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Species Composition, Vertical Distribution and Areographical Structure of the Family Tachinidae (Diptera) in Bulgaria

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Abstract: A total of 432 species of the family Tachinidae has been established in Bulgaria so far. The most species-rich are the zones between 200 and 800 m a.s.l. [291–298 species (67.5–69.1%)]. The greatest number of species has been found in the zone of the xerothermic oak forests (333 species or 77.3%). The tachinid fauna can be divided into two main groups: 1) species with Mediterranean type of distribution (63 species – 14.6%), more thermophilic and distributed mainly in the southern parts of the Palaearctic and the lower parts of the mountains; 2) species with Palaearctic and Eurosiberian type of distribution (369 species – 85.4%), more eurybiontic and widely distributed. The distribution of the zoogeographical categories in the different vegetation belts of Bulgaria is scrutinised. The tachinid fauna is compared with the neighbouring countries and Mediterranean Africa.

Key words: Tachinidae, Bulgaria, faunistic composition, zoogeography

Introduction

The first data on family Tachinidae from Bulgaria were reported by Löw (1862, 1863), Joakimoff (1899), Kovachev (1905) and Nedelkov (1909, 1912). Between the two World Wars, information about the hosts of the tachinids had been published by Chorbadzhiev (1924–1939). Studies on the different species were reported. A significant contribution to the study of the Bulgarian tachinid fauna was made by Jacentkovsky (1936, 1937). The number of publications increased after the Second World War. Taxonomic contributions and systematic faunistic studies of the separate territories had been published. New hosts had been established and generalising studies on the family were presented (Trenchev 1980a, 1980b, 1980c, 1980d, Hubenov 1985, 1988, 1992, 1993, 1995, 1996, 2001, 2008, 2015a, Beschovski & Hubenov 1986).

Most authors do not pay special attention to the vertical distribution. At the same time, the exact description of the localities from which the material is collected allows obtaining data information about the altitude. In the publications on Diptera from the Pirin, Rila, Vitosha and Vrachanska Planina Mts., the vertical distribution of 2275 species of 81 families is analysed (Hubenov 2015b, 2016, 2017, 2018, 2019a, 2019b). These publications contain a lot of data on family Tachinidae. In the last 30 years, 87 species of tachinids, new to the fauna of Bulgaria, had been established, taxa had been changed and the distribution of many species had been appended.

The aim of this work is to present the fauna, distribution according to the hypsometric and vegetation belts and zoogeography of Tachinidae in Bulgaria.

Materials and Methods

All species reported from Bulgaria are included. The areographical categorisation of the species was made on the basis of current data about their distribution. A number of monographs and catalogues on tachinids (Mesnil 1944–1975, 1980, Guimarães 1971, Crosskey 1973, 1976, 1977, 1980, 1984, Herting 1983, Cantrell & Crosskey 1989, Herting & Dely-Draskovits 1993, Ziegler & Shima 1996, Cerretti & Ziegler 2004, O'Hara & Wood 2004, Richter 2004, Tschorsnig et al. 2004, Cerretti 2005, 2010) and new publications from the recent years have been used (Pape et al. 2015, O'Hara & Cerretti 2016, El-Hawagry 2018, O'Hara & Henderson 2018, O'Hara et al. 2020, Kettani et al. 2022, Lutovinovas et al. 2022).

The vertical distribution is presented according to the hypsometric belts across 200 m. The geographical and vegetation zones are presented (Table 1). The vegetation of Bulgaria is differentiated in a system of six vegetation belts (Stojanov 1966, Velchev et al. 1982, Bondev 1991, Velchev 2002): 1) Xerothermic oak forests – up to 600–700 m a.s.l.; 2) Mesophylic and xeromesophylic mixed forests – from 600–700 m to 900–1000 m a.s.l.; 3) Beech forests – from 900–1000 m to 1500–1600 m a.s.l.; 4) Coniferous forests – from 1300–1600 m to 2000–2200 m a.s.l.; 5) Subalpine vegetation – from 2000–2200 m to 2500 m a.s.l.; 6) Alpine vegetation – over 2400–2500 m a.s.l. The boundaries between the vegetation belts are not defined clearly and depending on the relief, exposure and human activities there are large mixed zones. No tachinids have been found in the alpine belt and it is not included in the table.

The classification of the areas is based on the available literature and recent electronic issues. Zoogeographical analysis for the taxa categorisation was used. This method allows obtaining data information about species complexes with different zoogeographical character based on the published data regarding species distribution and results of the faunistic research. These complexes contain zoogeographical information about the taxonomic groups which, combined with the origin of the ranges, determines the zoogeographical character of the fauna. The distribution of the species according to the zoogeographical categories in the different vegetation belts and the distribution of the zoogeographical categories in each belt are scrutinised. The classification of the areas is based on the works of Geptner (1936), Darlington (1957), Kryzhanovsky (1965, 1976, 2002), de Lattin (1967), Emeljanov (1974, 2018), Müller (1974, 1980), Udvardi (1975), Crosskey & White (1977), Malicky et al. (1983), Gorodkov (1984), Grehan (1988, 1993), Vigna Taglianti et al. (1999), Procheş & Ramdhani (2012), Holt et al. (2013) and Ficetola et al. (2017). The border between the Western and Eastern Palaearctic along the Yenisei River is accepted. To compare the fauna, Czekanowski-Dice-Sørensen coefficient of similarity is used (Czekanowski 1909, Dice 1945, Sørensen 1948).

Abbreviations used: ● – presence of the species, **?** – probable category, **atm** – Afrotropical-Mediterranean, **bm** – Boreomontane, **cse** – Central and South European, **csee** – Central and Southeast European, **csei** – Central and South European-Iranian, **cseit** – Central and South European-Iran-Turanian, **csena** – Central and South European-North African, **csess** – Central and South European and South Siberian, **csewca** – Central and South European-West Central Asian, **des** – Disjunct Eurosiberian, **dp** – Disjunct Palaearctic, **dpat** – Disjunct Palaearctic-Afrotropical, **dpo** – Disjunct Palaearctic-Oriental, **e** – European, **eca** – European-Central Asian, **ee** – East European, **ees** – East European-Siberian, **ei** – European-Iranian, **em** – East Mediterranean, **emi** – East Mediterranean-Iranian, **eo** – European-Oriental, **esca** – Eurosiberian-Central Asian, **ess** – European and South Siberian, **eswa** – European-Southwest Asian, **h** – Holarctic, **h*** – species introduced in North America, **hat** – Holarctic-Afrotropical, **hn** – Holarctic-Neotropical, **hno** – Holarctic-Neotropical-Oriental, **ho** – Holarctic-Oriental, **hoes** – Holoeurosiberian, **hom** – Holomediterranean, **hop** – Holopalaearctic, **hpta** – Holarctic-Paleotropical-Australian, **i** – introduced species (immigrants), **k** – Cosmopolitan, **m** – montane, **mca** – Mediterranean-Central Asian, **mfe** – Mediterranean-Far East, **mi** – Mediterranean-Iranian, **mit** – Mediterranean-Iran-Turanian, **mss** – Mediterranean and South Siberian, **mt** – Mediterranean-Turanian, **mwca** – Mediterranean-West Central Asian, **nm** – North Mediterranean, **nmca** – North Mediterranean-Central Asian, **nmi** – North Mediterranean-Iranian, **nmwca** – North Mediterranean-West Central Asian, **pat** – Palaearctic-Afrotropical, **po** – Palaearctic-Oriental, **poa** – Palaearctic-Oriental-Australian, **ppt** – Palaearctic-Paleotropical, **ppta** – Palaearctic-Paleotropical-Australian, **ptm** – Paleotropical-Mediterranean, **se** – South European, **sesfe** – South European and South Far East, **sess** – South European and South Siberian, **sk** – Semicosmopolitan, **sp** – South Palaearctic, **spat** – South Palaearctic-Afrotropical, **spo** – South Palaearctic-Oriental, **sppt** – South Palaearctic-Paleotropical, **sppta** – South Palaearctic-Paleotropical-Australian, **swp** – Southwest Palaearctic, **swpat** – Southwest Palaearctic-Afrotropical, **swppt** – Southwest Palaearctic-Paleotropical, **tes** – Transeurosiberian, **tp** – Transpalaearctic, **wces** – West and Central Eurosiberian, **wcp** – West and Central Palaearctic, **wes** – West Eurosiberian, **wesca** – West Eurosiberian-Central Asian, **wp** – West Palaearctic, **wpat** – West Palaearctic-Afrotropical, **wpo** – West Palaearctic-Oriental, **wppt** – West Palaearctic-Paleotropical.

