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THE FOSSIL INSECTS OF THE TERTIARY REDBANK PLAINS SERIES

PART I: AN OUTLINE OF THE FOSSIL ASSEMBLAGE WITH DESCRIPTIONS OF THE FOSSIL INSECTS OF THE ORDERS MECOPTERA AND NEUROPTERA.

FOSSIL INSECTS FROM THE TERTIARY SEDIMENTS AT DINMORE, QUEENSLAND

By

E. F. RIEK

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By E. F. RIEK.

(Plates 1, 2; Text-figs. 1.4).

INTRODUCTION.

The Redbank Plains Series contains a rich and varied plant and animal fossil assemblage. At the type outcrop, Redbank Plains, plant fossils are rare, though occasionally leaves of the banksia type and what appear to be seeds are found. One specimen which is apparently a flower was also obtained. At Dinmore, some three or four miles distant, in beds that are generally considered contemporaneous, is a very rich flora. These beds contain large numbers of leaves and fruits of both flowering and more primitive types of plants. Occasional insect wings of the orders Orthoptera, Isoptera, Homoptera and Odonata are the only animal remains which have been found. Only five such remains have been obtained after extensive collecting, a single fragment being a good reward for a day's splitting of the rock.

At Redbank Plains, both at the type outcrop and at one of similar lithology one and a half miles east, animal remains are quite common. The best known fossils are those of fish, and indeed the bed is known as the Redbank Plains Fish Bed. Other remains, notably the insects, are just as common though not so conspicuous. In addition, there are a few crustaceans, Ostracoda and Cladocera, the latter preserved as casts and moulds but lacking ornamentation or other diagnostic characters and the former still retaining their shell material though generally in a crushed state. Rare reptilian remains also occur and are most interesting, for in addition to bones and bony plates there are a number of fragments of fossilised skin. The skin is of two distinct types, one undoubtedly crocodilian, the other much more finely scaled type is probably that of a turtle for, in association with it, there are plates recalling the horny coverings of the plastron. These latter were at first taken to be scales of *Neoceratodus* as teeth and other bones of this Dipnoan have been recorded from the bed, but closer examination indicates that they are more likely Chelonian remains. That Chelonians are present is evidenced by the presence of a distinct mould of the inner surface of a rib. This rib is of some considerable size and possibly may be crocodilian. The bones, in general, are too damaged to admit of adequate description, but in structure all appear to be reptilian, none of the higher vertebrate series being represented.

LITHOLOGY.

The type fossiliferous outcrop consists of a hardened band of ferruginous mudstone some four to ten inches in thickness both overlain and underlain by grey clay shales of varying shades. The band immediately overlying this ferruginous band is rather light grey in colour and contains at least some recognisable fossil remains. Fish scales and other small fish fragments have been observed, but the rock weathers into very fine fragments due to repeated conchoidal fracture combined with fine bedding planes and it is hard, even in the fresher material, to obtain a fragment of rock of any size.

At one outcrop the shales were more compact, dark grey in colour, and contained numerous ostracods. This shale, which was more of the nature of a poor oil shale, could be split into very fine flakes and though most of the carapaces of the ostracods present were crushed, the shell material was still preserved. This outcrop has since been covered by alluvium so that now only a few fragments containing the fossil ostracods are preserved. It seems probable that fish remains, at least, occur through a considerable portion of the sediments, but are only to be obtained as more or less complete specimens from the ferruginous band.

The basal and uppermost layers of the series are more coarsely grained and in some respects hard to distinguish from the underlying Mesozoic Series of sandstones and coarse shales.

Unconformably overlying the sediments are basalt flows which prevent any tracing of the fish beds in the direction of the Dinmore Plant Bed and associated sediments. Furthermore, the bed in the type area is preserved only on the higher land and is absent in the gullies, thus increasing the difficulty of tracing the beds and even preventing the linking up of the two known fossiliferous outcrops of the ferruginous type. There appears to be no observable difference in the general type of fish and insect remains between this second outcrop and the type one and as the lithology is similar one is considered as an extension of the other.

At Dinmore, and extending to Darra and Cooper's Plains, the sediments are mainly of compact clays and clay shales with some micaceous sandstone. At Cooper's Plains the sediments are overlain by basalt, the rock containing the fossil remains being taken from the bottom of the basalt quarry.

