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## TRENTEPOHLIA BIGOT, 1854, CRANE FLIES (DIPTERA, LIMONIIDAE) FROM BALTIC AMBER (EOCENE)

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*Key-words:* Baltic amber, Diptera, Limoniidae.

*Mots-clés:* ambre de la Baltique, Diptères, Limoniidae.

### Abstract

A new fossil species of *Trentepohlia* Bigot, 1854 crane flies (Diptera, Limoniidae), *T. (Paramongoma) gagri* sp. nov., is described from Baltic amber (Eocene). Its affinities with other recent and fossil *Trentepohlia* are discussed. Previously unknown males of *T. (Onutia) damzeni* Podenas, 2003 and *T. (Trentepohlia) dampfiana* Alexander, 1931 are described. A key for all Baltic amber species of *Trentepohlia* is given.

### Résumé

Une nouvelle espèce fossile de *Trentepohlia* Bigot 1854, *T. (Paramongoma) gagri* sp. nov. (Diptera, Limoniidae), est décrite de l'ambre de la Baltique (Eocène). Ses affinités avec les autres espèces actuelles et fossiles de *Trentepohlia* sont discutées. Les mâles encore inconnus de *T. (Onutia) damzeni* Podenas, 2003 et de *T. (Trentepohlia) dampfiana* Alexander, 1931 sont décrits. Une clé d'identification des espèces connues de l'ambre de la Baltique est donnée.

### INTRODUCTION

The genus *Trentepohlia* Bigot, 1854 is characterized especially by its peculiar wing venation: only two or three *R* veins reach the wing margin due to the fusion of *Rs* branches (ALEXANDER, 1970); veins *R*<sub>5</sub> and *M*<sub>1+2</sub> are fused, thus *r-m* is obliterated and only two branches of *M* reach the wing margin; veins *CuA*<sub>2</sub> and *A*<sub>1</sub> reaching the wing margin at the same point (some recent species), close to each other leaving cell *cu* open (fossil species from Dominican and Mexican ambers), or *CuA*<sub>1</sub> reaches *A*<sub>1</sub> some distance before its tip, thus forming a very short petiole (figs. 1, 3, 5) (all fossil species from Baltic amber); second anal vein short. Male genitalia with one pair of fleshy simple gonostyles of quite similar structure in most species.

More than three hundred recent species belong to *Trentepohlia*, divided into seven subgenera; the majority of species are found in tropical areas. Only the two widely distributed subgenera *Mongoma* Westwood, 1881 and *Trentepohlia* s. str., covering more than four-

fifths of all known species, are found in the Palaearctic. Five species are known from Eastern Palaearctic (3 species from China and 2 from Japan) and one species from Egypt (SAVCHENKO, OOSTERBROEK & STARY, 1992). No species are known from Nearctic region (McALPINE *et al.*, 1981).

*Trentepohlia* are very scarce in fossil material. Only two species, belonging to the subgenus *Mongoma*, have been described from Eocene/Oligocene sediments of England (EVENHUIS, 1994); single species belonging to the subgenera *Onutia* Podenas, 2003 (subgenus known only from fossil material) and *Trentepohlia s. str.* have been described from Eocene Baltic amber (ALEXANDER, 1931; PODENAS, 2003); two species, both belonging to subgenus *Paramongoma*, are described from Oligocene/Miocene Mexican amber (PODENAS & POINAR, 2001), and one *Paramongoma* species from Dominican amber (Upper Eocene) (PODENAS & POINAR, 1999).

In the present paper, a new species, belonging to the subgenus *Paramongoma* is described from new fossil material, recently accessed by the Muséum d'Histoire Naturelle, Neuchâtel, Switzerland. No recent or fossil species of this subgenus were known so far from the Holarctic region. More than fifty recent species belong to this subgenus from the Neotropical, Oriental, Afrotropical and Australian regions.

#### MATERIAL AND METHODS

The amber pieces were polished to reveal taxonomic details of the preserved specimens. The crane flies were studied with a MBS 9, Zeiss SV8 and Leica MZ125 dissecting microscopes. Drawings were completed by the author. Photographs were done by Antanas Luksenas (the Art Museum of Lithuania).

