-branched; Cu2 joined to base of R by crossvein.
bifida Davis, 1942; UPerm; Newcastle CM; Sydney.

Psocoscytina bifida; AMF39790; 3.9mm long. Line drawing (above) of Davis, 1942, fig. 1.

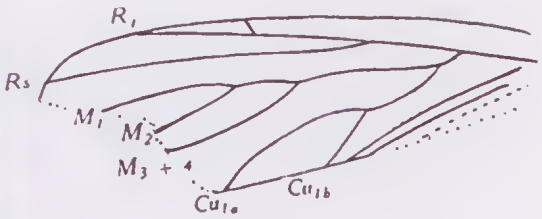
Psyllidella Evans, 1943b [*magna*]
Tegmen: broad; costal margin thickened, sinuate; R1 straight; Rs leaving R level with first fork of M.
magna Evans, 1943b; UPerm; Newcastle CM; Sydney.



Psyllidella magna; AMF40043; 5mm long. Line drawing (left) of Evans, 1943b, fig. 36.

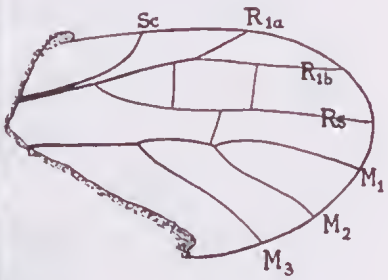


Psyllidiana davisia; AMF40711, 3mm long. Line drawing (right) of Evans, 1943b, fig. 33.

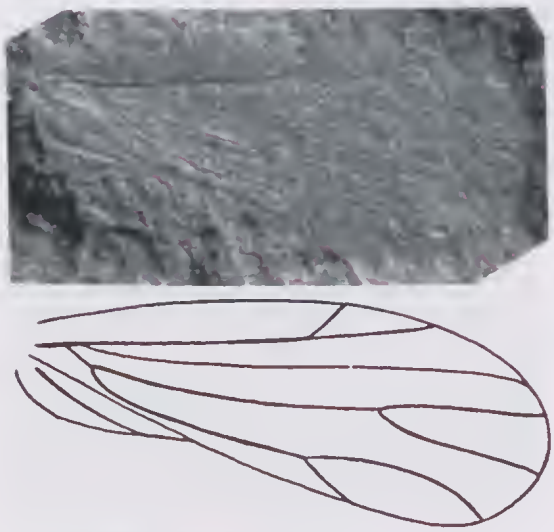


Psyllidiana Evans, 1943b [*davisia*]
Tegmen: narrow; R1 and Rs straight; M 3-branched; Cu1a longer than basal portion of Cu1.
davisia Evans, 1943b; UPerm; Newcastle CM; Sydney.

Triassopsylla plecoides; AMF39331; 4.6mm long. Line drawing (right) of Tillyard, 1918b, text-fig. 16

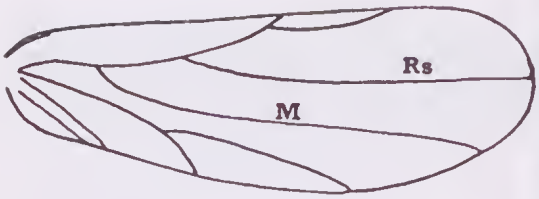


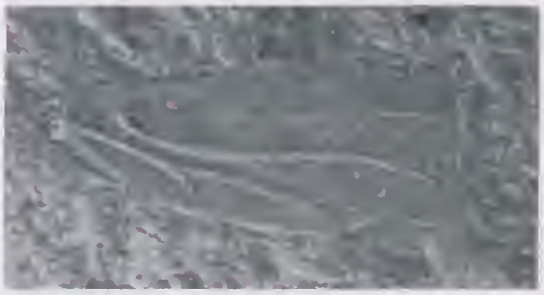
Triassopsylla Tillyard, 1918b [*plecioides*]
Forewing: broad; apex rounded; R1 2-branched; Rs simple; M 3-branched; membrane smooth.
plecioides Tillyard, 1918b; MTrias; Ashfield Fm; Sydney.



Triassothea analis; UQC1590; 2.8mm long.Line drawing (above) of Evans, 1956, fig. 25F.

Triassothea Evans, 1956 [*analis*]
Forewing: Rs arising from R very soon after M+Cu; M 2-branched distally; Cu1 2-branched; clavus small; single anal vein.
analis Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.



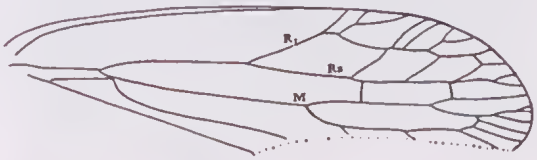


Tripsyllidium wadei; AMF30980; 3mm long. Line drawing (left) of Evans, 1956, fig. 25H.

Tripsyllidium Evans, 1956 [*wadei*]
R1a meeting costal margin near midlength; Rs ending at apex; M unbranched; no cross veins; clavus small; one anal vein only.
wadei Evans, 1956; UPerm; Newcastle CM; Sydney.

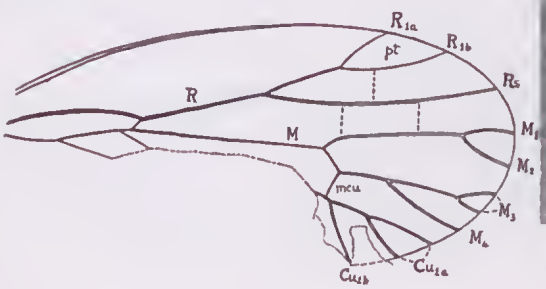
Family **SCYTINOPTERIDAE** Handlirsch, 1906

Crosbella Evans, 1956 [*elongata*]
Forewing: numerous terminal accessory veins and many supplementary cross veins.
elongata Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.
alata Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.

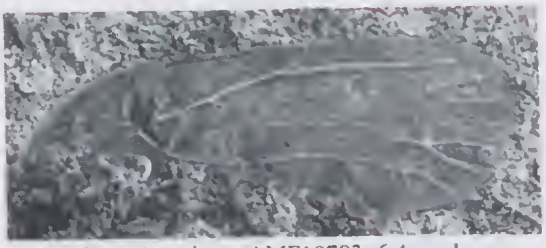


Crosbella elongata; UQC2125; 12mm long. Line drawing (above) of Evans, 1956, fig. 5H.

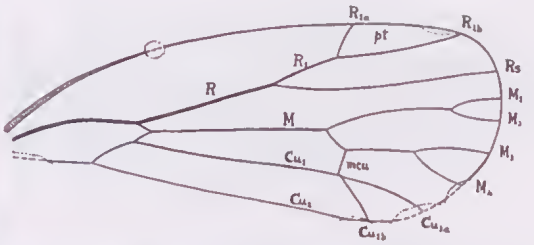
Elliptoscarta Tillyard, 1926a [*ovalis*]
Forewing: broadly oval with wide costal space; R1 evenly branched; Rs arises closer to branch of R1 than to origin of M; M 5-branched; Cu1 3-branched; m-cu and r-m present.
ovalis Tillyard, 1926a; UPerm; Newcastle CM; Sydney.



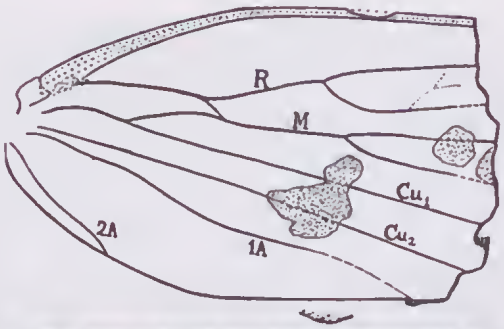
Ellipsoscarta ovalis; AMF41392; 5.6mm long. Line drawing (left) of Tillyard, 1926a, text-fig. 15.

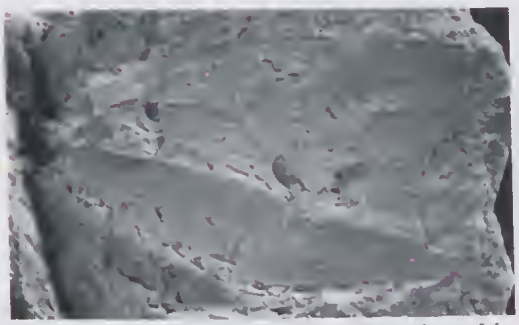


Homaloscytina plana; AMF19783; 6.4mm long. Line drawing (right) of Tillyard, 1926a, text-fig. 14.



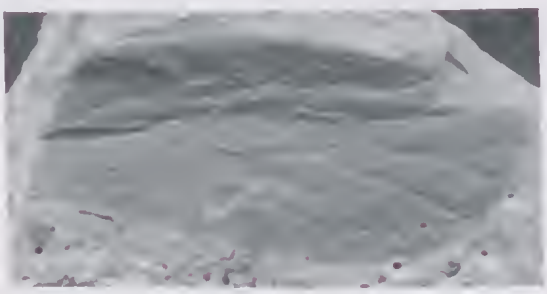
Homaloscytina Tillyard, 1926a [*plana*]
Forewing: R1a almost transverse to mainstem of R1 that continues as R1b in line to margin; Rs arises well beyond midlength; apical margin bluntly rounded; pterostigma moderately long; M 4-branched; Cu1 2-branched, straight from basal cell to fork.
plana Tillyard, 1926a; UPerm; Newcastle CM: Sydney.





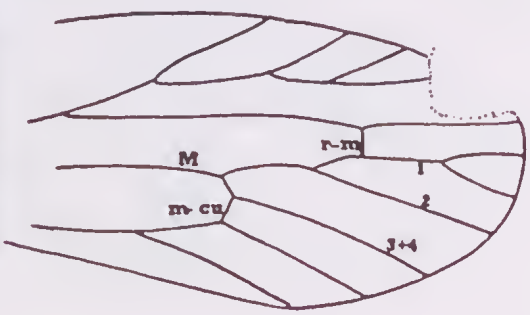
Mesodipthera grandis; GSQI213; 12mm long. Line drawing (above) of Tillyard, 1919d, text-fig. 7.

Mesodiphthera Tillyard, 1919d [*grandis*]
Forewing: R branches dichotomously just before the branching of M; branches of R and M branched irregularly distally; slightly impressed division of the wing in a line from end of R1 to end of clavus.
grandis Tillyard, 1919d; UTrias; Blackstone Fm; Ipswich.

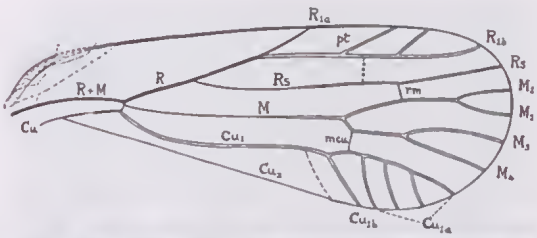


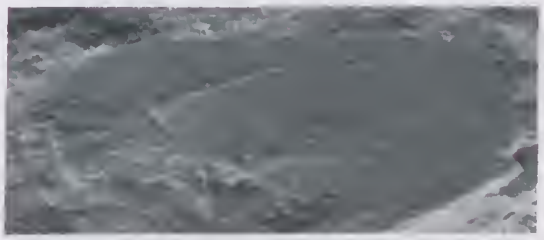
Mesonirvana abrupta; UQC1652; 9mm long (left). Line drawing (right) of Evans, 1956, fig. 5E.

Mesonirvana Evans, 1956 [*abrupta*]
Forewing: R1 4-branched; M1+M2 of equal length; M3+4 single vein; Cu1 a straight line as far as m-cu; Cu1a and Cu1b apically parallel with each other.
abrupta Evans, 1956; UTrias; MtCrosby Fm; Ipswich.



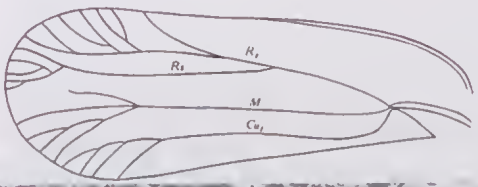
Orthoscytina Tillyard, 1926 [*mitchelli*]
Forewing: expanding distally; apex bluntly rounded; R+M arched above basal cell; R strong beyond cell, running forward to costal margin; R1b with two accessory veins across long pterostigmatic area; M 3- to 5-branched; Cu1a with series of accessory veins running to margin towards Cu1b.
mitchelli Tillyard, 1926; UPerm; Newcastle CM; Sydney.
quinquemedia Tillyard, 1926; UPerm; Newcastle CM; Sydney.
indistincta Tillyard, 1926; UPerm; Newcastle CM; Sydney.
subcostalis Tillyard, 1926; UPerm; Newcastle CM; Sydney.
irregularis Tillyard, 1926; UPerm; Newcastle CM; Sydney.
belmontensis Tillyard, 1926; UPerm; Newcastle CM; Sydney.
obliqua Tillyard, 1926; UPerm; Newcastle CM; Sydney.
pincombei Tillyard, 1926; UPerm; Newcastle CM; Sydney.
tetraneura Tillyard, 1926; UPerm; Newcastle CM; Sydney.

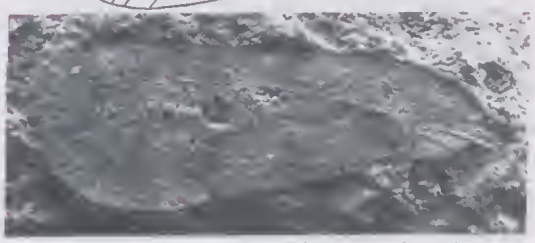




Orthoscytina mitchelli; AMF28026; 10mm long. Line drawing (above) of Tillyard, 1926a, text-fig. 4.

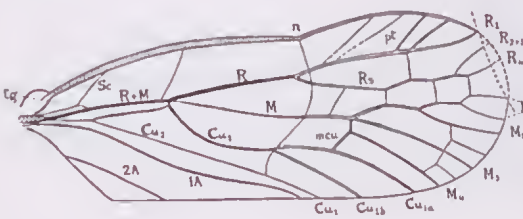
Permobrachus Evans, 1943b [*dubia*]
Forewing: long, narrow; R, Rs, M and Cu1 all with subsidiary veins; Cu1 curved following separation from R and M; costal space extensive.
dubia (Tillyard, 1926a); UPerm; Newcastle CM; Sydney.
magnus Evans, 1943b; UPerm; Newcastle CM; Sydney.

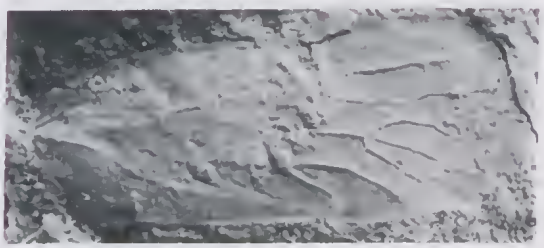




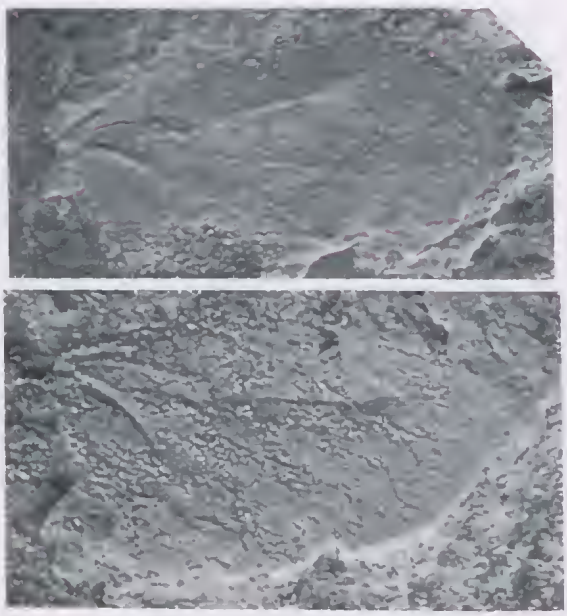
Permobrachus magnus; AMF40029; 16mm long. Line drawing (above left) of Evans, 1943b, fig. 1.

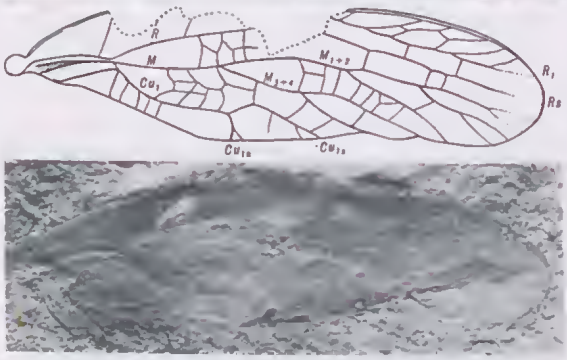
Permoglyphis Tillyard, 1926 [*belmontensis*]
Forewing: C strong, with prominent node; evenly rounded apically; basal tegula swollen; Sc short, weak; basal cell long, narrow; faint nodal line to Cu2; no strong R1a; series of pterostigmatic veinlets present; Rs arising just before nodal line, distally forked; Cu1 convex posteriorly, 2-branched; clavus triangular; A1 long, gently sigmoidally curved; A2 short, enclosing anal angle.
belmontensis Tillyard, 1926a; UPerm; Newcastle CM; Sydney.



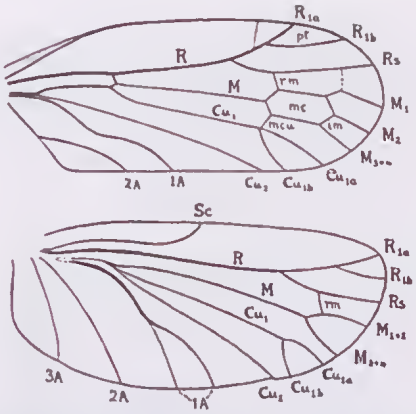


Permoglyphis belmontensis; AMF28023; 9.4mm long. Line drawing (left) of Tillyard, 1926a, text-fig. 19.





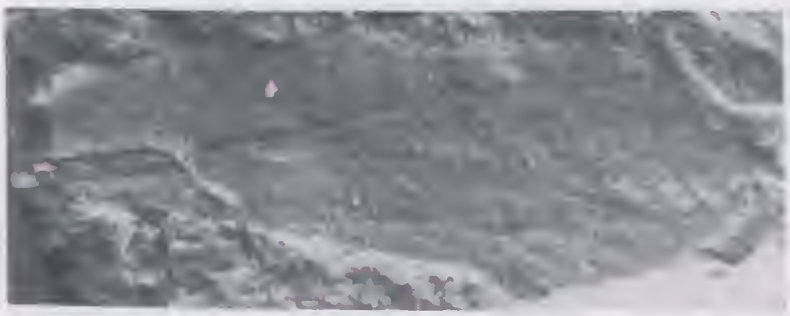
Stenoglyphis kimblensis; AMF41207; 36mm long; Line drawing (above) of Evans, 1947, fig. 1.



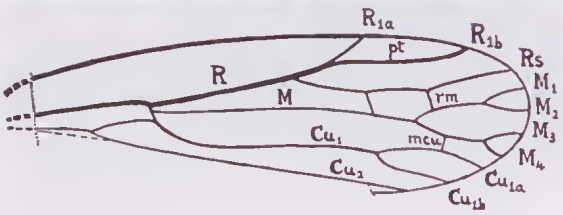
Permojassus australis; forewing AMF19782; 6mm long (left upper); hindwing AMF19781(left lower). Line drawings (above) of Tillyard, 1926a, text-figs 2 and 3.

Permojassus Tillyard, 1926a [*australis*]
Forewing: Se absent; R1b and pterostigmatic area short; M 4-branched; m-eu present; Cu1 curved forward close to M basally, 2-branched; Cu2 straight; A1 wavy; A2 enclosing anal angle. Hindwing: costal space wide; costal margin convexly rounded; M 2-branched.
australis Tillyard, 1926a; UPerm; Newcastle CM; Sydney.
dubius Tillyard, 1926a; UPerm; Newcastle CM; Sydney.

Stenoglyphis Evans, 1947 [*kimblensis*]
Tegmen: long, narrow, with circular basal lobe; M1 4-branched; M2, M3, M4 undivided; Cu1 short; Cu1a bent; reticulate cross veins between several main veins; clavus 0.3 wing length.
kimblensis Evans, 1947; UPerm; Newcastle CM; Sydney.

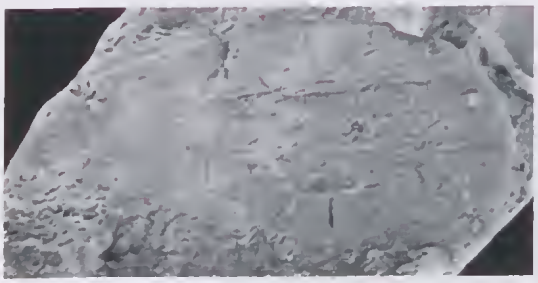


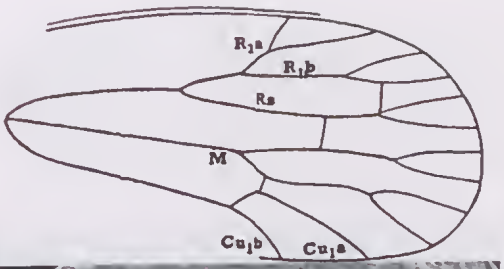
Stenoscytina australiensis; AMF28027; 7.2mm long. Line drawing (left below) of Tillyard, 1926a, text-fig. 13.

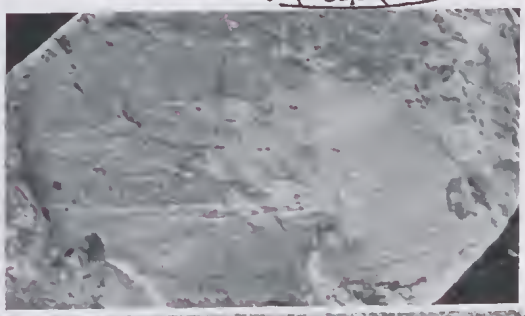


Stenoscytina Tillyard, 1926a [*australiensis*]
Tegmen: narrow; R curving forward to end of R1a; costa evenly curved from base to apex; Rs arising distally; M 4-branched; Cu1 curving down from basal cell close to Cu2; r-m and m-eu present.
australiensis Tillyard, 1926a; UPerm; Newcastle CM; Sydney.

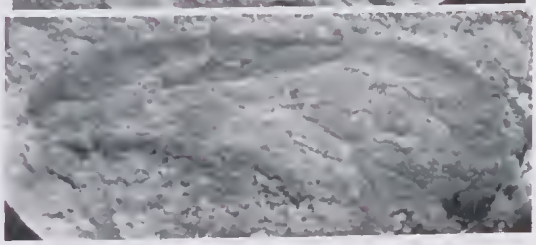
Triassoscelis Evans, 1956 [*anomala*]
Tegmen: Rs 2-branched; R1 multibranched; M 4-branched; enclosed cell between Rs and R1b; r-m and m-.cu present.
anomala Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.







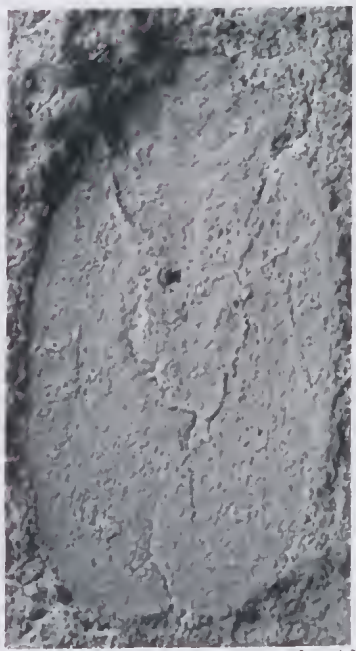
Triassoscelis anomala; UQC976; 12mm long (counterpart - right). Line drawing (above right) of Evans, 1956, fig. 5F.



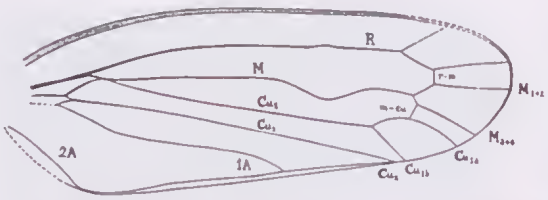
Triassoscytina incomplete; UQC1559; 10.8mm long (right). Line drawing of Evans, 1956, fig. 2B.

Triassoscytina Evans, 1956 [*incompleta*]
Forewing: complete venation like Homaloscytina but M dividing at same distance from wing base as origin of Rs; M dividing at same distance from wing base as origin of Rs.
incompleta Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.

Triassoscytinopsis Evans, 1956 [*stenulata*]
Forewing: parallel-sided; R1 with 4 or more parallel branches; Rs simple or 2-branched; M 4-branched; Cu1 with normal venation, with sharp proximal bend; anal veins separate for full length.
stenulata Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.
aberrans Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.
paranotalis Evans, 1956; MTrias; Hawkesbury Sst; Sydney.



Triassoscytinopsis paranotalis; AMF38265; 21mm long. Line drawing of Evans, 1956, fig. 5A.



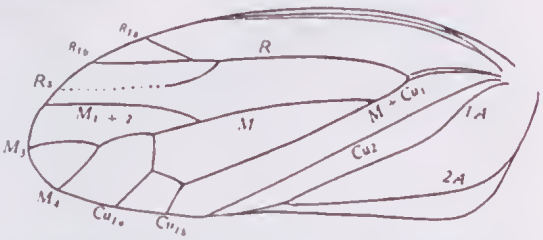
Family **STENOVICIIDAE** Evans, 1956

Apheloscyta Tillyard, 1922b [*mesocompta*]
Forewing: Rs originating close to apex; M with posterior convexity just beyond midlength; M and Cu 2-branched; m-eu, r-m and clavus present; A2 close to basal posterior margin, running close to the posterior margin of clavus.
mesocampta Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.