Results

A total of 432 species of the family Tachinidae, belonging to 192 genera and four subfamilies has been recorded from Bulgaria so far (Table 1). The most numerous is the subfamily Exoristinae, with 169 species, followed by Tachininae (122 species), Phasiinae (76 species) and Dexiinae (65 species). Many genera contain comparatively small number of species. This is a typical feature of the family Tachinidae. In Bulgaria the richest genera include from nine to 14 species: *Tachina* and *Gymnosoma* – nine species each, *Exorista* and *Siphona* – ten species each, *Carcelia* and *Linnaemya* – 12 species each and *Cylindromyia* – 14 species; 15 genera contain from five to seven species (*Chaetogena*, *Meigenia*, *Phryxe*, *Drino*, *Gonia*, *Peleteria*, *Loewia*, *Macquartia*, *Actia*, *Bithia*, *Billaea*, *Eriothrix*, *Phasia*, *Leucostoma* and *Besseria*). These 22 genera contain 164 species or 38.1% of all tachinids. The Bulgarian species represent 69.5% of the 620 species, known for the Balkan Peninsula (Hubenov 2008, Lutovinovas et al. 2022). When comparing the fauna with some well-studied European countries, such as Hungary (Mihályi 1986: 479 species), Switzerland (Herting & Tschorsnig 1997: 524 species), Germany (Tschorsnig & Ziegler 1999: 494 species), Austria (Tschorsnig et al. 2004: 508 species), Czech Republic (Vaňhara & Tschorsnig 2009: 476 species) and Italy (Cerretti 2010: 644 species), it can be seen that the Bulgarian tachinid fauna is unsufficiently studied. Probably the number of tachinids could reach 500 species under further investigations. Most tachinids have vast ranges and the endemics are poorly represented. No endemic forms are known from Bulgaria.

Discussion

The vertical distribution of the Tachinidae on the territory of Bulgaria (Table 1) is related to the specific natural conditions of the respective regions, the peculiarities of the families and their study. The greatest number of species has been established in the first two belts: xerothermic oak forests (333 species – 77.3%) and mesophylic and xeromesophylic mixed forests (317 species – 73.5%). This is in accordance with the position of the most localities below 1000 m a.s.l. In the next belt, beech forests (220 species – 51.0%), the number of species decreases by 26.3%. In the other two vegetation belts, the decreases in number of species is seven-fold in the coniferous belt (60 species – 13.9%) and over 30 times in the subalpine belt (14 species – 3.2%). The upper limit of the coniferous forests gradually passes into the subalpine vegetation with wide mixing zones. Thus, some of the species are common to both vegetation belts and the number of taxa increases. Only nine species have been established in all vegetation belts. It can be accepted that the first two vegetation belts are optimal for the development of the largest number of species of the family Tachinidae. These belts occupy the main part of the country's territory and most types of natural habitats are concentrated in them. The conditions in the corresponding regions are also important. When comparing the generalised data for the mountains (Hubenov 2019b), it is seen that the fauna of the subalpine belt of the Vitosha Mt. is richer than the fauna of the Rila and Pirin Mts. This is due to the lower height of the Vitosha Mt. and the lack of a clear coniferous belt in the southern parts of the mountain. The investigations in this part of the Rila and Pirin Mts. are insufficient and fragmentary. The differences between Belasitsa and Slavyanka Mountains are noticeable (Hubenov 2015a), related to their specific natural conditions (silicate, water-rich northern slope of Belasitsa Mt. and waterless karst massif of Slavyanka Mt.).

Regarding to the hypsometric belts, there are significant variations in the maximum number of species among the families in the separate mountains. In general, for the whole country the maximum number of species was established between 200 and 800 m a.s.l. [291-298 species (67.5-69.1%)] as there are differences in the mountains of ±200 m. The greatest number of species (298 or 69.1%) has been found between 600 and 800 m a.s.l. (Table 1). In some cases, the finding of species at certain altitude is accidential. The lack of systematic research, the unclear boundaries among the vegetation belts and the fragmentary data for most species do not allow explicit conclusions about the adherence of the taxa to one or another vegetation zone to be made. The distribution of species in groups according to their presence in the vegetation belts has a relative character and depends on the specific features of taxa and research areas, as well as on the duration of the research. Only two species [*Platymya fimbriata* (Meigen, 1824) – Palaearctic-Oriental and *Dinera carinifrons* (Fallén, 1817) – Holoeurosiberian] have been established in all hypsometric belts. There is a correlation between the horizontal and vertical distribution of Diptera. The species with wide vertical distribution usually comprise large areas of the Super Palaearctic, Palaearctic and Eurosiberian type. The tachinids found in the subalpine zone of the Bulgarian mountains have Holarctic, Palaearctic-Oriental, Disjunct Palaearctic-Oriental, Transpalaearctic, West and Central Palaearctic, Holoeurosiberian, West and Central Eurosiberian and European and South Siberian ranges. The degree of similarity of the tachinid fauna (Table 2) is best expressed between the close hypsometric and vegetation belts. The taxa richness and the number of common species are significant. Thus, up to 1500 m a.s.l. the degree of similarity is above 50%. In the regions around 2200 m a.s.l., due to the most common species, a high degree of faunistic similarity is also presented. It can be expected that the level of similarity between the hypsometric and vegetation belts will increase under further investigations of the mountains. Tachinids are a mobile group with wide distribution of species and it is normal the degree of similarity of the fauna among the separate regions and altitudinal zones to be high. The geographical location of Bulgaria outside the zone with a typical Mediterranean climate contributes to the predominance of the widely distributed tachinid taxa.

The zoogeographical categorisation of the species was done on the basis of current data about their distribution. Thus, Tachinidae were divided into 65 categories, combined into three main groups and five complexes (Table 3).

