AUSTRALIAN MUSEUM SCIENTIFIC PUBLICATIONS

Riek, E. F., 1968. *Robinjohnia tillyardi* Martynova, a mecopteron from the Upper Permian of Belmont, New South Wales. *Records of the Australian Museum* 27(14): 299–302, plate 44. [26 November 1968].

doi:10.3853/j.0067-1975.27.1968.448

ISSN 0067-1975

Published by the Australian Museum, Sydney

Robinjohnia tillyardi Martynova, A Mecopteron from the Upper Permian of Belmont, New South Wales

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Plate 44. Fig. 1. Manuscript received, 29th December, 1967

SUMMARY

Robinjohnia tillyardi Martynova is considered a mecopteron and placed in the Nannochoristidae. The dipteran affinities of the fossil, enumerated by Tillyard in the original reference to this species, have not been recognized.

In 1937 Tillyard described and figured, but did not name, a fossil insect from the Upper Permian of Belmont which he placed in a new order, the Protodiptera, differing from Diptera mainly in possessing four wings. Martynova (1948) named the species *Robinjohnia tillyardi* from the illustrations given in the original publication and subsequently (1961, 1962) referred the species to the suborder Paratrichoptera (order Mecoptera). All four wings and most of the body are preserved. The wings of the left side are outspread, but those of the right side are superimposed on one another and the venation is partly obscured; however, the right side preserves more details of the forewing venation than does the outspread wing of the left side. Tillyard gave a reconstruction of the hindwing which he compared with the forewing

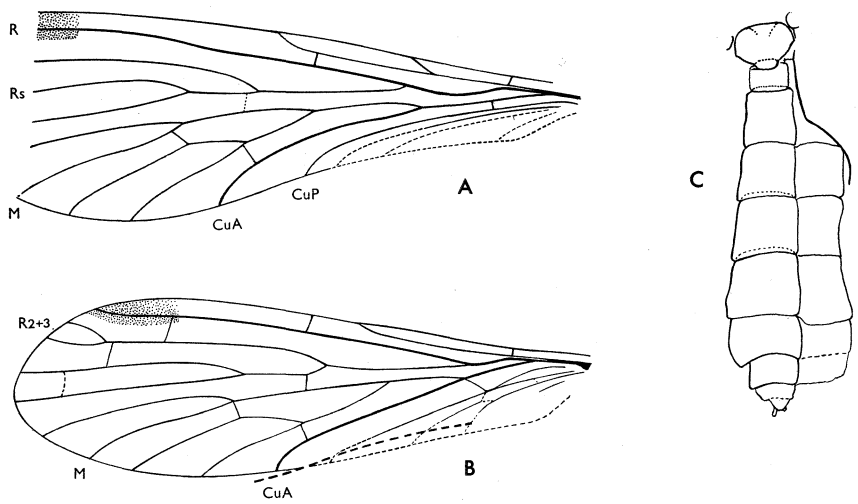


Fig. 1: *Robinjohnia tillyardi* Martynova. X15. A, left forewing. B, left hindwing. C, metanotum and abdomen

of Diptera. The most outstanding characteristics of this reconstruction are not preserved in the fossil. The lighting of the photograph of the fossil had been so arranged that the outline of one of the legs appeared as part of the caudal wing margin and gave a false impression to the wing. As the hindwing is more completely preserved than the forewing it is described first.

Hindwing

Complete except for part of anal field. Length 5 mm. Apex rounded. Sc simple, very short, ending before first forking of Rs. Humeral cross-vein distinct, not more than one-third length of Sc from wing base. R fused with Sc, or very close to it, as far as humeral cross-vein, with a decided bend before origin of Rs and at origin of Rs, simple and straight almost to apex. Pterostigma large but margins indefinite. Rs four-branched; R 2+3 forking close to wing margin. M four-branched, with M 1+2 forking after M 3+4. Discoidal cell distinctly closed by an oblique cross-vein. CuA simple, straight except for distinct downward curvature at wing margin. Basal stem of Cu long, just fusing with 1A before origin of CuA. CuA very oblique, just touching the stem of M. CuP fused to 1A for only a short distance, free portion of CuP well separated from CuA, subparallel to it, straight almost to wing margin. Free portion of 1A short, not fully preserved, first portion nearly traverse and appearing as a cross-vein. 2A short, apex not preserved. 3A preserved only at base.