Apheloscyta mesocampta; GSQI98a; 10mm long. Line drawing (above left) of Tillyard, 1922b, text-fig. 78.

Palaeovicia Evans, 1943b [*incerta*]
Forewing: broad, narrowing apically; R and R1b parallel costal margin; Rs short, straight; M 3-branched; M1+2 not branched; M and Cu1 fused basally; clavus broad, anals forming Y vein.
incerta Evans, 1943b; UPerm; Neweastle CM; Sydney.

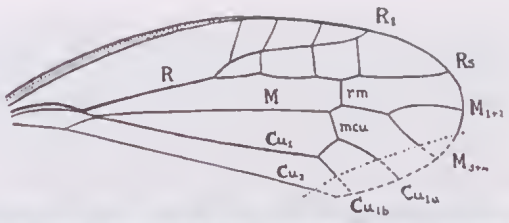
Permagra distincta; AMF39866; 7mm long. Line drawing of Evans, 1943a, text-fig. 1.



Palaeovicia incerta; AMF39999; 5.7mm long (above left). Line drawing of Evans, 1943b, fig. 26.

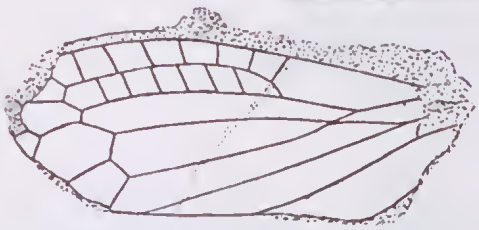
Permagra Evans, 1943a [*distincta*]
Forewing: costal margin thickened; Sc short and curved to meet R; R2+3 straight to apex; M 2-branched; Cu with 2 short branches.
distincta Evans, 1943a; UPerm; Neweastle CM; Sydney.

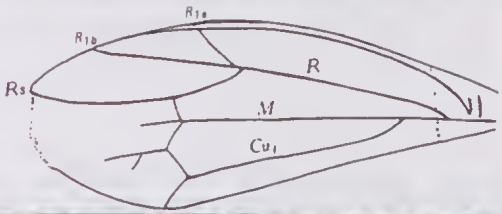
Permocentrus Evans, 1956 [*Permoscarta trivenulata*Tillyard, 1926a]
Forewing: 2 oblique veins between R1a and R1b; R1 linked to Rs by 3 cross veins; r-m present; M 2-branched; Cu1 not arched basally, separate from M.
trivenulatus Tillyard, 1926a; UPerm; Newcastle CM; Sydney.



Permocentrus trivenulatus; AMF19787; 6mm long. Line drawing (above right) of Tillyard, 1926a, text-fig. 17.

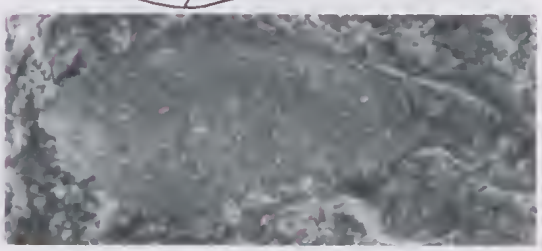
Permoscarta Tillyard, 1918b [*mitchelli*]
Tegmen: finely tubereulate; nodal line weak, evident near midlength; series of oblique costal veinlets; M unbranched; 2 m-cu; M leaving R near base, fused to Cu for short distance then diverging again; Cu straight, simple, parallel to A1.
mitchelli Tillyard, 1918b; UPerm; Newcastle CM; Sydney.



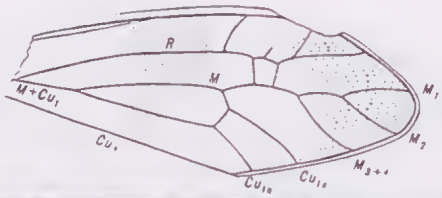


Permoscarta mitchelli; AMF39316; 6.4mm long (above right). Line drawing of Tillyard, 1918b, text-fig. 2a.

Permovicia Evans, 1943b [*obscura*]
Tegmen: short, broad; Sc short, wide, transverse; R and R1b parallel costal margin; Rs widely curved; M and Cu1 fused for short distance basally; r-m and m-cu present.
obscura Evans, 1943b; UPerm; Newcastle CM; Sydney.

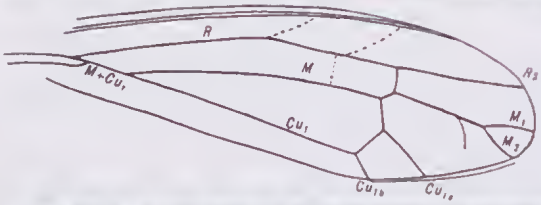


Permovicia obscura; AMF40059; 4.8mm long. Line drawing (above) of Evans, 1943b, fig. 28.



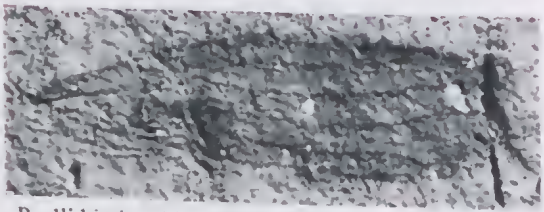
Stanleyana Evans, 1943b [*pulchra*]
Tegmen: narrowing apically; R parallel to costal margin; M and Cu1 fused basally; M 3-branched; Cu1 2-branched; m-cu present.
pulchra Evans, 1943b; UPerm; Newcastle CM; Sydney.

Stanleyana pulchra; AMF40016; 7mm long. Line drawing (above left) of Evans, 1943b, fig. 25.



Stenovicia Evans, 1943b [*angustata*]
Tegmen: narrowing apically; R parallel to costal margin; M and Cu1 fused close to R; M1 and M2 short; Cu1a twice length of Cu1b.
angustata Evans, 1943b; UPerm; Newcastle CM; Sydney.

Stenovicia angustata; AMF40008; 6mm long. Line drawing (above left) of Evans, 1943b, fig. 27.



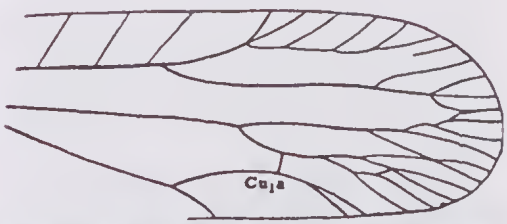
Psyllid indet.; NMVP103240; 2.1mm long.Line drawing (above) of Jell & Duncan, 1986, fig. 23D.

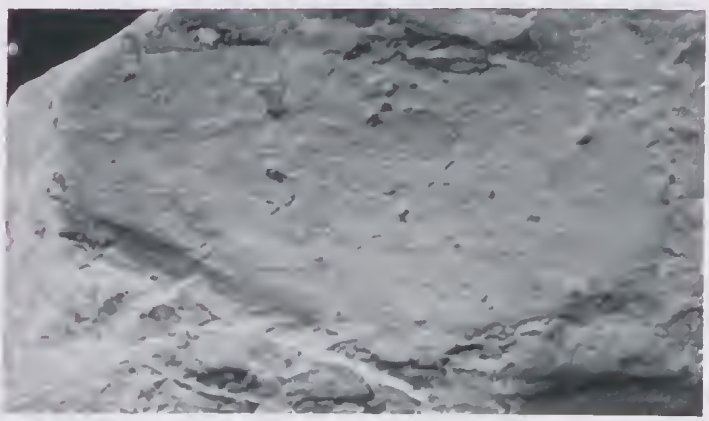
Family **PSYLLIDAE** Loew, 1879
Psyllid indet.
Small forewing with broadly truncated apex; pterostigma long, slender; R 2-branched, with fork closer eloser to base than apex; M, Cu 2-branched, with main stem joining just before common petiole joins basal vein, with 2 branches of M almost equal but 2 branches of Cu markedly different in length; clavus well developed, with angular change in posterior margin near wing base.
Psyllid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family
RICANIIDAE
Amyot & Serville, 1843

Scolypopites
Tillyard, 1923a
[*bryani*]
Forewing as in *Scolypopa* but Se shorter, not as strong as R, reaching only to a little beyond midwing; M and R not completely fused at base, only 1 series of gradate veins.
bryani Tillyard, 1923a; Palaeocene; Redbank Plains Fm; Ipswich.

Scolypopites bryani; UQF7218; 15mm long. Line drawing (left) of Tillyard, 1923a, text-fig. 1.





FAMILY UNCERTAIN

Mesocicadella Evans, 1956
[*venosa*]
Forewing: series of oblique veinlets proximal of separation of Rs from R1; Rs and R1 with aeeessory veins, M profusely branehed; Cu1a with another apieal branch, arched forward.
punctata Evans, 1961; UTrias; Mt Crosby Fm; Ipswich.
venosa Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.

Mesocicadella venosa; UQC844; 12mm long. Line drawing (above) of Evans, 1956, fig. 5I

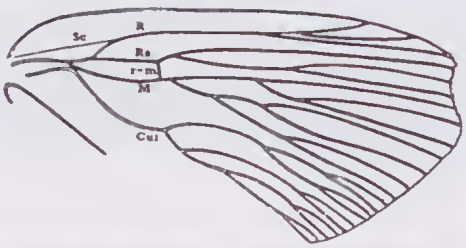
Knezouria unicus; QMF18850; 13mm long.

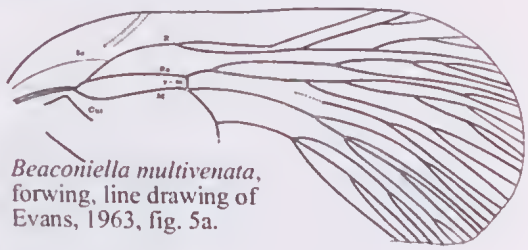
Knezouria Jell, 1993 [*unicus*]
Nymph: wings rudimentary; rostrum slender, extending beyond posterior margin of abdomen; frons large, diamond-shaped. Abdomen inverted beehive; 8 segments, with median longitudinal ridge, with paired areas of small tubercles on each segment. Terminal segment with anal and genital structures in midline, well forward of margin.
unicus Jell, 1993; UTrias; Blackstone Fm; Ipswich.

Order **HETEROPTERA**

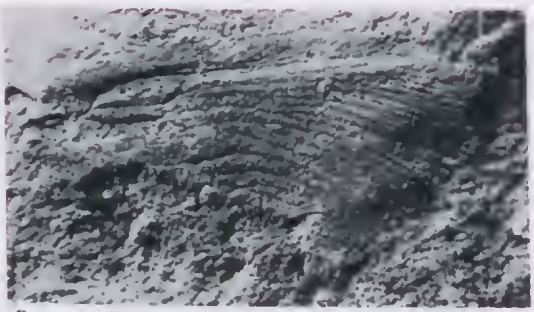
Family **FULGORIDAE**

Beaconiella Evans, 1963 [*fennahi*]
Aall principal veins multibranched; Se separate from R proximally but joiningwith R soon after; Rs joined to M by crossvein prior to branching of either vein; Rs diverging from R near base of wing; Rs, M, Cu1 branch initially the same distance from the base of the hindwing; clavus unknown.
fennahi Evans, 1963 MTrias; Hawkesbury Sst; Sydney.
multivenata Evans, 1963; MTrias; Hawkesbury sst; Sydney.



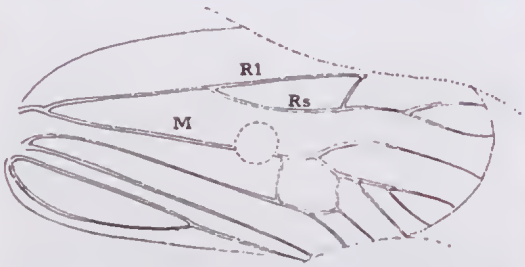


Beaconiella multivenata, forwing, line drawing of Evans, 1963, fig. 5a.

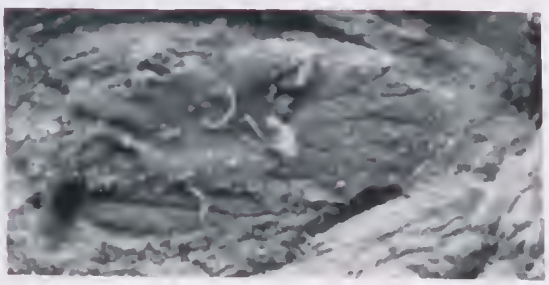


Beaconiella fennahi, hindwing; AMF30974; 17mm long. Line drawing (above) of Evans, 1963, fig. 5b.

Tricrosbia Evans, 1971 [*minuta*]
Rs 2-branched, diverging from R slightly proximally to its centre; M1+2 unbranched; M3 and M4 apically separate, with a third vein arising from their common stem; an enclosed cell proximal to the initial branching of M, bounded laterally by pair of m-cua; CuAterminating proximally at base of claval suture, not associated with base of M; clavus with anal veins apically fused into a single vein.
minuta Evans, 1971; UTrias; MtCrosby Fm; Ipswich.



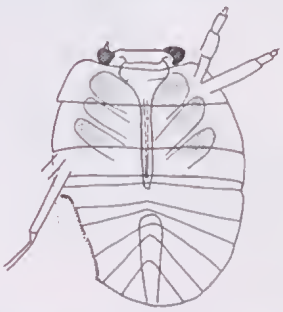
Tricrosbia minuta; QMF6520; 3.2mm long (right). Line drawing (above) of Evans, 1971, fig. 1.



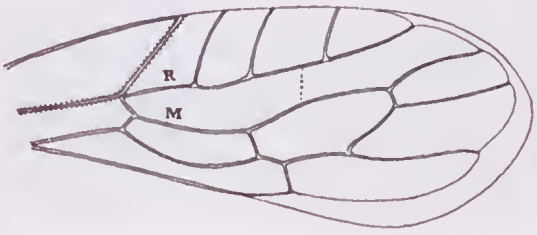
Family **PROGONOCIMICIDAE** Handlirsch, 1906

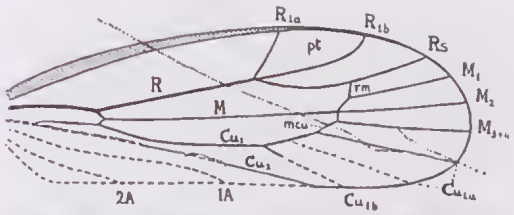
Actinoscytina Tillyard, 1926a [*belmontensis*]
Forewing: origins of Rs and R1a coincident and distal of midlength of wing; distal branches of M and Cu straight, slightly diverging; costal very wide and strong from base to R1a; R1a transverse; M2 running through middle of wing to margin in straight line; Cu1 concave towards M; M and Cu1 each with 3 distal branches meeting margin equidistance apart.
belmontensis Tillyard, 1926a; UPerm; Newcastle CM; Sydney.

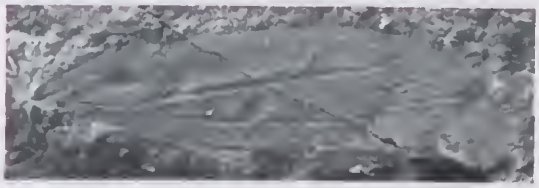
Gelastocorid indet.
Nymph broadly elliptical; head transverse, short, with usual elongate mouthparts extending to rear of thorax; eye large, subrounded, lateral on head; pronotum with convex lateral margins, with several anterior projections adjacent to the eyes, rounded posterolaterally; mesonotum and metanotum subequal in length and only slightly shorter than pronotum. Abdomen with segments 1 and 2 very short medially, with segments thus chevron-shaped; anterior femur arising from the expanded coxa distally; 2nd and 3rd femora arising near midline.
Gelastocorid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



Heterochterus Evans, 1971 [timmsii]
Forewing. Costal fracture well defined,1/3 of length from base; R multi-branched, terminating near commencement of the apical appendix; M diverging from common stem with R at angle of costal fracture, with 2 equal branches; M and CuA linked by 3 crossveins; marginal vein meeting claval suture at an acute angle; elavus unknown.
timmsii Evans, 1971; UTrias; Mt Crosby Fm; Ipswich.



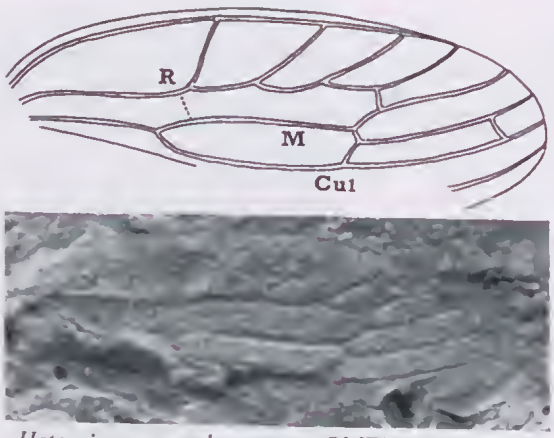




Actinoscytina belmontensis; AMF19788, 7mm long. Line drawing (above) of Tillyard, 1926a, text-fig. 16.

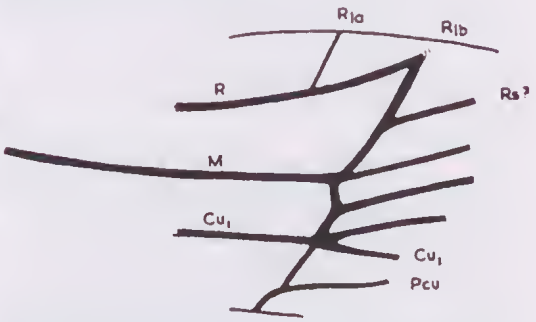
Gelastocorid indet., NMVP102519, 4mm long; ventral (above) and line drawing (left).

Heterochterus timmsii; QMF6473; 4.3mm long. Line drawing (left) of Evans, 1971, fig. 1.

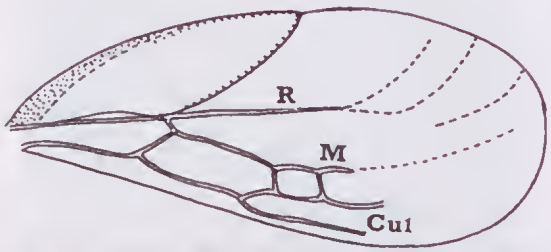


Heterojassus membranaceus; QMF3701; 5.1mm long. Line drawing (above) of Evans, 1961, fig. 5B.

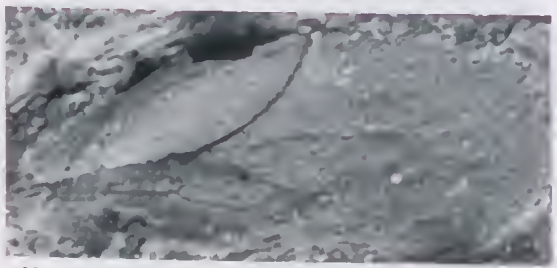
Heterojassus Evans, 1961 [*membranaceus*]
membranous tegmina; Rs multibranched; M and Cu1 form single vein basally; elongate enclosed cell between M and Cu1 and wide appendix; all veins curved towards anterior corner of apex of tegmen.
membranaceus Evans, 1961; UTrias; MtCrosby Fm; Ipswich.



Hexascytina transecta; BMNHIn44923; 2mm long. Line drawing (above) of Wootton, 1963, fig. 1.



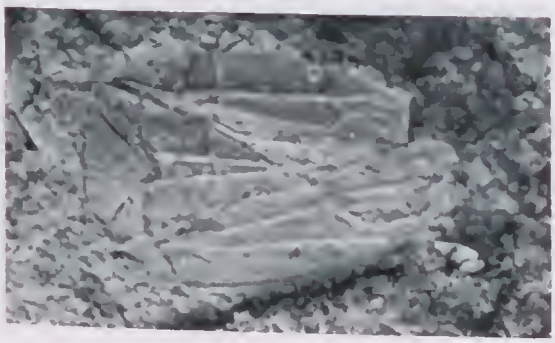
Hexascytina Wootton, 1963 [*transecta*]
Incomplete tegmen: 6 veins extend distally from the composite, transverse vein; transverse vein almost straight, running from anteriot to posterior margin of remigium.
transecta Wootton, 1963; UTrias; Mt Crosby Fm; Ipswich.

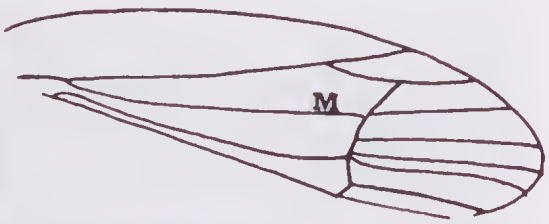


Heteronella marksei; QMF3699; 3.8mm long. Line drawing (above) of Evans, 1961, fig. 5A.

Heteronella Evans, 1961 [*marksei*]
costal fracture in tegmen; venation in basal half only; in distal half indistinct lines curve towards costal margin; R proximally incorporated in same vein as M; apically R seems to be 3-branched and M is single vein; cu-m wide; 2 branches of Cu elongated.
marksei Evans, 1961; UTrias; MtCrosby Fm; Ipswich.

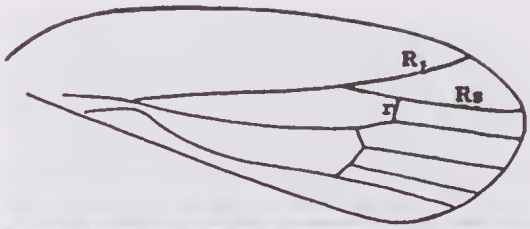
Heteroscytina Evans, 1956 [*tillyardi*]
Forewing: narrow apically; R1 2-branched or simple; Rs simple; r-m present.
tillyardi Evans, 1956; UTrias; MtCrosby Fm; Ipswich.

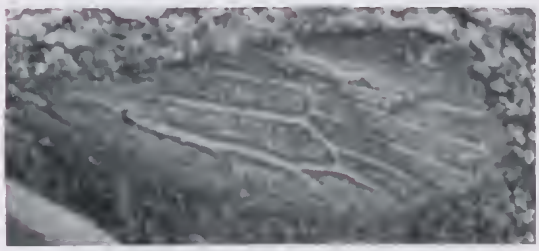




Heteroscytina tillyardi; UQC691; 4mm long (left). Line drawing (above) of Evans, 1956, fig. 29F.

Platyscytinella Evans, 1956 [*paradoxa*]
Tegmen: R1a absent; r-m nearer apex than m-cu1; anterior branch of M straight to apex.
paradoxa Evans, 1956; UTrias; MtCrosby Fm; Ipswich.

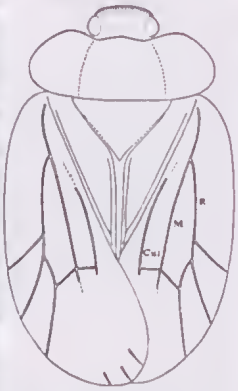




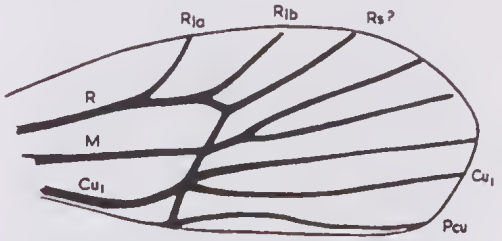
Platyscytinella paradoxa; UQC169; 3.2mm long. Line drawing (above) of Evans, 1956, fig. 29C.

Triassodoecus Evans, 1963 [*chinai*]
Pronotal paranota and tegmina large, overlapping apically; R widely separated from costal margin; Rs arising from R1b; M basally joined to R, linked to Rs by oblique cross vein; Cu1 joined to M by cross vein; claval veins forming a Y-vein.
chinai Evans, 1963; MTrias; Hawkesbury Sst; Sydney.

Triassodoecus chinai; AMF46398; 5mm long.

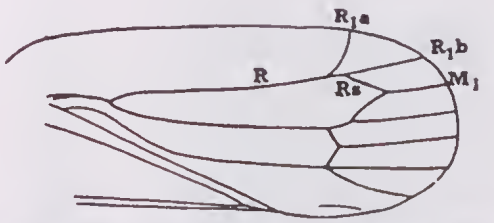


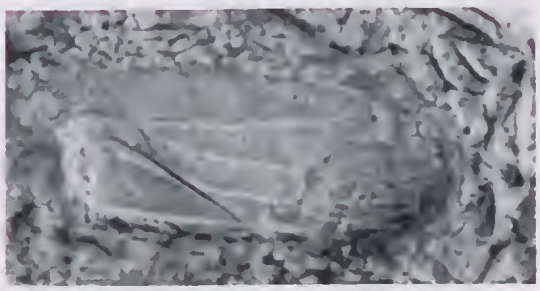
Triassodoecus chinai; line drawing of holotype, of Evans, 1963, fig. 6.



Microscytinella radians; BMNHIn44920; 2.2mm long. Line drawing (above) of Wootton, 1963, fig. 2.

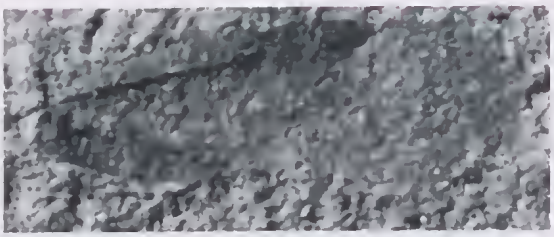
Microscytinella Wootton, 1963 [*radians*]
Composite transverse vein straight, just more than half wing length from the forewing base; M continued in straight line distal to transverse vein by common stem of its first two branches.
radians Wootton, 1963; M Trias; Mt Crosby Fm; Ipswich.





