

Polymera alexanderi n. sp., a new species of Limoniidae (Diptera) from Dominican amber

Wiesław KRZEMIŃSKI^{ID}, Katarzyna KOPEĆ^{ID}, Alicja PELCZYŃSKA^{ID} and Agnieszka SOSZYŃSKA-MAJ^{ID}

Received: 1 December 2021. Accepted: 15 December 2021. Available online: 30 December 2021. Issue online: 30 December 2021.

Original article

KRZEMIŃSKI W., KOPEĆ K., PELCZYŃSKA A., SOSZYŃSKA-MAJ A. 2021. *Polymera alexanderi* n. sp., a new species of Limoniidae (Diptera) from Dominican amber. *Acta zool. cracov.*, **64**(2): 169-174.

Abstract. Dominican amber is the fossil resin famous for the best quality of inclusions, exploited in Dominican Republic from the deposits formed in the late Early Miocene, ca. 16 Ma. A new species, *Polymera (Polymera) alexanderi* sp. n. of the dipteran family Limoniidae is described from this amber. This new limonid belongs to the genus *Polymera* Wiedemann, 1820 with 63 extant species described mostly from South America. Only three fossil species are known so far from Dominican and Baltic amber.

Key words: Nematocera, fossil insects, new species, morphology.

✉ Wiesław KRZEMIŃSKI, Katarzyna KOPEĆ, Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, 31-016, Kraków, Poland.
E-mail: wieslawk4@gmail.com (W.K.), k_slazyk@poczta.onet.pl (K.K.)
Alicja PELCZYŃSKA, Agnieszka SOSZYŃSKA-MAJ, University of Lodz, Faculty of Biology and Environmental Protection, Department of Invertebrate Zoology and Hydrobiology, 90-237 Lodz, Poland.
E-mail: alicja.pelczynska@edu.uni.lodz.pl (AP); agnieszka.soszynska@biol.uni.lodz.pl (AS-M)

I. INTRODUCTION

Dominican amber is a fossilized resin present on Caribbean islands, but in exploitable quantities it is available only in the Dominican Republic. From among all known fossil resins this amber is known for the best quality of animal and plant inclusions.

The age of this Miocene amber is still disputable, from 26 Ma (GRIMALDI 1995) to 16 Ma (ITURRALDE-VINCENTS 2001), and approximately, 20 Ma (SOLORZANO-KRAEMER 2007). The botanical source of Dominican amber was the deciduous tree *Hymenaea protera* (family Leguminosae) (POINAR 1992; POINAR & BROWN 2002; PENEY 2010).

The flies of the family Limoniidae in Dominican amber have been so far the subject of only four publications in which 13 species were described (KRZEMIŃSKI 1992; PODENAS & POINAR 1999, 2001; KOPEĆ et al. 2016). In the present paper we describe the next fossil species of limonids preserved in

this resin. The new species belongs to the genus *Polymera* WIEDEMANN, 1820, with 63 species described in two subgenera, i.e. *Polymera (Polymera)* WIEDEMANN, 1820 (55 species) and *Polymera (Polymerodes)* ALEXANDER, 1920 (ALEXANDER 1920b) (eight species known only from the Neotropical Region; OOSTERBROEK 2021). All species of this genus have remarkably long antennae exceeding body length, and adorned with rosettes of long setae on each flagellomere. As many as 58 species of *Polymera* occur in South America, while two species live in the Oriental, and two in the Nearctic Region. Only one species is known from the Eastern Palearctic Region. It was therefore a surprise to discover *Polymera magnifica* MEUNIER, 1906 in Eocene Baltic amber (ALEXANDER 1931). So far two species have been described from Dominican amber in this genus: *P. specula* PODENAS & POINAR, 1999 and *P. virgo* PODENAS & POINAR, 1999.