STRATIGRAPHY.

As already outlined, the ferruginous band of this series is known only from two isolated outcrops separated by a distance of about one and a half miles. Each outcrop occurs on the upper slopes of a low hill and is separated from the other by a series of gullies associated with a small creek. At the type outcrop the fossil band can be followed around the southern part of the hillside for a distance of about half a mile. On the northern side the gentle slopes are grass covered so that it is not possible to trace the outcrop here and beyond that is the basalt cover, which extends round on the western side where the more coarsely grained layers of the series outcrop in the road-cuttings. These appear to be the beds overlying the ferruginous layer, the fossil band being obscured by the alluvium. The other outcrop, which lies on the eastern side of the main creek, appears from a cursory examination to be an outlier of Tertiary material in the underlying Mesozoic Series. It, too, occurs towards the top of a small rise and consists mainly of the lower more coarsely grained material which can be followed for quite a considerable distance and only one small area of the ferruginous band. A single beetle elytron was obtained from a nodule in this coraser material, while the ferruginous band was quite productive.

At both these outcrops the beds are associated with trachytic material which is definitely intruded through them at the type outcrop.

The bed is considered unconformably to overlie the Mesozoic Series though the actual contact between the two has not been fully worked out. Sandstones of general Mesozoic type occur in the area between the two outcrops but, as indicated, the lower layers of the Redbank Plains Series are rather coarsely grained so that

it is at times difficult to decide whether one is dealing with a Mesozoic sandstone or with a sandstone derived from that series. Apparently overlying the series to the north and west are basalt flows which prevent a linking up of this series with the outcrops at Dinmore. The Dinmore Beds of mudstones and clay shales have an entirely different lithology so that it is a little doubtful whether they are strictly homologous with the Redbank Plains Series. Until the stratigraphy of the area is more adequately known they will be treated as such.

The series is generally estimated to have a thickness of about three hundred feet of sandstones, clays, clay shales and fissile shales lying unconformably on the various Mesozoic Series and overlain by up to five hundred feet of basalt. The basalt varies considerably in thickness (at Cooper's Plains it is quite thin) and in some areas is entirely absent. Jones (1926) remarks that the great similarity between the Tertiaries in this area and the underlying Mesozoic sediments is shown by the fact that for many years they were regarded as parts of these sediments. This marked similarity is due, in great part, to their origin—they are composed mainly of material derived from the denudation of the Mesozoic Series. "It was not till 1913 that the presence of an unconformity was proved by mining and boring operations in the Ipswich district. This unconformity is further demonstrated by the overlap of the Tertiary Series on to the Ipswich, Bundamba and Walloon (and Palaeozoic) Series."

PALAEONTOLOGY.

Plant Remains.

The Dinmore Bed is very rich in fossil plants almost to the exclusion of other fossils. These plants are preserved not only as fossil leaves but also as fruits and seeds. The leaves, in general, appear to be those of Angiosperms or flowering plants with a few fern-like types. Many of them have been identified with recent genera (Shirley 1898) and, though originally regarded as Cretaceous, are now placed in the Tertiary. The wealth of remains which occurs in these clay shales is astounding, but no recent critical examination of the flora has been attempted. The fruits and seed-like bodies, too, are diverse in shape and size, but unfortunately do not appear to be preserved sufficiently well to admit of microscopic examination.

Fossil plants are found in many other places, but in only a few are they at all plentiful. They occur at various localities around Oxley and Darra, particularly in the clay pits at Darra where the fossils are preserved in a fine grained micaceous sandstone; also from the quarry at Cooper's Plains, where the leaves are associated with fish remains in a soft clay sandstone overlain by the basalt. As already mentioned, they are rare in the ferruginous mudstone of the type outcrop.

Animal Remains.

Crustacea.

There are two distinct types of fossil crustacea. In the ferruginous mudstone occasional casts and moulds of a fossil Cladoceran are found, but these animals have rather thin shells generally lacking in ornamentation, and as specific differentiation is based largely on the appendages little characterisation can be undertaken on shape alone. At first glance they could be confused with beetle elytra, but their shape, convexity and lack of any hinge line separating the two valves are characteristic, though as yet no specimen showing the two valves preserved has been obtained. The elytra always show distinct margins and, in general, are of a very different shape.