Species distributed in the Palaearctic and beyond it. This group (137 species – 31.8%) includes 24 categories, of which 16 combine species of **northern type** (widely distributed in the Holarctic and Palaearctic) and eight species of **southern type** (distributed only in the southern parts of the Palaearctic). The difference among the separate vegetation belts reaches 4.0% and varies from 31.7% (coniferous forests) to 35.7% (subalpine vegetation). Of the other areographical categories, this difference is the highest in the Palaearctic-Oriental (7.5%), Disjunct Palaearctic-Oriental (5.4%) and Holarctic (5.0%) species. The establishment of other species of the group of the northern type in the subalpine belt is very likely, owing to their distribution and insufficient studies of the higher parts of the mountains. It is known that the species of the northern type have vast areas and ecological flexibility. The most widely distributed tachinids belong to this group: the cosmopolitan *Voria ruralis* (Fallén, 1810) and the subcosmopolitans *Compsilura concinnata* (Meigen, 1824), *Linnaemya comta* (Fallén, 1810), *Prosena siberita* (Fabricius, 1775) and *Leucostoma simplex* (Fallén, 1815). In the Super Palaearctic complex, the Holarctic-Oriental species prevail: 60 species – 13.9% (from 15.3% in the xerothermic oak forests to 21.4% in the subalpine zone). Of the other areographical types, the Disjunct Palaearctic-Oriental [17 species – 3.9% (1 to 12 species, from 1.7% to 7.1% in the separate belts)] and Holarctic [12 species – 2.8% (1 to 7 species, from 2.1% to 7.1%)] forms are better presented. The species of the southern type (15 species – 3.5%) are represented mainly in the first two (three) vegetation belts (one species is found in the coniferous forests belt). The group is not important for the zoogeographical characteristic because of the small number of species (1-12 species, 1.7-3.6%). Usually the Super-Palaearctic complex is scantly presented and is not determinant for the zoogeographical characteristic of taxa in the Bulgarian terrestrial fauna (with the exception of the coastal fauna). Only in highly mobile forms (such as Diptera), the complex is well presented and could reach 20% (Hubenov 2015c). In Tachinidae, it is represented with five species in the subalpine zone, of which four species probably are boreomontane forms [*Admontia podomyia* Brauer & Bergenstamm, 1889; *Nowickia atripalpis* (Robineau-Desvoidy, 1863); *N. marklini* (Zetterstedt, 1838) and *Hyalurgus lucidus* (Meigen, 1824)].

Species distributed only in the Palaearctic but in more than one subregion (Palaearctic type). Taxa, which areas include more than one Palaearctic subregion in latitudinal direction belong to this group. They are well represented in the high mobile groups and comprise above 20% of the species composition. A total of 11 areographical categories, including 131 species (30.4%) of the Bulgarian fauna of Tachimidae has been registered (Table 3). The character of the Palaearctic complex is determined by the Transpalaearctic [45 species – 10.4% (11.4% to 16.7% in the separate vegetation belts)], West and Central Palaearctic [29 species – 6.7% (6.9% to 28.6%)] and the Eurosiberian-Central Asian [17 species – 3.9% (3.3% to 3.8%)] species. The Disjunct Palaearctic (15 species) and the West Palaearctic (ten species) taxa are well presented. The correlation of the mentioned categories is kept in the separate vegetation belts and varies from 1.4% to 28.6% (1 to 41 species). Fifteen species (3.5%) have a longitudinal disjunction of the areas with regard to Siberia and Central Asia, from three to 13 species in the separate vegetation belts. Probably some of these species are presented with sparse populations and will be studied in more detail as a result of further research. Most often a latitudinal disjunction of the areas of this complex is lacking (Gorodkov 1984, Josifov 1988, Hubenov 2015c). A significant part of the species with wide vertical distribution belong to the Palaearctic complex. The main part of the species found in the subalpine zone belongs to it (42.9%). The vast areas and wide vertical distribution of the taxa of this complex are an indication of the greater ecological flexibility of its species.

Species distributed within one subregion of the Palaearctic. This group (163 species – 37.8%) includes from three to 114 species (21.4% to 34.2%) in the separate vegetation belts. The group combines species with Eurosiberian and Mediterranean type of distribution. The Mediterranean-Central Asian species are also included here according to Kryzhanovsky (1965, 2002) and Lopatin (1989), who combine the Mediterranean and Central Asian subregions. The species with Mediterranean type of distribution are accepted in a general way and include Submediterranean, Subiranian and Pontian faunistic elements that could be also considered separately from the Mediterranean ones.

The Eurosiberian species include ten areographical categories (115 species or 26.7%), with from three to 114 species (21.4% to 31.7%) in the separate vegetation belts (Table 3). The European [26 species (6.0%) – from five to 16 species (4.5% to 8.3%) in the separate belts], Disjunct Eurosiberian [22 species (5.1%) – from three to 16 species (3.6% to 5.0%)] and the Holoeurosiberian [17 species (3.9%) – from one to 14 species (3.3% to 7.1%)] taxa are the most numerous. The West and Central Eurosiberian, West Eurosiberian, Central and South European species are well represented. The number of taxa of these categories per vegetation belt varies from 0.2% to 8.3% (1-16 species). This difference is the largest in the European and South Siberian species (5.3%). The greatest number of Eurosiberian species (as a percentage) are found in the coniferous forests (19 species or 31.7%). In all belts (except for taxa with Super Palaearctic ranges in the coniferous belt) they are poorly represented compared to species with Super Palaearctic and Palaearctic ranges. Only three species (21.4%) of three areographical categories were found in the subalpine belt. The Eurosiberian complex includes a number of disjunctive areas: a longitudinal disjunction for Siberia and Central Asia and latitudinal disjunction with boreomontane and boreoalpine distribution (Gorodkov 1984, Josifov 1988, Hubenov 2015c). Of interest is the significant presence of Eurosiberian species in the first two vegetation belts (20.7% and 26.2%). This could be explained in three ways: 1) possibly a part of these species have unclear Palaearctic distribution; 2) the humid mountain valleys characterised with cooler climate have facilitated the migration of the part of the above-mentioned forms to the low lands; 3) predominant research of the lower parts of the mountain compared to the higher ones. Eurosiberian boreomontane forms at low altitudes have also been found for other groups as Cerambycidae (Coleoptera) and Heteroptera (Josifov 1963, 1976, Georgiev & Hubenov 2006). For Cerambycide this fact is due to the large afforestations of conifers in the first two vegetation belts. Probably, under further research on Tachinidae in the higher parts of the mountains, the number of the Eurosiberian species will increase.

The Mediterranean species include 20 areographical categories (48 species or 11.1%). These are from one to 45 (1.7% to 13.5%) species in the separate vegetation belts (Table 3). They are presented mainly in the first two vegetation belts and their number rapidly decreases with altitude. The Mediterranean species, established in one or two vegetation belts, prevail. The significant percentage of these species in the lower vegetation belts (93.7% in the first and 47.9% in the second belt) and their relatively scarce populations are due to the lower ecological flexibility of the Mediterranean forms in comparison with the previous ones. Because of the big variety of these areas, the group is divided into many subgroups with different origin, distribution and ecological peculiarities of the taxa. This complexity contributes to establishing of various zoogeographical classifications for Bulgaria. For the different areographical categories the difference among the vegetation belts is the largest in the Mediterranean-Central Asian species (1.3%). The Holomediterranean, Mediterranean-Central Asian (six species or 1.4% each) and Mediterranean-West Central Asian (five species – 1.2%) taxa are the most numerous. There are no significant differences in the distribution of the well-presented areographical categories for the Mediterranean species of the mountains. All Mediterranean species have been established only in the first three vegetation belts, except for *Rhamphina pedemontana* (Meigen, 1824), a South European species also found in the coniferous forests belt. The percentage of these species in the Sandanski-Petrich Valley, the region with the strongest Mediterranean influence in Bulgaria, reaches 17% (Hubenov 2008).

When comparing the tachinid fauna of Bulgaria with other countries some tendencies are seen, best presented in the species with Mediterranean distribution. The percentage of the typical Mediterranean species increases significantly from north to south. In Romania this percentage reaches to 9.7%, in Bulgaria – 11.1% and in Greece – 24.5% (Hubenov 2008). In total, for the Balkan Peninsula, species with Mediterranean type of distribution reach to 21.8% (more than in Bulgaria). The zoogeographical character of the fauna of Tachinidae is determined by the species with Palaearctic and Eurosiberian type of distribution, typical for the European countries. When comparing the Balkan tachinid fauna with that of Mediterranean Africa (Hubenov 2022), a significant difference is noticed. The tachinid fauna of Mediterranean Africa can also be divided into two main groups: 1) species with Mediterranean type of distribution (140 species or 53.8%); 2) species with Holarctic and Palaearctic type of distribution (120 species or 46.2%). The zoogeographical character of the family Tachinidae is determined mainly by the species with Mediterranean type of distribution (inversely to the European countries where species with Palaearctic and Eurosiberian type of distribution prevail).