Triscytina rotundata; UQC2311; 3mm long. Line drawing (above) of Evans, 1956, fig. 29G.

Triscytina Evans, 1956 [*rotundata*]
Tegmen: apex evenly rounded; R1a present; Rs+M1 fused apically' A1 adjacent to claval suture; A2 along hind margin; anals forming Y-vein.
rotundata Evans, 1956; UTrias; Mt Crosby Fm; Ipswich.



Anthocorid indet.; NMVP103163; 2.4mm long. Line drawing(right) of Jell & Duncan, 1986, fig. 23C.

Family **ANTHOCORIDAE** Amyot & Serville, 1843

Anthocorid indet.
Hemelytron with cuneus and embolium, membrane without basal cells, with large clavus and distinct vein close to posterior margin.
Anthocorid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

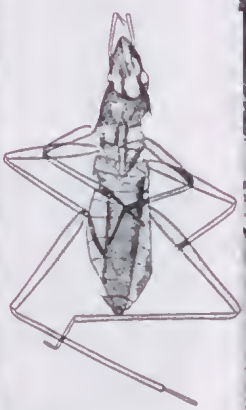
Family **VELIIDAE** Dohrn, 1859

Veliid indet.
Dorsoventrally compressed; head triangular, with bulging lateral eyes, anteriorly obtuse; antennae long, thin, of few segments; legs all long, thin, with femora wider than tibiae, with hindleg longest; abdomen tapering , with wide doublure, with short segments anteriorly becoming longer posteriorly; 6th segment more than half as long as wide.
Veliid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Veliid indet.; NMVP103235; 3mm long

Family **MESOVELIIDAE** Douglas & Scott, 1867

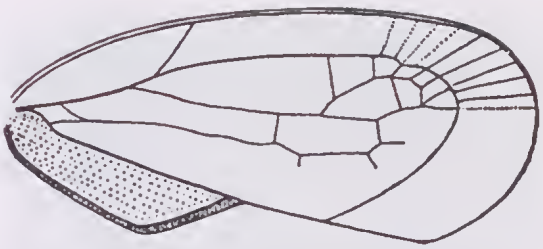
Duncanovelia Jell & Duncan, 1986 [*extensa*]
Head elongate; eyes near midlength of head; antenna of 4 long segments; thoracic segments relatively short, sebequal, becoming slightly longer to posterior.
extensa Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



Duncanovelia extensa Jell & Duncan, 1986; NMVP103237; 5mm long, with line drawing (above) from Jell & Duncan, 1986, fig. 24B and NMVP27044 (right); 5mm long

Family **TRIASSOCORIDAE** Tillyard, 1922b

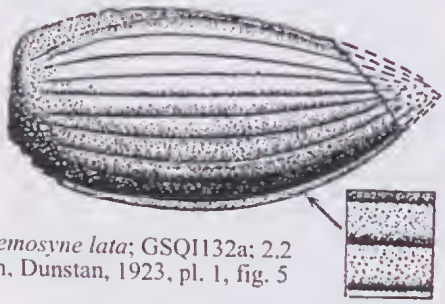
Triassocoris Tillyard, 1922b [*myersi*]
Hemelytron: short, broad, smooth, shiny, dark; venation faint; 3 main veins on corium – R, M, Cu – fused basally for a short distance; R parallel to costal margin, some distance from it; one veinlet near origin of M then series to C near apex; a costal fracture apparently present.
myersi Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.
scutulum Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.
ovalis Tillyard, 1923b; UTrias; Blackstone Fm; Ipswich.
grandis Tillyard, 1923b; UTrias; Blackstone Fm; Ipswich.



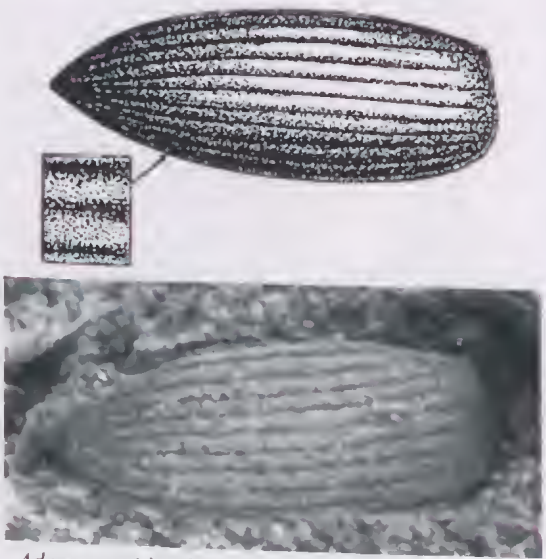
Triassocoris myersi; GSQI140a; 5.8mm long. Line drawing of Tillyard, 1922, text-fig. 87.

Triassocoris ovalis; GSQI129a; 4.8mm long.

Ademosyne australiensis; GSQ112b; 3.4mm long. Line drawing of Dunstan, 1923, pl.1, fig. 3.



Ademosyne lata; GSQ1132a; 2.2 mm, Dunstan, 1923, pl. 1, fig. 5



Ademosynoidesobtusa; GSQ19b; 2.4mm long. Line drawing of Dunstan, 1923, pl. 2, fig. 17.

Order COLEOPTERA

Family **ADEMOSYNIDAE** Ponomarenko, 1968

Ademosyne Handlirsch, 1906 [*major*]
Elytron: punctate-striate, costate; without wide border; 8-11 costae.

major Handlirsch, 1906; UTrias; Blackstone Fm; Ipswich.

australiensis Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.

olliffi (Handlirsch, 1906); UTrias; Blackstone Fm; Ipswich.

congener Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.

cameroni Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.

punctata Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.

parva Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

intermedia Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

lata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

brevis Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

curvata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

ramocostata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

rugulosa Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

vittamargina Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

aduncа Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

wianamattensis Tillyard, 1918b; UTrias; Blackstone Fm; Ipswich.

Ademosynoides Dunstan, 1923 [*minor*]
Elytron: impunctate-striate; 8-10 costae; borders narrow or moderately wide.

minor (Handlirsch, 1906); UTrias; Blackstone Fm; Ipswich.

obtusa (Tillyard, 1916); UTrias; Blackstone Fm; Ipswich.

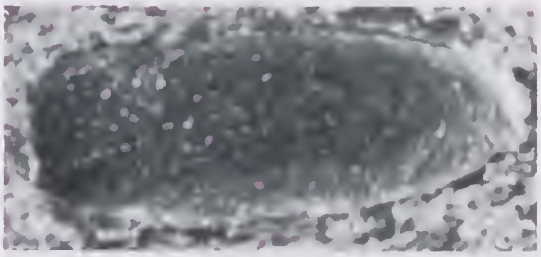
angustata Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.

alternata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

striatella Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

abnormis Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

magnifica Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

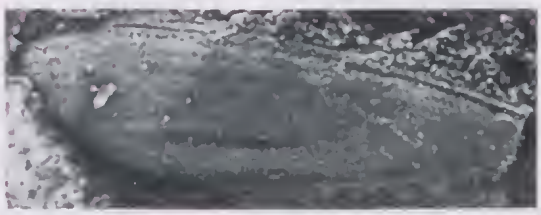


Grammositus bilineatus; GSQI136a; 2.5mm

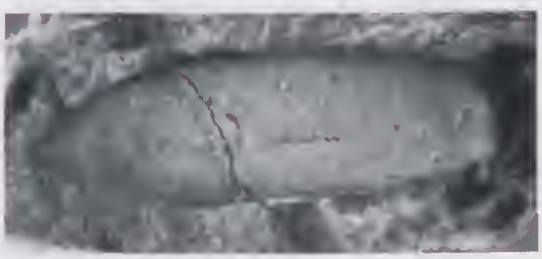
Grammositus Dunstan, 1923 [*bilineatus*]
Elytron: apex blunt; basal margin long; humerus extended; only 2 rows of striae; elongate granules oriented longitudinally.
bilineatus Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

Permosyne belmontensis; AMF19777; 3.1mm long. From Tillyard, 1924, text-fig. 2.

Permosyne Tillyard, 1924 [*belmontensis*]
Elytra with lateral margins not thickened,; sutural margin narrow; both margins curved; strae plain or punctate, with 2nd, 3rd and 4th ending on 1st, with 8th ending on 9th; 9th stria (next to sutural margin)arising basally further from margin than from 8th stria; usually vestige of a short 10th stria in basal part of interval between 9th stria and margin.
belmontensis Tillyard, 1924; UPerm; Newcastle CM; Sydney.
affinis Tillyard, 1924; UPerm; Newcastle CM; Sydney.
mitchelli Tillyard, 1924; UPerm; Newcastle CM; Sydney.
pincombeae Tillyard, 1924; UPerm; Newcastle CM; Sydney.

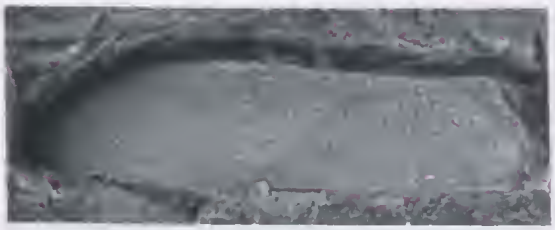


Permosyne pincombei; AMF19778; 3.3mm long.

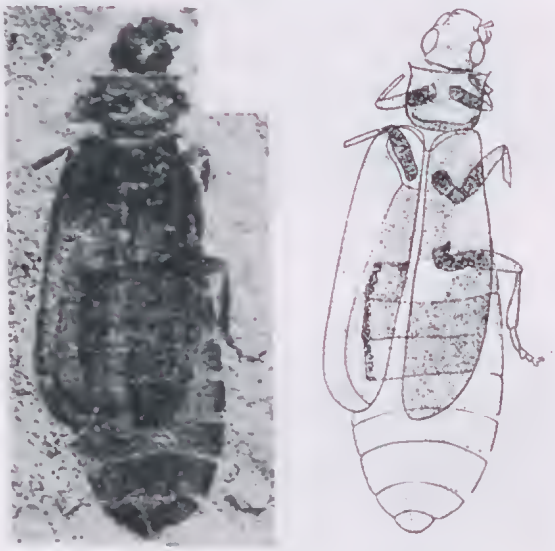


Lobites tuberculatus; GSQI342a; 5.8mm long. Line drawing (above) of Dunstan, 1923, pl. 5, fig. 41.

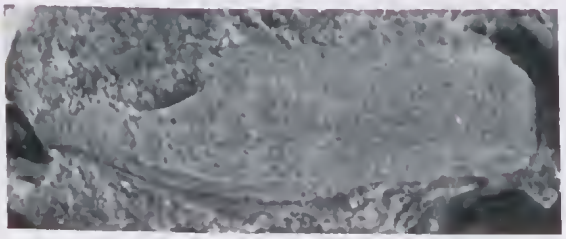
Family **BUPRESTIDAE** Leach, 1815
Lobites Dunstan, 1923 [*tuberculata*]
Elytron: lateral margin bisinuate; sutural margin arcuate; surface with several lines of tuberculation, 3 lines of tubercules or smooth.
tuberculata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
trivittata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
granulata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.



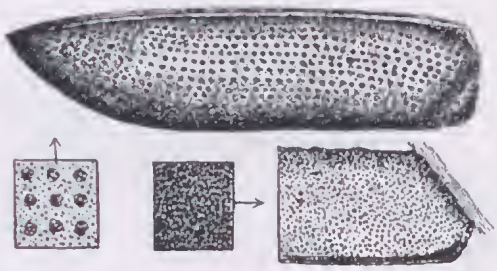
Mesostigmodera typica; GSQI61a; 15mm long. Line drawings (right) of Dunstan, 1923, pl.5, fig. 39.



Cantharid indet.; NMVP103331; 7mm long. Line drawing of Jell & Duncan, 1986, fig. 39A.



Etheridgea australis; GSQI31; 9mm long. Line drawing of Dunstan, 1923, pl. 7, fig. 60. [The type specimen is not readily identified in either GSQ or AM



Mesostigmodera Etheridge & Olliff, 1890 [*typica*]
Like *Lobites* but differing in ornamentation, border details and in lacking an incision on the disc.
typica Etheridge & Olliff, 1890; UTrias; Blackstone Fm; Ipswich.

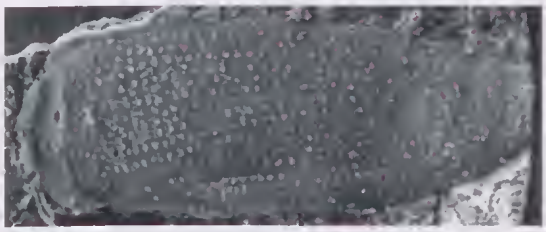
Family **CANTHARIDAE** Thomson, 1864
Cantharid indet.
Head narrow; clypeal region produced forward, with convex anterior; mandibles elongate; pronotum much wider than head,, with lateral margin concave anteriorly ; elytra soft, elongate, not covering apical segments of abdomen; middle and forelegs similar, with small coxae not touching, expanded femur and long thin tibia; abdomen of 8 uniform segments except for 2 longer posterior ones.
Cantharid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family **CERAMBYCIDAE** Latreille, 1802
Willcoxia Dunstan, 1923 [*magnopunctata*]
Elytron: 3 longitudinal and 2 oblique double rows of pits; lateral border wide, prounounced.
magnopunctata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

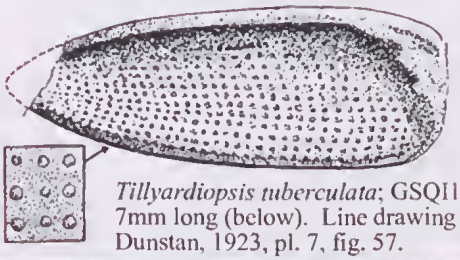
Willcoxia magnopunctata; GSQI 261; 10mm long (left). Line drawing of Dunstan, 1923, pl.6, fig. 47.

Family **CURCULIONIDAE** Latreille, 1802
Etheridgea Handlirsch, 1906b [*australis*]
Elytron: small, distally pointed; 13 rows of minute tubercles of variable size and distance from one another.
australis Handlirsch, 1906b; UTrias; Blackstone Fm; Ipswich.
petrica Tillyard, 1916; MTrias; Ashfield Fm; Sydney.

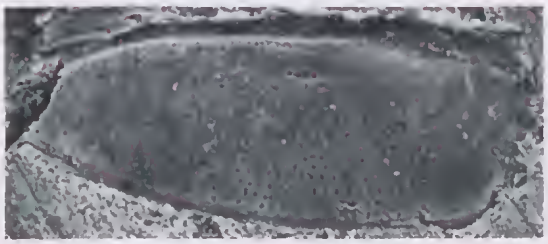
Mesorhynchophora Tillyard, 1916 [*dunstani*]
Elytron: very broad base, tapering to narrow rounded apex; surface convex, with 4 converging striae distally separated by wide flat interstices.
dunstani Tillyard, 1916; MTrias; Ashfield Fm; Sydney.
Tillyardiopsis Dunstan, 1923 [*tuberculata*]
Elytron: sutural border narrow; lateral and humeral borders wide; surface granulate; short deep incision or line of close deep punctae at middle of lateral half.
tuberculata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
granulata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
variotubercula Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.



Tillyardiopsis variotubercula; GSQI66a; 6.5mm long.



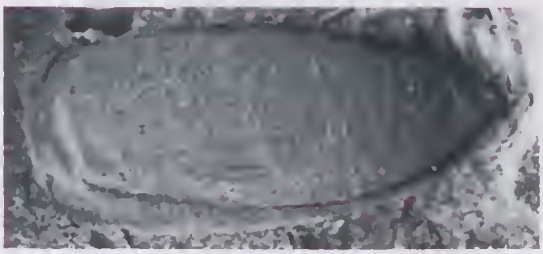
Tillyardiopsis tuberculata; GSQI133; 7mm long (below). Line drawing of Dunstan, 1923, pl. 7, fig. 57.



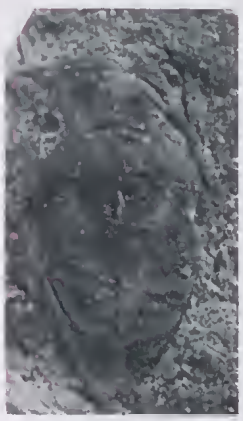
Family **DASCILLIDAE** Guérin-Méneville, 1823

Apheloodes Dunstan, 1923 [*obliqua*]
Elytron: rugose lines concentric with lateral borders; sometimes with 2 oblique lines; low convexity.
obliqua Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
rugosa Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

Mesorhynchophora dunstani; GSQI27a; 15mm long. Line drawwing of Dunstan, 1923, pl. 1, fig. 7

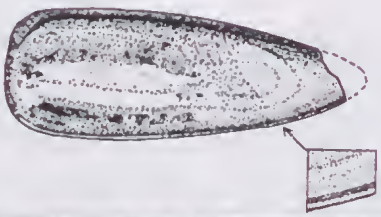


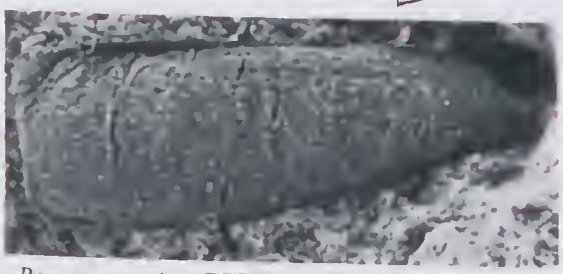
Tillyardiopsis granulata; GSQI289a; 6.9mm long.



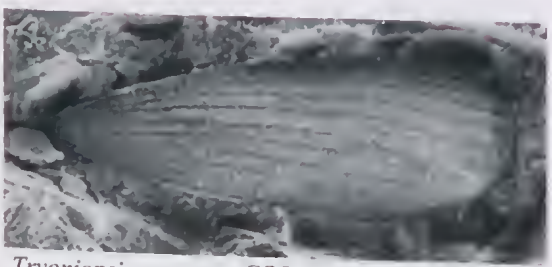
Apheloodes obliqua; GSQI143a; 2mm long. Line drawing of Dunstan, 1923, pl. 6, fig. 54.

Leioodes plana; GSQI348; 1.8mm long. Line drawing (right) of Dunstan, 1923, pl. 6, fig. 53.



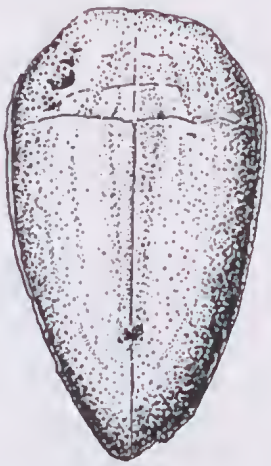


Reeveana major; GSQI251a; 5.4mm long. Line drawing (above) of Dunstan, 1923, pl. 5, fig. 38.



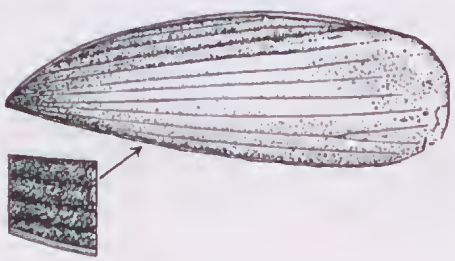
Tryoniopsis punctata; GSQI250b; 6mm long. Line drawing (right) of Dunstan, 1923, pl. 7, fig. 65.

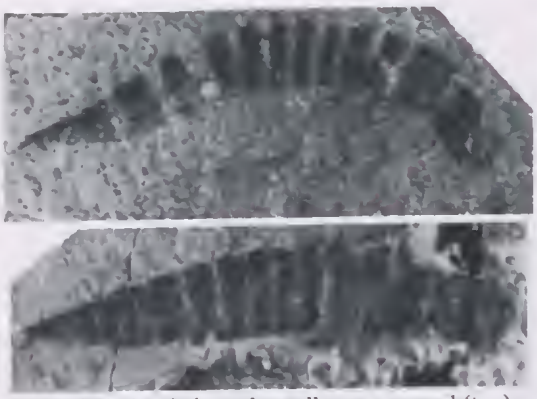
Leioodes Dunstan, 1923 [*plana*]
Elytron: very small, highly convex; ornament very faint; lateral margin areuate.
plana Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
pygmaea Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.



Family **DERMESTIDAE** Latreille, 1807
Reeveana Dunstan, 1923 [*minor*]
Elytron: distally tapered; widest point near base; subulate or cuneate overall; ornament very weak, concentric to absent.
major Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
intermedia Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
minor Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

Tryoniopsis Dunstan, 1923 [*punctata*]
Elytron: explanate, distally attenuate; borders narrow, well defined; costae low; striae shallow; almost flat.
punctata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
granulata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.





Dytiscid indet. 2; larva laterally compressed (top), NMVP103330, 6.5mm long; larva dorsally compressed (lower above), NMVP103302, 4.2mm long.

Family **DYTISCIDAE** Latreille, 1825

Dytiscid indet 1.

Larva with head longer than pronotum; mandibles strongly curved, opposed, single-tipped; 8th abdominal tergite drawn out into spine-like projection. Adult and elytron only tentatively assigned, rather indistinct.

Dytiscid. indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Dytiscid indet 2.

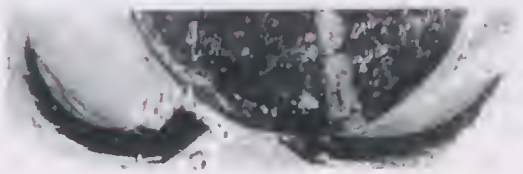
Larvae:Head subrectangular, with prominent Y-shaped ridge; antennae short, 3-4 segments; pronotum shorter than head, longer than succeeding segments, with truncated corners; abdomen 8-segmented, posteriorly pointed. Adult oval; antennae 10-segmented, becoming beaded; pronotum half body length; coxae large, bearing hairs along outer margin; tibia and tarsus covered with hairs; abdomen of 6 sternites, 1st longest; elytra with longitudinal ridges.

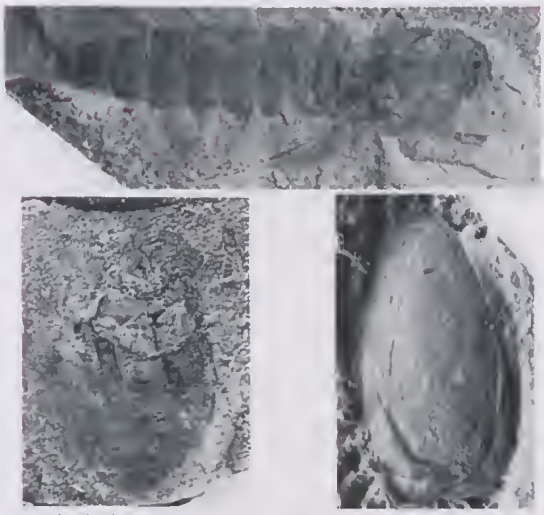
Dytiscid. indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Dytiscid indet 3.

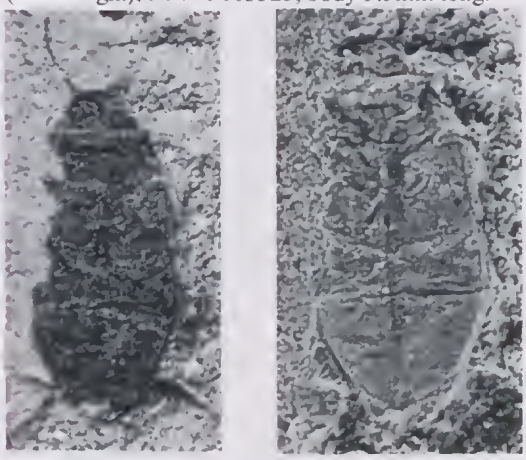
Thorax 2nd = 3rd in length; body widest at rear of thorax; foreleg femur long narrow; mid leg femur heavier, expanding distally; hindleg long, stout, femur & tibia same length; tibia with strong lateral hairs on apex; tarsus 5-segmented, tapering distally to sharp tip, with long fine hairs from concave side and stout prominent lateral hairs from convex side.

Dytiscid. indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



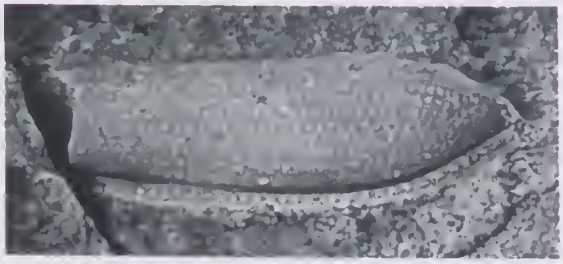


Dytiscid indet. 1; larva , MUGD3749, 9mm long (upper); immature adult (above left) and elytron (above right), NMVP103325, body 5.5mm long.

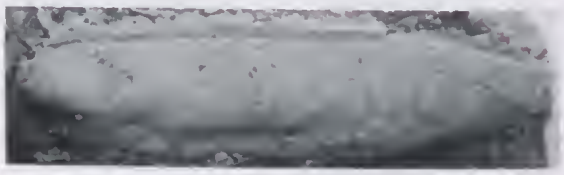


Dytiscid indet. 2; adult, NMVP103169, 4mm long, whitened with ammonium chloride on right.