The Ostracoda occurring in the shales which very probably overlie the Fish Bed are better preserved. They still retain the shell material, though usually rather badly crushed due to compaction of the sediment. The shell structure and general shape are sufficiently well preserved to admit of specific description. Chapman (1935) has described these forms under three specific names (of three genera) though they appear to be merely growth stages of the one species, *Herpetocypris* (?) *aequalis* Chapman 1935. Chapman in his summary stated that "the Redbank Plains ostracod shale contains species of freshwater and estuarine characters, thus indicating a lacustrine area that was open intermittently to a shallow sea." I consider that he was dealing with a single freshwater species and therefore there was no need to postulate intermittent connection with the sea, of which there is certainly no further fossil evidence. Beasley (1945), following Chapman, has retained these names and has further identified *Stenocypris lowmeadensis* Beasley from the same beds.

Sponges.

At Cooper's Plains, in association with the fish remains, occur small rounded bodies at one time recorded as ostracods which on general shape are similar to sponge gemmules. However, spicules have been obtained from the crushed rock only on one occasion so that either considerable alteration has taken place or else the bodies are not gemmules, the spicules observed being adventitious.

Lamellibranchs.

Moulds of a number of specimens of a Unionid Lamellibranch have been collected from the clay pits at Darra. The umbonal region of most is badly preserved, so that it is difficult to arrive at a satisfactory specific description.

Reptilia.

A number of bones and bone fragments are known from the ferruginous mudstone. Most of these are too fragmentary to warrant further mention except to restate that in their bone structure they all appear to be reptilian. In addition, there are one or two bones of a more definite nature. Firstly, there is the mould of a reasonably large rib, which would be at least 1½ inches in width. This could have come either from a turtle or from a crocodile, and from its size it may be more reasonable to suppose that it is from a turtle. There is another bony plate apparently representing portion of the plastron of a turtle. Other small long bones appear to be phalangal segments or terminal vertebrae.

Finally in the reptilian series we have some interesting remains. These represent fragments of two distinct types of skin, both of which are figured. The larger type, of which there is only a single specimen, shows scales of a rather flat, unornamented type, varying somewhat in size and, in general, apposed to one another. A similar type of skin appears in the neck region of recent crocodiles. This suggestion is further supported by the presence of a number of small segmentally arranged bones adjacent to the skin, which very probably represent vertebrae of the neck. They could possibly be from the tail region, but the type of scaling precludes this suggestion.

The smaller type of skin, of which there are several specimens, is more problematical. The scales are very much smaller and many are ornamented with a backwardly projecting spine, so that there does not appear to be any close affinity between the two. This type recalls somewhat that of the monitor lizards, but it

also shows some similarity to that of recent freshwater turtles. In further support of the latter view is the presence of scute-like plates in association with some fragments of the skin.

Reptilian remains have previously been recorded from two localities apparently within this Tertiary series. First, there is the reference (R. L. Jack, Geol. & Palaeont. of Queensland) to *Pallimnarchus pollens* in association with a tooth of *Epiceratodus* from a well sunk at Eight Mile Plains, which passed through the overlying basalt. Secondly, fragments of an angular bone of the jaw of a reptile provisionally referred to *P. pollens*, occurred close to the ostracod shale at Redbank Plains. Fragments of the carapace and plastron of a turtle have been found in the alluvium of the gully in which the ostracods occur, but they are possibly only those of a recent specimen.

Fish and Dipnoi.

Hills (1934) has dealt in some detail with the rich fish remains from the ferruginous mudstone and from the clay sandstone at Cooper's Plains. Most of the material is from the ferruginous band both from the type outcrop and from the bed to the east. In his paper, Hills describes the Dipnoan *Epiceratodus denticulatus* based mainly on the number and shape of comb ridges to the teeth as well as several Teleostean species, belonging to both fossil and recent genera.

Insects.

Insect remains have been collected from the ferruginous mudstone at Redbank Plains and from the clay shales of Dinmore. There is no similarity in these two faunulae. At Dinmore, the fauna is one of Orthoptera, Isoptera, Homoptera and possibly Odonata, while at Redbank Plains it is predominantly a Coleoptera-Homoptera association with a few Diptera, Mecoptera, Neuroptera, Orthoptera and Hemiptera. It seems strange that if the beds are contemporaneous there should be such a difference in the faunulae as the two localities are only separated by at most three or four miles. Admittedly, very few fossils have been collected from Dinmore and those that are preserved are not forms that one would normally expect as fossils, particularly the Isoptera. Without any direct evidence to the contrary these beds will be treated as of the one age, but will be considered separately, the faunula of the Dinmore Beds being considered as a separate part.