The amber fossils were studied from the Muséum d'Histoire Naturelle, Neuchâtel, Switzerland (designations of specimens preceded by "MHNN") and Academy of

Natural Sciences, Philadelphia, PA, USA (designations of specimens preceded by "ANSP"). The type of this new species is deposited in the Muséum d'Histoire Naturelle, Neuchâtel, Switzerland.

Terminology of morphological features generally follows that of ALEXANDER (1970) and McALPINE *et al.* (1981); systematic arrangement follows that of SAVCHENKO, OOSTERBROEK & STARY (1992) and STARY & GEIGER (1998).

#### Key to fossil species of *Trentepohlia* Bigot, 1854 in Baltic amber

1. Wings with discal cell closed (figs. 1, 3) ..... 2
- Discal cell missing (fig. 5) ..... *T. (s. str.) dampfiana* Alexander
2. Veins  $R_3$  and  $R_4$  separate (fig. 3) ..... *T. (Paramongoma) gagri* spec. nov.
- Veins  $R_3$  and  $R_4$  coalescent (fig. 1) ..... *T. (Onutia) damzeni* Podenas

#### SYSTEMATICS

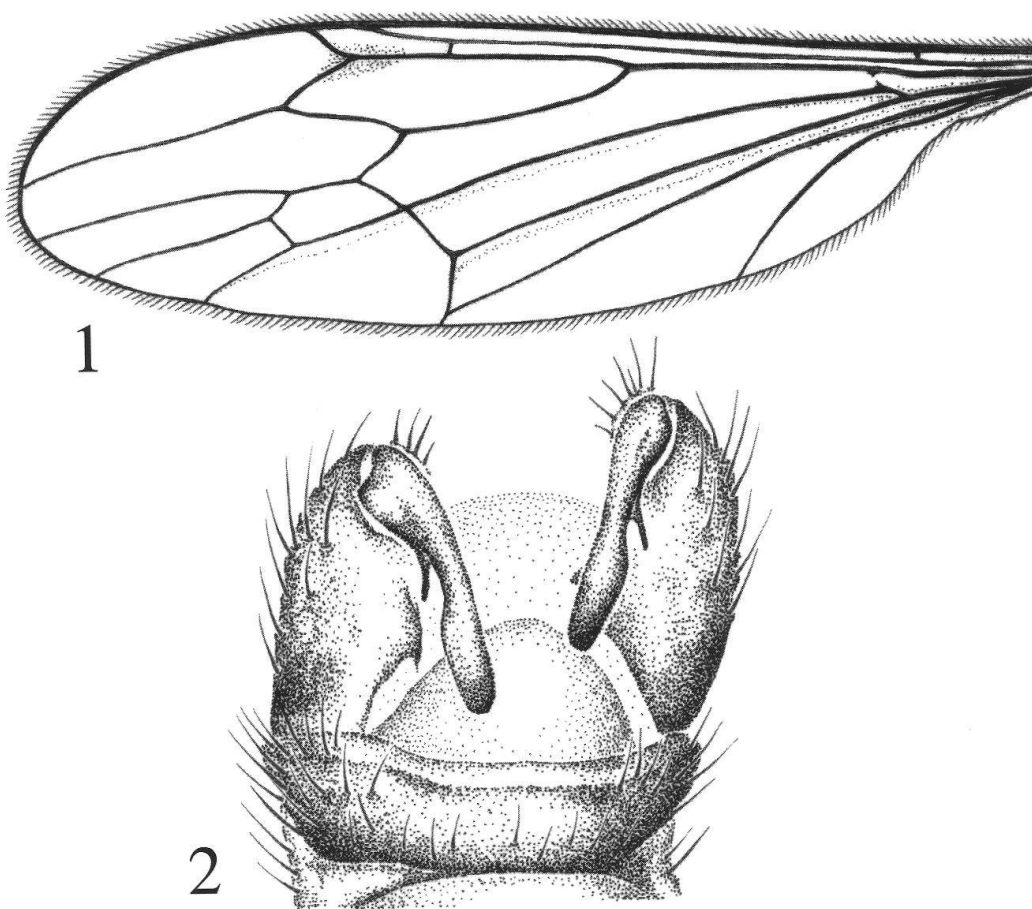
Order DIPTERA, Family LIMONIIDAE, Subfamily CHIONEINAE, Tribe GONOMYIINI

*Trentepohlia (Onutia) damzeni* Podenas, 2003 (Figs 1, 2; Pl. I. A)

*Material Examined.* – Holotype, Baltic amber (Eocene), Kaliningrad Region, Sembian Peninsula, Russia, female, ANSP 80130; male, same as holotype, ANSP 80106 (Pl. I. A).