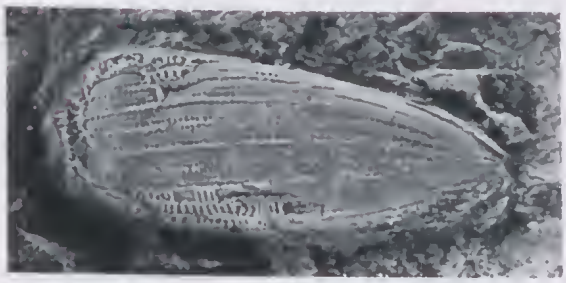
Dytiscid indet. 3; NMVP 102527; 10mm long. Detail of distal part of hindleg at left.



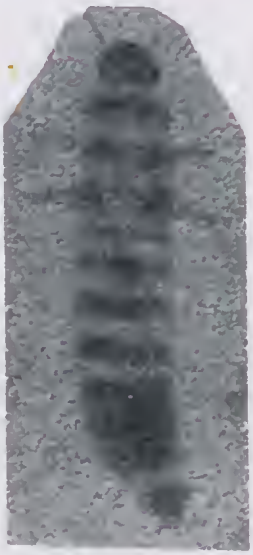
Elaterium punctomarginum; GSQl200b; 7mm long.
Line drawing (right) of Dunstan, 1923, pl.5, fig. 43.

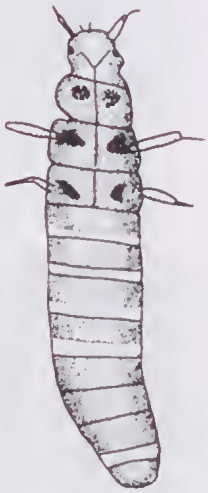


Elateridium angustius; AMF39328; 9mm long.



Elateridium transversum; GSQl159; 6.5mm long.
Line drawing (right) of Dunstan, 1923, pl. 4, fig.





Helodid larva indet.; NMVP103308; 7mm long.
Line drawing of Jell & Duncan, 1986, fig. 37A.

Family **ELATERIDAE** Leach, 1815

Elaterium Westwood, 1854 [*pronaeus*]
Elytron: elongate dise with parallel costae; double lines of punctate striae or minute groups of punctae centrally on border.
punctomarginum Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
bipunctatum Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.

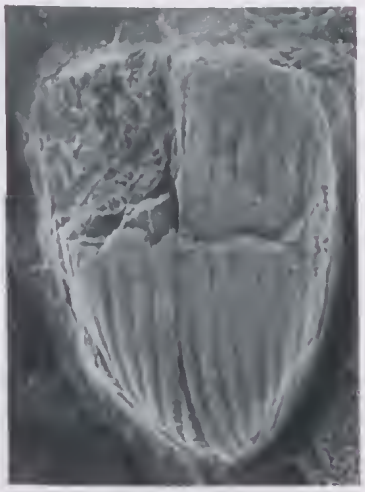
Elateridium Tillyard1918b [*wianamattense*]
Elytron: elongate, oval, tapering posteriorly; no sculpture evident except a slight roughness on the surfaee.
wianamattense (Tillyard, 1916); MTrias; Ashficld Fm; Sydncy.
angustius Tillyard, 1918b; MTrias; Ashfield Fm; Sydney.
subulatum (Dunstan, 1923); UTrias; Blackstonc Fm; Ipswich.
transversum (Dunstan, 1923); UTrias; Blackstonc Fm; Ipswich.

Family **HELODIDAE** Lecontc, 1862

Helodid indet.
Larva comparatively broad: Head small, subquadrate; antennae long, with long 1st segment, of many segments; eyes small, lateral, nearmidlength of head behind insertion of antenna; median groove on rear of head dividing forward, running to lateral margins just forward of eyes; thorax of subequal segments, with rounded lateral margins to segments, with fine raised ridge around entire margin of tergite. legs short, with large tibia, tarsus and tarsal claw; abdomen of 8 segments, 8th shorter than 7th.
Helodid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

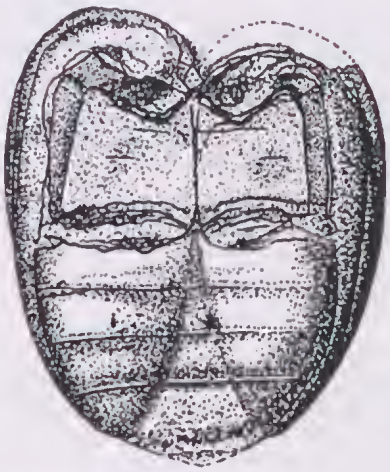
Family **HYDROPHILIDAE** Latreille, 1802

Platycrossos Dunstan, 1923 [*tumidus*]
Elytron: punctate-striate; 8-9 costae; lateral border very wide; extended humeral area and border.
tumidus (Tillyard, 1916); UTrias; Blackstone Fm; Ipswich.
ligulatus Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
subtumidus Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.



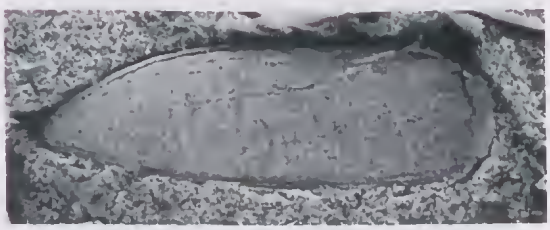
Platycrossos tumidus; GSQI45b; 6.2mm long. Line drawing (left) of Dunstan, 1923, pl. 3, fig. 21.

Polysitum Dunstan, 1923 [*punctatus*]
Elytron: broadly ovate, uniformly granulate, otherwise like Ademosyne.
punctatus Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
minutus Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.



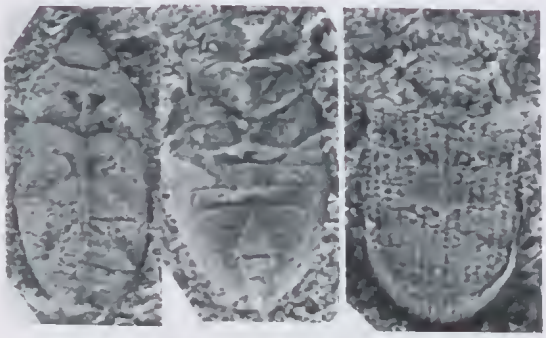
Polysitum punctatum; GSQI153b; 7mm long. Line drawing (left) of Dunstan, 1923, pl. 4, fig. 37.

Sheperdia Dunstan, 1923 [*quadrivittata*]
Elytron: banded seulpture with fine eross lining; apex aeutely rounded; otherwise like *Ademosyne*.
quadrivittata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.



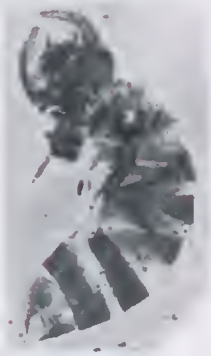
Sheperdia quadrivittata; GSQI130a; 11mm long. Line drawing (left) of Dunstan, 1923, pl. 4, fig. 32.

Simmondsia cylindrica; GSQI87a; 3mm long. Line drawing (right) of Dunstan, 1923, pl. 4, fig. 29.

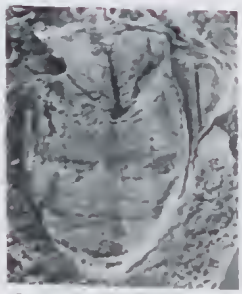


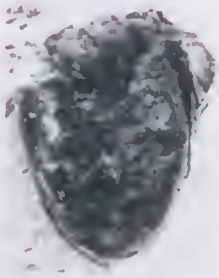
Hydrophilid indet.; NMVP103314; 102522; 102768; x12.

Hydraenid indet.; NMVP 103319; 2.5mm long.

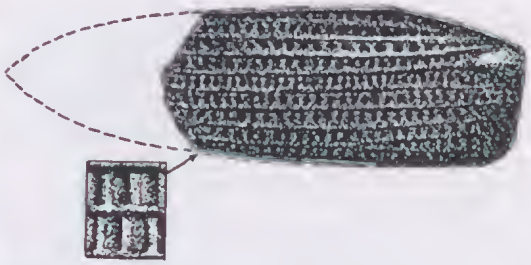


Hydrophilid larva indet.; NMVP 32284; 9mm long.





Gyrinid indet.; NMVP103311; 2.5mm long; whitened with ammonium chloride (left) and in normal light (right).



Simmondsia Dunstan, 1923 [*subpyriformis*]
Elytron: number of longitudinal ridges and connecting crossbars; enclosed squares depressed; lateral and sutural borders narrow; scutellary margin long.
subpyriformis Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
cylindrica Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
Hydrophilid indet.
Small body; head trapezoidal; antennae of 2 long basal segments, shorter broader 3rd segment and 3 short broad distal to the cupule; eyes tiny, posterolateral; pronotum coarsely pustulose, with large paratergal lobes; elytra with broad longitudinal ridges separated by narrow grooves with closely spaced pits along entire length; abdomen of 6 sternites.
Hydrophilid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.
Hydrophilid larva indet.
Large curved mandibles; thoracic segments subequal; abdomen tapering posteriorly
Hydrophilid larva indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family **HYDRAENIDAE** Mulsant, 1844
Hydraenid indet.
Elongate adult; head longer than wide; antennae inserted anterolaterally, of 2 long basal segments and 5 bead-like apical sections; pronotum not expanded; 3rd thoracic segment very long; elytra long, thin; abdomen with 6 sternites.
Hydraenid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family **GYRINIDAE** Latreille, 1810
Gyrinid indet.
Hind leg with greatly expanded coxa; tibia wide, expanding distally; basitarsus wider than long, relatively massive; 1st abdominal sternite with pair of circular central and margined depressions to receive posterior tip of hind coxa, much longer than succeeding sternites; 6th sternite as long as others; elytra with widely separated longitudinal ridges.
Gyrinid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

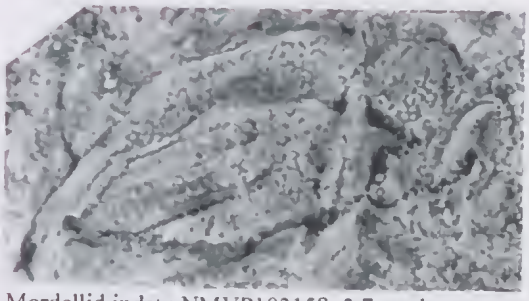
Family **MALACODERMIDAE**

Metrorhynchites Tillyard, 1916 [*sydneiensis*]
Elytron: elongate, oval, with 3 strong longitudinal ribs, one parallel to inner margin and extending to tip, other two roughly parallel with outer margin and meeting first independently near apex.
sydneiensis Tillyard, 1916; MTrias; Ashfield Fm; Sydney.
grandis Tillyard, 1918b; MTrias; Ashfield Fm; Sydney.

Metrorhynchites grandis; AMF39330; 14.4mm long.

Family **MORDELLIDAE** Latreille, 1802

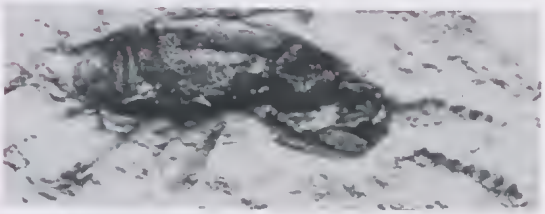
Mordellid indet.
Body typically hump-shaped, with small high head tucked down beloweonvex pronotum; elytra well sclerotised, with well-defined border and longitudinal striations.
Mordellid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



Mordellid indet.; NMVP103158; 3.7mm long.

Family **PSELAPHIDAE** Latreille, 1802

Pselaphid indet.
Head small; antenna 11-segmented, with basal segment twice as long as wide; becoming beaded distally; pronotum longer than head, convex; legs with forfemur greatly enlarged, club-shaped mid and hind femora; elytra short, over only abdomen anterior; abdomen short; segments short.
Pselaphid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

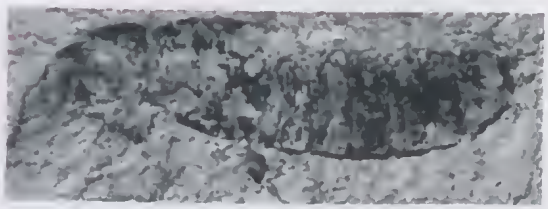


Pselaphid indet.; NMVP103321; 2mm long.

Family **STAPHYLINIDAE** Latreille, 1802

Staphylinid indet.
Brachypterous; head subquadrate; antennae 11-sgmented, expanding apically, apical segment larger than penultimate; pronotum with small anterolateral spine; elytra subrectangular, just reaching abdomen; abdomen with segments 2-7 subequal; segment 8 small, with indistinct cerci and terminalia.

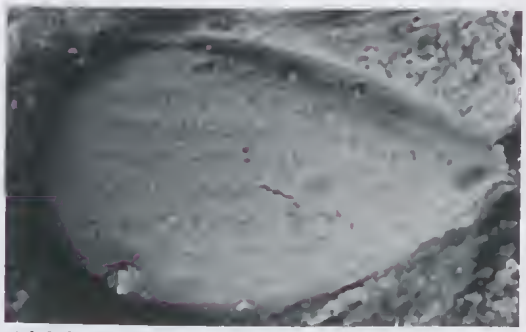
Staphylinid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



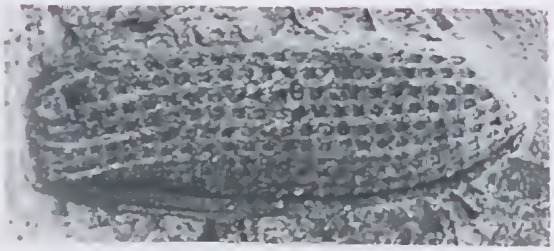
Staphylinid indet.; MUGD3737B; 4mm long. Line drawing (left) of Jell & Duncan, 1986, fig. 35A

Family **TENEBRIONIDAE** Latreille, 1802

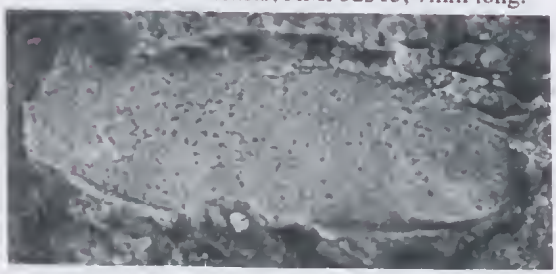
Adelidium Tillyard, 1918b [*cordatum*]
Elytron: broad, small, highly convex; sculpture of 9 slightly raised longitudinal striae, separated by wider interstices; striae punctate.
cordatum Tillyard, 1918b; MTrias; Ashfield Fm; Sydney.



Adelidium cordatum; AMF39329; 4mm long. Line drawing (left) of Tillyard, 1918, text-fig. 14.

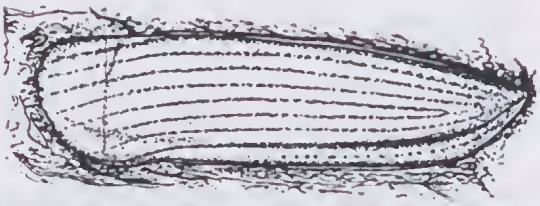


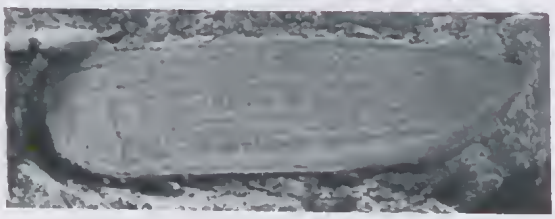
Mesothoris westraliensis; AMF52315; 7mm long.



Mesothoris tenuiclathrata; GSQI313a; 6.8mm long. Line drawing (right) of Dunstan, 1923, pl. 6, fig.

Mesothoris Tillyard, 1916 [*clathrata*]
Elytron: elongate, almost parallel sided; sculpture areolate, formed by 9 broad flat longitudinal ridges intersected by transverse ridges; areolae subquadrate.
clathrata Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.
quadripartita Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
tenuiquadrata Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
grandis Dunstan, 1923; UTrias; Blackstone Fm; Ipswich.
westraliensis Rick, 1968; LJur; Cockleshell Gully Fm; Perth.





Ulomites willcoxi; GSQI50b; 11mm long. Line drawing of Dunstan, 1923, pl. 4, fig. 33.

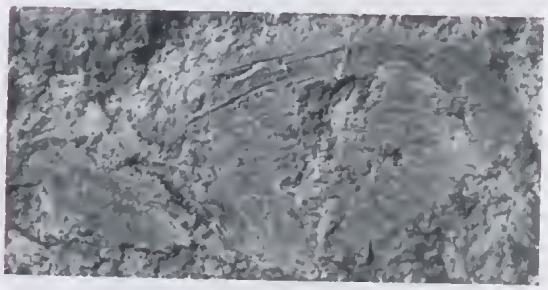
Ulomites Tillyard, 1916 [*willcoxi*]
Elytron: sides subparallel, base rounded, apex pointed; marginal and sutural borders narrow; sculpture of 7 distinct punctate striae; distance between punctures half interstitial width; marginal interstices becoming wider apically; interstices finely granulose.
willcoxi Tillyard, 1916; UTrias; Blackstone Fm; Ipswich.

Undetermined beetles from Koonwarra Fossil Bed (left) and Wianamatta Shale (right)

Order NEUROPTERA (lacewings)

Family **ARCHEOSMYLIDAE** Rick, 1953

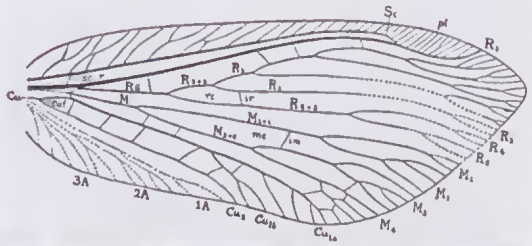
Archeosmylus Rick, 1953 [*pectinatus*]
Forewing: Sc and R1 fused; pterostigma long, curved round towards apex; Rs 8- or 9-branched; Rs and M1+2 fused for short distance, with proximal portion of M1+2 almost transverse; Cu2 deeply forked; anals simple, with short pectinate branches near margin.
pectinatus Rick, 1953; UPerm; Newastle CM; Sydney.
stigmatus Riek, 1955; UTrias; MtCrosby Fm; Ipswich.
costalis Riek, 1955; UTrias; MtCrosby Fm; Ipswich.

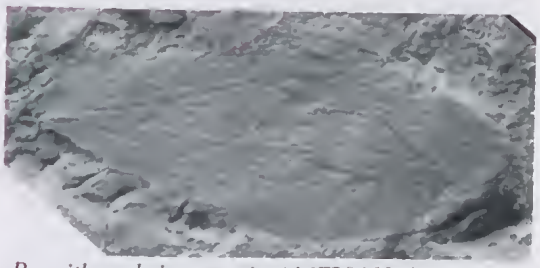


Archeosmylus pectinatus; AMF40264; 11mm long. Line drawing (above) of Riek, 1953, text-fig. 66.

Family **PERMITHONIDAE** Tillyard, 1922

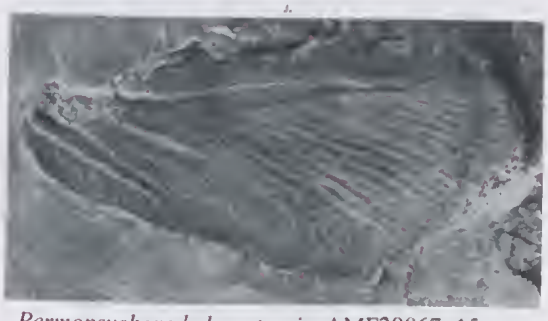
Permithone Tillyard, 1922a [*belmontensis*] [=*Permosmylus* Tillyard, 1926b; type P. *pincombeae*]. Forewing: Sc fused to R1 distally; costal space expanded at base; 6-7 cross veins from R to Rs; Rs with only 4-5 pectinate branches; MP forking before Rs; cubito-median Y-vein distinct; Cu1 branched; Cu2 simple or with one distal fork; A1 pectinately branched; A2 and A3 branched, enclosing an irregularly celled area; cross veins between Cu1 and Cu2 simple or irregular. Hindwing: costal space narrow; Cu1 branched pectinately; Cu2 simple; Cu1 touching or fused to M for short distance; no cubito-median Y-vein.
belmontensis Tillyard, 1922a; UPerm; Newcastle CM; Sydney.
oliarcoides Tillyard, 1926b; UPerm; Newcastle CM; Sydney.
neoxenus Rick, 1953; UPerm; Newcastle CM; Sydney.
pincombeae (Tillyard, 1926b); UPerm; Newcastle CM; Sydney.



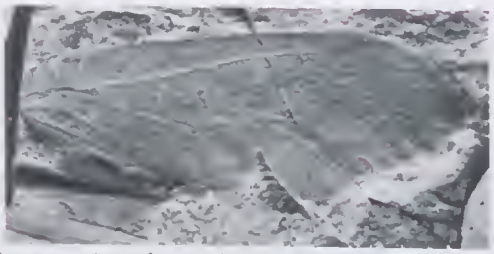


Permithone belmontensis; AMF28465; 9.4mm long. Line drawing (above) of Tillyard, 1922a, text-fig. 6.

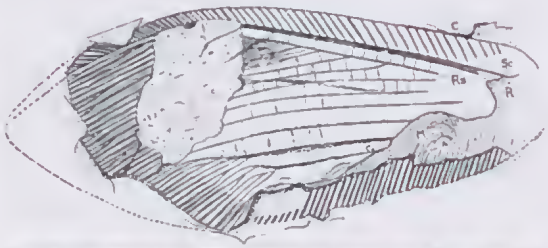
Permopsychops Tillyard, 1926b [*belmontensis*]
Forewing: Sc fused to R1 distally; costal veinlets simple, rarely branched, without cross veins; 3 r-rs; Rs with numerous pectinate branches; M forking near base before Rs; cubito-median Y-vein distinct; Cu1 2-branched; Cu2 simple; A1 forked near apex; 2A and 3A branched.
belmontensis Tillyard, 1926b; UPerm; Newcastle CM; Sydney. [=*Permithone venosa* Davis, 1943; UPerm; Newcastle CM; Sydney].

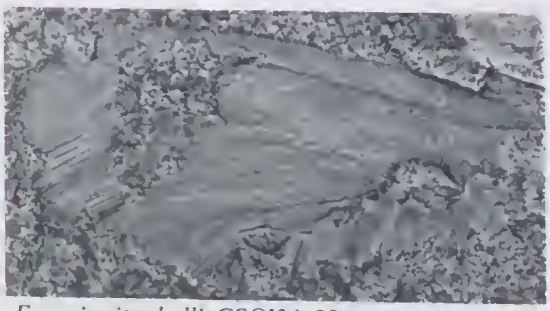


Permopsychops belmontensis; AMF39867; 15mm long, holotype of *P. venosa*.

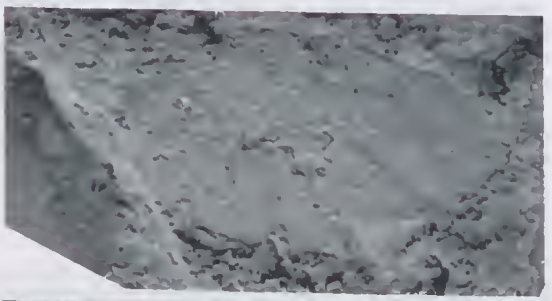


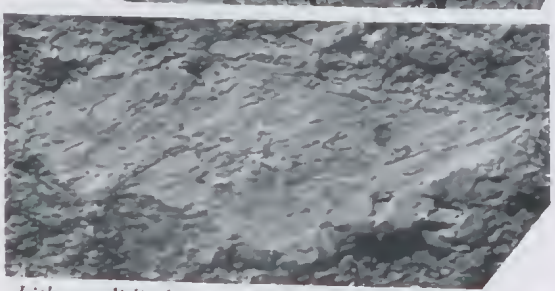
Permorapisma biserialis; AMF28053; 20mm long. Line drawing (right) of Riek, 1953, text-fig. 48.





Euporismites balli; GSQ134; 22mm long. Line drawing (above) of Tillyard, 1916, pl. 3, fig. 1.





Lithosmylidia lineata; UQC2189 (part and ep); 20mm long. Line drawing (right) of Riek, 1955, fig. 22.

Permorapisma Tillyard, 1926 [*biserialis*]
Forewing: costal space enlarged near base; Sc fused with R1 distally; costal veinlets often branched and connected by numerous irregular cross veins; 10 or more r-rs; Rs with 9 pectinate branches (including MA), with dense end twigging; cubito-median Y-vein distinct; Cu1 branched towards apex; 3 anal veins branched pectinately; Cu1 to Cu2 cross veins reticulate, forming 2-3 cells; similar reticulate cross veins between anals.

biserialis Tillyard, 1926b; UPerm; Newcastle CM; Sydney.

triserialis als Tillyard, 1926b; UPerm; Newcastle CM; Sydney.

Family **OSMYLIDAE** Leach, 1815

Euporismites Tillyard, 1916 [*balli*]
Bordered by close veins (costal cross veins anteriorly, many branches of primary veins apically and of Cu and A veins posteriorly); Sc and R1 very close, parallel; Rs parallel to R1 giving off large series of pectinate branches; M widely separated from Rs; Cu1 and Cu2 not distinct, zigzag, curving posteriorly very early and then branching.

balli Tillyard, 1916; Palaeocene; Redbank Plains Fm; Ipswich.