II. MATERIALS AND METHODS

Investigated material comes from the Brodzinsky/Lopez-Penha Collection in the Entomology Department of the American Museum of Natural History, New York (AMNH) (two specimens), and from the collection of the Natural History Museum of the Institute of Systematics and Evolution of Animals Polish Academy of Sciences, Kraków, Poland (ISEA PAS) (two specimens as synclusions in one piece of amber). The description is based on the holotype MP/3453a and paratype MP/3453b housed in the collection of ISEA PAS. The images were taken with a Nikon SMZ25 stereoscopic microscope equipped with a Nikon DSRi2 digital camera. Drawings were taken based on the camera pictures with the specimens under constant control. The terminology of wing venation follows KRZEMIŃSKA *et al.* (2009).

III. SYSTEMATIC PART

Order: **Diptera** LINNAEUS, 1758

Infraorder: **Tipulomorpha** ROHDENDORF, 1961

Family: **Limoniidae** SPEISER, 1909

Subfamily: **Limnophilinae**, BIGOT, 1854

Genus: ***Polymera*** WIEDEMANN, 1820

Subgenus: ***Polymera*** WIEDEMANN, 1820

Genus and subgenus type species: *Polymera fusca* WIEDEMANN, 1820, Lesser Antiles; Diptera exotica: 40

***Polymera (Polymera) alexanderi* sp. n.**

(Figs 1-2)

D i a g n o s i s. Antennae long, almost as long as the length of abdomen, with long bristle rosettes on each flagellomeres; scapus short and tube-shaped, pedicel barrel-shaped; vein Sc ends opposite half of vein R_{2+3+4} ; four medial veins, d-cell open; vein M_{1+2} almost 5 times longer than M_1 ; outer gonostylus clearly extended at 2/3 of its length, broad at the end with two protruding short processes; inner gonostylus lobed, 1/3 shorter than the outer gonostylus, with long strong bristles in the middle of the lobe.

Subgeneric classification. The new species is allotted to the subgenus *Polymera* based on wing venation, i.e., long Sc terminating beyond the fork of Rs into R_{2+3+4} and R_5 , and four medial veins ending in wing margin. In the subgenus *P. (Polymerodes)* ALEXANDER 1920 (ALEXANDER 1920a) the vein Sc is much shorter, and only three medial veins are present.

Etymology. The name of the species commemorates Charles P. ALEXANDER, the world known specialist of flies from the family Limoniidae.

Description. Wing 5.7 mm length, 1.5 mm width; body length 5.8 mm. Head small, round, antennae long, almost as long as the length of abdomen, rosettes of long bristles on each flagellomere (Fig. 1 B, Fig. 2E); palpi almost as long as head width, last segment equal to two preceding segments combined (Fig. 2F). Wing narrow, almost 3.5x longer than its maximal width (Fig. 2A-C); vein Sc ends against midlength of vein R_{2+3+4} ; R_1 long, wavy at end; R_3 almost as long as R_{2+3} ; four medial veins present; d-cell open; M_{1+2} almost 5x longer than M_1 ; A_2 long and slightly wavy. Male hypopygium (Fig. 1D, 2D) small, narrow, gonocoxite almost twice longer than outer gonostyle, narrow and slightly sickle-shaped; outer gonostyle clearly expanded at 2/3 of its length, widened at end, with two protruding short processes; inner gonostyle in shape of fleshy lobe, 0.6x as long as outer gonostyle, with singular, long strong bristle in middle of lobe. Female: ovipositor long, narrow, curved towards the dorsal side; hypogynal valves only little shorter than ovipositor (Fig. 1E, 2G).

Material examined. #MP/3453, two males in one piece of amber, holotype (MP/3453a) and paratype (MP/3453b), Dominican amber from Dominican Republic, late Lower Miocene; (ISEA PAS). Additional specimens: #DR-8-445, sex unknown, abdomen missing, only wings, head with antennae, and a part of a leg are preserved; #DR-6-157 female (AMNH).

