



Fig. 3. *Belmophenopterum pectinatum* gen. et sp. nov., holotype NHM, In. 45837: (a) details of structure and (b) general appearance, $\times 6$.

branches. The crossveins are arranged in different ways and are simple except for the double rows of cells in the costal field and between the Cu branches ahead of the wing midlength. No distinct wing color patterns have been discovered except for veins being variably darkened in different specimens.

Measurements, mm. Holotype: length, 18; width, 11. Paratype In. 45620: length, 19; width, 8. Paratype In. 45627: length, 22; width, 9; full forewing length, about 26–28.

Remarks. The differences in venation that are observed in the specimens under description are most likely due to interspecific or even intergeneric differences rather than to intraspecific variability. However, the latter interpretation is more acceptable for two reasons: First, there is no distinct correlation in the distribution of different characters in the three specimens at hand. Second, this variability is restricted mainly to the pattern of the junction of branches, whereas the number of main branches is much more stable. Until more material is available, it is better to explain the high variability with reference to the fact that we are dealing with the last representative of the order Hypoperlida rather than with three new species and genera. Variability is well known to increase in groups that are predestined for extinction.

Material. In addition to the holotype, paratypes NHM, In. 45520 and In. 45627, incomplete wings from the same locality.

Order Grylloblattida

Suborder Protoperlina

Family Sylvaphlebiidae Carpenter, 1950

Genus *Belmophenopterum* Rasnitsyn et Aristov, gen. nov.

Etymology. From locality and the generic name *Phenopterum*. Neutral gender.

Type species. *B. pectinatum* sp. nov.

Diagnosis. Anterior and posterior wing margins weakly convex; in basal half of wing, costal field wider than subcostal field. SC reaching distal quarter of wing, anterior branches of R forming double row of cells. RS two-branched and starting in basal third of wing. MA and MP simple at least up to the SC tip. CuA_1 weakly curved and branching early to form posterior comb of branches. Crossveins simple or forming double rows of cells.

Species composition. Type species.

Comparison. It is similar to *Phenopterum* Carpenter, 1950 from the Lower Permian (Artinskian) of Elmo (Kansas, United States) in having a wide costal field and late branching of MA and MP but differs in the convexity of the anterior wing margin and in the presence of a double row of cells in the distal half of the costal field. Additionally, the new genus differs from all sylvaphlebiids in the early branching and weakly curved CuA_1 .

Remarks. The family Sylvaphlebiidae first appears in the paleontological record in the Artinskian (or Sakmarian; see Shcherbakov, 2000) of the Lower Permian (localities of Obora, Czech Republic, and Elmo, United States). Up to the present, only a single Upper Permian representative of this family, *Paraphenopterum unicolor* Storozhenko, 1992 from the locality of Soyana, Kazanian of Russia (Storozhenko, 1992), has been known. *Belmophenopterum* gen. nov. is the youngest representative of the sylvaphlebiids; thus, only two Early Permian grylloblattid families, Sylvaphlebiidae and Liomopteridae, are known to have survived until the end of the Permian but not into the Triassic.

Sylvaphlebiidae is another grylloblattid family recorded from the Tatarian (the others being Liomopteridae, Ideliidae, Megakhosaridae, Geinitziidae, Tunguskapteridae, Blattogryllidae, and Chaulioditidae). The discovery of *Belmophenopterum* gen. nov. increases the diversity of Tatarian grylloblattids, which seems to be high as compared with the Upper Kazanian fauna—where only Ideliidae, Megakhosaridae, Chaulioditidae, and Liomopteridae have been found—and that of the first half of the Triassic—where only Geinitziidae and Chaulioditidae have been recorded. During the Early Tatarian, both Sylvaphlebiidae and

Geinitziidae disappear from oryctocenoses; this may be attributed to a possible reduction in their abundance (Aristov, 2004).

Belmophenopterum pectinatum Rasnitsyn et Aristov, sp. nov.

E t y m o l o g y. From Latin *pectinatum* (pectinate).

H o l o t y p e. NHM, In. 45837, impression of forewing without base and apex; locality of Belmont; Upper Permian.

D e s c r i p t i o n (Fig. 3). The anterior branches of SC are simple and straight, M apparently has three terminal branches. CuA₁ has six branches, CuA₂ is simple and S-shaped.

M e a s u r e m e n t s, mm. Fragment length, 8.7; full length, about 12.

M a t e r i a l. Holotype.

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