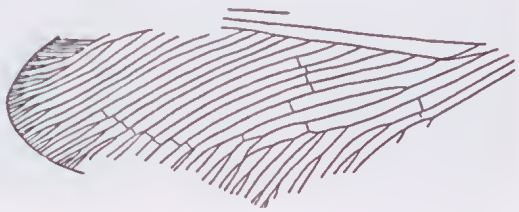
Lithosmylidia Riek, 1955 [*lineata*]
Forewing: Sc and R1 fused towards apex; M1+2 only just touching Rs, with free oblique basal stem; limited cross veins near base of Rs; pterostigmatic veinlets often forked; terminal branches of CuA and CuP not transverse.

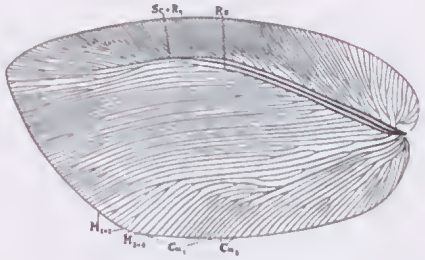
lineata Riek, 1955; UTrias; Mt Crosby Fm; Ipswich.

parvula Riek, 1955; UTrias; Mt Crosby Fm; Ipswich.

baronne Lambkin, 1988; Gayndah Beds; Esk Graben.

sp. A Lambkin, 1988; UTrias; Mt Crosby Fm; Ipswich

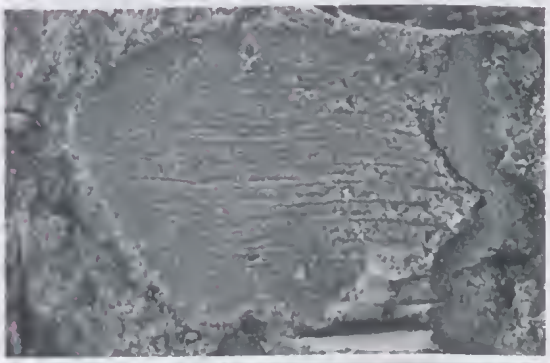


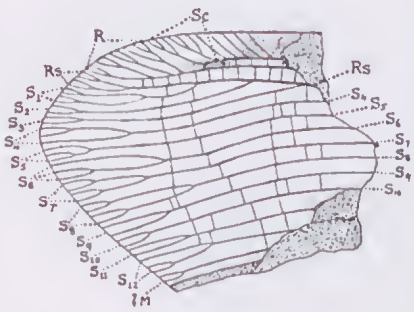


Osmylopsychops spillerae; GSQI314; 14mm long. Line drawing (left) of Tillyard, 1923b, text-fig. 93.

Family **OSMYLOPSYCHOPIDAE** Martynova, 1949

Osmylopsychops Tillyard, 1923b [*spillerae*]
Forewing: Sc and R1 fused apically; all veins abundantly branched; CuA many branched; Sc, R1 and Rs separate almost to base; endtwigging limited; costal veinlets mainly forked and connected by scattered cross veins; CuP and anals well branched.
spillerae Tillyard, 1923b; UTrias; Blackstone Fm; Ipswich.

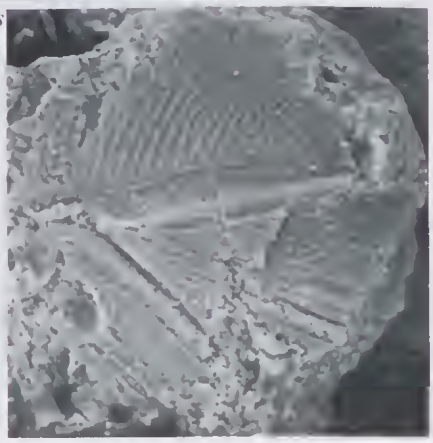




Protopsychopsis venosa; GSQI160a; 9.5mm long (right). Line drawing (left) of Tillyard, 1917, pl. 8, fig. 3.

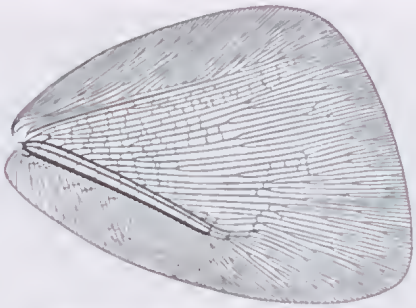
Protopsychopsis Tillyard, 1917 [*venosa*]
Wing broad, moderately pointed; large number of forked apical veins. Forewing: broad costal margin, with numerous costal cross veins, some forked; Sc and R separated by numerous cross veins; distally Sc and R approach close to one another a short distance before the apex; R and Rs further apart, with many cross veins; Rs 12-branched, with delicate cross veins; 2 rows of gradate veins in almost complete transverse lines across wings; another series of stepwise crossveins between the two.
venosa Tillyard, 1917; UTrias; Blackstone Fm; Ipswich.

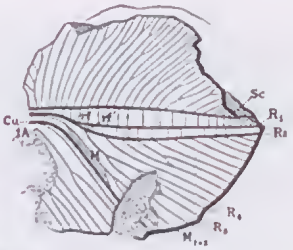
Petropsychops superba; UQC2136; 28mm long along R.



Petropsychops Riek, 1956 [*superba*]
Sc fused to R1; no distinct 'ven triplica'; R bent strongly away from Sc at base; Rs arising almost basally; Cu diverging strongly from the Sc-R veins; M forming pectinate series of many anterior branches occupying large area of wing.
superba Riek, 1956; UTrias; Blackstone Fm; Ipswich.

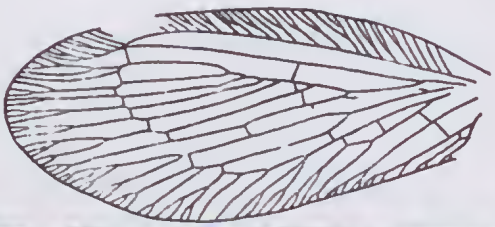
Archepsychops triassica; GSQI137; 6.7mm long.



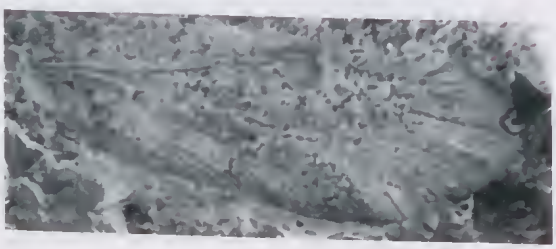


Archepsychops triassica; GSQ137; line drawing of Tillyard, 1919a, text-fig. 27.

Triassopsychops superba; GSQ1284a; 29mm long. Line drawing (above) of Tillyard, 1922b, text-fig. 89.



Proberotha superba; UQC1404; 7mm long (below). Line drawing (above) of Riek, 1955, fig. 18.



Family **PSYCHOPSIDAE** Handlirsch, 1906

?Archepsychops Tillyard, 1919a [*triassica*]
Forewing: costal space markedly expanded towards base but tapering rapidly towards pterostigma; Se, R1 and Rs probably forming a vena triplica.

triassica Tillyard, 1919a; UTrias; Blackstone, MtCrosby Fms; Ipswich.

Triassopsychops Tillyard, 1922b [*superba*]
Forewing: very broad; apex rounded; Se, R1, Rs strong from base to just beyond midlength, joined distally by two strong cross veins; the 3 continuing for short distance to be joined by cross veins again; Se and R1 continuing a further short distance to another cross vein then all dividing into terminal veinlets; costal area with recurrent veinlet near base sending a few veinlets to margin; most costal veinlets arising from Se at 45°; M and Cu1 not fused distally; Rs with about 14 branches from Rs; M 5-branched; basal r-m short, strong; cross veins between branches of Rs numerous; Cu simple for long way, distally multibranched; A1 and A2 multi-branched.

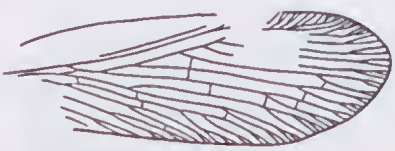
superba Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.

Family **PROBEROTHIDAE** Riek, 1955

Proberotha Kruger, 1923 [*prisca*]
Forewing: costal space markedly expanded over middle portion; margin of wing almost entire; Sc and R1 fused near apex; normally 3 cross veins between R1 and Rs; M and Rs connected only by a cross vein.

superba Riek, 1955; UTrias; Mt Crosby Fm; Ipswich.

Proberothella Riek, 1955 [*elongata*]
Forewing: costal space markedly expanded over middle portion; margin of wing almost entire; Sc and R1 fused near apex; 3 cross veins re-m; A1 deeply forked.



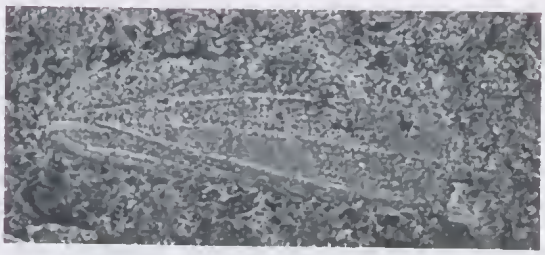
Proberothella elongata; UQC2196; 9mm long (left). Line drawing (above) of Riek, 1955, fig. 19.

elongata Riek, 1955; UTrias; Mt Crosby Fm; Ipswich.

Order GLOSSELYTRODEA

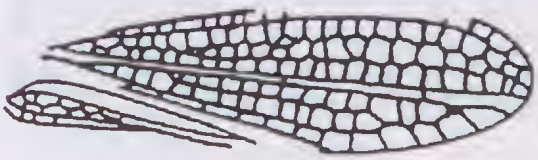
Family **JURINIDAE** Zalessky, 1929

Polycytella Tillyard, 1922b [*triassica*]
Tegmen: surface ornament of raised polygonal cellules forming meshwork; Sc, R, M and Cu1 unbranched, running straight to margin; R finishing near midlength; M finishing near apex; clavus narrow.
triassica Tillyard, 1922b; UTrias; Blackstone Fm; Ipswich.

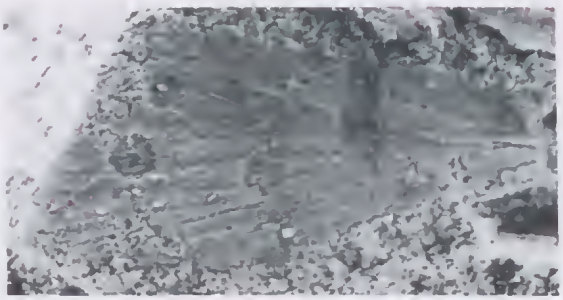


Polycytella triassica; GSQI81a; 7.5mm long.

Permoberothella Riek, 1953 [*perplexa*]
Forewing: pterostigma absent; Rs arising near base of wing; M1+2 fused with Rs proximally, then almost straight to the apex; M3+4 fused with Cu1 for short distance then parallel to M1+2; a distinct groove between MA and MP; MP 2-branched, with terminal twigging; Cu1 and Cu2 simple; 3 simple anals connected by irregular cross veins.
perplexa Riek, 1953; UPerm; Newcastle CM; Sydney.



Permoberothella perplexa; AMF42520; 7mm long. Line drawing (above) of Riek, 1953, text-fig. 53.



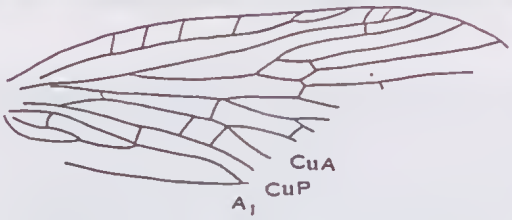
Cladochorista belmontensis; AMF28054; 4mm long. Line drawing (right) of Riek, 1953, text-fig. 50.

Order TRICHOPTERA (caddisflies)

Family **CLADOCHORISTIDAE** Riek, 1953

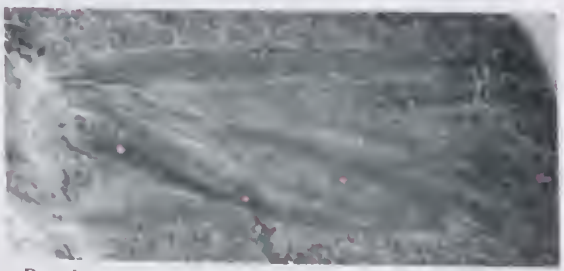
Cladochorista Rick, 1953 [*belmontensis*]
Costal spaee with numerous oblique erossveins; R1 branehed at apex; R2+3 branching before R4+5; se-r before origin of Rs; M 4-branched; eubito-median Y-vein distinet; Cu1 branched at or beyond its middle; Cu2 simple, weak; anal veins looped.
belmontensis Tillyard, 1926b; UPerm; Newcastle CM; Sydney.

Cladochoristella Riek, 1955 [*bryani*]
Forewing: Se ending in series of veinlets; 4 transverse eostal veinlets; R1 forked in pterostigma, 3-branched; arms of eubito-median Y-vein unequal; R2+3 forking before R4+5; M 5-branched, with extra braneh on Ms. Hindwing: Se forked, ending before R1; Rs forked as in forewing.
bryani Rick, 1955; UTrias; MtCrosby Fm; Ipswich.

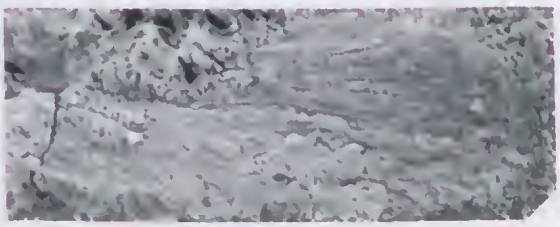


Cladochoristella bryani; UQC1746; 12mm long. Line drawing of Riek, 1955, fig. 16.

Prorhyacophila Rick, 1955 [*colliveri*]
[=*Eocorona* Tindalc, 1980; type *iani*]
Forewing: Se forked at apex, with only single eross vein to eostal margin; R1 simple; CuA deeply forked; CuP straight; distinet eubito-median Y-vein.
colliveri Rick, 1955; UTrias; Mt Crosby Fm; Ipswich.
iani Tindale, 1980; UTrias; Mt Crosby Fm; Ipswich.



Prorhyacophila colliveri; UQC1741; 5mm long. Line drawing (above) of Riek, 1955, fig. 17.

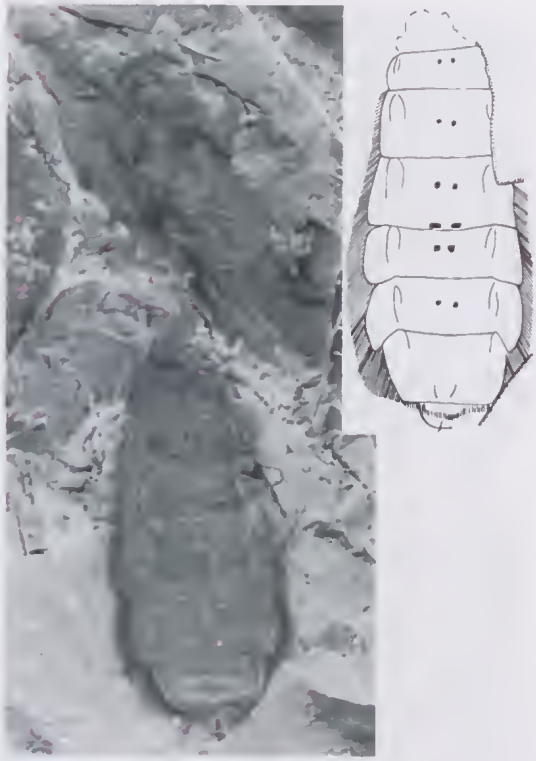


Prorhyacophila iani (holotype of *Eocorona iani)*; UQC2327; 8mm long.

Family **CALAMOCERATIDAE** Ulmer, 1905

Calamoceratid pupa indet.
Abdomen with fringe of fine long hairs from segment 2 back, with dorsal hook plates on segments 2-7,
Calamoceratid pupa indet. Jell & Dunean, 1986; LCret; Koonwarra FB; Gippsland.

Oecetis sp.; NMVP103184; 9mm long.



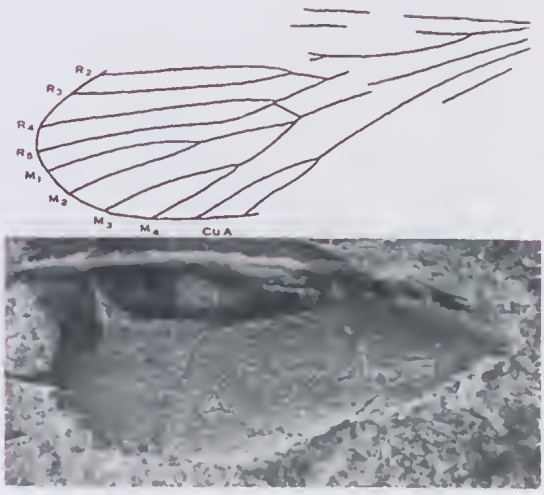
Calamoceratid pupa indet.; NMVP102632; x8. Line drawing (above right) of Jell & Dunean,

Family **LEPTOCERIDAE** Leach, 1815

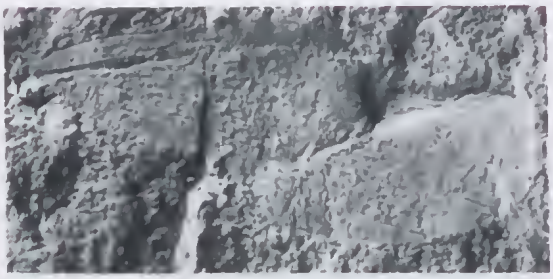
Oecetis sp.
Case of fine sand grains, straight, slightly tapered; apex slightly oblique; sand grains increasing in size towards aperture.
Oecetis sp. Jell & Dunean, 1986; LCret; Koonwarra FB; Gippsland.

Family **STEREOCHORISTIDAE** Tillyard, 1919

Stereochorista Tillyard, 1919a [frustrata]
Wing small; CuA forked; R2+3 forking before R4+5; r-m strong
frustrata Tillyard, 1919a; UTrias; Blaekstone Fm; Ipswieh.
[Tillyard (1919a) assigned the genus to the Mecoptera and detailed some peculiar morphology e.g. the 3-branched 1A. Rick (1956, fig. 1) interpreted the wing the other way up from Tillyard and assigned the genus to the Trichoptera. Carpenter (1992) considered it among genera that could not be assigned to Order within the Neoptera].



Stereochorista frustrata; GSQ1218; 7.5mm long. Line drawing (above) of Rick, 1956, fig. 1.



Aphryganoneura anomala; AMF29033; 12mm long.

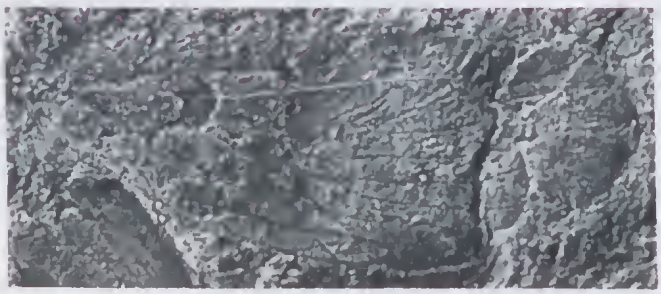
Order MECOPTERA (scorpionflies)

Family INCERTAE SEDIS

Aphryganoneura Tillyard, 1926b [*anomala*]
Forewing: branches of main veins parallel, separated by grooves as in Neuroptera Plannipennia, unbranched distally.
anomala Tillyard, 1926b; UPerm; Newcastle CM; Sydney.

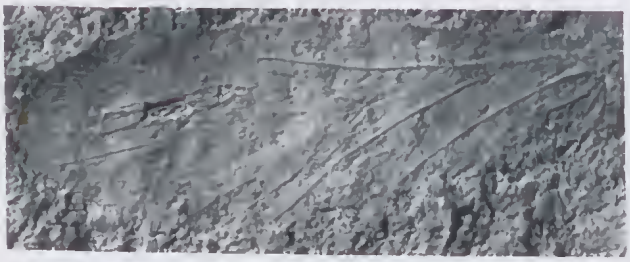
Family **AGETOPANORPIDAE** Carpenter, 1930

Agetochoristella Riek, 1953 [*adscita*]
Forewing: Se 3-branched; costal space expanded; Rs 5-branched, dichotomously, with extra fork on R5; M 5-branched, with extra fork on M2; cubito-median Y-vein distinct; Cu1, Cu2, A1 and A2 all simple.
adscita Riek, 1953; UPerm; Newcastle CM; Sydney.



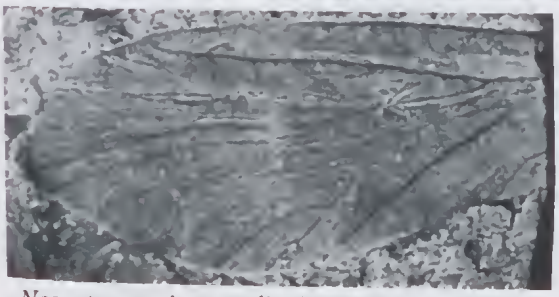
Agetochoristella adscita; AMF43656; 10mm long. Line drawing (above left) of Riek, 1953, fig. 28.

Neoageta Riek, 1953 [*elongata*]
Forewing: Sc 3-branched; Rs 5-branched, with extra fork on R5; M 6-branched, extra forks on M2 and M4; Cu1, Cu2 and anal veins simple; Cu1 and M touching; cubito-median Y-vein absent.
elongata Riek, 1953; UPerm; Newcastle CM; Sydney.



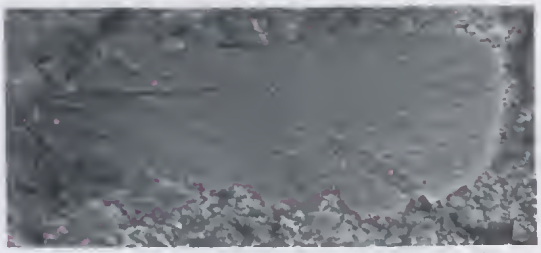
Neoageta elongata; AMF43969; 12mm long. Line drawing (above left) of Riek, 1953, fig. 26.

Neopetromantis Riek, 1953 [*australis*]
Forewing: costal space not expanded; Sc 3-branched; Rs 4-branched; M 6-branched, extra forks on M2 and M4; Cu1, Cu2 and A1 simple; cubito-median Y-vein absent.
australis Riek, 1953; UPerm; Newcastle CM; Sydney.



Neopetromantis australis; AMF40211; 5mm long. Line drawing (right) of Riek, 1953, fig. 27.

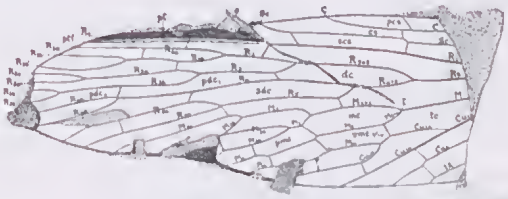
Phipoides Riek, 1953 [*elegans*]
Forewing: costal space expanded, Sc 3-branched; Rs 5-branched, extra fork on R2; M 6-branched; Rs 5-branched, extra fork on R2; M 6-branched, extra forks on M2 and M4. Hindwing: costal space not expanded; Sc short, simple; R1 forked near apex; Rs same as in forewing; M 4- or 5-branched.
elegans Riek, 1953; UPerm; Newcastle CM; Sydney.



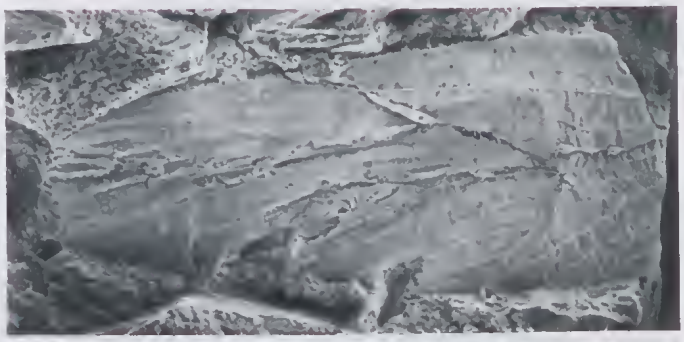
Phipoides elegans; AMF40144; 8mm long. Line drawing (above) of Riek, 1953, fig. 25.

Family **ARCHIPANORPIDAE** Tillyard, 1917

Archipanorpa Tillyard, 1917 [*magnifica*]
Forewing: pterostigma short, irregular; R arching up into pterostigma; Se reaching costal margin beyond midwidth; Rs and M branching repeatedly and dichotomously; Cu1 2-branched; Cu2 simple.
magnifica Tillyard, 1917; UTrias; Blackstone Fm; Ipswich.

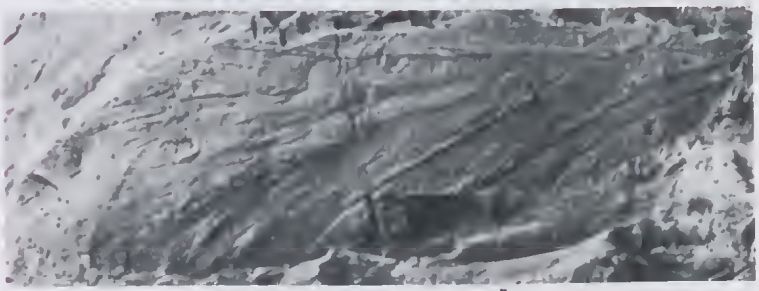


Archipanorpa magnifica; GSQ1106; 33mm long (right). Line drawing (above) of Tillyard, 1917, pl. 8, fig. 5.