In this paper I wish to deal with the faunula of the ferruginous mudstone. After considering the general composition, I will deal fully only with the Mecoptera and Neuroptera. The remaining orders, with the exception of the Coleoptera, will be dealt with in succeeding papers.

From this band well over two hundred fossil insects have been obtained. Many of them are fragmentary, but most are sufficiently well preserved to admit of description, the exceptions being limited mainly to probable Dipterous remains and to some of the smaller Homoptera. The larger Homoptera are generally beautifully preserved; so, too, are many of the beetle elytra. The mudstone varies somewhat in the amount of ferruginous cementing, some being soft and generally splitting evenly, while the remainder is hard and shows a definite conchoidal fracture. Naturally, it is easier to obtain more complete specimens from the softer type, but the preservation, in general, is not as good as in the harder portions. The fragments of rock of the soft type which have been exposed on the surface for any considerable

time have hardened somewhat and yield better specimens than the freshly excavated rock which, in any case, needs two or three months drying before splitting if the best results are to be obtained.

As mentioned above, the main elements of this faunula are the Coleoptera and the Homoptera. The Coleoptera or beetles, which are generally represented by single elytra though, occasionally, by complete specimens, constitute about fifty per cent. of the total specimens being representative of about twenty or so specific types. This arbitrary division into species is based mainly on ornamentation and to some extent on size. There are between thirty and forty specimens of Homoptera, notably of the family Ricanidae, of which Tillyard (1923) has already described *Scolypopites bryani*. There are now known to be a number of other genera present, including the recent *Scolypopa*. In addition to the wings there are twenty or so abdomens of Homopterous insects. Thus, considering the two orders together we have about seventy per cent. of the fauna. There appear to be almost as many Diptera as Homoptera, but as some are poorly preserved it is a little doubtful if they are really Diptera so, until this order has been considered in detail, it is better not to commit oneself to a definite estimate. Finally, there is a group of orders represented more or less by single species. There are four or five specimens of Mecoptera, about the same of Blattaria, a few more Hemiptera, two Neuroptera, and possibly an Odonata.

AGE OF THE BEDS.

From a cursory examination of the insects it is not possible to state any definite age for these sediments except to say that though there are representatives of recent genera, these are in groups in which little change has occurred since their first appearance in the Permian, so that this is not so surprising as might at first be considered. On the other hand there are forms showing strong affinity to the Liassic and Jurassic, and even in some cases to the Triassic, so for the present the beds are best considered as low in the Tertiary Series.

Hills, in his summary, states that the evidence (based on the fish) is strong that the Redbank Plains Series is of Palaeogene age—Eocene or Oligocene—and certainly not Cretaceous, but beyond that it is not possible to particularise with certainty. He then goes on to reason that as some of the fossil species show close resemblances to living species it would probably be best tentatively to refer the series to the Oligocene. Chapman (1935), dealing with the ostracod fauna of this series, stated that they give no very decisive data as to the age of the beds other than Tertiary—the rocks may range from Lower Miocene, or even older, to Pliocene.

SYSTEMATICS OF THE INSECTA.

Very few Tertiary insects are recorded from Australia. Tillyard (1916, 1923) has already recorded two—*Euporismites balli* Tillyard 1916 (Planipennia) and *Scolypopites bryani* Tillyard 1923 (Homoptera)—from the Redbank Plains Series; while the only other recorded species, *Austrodictya corbouldi* Tillyard 1922 (Orthoptera), is enclosed in a crystal of selenite and can only doubtfully be referred to any series, though it bears close resemblance to recent Australian forms.

Faunula of the Redbank Plains Ferruginous Band.

Order MECOPTERA.

This order is represented in the present collection by two species each referable to recent families, in one case to the recent genus *Chorista*. The Mecoptera of the

Permian are not strikingly different from the present day forms, so it is not surprising that the genus *Chorista* should be represented by a fossil even in the lower Tertiary. The family Choristidae is restricted to Australia, the two recent genera *Chorista* and *Taeniochorista* being very similar in structure.