Comments

Two male specimens are preserved in one piece of amber. The holotype unfortunately has damaged wings, so the description of the wing venation is based on a paratype, whereas the holotype has a perfectly preserved hypopygium and the morphological description is based on this specimen. Other specimens included in the new species show little variation of the venation (Figs 2B, 2C). The new species clearly differs in the structure of hypopygium from both species known from Dominican amber, especially in the structure of the gonostyle (Figs 3D, 3E). Moreover, the new species differs in the details of the wing venation: in *P. (P.) specula* (Fig. 3A) the cross-vein m-cu is positioned well before the fork of the vein Mb into M_{1+2} and M_{3+4} , (beyond this fork in *P. (P.) alexanderi* sp.n.), whereas in *P. (P.) virgo* the d-cell (Fig. 3B) is closed (open in *P. (P.) alexanderi* sp. n.).

In general, the genus *Polymera* is abundantly represented in the Neotropical Region, which includes the island of Haiti, but only one species of the genus has been reported from the island itself, *Polymera (P.) albitarsis dominicana* ALEXANDER, 1970, while *P. (P.) albitarsis albitarsis* ALEXANDER, 1970 was described from the island of St. Vincent located in the

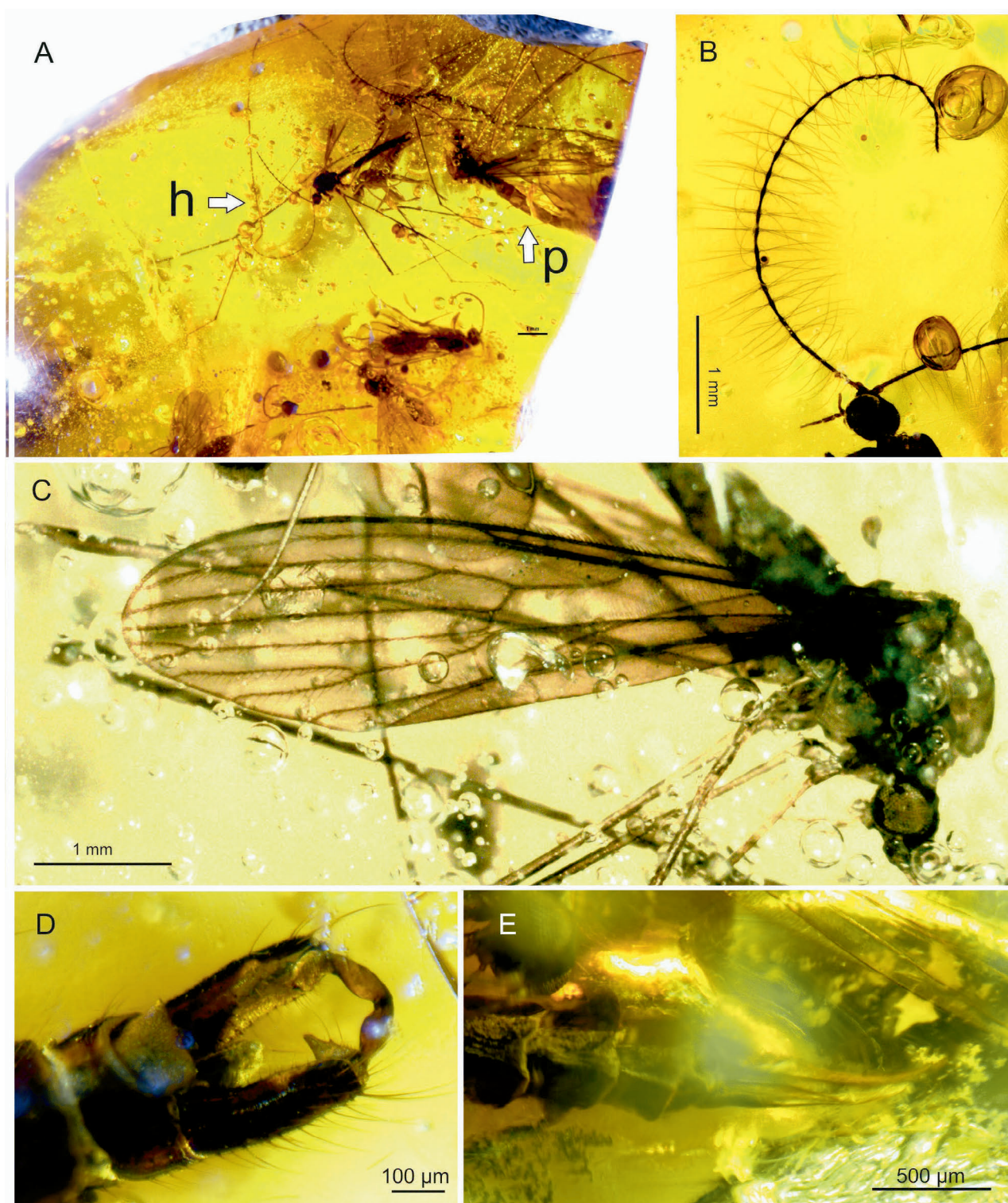


Fig. 1. *Polymera (Polymera) alexanderi* sp. n., MP/3453: A – habitus of holotype (h, MP/3453a) and paratype (p, MP/3453b); B – antenna of holotype; C – right wing of paratype; D – male hypopygium of holotype; E – female genitalia (DR-6-157).

