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A NEW GENUS OF THE FAMILY PANFILOVIIDAE (INSECTA, NEUROPTERA) FROM THE MIDDLE JURASSIC OF CHINA

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Abstract: *Epipanfilovia oviformis* gen. et sp. nov. (Neuroptera: Panfiloviidae) is described from the Middle Jurassic locality of Daohugou (Inner Mongolia, China) based on six specimens. A revised diagnosis of this family is provided. It includes two genera, *Panfilovia* Makarkin and *Epipanfilovia* gen. nov.; *Osmylogramma* Ponomarenko is removed from the family. Panfiloviidae is most closely related to another Jurassic family Grammolingiidae, and both are provisionally assigned to the superfamily Osmyloidea.

Key words: Neuroptera, Panfiloviidae, Grammolingiidae, Jurassic, Daohugou.

THE Mesozoic neuropteran family Panfiloviidae is very poorly known. It currently includes two genera, *Panfilovia* Makarkin, 1990 and *Osmylogramma* Ponomarenko, 1992. The former was originally described as the monotypic genus *Grammosmylus* Panfilov, 1980 from the Upper Jurassic Karatau locality, South Kazakhstan. It was the type and only genus of the family Grammosmylidae Panfilov, 1980. This generic name, however, turned out to be a homonym preoccupied by *Grammosmylus* Krüger, 1914 (Neuroptera: Osmylidae). Makarkin (1990) proposed the replacement names *Panfilovia* Makarkin and Panfiloviidae, respectively. Later, Ponomarenko (1996) described another species in this genus, *Panfilovia fasciata* Ponomarenko, from the Lower Jurassic (Lower Toarcian) of Germany based on a fragmentary wing. This species is here transferred to the new genus.

The monotypic genus *Osmylogramma* was described from the Lower Cretaceous Mongolian locality of Tsagan-Tsab (= Thagan-Tsav), and it is based on a well-preserved forewing (Ponomarenko 1992). However, its venation strongly differs from that found in other genera of Panfiloviidae. Particularly, the costal space is basally dilated with a well-developed recurrent branched humeral veinlet, Sc and R1 are fused far from the wing apex, the branches of Rs are inclined to Rs at a considerable angle, CuA is relatively short, enters the hind margin at the mid-point of the wing, and 3A is poorly developed. These features contradict the diagnosis of the family Panfiloviidae based on the type genus. Therefore, *Osmylogramma* is here removed from the family; most probably, it belongs to some psychopsoid family.

Thus, the family Panfiloviidae is confidently known to comprise only two species represented by two quite poorly preserved or incomplete specimens. The systematic position of this family was confused. Lambkin (1988, p. 457) classified it into the category 'Neuroptera of problematical affinities'. Similarly, Panfiloviidae was shown in the phylogenetic tree of Neuroptera as the only family whose relationships with other families is entirely unknown (Grimaldi and Engel 2005, text-fig. 9.4). Martins-Neto (1997) and Engel and Grimaldi (2008) considered this family as belonging to the superfamily Osmyloidea of the suborder Hemerobiiformia. Ponomarenko (2002) placed it amongst the families related to the extant Psychopsidae, that is, within the psychopsoids. Ren (2002) assigned it to the superfamily Myrmeleontoidea, and Ren and Engel (2008) to the suborder Myrmeleontiformia. Unfortunately, all these authors provided no reason for their placements. Makarkin and Archibald (2003) discussed a possible synonymy of Panfiloviidae with Kalligrammatidae.

In this study, we describe a new genus of Panfiloviidae from the Middle Jurassic of the Chinese locality of Daohugou based on several well-preserved specimens. The new material allows detailed study of the family's venation and enables the systematic position to be determined more definitely.

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MATERIAL AND METHODS

This study is based on six specimens collected near Daohugou Village (Shantou Township, Ningcheng County, Inner Mongolia, China) and housed in the fossil insect collection of the Key Laboratory of Insect Evolution and Environmental Changes, College of Life Sciences, Capital Normal University, Beijing, China (Dong Ren, curator), and the type specimen of *Panfilovia acuminata* Panfilov, 1980 from the Karatau locality (Kazakhstan) which is deposited in Palaeontological Institute of the Russian Academy of Sciences, Moscow, Russia. The insect-bearing beds near Daohugou Village are here considered as belonging to the Jiulongshan Formation and are dated as Bathonian, Middle Jurassic (Gao and Ren 2006); those at the Karatau locality are usually dated as Oxfordian/Kimmeridgian, Upper Jurassic (Rasnitsyn and Zherikhin 2002).

Specimens were examined using a Leica MZ12.5 dissecting microscope. Line drawings were prepared with the CorelDraw 12 graphics software and with the aid of Adobe Photoshop CS3. They were photographed using a Nikon SMZ1000 stereomicroscope and Nikon D100 digital camera.

SYSTEMATIC PALAEONTOLOGY

Remarks. The traditional terminology of wing venation (*sensu* Wootton 2003) follows Comstock (1918), with recent interpretations by Oswald (1993) and Archibald and Makarkin (2006).

Venation abbreviations used in the text and figures. 1A–3A, anal veins; C, costa; Cu, cubitus; CuA, anterior cubitus; CuP, posterior cubitus; M, media; MA, anterior branch of media; MP, posterior branch of media; R, radius; R1, first branch of radius; Rs, radial sector; Rs1, most proximal branch of radial sector; Sc, subcosta.

All wings are figured with the apex to the right.

Institutional abbreviations. CNUB, College of Life Sciences, Capital Normal University, Beijing, China; PIN, Palaeontological Institute of the Russian Academy of Sciences, Moscow, Russia.

Class INSECTA Linnaeus, 1758
Order NEUROPTERA Linnaeus, 1758
Family PANFILOVIIDAE Makarkin, 1990

1990 Panfiloviidae Makarkin, p. 120.
1980 Grammosmylidae Panfilov, p. 102 (nom. praeocc.)

Type genus. Grammosmylus Panfilov, 1980 (= *Panfilovia* Makarkin, 1990).