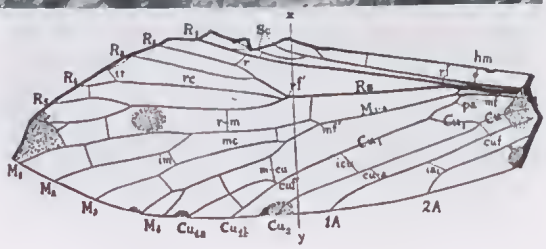


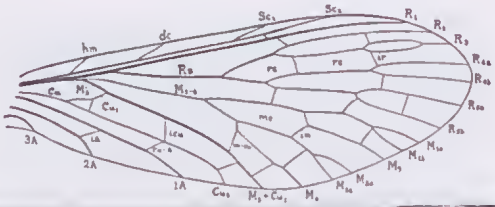
Family **BELMONTIIDAE** Tillyard, 1919b

Belmontia Tillyard, 1919b [*mitchelli*]
Forewing: costal space narrow, not expanded near base; Sc forked near its apex, connected to R1 by a cross vein; no distinct pterostigma; R1 simple; Rs 6-branched; M 4-branched, occasionally 5-branched; cubito-median Y-vein well-developed; Cu1 normally forked near apex; Cu2 simple; anal veins simple with cross veins.
mitchelli Tillyard, 1919b; UPerm; Newcastle CM; Sydney.

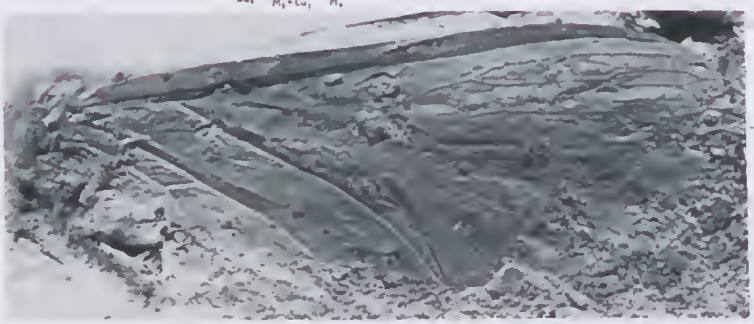


Belmontia mitchelli; AMF28469; 16mm long. Line drawing (right) of Tillyard, 1919b, text-fig. 1.





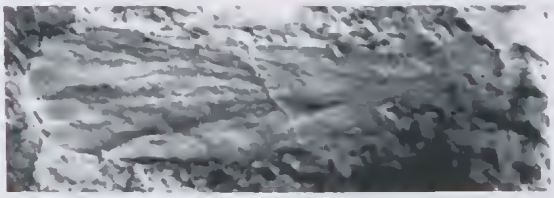
Parabelmontia Tillyard, 1922a [*permiana*]
Sc forked distally; 2 r3-r4; M fused basally with RRs and M each 6-branched; Cu1 not forked distally;
permiana Tillyard, 1922a; UPerm; Newcastle CM; Sydney.



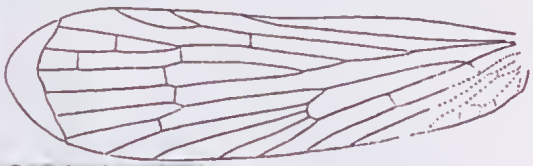
Parabelmontia permiana (hindwing); AMF28461; 18mm long. Line drawing (above left) of Riek, 1953, text-fig. 7.

Family **CHORISTIDAE** Ebsen-Petersen, 1915

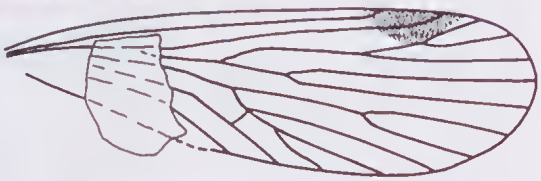
Chorista Klug, 1836 [*australis*]
Forewing: costal area narrow, with one simple cross vein; Sc reaching margin at or just beyond midlength; Cu1 touching or fused with M for short distance; Rs 4-branched; M 5-branched, extra fork on M4.
sobrina Riek, 1952a; Palaeocene; Redbank Plains Fm: Ipswich.

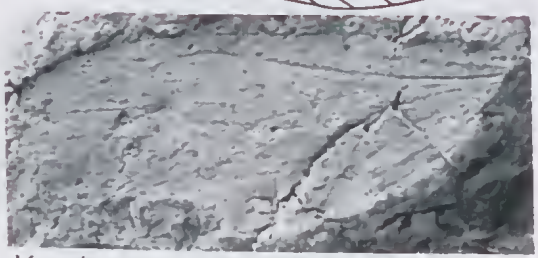


Chorista sobrina Riek, 1952; UQF10628; x4. Line drawing (right) from Riek, 1952a, text-fig. 1.



Cretacochorista parva; NMVP 103248; 7mm long. Line drawings (below) of Jell & Duncan, 1986, fig. 41C; forewing (right) and hindwing (left).





Mesochorista proavita [holotype of *Eoses triassica*]; UQF7853; 11mm long.

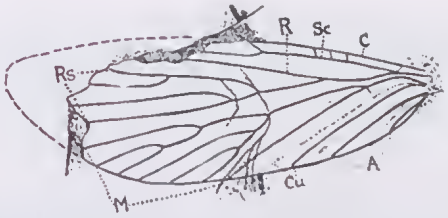
Cretacochorista Jell & Duncan, 1986 [parva]
Rs 5-branched; M 5-branched in forewing, 4-branched in hindwing.
parva Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family **PERMOCHORISTIDAE** Tillyard, 1918b

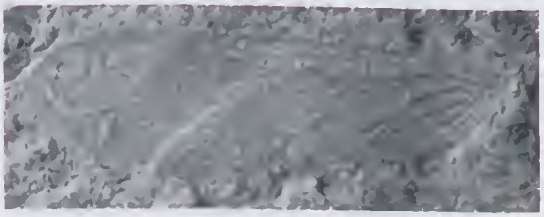
Mesochorista Tillyard, 1916 [*proavita*][=*Eoses* Tindale,1945; type *triassica (=proavita)*] [=*Permochorista* Tillyard, 1918b; type *australica*]
Forewing: Sc 2-branched; Rs 4-branched; M 6-branched, extra forks on M2 and M4; CuA simple; Cu-M Y-vein variable. Hind: Sc simple; Rs as in fore; M 4-branched; CuP and A1 fused for part of length.
proavita Tillyard, 1916; Trias; Blackstone, Mt Crosby Fms; Ipswich.
australica (Tillyard, 1918b); UPerm; Newcastle CM; Sydney.
jucunda (Tillyard, 1926b); UPerm; Newcastle CM; Sydney.
dubia Riek, 1953; UPerm; Newcastle CM; Sydney.
phipa Riek, 1953; UPerm; Newcastle CM; Sydney.
Parachorista Tillyard, 1926b [*pincombeae*]
Forewing: R2+3 forming pectinate series of 4 or 3 branches; R4+5 2-branched; M 6-branched, extra forks on M2 and M4; Cu1 and anals simple; cubito-median Y-vein distinct. Hindwing: R branched as in forewing; M 4-branched; Cu1 fused to M for short distance.
pincombeae Tillyard, 1926b; UPerm; Newcastle CM; Sydney.
splendida Tillyard, 1926b; UPerm; Newcastle CM; Sydney.
bairdae (Tillyard, 1922b); UPerm; Newcastle CM; Sydney.
warnerensis Tillyard, 1926b; UPerm; Newcastle CM; Sydney.

Family **MESOPANORPODIDAE** Tillyard, 1918b

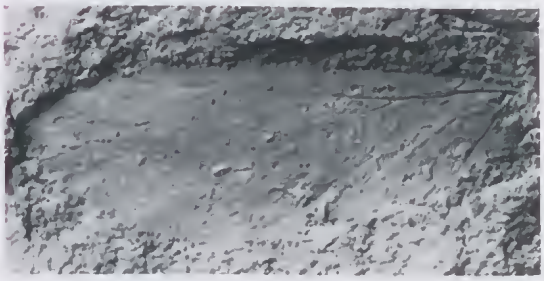
Mesopanorpodes Tillyard, 1918b [*wianamattensis*]
Forewing: Sc forked, 2-branched; Rs 4-branched; R2+3 forking before R4+5; M 4-branched; cubito-median Y-vein variable; Cu1, Cu2, A1, A2 simple; A3 forked close to its base; forking to Rs abnormal, similar to Trichoptera.
wianamattensis Tillyard, 1918b; MTrias; Ashfield Fm; Sydney.
belmontensis Riek, 1953; UPerm; Newcastle CM; Sydney.
robustus Riek, 1953; UPerm; Newcastle CM; Sydney.



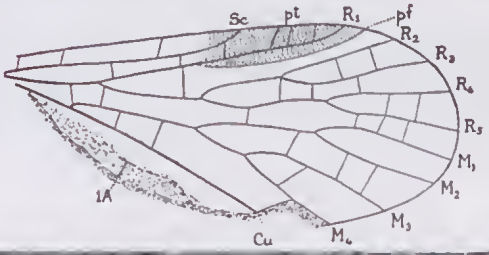
Mesochorista proavita; GSQ132. Line drawing from Tillyard, 1916, pl. 2, fig. 2.[Parfrey (1996) noted the type missing since being loaned to Tillyard in 1936. It is now in AM (Fletcher, 1971)].

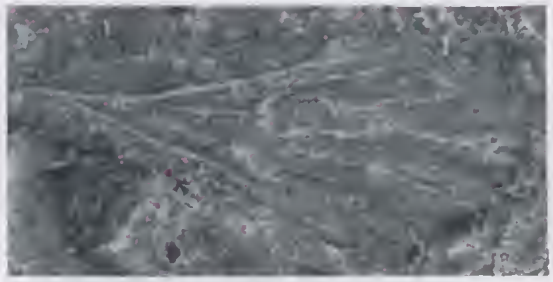


Mesochorista australica; AMF40141; 10mm long.

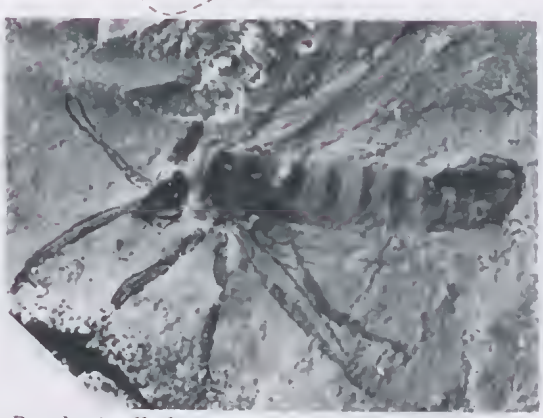


Parachorista splendida; AMF28048; 15mm long. Line drawing (left) of Riek, 1953, fig. 24.

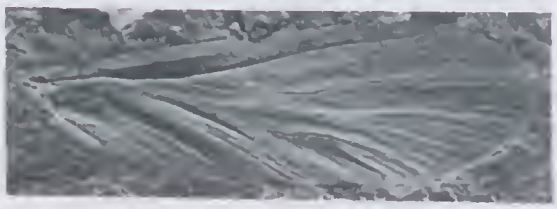


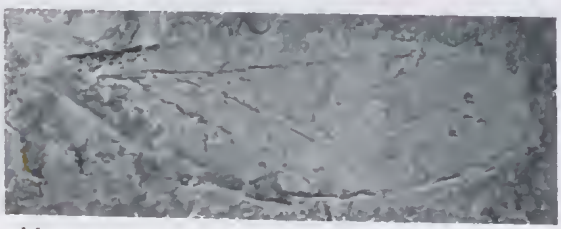


Mesopanorpodes wianamattensis; AMF39326; 7.5mm long. Line drawing (above) of Tillyard, 1918b, text-fig. 10

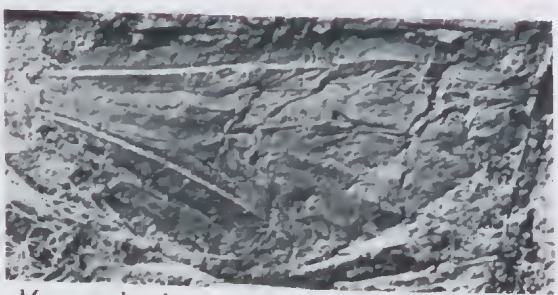


Prochoristella leongatha; NMVP102512; x9. Line drawing (above) of Jell & Duncan, 1986, fig. 43C.





Mesopsyche superba; AMF39263; 24mm long.

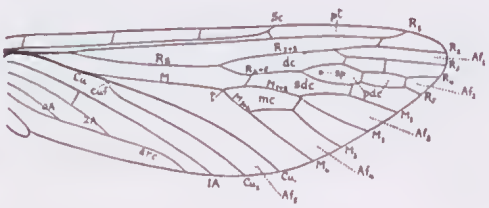


Mesopsyche elongata; AMF39233; 13mm long. Line drawing (right) of Tillyard, 1917, pl. 7, fig. 1.

Prochoristella Riek, 1953 [*megaloprepia*]
Forewing: Sc long, 2-branched; R1 simple, pterostigma well-developed; Rs 4-branched; cubito-median Y-vein variable, arms equal of CuA and M fused; CuA and CuP simple; A1, A2 simple; A3 apparently simple.
megaloprepia Riek, 1953; UPerm; Newcastle CM; Sydney.
anagaura Riek, 1953; UPerm; Newcastle CM; Sydney.
exilis Riek, 1953; UPerm; Newcastle CM; Sydney.
pusilla Riek, 1953; UPerm; Newcastle CM; Sydney.
belli (Tillyard, 1926b); UPerm; Newcastle CM; Sydney.
concinna Riek, 1953; UPerm; Newcastle CM; Sydney.
leongatha Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Prochoristella megaloprepia; AMF40123; 7mm long (left). Line drawing of Riek, 1953, text-fig. 37.

Family **MESOPSYCHIDAE** Tillyard, 1917
Mesopsyche Tillyard, 1917 [*triareolata*]
(= *Aristopsyche* Tillyard, 1919a; =*Neuropsyche* Tillyard, 1919a; = *Triassopsyche* Tillyard, 1917a
Forewing: normal Mecoptera except for series of costal veinlets; Rs and M each normally 4-branched; distinct cubito-median Y-vein. Hindwing: often with small end twigging on branches of Rs; Sc shorter than in forewing; no cubito-median Y-vein.
triareolata Tillyard, 1917; UTrias; Blackstone Fm; Ipswich.
dunstani (Tillyard, 1917); UTrias; Blackstone Fm; Ipswich.
elongata (Tillyard, 1919a); UTrias; Blackstone Fm; Ipswich.
superba (Tillyard, 1919a); UTrias; Blackstone Fm; Ipswich.



Family **NANNOCHORISTIDAE** Tillyard, 1917

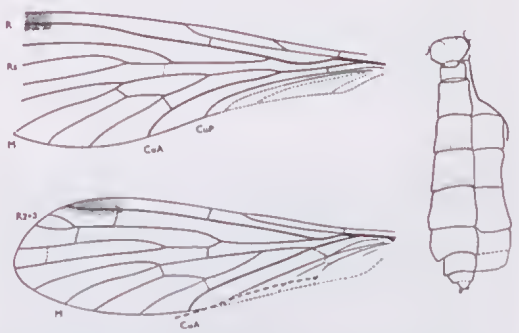
Nannochorista Tillyard, 1917 [*dipteroides*]
Head with heavily selerotised caudal margin; pronotum with selerotised shield having scalloped anterior and convex lateral margins; abdominal segments increasing in length from 1 to 3; with middle tergites twice as long as wide; segments 7-10 decreasing in length and width; anal hooks long, tapering to point, as long as 10th segment.
Nannochorista sp. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Nannochorista sp; NMVP103245; 13mm long.

Nannochoristella reducta; AMF39968; 5mm long. Line drawing (above) of Riek, 1953, text-fig. 47.

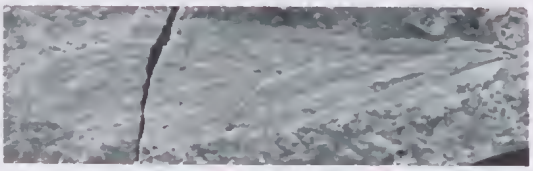
Nannochoristella Riek, 1953 [*reducta*]
Forewing: Se forked; Rs 3-branched; M 3-branched; no cubito-median Y-vein; M and Cu1 fused for short distance. Hindwing: apex a little more rounded; Rs and M as in forewing.
reducta Riek, 1953; UPerm; Newcastle CM; Sydney.
Neochoristella Riek, 1953 [*optata*]
Forewing: Se long, probably forked; Rs 3-branched; M 4-branched; cubito-median Y-vein absent; Cu1 and M fused for some distance; Cu1 and Cu2 simple; A1, A2 simple.
optata Riek, 1953; UPerm; Newcastle CM; Sydney.

Neochoristella optata; AMF41608; 4mm long. Line drawing (above) of Riek, 1953, text-fig. 46.

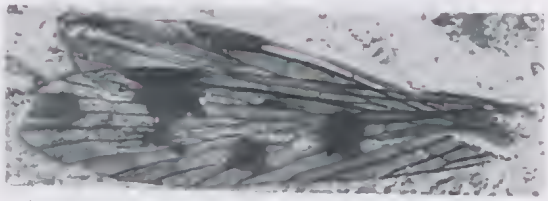


Robinjohnia tillyardi; AMF52312; x8. Line drawings of Riek, 1968, fig. 1A, forewing (upper left), 1B, hindwing (lower left), 1C, metanotum and abdomen (right).

Robinjohnia tillyardi; AMF52312; x8.



Choristopanorpa bifasciata; AMF38263; x3.



Choristopanorpa drinnani; NMVP102506; 7.5mm long. Line drawing (right) of Jell & Duncan, 1986, fig. 41A.

Robinjohnia Martynova, 1948 [*tillyardi*]
Forewing: costal space not expanded; Sc forked, short; R simple, straight, except at base; pterostigma large but not sharply defined; Rs and M 4-branched; R2+3 forking close to margin; M1+2 forking after M3+4; discoidal cell closed by cross vein; Cu1 simple, straight; Cu2 parallel to Cu1 strongly curved at margin, finishing away from Cu1; Cu1 and M fused near bases; basal stem of Cu1 transverse, joining M level with humeral cross vein. Hindwing: Sc simple, short; humeral cross vein distinct; R fused with Sc as far as humeral cross vein; Cu1 simple, distinctly curved back at margin; Cu1 very oblique, just touching M; Cu2 well separated from Cu1; Cu2 and A1 fused for short distance.
tillyardi Martynova, 1948; UPerm; Newcastle CM; Sydney.

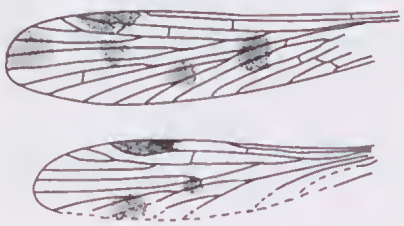
Family **NEORTHOPHLEBIIDAE** Handlirsch, 1939

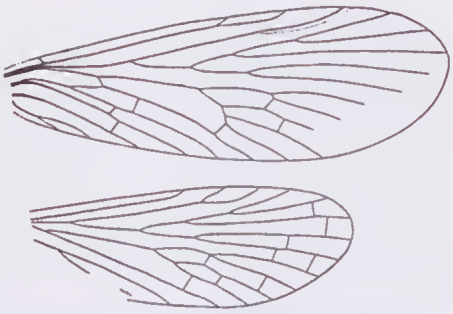
Archebittacus Riek, 1955 [*exilis*]
Forewing: very narrow base; A3 absent or very short; M4 a distinct stem before it branches.
exilis Riek, 1955; UTrias; Mt Crosby Fm; Ipswich.

Archebittacus exilis; UQC2139; 16mm long (left). Line drawing of Riek, 1955, fig. 11.

Family **ORTHOPHLEBIIDAE** Handlirsch, 1906

Choristopanorpa Riek, 1950 [*bifasciata*]
Forewing: Sc long, reaching into pterostigma; Rs 5-branched, extra fork on R2; R2+3 forking before R4+5; M 5-branched, extra branch on M4; cubito-median Y-vein well-developed; 3 anal veins; A3 forked. Hindwing: Sc long, simple; R1 forked distally; Rs 5-branched, rarely 6-branched; M 4-branched; cubito-median Y-vein absent; CuP and A1 fused for part of its length.
bifasciata Riek, 1950; MTrias; Hawkesbury Sst; Sydney.
drinnani Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

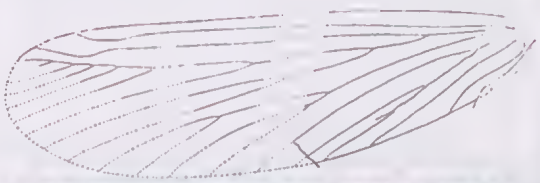


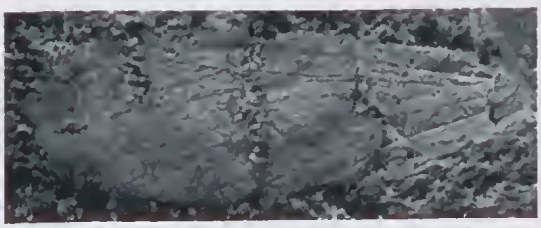


Choristopanorpa bifasciata, line drawing of holotype forewing, AMF30959 (above) and a typical hindwing, AMF39195 (below).

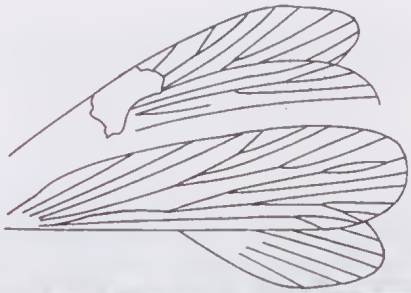
Neoparachorista Riek, 1955 [*perkinsi*]
Forewing: Se forked distally; R1 forked in pterostigma; Rs with 5-8 branches; without cubito-median Y-vein; CuA almost straight; M 5- or 6-branched. Hindwing: same as forewing but M 4-branched; Se shorter and simple; CuP and A1 fused for part of their length.
perkinsi Riek, 1955; UTrias; MtCrosby Fm; Ipswich.
splendida Riek, 1955; UTrias; MtCrosby Fm; Ipswich.
semiovena Riek, 1955; UTrias; MtCrosby Fm; Ipswich.
clarkae Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

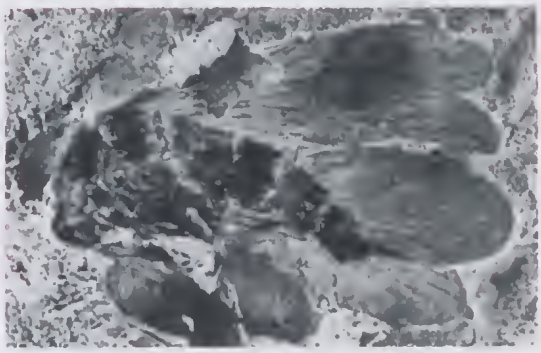
Family **PANORPIDAE** Latreille, 1804
Austropanorpa Riek, 1952a [*australis*]
Forewing: Se ending close to or at pterostigma; R2 pectinately branched; R2 4-, 5- or 6-branched; Cu1 not fused to M, connected to it by cross vein; A1 reaching margin beyond origin of Rs.
australis Riek, 1952a; Palaeocene; Redbank Plains Fm; Ipswich.



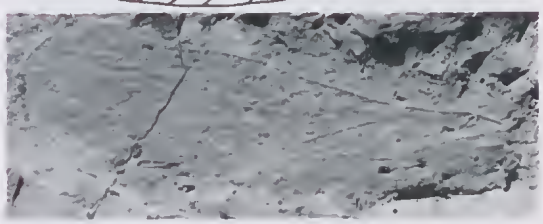


Austropanorpa australis; UQF10636; x4. Line drawing (above) of Riek, 1952a, fig. 2.



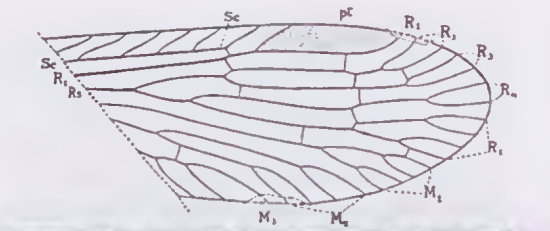


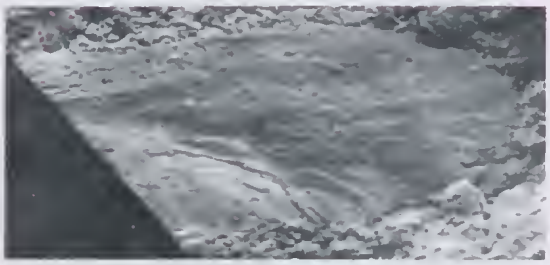
Neoparachorista clarkae; NMVP102529; body 9mm long. Line drawing (above) of Jell & Duncan, 1986, fig. 41B.



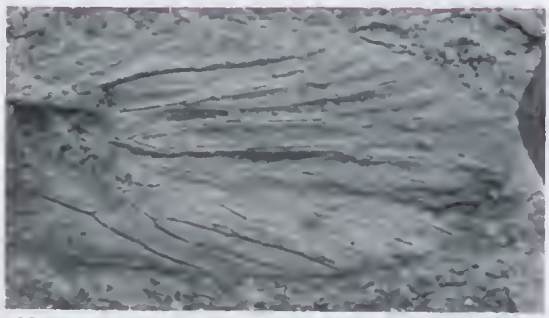
Neoparachorista perkinsi; UQC1897; 24mm long. Line drawing (left) of Riek, 1955, fig. 6.