*Description.* – Male (Pl. I. A and Figs 1-2). Body length 6.0 mm, wing length 4.5 mm.

Head brown, grey dusted, elongated; length including elongated proboscis 1.1 mm; mouth parts 0.6 mm long, greyish dusted. Eyes touching on ventral side of the head. Dorsal surface of the head covered with short scarce light hairs. Rostrum short, mouth parts elongated, but less than



**Figures 1-2:** *Trentepohlia (Onutia) damzeni* male (ANSP 80106): 1- right wing, 2- genitalia, dorsal view.

in female, covered with dense hairs on apex. Palpus four-segmented, 0.3 mm length, light brown, covered with scarce short light hairs; basal segment longest, the second segment approximately twice as short as basal, third and fourth segments decreasing in length, oval. Antenna 1.3 mm long, 16-segmented; scape elongated, nearly cylindrical, brown; pedicel short, nearly rounded, brownish; flagellum light brown, flagellomeres oval, decreasing in length toward apex; first flagellomere about half the length of scape, last segment slightly smaller than preceding; verticils light and short, shorter than length of the respective segments; pubescence covering flagellomeres light and scarce.

Thorax brown, dorsum without visible pigmented stripes and with two longitudinal lines formed by light erect hairs. Scutellum brown.

Wing clear, without any darker marks except very light stigmal region; veins light brown. Venation (Fig. 1): vein  $Sc_1$  long, extending beyond level of tip of  $Rs$ ;  $Sc_2$  level of about three fourth of  $Rs$  length;  $R_{1+2+3}$  reaching wing margin slightly beyond tip of  $Sc_1$ ;  $Rs$  long, slightly arcuate at base. The other radial veins are strongly reduced and only one branch of  $Rs$ ,  $R_{4+5}$ , reaches wing margin;  $R_{2+3}$  an oblique cross-vein reaching  $R_1$  close to its tip. Discal cell elongated, slightly more than twice as long as wide. Veins  $R_5$ ,  $M_1$  and  $M_2$  fused, thus cell  $m_1$  absent. Basal deflection of  $CuA_1$  reaches  $M$  slightly before the base of discal cell; vein  $CuA_2$  strongly bent posteriorly and falling into  $A_1$  close to its tip, thus cell  $cu$  with short apical petiole. Vein  $A_2$  comparatively short, its tip reaches wing margin before the level of  $Rs$  base.

Coxae, trochanters and legs light brown. Tip of front femur darkened. Legs covered with short, comparatively scarce brownish hairs. Front femur 5.4 mm long. Haltere 0.6 mm long, light brown.

Abdomen light brown, with darkened distal portion, covered with semi-erect light scarce hairs; tergites with light posterior margins. Male genitalia (Fig. 2) with ninth tergite and sternite simple, devoid of additional lobes or other structures; gonocoxite elongated, without additional lobes; one pair of elongated gonostyles. Gonostylus flattened and elongated, bearing a black inner spine at middle.

Female described in PODENAS, 2003.

*Discussion.* - Features showing that *Trentepohlia damzeni* Podenas, 2003 belongs to subgenus *Trentepohlia* (*Onutia*) Podenas, 2003, are: head extended longitudinally; rostrum short; mouth parts strongly extended; wing with vein  $R_s$  long, only one separate branch of  $R_s$  reaching wing margin;  $R_2$  an oblique cross-vein reaching  $R_1$  close to its tip;  $R_5$  coalescent with  $M_{1+2}$  thus cell  $m_1$  absent; discal cell closed; vein  $CuA_2$  strongly bent posteriorly, thus reaching  $A_1$  close to its tip; vein  $A_2$  comparatively short, its tip reaching wing margin before level of origin of  $R_s$ ; ovipositor with cercus narrow and strongly curved upwards.