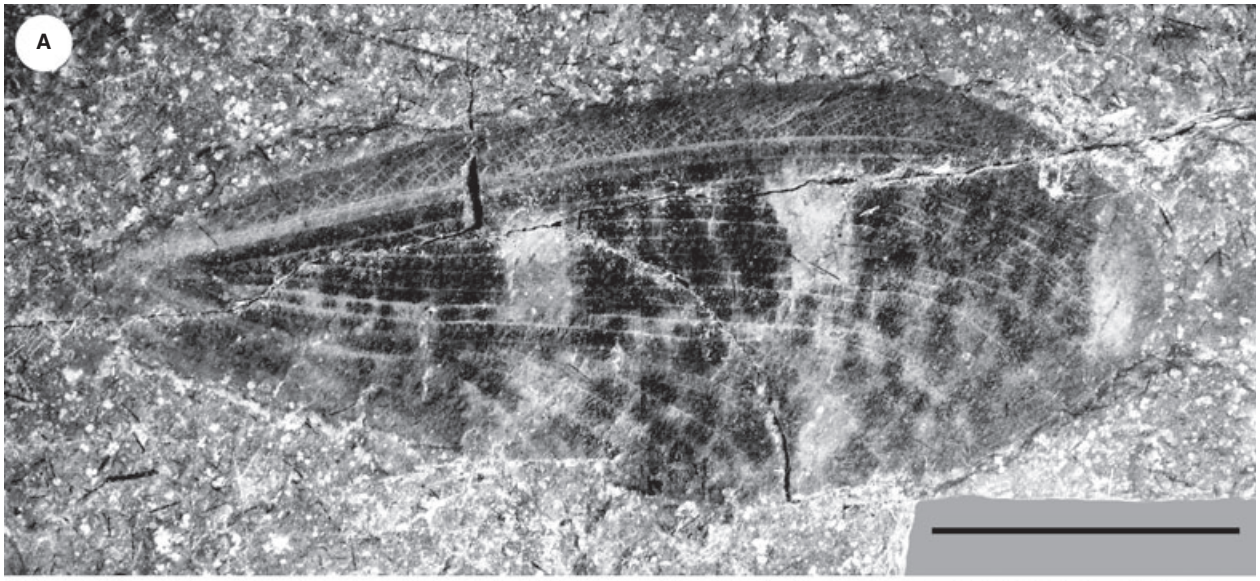
Revised diagnosis. Large neuropterans of osmyloid appearance (forewings 35–90 mm, hind wings 70–80 mm long); wings quite strongly folded, with alternating concave/convex position of branches of Rs to CuA, and fore- and hind wing venation similar; in both wings, trichosors restricted to distal portion; costa very stout along anterior margin; costal space moderately broad, narrowed basally; humeral veinlet simple, not recurrent; subcostal veinlets long, branched, quite strongly inclined to Sc, connecting by many closely spaced crossveins; Sc and R1 distally separated or fused near wing apex; branches of Rs running at very acute angle to R1; CuA relatively long, pectinate, entering hind margin after wing mid-point, with branches very long and deeply forked; CuP relatively short, pectinate branched, with few long branches; proximal branches of 2A terminating at 3A; 3A relatively long, running parallel to hind margin; crossveins very dense all around the wing; trichiation present on longitudinal veins and crossveins; in forewing, M forked proximally, at some distance from its origin; MA, MP not forked before distal branching; in hind wing, M forked very near to wing base; basal sinuous crossvein r-m present; jugal lobe apparently present.

Included genera and occurrence. Two genera: *Epipanfilovia* nov. gen. (two species) from the Lower Jurassic (Lower Toarcian; Posidonia Shale) of Germany and the Middle Jurassic (Bathonian; Jiulongshan Formation) of China, and *Panfilovia* (one species) from the Upper Jurassic (Oxfordian/Kimmeridgian; Barabastau Formation) of South Kazakhstan.

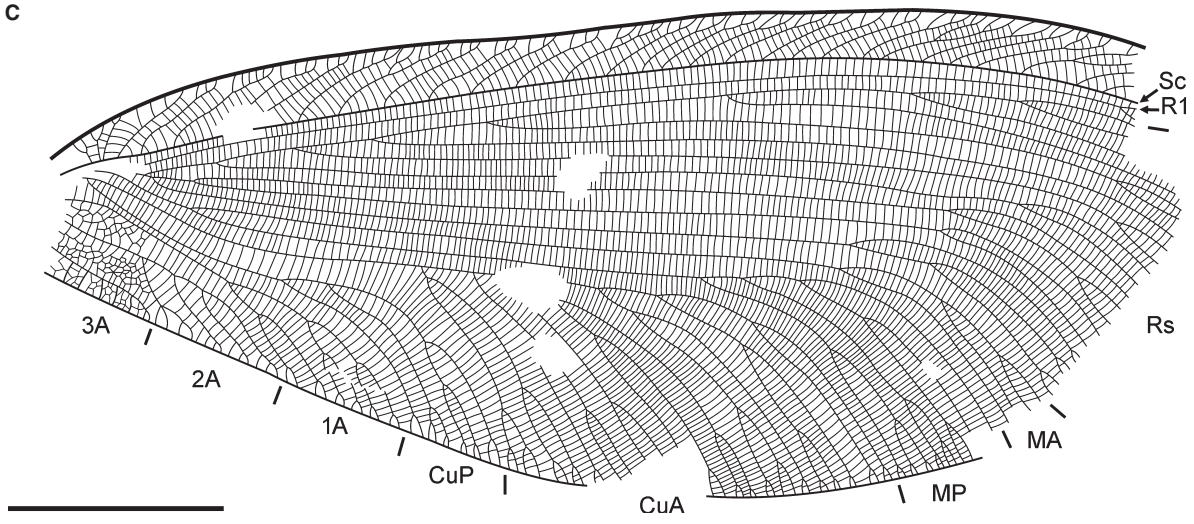
Remarks. The holotype of *Panfilovia acuminata* is represented by a rather poorly preserved, almost complete forewing (Fig. 1A). Our examination shows that its venation was in general correctly figured by Panfilov (1980, text-fig. 105), but M is forked in a more proximal position than in his figure, that is, at the same level as the origin of Rs1. The distal position of the fork of M and the convex CuA indicate a forewing, although the costal space is strongly narrowed basally. Association of *Panfilovia* and *Epipanfilovia* gen. nov. into same family is unequivocal, as they possess very similar wing venation. A few differences between these taxa are at most generic. Other genera that might be included in this family are unknown.