Austropanorpa australis; UQF15572; .

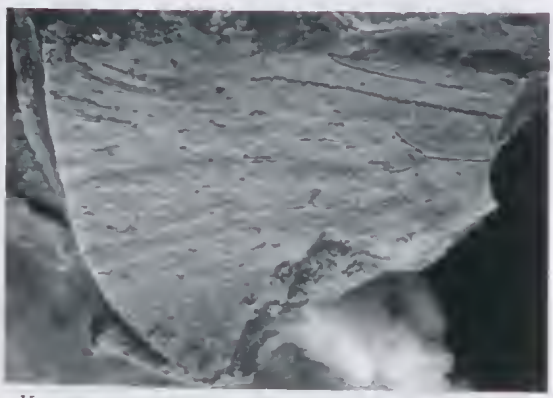




Permomerope australis; AMF28045; 8.5mm long. Line drawing (above) of Riek, 1953, fig. 1.



Neopermopanorpa mesembria; UQC643; 7.5mm long. Line drawing (above right) of Riek, 1955, fig. 2.



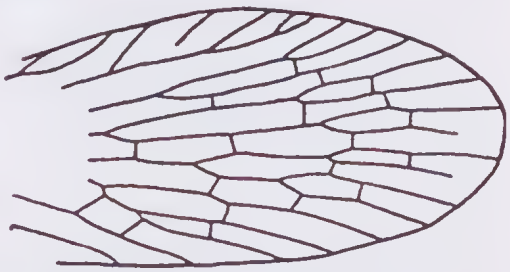
Xenopanorpa didymovena; UQC1043; 11mm long. Line drawing (right) of Riek, 1955, fig. 3.

Family **PERMOMEROPIDAE** Riek, 1953

Permomerope Tillyard, 1926b [*australis*]
Forewing: costal spaee slightly expanded over basal half; Rs with numerous diehotomous branehes; M normally 8-branehed; CuA forked at least onee near apex. Hindwing: eostal space narrow basally; Se not reaehing pterostigma but fused to R1; pterostigma well-dcveloped in apieal fork of R1; Rs with fewer branehes than forewing; M usually with 8 diehotomous branehes; eubito-median Y-vein not elear; CuA forked at least once, generally twiee near apex.

australis Tillyard, 1926b; UPerm; Newcastle CM; Sydney.

nanus Riek, 1953; UPerm; Newcastle CM; Sydney.



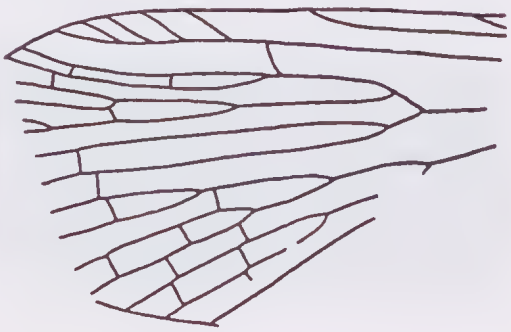
Family **PERMOPANORPIDAE** Tillyard, 1926

Neopermopanorpa Riek, 1955 [*mesembria*]
Forewing: similar to *Permopanorpa* but with 7-branehed M; M4 with strong fork; Se forked near apex; pterostigma well-developed; Rs 7-branehed; CuA simple.

mesembria Riek, 1955; UTrias; MtCrosby Fm; Ipswich.

Xenopanorpa Riek, 1955 [*didymovena*]
Forewing: R2+3 and R4+5 both very short; R2+3 branching just before R4+5; Rs 7- or 8-branehed; M 7- or 8-branched, diehotomous divisions; Sc forked ncar apex.

didymovena Riek, 1955; UTrias; MtCrosby Fm; Ipswich.



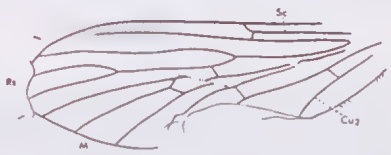
Family **PERMOTANYDERIDAE** Riek, 1953

Permotanyderus Riek, 1953 [*ableptus*]
Forewing: Sc long, simple, close to costal margin; pterostigma well-developed; Rs 4-branched; M 4-branched; Cu1 simple, curved over apical part; 2 anal veins.
ableptus Riek, 1953; UPerm; Neweastle CM; Sydney.

Choristotanyderus Riek, 1953 [*nanus*]
Forewing: Sc long, close to costal margin; pterostigma well-developed, well before apex of wing; Rs 4-branched; M 4-branched, cubito-median Y-vein present; Cu1 with slight bend towards apex; e anal veins.
nanus Riek, 1953; UPerm; Newcastle CM; Sydney.

Mesotanyderus Riek, 1955 [*jonesi*]
Forewing: long, narrow; Sc long, simple; Rs arising close to wing base; cubito-median Y-vein absent; 3 anal veins; A2 and A3 short; Sc, R and M fused at base; R strongly angled at base; a few cross veins over apical half.
jonesi Riek, 1955; UTrias; MtCrosby Fm; Ipswich.

Mesotanyderus jonesi; UQC1054; 7mm long (right). Line drawing (above) of Rick, 1955, fig. 15.

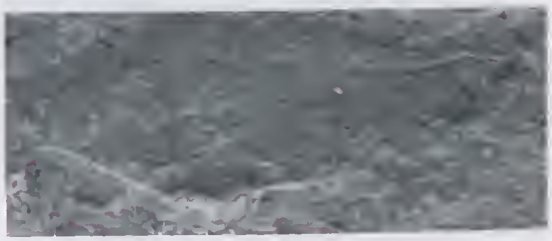


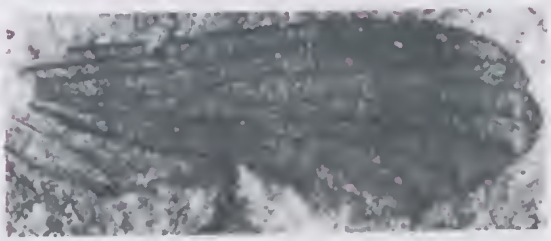
Family **PERMOTIPULIDAE** Tillyard, 1929

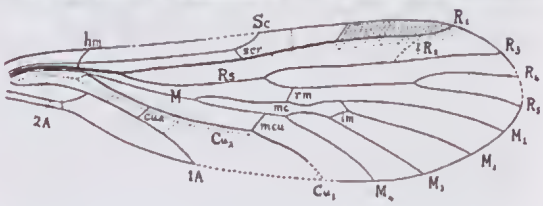
Permotipula Tillyard, 1929 [*patricia*]
Forewing: Sc short, only to midlength; pterostigma well-developed; Rs 3-branched; R2+3 simple; M 4-branched, arising close to base; cubito-median Y-vein reduced; only 2 anal veins.
patricia Tillyard, 1929; UPerm; Neweastle CM; Sydney.

Permotanyderus ableptus; AMF40675; 5mm long. Line drawing (above) of Riek, 1953, text-fig. 48.

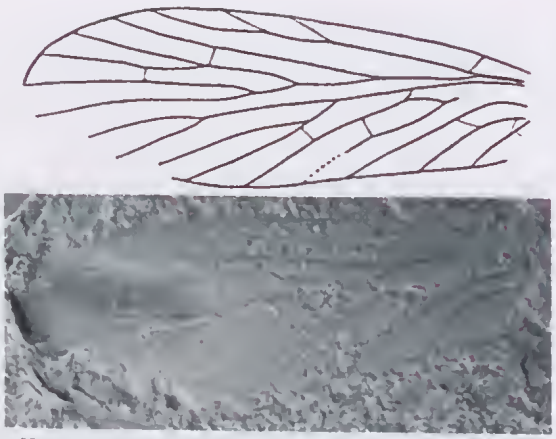
Choristotanyderus nanus; AMF39964; 4mm long. Line drawing (left) of Riek, 1953, text-fig. 49.



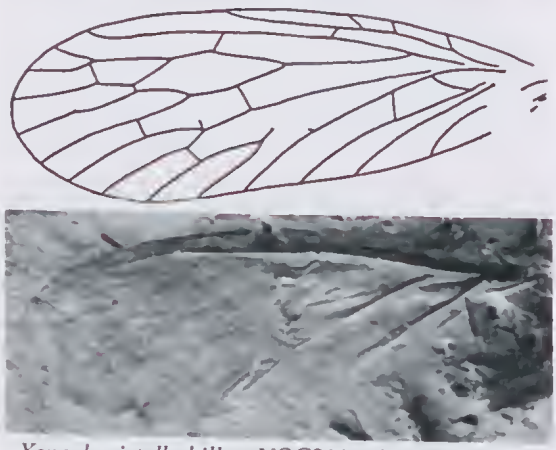




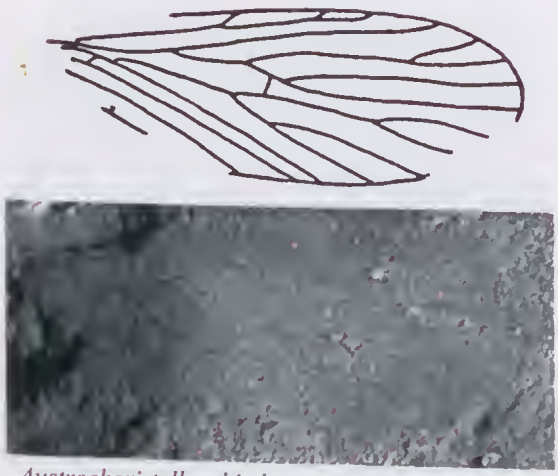
Permotipula patricia; BMNH In45382 (2nd above). Wing venation from Willman, 1989a, fig. 2B (above left) and Tillyard, 1929 (above).



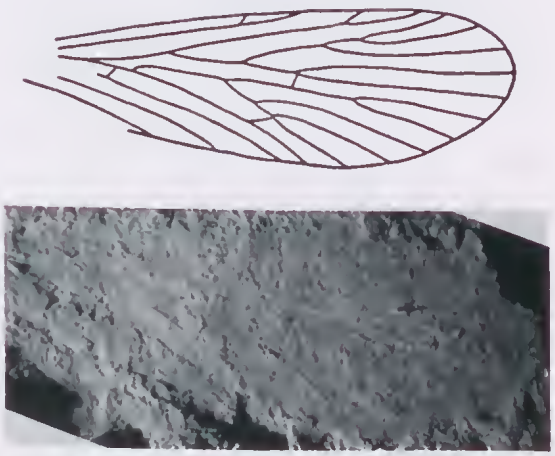
Xenochorista splendida; AMF40157; 11mm long. Line drawing (above) of Riek, 1953, fig. 33.



Xenochoristella hillae; UQC2115; 10.5mm long. Line drawing (above) of Riek, 1955, fig. 13.



Austrochoristella whitehousei; UQC2172; 5.5mm long. Line drawing of Riek, 1955, fig.14.



Triassochorista nana; UQC2080; 12mm long. Line drawing of Riek, 1955, fig. 10.

Family **XENOCHORISTIDAE** Riek, 1953

Xenochorista Riek, 1953 [*splendida*]
Forewing: costal space moderately expanded; Sc forked near midlength, 3-branched; Rs and M each 4-branched; cubito-median Y-vein well-developed; CuA, CuP and anals (with possible exception of A3) simple.
splendida Riek, 1953; UPerm; Neweastle CM; Sydney.
sobrina Riek, 1953; UPerm; Newcastle CM; Sydney.

Xenochoristella Riek, 1955 [*hillae*]
Forewing: costal space moderately expanded; Sc 3-branched, with distinct cross vein to margin between 1st and 2nd branches; Rs and M each 4-branched; cubito-median Y-vein with unequal arms; CuA, CuP and anals (except A3) simple.
hillae Riek, 1955; UTrias; MtCrosby Fm; Ipswieh.

Family **MESOPANORPODIDAE** Tillyard, 1918b

Austrochoristella Willmann, 1989b
[*Prochoristella whitehousei* Riek, 1955]
M and Cu1 fused for short distance near base.
whitehousei (Riek, 1955); UTrias; MtCrosby Fm; Ipswich.

Family TRIASSOCHORISTIDAE Willmann, 1989

Triassochorista Willmann, 1989b
[*Neoparachorista nana* Riek, 1955
Rs 5-branched; M 5-branched; M and Cu1 fused for short section at base
nana (Riek, 1955); UTrias; MtCrosby Fm; Ipswieh.

Order SIPHONAPTERA (fleas)

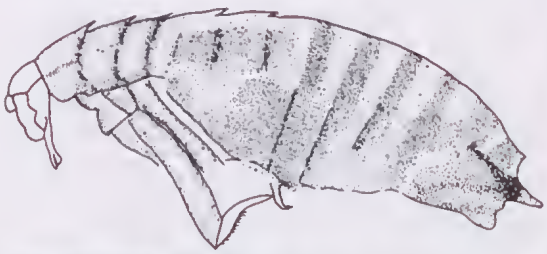
Family INCERTAE SEDIS

Tarwinia Jell & Duncan, 1986 [*australis*]
Antennae 18 or 19-segmented; head not excessively compressed laterally; thoracic segments relatively long; tergal combs absent; tibiae all with stout bristles; tarsi very long, with long tarsal claws, with stout bristles under apical tarsal segment. Abdomen enlarged, with typical male genitalia.
australis Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.
Niwratia Jell & Duncan, 1986 [*elongata*]
Legs long, slender; body typically siphonapteran.
elongata Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family PULICIDAE Stephens, 1829

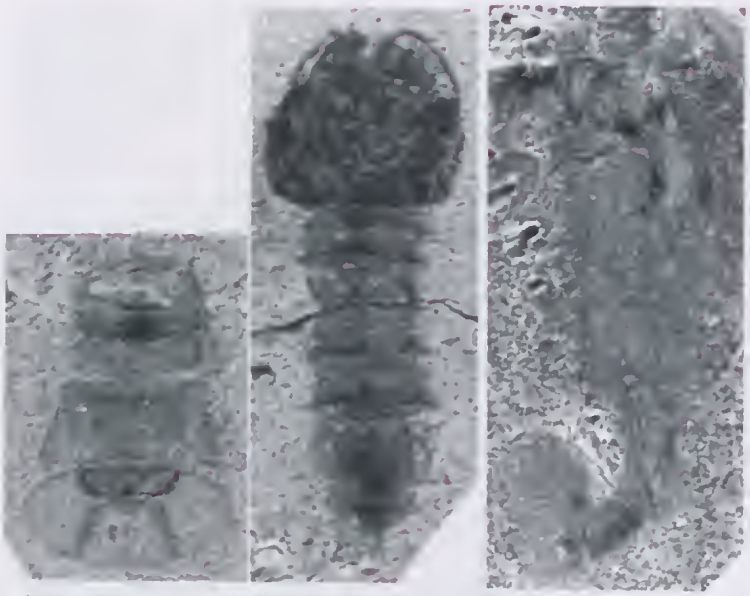
Pulicid indet.
Wingless, laterally compressed
Pulicid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.
[Carpenter (1992:395) noted the 2 apterous insects from the Lower Cretaceous of Australia assigned to the Siphonaptera by Riek (1970a) but on the opinions of "specialists who have examined the fossils" he dismissed them from the order. Rasnitsyn in Rasnitsyn & Quicke, 2002:242 accepted one of these, *Tarwinia australis*, as a siphonapteran but dismissed others. Zherikhin in Rasnitsyn & Quicke, 2002:366 considered *Niwratia elongata* to be a young dragonfly nymph and the Pulicid indet. to be roach nymphs].

Tarwinia australis; NMVP26202, body 7mm long.



Pulicid indet.; NMVP103056; body 3mm long.Line drawing (above) of Jell & Duncan, 1986, fig. 45A.

Niwratia elongata; NMVP102517; body 3.5mm long.



Chironomaptera collessi; larva NMVP103262 (left), 5mm long; pupae NMVP103253 (centre), 4mm long; NMVP 103139 (right), 5mm long.

Order DIPTERA (flies)

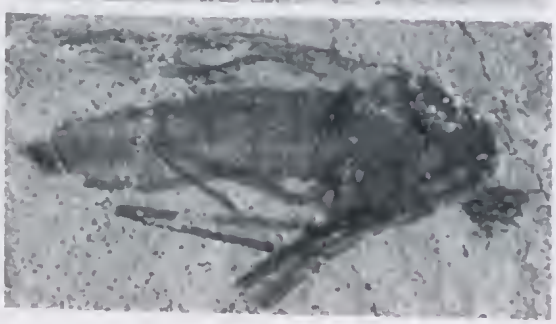
Family **CHAOBORIDAE** Edwards, 1920

Chironomaptera Ping, 1928 [*Samarura gregaria* Grabau, 1923]

Larva: Head very large, with eyes; Thorax and 7th abdominal segment with narrow elongate air saes (tracheal chambers). Abdominal segment 10 with typieal elongate eulicoid ventral brush of 16 or more hairs, dense anteriorly; dorsal brush small with short hairs; siphon with pointed tip.

Pupa: abdominal segments wth transverse, symmetrieal, tapering, tuft-like sets of markings (presumably hairs); segment 7 shorter than segment 8; posterior paddles wide.

collessi Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



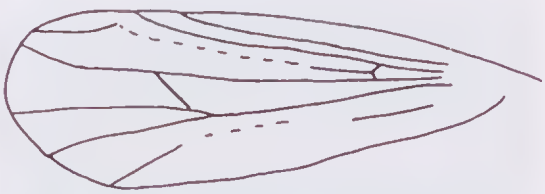
Family **CHIRONOMIDAE** Macquert, 1838

Subfamily **TANYPODINAE** Skuse, 1889

Tanypodine indet.

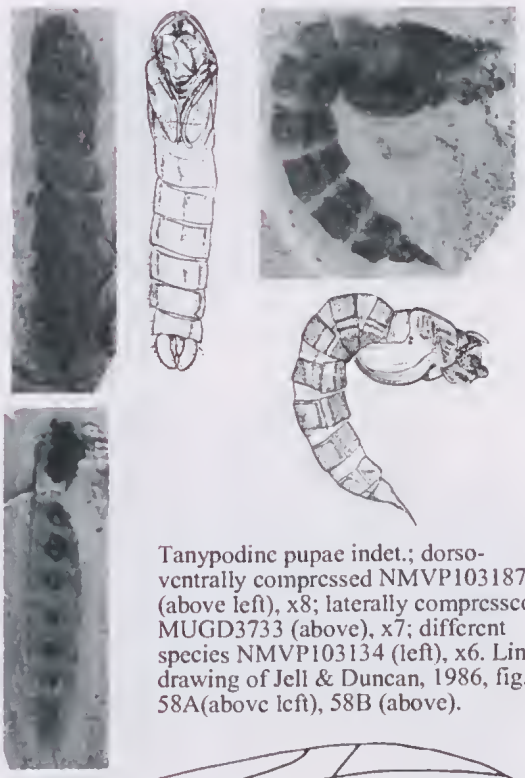
Head small, with lateral surfaee almost completely occupied by eyes; antenna long, stout, with short pedieel, longer seape, at least 10 flagellar segments, plumose distally. Thorax large, strongly convex; metanotum heavily selerotised; legs with long thin femora and tibia; basitarsus 0.6 of length of tibia, with rest of tarsus ineluding long elaw less than half as long as basitarsus. Abdomen twiee as long as thorax, of 8 segments and terminalia, with first 6 segments of equal length, with 7th and 8th shorter. Wing with strong R; R4+5 forward of apex; R1 meeting costal margin beyond midlength of wing; base of M3+4 distal to M3+4 -CuA junetion.

Tanypodine indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



Tanypodine indet.; NMVP103282 (left above), body 2.1mm long; NMVP103285 (left), 5.5mm long. Line drawing (above) of Jell & Dunean, 1986, fig. 55B.

Tanypodine pupae indet.
Two types of pupae of typical form, with 8 abdominal segments plus caudal lobes; each segment with median carina and lateral longitudinal furrows; caudal lobes in one type broad, flat, with rounded outer margin and straight almost sagittal margins along posteromedia cleft; in other type they are large, flat, with outer margin inverted pear-shaped, with posterior spines, wide posterior embayment and fringe of fine hairs around whole margin.
Tanypodine pupa indet. 1 Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.
Tanypodine pupa indet. 2 Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

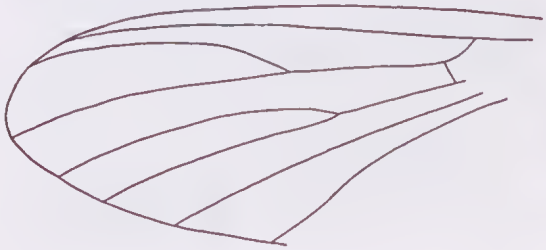


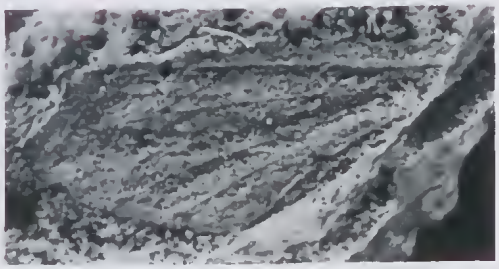
Tanypodine pupae indet.; dorso-ventrally compressed NMVP103187 (above left), x8; laterally compressed MUGD3733 (above), x7; different species NMVP103134 (left), x6. Line drawing of Jell & Duncan, 1986, fig. 58A(above left), 58B (above).

Family **DIXIIDAE** Brauer, 1880
Dixid indet. Jell & Duncan, 1986
Head small, rounded, with large lateral eyes; antenna longer than body, with stout scape, with long hairy tapering markedly more slender flagellum. Thorax broad, with sclerotised wing attachment points. Wing: Sc and R parallel , close from humeral vein; R1 curving distally just inside margin; Rs arising closer to the base of the wing than Sc; Legs extremely long, slender, with long femur, tibia and basitarsus. Abdomen large, with bluntly rounded posterior.
Dixid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

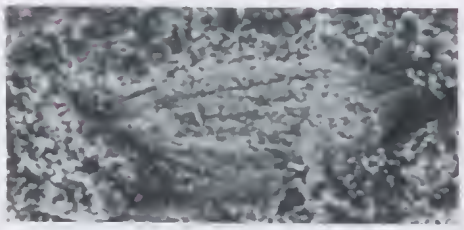
Dixid indet.; NMVP102499; body4.5mm long. Line drawing of wing (above) of Jell & Duncan, 1986, fig. 50J.

Family **DITOMYIIDAE**
Australosymmerus Freeman, 1954
Sc lacking;
imperfecta Riek, 1954a; Palaeocene; Redbank Plains Fm; Ipswich.
[named by Riek as *Centrocnemis*? *imperfecta* but genus preoccupied; *Centrocnemis* replaced by *Australomyia* Freeman, 1951, replaced by *Australosymmerus*].

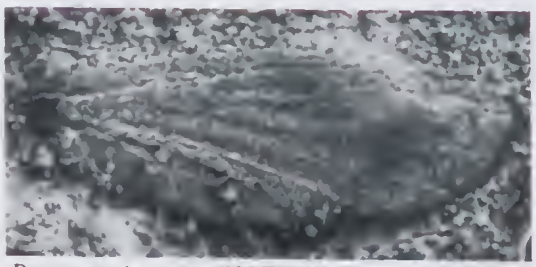




Australosymmerus imperfecta; UQF14345; 5mm long. Line drawing (left) of Riek, 1954, fig. 2.

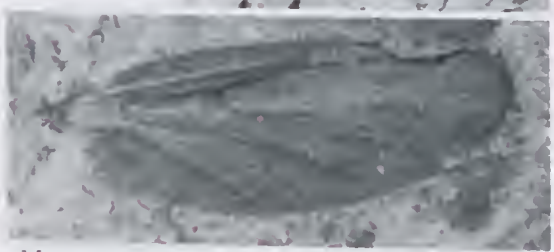


Aneura apicalis; UQF14361; 2.5mm long. Line drawing (right) of Riek, 1954, fig. 5



Protasmanina nana; UQF14347; 4mm long. Line drawing (above) of Riek, 1954, fig. 3.

Pseudalysiinia mimicans; NMVP103290; body 3.5mm long. Line drawing (below) of Jell & Dunean, 1986, fig. 501.



Mycetophilidae gen. nov.; NMVP103286; 3.2mm long. Line drawing (right) of Jell & Dunean, 1986, fig.50H.

Family **MYCETOPHILIDAE** Macquert, 1838

Aneura Marshall, 1896 [*boletinoides*]
Wing: Se without an apieal erossvein to R1; M1+2 forking towards the wing margin, with stem longer than braneh.es, with stem longer than r-m; r-m long; only 1A distinct.

apicalis Riek, 1954a; Palaeocene; Redbank Plains Fm; Ipswich.

Protasmanina Riek, 1954a [*nana*]
Wing with Se ending in C after origin of Rs, with erossvein to R1; Rs transverse from its origin to r-m; r-m more or less longitudinal, about equal to stem of M1+2; M3+4 arising from CuA more basad than forking of M1+2; CuP long but weak; 1A ending well before wing margin; 2A strong, longer than 1A, reaching nearer wing margin than 1A.

nana Riek, 1954a; Palaeocene; Redbank Plains Fm; Ipswich.

Pseudalysiinia Tonnoir, 1929 [*mimicans*]
Se long, not quite reaching midlength of wing;, ending at eostal margin; R1 strong, simple; Rs leaving R1 well beyond apex of Se; r-m long; M3+4 branching from CuA elose to wing base; CuP elose to CuA, both strongly eurved.

