The zoogeographic classification of the Palaearctic genera of fungus gnats (Diptera: Sciaroidea, excluding Sciaridae)

[Analyse der Verbreitung paläarktischer Pilzmückengattungen aus zoogeografischer Sicht (Diptera: Sciaroidea, ausser Sciaridae)]

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Abstract A list has been prepared of the 96 genera of fungus gnats known from the Palaearctic region, together with an analysis of their distribution. The genera are arranged in 14 zoogeographic categories: Palaearctic; Palaearctic - Oriental; Holarctic; Holarctic - Oriental; Holarctic - Neotropical; Holarctic - Australian; Holarctic - Palaeotropical; Holarctic - Oriental - Neotropical; Holarctic - Afrotropical - Neotropical; Holarctic - Neotropical - Australian; Palaeotropical - Palaearctic; Palaeotropical - Australian - Palaearctic; subcosmopolitan; and cosmopolitan. The composition of the fungus gnat fauna of the Palaearctic region is discussed.

Key words Diptera, Sciaroidea, zoogeography, Palaearctic

Zusammenfassung Die 96 Genera von Pilzmücken die in der paläarktischen Region Vorkommen werden hinsichtlich ihrer Verbreitung in anderen zoogeographischen Regionen analysiert. Die folgenden 14 Kategorien werden unterschieden: palaearctisch, palaearctisch - orientalisch; holarktisch; holarktisch - orientalisch; holarktisch - neotropisch; holarktisch - australisch; holarktisch - palaeotropisch; holarktisch - orientalisch - neotropisch; holarktisch - afrotropisch - neotropisch; holarktisch - neotropisch - australisch; palaeotropisch - paläarktisch; palaeotropisch - australisch - paläarktisch; subcosmopolitisch und cosmopolitisch. Die Zusammensetzung der paläarktischen wird unter dem Blickwinkel dieser Kategorien Pilzmückenfauna diskutiert.

Stichwörter Diptera, Sciaroidea, Zoogeografie, paläarktische Region

Introduction

The superfamily Sciaroidea belongs to the infraorder Bibionomorpha of the order Diptera. It includes the families Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae, Lygistorrhinidae, Mycetophilidae and Sciaridae (MATILE 1990). With the exception of certain species which also occur in the tundra, the fungus gnats (families excluding Sciaridae) are most common in forest habitats and on the whole do not inhabit dry areas. The larvae of most species are mycetophagous and endomycetobionts. So far, over 4100 species belonging to 226 genera (excluding Sciaridae) have been described (BECHEV, in preparation). 96 genera with over 1500 species are known in the Palaearctic region.

Only a few studies dealing with the zoogeography of the fungus gnats have been published, among them MATILE (1990), MUNROE (1974), GAGNÉ (1975, 1981), ZAITZEV (1982), VÄISÄNEN (1984), SØLI (1997).

Material and methods

In order to analyse the representation of the Palaearctic genera of fungus gnats in other zoogeographic regions of the world, information on genera and the numbers of species was taken from the various regional Diptera catalogues (KRIVOSHEINA & MAMAEV 1988a-c, KRIVOSHEINA 1988, MAMAEV & KRIVOSHEINA 1988, MATILE 1988, HACKMANN et al. 1988, LAFFOON

1965, Colless & Liepa 1973, Matile 1980, 1989; Papavero 1977 a-c, 1978 a, b). The data have been corrected following contemporary developments in the classification and nomenclature of the superfamily. They have been updated by including all the genera and most of the described species published up to 1997 inclusive. The borders of the various zoogeographic regions are as specified in the relevant catalogues and largely corresponds to the classic definition of zoogeographic regions given by Wallace (1876).

Results and discussion

According to their recent geographic distribution (see Tab. 1), the genera occurring in the Palaearctic region can be arranged in 14 zoogeographic categories: Palaearctic endemic; Palaearctic - Oriental; Holarctic (Palaearctic + Nearctic); Holarctic - Oriental; Holarctic - Neotropical; Holarctic - Australian; Holarctic - Palaeotropical (Afrotropical + Oriental); Holarctic - Oriental - Neotropical; Holarctic - Afrotropical - Neotropical; Holarctic - Neotropical - Australian; Palaeotropical - Palaearctic; Palaeotropical - Australian - Palaearctic; subcosmopolitan (in 5 regions) and cosmopolitan (in all regions).