Conclusion

A total of 432 species of the family Tachinidae have been recorded from Bulgaria so far. The greatest number of species has been found in the zone between 200 and 800 m a.s.l. The tachinid fauna can be divided into two main groups: 1) species with Mediterranean type of distribution (63 species or 14.6%) – more thermophilic and distributed mainly in the southern parts of the Palaearctic and the lower parts of the mountains. The species of the southern type, distributed in the Palaearctic and beyond it, can be formally related to this group as well; 2) species with Palaearctic and Eurosiberian type of distribution (368 species or 85.4%) – more eurybiontic and widely distributed. The species of the northern type, distributed in the Palaearctic and beyond it, can be formally related to this group as well. Of the first group, the Mediterranean-Central Asian and Holomediterranean forms are the most numerous. Of the second group, the Palaearctic-Oriental and Transpalaearctic taxa prevail. The distribution of species according to the hypsometric belts across 200 m a.s.l. is presented and the distribution of the zoogeographical categories in the vegetation belts of Bulgaria is scrutinised.

Xerothermic oak forests (334 species or 77.3%). Of the species with Mediterranean type of distribution (57 species or 17.1%) the Mediterranean-Central Asian, Holomediterranean and Mediterranean-West Central Asian taxa are the most numerous. Of the species with Palaearctic and Eurosiberian type of distribution (276 species or 82.9%) the Palaearctic-Oriental, Transpalaearctic, West and Central Palaearctic and European taxa are best represented. This belt includes 62 areographical categories. Most Mediterranean species (45 species or 13.5%) are represented.

Xeromesophyllic and mesophyllic mixed (oak-hornbeam) forests (317 species or 73.5%). Of the species with Mediterranean type of distribution (33 species or 10.4%), the Mediterranean-Central Asian and Mediterranean-West Central Asian taxa are the most numerous and of the species with Palaearctic and Eurosiberian type of distribution (284 species or 89.6%) – the Palaearctic-Oriental, Transpalaearctic and West and Central Palaearctic taxa. The percentage of the Mediterranean species (23 species or 7.3%) decreases.

Beech forests (220 species or 51.0%). Of the species with Mediterranean type of distribution (17 species or 7.7%) the South Palaearctic-Paleotropical-Australian, South Palaearctic-Oriental and Mediterranean-West Central Asian species are the most numerous. Of the species with Palaearctic and Eurosiberian type of distribution (203 species or 92.3%), the Palaearctic-Oriental and Transpalaearctic species are best represented. The percentage of the Palaearctic species and the species of northern type distributed in the Palaearctic and beyond it, increases. The number of the areographical categories decreases.

Coniferous forests (60 species or 13.9%). Of the species with Mediterranean type of distribution (two species or 3.3%) one South Palaearctic-Oriental and one South European species are represented. Of the species with Palaearctic and Eurosiberian type of distribution (58 species or 96.7%) the Palaearctic-Oriental and Transpalaearctic taxa prevail. The number of the areographical categories and the percentage of the Mediterranean forms decrease significantly.

Subalpine vegetation (14 species or 2.2%). Species with Mediterranean type of distribution have not been established. Of the species with Palaearctic and Eurosiberian type of distribution eight areographical categories are presented. The SuperPalaearctic, Palaearctic and Eurosiberian forms are presented. The Palaearctic-Oriental, Transpalaearctic and West and Central Palaearctic taxa prevail.

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Table 1. Species composition and vertical distribution of the Bulgarian Tachinidae

Taxa	Distribution													
	Vegetation belts													Zoogeography
	Xerothermic oak forests (to 600-700 m)			Mixed forests (to 900-1000 m)		Beech forests (to 1500-1600 m)			Coniferous forests (from 1300-1600 m to 2000-2200 m)			Subalpine vegetation (to 2500 m)		
	Geographical hypsometric belts													
	Lowlands	Hills		Low mountains		Middle mountains			High mountains					
	0-200 m	200-400 m	400-600 m	600-800 m	800-1000 m	1000-1200 m	1200-1400 m	1400-1600 m	1600-1800 m	1800-2000 m	2000-2200 m	2200-2400 m	2400-2600 m	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Exoristinae														
Exorista civilis (Rondani, 1859)	●	●	●											spo, ? po
Exorista deligata Pandellé, 1896		●	●											wp
Exorista grandis (Zetterstedt, 1844)	●	●	●	●	●	●								ei, ? wp, ess
Exorista larvarum (Linnaeus, 1758)	●	●	●	●	●	●	●							ho
Exorista mimula (Meigen, 1824)	●	●	●	●	●	●	●							ho
Exorista nova (Rondani, 1859)			●	●	●	●								mwca
Exorista rustica (Fallén, 1810)	●	●	●	●	●	●	●	●						po
Exorista segregata (Rondani, 1859)	●	●	●	●										mca
Exorista sorbillans (Wiedemann, 1830)		●	●	●	●	●								sppta
Exorista xanthaspis (Wiedemann, 1830)	●	●	●	●										ppta
Neophryxe vallina (Rondani, 1861)			●											csena
Chetogena acuminata Rondani, 1859		●	●	●	●	●	●							ppt
Chetogena fasciata (Egger, 1856)				●	●									des, ? ess
Chetogena filipalpis Rondani, 1859			●	●	●	●	●	●						csewca
Chetogena nigrofasciata (Strobl, 1902)		●	●	●										swpat
Chetogena obliquata (Fallén, 1810)			●	●	●	●								wcp, ? tp
Diplostichus janitrix (Hartig, 1838)	●	●												des
Parasetigena silvestris (Robineau-Desvoidy, 1863)	●	●	●	●	●	●	●	●						h
Phorocera assimilis (Fallén, 1810)	●	●	●	●	●	●	●	●						tp
Phorocera grandis (Rondani, 1859)		●	●	●	●									dpo
Phorocera obscura (Fallén, 1810)		●	●	●	●	●	●							des, ? dp
Phorinia aurifrons Robineau-Desvoidy, 1830		●	●	●										dpo
Bessa parallela (Meigen, 1824)		●	●	●	●									po
Bessa selecta (Meigen, 1824)		●	●	●	●	●	●							hoes
Belida angelicae (Meigen, 1824)							●							tp
Meigenia dorsalis (Meigen, 1824)	●	●	●	●	●	●	●	●						po
Meigenia incana (Fallén, 1810)	●													po