Austropanorpa gen. nov., to which the other fossil species is referred, shows affinities with the recent *Panorpa* (with a more or less Holarctic distribution) differing from it mainly in the pectination of R_2. The Mecoptera normally show only a dichotomous branching of R_2, or with at most three branches, while in this fossil there are either five or six. This character excludes the species from any direct line of ancestry of the recent Panorpidae. The only recent member of this family to be recorded from Australia is the wingless *Apteropanorpa tasmanica* Carpenter 1941 from the mountains of Tasmania. The family, while typically a northern hemisphere one, occurs commonly in the East Indies, so one would have expected some recent species from the mainland of North Australia. This fossil species indicates that in early Tertiary times Panorpidae did occur in Australia. Since then the family has receded in importance, being dominated by the Choristidae which was contemporaneous with it in these early Tertiary times.

Family *CHORISTIDAE*.

Costal area not unusually broad, narrower in hindwing than in forewing and with one or more simple cross-veins. The subcosta joins the costa or the wing margin a little beyond the middle. In both fore and hind wings CuA touches or fuses with M for a short distance. In both wings Rs is four branched. In the forewing M is five branched, M_4 dividing into M_{4a} and M_{4b}. In the hindwing M is four branched.

There are two recent genera *Chorista* and *Taeniochorista* in this family which is apparently restricted to Australia.

Genus **Chorista** Klug 1836.

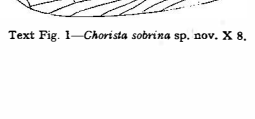
Genotype *Chorista australis* Klug 1836.

Chorista Klug 1836.

Euphania Westwood 1846.

Chorista auct.

Chorista differs from *Taeniochorista* in that there is only a single cross-vein in the costal area of the forewing while in *Taeniochorista* the cross-veins are more numerous.



Text Fig. 1—*Chorista sobrina* sp. nov. X 8.

Chorista sobrina sp. nov.

Plate 1, fig. 1; Text-fig 1.

Forewing: Subcostal space moderately swollen in basal third, Sc reaching the anterior margin only a little before the pterostigma. R_1 forks at apex to form the pterostigma. Rs of four branches; R_{2+3} divides into R_2 and R_3 at about the middle of its length, slightly beyond the forking of R_1; R_{4+5} divides close to its origin. M, free of R, five-branched; M_{1+2} divides into M_1 and M_2 beyond half its length, on about a line with the forking of R_1; M_{3+4} divides into M_3 and M_4 fairly close to its origin and M_4 divides again almost immediately into M_{4a} and M_{4b}. M_{4b} connected to CuA by a very distinct cross-vein so that the cell between M and CuA is six-sided, not five-sided as is typical. CuA strong, just touching M, not fused to it for any distance. CuP parallel to CuA, with a distinct cross-vein at about the middle. Anal veins absent except for the apex of A_1. Cross-veins are not well preserved owing to the coarse nature of the matrix. In addition to those already mentioned the only obvious one lies about the middle of R_4 and R_5 connecting these two veins.

The expanded subcostal space and the bend in the main stem of R at the furcation of Rs from it indicate a forewing rather than a hindwing. The wing is rather long and narrow, with a rounded apex, recalling that of the recent *C. australis* Klug or *C. australis luteola* (Westwood). The branching of M is similar to that of *C. ruficeps* (Newman) except that M_4 divides more rapidly and has the branches more widely open in the fossil giving rise to the peculiar cubital cell between M and CuA. The branching of R_{2+3} beyond that of R_1 (pterostigma) is rather abnormal, though in *C. luteola* these two are in line.

Type.—F. 10628 and counterpart, F. 10629, in the University of Queensland, Department of Geology Collection.

Type Locality.—Redbank Plains, type outcrop of Redbank Plains Series.

Horizon.—Ferruginous Band, Redbank Plains Series, Lower Tertiary.

In addition to the type there are two other specimens (F. 10630 and counterpart F. 10631; and F. 10632 and counterpart F. 10633) referable to this species, both representing only the apical half of a wing and so lacking distinctive characters though showing that the species was probably of common occurrence.