Both sexes of *T. damzeni* are superficially similar to other limoniid crane flies with an elongate „proboscis“, but differ in, that „proboscis“ is formed by elongated mouth parts (labrum, maxillae and labium), not by an elongated rostrum. Female's „proboscis“ is comparatively longer than male's (length ratio „proboscis“/head for female is 2.0, when that for male is 1.3). The elongated mouth parts of *T. damzeni* are unique for the genus. Because of the extended mouth parts and wing venation *T. damzeni* resembles species from genus *Toxorhina*; but it differs from it by the preserved vein  $R_{2+3}$ , a much longer vein  $R_s$ , and  $CuA_2$  branch strongly bent posteriorly, the latter feature unique

for *Trentepohlia*. Three subgenera of *Trentepohlia* possess arrangement of the  $R$ -veins as in *T. damzeni*. These are *Promongoma* (Neotropical), *Anchimongoma* and *Plesiomongoma* (both Oriental and Australasian), but differences are observed in other veins, especially in the way of branching of  $M$  and position of basal deflection of  $CuA_1$ . All these subgenera have four separate branches of  $M$ . Cell  $m_1$  petiolate and basal deflection of  $CuA_1$  situated beyond branching point of  $M$  in *Promongoma*; open discal cell and basal deflection of  $CuA_1$  is at branching point of  $M$  in *Anchimongoma*. *Plesiomongoma* is closest to *T. damzeni* in wing venation, but differs by presence of separate branches of  $M_1$  and  $M_2$  (some species of *Plesiomongoma* also have open discal cell).

The clearest feature separating both sexes of *T. damzeni* from all other fossil *Trentepohlia* known from Baltic amber, apart from elongated mouth parts, is completely fused veins  $R_3$  and  $R_4$  forming  $R_{3+4}$  which reaches wing margin.

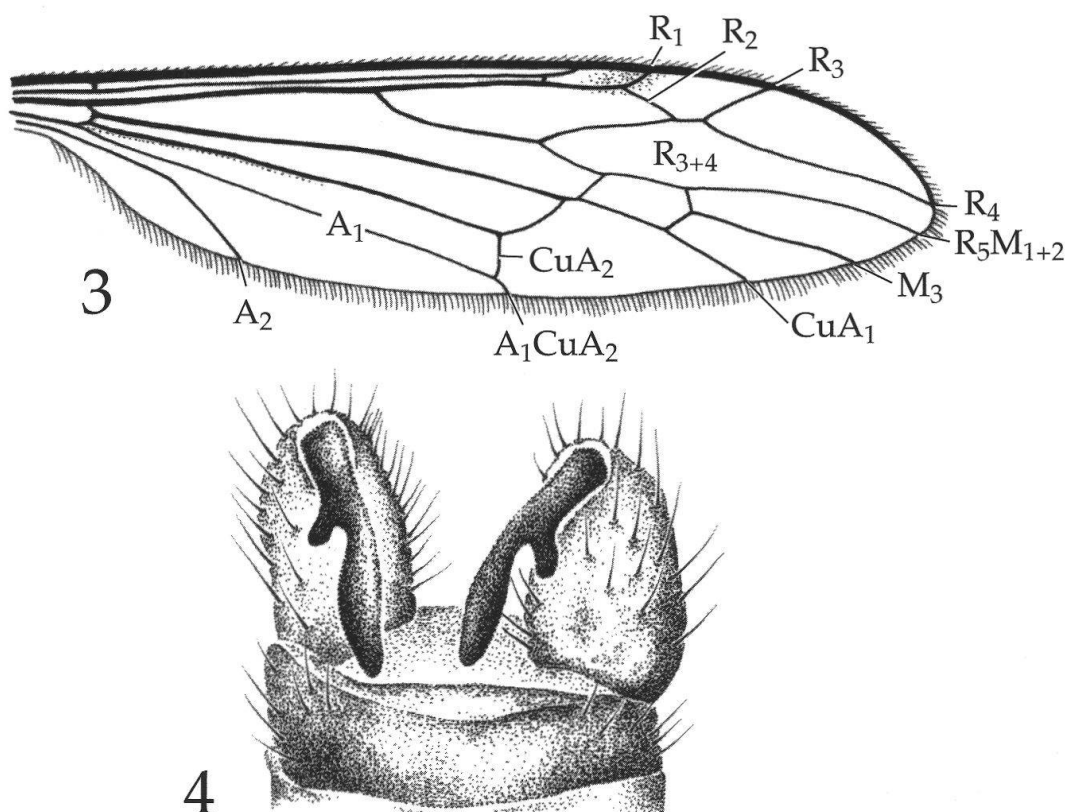
Male genitalia are of quite similar structure in most *Trentepohlia* species, but structure of gonostylus is one of the clearest features separating male of *T. damzeni* from other related species known from Baltic amber. Gonostylus is comparatively wide, narrowed in the central part and with narrow acute spine before its midlength in *T. damzeni*, narrow and long with similar spine in *T. dampfiana* and wide, armed with wide lobe before midlength in *T. gagri* sp. nov.