Forewing

Apex not preserved but in other respects closely similar to hindwing except in anal field. Slightly larger than hindwing. Costal space not expanded. Sc forked, very short, extending very little further than in hindwing. R simple, almost straight except at base. Pterostigma large but not sharply defined. Rs and M similar to hindwing though forking of R 2+3 is preserved in only one wing. (Apex missing, in part, in both forewings). CuA not quite as strongly curved at apex as in hindwing but otherwise similar. CuP subparallel to CuA, strongly curved at wing margin and ending well basad of apex of CuA. CuA and M fused for a considerable distance near their bases. Basal stem of CuA transverse, joining stem of M about level with humeral cross-vein. M separating from CuA just before level of origin of Rs. Anal field crumpled. 1A close to CuP, with apex apparently close to apex of CuP. 2A not clearly preserved.

Body

Head, thorax and abdomen all more or less completely preserved though some structures are not clear. Head preserved in frontal view, small, about as wide as metanotum. Eyes large, somewhat bulging, separated by a distance about equal to their width. Clypeus well developed, lower margin slightly concave. Malar space long. Postocular region rounded, indistinct at meson. Ocelli not defined. Antennae inserted about middle of face, only basal two segments preserved; second segment appears as a pair of raised areas on lower clypeus. Labrum not preserved, but the long malar area suggests that a short rostrum may have been developed. Palps not preserved.

Pronotum and mesonotum badly crushed. Metanotum clearly defined; scutellum small, transverse, with straight anterior and posterior margins; scutum not clearly subdivided. Basal articulation of hindwing clear on one side.

Abdomen complete, shorter than wings. Sternites of anterior segments visible to one side of tergites, apparently due to rupture of the membranes along the left side so that the sternites are displaced to the right and viewed ventrally. Basal tergites preserved in dorsal view. First tergite short; second to sixth subequal, with fifth and sixth decreasing slightly in length; some overlap between tergites visible; seventh both shorter and narrower than sixth. Sternites 1-7 comparable in length with tergites. Apex of abdomen beyond seventh segment very small with no evidence of sternites displaced to one side. Segmentation not clear but apparently with two segments visible. Apex with a distinct cercus on left side and suggestion of one on right. It is suggested that the apical segments of the abdomen are telescoped and that the two visible segments are 9 and 10. Segmentation of cercus not preserved.

Portion of one leg preserved, apparently tibia and base of tarsus.

In general facies the fossil is closely similar to Recent Nannochoristidae. The head is similar but the eyes are less bulging and so the head appears relatively smaller. The specimen is apparently a female as the apex of the abdomen is not swollen and ends in short but distinct cerci. It is similar to that of Recent female *Nannochorista*. This similarity to the Recent species extends to the wing venation. The forewing shows the same marked fusion between the bases of M and CuA and differs mainly in the short Sc and distal branching of R 2+3. There is also close similarity between the hindwings, though small differences occur between the cubital and anal fields, which are not fully preserved in the fossil species. Marked reduction of Sc in both wings is a feature of Recent Bittacidae but other characters of the fossil align it with the Nannochoristidae.

There is no close similarity between the forewing of the fossil and the forewings of Recent Diptera and little purpose is served in comparing the hindwing of the fossil with the forewings of Recent Diptera, for the evolution of the forewing and hindwing in the mecopteroid orders has followed separate paths. In the hindwings of all Recent and fossil Eumecoptera there is some fusion between CuP and 1A. Such fusion does not occur in the forewing. In the forewing of Diptera CuP becomes weak and finally disappears. Diptera differ more fundamentally in venation from Mecoptera in re-alignment of the bases of the main veins.

After original placement in the new family Robinjohniidae (Martynova, 1948) of the suborder Eumecoptera, then in the Permotipulidae (Martynova, 1961, 1962), which was transferred to the suborder Paratrichoptera (for corrected diagnosis of this suborder see Riek, 1956), *Robinjohnia tillyardi* is now placed in the Nannochoristidae of the suborder Eumecoptera, even though there is a small terminal branch on R 2+3 which is absent from all other Recent and fossil species at present referred to the family, for combined with this reduction in venation, there is marked fusion between the bases of M and CuA in the forewing which is so characteristic of this family. Apart from the terminal branching of R 2+3, the short Sc separates *Robinjohnia* from *Nannochoristella* and *Neochoristella*, two genera from the same Upper Permian strata that are also referred to the Nannochoristidae (Riek 1953).