Meigenia majuscula (Rondani, 1859)						●								po
Meigenia mutabilis (Fallén, 1810)	●	●	●	●	●	●	●	●	●	●	●	●		wcp
Meigenia uncinata Mesnil, 1967		●												wces
Conogaster pruinosa (Meigen, 1824)				●	●	●	●							csess, ? esca
Zaira cinerea (Fallén, 1810)	●	●	●	●	●	●	●							tp
Gastrolepta anthracina (Meigen, 1826)		●												wp
Steleoneura czernyi Stein, 1924		●	●											mca
Medina collaris (Fallén, 1820)				●	●									po
Medina luctuosa (Meigen, 1824)				●	●	●	●							po
Medina separata (Meigen, 1824)		●	●	●										tes
Istocheta cinerea (Macquart, 1850)		●	●											csena, ? hom
Lecanipa bicincta (Meigen, 1824)					●	●	●							wces
Lecanipa leucomelas (Meigen, 1824)					●	●	●							e
Admontia grandicornis (Zetterstedt, 1849)				●	●	●	●	●	●	●				ho
Admontia maculisquama (Zetterstedt, 1859)				●	●	●	●	●	●	●				des
Admontia podomyia Brauer & Bergenstamm, 1889				●	●	●	●	●	●	●	●	●		dpo, bm
Oswaldia muscaria (Fallén, 1810)						●	●							dpo
Oswaldia spectabilis (Meigen, 1824)					●	●	●							wes
Lomachantha parra Rondani, 1859						●	●							wp
Ligeria angusticornis (Loew, 1847)		●	●	●										des
Picconia incurva (Zetterstedt, 1844)		●	●	●										wcp
Erynniopsis antennata (Rondani, 1861)	●	●	●	●	●	●								mt, h*, i
Ligeriella aristata (Villeneuve, 1911)		●	●	●										eca
Blondelia inclusa (Hartig, 1838)	●	●												po, ? dpo
Blondelia nigripes (Fallén, 1810)	●	●	●	●	●	●	●	●	●	●	●	●		po, h*, i
Compsilura concinnata (Meigen, 1824)	●	●	●	●	●	●	●							hpta, sk, h*, i
Vibrissina debilitata (Pandellé, 1896)						●								dpo
Vibrissina turrita (Meigen, 1824)				●	●	●	●							dpo
Acemya acuticornis (Meigen, 1824)					●	●	●							tp
Acemya rufitibia (von Roser, 1840)		●	●	●										des
Ceracia mucronifera Rondani, 1865		●	●											ptm
Ethilla aemula (Meigen, 1824)			●											wcp
Paratryphera barbatula (Rondani, 1859)		●												po
Atylomyia loewi Brauer, 1898		●	●	●										tp
Smidtia amoena (Meigen, 1824)	●	●	●	●	●	●	●							po
Smidtia conspersa (Meigen, 1824)		●	●	●										dp
Winthemia cruentata (Rondani, 1859)			●	●	●	●								dp, ? tp
Winthemia erythrura (Meigen, 1838)		●	●	●	●									wces
Winthemia quadripustulata (Fabricius, 1794)	●	●	●	●	●	●	●							ho
Winthemia variegata (Meigen, 1824)					●									e
Nemorilla floralis (Fallén, 1810)	●	●	●	●	●	●								pat, ? hat
Nemorilla maculosa (Meigen, 1824)		●	●	●										po
Aplomya confinis (Fallén, 1820)	●	●	●	●	●	●	●	●	●					ppt
Phebellia nigripalpis (Robineau-Desvoidy, 1847)		●	●	●	●	●	●							h

Phebellia pauciseta (Villeneuve, 1908)		●	●	●										e
Ptesiomyia alacris (Meigen, 1824)						●	●	●						e
Nilea hortulana (Meigen, 1824)	●	●	●	●	●									hoes
Nilea innoxia Robineau-Desvoidy, 1863			●											dp
Tlephusa cincinna (Rondani, 1859)			●	●	●	●	●	●	●					ess
Epicampocera succincta (Meigen, 1824)				●	●	●	●	●						po
Buquetia musca Robineau-Desvoidy, 1847	●													po
Phryxe erythrostoma (Hartig, 1838)							●							wes
Phryxe magnicornis (Zetterstedt, 1838)	●	●												hoes
Phryxe nemea (Meigen, 1824)	●	●	●	●	●	●	●	●	●	●				tp
Phryxe prima (Brauer & Bergenstamm, 1889)				●	●	●								mwca
Phryxe unicolor (Villeneuve, 1908)		●	●	●										e
Phryxe vulgaris (Fallén, 1810)	●	●	●	●	●	●	●	●	●	●				ho
Periarchiclops scutellaris (Fallén, 1820)			●	●	●	●								wces
Bactromyia aurulenta (Meigen, 1824)				●	●									dp, ? des
Pseudoperichaeta nigrolineata (Walker, 1853)	●	●	●	●	●	●	●	●						po
Pseudoperichaeta palesoidea (Robineau-Desvoidy, 1830)	●	●												wcp
Catagonia aberrans (Rondani, 1859)		●												dpo
Lydella grisescens Robineau-Desvoidy, 1830	●	●	●	●	●									po
Lydella stabulans (Meigen, 1824)		●	●	●	●	●								esca
Lydella thompsoni Herting, 1959	●													h, i
Chetina setigena Rondani, 1856	●	●	●											mwca
Cadurciella tritaeniata (Rondani, 1859)	●	●	●	●	●	●	●	●						dp
Drino atropivora (Robineau-Desvoidy, 1830)	●	●	●	●	●	●	●							sppta
Drino gilva (Hartig, 1838)	●	●												dp, ? dpat
Drino inconspicua (Meigen, 1830)	●	●	●	●	●	●	●							po, ? ppt
Drino lota (Meigen, 1824)	●	●	●	●	●	●	●							ppt
Drino vicina (Zetterstedt, 1849)		●	●	●	●	●	●							wcp
Thelyconychia solivaga (Rondani, 1861)	●	●	●											ppt
Amelibaea tultschensis (Brauer & Bergenstamm, 1891)		●	●	●										dp
Huebneria affinis (Fallén, 1810)	●	●	●	●	●	●	●	●	●	●	●	●		ess, ? wces
Tryphera lugubris (Meigen, 1824)			●	●										wcp
Carcelia bombylans Robineau-Desvoidy, 1830						●	●	●	●					po
Carcelia dubia (Brauer & Bergenstamm, 1891)	●													spo
Carcelia falenaria (Rondani, 1859)		●												swp
Carcelia gnava (Meigen, 1824)	●	●	●	●	●	●	●							dpo, h*
Carcelia iliaca (Ratzeburg, 1840)				●										cse
Carcelia laxifrons Villeneuve, 1912	●	●	●											ho, h*
Carcelia lucorum (Meigen, 1824)	●	●	●	●	●	●	●							po
Carcelia puberula Mesnil, 1941				●										dpo
Carcelia rasa (Macquart, 1849)		●	●	●										po
Carcelia rasella Baranov, 1931		●	●	●										dpo
Carcelia stackelbergi Mesnil, 1963	●	●	●	●										ee

