

Fossil and Recent *Anisopodomorpha* (Diptera, Oligoneura): family *Cramptonomyiidae*.

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Abstract. The key for distinguishing the Recent and fossil genera of the family *Cramptonomyiidae* is presented. Three new fossil species belonging to two new genera are described: *Tega penna* gen. et sp. n. from the Upper Jurassic of Mongolia, *T. karatavica* sp. n. from the Upper Jurassic of Kazakhstan and *Pivus sarus* gen. et sp. n. from the Lower Cretaceous of Transbaikalia (South Siberia).

Key words: *Diptera*, *Anisopodomorpha*, *Axymyiomorpha*, *Cramptonomyiidae*, *Pachyneuridae*, *Tega*, *Pivus*, fossil, Jurassic, Cretaceous, Mongolia, Siberia.

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INTRODUCTION

The family *Cramptonomyiidae* was established by HENNIG (1969) within the infraorder *Bibionomorpha*. KRIVOSHEINA & MAMAEV (1970) placed this family between the *Pachyneuridae* + *Hesperididae* and *Anisopodidae*. WOOD (1981) transferred it, at the subfamily level, to the family *Pachyneuridae*. However, in our opinion, *Pachyneuridae* and *Cramptonomyiidae* represent two separate lineages, which is apparent when comparing their wing venation (Figs 1-5). *Pachyneuridae* should be included into the infraorder *Axymyiomorpha*, whose representatives are characterized by four radial veins terminating in the wing margin, although the vein R_3 is very short (long R_{3+4} is present, formed by fusion of proximal sections of R_3 and R_4). In the higher *Axymyiomorpha* one medial vein is entirely reduced and d cell open (KRZEMIŃSKA et al. 1992). *Cramptonomyiidae* exhibit the features characteristic for the infraorder *Anisopodomorpha*: all medial veins present and d cell closed. Unique for the family is the course of R_4 ; this vein originates from Rs

in a position of a cross-vein, while its remaining distal part is fused with R_3 to form R_{3+4} which reaches wing margin.

The family *Cramptonomyiidae* is a direct descendant of the Jurassic family *Procramptonomyiidae* (KALUGINA & KOVALEV 1985). The family comprises three Recent genera: *Cramptonomyia* ALEXANDER (1931), *Haruka* OKADA (1938) and *Pergatospes* KRIVOSHEINA & MAMAEV (1970). No fossil representatives were recorded till now.

The present paper comprises the descriptions of three new fossil genera and species from the Jurassic and Cretaceous of Asiatic localities.

SYSTEMATIC PART

Key for the Recent and fossil genera of *Cramptonomyiidae* (based mainly on the wing venation characters).

1. Cell d very small (its length equals ca. 1/13 of wing length); cross-vein $m-cu$ attached to M_4 (Fig. 6, 8) *Tega* gen.n.
- cell d large (ca. 1/6 of wing length); cross-vein $m-cu$ attached to M_{3+4} (Figs 3, 4, 5, 9) 2
2. M_{1+2} very short (not exceeding half length of d cell); fork of M_{1+2} in the proximal part of d cell (Fig. 3) *Cramptonomyia* ALEXANDER
- M_{1+2} longer, its fork positioned in the distal part of d cell or beyond the cell 3.
3. Petiole of M_{1+2} absent (Fig. 9) *Pivus* gen. n.
- petiole of M_{1+2} present 4
4. R_s long (ca. 1/3 of R_5 length); R_3 branches off R_s together with cross-vein $r-m$ (Fig. 5).
Eyes of males are fused over a long section *Haruka* OKADA.
- R_s short (ca. 1/4 of R_5 length); R_3 branches directly off R_s (beyond the cross-vein $r-m$, Fig.4)
Eyes of males and females distinctly separate(Fig.4)
. *Pergatospes* KRIVOSHEINA & MAMAEV.