The fore- and hind wings of Panfiloviidae are similar to each other in their overall shape, the shape of the

FIG. 1. The forewings of Panfiloviidae. A, *Panfilovia acuminata* (Panfilov, 1980), photograph of the holotype PIN 2239/1710 (part). B–C, *Epipanfilovia oviformis* gen. et sp. nov., photograph (B) and line drawing (C) of the holotype CNU-NEU-NN2009483. Scale bar represents 10 mm.


A


B


C
Sc
R1
Rs
MA
MP
CuA
CuP
1A
2A
3A

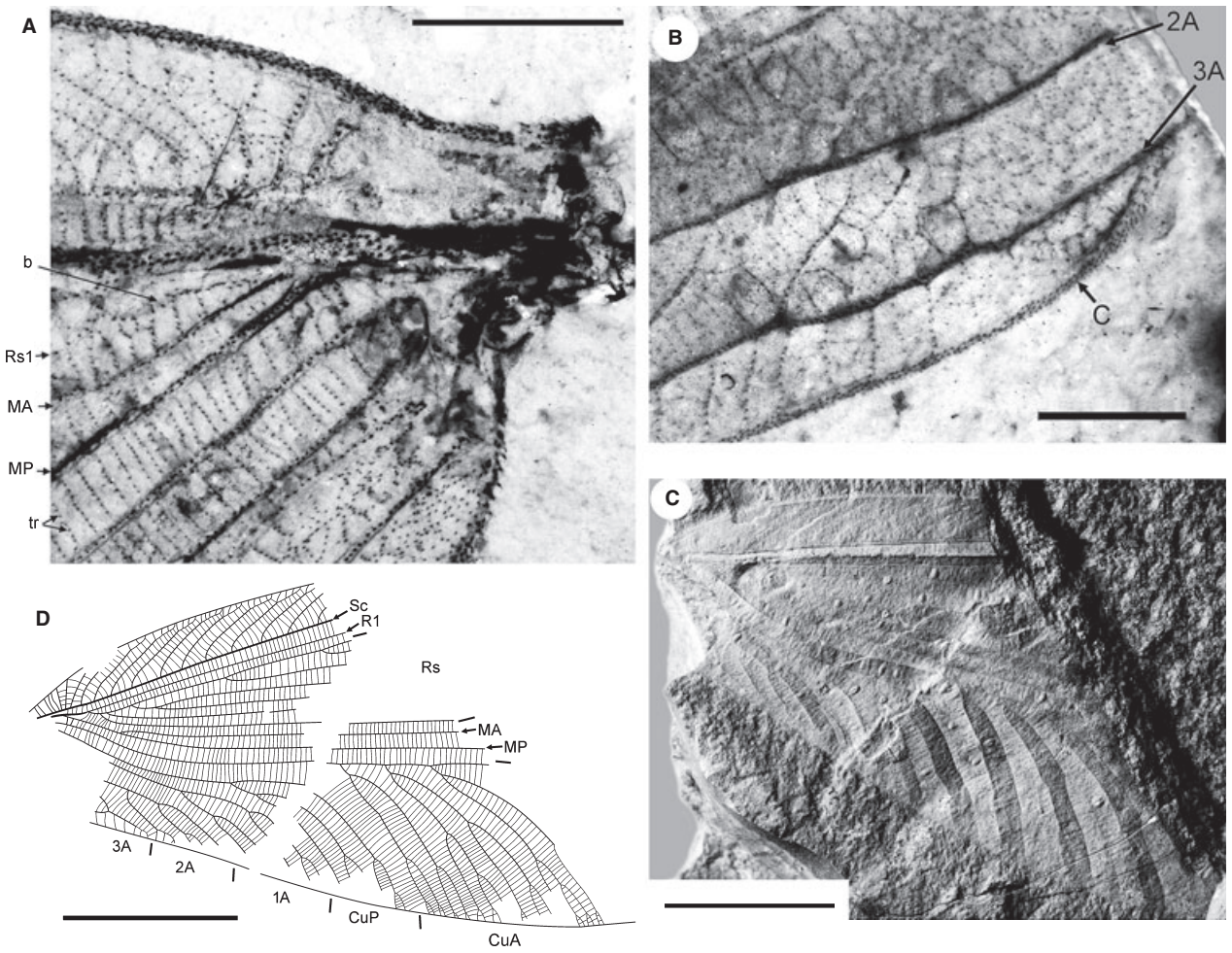


FIG. 2. *Epipanfilovia oviformis* gen. et sp. nov. A, basal portion of the hind wing showing trichiation on crossveins (tr) and the basal sinuous crossvein r-m (b), specimen CNU-NEU-NN2009019PC. B, anal region of the forewing showing the proximal branches of 2A terminating at 3A, specimen CNU-NEU-NN2009596. C, photograph and D line drawing of the forewing of specimen CNU-NEU-NN2009486. Scale bar represents 3 mm (A), 2 mm (B), 10 mm (C–D).

spaces (including costal ones) and the venation. They are unusual for the order, in which the vast majority of families express these features more or less differently. The only other family that has a similar fore- and hind wing shape and venation is Grammolingiidae, but the shape and venation of their costal spaces are different in the fore- and hind wings. The fore- and hind wings in Panfiloviidae may be distinguished only by the forking of M (see Diagnosis), the presence of the sinuous basal crossvein between the R and M systems in the hind wing, and the concavity/convexity relationships of CuA, which is convex in the forewing, and concave in the hind wing (Makarkin *et al.* 2009).