Carcelia tibialis (Robineau-Desvoidy, 1863)		●	●	●	●									dpo
Senometopia confundens (Rondani, 1859)	●	●												dpo
Senometopia excisa (Fallén, 1820)		●	●	●										po
Senometopia separata (Rondani, 1859)	●	●												po
Thecocarcelia acutangulata (Macquart, 1850)	●	●	●	●	●	●								spat, ? dpat
Erycia fatua (Meigen, 1824)		●	●	●										tes
Erycia fasciata Villeneuve, 1924						●								wcp
Erycia festinans (Meigen, 1824)					●	●	●							wces
Xylotachina diluta (Meigen, 1824)	●	●	●	●										des
Alsomyia capillata (Rondani, 1859)			●	●	●									mwca, ? swp
Townsendiellomyia nidicola (Townsend, 1908)			●	●										nmwca, h*
Platymya antennata (Brauer & Bergenstamm, 1891)			●	●	●	●								wcp
Platymya fimbriata (Meigen, 1824)	●	●	●	●	●	●	●	●	●	●	●	●	●	po, ? bm
Eumea linearicornis (Zetterstedt, 1844)	●	●	●	●	●	●	●	●						po
Eumea mitis (Meigen, 1824)			●	●	●	●	●							hoes
Myxexoristops blondeli (Robineau-Desvoidy, 1830)	●	●	●	●										po
Myxexoristops stolida (Stein, 1924)				●										des
Zenillia dolosa (Meigen, 1824)				●	●									po
Zenillia libatrix (Panzer, 1798)	●	●	●	●	●	●	●	●	●					po
Calozenillia tamara (Portshinsky, 1884)	●													dp
Clemelis pullata (Meigen, 1824)	●	●	●	●	●	●	●	●	●	●	●	●		wcp
Pales pavida (Meigen, 1824)	●	●	●	●	●	●	●							po
Pales pumicata (Meigen, 1824)	●	●	●	●	●	●	●	●						nm, ? se
Phryno vetula (Meigen, 1824)			●	●										dpo
Bothria frontosa (Meigen, 1824)		●	●	●	●	●	●							tp, ? hoes
Ceromasia rubrifrons (Macquart, 1834)	●	●	●	●	●	●	●							tp
Allophorocera ferruginea (Meigen, 1824)				●	●	●	●	●	●	●				des
Allophorocera pachystyla (Macquart, 1850)										●				e, m
Ocytata pallipes (Fallén, 1820)			●											dp
Erythrocera nigripes (Robineau-Desvoidy, 1830)			●											des
Eurysthaea scutellaris (Robineau-Desvoidy, 1848)	●	●	●	●	●	●								dpo
Erynnia ocypterata (Fallén, 1810)		●	●	●										dp
Elodia ambulatoria (Meigen, 1824)	●	●	●	●	●	●	●							tp, ? dp
Elodia morio (Fallén, 1820)		●	●	●	●	●								tp
Sturmia bella (Meigen, 1824)	●	●	●	●	●	●	●							poa
Blepharipa pratensis (Meigen, 1824)	●	●	●	●	●	●	●							pat, hat, h*, i
Blepharipa schineri (Mesnil, 1939)		●	●	●										po
Masicera pavoniae (Robineau-Desvoidy, 1830)		●	●	●	●									wp
Masicera silvatica (Fallén, 1810)	●	●	●	●	●	●	●							wes
Masicera sphingivora (Robineau-Desvoidy, 1830)	●	●	●											tp
Prosopea nigricans (Egger, 1861)	●	●	●	●	●	●	●							tp
Gaedia connexa (Meigen, 1824)				●	●	●	●							e
Gaedia distincta Egger, 1861				●	●	●	●							wp, ? wes
Hebia flavipes Robineau-Desvoidy, 1830		●	●	●										dp, ? des

Thelymorpha marmorata (Fabricius, 1805)				●	●									esca
Baumhaueria goniaeformis (Meigen, 1824)		●	●	●	●	●	●							wp
Gonia atra Meigen, 1826	●													ho, ? spo
Gonia bimaculata Wiedemann, 1819	●	●	●	●	●	●								sppt
Gonia capitata (De Geer, 1776)			●	●	●	●	●	●	●	●				wcp, tp
Gonia ornata Meigen, 1826		●	●	●										tp
Gonia picea (Robineau-Desvoidy, 1830)		●	●	●										po
Onychogonia flaviceps (Zetterstedt, 1838)				●	●	●								h
Pseudogonia parisiaca (Robineau-Desvoidy, 1851)	●	●	●	●	●	●	●							ess, ? tes
Pseudogonia rufifrons (Wiedemann, 1830)	●	●	●	●	●	●								ppta
Spallanzania hebes (Fallén, 1820)	●	●	●	●	●									hno
Tachininae														
Tachina casta (Rondani, 1859)	●	●	●	●	●									nm
Tachina corsicana (Villeneuve, 1931)	●													mca, ? sp
Tachina fera (Linnaeus, 1761)	●	●	●	●	●	●	●	●	●	●	●			hop
Tachina grossa (Linnaeus, 1758)	●	●	●	●	●	●	●	●						tp
Tachina lurida (Fabricius, 1781)	●	●	●	●	●	●								wcp
Tachina magna (Giglio-Tos, 1890)	●	●	●	●	●									sess
Tachina magnicornis (Zetterstedt, 1844)	●	●	●	●	●	●	●	●	●	●				hop
Tachina nupta (Rondani, 1859)	●	●	●	●	●	●	●	●	●					po
Tachina praeceps Meigen, 1824	●	●	●	●	●	●	●							tp
Schineria tergestina Rondani, 1859		●												po
Nowickia atripalpis (Robineau-Desvoidy, 1863)						●	●	●	●	●	●	●		po, ? bm
Nowickia marklini (Zetterstedt, 1838)							●	●	●	●	●	●		h, ? bm
Nowickia ferox (Panzer, 1809)					●	●	●	●	●	●	●	●		wces
Nowickia rondanii (Giglio-Tos, 1890)				●	●	●	●	●	●					spo
Cnephaotachina danilevskyi (Portshinsky, 1882)		●	●	●	●									mca
Peleteria abdominalis Robineau-Desvoidy, 1830		●	●	●	●	●	●							nmi
Peleteria ferina (Zetterstedt, 1844)	●	●	●	●	●	●	●							tes
Peleteria iavana (Wiedemann, 1819)		●	●	●										ppta
Peleteria prompta (Meigen, 1824)		●												ess, ? m
Peleteria rubescens (Robineau-Desvoidy, 1830)	●	●	●	●	●	●	●	●	●	●				tp
Peleteria ruficornis (Macquart, 1835)	●	●	●	●	●									wpat
Peleteria varia (Fabricius, 1794)	●	●	●	●	●	●	●	●						ppta
Germaria ruficeps (Fallén, 1820)				●	●	●	●							wcp
Nemoraea pellucida (Meigen, 1824)	●	●	●	●	●	●	●	●						po
Linnaemya comta (Fallén, 1810)	●	●	●	●	●	●	●							hno, sk
Linnaemya frater (Rondani, 1859)		●	●	●										mi
Linnaemya impudica (Rondani, 1859)	●	●	●	●	●	●	●							e
Linnaemya haemorrhoidalis (Fallén, 1810)		●	●	●	●	●	●	●	●	●				hoes, bm
Linnaemya helvetica Herting, 1963			●	●	●									cse
Linnaemya lithosiophaga (Rondani, 1859)	●	●	●	●	●									hom
Linnaemya olsufjevi Zimin, 1954		●	●	●										esca, ? hoes
Linnaemya perinealis Pandelle, 1895		●												po