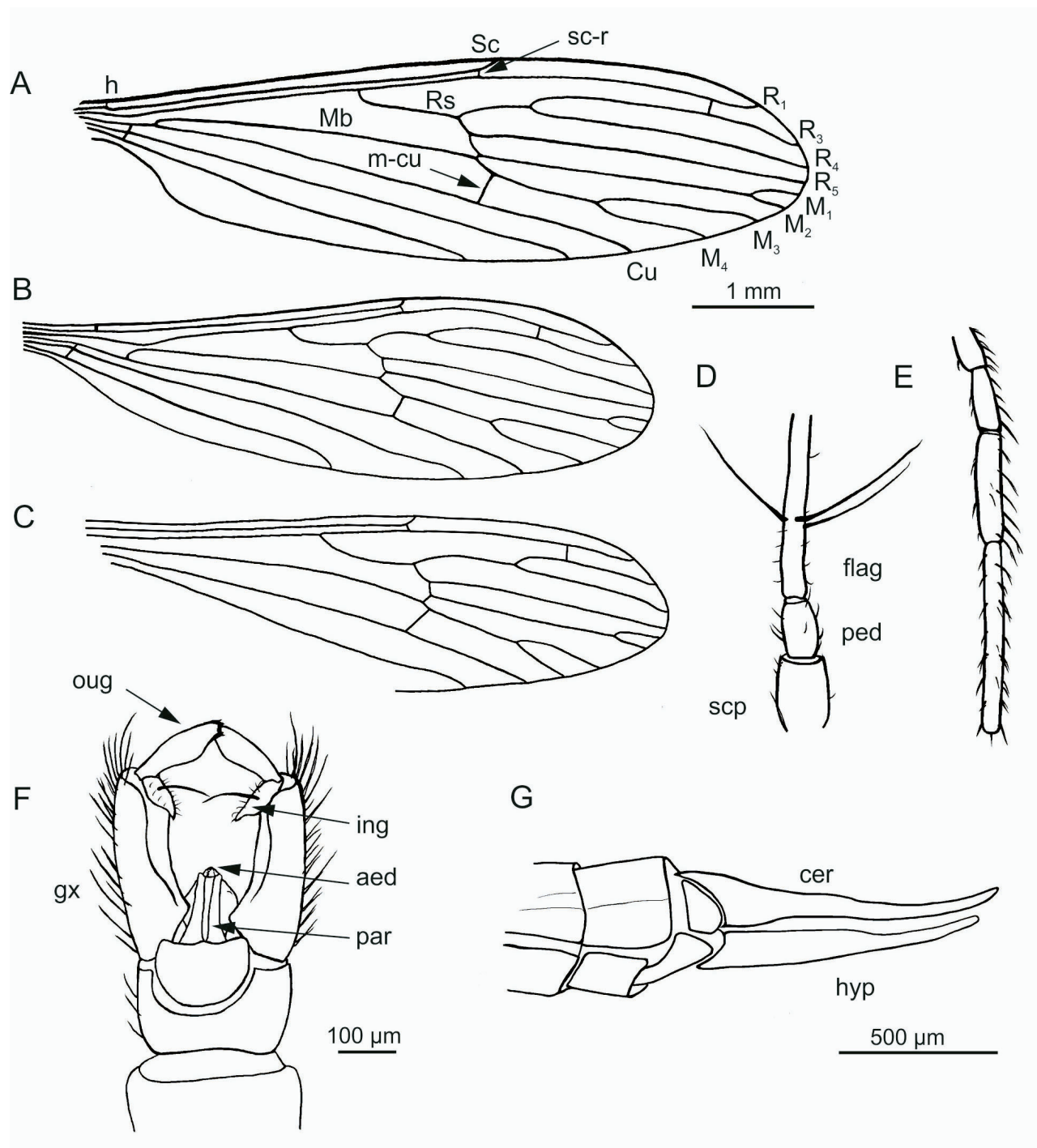


Fig. 2. *Polymera (Polymera) alexanderi* sp. n., explanatory drawings. A – right wing of paratype MP/3453b; B – wing of female DR-6-157; C – wing of specimen DR-8-445; D, E – basal part of antennae and palp of paratype, respectively; F – male hypopygium of holotype MP/3453a; G – ovipositor of DR-6-157 (aed – aedeagus, cer – cercus of ovipositor, flag – flagellomere, gx – gonocoxite, hyp – hypogynal valve, ing – inner gonostyle, oug – outer gonostyle, par – paramere, ped – pedicel, scp – scapus).