Family *Cramptonomyiidae*

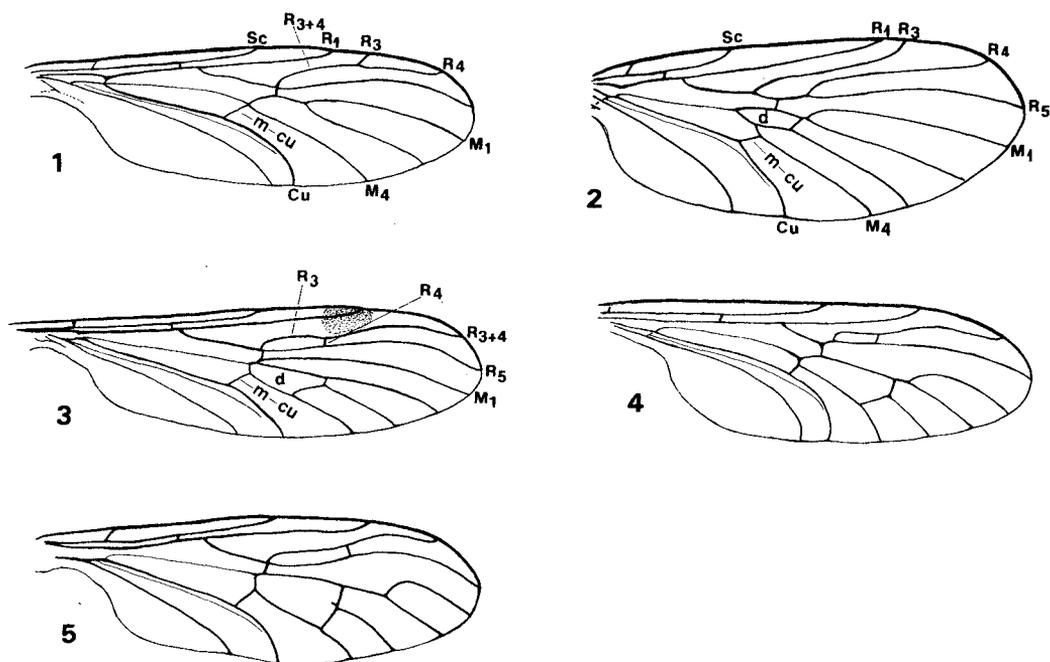
Diagnosis. Always three long radial veins reaching wing margin; in r_3 cell one cross vein present, probably a remnant of R_4 vein.

Type genus: *Cramptonomyia* ALEXANDER from North America.

Description. Head: long eyes, generally widely separated, only in males of *Pergatospes* joined over a short section. Antennae half longer than the head width, 15 segmented in *Haruka*, *Pergatospes* and *Cramptonomyia*, 14 segmented in *Tega* gen. n. Palpi 5-segmented, as long as the head or slightly shorter; two last segments of equal length. Three ocelli present.

Venation: Sc as long as half length of wing; always three long radial veins reaching the wing margin; in the r_3 cell one cross vein present, probably a remnant of R_4 vein; d cell always closed; four medial veins present.

Legs: in the middle and hind legs at least one tibial spur present. Genital organs: three small spermathecae in *Pivus* gen. n. present; two large ones in *Tega* gen. n.; in *Pergatospes* the spermathecae invisible.



Figs 1-5. Wing venation of *Axymyiomorpha* (1) and *Anisopodomorpha* (2-5): 1. *Pachyneura fasciata* ZETT. (*Pachyneuridae*); 2. *Archyrhyphus* sp. (*Protorhyphidae*); 3. *Cramptonomyia spenceri* ALEX.; 4. *Pergatospes holoptica* KRIVOSHEINA & MAMAEV; 5. *Haruka elegans* OKADA (all three *Cramptonomyiidae*).

Genus *Cramptonomyia* ALEXANDER, 1931

Only one, Recent, species known: *Cramptonomyia spenceri* ALEXANDER from North America (Fig. 3).

Genus *Haruka* OKADA, 1938

Only one, Recent, species known: *Haruka elegans* OKADA from Japan (Fig. 5).

Genus *Pergatospes* KRIVOSHEINA & MAMAEV (1970)

Only one, Recent species known, *Pergatospes holoptica* KRIVOSHEINA & MAMAEV from Asiatic part of Russia (Far East – Primorye) (Fig.4).

Tega gen. n.

Diagnosis: *d* cell very small, of the length reaching only 1/13 of wing length.

Type species: *Tega karatavica* sp. n., Karatau (Kazakhstan, south-western Asia) – end of Upper Jurassic. Two fossil species are known.