Order **Mecoptera**

Suborder **Eumecoptera**

Family **Nannochoristidae**

Robinjohnia tillyardi Martynova 1948: 42. Holotype F.52312 in the Australian Museum.

REFERENCES

Martynova, O. M. (1948). *Trudy Paleontol. Inst. U.S.S.R.* 14 (1): 1–76.

Martynova, O. M. in Rohdendorf, B.B. *et al.* 1961 Paleozoic insects of the Kuznetsk basin. *Proc. Paleont. Instit. U.S.S.R.* 85: 1–674.

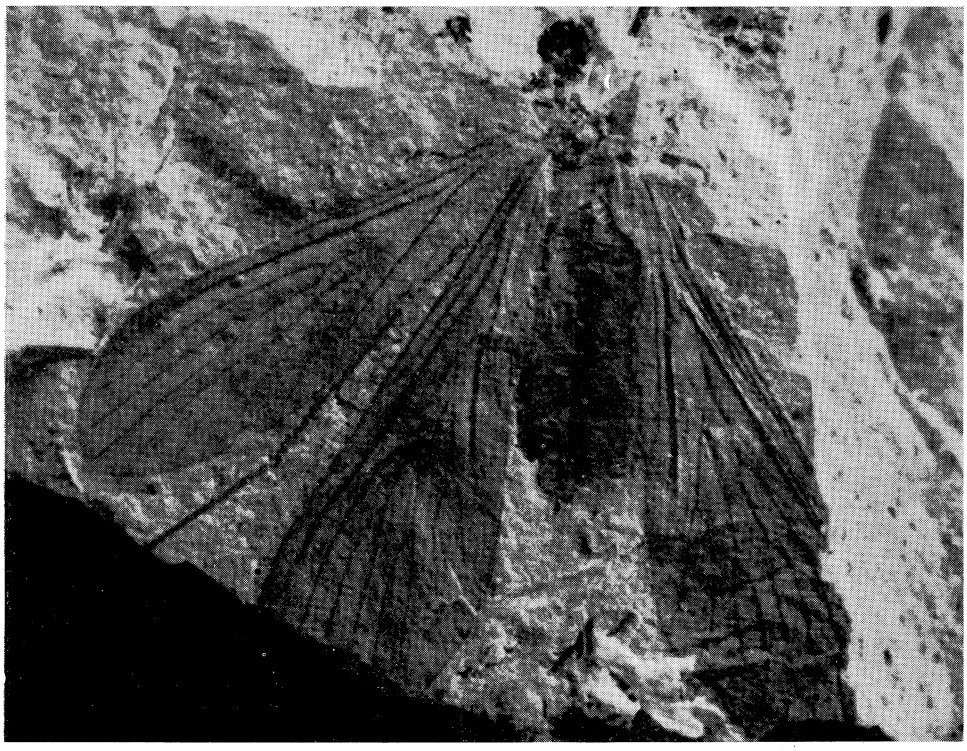
Martynova, O. M. in Rohdendorf, B.B. edit. 1962 Bases of Paleontology. *Arthropoda. Acad. Sci. U.S.S.R.* Moscow, 560 pp.

Riek, E. F. (1953). "Fossil mecopteroid insects from the Upper Permian of New South Wales." *Rec. Aust. Mus.* 23: 55–87.

Riek, E. F. (1956). A Re-examination of the Mecopteroid and Orthopteroid Fossils (Insecta) from the Triassic Beds at Denmark Hill, Queensland, with Descriptions of Further Specimens. *Aust. J. Zool.* 4 (1): 98–110, 2 pls.

Tillyard, R. J. (1937). "The Ancestors of the Diptera". *Nature*, January, 1937: 66–67.

V. C. N. Blight, Government Printer, New South Wales—1968



Robinjohnia tillyardi Martynova. X15