

## Identity of *Prosepididontus calopteryx* HANDLIRSCH 1920 (Insecta: Grylloblattida: Geinitziidae)

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### ABSTRACT

*Prosepididontus calopteryx* HANDLIRSCH 1920, from the upper Lower Jurassic of Germany, is transferred from Trichoptera to Grylloblattida: Geinitziidae. The anal loop like structure of *Prosepididontus calopteryx* is built of the concave CuP and two anal veins. Prosepididontidae HANDLIRSCH, 1920 is synonymised under Geinitziidae HANDLIRSCH, 1906.

**Keywords:** Trichoptera. Prosepididontidae. Grylloblattida. Geinitziidae. Dobbertin. Toarcian.

### INTRODUCTION

Geinitz (1880, 1884), Bode (1905) and first of all Handlirsch (1906-08, 1920-21, 1939) described from the Upper Liassic of Dobbertin and Braunschweig (Northern Germany) about 38 species of Trichoptera which Handlirsch assigned but one (*Prosepididontus calopteryx*) to Necrotauliidae HANDLIRSCH, 1906. While revising the type material one of us (J.A.) found amongst the necrotauliids true *Necrotaulius* HANDLIRSCH 1906 (probably stemgroup of Amphiesmenoptera = Trichoptera + Lepidoptera), representatives of Trichoptera (e.g. *Liadotaulius* HANDLIRSCH 1939) and most surprising a number of Lepidoptera with well preserved wing scales (e.g. *Pseudorthophlebia platyptera* HANDLIRSCH 1906, ?*Paratrachopterygidium efoosum* HANDLIRSCH 1939, ?*Paratrachopterygidium costale* HANDLIRSCH 1939). Finally *Metatrachopterygidium confusum*

HANDLIRSCH 1939 was recognized as a representative of Diptera: Hennigmatidae SHCHERBAKOV, 1995 (An-sorge in prep.).

Since its first description from the upper Lower Jurassic of Dobbertin (Mecklenburg/Germany) (Handlirsch, 1920-21: 200: Fig. 170) *Prosepididontus calopteryx* (Fig. 1) was always considered representing its personal family Prosepididontidae HANDLIRSCH 1920 within the Trichoptera (Handlirsch, 1920-21, 1936, 1939; Laurentieux, 1953; Fischer, 1960, 1971; Martynova, 1962; Müller, 1963, 1978, 1989; Malicky, 1973; Sukatsheva, 1980, 1982, 1989; Carpenter, 1992; Novokshonov, 1997).

Sukatcheva (1980, 1982, 1989) included Prosepididontidae within the Paleozoic trichopteran suborder Proteromeropina. Novokshonov (1997: 85) rejected this view,

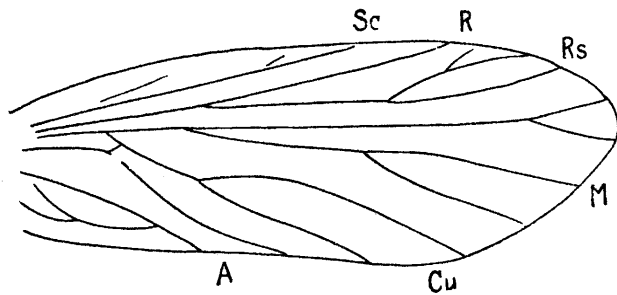


Figure 1. *Prosepididontus calopteryx* HANDLIRSCH 1920 from the Lower Toarcian of Dobbertin (Mecklenburg/Germany) - original drawing of Handlirsch (1920-21, Fig. 170).

thinking Prosepididontidae to be a representative of any of the living suborders.

After restudying the holotype of *Prosepididontus calopteryx* it became clear that this species can not be a representative of the Trichoptera. The reasons for excluding *P. calopteryx* from Trichoptera and the arguments for the new placement are discussed in this paper.

#### REDESCRIPTION

**Order:** Grylloblattida WALKER, 1914

**Family:** Geinitziidae HANDLIRSCH, 1906

- \* 1906 Geinitziidae fam. nov. - Handlirsch: 426
- 1920 Prosepididontidae fam. nov. - Handlirsch: 200, syn. nov.