*Trentepohlia* (*Paramongoma*) *gagri* spec. nov. (Figs 3, 4; Pl. I. B)

*Material examined.* - HOLOTYPE, male, Baltic amber (Eocene), Kaliningrad Region, Sembian Peninsula, Russia, MHNN 1875 (Pl. I. B), deposited in Museum d'histoire naturelle Neuchâtel, Switzerland.

*Diagnosis.* - Comparatively small crane fly, body length 3.1 mm, wing length 3.4 mm. General coloration dark brown. Antenna short, not reaching wing base, if





Figures. 3-4: *Trentepohlia (Paramongoma) gagri spec. nov.*, male, holotype (MHNN 1875): 3- wing venation, 4- male genitalia, dorsal view.

bent backwards. Wing (Fig. 3) with veins  $R_5$  and  $M_{1+2}$  fused to comprise the entire anterior border of discal cell, thus  $r-m$  obliterated; 2 branches of  $M$  reaching wing margin;  $CuA_2$  strongly bent backwards and falling into the first anal vein just before it reaches wing margin; vein  $A_2$  short. Ninth tergum of male genitalia (fig. 4) simple with nearly straight posterior margin. One pair of terminal, comparatively broad gonostyles. Gonostylus with a broad lobe before middle.

*Description.* – Male. Body length 3.1 mm, wing length 3.4 mm.

Head dark brown, covered with short scarce blackish hairs. Rostrum short. Palpus very short, brown, last segment slightly elongated. Antenna approximately 1.1 mm long, not reaching wing base, if bent backwards, 16-segmented, brown; scape elongated,

nearly cylindrical; pedicel short, cup-shaped; flagellomeres short, oval, decreasing in length and width apically, only the last flagellomere approximately twice as long as preceding segment; first flagellomere shorter than pedicel. Verticils dark, slightly longer than length of the respective segment.

Thorax dark brown. Wing brownish, without any darker markings except light stigmal region; veins brown. Venation (Fig. 3): vein  $Sc_1$  long, extending clearly beyond level of  $R_s$  fork;  $Sc_2$  only slightly basad to level of  $R_s$  fork;  $R_2$  slightly shorter than  $R_3$ ;  $R_{3+4}$  three times shorter than  $R_3$ ;  $R_5$  and  $M_{1+2}$  fused to comprise the entire anterior border of discal cell,  $r-m$  obliterated; two branches of  $M$  reaching wing margin; basal deflection of  $CuA_1$  reaching  $M$  before base of discal cell;  $CuA_2$  strongly bent backwards and joining the first anal vein just before it reaches

wing margin, thus cell *cu* with short apical petiole; vein *A*<sub>1</sub> short.

Coxae, trochanters and legs brown, only extreme posterior margin of coxae dark brown. Legs covered with short, comparatively scarce brown hairs. Posterior femur 5.0 mm long. Haltere 0.4 mm long, brownish.

Tergites of abdomen brown, with narrowly lighter posterior margins, covered with semi-erect dark scarce hairs; sternites light brown. Male genitalia (Fig. 4) with simple ninth tergite and sternite, having no additional lobes or other structures, with nearly straight posterior margin; gonocoxite short and wide, hairy, without additional lobes; one pair of elongated terminal gonostyles. Gonostylus comparatively broad, blackish, bearing a rather wide lobe before middle.

Female unknown.

**Discussion.**— The closed discal cell with three veins originating from it are key features separating subgenus *Paramongoma* Brunetti from subgenus *Trentepohlia* (Alexander, 1938). Closed cell *cu* of *Trentepohlia* (*Paramongoma*) *gagri* spec. nov. suggests it to be closer to subgenus *Trentepohlia* than all recent species having cell *cu* open.