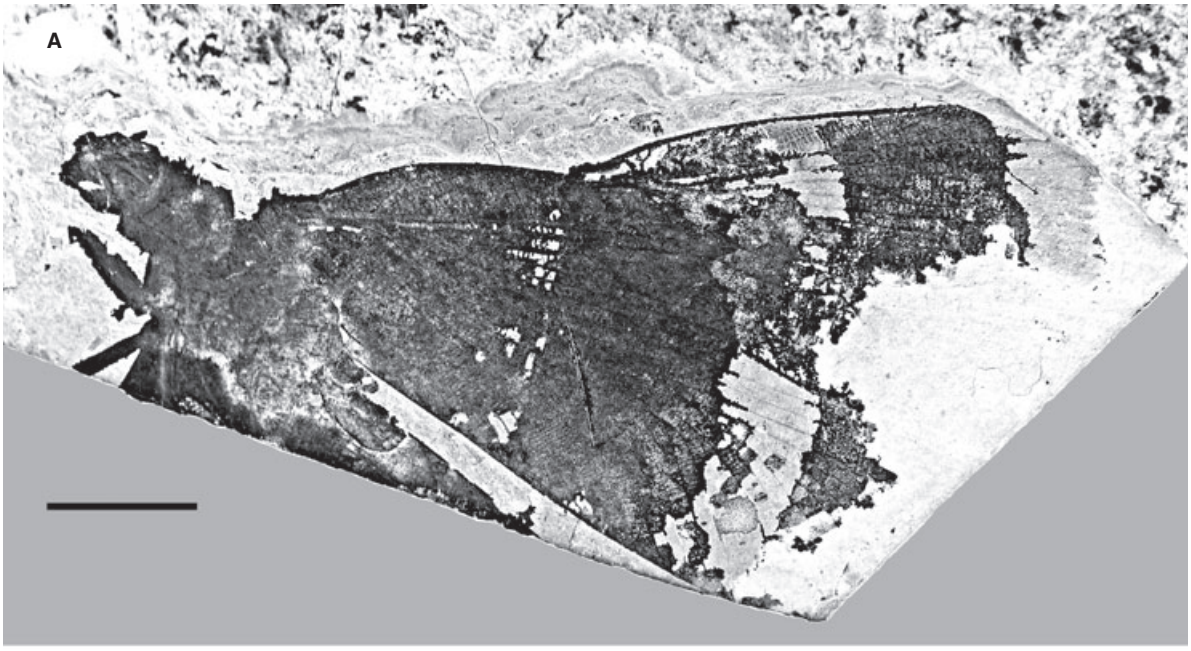
The jugal lobe is partly preserved in the specimen CNU-NEU-NN2009018PC. In this specimen, the jugal lobe is suggested by a folded-up structure and the presence of the partial costal vein near the wing base.

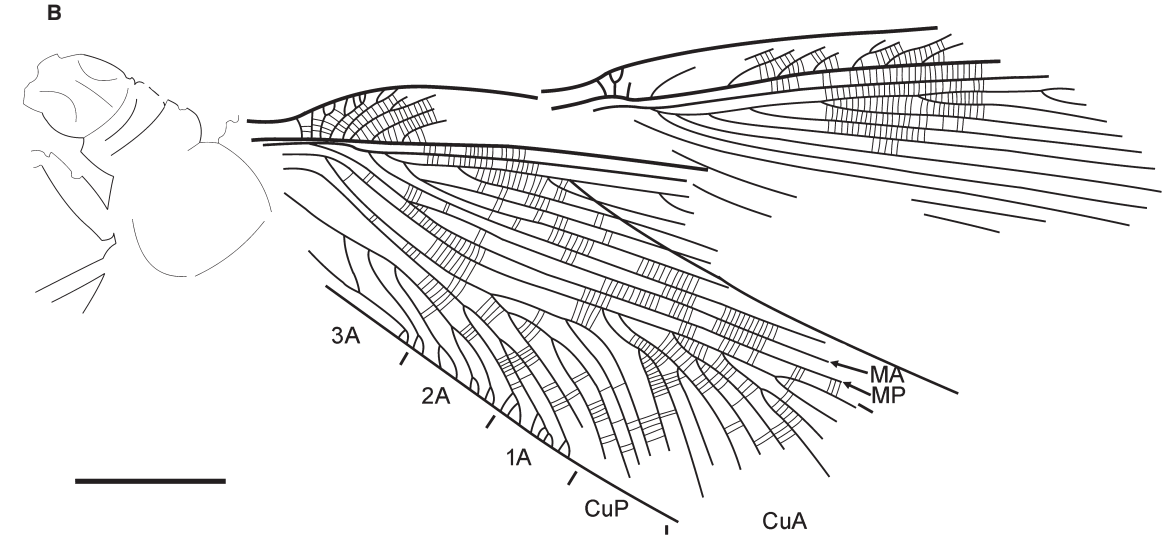
Genus EPIPANFILOVIA gen. nov.

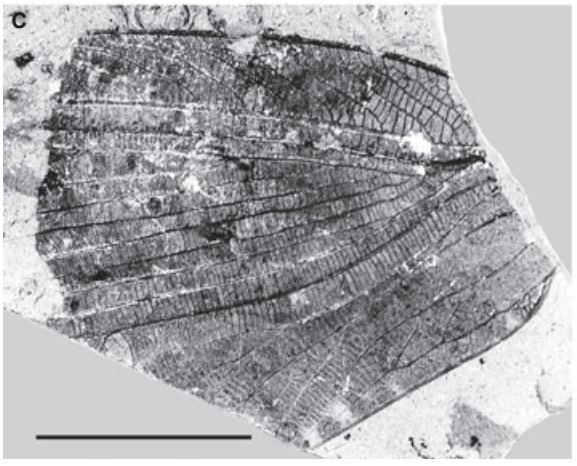
Type and only species. *Epipanfilovia oviformis* sp. nov.