Description. Small flies, of body and wing size 3 mm. Antennae 14 segmented. Venation: *Sc* short (shorter than half of wing length); cross-vein *sc-r* before *Rb* fork; cross-vein in cell r_3 present, probably a part of R_4 whose distal section is fused with R_3 ; only three radial veins terminate in wing margin, i.e., R_1 , R_{3+4} and R_5 ; medial veins very long (longer than half of wing); d cell extremely small (of length equal $1/13$ wing length); cross-vein *m-cu* attached to M_4 .

Legs short, in all specimens badly preserved; at least one tibial spur present.

Genitalia only in female known; cerci short.

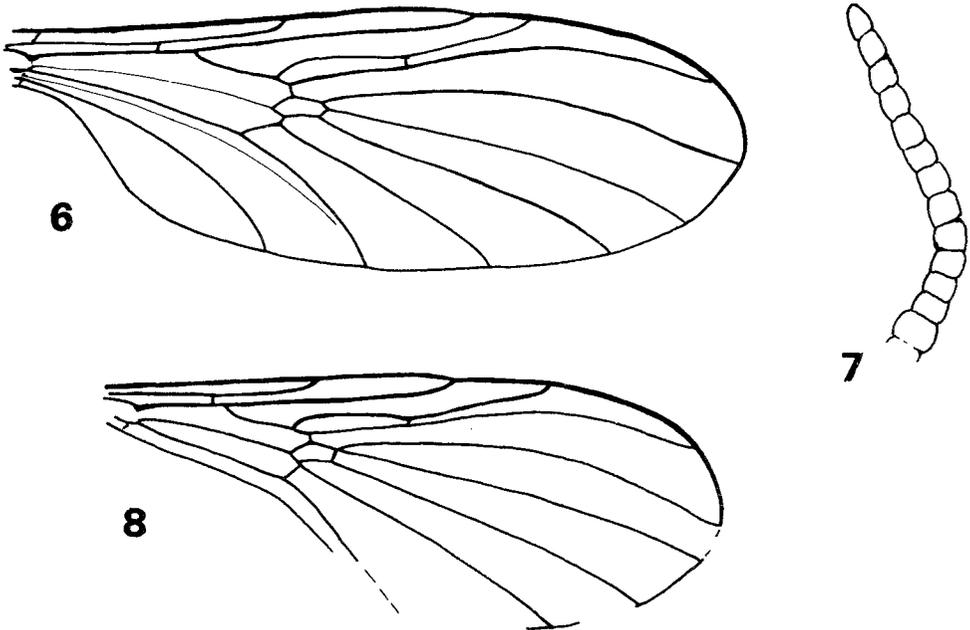
Remark. The new genus is very divergent from all other known representatives of the family, Recent or fossil.

Tega karatavica sp. n.

Diagnosis. Distance between tips of *Sc* and R_1 is 3.5 times as long as distance between tips of R_1 and R_{3+4} .

Description. whole body preserved (female, Plates I, II), 3.2 mm long; wing length 3 mm. Head well preserved, antennae (Fig.7) 14-segmented, almost half longer than the head width; flagellomeres short, thick; palpi invisible.

Wing (Fig.6): *Sc* ending opposite cross-vein *r-m*; cross-vein *sc-r* at its three lengths before (proximal to) the fork of *Rb*; r_1 cell very narrow, at the wing margin half as broad as the length of R_5 ; cross-vein (probably R_4) in the r_3 cell; d cell very small, ca. $1/13$ as long as wing; M_1 very long, exceeding half length of wing; petiole of M_{1+2} absent;



Figs 6-8. *Tega* gen. n. representatives (*Cramptonomyiidae*): 6. wing and 7. antenna of *T. karatavica* sp. n.; 8. wing of *T. penna* sp. n.

cross-vein *m-m* just beyond fork of M_{1+2} ; cross-vein *m-cu* long, attached to M_4 and parallel to costal wing margin.

Legs: only in one leg (probably middle) a tibial spur visible.

Abdomen covered with short, dense bristles; on each of side pleurytes a large spot visible (in a lateral view). Two very large spermathecae present; cerci short.

Material examined: holotype No. 2066/1444, female (Plate I); paratype No. 2997/3555, female (Plate II). Both specimens from Karatau (Kazakhstan, south-western Asia), Lower Jurassic.

Tega penna sp. n.