Radial field of the wing of *T. (P.) gagri* spec. nov. is similar to that of *T. (Trentepohlia) dampfiana* Alexander, but *T. (P.) gagri* spec. nov. has closed discal cell, (open in *T. (T.) dampfiana* Alexander). Discal cell is closed also in *T. (Onutia) damzeni* Podenas, but only *T. damzeni* has very reduced radial veins. Wing venation of *T. (P.) gagri* spec. nov. is less reduced than that of both previously known *Trentepohlia* species from Baltic amber, thus more resembling venation of fossil species known from Dominican and Mexican ambers.

Male gonocoxite of *T. (P.) gagri* spec. nov. is very short, thus gonostylus clearly exceeds its length, whereas both previously known species from Baltic amber have a more elongated gonocoxite, and shorter gonostylus. The additional lobe at the mid-

dle of the gonostylus of *T. (P.) gagri* spec. nov. is broad, while that of *T. dampfiana* and *T. damzeni* is very narrow, thus gonostylus of *T. (P.) gagri* spec. nov. more resembles that of *T. (Paramongoma) immemorata* Podenas & Poinar from Mexican amber.

Due to the fusion of *CuA*<sub>2</sub> and *A*<sub>1</sub>, cell *cu* is closed and has a short petiole in *T. (P.) gagri* spec. nov.; this is the feature discriminating it from most of the recent species of *T. (Paramongoma)*, which otherwise have similar wing venation but where *CuA*<sub>2</sub> and *A*<sub>1</sub> reach wing margin as separate veins, and thus cell *cu* is open (for example, *T. (P.) aequivena* Alexander, 1980, *T. (P.) bananaensis* Alexander, 1930, *T. (P.) bromeliae* Alexander, 1969, *T. (P.) concumbens* Alexander, 1942, *T. (P.) petulans* Alexander, 1947). The other feature separating *T. (P.) gagri* spec. nov. from recent species is the peculiar shape of gonostylus (Fig. 4).

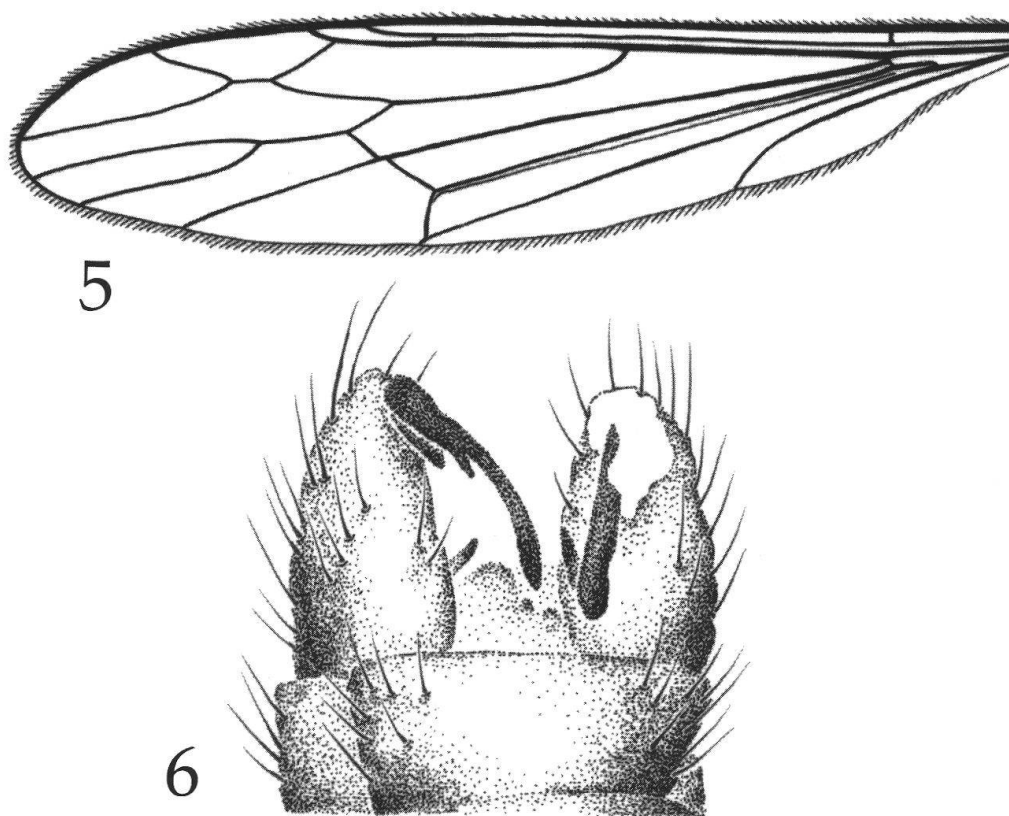
**Etymology.**— The name of this species is an arbitrary combination of letters having no special meaning.