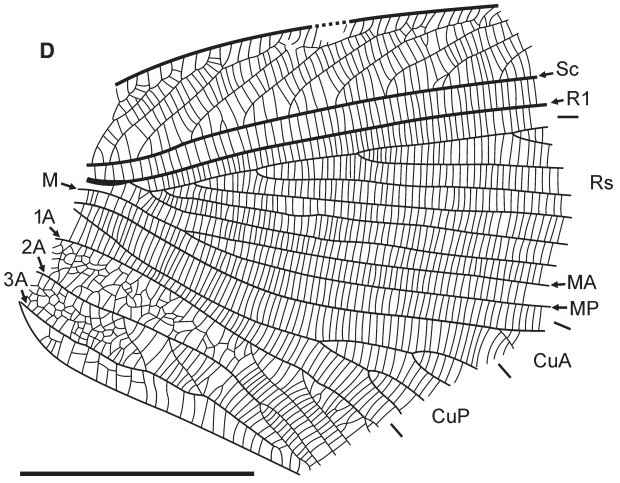
Derivation of name. The generic name is derived from the Greek *epi*, near, and *Panfilovia*, a genus-group name. Gender feminine.

FIG. 3. *Epipanfilovia oviformis* gen. et sp. nov. A, photograph and B line drawing of the part of specimen CNU-NEU-NN2009328P. C, photograph and D line drawing of the forewing of specimen CNU-NEU-NN2009596. Scale bar represents 10 mm.


A


B
3A
2A
1A
CuP
CuA
MA
MP


C


D
Sc
R1
Rs
M
1A
2A
3A
MA
MP
CuA
CuP

Diagnosis. May be distinguished from *Panfilovia* by Sc and R1 distally separated (fused in *Panfilovia*); M forked distal to origin of Rs1 (nearly at same level in *Panfilovia*); proximal branches of CuA originate at an obtuse angle, distal branches at acute angle (all branches of CuA originate at an acute angle in *Panfilovia*); CuP incurved proximally, strongly arched distally (CuP straight proximally, slightly arched distally in *Panfilovia*).

Remarks. The wings examined differ considerably in size, especially the forewings that vary from 60 to 90 mm (the hind wings vary from 70 to 80 mm). Moreover, the wings have slightly different wing proportions (length/width ratio 2.50–2.67 for forewings, 2.31–2.43 for hind wings). Nevertheless, all are here considered to belong to a single species, because there are no considerable differences in the wing venation between them to justify the creation of two or more species. Only one incomplete forewing CNU-NEU-NN2009596 differs more greatly than the others. Particularly, its subcostal space is much broader, and 3A is longer such that the two proximal branches of 2A terminate at 3A. Also in the forewing of CNU-NEU-NN2009328PC, Rs1 originates separately from R (not from the stem of Rs as found in other specimens), but otherwise its venation is on the whole very similar to that of the holotype, although they differ greatly in size. The two hind wings could also represent two species, because they differ slightly in colour pattern and venation. However, at present, we cannot evaluate the taxonomic significance of these differences because of the absence of well-preserved complete specimens with articulated fore and hind wings. Until such specimens are found, the actual number of species remains unknown.

Epipanfilovia oviformis sp. nov.
Figures 1B–C, 2–5

Derivation of name. From Latin *ovum*, egg, and *forma*, form, shape, in reference to the ovoid shape of the hind wing.

Holotype. CNU-NEU-NN2009483 (holotype), a nearly complete forewing (Fig. 1B–C).

Additional material. CNU-NEU-NN2009486, a proximal part of forewing; CNU-NEU-NN2009328PC, a poorly preserved anterior portion of body and proximal parts of forewing and hind wing; CNU-NEU-NN2009596, a proximal part of forewing; CNU-NEU-NN2009019PC, a well-preserved almost complete hind wing; CNU-NEU-NN2009018PC, a well-preserved hind wing lacking apical part. All deposited in CNUB.

Type locality and horizon. China, Inner Mongolia, Daohugou locality; Jiulongshan Formation, Middle Jurassic (Bathonian).

Differential diagnosis. Differs from *E. fasciata* by more oblique distal branches of CuA.