Linnaemya picta (Meigen, 1824)		●	●	●	●	●	●							po
Linnaemya rossica Zimin, 1954	●	●	●	●	●	●	●	●	●					po, ? hoes, bm
Linnaemya tessellans (Robineau-Desvoidy, 1830)		●	●	●										po
Linnaemya vulpina (Fallén, 1810)	●	●	●											po
Gymnoglossa transsylvanica Mik, 1898									●	●				ees
Chrysosomopsis aurata (Fallén, 1820)			●	●	●									po
Lydina aenea (Meigen, 1824)		●	●											esca
Lypha dubia (Fallén, 1810)				●										hoes
Petagnia subpetiolata Rondani, 1859				●										cse
Ernestia laevigata (Meigen, 1838)					●	●	●	●						hoes
Ernestia puparum (Fabricius, 1794)					●	●	●							hoes, ? tp
Ernestia rudis (Fallén, 1810)				●	●	●	●	●	●					tp
Eurithia anthophila (Robineau-Desvoidy, 1830)			●	●	●	●	●	●						po
Eurithia caesia (Fallén, 1810)					●	●	●	●	●					po
Eurithia consobrina (Meigen, 1824)							●							esca
Eurithia gemina (Mesnil, 1972)						●	●	●	●	●				e, m
Hyalurgus lucidus (Meigen, 1824)								●	●	●				po, bm
Gymnocheta viridis (Fallén, 1810)					●									tp
Zophomyia temula (Scopoli, 1763)		●	●	●	●	●	●	●	●	●	●	●		tp
Cleonice callida (Meigen, 1824)			●	●	●	●	●							des
Cleonice nitidiuscula (Zetterstedt, 1859)				●	●									wes
Loewia brevifrons (Rondani, 1856)	●	●	●	●	●	●	●							csei
Loewia phaeoptera (Meigen, 1824)		●	●	●	●	●	●							wes
Loewia piligena Mesnil, 1973							●							e, ? cse
Loewia setibarba Egger, 1856	●	●	●	●	●	●								e
Loewia submetallica (Macquart, 1855)				●	●									e
Pseudopachystylum gonioides (Zetterstedt, 1838)					●	●	●	●	●					hoes
Pelatachina tibialis (Fallén, 1810)	●	●	●	●	●	●	●							hoes
Macquartia chalconota (Meigen, 1824)			●	●	●	●	●	●						esca
Macquartia dispar (Fallén, 1820)		●	●	●	●	●	●							esca
Macquartia grisea (Fallén, 1810)			●	●	●									wesca
Macquartia praefica (Meigen, 1824)	●	●	●	●	●	●	●							? wp
Macquartia tenebricosa (Meigen, 1824)	●	●	●	●	●	●	●	●	●					wcp
Macquartia tessellum (Meigen, 1824)		●	●	●	●	●	●							spo
Macquartia viridana Robineau-Desvoidy, 1863						●								dpo
Macroprosopa atrata (Fallén, 1810)		●	●											ess
Triarthria setipennis (Fallén, 1810)	●	●	●	●										h
Neaera atra Robineau-Desvoidy, 1850		●	●											nm, ? hom
Phytomyptera abnormis (Stein, 1924)									●	●				cse
Phytomyptera cingulata (Robineau-Desvoidy, 1830)	●	●												e
Phytomyptera nigrina (Meigen, 1824)				●	●									wcp
Graphogaster brunnescens Villeneuve, 1907	●	●	●	●	●	●								ess
Graphogaster vestita Rondani, 1868		●	●											hom, ? mi
Ceromya dilecta Herting, 1977		●	●											cse, ? se

Ceromya flaviseta (Villeneuve, 1921)	●	●	●	●	●									eo
Actia crassicornis (Meigen, 1824)		●	●	●	●	●	●	●						po
Actia infantula (Zetterstedt, 1844)		●	●	●	●	●								wcp
Actia lamia (Meigen, 1838)		●	●	●										hoes, ? se
Actia nigroscutellata Lundbeck, 1927				●										dpo
Actia pilipennis (Fallén, 1810)	●	●	●	●	●	●	●							po
Peribaea apicalis Robineau-Desvoidy, 1863	●													tes
Peribaea tibialis (Robineau-Desvoidy, 1851)	●	●	●	●	●	●								ppt
Ceranthia lichtwardtiana (Villeneuve, 1931)										●				des
Siphona collini Mesnil, 1960		●	●	●										hoes, ? des
Siphona cristata (Fabricius, 1805)	●	●	●	●	●	●								ho
Siphona flavifrons Staeger, 1849				●	●	●	●	●	●	●				wces, ? des, h*
Siphona geniculata (De Geer, 1776)	●	●	●	●	●	●	●							ho, h*
Siphona hokkaidensis Mesnil, 1957									●					h
Siphona hungarica Andersen, 1984		●	●	●										e, ? csee
Siphona maculata Stæger, 1849		●												h
Siphona pauciseta Rondani, 1865		●	●	●										po
Siphona setosa Mesnil, 1960							●							wces, ? tes
Siphona variata Andersen, 1982		●	●	●										wp
Aphantorhaphopsis siphonoides (Strobl, 1898)							●	●	●	●				e
Aphria latifrons Villeneuve, 1908					●									mss,? mca
Aphria longirostris (Meigen, 1824)		●	●	●	●	●	●	●	●	●	●	●		wcp
Aphria xyphias Pandellé, 1896		●	●	●										esca
Demoticus plebejus (Fallén, 1810)		●	●	●	●	●	●	●	●	●				wces
Bithia demotica (Egger, 1861)		●	●	●										des
Bithia geniculata (Zetterstedt, 1844)	●													wces
Bithia glirina (Rondani, 1861)	●	●	●	●	●	●	●	●						wes
Bithia immaculata (Herting, 1971)		●	●	●										cse, ? se
Bithia jacentkovskyi (Villeneuve, 1937)		●												eca
Bithia modesta (Meigen, 1824)	●	●	●	●	●	●								mca
Bithia spreta (Meigen, 1824)					●									wes
Leskia aurea (Fallén, 1820)		●	●	●	●	●								hoes
Solieria fenestrata (Meigen, 1824)					●									wes
Solieria pacifica (Meigen, 1824)				●	●									des
Solieria vacua (Rondani, 1861)		●	●	●										e, ? cse
Mintho compressa (Fabricius, 1787)	●	●	●	●	●									atm
Mintho praeceps (Scopoli, 1763)			●	●										hom
Mintho rufiventris (Fallén, 1817)	●	●	●	●	●	●								tp
Minthodes picta (Zetterstedt, 1844)					●	●	●	●	●					wes, bm
Minthodes pictipennis Brauer & Bergenstamm, 1889	●	●												emi
Palmonia hermonensis Kugler, 1972		●	●											em
Ziminia masiceraeformis (Portshinsky, 1881)		●	●											mwca
Mesnilomyia longicornis Kugler, 1972		●	●											em
Melisoneura leucoptera (Meigen, 1824)							●							des

Microphthalma europaea Egger, 1860	●	●	●	●	●	●								wpo, ? wppt
Dexiosoma caninum (Fabricius, 1781)						●	●							des
Dexiinae														
Trixa caerulescens Meigen, 1824		●												wes
Trixa conspersa (Harris, 1776)	●	●	●	●	●	●								po
Billaea adelpha (Loew, 1873)			●	●	●	●								eswa
Billaea fortis (Rondani, 1862)	●	●	●	●	●	●								po
Billaea irrorata (Meigen, 1826)	●	●	●	●	●	●	●	●	●	●				e
Billaea maritima (Schiner, 1862)		●	●											mfe, dp
Billaea pectinata (Meigen, 1826)	●	●	●	●	●	●	●							swp, ? mca
Billaea steini (Brauer & Bergenstamm, 1891)						●								des
Billaea triangulifera (Zetterstedt, 1844)					●	●	●	●	●					tp, ? hoes
Dinera carinifrons (Fallén, 1817)	●	●	●	●	●	●	●	●	●	●	●	●	●	hoes
Dinera ferina (Fallén, 1817)	●	●	●	●	●	●	●	●						wces
Dinera fuscata Zhang & Shima, 2006		●	●	●										po, wpo
Dinera grisescens (Fallén, 1817)		●	●	●	●									h
Estheria bohemani (Rondani, 1862)						●	●	●	●	●				e
Estheria cristata (Meigen, 1826)						●	●							eca
Estheria petiolata (Bonsdorff, 1866)	●	●	●	●	●	●	●	●	●	●				esca
Estheria picta (Meigen, 1826)	●	●	●	●	●	●	●	●	●					esca
Dexia rustica (Fabricius, 1775)	●	●	●	●	●	●								tp
Prosena siberita (Fabricius, 1775)	●	●	●	●	●	●	●	●	●	●				hpta, sk, i
Zeuxia brevicornis (Egger, 1860)		●	●											esca
Zeuxia cinerea Meigen, 1826	●	●	●	●	●	●	●	●	●	●				wp
Zeuxia erythraea (Egger, 1856)		●												nmca
Zeuxia tricolor (Portshinsky, 1881)		●	●											em
Eriothrix apenninus (Rondani, 1862)				●	●	●	●	●	●	●	●	●	●	wcp
Eriothrix argyreatus (Meigen, 1824)		●	●	●										wcp
Eriothrix inflatus Kolomiets, 1967				●	●									ee
Eriothrix prolixa (Meigen, 1824)		●	●	●										esca
Eriothrix rufomaculatus (De Geer, 1776)		●	●	●	●	●	●	●	●	●	●	●	●	tp
Trafoia monticola Brauer & Bergenstamm, 1893				●	●									e
Campylocheta inepta (Meigen, 1824)							●							wcp
Campylocheta latigena Mesnil, 1974		●	●	●										e
Campylocheta similis Ziegler & Shima, 1996		●	●	●										des
Blepharomyia pagana (Meigen, 1824)	●	●	●	●	●									des
Blepharomyia piliceps (Zetterstedt, 1859)		●												e, bm
Peteina erinaceus (Fabricius, 1794)				●	●									esca
Ramonda prunaria (Rondani, 1861)			●											esca, ? wces
Ramonda spathulata (Fallén, 1820)	●	●	●	●	●	●	●	●						tp
Periscepsia carbonaria (Panzer, 1798)	●	●	●	●	●	●	●							ppt
Wagneria costata (Fallen, 1815)	●	●	●											e
Wagneria cunctans (Meigen, 1824)		●	●											csena
Wagneria gagatea Robineau-Desvoidy, 1830		●	●	●										des