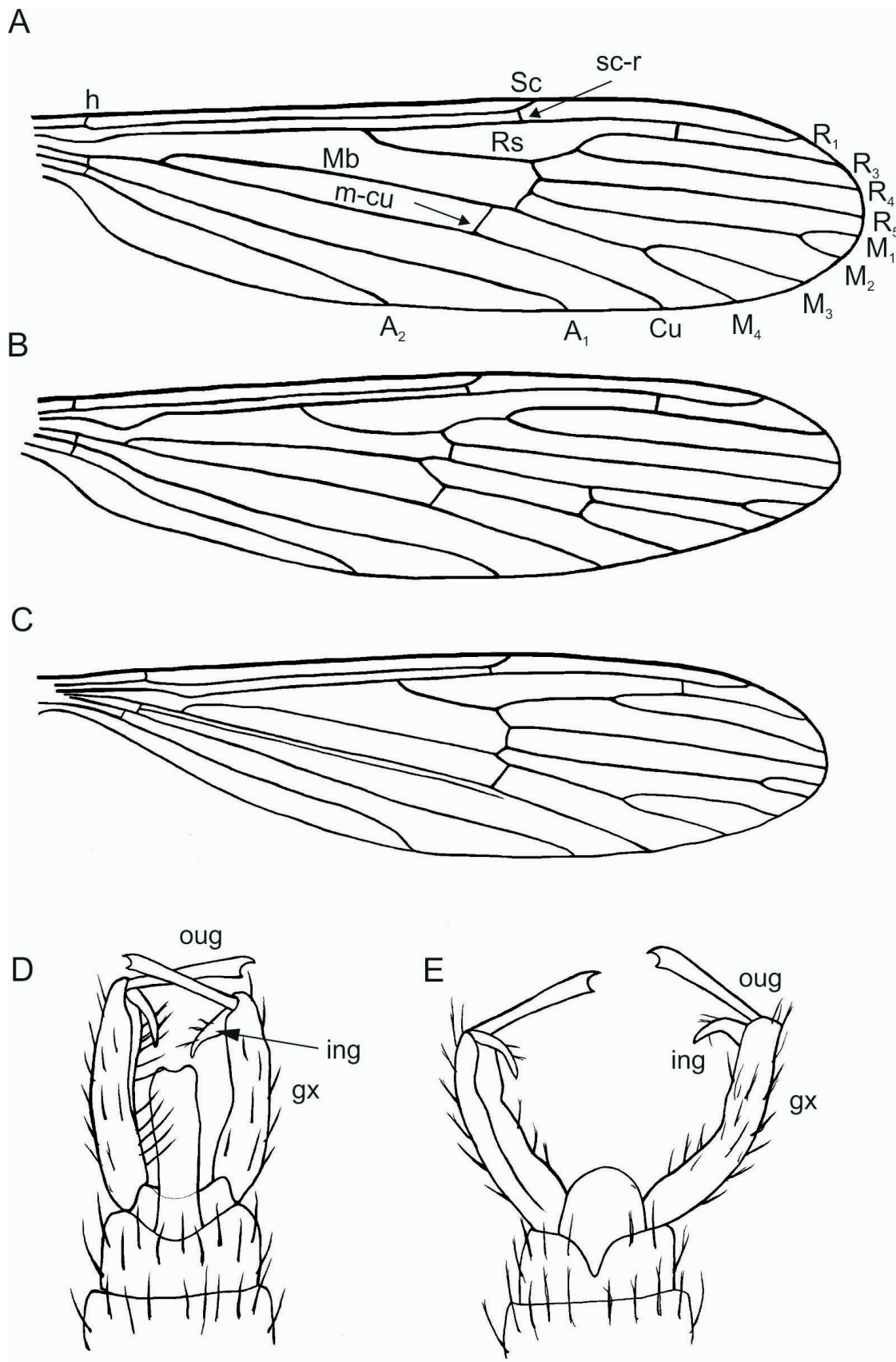


Fig. 3. Species of *Polymera*: A-C wings: A – *Polymera specula* PODENAS & POINAR, 1999; B – *Polymera virgo* PODENAS & POINAR, 1999 (both from Dominican amber); C – recent species *Polymera (Polymera) albitarsis dominicana* ALEXANDER, 1970. D, E male hypopygium of *Polymera specula* PODENAS & POINAR, 1999 (D), and *Polymera virgo* PODENAS & POINAR, 1999 (E). A, B, D, E – redrawn from PODENAS & POINAR 1999: fig. 1, 6, 2, 5, respectively; C – redrawn from ALEXANDER, 1970: fig. 37. Abbreviations as in Fig. 2.

Caribbean Sea. The extant species found in the Dominican Republic resembles extinct species *P. (P.) specula* in wing venation (Fig. 3A), but differs distinctly in the position of the cross-vein m-cu, which in the recent species occurs distinctly before the fork of Mb into M₁₊₂ and M₃₊₄ (Fig. 3C).