*Trentepohlia* (*Trentepohlia*) *dampfiana*  
Alexander, 1931 (Figs 5, 6)

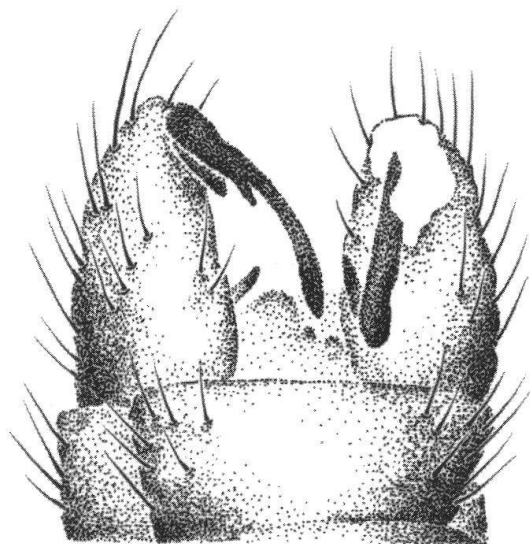
**Material Examined.** — Baltic amber (Eocene), Kaliningrad Region, Sembian Peninsula, Russia, male, MHNN 1876.

**Description.** — Male. Generally similar to female, but slightly smaller. Body length 4.6 mm, wing length 3.8 mm.

Head light brown, rounded. Eyes big, covering nearly the whole lateral surface of the head. Dorsal surface of the head covered with scarce dark hairs. Rostrum short. Palpus four-segmented, three basal segments approximately equal in length, last segment approximately twice as long as preceding segment. Antenna 1.6 mm long, 16-segmented, light brown; scape elongated; pedicel shorter, approximately as long as first flagellar segment; basal flagellomeres oval, apical flagellomere large, cylindrical, nearly as long as preceding segment; verticils light



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**Figures 5-6:** *Trentepohlia (Trentepohlia) dampfiana* male (MHNN 1876): 5- wing venation, 6- male genitalia, dorsal view.

and short, shorter than length of respective segment; pubescence on flagellomeres light and scarce.

Thorax light brown, dorsum without visible pigmented stripes and with two longitudinal lines formed by light erect hairs.

Wing clear, without any darker markings except very light stigmal region; veins only slightly darker than membrane. Venation (fig. 5) identical with that of female (ALEXANDER, 1931 - Fig. 167).

Coxae, trochanters and legs light brown, only bases of femorae slightly darkened. Legs covered with short, comparatively scarce semi-erect brownish hairs. Haltere 0.5 mm long, light brown.

Abdomen light brown, covered with semi-erect, light and scarce hairs. Male genitalia (Fig. 6) with ninth tergite and sternite simple, without any additional lobes or other structures; gonocoxite elongated devoid of

additional lobes. Outer gonostylus strongly elongated with small spine at basal third; a small elongated darkened structure may be seen at the base of right gonostylus, which could be strongly reduced inner gonostylus. Paramere spine-shaped, darkened.

Female described in ALEXANDER (1931).

*Discussion.*- Features showing that this fossil species belongs to nominative subgenus are: separate veins  $R_3$  and  $R_4$ ; open discal cell; fusion of veins  $CuA_2$  and  $A_1$  which closes cell  $cu$ .

Both male and female of *Trentepohlia (s. str.) dampfiana* Alexander, 1931 could be separated from other *Trentepohlia* species known from Eocene Baltic amber by peculiarities of their wing venation: it is the only species, with open discal cell; from *T. damzeni* it also differs by structure of radial field: *T. dampfiana* possesses stem  $R_{3+4}$



and strongly diverging branches  $R_3$  and  $R_4$  whereas *T. damzeni* has both veins  $R_3$  and  $R_4$  coalescent and reaching wing margin together as vein  $R_{3+4}$ .