The dominant genera among the Palaearctic fungus gnats are widespread (Fig. 1): cosmopolitan (16.7 %), subcosmopolitan (13.5 %), Holarctic (24.0 %) and Holarctic - Oriental (11.5 %). The remaining zoogeographic categories are poorly presented. 6 genera (6.25 %) with following distribution are endemic to the Palaearctic region:

Asioditomyia Saigusa, 1973 - 1 species in Japan and Russian Far East
Antlemon Loew, 1871 - 3 species in Western Palaearctic (Europe and Mediterranean region)
Neoclastobasis Ostroverkhova, 1970 - 3 species: 1 in Western Palaearctic (Europe) and 2 in Western Siberia, Russian Far East and Japan
Neoneurotelia Shinji 1938 - 1 species in Japan, but generic status unconfirmed
Neoparatinia Shinji 1939 - 1 species in Japan, but generic status unconfirmed
Vecella Wu, 1996 - 1 species in SE China, Fujian province.

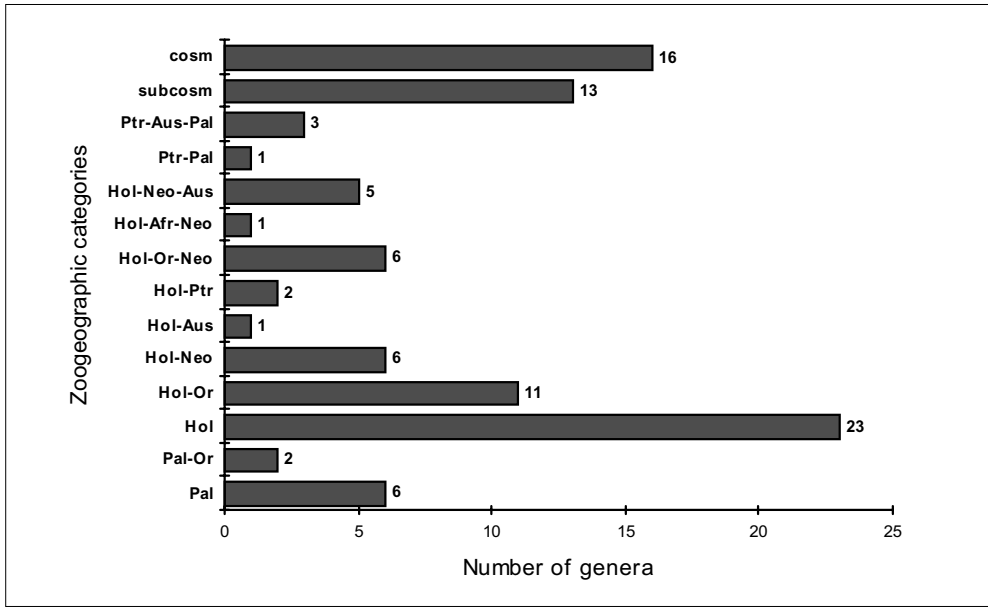

Fig. 1: The composition of the fungus gnat fauna of the Palaearctic region. Abbreviations: see Table 1.

Tab. 1: Distribution of the Palaearctic genera of fungus gnats
Abbreviations: **Pal** = Palaearctic, **Nea** = Nearctic, **Hol** = Holarctic, Or = Oriental, **Afr** = Afrotropical, **Neo** = Neotropical, **Aus** = Australian, **Ptr** = Palaeotropical Region, **cosm** = cosmopolitan, **subcosm** = subcosmopolitan
The figures = approximate number of species in each region, "+" = reported, "**~**" = probably