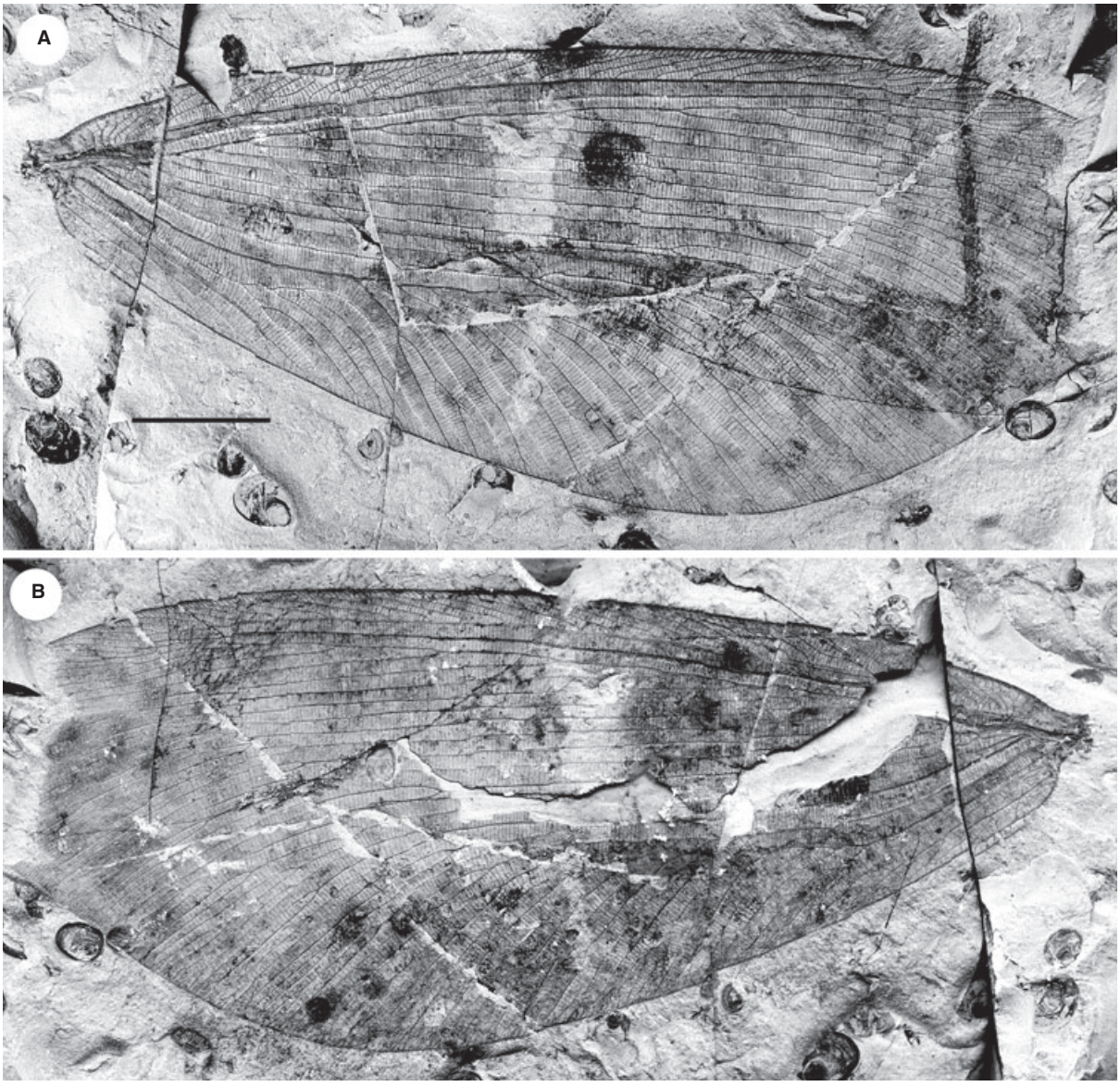
Description

Holotype. Forewing elongate oval, 52.5 mm long (as preserved; estimated complete length about 60 mm), 22.5 mm wide (length/width ratio about 2.67). C very stout along proximal 2/3 of anterior margin; rather stout distally along anterior margin and basally along hind margin. Costal space moderately broad for entire length, narrowed basally. Subcostal veinlets long, inclined to wing apex, mainly pectinately branched near anterior margin, connected by numerous closely spaced crossveins; basal veinlets at nearly right angle to Sc, forked near C. Subcostal space relatively narrow, filled with dense crossveins. R1 branched far proximal to apex (incompletely preserved). R1 space approximately as broad as width of subcostal space. Rs originates near wing base, with nine very oblique branches arched distally. Rs1 fused basally for short distance with Rs2; Rs2 deeply forked at level of fork of M. M forked distal to origin of Rs1. MA nearly straight before distal branching, arched distally, weakly branched (with three simple branches). MP parallel to MA, distally arched, pectinately branched with three long curved branches running parallel to distal part of MA. Cu dividing into CuA and CuP very close to wing base. CuA long, incurved before branching, distally somewhat arched, with 5–6 long pectinate deeply forked branches; distal branches oblique, parallel to those of MP, proximal branches become less oblique. CuP much shorter than CuA, incurved proximally, strongly arched distally, with three branches, majority not deeply forked. 1A long, with three long pectinate branches, of which two are deeply forked. 2A long, with three long pectinate branches. 3A relatively long, pectinately branched, running nearly parallel to hind margin. Crossveins very dense over entire wing; reticulation present between anal veins proximally. Colour pattern not preserved.

Specimen CNU-NEU-NN2009486. Forewing about 35 mm long, about 20.5 wide (as preserved; estimated complete length about 60 mm, width about 24; length/width ratio about 2.5; Fig. 2C–D). The venation is very similar to that of the holotype, but differs as follows: different arrangement of Rs branches (it is clearly an individual variation); proximal branch of 2A fused with 3A; and 3A longer. Colour pattern not preserved.

Specimen CNU-NEU-NN2009328PC. Head with distinct epicranial suture (Fig. 3A–B). Prothorax and forelegs relatively short.

FIG. 4. *Epipanfilovia oviformis* gen. et sp. nov. A, photograph of part, B, counterpart and C, line drawing of the hind wing of specimen CNU-NEU-NN2009019PC. Scale bar represents 10 mm (A, B to same scale).


A
B
C
Sc
R1
Rs
MA
MP
CuA
CuP
1A
2A
3A

Forewing 45 mm long, 23 mm wide (as preserved; estimated length about 80–90 mm). Venation is similar to that of the holotype, distinguished from it by Rs1 originating separately at R proximal to the origin of the remainder of Rs; branches of 1A and 2A are more oblique; proximal branch of 2A is fused with 3A, and 3A is running closer to hind margin. Forewing colour pattern consists of dark membrane with two pale transverse preserved bands, narrow (interrupted) proximally and broad near wing mid-point. Venation of hind wing poorly preserved, only a few characters visible. Hind wing colour pattern consists of dark membrane with pale transverse band at proximal 1/3 of wing length, broadening anteriorly.

Specimen CNU-NEU-NN2009596. Forewing 24 mm long, 19 mm wide (as preserved; estimated complete length 70–80 mm, width 26–28 mm; Figs 2B, 3C–D). Costa very stout along anterior margin (stouter than Sc) covered with several rows of hairs; slightly less stout along posterior margin (nearly as stout as Sc). Trichosors absent in preserved (proximal) wing portion. Costal space moderately broad for entire preserved length. Subcostal veinlets long, oblique, pectinately branched near anterior margin, connected by closely spaced crossveins. Subcostal space broad. R1 basally (before origin of Rs) very stout. Rs with five oblique parallel preserved branches, not forked in preserved fragment; Rs1 originating near origin of Rs. M not fused with R basally, forked much distad origin of Rs1; MA and MP parallel proximally. Cu dividing into CuA and CuP near wing base. CuA incurved, origin of proximal-most branch located distad second branch of CuP. CuP in general parallel to CuA, with two branches preserved, proximal-most branch deeply forked. 1A pectinate, with three preserved oblique branches. 2A pectinate, with three oblique branches, two proximal of which fused with 3A. 3A very long, pectinate, in general nearly parallel to hind margin. Crossveins very dense over entire wing fragment; reticulation present between 1A, 2A, and 2A, 3A proximal to their branching. Colour pattern of proximal wing portion indistinct appears to be nearly unicolourous fuscous.