In some characters this species recalls the Permian and Triassic *Mesochorista* Tillyard with its four-branched Rs, but differs in the reduced branching of M, that of *Mesochorista* being typically six-branched, five-branched in rare cases, but then the final branch of M_4 is towards its apex, not towards the base as in this species. Sc is simple in *Chorista* usually branched in *Mesochorista*. In the branching of M the species closely resembles that of the Liassic genus *Mesopanorpa* Handlirsch (*non* Tillyard), but differs in the structure of Sc and in the reduced branching of Rs.

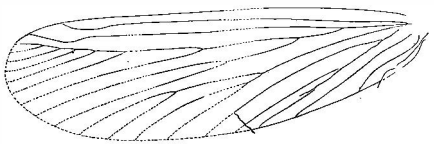
Family *PANORPIDAE*.

This family is differentiated from the Choristidae mainly on wing venation. CuA is not fused with the main stem of M in the forewing, whereas in the Choristidae CuA either touches M or fuses with it for a short distance.

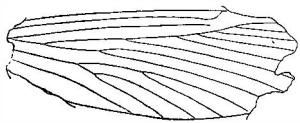
Austropanorpa gen. nov.

Genotype *Austropanorpa australis* sp. nov.

Forewing only known. Sc ending close to or at the pterostigma. R_4 pectinately branched, of four or more branches (five or six in the type species). CuA not fused to the stem of M, connected to it by a cross vein. A_1 joins the margin of the wing beyond the origin of Rs.



Text Fig. 2—*Austropanorpa australis* gen. et sp. nov. Holotype X 8.



Text Fig. 3—*Austropanorpa australis* gen. et sp. nov. Paratype X 8.

Austropanorpa australis sp. nov.

Plate 1, figs. 2, 3; Text-figs. 2, 3.

Forewing: Costal margin almost straight, subcostal space not enlarged. Sc ending up on C at the pterostigma and connected to R_1 by a cross vein. R_1 straight except for apical portion which curves round the pterostigma. Pterostigma not well defined on the fossil. Rs arises fairly close to base of wing, divides rapidly into R_{2+3} and R_{4+5}; R_{4+5} divides into R_4 and R_5 only, stem of R_{4+5} slightly longer than stem of Rs; R_{2+3} pectinately branched, seven branches, each reaching the wing margin without dividing. M arises close to the base of the wing, of four branches; forking of M after the forking of Rs but before the forking of R_{4+5}; M_{3+4} divides almost immediately into M_3 and M_4. At the furcation of M there is a definite break in the vein indicative of a thyridium such as occurs commonly in the recent species. CuA arises from base of wing, more or less parallel to the stem of M, possibly connected to it by a cross-vein. CuP parallel to CuA over its distal half; base of CuP not preserved. Three simple, almost straight, anal veins connected to one another by single cross veins; A_1 joins the hind margin of the wing well beyond the origin of Rs.

The long Sc and the origin of M close to the base of the wing and free CuA except possibly for a cross-vein indicate a forewing. The characteristic feature of the wing is the strongly pectinate R_{2+3}.

Type.—F. 10634 and counterpart, F. 10635, each in two pieces in the University of Queensland, Department of Geology Collection.

Type Locality.—Redbank Plains, type outcrop of the Redbank Plains Series, near Goodna, Queensland.

Horizon.—Ferruginous Band, Redbank Plains Series, Lower Tertiary.

There are two specimens of this species. The type is the better preserved being in a finer matrix than the other specimen. Unfortunately it has been sawn across in two places in a preliminary breaking of the rock, the first cut running transverse about the centre of the wing and the second dividing the apical half longitudinally. The lower portion of this second cut is missing. The second specimen, F. 10336 and counterpart F. 10637, though more complete apically, lacks the anal veins.

The genus *Austropanorpa* is most closely allied to the recent *Panorpa* where slight pectination of R_2 does occur but is normally limited to three branches, whereas in the fossil species there are either five or six. With the exception of this pectinate branching the fossil approaches rather closely to the recent genus *Panorpodes* with a distribution including Japan and North America. In the branching of Rs the species shows some resemblance to the Permian, *Parachorista* Tillyard, but the branching of M is very different, though in the hind wing of *Parachorista*, M is four-branched, but then the number of branches to Rs is reduced, too. With the development of end twigging to the veins of this fossil it would be quite easy to derive the Megaloptera from such a stock. However, it is not considered that *Austropanorpa* is ancestral to any of the Megaloptera for this order is well differentiated in the Permian. It does approach the Liassic *Orthophlebia* rather closely but differs in the structure of the media.