Diagnosis. Distance between tips of *Sc* and R_1 is 1.5 times as long as distance between tips of R_1 and R_{3+4} .

Description. Only one wing preserved, ca. 3 mm long (Fig. 8, Plate III); stigma invisible. *Sc* ending before midlength of wing, about the cross-vein *r-m* level; cross-vein *sc-r* positioned just before the fork of *Rb* into R_1 and R_s ; R_s short (ca. 1/5 of R_5 length); R_3 originates in R_s (i.e., before *r-m*); in the r_3 cell a cross-vein present, possibly the remainder of long R_4 vein; cross-vein *r-m* in midlength of upper part of *d* cell; M_1 exceeding half length of wing; petiole of M_{1+2} absent, i.e., *m-m* positioned in fork of M_{1+2} ; distal part of m_1 cell may probably be wider than that in Fig. 8 (the wing is slightly folded in this place); cross-vein *m-cu* escapes directly M_4 , just beyond the fork of M_{3+4} ; anal part strongly folded and not recognizable.

Material examined: Holotype No. 4270/2172(+,-) (Plate III), Shara-Teg (Mongolia), end of Lower Jurassic. Housed in the Paleontological Institute, Moscow.

Pivus gen. n.

Type species: *Pivus sarus* sp. n., Baysa (South Siberia), Lower Cretaceous (Neocomian).

Only one species is known; hence the diagnosis and description of the genus are covered by these of the new species.

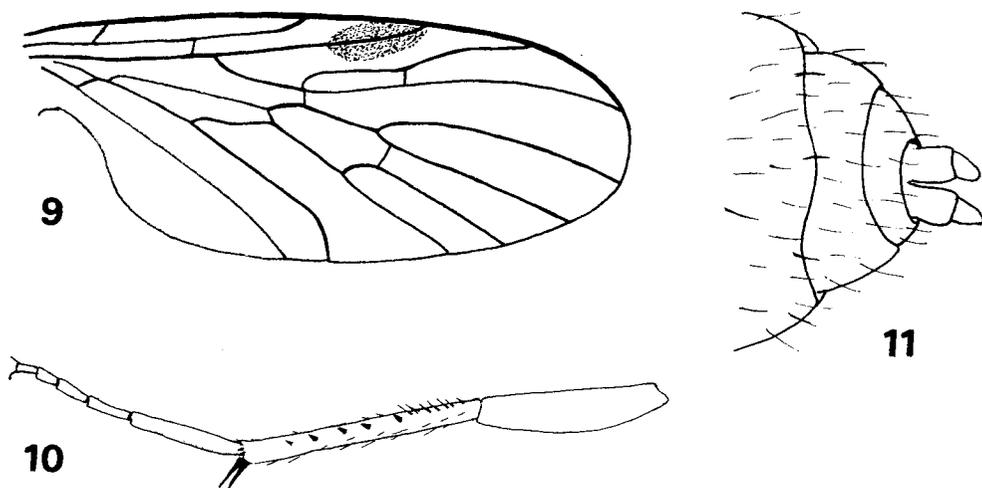
Pivus sarus sp. n.

Diagnosis: broad wing, its distal part rounded. Fork of M_{1+2} in the distal part of *d* cell which is large (as long as 1/5 of wing length).

Description: whole specimen preserved (Plate IV). Body length ca. 7.5 mm, wing length ca. 5 mm. Head partially visible, without antennae and palpi.

Wing (Fig. 9): *Sc* shorter than half of wing length, ending opposite the fork of R_s ; cross-vein *sc-r* at its one length before the fork of *Rb* into R_s and R_1 ; R_s short; R_3 wavy, 2.5 times as long as R_s ; cross-vein *r-m* positioned in 1/3 of *d* cell; M_1 escaping just before distal end of *d* cell, its length more than twice exceeding M_{1+2} length; *d* cell as long as 1/5 of wing length; cross-vein *m-cu* positioned in 1/6 of *d* cell base; anal lobe broad, rounded.

Legs (Fig. 10): short, with thick femora; covered with long, conspicuous setae; tibiae and tarsi with additional, short, strong bristles; tibiae of hind legs provided with double, strong spurs; second tarsomere twice shorter than the first.



Figs 9-11. *Pivus sarus*, gen. et sp. n. (*Cramptonomyiidae*): 9. wing, 10. leg, 11. cerci.