Specimen CNU-NEU-NN2009019PC. Hind wing ovoid in shape, most dilated after wing mid-point; 76 mm long (as preserved; estimated complete length 82–83 mm); 34.2 mm wide (length/width ratio about 2.43; Figs 2A, 4A–C). C very stout along proximal half of anterior margin gradually thinner towards wing apex; slightly less stout along posterior margin (nearly as stout as Sc). Indistinct trichosors preserved only along posterior margin distal to wing mid-point. Costal space relatively broad, slightly dilated before wing mid-point. Subcostal veinlets long, strongly inclined to wing apex, pectinately branched near anterior margin, connected by numerous closely spaced crossveins; basal veinlets nearly at right angle to Sc, simple or forked near C; humeral veinlets not recurrent, slightly bent to base. Subcostal space broad for entire length. Sc and R1 basally very stout; distally not fused, widely separated, entering margin well before wing apex. R1 distally branched rather far from wing apex. Rs originates quite near wing base, with 13 very oblique parallel branches, not forked for 2/3 of their lengths; Rs1 originating near origin of Rs. Basal sinuous vein between R and M systems present, rather long, connecting beginnings of Rs1 and MA. Fork of M very near to wing base, MA and MP appear to originate from R (no stem of M visible). Additional longitudinal vein present between MA and MP, beginning nearly at level of origin of Rs1 and terminating at level of proximal branch of MP. MA concave, nearly straight before branching, nearly dichotomously branched after, with few long very oblique branches. MP incurved before branching, arched after, with three long, very oblique branches; one of them deeply forked. Cu dividing into CuA and CuP near wing base. CuA long, incurved before branching, arched after, with seven long branches, mainly deeply branched; distal branches oblique, parallel to those of MP, proximal branches became less oblique. CuP almost straight before branching, strongly arched after, with three long pectinate branches, of which proximal-most deeply forked. 1A rather short, nearly straight, only with terminal branching. 2A nearly straight, with four pectinate branches, one proximal-most terminated at 3A, other long, very obliquely terminated at hind margin. 3A running parallel close to hind margin, with short pectinate branches. Crossvenation very dense over entire wing; reticulation present between 1A, 2A, and 2A, 3A proximally. Hairs on longitudinal veins and crossveins present. Colour pattern in general fuscous, slightly variegated in distal half, with broad transverse pale spot crossing branches of Rs before wing mid-point, and transverse pale narrow band across branches of CuA.

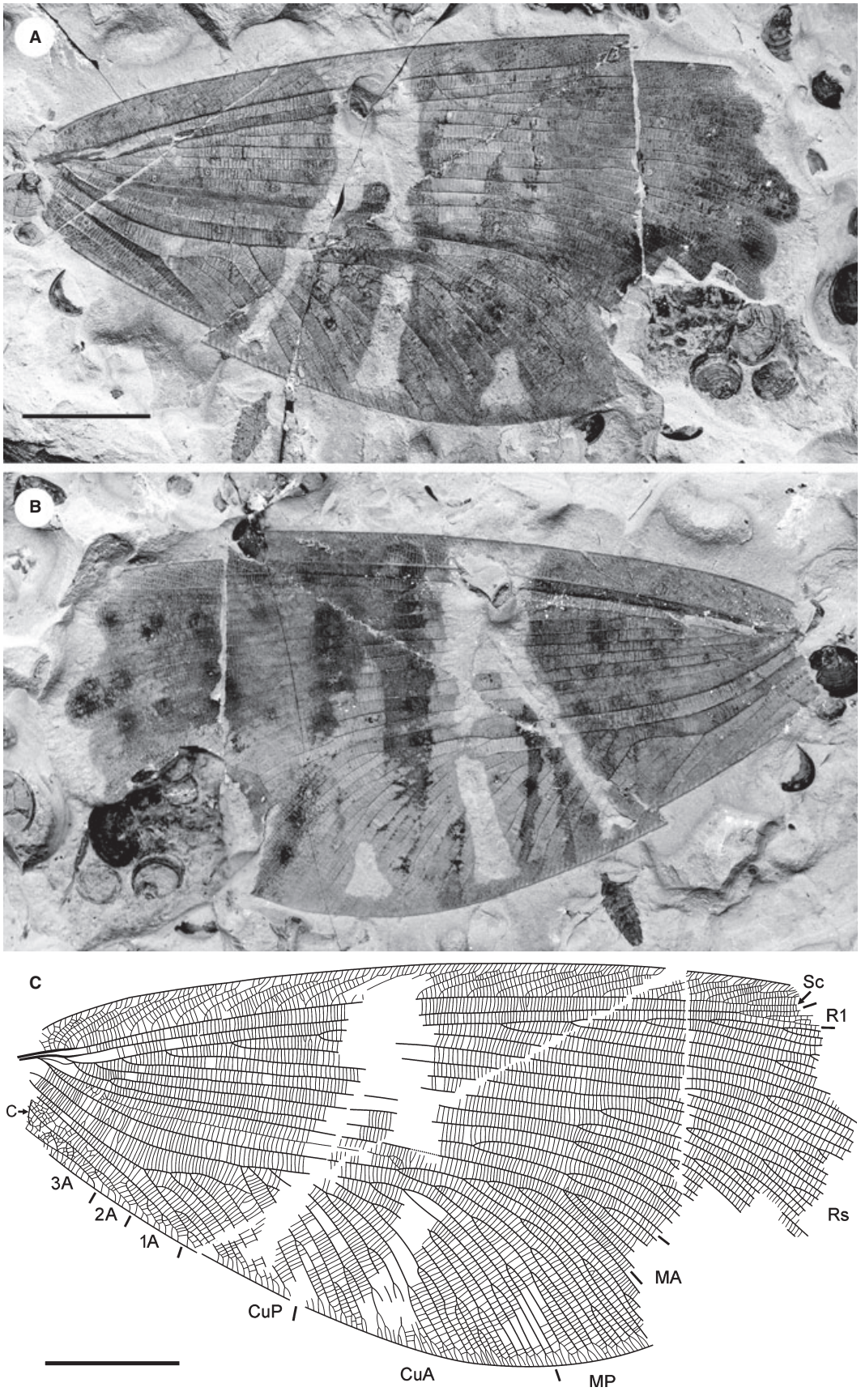
Specimen CNU-NEU-NN2009018PC. Hind wing 60 mm long (as preserved; estimated complete length about 70 mm), 30.3 mm wide (length/width ratio about 2.31; Fig. 5A–C). Venation is similar to that of CNU-NEU-NN2009019PC, differs mainly as follows: Rs1 deeply forked; short stem of M present; additional vein between CuP and proximal branch of CuA present, so that these appear fused. Colour pattern fuscous, lighter posteriorly, with Λ-like transverse pale spot across entire wing before its mid-point, similar blackish spot distal to that, and several small round blackish spots apically.