Order PLANIPENNIA.

Family *OSMYLIDAE*.

Genus **Euporismites** Tillyard 1916.

Genotype *Euporismites balli* Tillyard 1916.

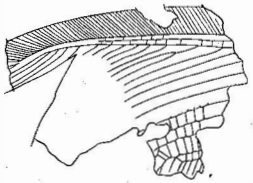
Closely allied to *Euporismus* but differing in the branching of Rs, the basal branches being more widely spaced and with the first branch not closely apposed to M.

Euporismites balli Tillyard 1916.

Text-fig. 4.

Euporismites balli Tillyard 1916. Qld. Geol. Surv. Publ. 243: 44.

This species was described by Tillyard from a practically complete wing, which lacked only the base and apex. A further specimen representing the apical half of a wing of similar size has since been collected. The type specimen is considered to be a hindwing, while the specimen under consideration is more like a forewing having a wider costal space and with a different cubital field, which turns more abruptly at its apex to join the wing margin.



Text Fig. 4—*Euporismites balli* Tillyard. X 8.
Variation completed only in the diagnostic areas of the wings.

In this second specimen the costal area is broad but tapers gradually to the apex. Costal veinlets are moderately spaced except towards the apex, where they become closely crowded; veinlets simple, the more basal ones straight though sloping, those towards the apex with a definite sigmoid curve, but the apical ones again straight. The apical ending of Sc is obscured but it appears to fuse with R_1 which continues round the curve of the wing to reach the margin before the apex. Rs runs more or less parallel to R_1, giving off a large series of pectinate branches, at first widely spaced but becoming more crowded towards the apex. Between R_1 and Rs a series of strongly developed cross veins, spaced irregularly at fairly wide intervals. Numerous well developed cross veins occur between the basal branches of Rs. Rs has about fifteen or so branches, those of the basal portion quite widely spaced, but the width between the branches gradually decreases towards the apex, where the veins are quite crowded. There is very little secondary branching except possibly at the wing margin. The most basal branch of Rs is widely separated from M, which is preserved only as a small area close to the primary forking of the vein. CuA and CuP similarly fragmentary, only the short area where they turn abruptly to join the wing margin being preserved, and here they show the beginning of a number of branches. M is more widely separated from CuA than it is from the first branch of Rs.

Type.—Specimen 34a and counterpart 34b in Geol. Surv. Mus. Coll. Queensland.

Type Locality.—Redbank Plains, type outcrop of Redbank Plains Series, near Goodna, Queensland.

Horizon.—Ferruginous Band, Redbank Plains Series. Lower Tertiary.

In addition to the type hindwing there is the apical half of a forewing in the University of Queensland, Department of Geology Collection F. 10638 and counterpart F. 10639 from the same horizon and locality. In this specimen the apical portion of the wing is more completely preserved.

Remarks.—At first glance this species, particularly as represented by the present specimen, shows close similarity to *Osmylopsychops spillerae* Tillyard, from which it differs mainly in the unbranched nature of the costal veinlets, the more openly branched Rs and the more narrowed apical costal space. However, the median and cubital fields are very different in the two species so that there can be no close affinity.

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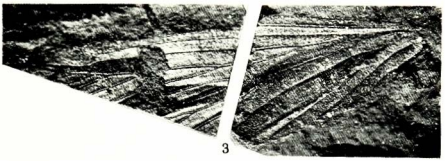
PLATE 1

1

2



3

4a

4b

Fig. 1—*Chorista sobrina* sp. nov. Holotype X 4 diameters.
Fig. 2—*Austropanorpa australis* gen. et sp. nov. Paratype X 4 diameters.
Fig. 3—*Austropanorpa australis* gen. et sp. nov. Holotype (in two pieces) X 4 diameters.
Figs. 4a, b—Skin of crocodile (? neck region).
a. Fig. 2/3 nat. size.
b. Fig. X 2 diameters.

PLATE 2

Figs. 1, 2—Skin of ? turtle.
Fig. 1—X 3 diameters.
Fig. 2—A second specimen X 1½ diameters. Note the two large scutes.
Fig. 3—Skin of crocodile. Same specimen as Pl. 1, fig. 4, X 5 diameters.