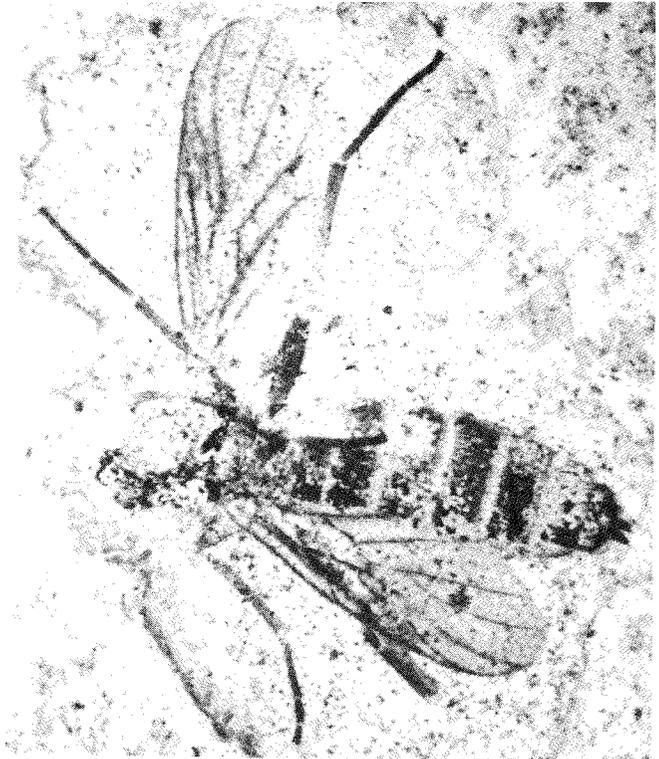
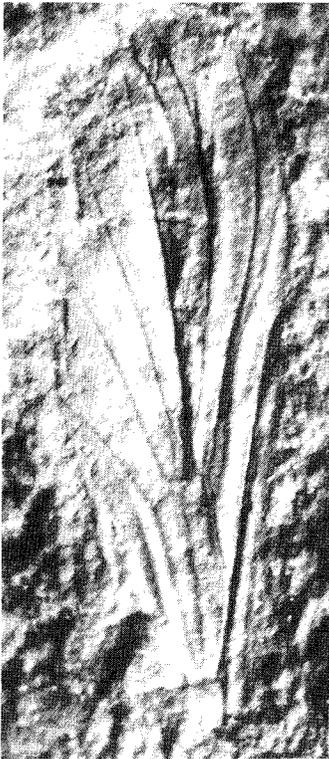
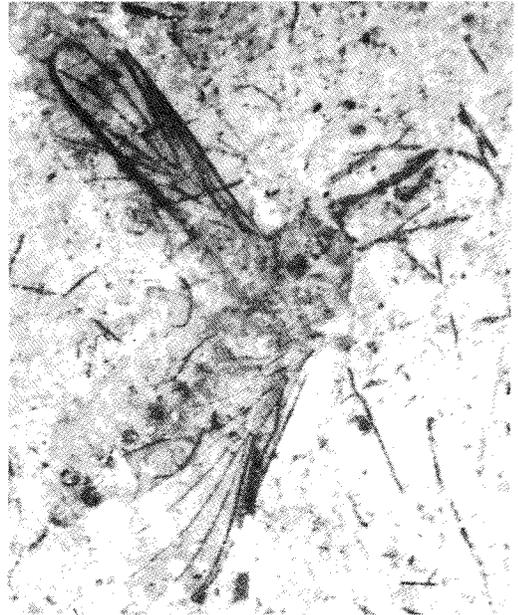
Abdomen densely set with bristles.

Female genital apparatus (Fig. 11): cerci two-segmental, densely covered with delicate bristles.

Material examined: Holotype No. 3064/9740 (Plate IV), Baysa (South Siberia), Lower Cretaceous. Housed in Paleontological Institute in Moscow.

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- I. *Tega karatavica* sp. n. (*Cramptonomyiidae*), holotype.
- II. *Tega karatavica* sp. n. (*Cramptonomyiidae*), paratype No.2997/3555.
- III. *Tega penna* sp. n. (*Cramptonomyiidae*), holotype.
- IV. *Pivus sarus* sp. n. (*Cramptonomyiidae*), holotype.