

A RE-EXAMINATION OF AN UPPER PERMIAN INSECT, *PARAKNIGHTIA MAGNIFICA* EV.

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(Figures 1-15.)

In the Permian strata of America, Russia and Australia there have been found abundant remains of insects belonging to the sub-order Homoptera. However, up to the present not a single undoubted representative of the Heteroptera has been described from either the Permian or the Carboniferous. It is true that the figure of the forewing of *Phthanocoris occidentalis* Scudder from the Carboniferous of America suggests that of an insect belonging to the Heteroptera, but Handlirsch (1908) was of the opinion that the apparent division of the wing into corium and membrane was due to a fracture in the underlying rock.

A few Heteroptera have been described from the Triassic. These include *Dunstaniana pulchra* Tillyard, *Dunstanioopsis triassica* Tillyard (1918) and *Triassocoris myersi* Tillyard (1922). Handlirsch has figured several from the Jurassic, the most convincing being *Archehocimex geinitzi* Handlirsch and *Eocimex liasinus* Handlirsch.

While much has been written about the relationships of the two sub-orders of the Hemiptera to each other, their relative antiquity and their origin, little more can be surmised than that both arose during Carboniferous times and that their common ancestor did not survive into the Permian epoch. If this surmise is correct, then it can be expected that Heteropterous remains will occur in Permian strata.

It is the purpose of this paper to suggest that an insect, formerly described from the Upper Permian of Lake Macquarie, New South Wales, as a Homopteron belonging to the family Ipsviciidae, and named *Paraknightia magnifica* Ev., is in reality a representative of the sub-order Heteroptera. (Evans, 1943.)

The principal features in which the Homoptera differ from the Heteroptera are associated with the head. The wings, especially the forewings, are also distinctive, both in the manner in which they are folded as well as in their texture and venation. While in the Homoptera the wings are usually carried roof-wise over the body, in the Heteroptera they lie flat and overlap apically. In texture, those of the Homoptera are either entirely membranous or entirely coriaceous, while the forewings of most Heteroptera are coriaceous basally and membranous apically.

Fossils do not provide evidence relating to wing position. It thus would seem that the only criterion for the determination of the correct sub-order from evidence provided by wings (assuming that characteristic venational features are lacking) is the presence or absence of a transverse line dividing the corium from the membrane. Even such a dividing line may not provide positive evidence, since there are some Homoptera belonging to both extinct and recent forms, which have a similar line, the nodal line. Nevertheless there exists a feature common to the forewings of many Heteroptera which is entirely lacking in those of the Homoptera. This feature is the costal fracture.

The costal fracture is a transverse line of weakness which extends from the costal margin of the hemielytron as far as the median furrow, or as far as vein R+M. The area of the wing thus separated from the remainder is known as the embolium (Figs. 2, 3).

An embolium is usually regarded as a special characteristic of the Miridae and Anthocoridae, but it occurs also in insects comprised in several other families of the Heteroptera. It is especially well developed in the Naucoridae (Fig. 2, *Pelecoris*