Male of *T. dampfiana* differs from other *Trentepohlia* species by structure of genitalia, especially by very long and narrow gonostylus, spine before midlength of gonostylus is short, narrow and blunt-apexed.

Female of *T. dampfiana* differs from other *Trentepohlia* species by structure of ovipositor, from *T. damzeni* also by much shorter mouth parts. Ovipositor of *T. dampfiana* with the tergal valves somewhat longer than

in the recent species, strongly upcurved to the acute tips; sternal valves short and stout, straight (ALEXANDER, 1931).

#### ACKNOWLEDGEMENTS

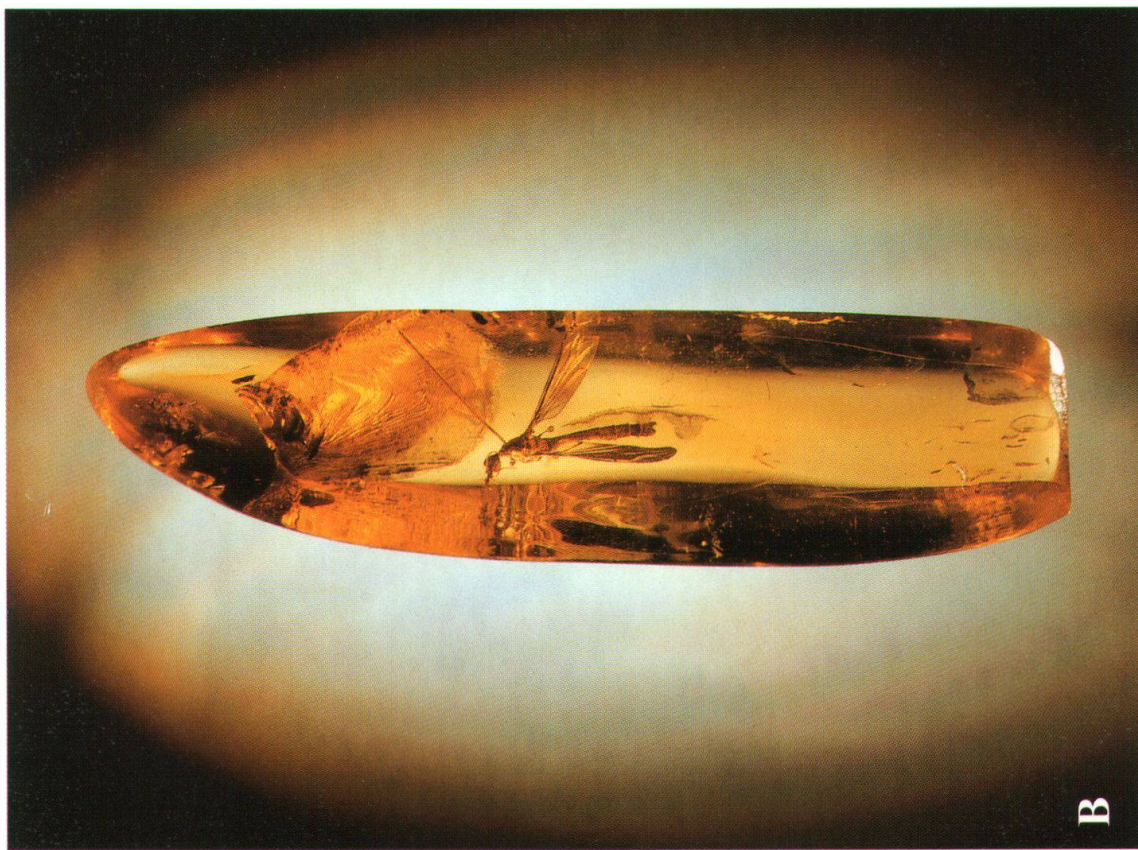
My warmest thanks go to Dr. Christophe Dufour and Jean-Paul Haenni (Museum d'Histoire Naturelle, Neuchâtel, Switzerland) and to Dr. Jon Gelhaus (Academy of Natural Sciences, Philadelphia, PA, U.S.A.), for their efforts to build up amber collections, for the loan of the specimens, and for valuable comments and corrections of the text.

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**Plate I:** A. *Trentepohlia (Onutia) damzeni* male (ANSP 80106), general view - B. *Trentepohlia (Paramongoma) gagri spec. nov.*, male, holotype, general view (MHNN 1875).