Taxon	Pal	Nea	Or	Afr	Neo	Aus	Zoogeogr. category
DITOMYIIDAE							
Asioditomyia Saigusa, 1973	1	-	-	-	-	-	Pal
Ditomyia Winnertz, 1846	7	2	-	-	-	-	Hol
Symmerus Walker, 1848	9	4	2	-	-	-	Hol-Or
DIADOCIDIIDAE							
Diadocidia Ruthe, 1831	8	3	-	-	2	2	Hol-Neo-Aus
KEROPLATIDAE							
Keroplatinae Keroplatini							
Cerotelion Rondani, 1856	5	1	1	-	6	7	subcosm
Heteropterna Skuse, 1888	1	1	4	2	10	9	cosm
Keroplatus Bosk, 1792	8	4	1	2	9	1	cosm
Rocetelion Matile, 1988	1	3	-	-	-	-	Hol
Setostylus Matile,1990	1	-	4	-	4	-	~Hol-Or-Neo
Orfeliini							
Antlemon Loew, 1871	3	-	-	-	-	-	Pal
Asindulum Latreille, 1805	2	2	-	-	-	-	Hol
Isoneuromyia Brunetti, 1912	2	-	8	-	21	3	~subcosm
Macrorrhyncha Winnertz, 1846	16	1	-	-	-	-	Hol
Monocentrota Edwards, 1925	5	-	-	4	1	-	~Hol-Afr-Neo
Neoplatyura Malloch, 1928	6	2	1	5	9	20	cosm
Orfelia A. Costa, 1857	21	34	6	-	2	-	Hol-Or-Neo
Platyura Meigen, 1803	3	7	-	-	-	-	Hol
Pyratula Edwards, 1929	5	-	1	-	1	-	~Hol-Or-Neo
Rutylapa Edwards, 1929	1	-	4	6	-	6	Ptr-Aus-Pal
Truplaya Edwards, 1929	1	-	3	23	-	-	Ptr-Pal
Urytalpa Edwards, 1929	5	-	1	-	-	-	Pal-Or
Xenoplatyura Malloch, 1928	4	-	3	19	10	6	subcosm
Macrocerinae Macrocerini							
Macrocera Meigen,1803	62	23	27	21	25	24	cosm
BOLITOPHILIDAE							
Bolitophila Meigen, 1803	36	20	-	-	-	-	Hol
LYGISTORRHINIDAE							
Lygistorrhina Skuse, 1890	1	1	2	6	7	2	cosm
MYCETOPHILIDAE							
Mycomyinae							
Mycomya Rondani, 1856	136	97	31	8	84	13	cosm
Neoempheria Osten Sacken,1878	28	7	12	10	68	2	cosm
Vecella Wu, 1996	1	-	-	-	-	-	Pal
Sciophilinae							
Acnemia Winnertz,1863	14	13	1	1	5	-	subcosm
Acomoptera Vockeroth, 1980	1	1	-	-	-	-	Hol
Allocotocera Mik, 1886	2	1	-	-	5	4	Hol-Neo-Aus
Anaclileia Meunier, 1904	4	3	1	-	-	-	Hol-Or
Azana Walker, 1856	5	1	1	1	-	-	Hol-Ptr

continuation of table 1

Taxon	Pal	Nea	Or	Afr	Neo	Aus	Zoogeogr. category
continuation Mycetophilidae							
Baeopterogyna Vockeroth, 1972	1	1	-	-	-	-	Hol
Coelophthinia Edwards, 1941	1	1	-	-	3	-	Hol-Neo
Drepanocercus Vockeroth, 1980	1	1	-	-	-	-	Hol
Eudicrana Loew, 1869	2	1	+	-	7	1	subcosm
Impleta Plassmann, 1978	1	1	-	-	-	-	Hol
Leptomorphus Curtis, 1831	4	8	2	10	3	-	subcosm
Megalopelma Enderlein, 1911	1	1	-	-	4	-	Hol-Neo
Monoclona Mik, 1886	6	5	-	-	7	-	Hol-Neo
Neoneurotelia Shinji, 1938	1	-	-	-	-	-	Pal
Neoparatinia Shinji, 1939	1	-	-	-	-	-	Pal
Neuratelia Rondani, 1856	10	14	1	-	1	-	Hol-Or-Neo
Paratinia Mik, 1874	2	1	-	-	-	-	Hol
Phthinia Winnertz, 1863	14	6	-	-	3	1	Hol-Neo-Aus
Polylepta Winnertz, 1863	4	1	1	-	-	-	Hol-Or
Sciophila Meigen, 1818	56	57	8	20	17	-	subcosm
Speolepta Edwards, 1925	1	1	-	-	-	-	Hol
Gnoristinae							
Aglaomyia Vockeroth, 1980	2	1	-	-	-	-	Hol
Apolephthisa Grzegorzek, 1885	1	1	-	-	-	-	Hol
Boletina Staeger, 1840	77	36	10	-	-	-	Hol-Or
Coelosia Winnertz, 1863	11	10	1	-	6	-	Hol-Or-Neo
Dziedzickia Johannsen, 1909	3	7	1	5	33	-	subcosm
Ectrepesthoneura Enderlein, 1911	12	5	-	-	-	-	Hol
Gnoriste Meigen,1818	8	4	-	-	-	-	Hol
Grzegorzekia Edwards, 1941	1	1	-	-	-	-	Hol
Hadroneura Lundström, 1906	2	6	-	-	-	-	Hol
Palaeodocosia Meunier, 1904	3	1	-	-	-	-	Hol
Saigusaia Vockeroth,1980	1	1	1	-	-	-	Hol-Or
Synapha Meigen, 1818	2	4	1	5	10	1	cosm
Syntemna Winnertz, 1863	12	7	-	-	-	-	Hol
Tetragoneura Winnertz, 1863	6	8	-	-	35	26	Hol-Neo-Aus
Allactoneurinae							
Allactoneura de Meijere, 1907	1	-	5	1	-	3	Ptr-Aus-Pal
Leiinae							
Clastobasis Skuse, 1890	2	-	6	5	-	6	Ptr-Aus-Pal
Docosia Winnertz, 1863	21	15	-	-	2	-	Hol-Neo
Greenomyia Brunetti, 1912	6	2	4	-	-	-	Hol-Or
Leia Meigen, 1818	26	19	10	23	71	2	cosm
Megophthalmidia Dziedzicki, 1889	4	1	-	-	7	-	Hol-Neo
Neoclastobasis Ostroverkhova, 1970	2	-	-	-	-	-	Pal
Novakia Strobl, 1893	2	1	-	-	1	-	Hol-Neo
Rondaniella Johannsen, 1909	1	1	1	-	-	-	Hol-Or
Manotinae							
Manota Williston, 1896	1	1	1	18	3	3	cosm
Mycetophilinae **Exechiini**							
Allodia Winnertz, 1863	33	13	3	2	-	3	subcosm
Allodiopsis Tuomikoski, 1966	5	+	+	-	-	-	Hol-Or
Anatella Winnertz, 1863	30	5	-	-	-	1	Hol-Aus
Brachypeza Winnertz, 1863	6	4	+	-	-	-	Hol-Or