#### GENUS *Prosepididontus* HANDLIRSCH 1920

##### *Prosepididontus calopteryx* HANDLIRSCH 1920 Figures 1-3

- \* 1920 *Prosepididontus calopteryx* gen. et sp. nov. - Handlirsch: 200, fig. 170
- 1936 *Prosepididontus calopteryx* HANDLIRSCH - Handlirsch: 1542: Fig. 1640
- 1939 *Prosepididontus calopteryx* gen. et sp. nov. - Handlirsch: 101, pl. 10, fig. 177
- 1953 *Prosepididontus calopteryx* - Laurentieux: 489
- 1960 *Prosepididontus calopteryx* HANDLIRSCH 1919 - Fischer: 9
- 1963 *Prosepididontus calopteryx* HANDLIRSCH - Müller: 223, Fig. 306
- 1971 *Prosepididontus calopteryx* HANDLIRSCH 1919 - Fischer: 7
- 1978 *Prosepididontus calopteryx* HANDLIRSCH - Müller: 255, Fig. 303
- 1982 *Prosepididontus calopteryx* HANDL. - Sukatcheva: 6, 7, Fig. 8
- 1989 unnamed figure - Sukatcheva: 442, fig. 1
- 1989 *Prosepididontus calopteryx* HANDLIRSCH - Müller: 257: Fig. 290
- 1992 *Prosepididontus calopteryx* HANDLIRSCH, 1920: - Carpenter: 363, fig. 202,3
- 1997 *Prosepididontus calopteryx* HANDL. - Novokshonov: 85

**Holotype:** Isolated wing (part and counterpart) housed in Institute of Geological Sciences of Ernst-Moritz-Arndt-University Greifswald (123/88) in a rather poor state of preservation.

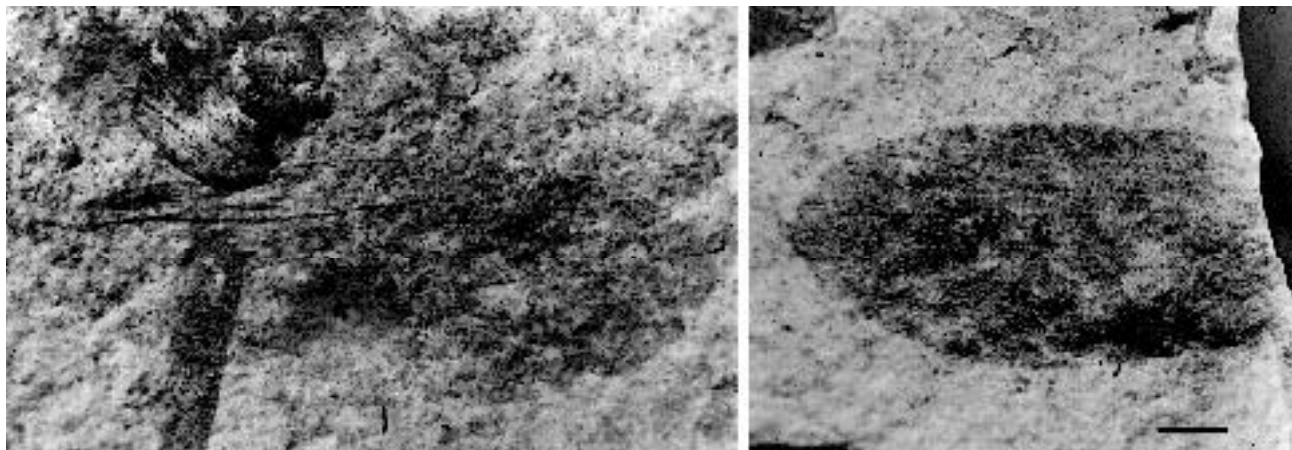


Figure 2. *Prosepididontus calopteryx* HANDLIRSCH 1920 from the Lower Toarcian of Dobbertin (Mecklenburg/Germany), holotype housed in Institute of Geological Sciences University of Greifswald (123/88). Scale bar 1 mm.

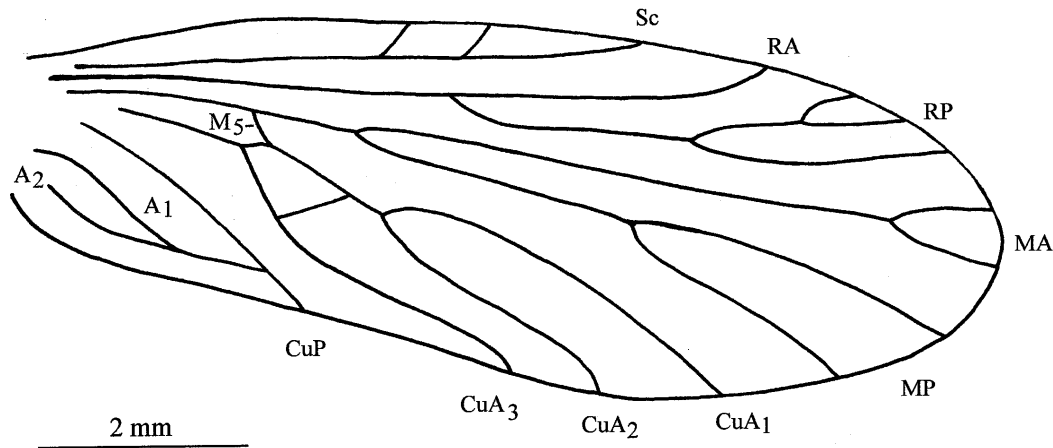


Figure 3. *Prosepididontus calopteryx* HANDLIRSCH 1920 from the Lower Toarcian of Dobbertin (Mecklenburg/Germany), drawing of the holotype. Scale bar 1mm.