IV. REFERENCES

- ALEXANDER C.P. 1920a. New or little known crane-flies from tropical America (Tipulidae, Diptera). *Canadian Entomologist*, **52**: 141-144.
- ALEXANDER C.P. 1920b. Tipulidae collected by the American museum Congo expedition. *Bulletin of the American Museum of Natural History*, **43**: 9-20.
- ALEXANDER C.P. 1931. Crane-flies of the Baltic amber (Diptera). *Bernstein Forschungen*, **2**: 1-135.
- ALEXANDER C.P. 1970. Bredin-Archbold-Smithsonian biological survey of Dominica. The crane flies (Diptera: Tipulidae). *Smithsonian Contributions to Zoology*, **45**: 1-59.
- BIGOT J.M.F. 1854. Essai d'une classification générale et synoptique de l'ordre des insectes diptères. 3e mémoire, vol. 2. *Annales de la Société entomologique de France*, Troisième Série: 447-482.
- GRIMALDI D. 1995. On the Age of Dominican Amber. [In:] ANDERSON K.B. and CRELLING J.C. (eds.), *Amber, Resinites, and Fossil Resins*. ACS Symposium Series, vol. 617. ACS publications, Washington. Pp. 1-11.
- ITURRALDE-VINCENTS M.A. 2001. Geology of the amber-bearing deposits of the Greater Antilles. *Caribbean Journal of Science*, **158**: 300-311.
- ITURRALDE-VINCENT M.A., MACPHEE R.D.E. 1996. Age and Paleogeographical Origin of Dominican Amber. *American Association for the Advancement of Science*, **273**: 1850-1852.
- KOPEĆ K., KANIA I., KRZEMIŃSKI W. 2016. New and little known crane-flies species of the genera *Helius*, *Elephantomyia* and *Toxorhina* (Diptera, Limoniidae) from Dominican and Mexican amber. *Palaeontologia Electronica* **19.2.26A**: 1-14. <https://doi.org/10.26879/593>
- KRZEMIŃSKI W. 1992. Limoniidae (Diptera, Nematocera) from Dominican amber. I. Genus *Molophilus* CURTIS, 1833. *Acta zoologica cracoviensia*, **35**:107-111.
- KRZEMIŃSKA E., KRZEMIŃSKI W., DAHL C. 2009. Monograph of fossil Trichoceridae (Diptera): over 180 million years of evolution. Institute of Systematics and Evolution of Animals Polish Academy of Sciences, Kraków, 170 pp.
- LINNAEUS C. 1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Tomus I. Editio decima, reformata. L. Salvii, Holmiae [= Stockholm], p. 824.
- MEUNIER F. 1906. Monographie des Tipulidae et des Dixidae de l'ambre de la Baltique. *Annales de Science Naturelles, Zoologie Series*, **94**: 349-401.
- OOSTERBROEK P. 2021. Catalogue of the Crane-flies of the World. (Diptera, Tipuloidea: Pediciidae, Limoniidae, Cyndrotomidae, Tipulidae). Last updated 20 December 2021. <https://ccw.naturalis.nl/results.php>
- PENNEY D. 2010. Dominican amber. [In:] PENNEY D. (ed.), *Biodiversity in Fossils in Amber from Major World Deposits*. Sri Scientific Press, Manchester. Pp. 22-41.
- POINAR G.O. Jr. 1992. *Life in Amber*. Stanford University Press, Stanford.
- POINAR G.O. Jr., BROWN A. 2002. *Hymenaea mexicana* sp. nov. (Leguminosae: Caesalpinioideae) from Mexican amber indicates Old World connections. *Botanical Journal of the Linnean Society*, **139**: 125-132. <https://doi.org/10.1046/j.1095-8339.2002.00053.x>
- ROHDENDORF B.B. 1961. The most ancient infraorders of Diptera from the Triassic of Central Asia. Russian. *Paleontological Zhurnal*, **3**: 90-100.
- SOLÓRZANO-KRAEMER M.M. 2007. Systematic, palaeoecology and palaeobiogeography of the insect fauna from Mexican amber. *Palaeontographica*, **282**: 1-133. <https://doi.org/10.1127/pala/282/2007/1>
- SPEISER P. 1909. 10. Diptera 4. Ortophapha Nematocera. [In:] Sjöstedt Y., ed., *Wissenschaftliche Ergebnisse der Schwedischen Zoologischen Expedition nach dem Kilimanjaro, dem Meru und den umgebenden Massaistepfen Deutsch-Ostafrikas 1905-1906*. Stockholm, Sweden, Tryck hos P. Palmquists aktiebolag. Pp. 31-65.
- WIEDEMANN C.R.W. 1820. *Diptera exotica*. Sectio I. Natennis multiarticulatus. Ed. 1. [=Kiel]: i-xix, 1-38. Kiliae.