Epipanfilovia fasciata (Ponomarenko, 1996), comb. nov.

1996 *Panfilovia fasciata* Ponomarenko, p. 88, text-figs 76, 80.

Remarks. This species is known from an incomplete forewing described from the Lower Jurassic (Lower Toarcian) of Hondelage near Braunschweig, Germany. It is here tentatively assigned to this genus based on the configuration of CuP and the fork of M located far distal to the origin of Rs1; both conditions are similar to those found in the type species of *Epipanfilovia* gen. nov.

FIG. 5. *Epipanfilovia oviformis* gen. et sp. nov. A, photograph of part, B counterpart and C line drawing of the hind wing of specimen CNU-NEU-NN2009018PC. Scale bar represents 10 mm (A, B to same scale).


A
B
C
Sc
R1
C
3A
2A
1A
Rs
MA
CuP
CuA
MP

DISCUSSION

Our study shows that the venation and wing shape of Panfiloviidae are most similar to those of Grammolingiidae that is known to occur from the Lower Jurassic of Kyrgyzstan (Khramov 2011) to the Middle and Upper Jurassic of China and Mongolia (Ren 2002; Khramov 2010; Liu *et al.* 2011; Shi *et al.* 2011). These two families are clearly closely related to each other. Indeed, the wings of both groups have a strong folding structure; all longitudinal veins are in general similarly (sometimes identically) configured; the costa is very stout; the numerous closely spaced crossveins are distributed all over the wing and bear hairs; the reticulation between anal veins is present. The grammolingiids and panfiloviids differ by some minor features: in Grammolingiidae, the subcostal veinlets are simple, inclined at nearly right angles to Sc, connecting by at most one crossvein in the forewing, and none in the hind wing; the subcostal and R1 spaces are very broad (in comparison with those of Panfiloviidae); the costal space is narrow in the hind wing; 3A is usually short, and the branches of 2A are not terminating at 3A (see family diagnosis for these character states in Panfiloviidae). However, these differences between the families are constant and retained in taxa from the Middle Jurassic (both groups are represented in China) to the Upper Jurassic (the panfiloviid genus *Panfilovia* from Kazakhstan, and the grammolingiid genus *Leptolingia* Ren, 2002 from Mongolia). The known grammolingiids are smaller (forewings length 42–54 mm) than the Middle Jurassic panfiloviids (60–90 mm). However, the type species of Panfiloviidae from the Upper Jurassic is much smaller than both grammolingiids and the Middle Jurassic panfiloviids (forewing length 35 mm). Therefore, it is a matter of preference to consider grammolingiids and panfiloviids as subfamilies of a single family or as two distinct closely related families. Grammolingiidae is here considered a distinct family pending discovery of new taxa from the Lower Jurassic and Lower Cretaceous which may help resolve the problem.

Panfiloviidae (and Grammolingiidae) are distantly related to most families of Neuroptera classified into three suborders, Nevrorthiformia, Hemerobiiformia and Myrmeleontiformia (Aspöck *et al.* 2001; Grimaldi and Engel 2005; Engel and Grimaldi 2008). Most psychopsid-like neuropterans and all Myrmeleontoidea are entirely dissimilar to Panfiloviidae. Also, this family is very unlike the majority of families of Hemerobiiformia and the single family of Nevrorthiformia. Of the psychopsid-like neuropterans (psychopsoids) that are assigned usually to Myrmeleontiformia, panfiloviids resemble only Kalligrammatidae, mainly because of the presence of numerous closely spaced crossveins, and similar structure of the costal space in some taxa (see e.g. *Kalligramma multinerve* Panfilov, 1968). Configurations of the longitudinal veins are different in these groups, especially with regard to MP (which is pectinate, with branches directed anteriorly in the vast majority of taxa), and anal veins (in particular, 1A is very long and pectinate). Moreover, the fore- and hind wings are strongly dissimilar to each other in shape and venation in Kalligrammatidae. Panfiloviidae are similar to only one family of Hemerobiiformia: Osmylidae. Panfiloviidae shares with all (or some) genera of Osmylidae a common venational pattern, in particular the following character states: in the forewing, the costal space is strongly narrowed basally, with a simple, crossvein-like humeral veinlet; the branching of M is similar; Cu is forked close to the wing base, with CuA and CuP pectinate; the numerous closely spaced crossveins; in the hind wing, M is forked close to the wing base and is similarly branched; the sinuous basal crossveins between the R and M systems are present. However, in all Osmylidae, Sc and R1 are fused far from the wing apex, and the wing shape and venation are different in the fore- and hind wings; the vast majority of the osmylid genera have CuP more pectinately branched than CuA; 1A is often long, strongly pectinate; 3A is usually very short. These features contradict those of Panfiloviidae. Consequently, the venational similarity of Panfiloviidae and Osmylidae is only relative: Panfiloviidae are more similar to the latter than to any other family (possibly excluding Kalligrammatidae). This similarity with Osmylidae supports, although preliminary, the assignment of Panfiloviidae to the superfamily Osmyloidea by Martins-Neto (1997) and Engel and Grimaldi (2008).

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