*Type locality:* Former clay pit of Schwinz near Dobbertin (Mecklenburg/Germany).

*Type horizon:* Carbonate concretions within clay of the „Green Series”, ammonite zone of *Harpoceras fal-ciferum* (Lower Toarcian).

*Description:* Left fore wing, length 9,8 mm, width 3,5 mm, densely covered with microtrichiae. A number of very faint crossveins and spots is situated in the distal part of the wing. At least two weak crossveins in the costal area. Radius branches little before the middle of the wing, the anterior branch of RP is forked distally, RA distally not forked. Media branches at one third of the wing length, distally forked dichotomous. The anterior deeply forked branch of CuA is fused with M<sub>5</sub>. CuA<sub>3</sub> is waved sigmoidally, connected with an oblique crossvein with CuA<sub>2</sub>. The two convex anal veins form together with concave CuP an anal loop like structure.

*Discussion:* The obvious reason of earlier authors to consider *P. calopteryx* a trichopteran was the well developed anal loop like structure, that is, three forewing anal veins meeting each other to form a single veinlet prior reaching the hind wing margin. At the same time, some other characters of *Prosepididontus*, particularly the narrow, pectinate, 3-branched RP, and especially the 3-branched CuA, are unknown among caddisflies and mecopteroid orders in general. This casts doubts on the current assignments of *Prosepididontus*, the more so that the anal loop is not unique in caddisflies and their sister group of Lepidoptera (Willmann, 1989: 48). It has been acquired independently by hemipterous and hymenopterous insects, as well as by some booklice. These latter or-

ders have otherwise nothing to do with *Prosepididontus*, so other groups should be considered in this connection.

Within all the variety of the pterygote orders known to exist in the Mesozoic, not a single fits features of *Prosepididontus* perfectly, even if to forget the anal loop for the moment. Indeed, dragonflies, mayflies, orthopteroid and blattopteroid orders, webspinners, stoneflies, earwings, beetles and hymenopterans all have a radically different wing structure and/or venational scheme. Differences of the mecopteroid orders are mentioned above. Likewise, the neuropteroid wings, when oligoneurous and not much modified, also have short or no CuA fork and retain traces of compound origin of their RP (as RP+MA), that is, the forked hind RP branch and/or rudiment of MA base. Hemipterans and Mesozoic booklice lack normally developed SC. Miomopterans always have each M and CuA two-branched.

The general type of venation, esp. the 3-branched CuA and the single concave CuP of *Prosepididontus* indicates a relationship only with grylloblattideans (Grylloblattida). Among the Mesozoic grylloblattideans only Geinitziidae are similar to *Prosepididontus* in having M<sub>5</sub>, that is, the convex, usually oblique hind branch of M that leaves M subbasally to connect it with CuA. In the Paleozoic realm, more grylloblattideans retain M<sub>5</sub>, so as some of the archaic Euryptilonidae MARTYNOV, 1940, particularly *Blania falsa* KUKALOVÁ 1964, from the Lower Permian of Moravia (Czech Republik). Most of other features are alike in *Prosepididontus* and Geinitziidae as well, viz., long SC meeting C and bearing oblique veinlets (only two of them seen in *Prosepididontus* might

be due to its poor preservation state), few RP branches directed obliquely upward, twice dichotomous M, and three-branched, pectinate backward CuA (the latter is present in geinitziid genera other than *Geinitzia* HANDLIRSCH 1906). Unlike *Prosepididontus*, Geinitziidae have not an anal loop like structure, although an initial step in its direction is possible to see in the paratype of *Shurabia ferganensis* RASNITSYN 1983, where the two posterior anal veins join before reaching the hind wing margin (Rasnitsyn, 1983, fig. 4b). This makes it possible to infer that *Prosepididontus calopteryx* represents not more than an aberrant genus of Geinitziidae, the more so that the geinitziid stratigraphic range (Upper and, possibly, Middle Triassic of Central Asia, China, Australia and South Africa, and Lower Jurassic of Germany, England, Central Asia, East Siberia, Mongolia, and China; Storozhenko, 1997) covers the upper Lower Jurassic, the type stratum of *P. calopteryx*. Within Geinitziidae, *Prosepididontus* differs from other genera, besides the anal loop like structure, in that its SC is equidistant to C and R at the level of the RS base, instead of being closer to the latter. Otherwise it is similar to *Shurabia* MARTYNOV because of CuA three-branched and M forking basally of the RS base [and particularly to *Sh. parvula* RASNITSYN 1983 from the Asian Lower Jurassic (locality Ust Baley) due to small size and relatively close position of the RS base and the first fork of M].

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