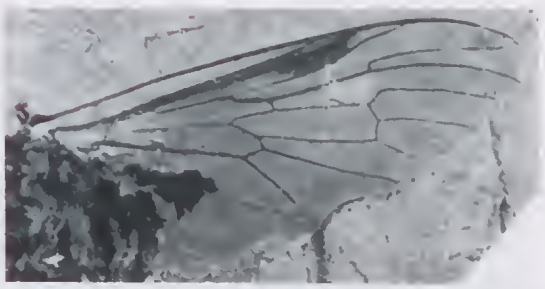
mimicans Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.
[Blagoderov (1994) considered this species may possibly represent a new genus of Mesosciophilidae].

Mycetophilidae gen. nov. Jell & Duncan, 1986
Se short, close to R1, fading out rapidly laterally to eostal margin; R1 curving forward to eostal margin; R5 simple, arising from R1 near wing base, just touching R1 at point where latter turns to costal margin; r-m short, before fork of M; M1+2 leaving R near base, forking just basal to touching of R1 and Rs; M3 simple meeting Cu near wing base; Cu simple, strong, eonvex forward; single anal reaching posterior margin.

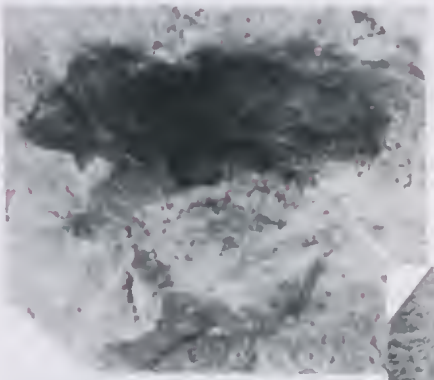
Mycetophilidae gen. nov. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family **RHAGIONIDAE** Latreille, 1802

Atherimorpha White, 1915 [*vernalis*]
Stigma from apex of R1 between Sc and R2+3 to transverse line through r-m, tapering basally; apices of Sc, R1 and R2+3 equally spaced, well apart; r-m meeting discal cell about ¼ its length from base; M1 with short basal portion; wing apex between R4, R5.
festuca Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



Atherimorpha festuca; NMVP102498; 10mm long. Line drawing (right) of Jell & Duncan, 1986, fig. 61B.



Simuliid indet.; adult NMVP 103050; x12. Line drawing (left) of Jell & Duncan, 1986, fig. 60A.

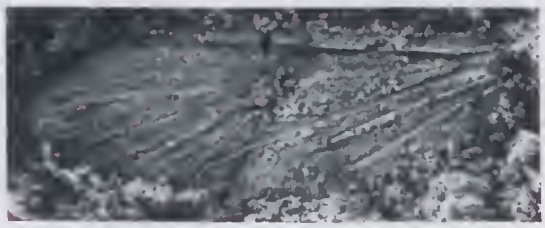
Simuliid indet.; larva (far right) NMVP103178; x8. Line drawing (right) of Jell & Duncan, 1986, fig. 60C.

Family **SIMULIIDAE** Newman, 1834

Simuliid indet.
Adult: Head small; eye large, occupying most of lateral view of head. Thorax large, with mesopleuron markedly produced ventrally; foreleg with coxa longer than wide and trochanter smaller than coxa. Abdomen longer than head and thorax combined, heavily sclerotised only dorsally and at apex.
Larva: Head subrectangular, longer than wide, heavily sclerotised, with base supporting cephalic fan ray extending from anterolateral corner of head, with fan rays more than half length of head, with prominent anteromedial projectionon head, with 7-8 rays per fan. Abdomen only slightly expanded towards apex around segments 5-7; proleg large, extending well under head, truncated, sclerotised at apex; terminal sucker well-developed, with sclerotised radial barsabout 1/3 diameter of sucker.
Simuliid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family **TIPULIDAE** Leach, 1815

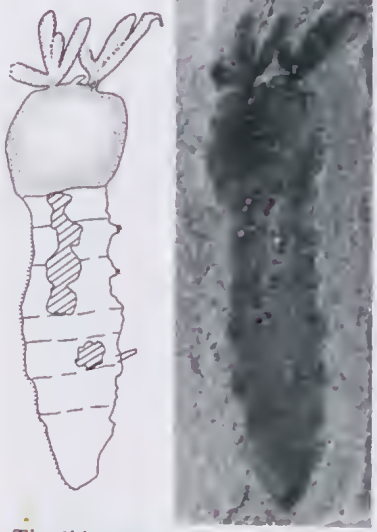
Protolimnophila Riek, 1954a [*superba*]
Wing like Archilimnophila but with discal cell more truncate basally, with M1 and M2 more widely separated, with M more sinuous. m-cu sloping in opposite direction; CuP almost or completely reaching wing margin.
superba Riek, 1954a; Palaeocene; Redbank Plains Fm; Ipswich.



Protolimnophila superba; UQF14344; 10mm long. Line drawing (above) of Riek, 1954a, fig. 1.

Tipulid indet.; NMVP103289; 3.5mm long.

Tipulid? indet.
Head small, with large eyes dorsolaterally, with elongate frons; antennae geniculate above scape; thorax deep, with greatly expanded mesonotum, with small prosutural portion; legs extremely long and slender; hind femur (1.5mm long) more than half abdominal length; abdomen long,, widest near midlength, tapering posteriorly to acute termination.
Tipulid? indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.
Tipulid larva indet.
Head small, sclerotised, well back on body with only half protruding forward of the thorax, with distinct median longitudinal furrow; thorax and abdomen apparently soft; free pleural margins weakly convex;
Tipulid larva indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

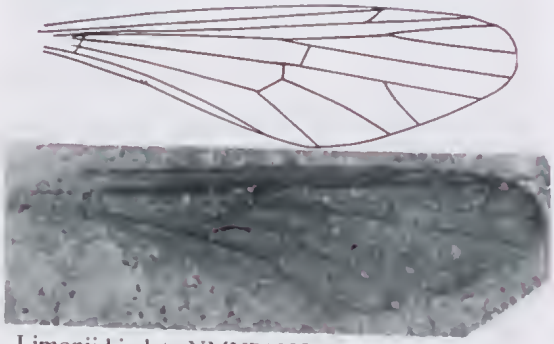


Tipulid pupa indet.; NMVP103254; x10.

Tipulid pupa indet.; NMVP 103188; x7.

Tipulid larva indet.; NMVP 103251; x9

Tipulid pupae indet.
These pupae are assigned here by comparison with the pupae of living genera *Ischnotoma* and *Antocha*.
Tipulid pupa 1 indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.
Tipulid pupa 2 indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



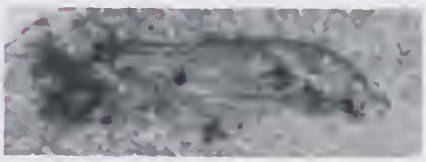
Limoniid indet.; NMVP103287; 5mm long. Line drawing (above) of Jell & Duncan, 1986, fig. 50A.

Family **LIMONIIDAE** Engel, 1915

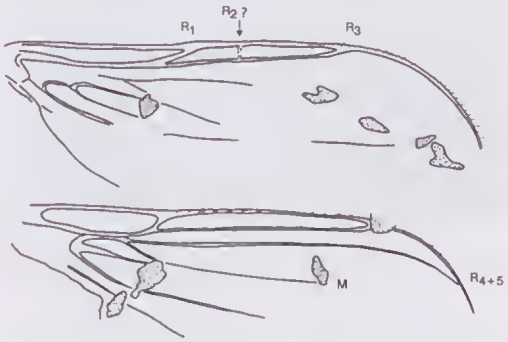
Limoniid indet
Wing long, narrow; Sc long; R1 long; Rs 4-branched; r-m from R5 to M; long distances between forks in general but particularly on Rs1
Limoniid indet. 1 Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.
Limoniid indet. 2 Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family **CERATOPOGONIDAE** Skuse, 1890

Leptoconops Skuse, 1890 [*stygius*]
C poorly defined beyond R1; origin of R4+5 and M near base of wing; venation generally similar to that of living members of the genus.
Simuliid indet. 2 Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.
[Generic assignment by Borkent (1997)]



Leptoconops sp.; NMVP 103203;1.8mm long.

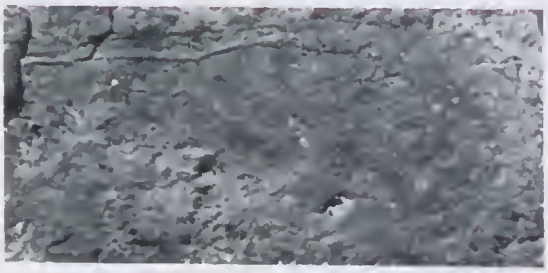


Leptoconops sp.; NMVP103203. Sketches from Borkent, 1997, fig. 2G,H.

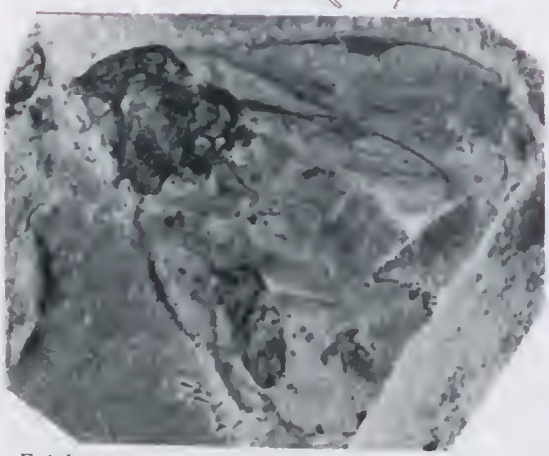
Family **TILLYARDIPTERIDAE** Lukashevich & Shcherbakov, 1998

Tillyardiptera Lukashevich & Shcherbakov, 1998 [*prima*]
C thick along anterior margin (except base), narrow beyond R4 apex; Se terminating distal of R4+5 bifurcation, the latter level with that of M3+4; free R2 absent; R4+5 fork about 7 times longer than R4+5 stem; M1+2 fork as long as d cell; Se apex at 61%; R fork at 29%; Rs fork at 54%; M fork at 45%; CuA apex at 64%; CuP apex at 53% of wing length.
prima Lukashevich & Shcherbakov, 1998; Mt Crosby Fm; UTrias; Ipswich.

Tillyardiptera prima; BMNHIn 44958; 10mm long. Line drawing (above right) from Lukashevich & Shcherbakov, 1998, fig. 2.



Archexyela crosbyi; UQC2232; 9mm long. Line drawing (above) of Riek, 1955, fig. 1.Second specimen mentioned by Riek (1955) UQC2233 (top and middle at right (part and counterpart), 9mm long. *Archexyela* sp. nov., QMF44154(lower at right), 10mm long.

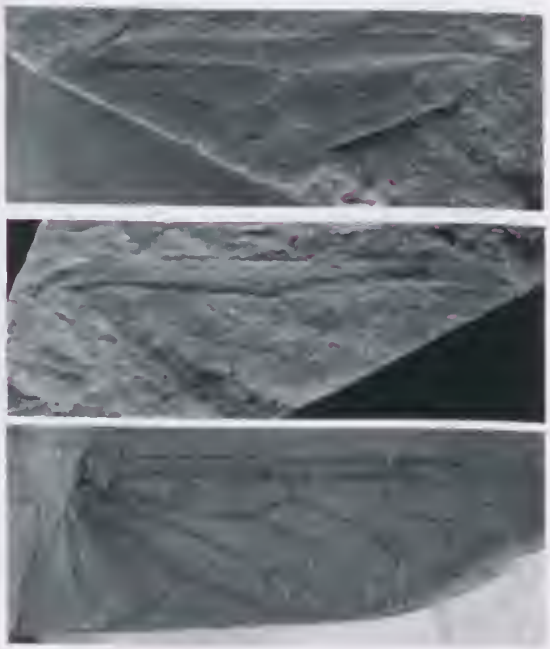


Eoichneumon duncanae; NMVP103104; 7mm long. Line drawing (above) of Jell & Duncan, 1986, fig. 65B.

Order HYMENOPTERA
Suborder SYMPHYTA
Gerstaecker, 1867

Family **XYELIDAE** Newman, 1835

Archexyela Riek, 1955 [*crosbyi*]
Forewing: like modern Macroxyela but apical cross vein from pterostigma to Rs passing to R2+3 not to stem of Rs; Sc free to base of wing; M curved back towards apex of wing.
crosbyi Riek, 1955; UTrias; MtCrosby Fm; Ipswich.



Suborder APOCRITA
Gerstaecker, 1867

Family **EOICHNEUMONIDAE** Jell & Duncan, 1986

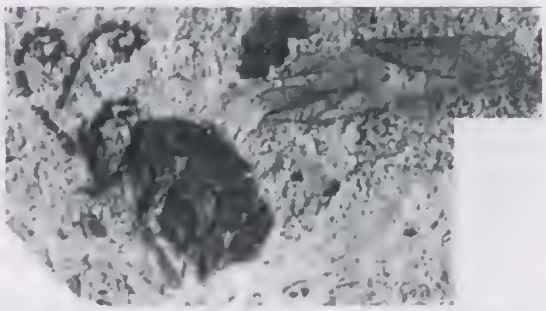
Eoichneumon Jell & Duncan, 1986 [*duncanae*]
Forewing with basal m-cu joining M just after its separation from Rs; areolet 6-sided. Metasoma like Pimplinae (Ichneumonidae), with tergites short and broad; 1st tergite with pair of diverging carinae arising from base, only slightly longer than succeeding segments; ovipositor strongly exserted; basitarsus of hindleg longer than segments 2-5 combined.
duncanae Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family **AULACIDAE** Shuckard, 1841

Aulacid indet.

Antenna 14-segmented, with short scape and funicle; Mesoscutellum with deep percurrent notauliees; scutellum large, as long as scutum; metanotum half length of scutellum; propodium abruptly declivous; metasoma iserted high, well above hind coxal insertion. Wings with long radial cell ending before apex, with thickened margin from pterostigma to apex of radial cell; pterostigma narrow.

Aulacid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



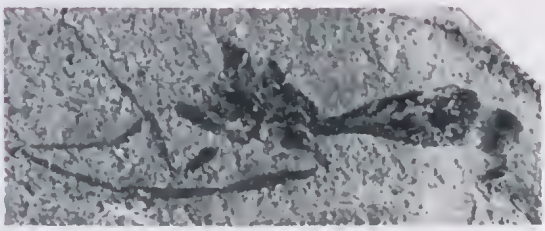
Aulacid indet.; NMVP103168; x10. Line drawing (above) of Jell & Duncan, 1986, fig. 65E.

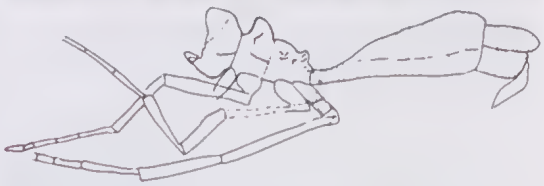
Family **PROCTOTRUPIDAE** Latreille, 1802

Proctotrupid indet.

Propodeum coarsely ornamented; apex produced into slight neck; metanotum vertical at meson; scutellum raised; hindleg with large coxa; trochanter long, thin, more than 0.5 length of coxa; femur long, thin, narrow at base; tibia as long as femur; middle leg shorter than hindleg, with small coxa; metasoma arising from high on mesosoma, consisting mainly of greatly enlarged first segment, with its sternite defined at base ventrally and over very short area dorsally, with tergite produced ventrally to enclose sternite over distal two thirds.

Proctotrupid indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.





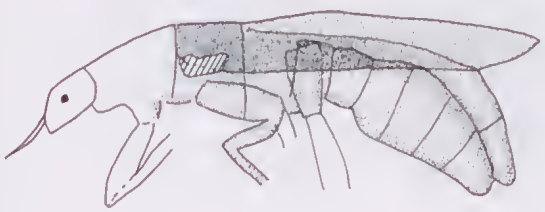
Proctotrupid indet.; NMVP103106; x10. Line drawing (above) of Jell & Duncan, 1986, fig. 65A.

Superfamily **BETHYLOIDEA** Haliday, 1840

Bethyloid? indet.

Head elongate, flattened; antennae and large lateral eyes present but poorly preserved; thorax as long as abdomen; wings folded back along abdomen, not quite reaching end of body; legs incomplete, coxae and femora markedly expanded, with more slender tibiae and tarsi. Metasoma well segmented, expanded throughout but slightly more enlarged anteriorly.

Bethyloid? indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.



Bethyloid? indet.; NMVP103320; 5mm long. Line drawing (left) of Jell & Duncan, 1986, fig. 68F.

Pemphredonine indet.; NMVP102740; 5mm long. Line drawing of Jell & Duncan, 1986, fig. 68C.

Family **SPHECIDAE** Leach, 1815

Pemphredonine? indet.

Head with occipital carinae converging forward, not curved around foramen. Propleuron longer than wide; pronotum rounded posterolaterally, with posterolateral spiracle cover lobe sharply differentiated from central extension of pronotum; episternum large, with fore margin clearly defined at meson, with short concave anterolateral margin; prepectus evident; middle coxa small, with elongate trochanter; hind coxa larger, stouter, trochanter not clearly defined, femur only slightly widened, with a narrow dorsal flange defined by a groove or ridge, with tibia narrower than femur. Metasoma longer than mesosoma, with sutures between all 7 segments; first sternite very short, with convex apical margin; 3rd-6th sternites becoming shorter, with caudal margins becoming more concave. posterior with pair of large claspers over apical segment laterally.

Pemphredonine? indet. Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Family **FORMICIDAE**?? Latreille, 1802

Cretacoformica Jell & Duncan, 1986 [*explicata*]

Single petiote segment; abdominal segment IV non-tubulate; pronotum subrectangular, narrower than rest of mesosoma; forewing with reduced

Cretacoformica explicata; NMVP102501; wingspan 7.5mm. Line drawing of wing venation from Jell & Duncan, 1986, fig. 69C.

venation, with enclosed costal cell, with pterostigma, with M+CuA, M, CuA and 1A not tracheate. Legs similar, various segments longer to posterior; femur expanded medially; tibia expanded distally; basitarsus of uniform width, longer than rest of tarsus combined.

explicata Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

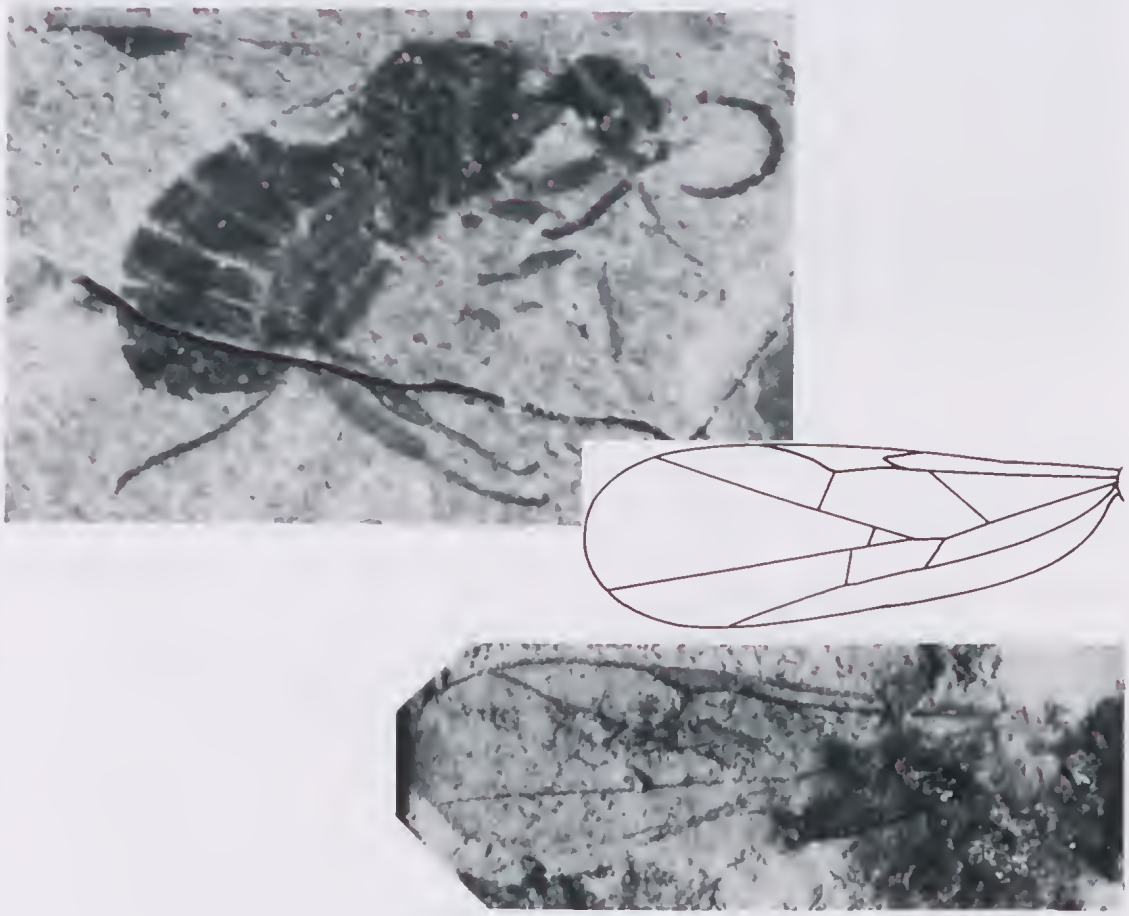
[Holldobler & Wilson (1990) doubted the family assignment of *Cretacoformica* and Naumann (1993) gave a very detailed description and discussion of the taxon. He concluded that it could not be satisfactorily assigned to any family of the Apocrita principally because the nature of the petiole could not be discerned due to the attitude of preservation —a difficulty expressed by Jell & Duncan (1986).]

Family **PRAEAULACIDAE** Rasnitsyn, 1972

Westratia Jell & Duncan, 1986 [*nana*]
First funicle segment longest. Hindleg short; femur distinctly shorter than metasoma; basitarsus shorter than segments 2-5 combined. Anterior of mesoscutum apparently not produced into transverse ridges. Wing with wide costal cell, prominent pterostigma, slightly reduced forewing venation similar to that of Austronia rubrithorax Riek, 1955. Ovipositor strongly exserted.

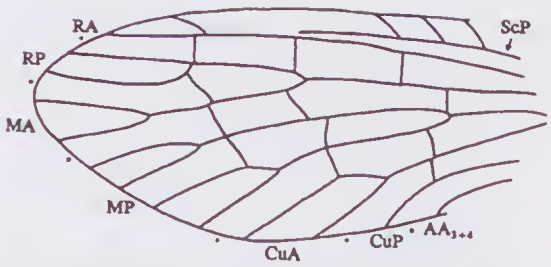
nana Jell & Duncan, 1986; LCret; Koonwarra FB; Gippsland.

Westratia nana; NMVP103105; x18 (below left). Line drawing (above) of Jell & Duncan, 1986, fig. 65D.



Westratia nana; NMVP103324; x18. Line drawing (above) of Jell & Duncan, 1986, fig. 65C.

Order MEGALOPTERA (alderflies)



Family **SIALIDAE**

Austrosialis Tillyard [*ignicollis*]
RP3+4 simple; MA 2-branched; MP1+2 2-branched; MP1+2 forked at about same level as representative; MP3+4 2-branched; forks of MA, MP and CuA not differing much in depth.
sp. Lambkin, 1992; Palaeocene; Redbank Plains Fm; Ipswich.

Austrosialis sp.; QMF21638; 11mm long. Line drawing of Lambkin, 1992, fig. 1.

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I thank Andrew Ross and Phillip Crabb, Natural History Museum for providing photographs of specimens in the collection under their care, Bob Jones, Australian Museum for the loan of specimens, Robert Beattie for providing upto date information on the Belmont/Warners Bay fossil insect sites, Paul Avern and Sue Parfrey, Queensland Museum, for help with photography and Megan Lloyd, Queensland Museum, for help in obtaining difficult literature.

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Entries for Orders are in upper case and bold face type. Entries for other supragenerie taxa (mainly families) are in upper case. All species entries are in lower case and are followed by the generic assignment. Generic and specific entries in italics indicate the taxon has gone into synonymy.

NOTE ADDED IN PROOF

Since this volume went to press I have become aware that Rasnitsyn & Aristov (2004) have ereeted *Jarmilacladus variabilis* gen. et sp. nov. (Hypoperlida: Anthracopeltidae) [holotype BMNHIn45933] and *Belmophenopterum pectinatum* gen. et sp. nov. (Grylloblattida: Sylvaphlebiidae) [holotype BMNHIn45837] from the Upper Permian Neeastle Coal Measures near Belmont, south of Newcastle.

Sue Parfrey has kindly brought to my attention a fossil inseet in a drill eore through the Upper Permian Baralaba Coal Measures in the southeastern Bowen Basin, eentral Queensland. It is a stonefly nymph but a more detailed deseription will be provided in another paper. The signifieanee of this speeimen is as the first insect from the eonsiderable thiekness and extent of the Permian sediments in the Bowen Basin. Further Permian inseets may be expected from the Basin.

Mesochorista australica, the type of ***Permochorista*** (page 91), was considered by Riek (1953) to be the senior synonym of 8 other species referred to *Permochorista* by Tillyard, namely:- *mitchelli* in 1918b, *sinuata* and *affinis* in 1922a and *collinsi, pincombei, angustipennis, osbornei* and *inaequalis* in 1926b.

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