Taxon	Pal	Nea	Or	Afr	Neo	Aus	Zoogeogr. category
Brevicornu MARSHALL,1896	37	20	-	1	7	5	subcosm
Cordyla MEIGEN, 1803	19	10	-	-	-	-	Hol
Exechia WINNERTZ, 1863	62	48	17	8	-	13	subcosm
Exechiopsis TUOMIKOSKI, 1966	52	+	+	-	7	-	Hol-Or-Neo
Pseudexechia TUOMIKOSKI, 1966	7	5	1	7	-	-	Hol-Ptr
Pseudobrachypesa TUOMIKOSKI, 1966	1	1	+	-	-	-	Hol-Or
Pseudorymosia TUOMIKOSKI, 1966	2	-	+	-	-	-	Pal-Or
Rymosia WINNERTZ, 1863	40	21	1	2	5	-	subcosm
Synplasta SKUSE, 1890	15	2	-	-	1	2	Hol-Neo-Aus
Tarnania TUOMIKOSKI, 1966	5	1	-	-	-	-	Hol
Mycetophilini							
Dynatosoma WINNERTZ, 1863	14	11	-	-	-	-	Hol
Epicypta WINNERTZ, 1863	5	1	19	22	52	7	cosm
Macrobrachius DZIEDZICKI, 1889	1	1	1	-	-	-	Hol-Or
Mycetophila MEIGEN, 1803	142	97	10	4	157	56	cosm
Phronia WINNERTZ, 1863	84	49	1	4	1	1	cosm
Platurocypta ENDERLEIN, 1910	3	1	2	11	1	2	cosm
Sceptonia WINNERTZ, 1863	14	2	1	1	4	1	cosm
Trichonta WINNERTZ, 1863	52	43	2	-	6	2	subcosm
Zygomyia WINNERTZ, 1863	17	9	2	3	15	30	cosm

Even with this relatively low level of generic endemism (BECHEV, in preparation) two centres can be discerned: Western and Eastern Palaearctic.

The geographic distribution of the genera (Tab. 1) suggests that the greater part of them are of boreal (Holarctic) origin. Even for genera that contain mainly non-Holarctic species, it is hard to accept unreservedly that they originated in the southern zoogeographic regions. Such an origin can be accepted with some certainly for *Truplaya* EDWARDS, 1929 (with 26 species in the Palaeotropic and one in Israel) and *Allactoneura* DE MEIJERE, 1907 (with 9 non-Holarctic species and one in the Russian Far East), and possibly for *Lygistorrhina* SKUSE, 1890; *Manota* WILLISTON, 1896 and others too.

To determine the origin of many genera, more faunistic and phylogenetic data are needed. The results presented here would be a basis form for such works in the future.

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