Athrycia curvinervis (Zetterstedt, 1844)						●									hoes
Athrycia impressa (van der Wulp, 1869)						●	●								esca
Athrycia trepida (Meigen, 1824)	●	●	●	●	●	●	●								tp
Voria ruralis (Fallén, 1810)		●	●	●	●	●	●	●	●						k
Cyrtophloeba ruricola (Meigen, 1824)		●	●	●	●	●									tp
Hyleorus elatus (Meigen, 1838)		●	●	●	●	●	●								po
Klugia marginata (Meigen, 1824)				●	●										esca
Phyllomya volvulus (Fabricius, 1794)	●	●	●	●	●	●	●	●	●						tp
Thelaira leucozona (Panzer, 1809)			●	●											po
Thelaira nigripes (Fabricius, 1794)	●	●	●	●	●	●	●								po
Thelaira solivaga (Harris, 1780)		●	●	●											po
Halidaya aurea Egger, 1856		●	●	●	●	●									po
Stomina caliendrata (Rondani, 1862)		●	●	●	●	●									swp, ? mwca
Stomina iners (Meigen, 1838)	●	●	●	●	●	●									mit
Stomina tachinoides (Fallén, 1817)		●	●	●	●	●									wcp
Rhamphina pedemontana (Meigen, 1824)					●	●	●	●	●						se
Dufouria chalybeata (Meigen, 1824)	●	●	●	●	●	●	●								tp
Dufouria nigrita (Fallén, 1810)	●	●	●	●	●	●	●								wcp
Dufouria occlusa (Robineau-Desvoidy, 1863)			●												e
Chetoptilia puella (Rondani, 1862)	●	●	●	●											des
Rondania fasciata (Macquart, 1834)							●	●							wes
Rondania dimidiata (Meigen, 1824)				●	●										wces
Microsoma exiguum (Meigen, 1824)					●										dp
Freraea gagatea Robineau-Desvoidy, 1830		●	●	●											wcp, ? wces
Phasiinae															
Redtenbacheria insignis Egger, 1861							●								tp
Euthera fascipennis (Loew, 1854)		●													ptm
Eliozeta helluo (Fabricius, 1805)	●	●	●	●	●										tp
Eliozeta pellucens (Fallén, 1820)	●	●	●	●	●										dp
Clytiomya continua (Panzer, 1798)	●	●	●	●	●	●	●								tp
Clytiomya sola (Rondani, 1861)		●	●												hom
Ectophasia crassipennis (Fabricius, 1794)	●	●	●	●	●	●	●	●	●						tp
Ectophasia leucoptera (Rondani, 1865)	●	●													nmwca
Ectophasia oblonga (Robineau-Desvoidy, 1830)	●	●	●	●	●	●	●								wp
Subclytia rotundiventris (Fallén, 1820)		●	●	●											tp
Gymnosoma clavatum (Rohdendorf, 1947)	●	●	●	●	●	●	●	●	●						tp
Gymnosoma costata (Panzer, 1800)	●	●	●	●	●										wcp, ? tp, ? e
Gymnosoma desertorum (Rohdendorf, 1947)	●	●	●	●	●	●	●								po
Gymnosoma dolycoridis Dupuis, 1961	●	●	●	●	●	●	●								po
Gymnosoma inornatum Zimin, 1966	●	●	●	●	●	●	●								po
Gymnosoma nitens Meigen, 1824			●	●	●	●	●								esca
Gymnosoma nudifrons Herting, 1966			●	●	●	●	●								tp
Gymnosoma rotundatum (Linnaeus, 1758)	●	●	●	●	●	●	●	●	●						po
Gymnosoma rungsi (Mesnil, 1952)		●	●	●											swp, mit

Cistogaster globosa (Fabricius, 1775)	●	●	●	●										ess
Opesia cana (Meigen, 1824)		●	●	●	●	●								tp
Opesia grandis (Egger, 1860)	●													tp
Elomya lateralis (Meigen, 1824)	●	●	●	●	●	●	●							tp
Phasia aurigera (Egger, 1860)		●	●	●										dp
Phasia aurulans Meigen, 1824		●	●	●	●									h
Phasia hemiptera (Fabricius, 1794)		●	●	●	●									tp, ? hoes
Phasia obesa (Fabricius, 1798)	●	●	●	●	●	●	●	●	●					tp, ? hop
Phasia pandellei (Dupuis, 1957)		●												e
Phasia pusilla Meigen, 1824	●	●	●	●	●	●								po
Phasia subcoleoptrata (Linnaeus, 1767)	●	●	●	●	●	●	●							tp
Trichopoda pennipes (Fabricius, 1781)	●													sk, i
Xysta holosericea (Fabricius, 1805)	●	●	●											mi
Catharosia pygmaea (Fallén, 1815)	●	●	●	●										wcp
Litophasia hyalipennis (Fallén, 1815)		●	●	●										e
Strongygaster globula (Meigen, 1824)	●	●	●	●	●									hoes, ? tes
Dionaea aurifrons (Meigen, 1824)	●	●	●	●	●	●	●	●						tp, ? dp
Eulabidogaster setifacies (Rondani, 1861)		●	●											wcp
Leucostoma abbreviatum Herting, 1971		●	●											mit
Leucostoma anthracinum (Meigen, 1824)		●												? wcp
Leucostoma engeddense Kugler, 1966		●	●											atm
Leucostoma nudifacies Tschorsnig, 1991		●	●											sesfe
Leucostoma simplex (Fallén, 1815)		●												sk, i
Leucostoma tetraptera (Meigen, 1824)	●	●	●	●	●	●	●							pat
Leucostoma turonicum Dupuis, 1964		●	●	●										csei
Clairvillia biguttata (Meigen, 1824)	●	●	●	●	●	●								dp
Clairvillia pninae Kugler, 1971		●	●											hom
Labigastera forcipata (Meigen, 1824)					●	●	●							wes
Labigastera nitidula (Meigen, 1824)		●	●	●										swp, mt
Labigastera pauciseta (Rondani, 1861)	●	●	●	●	●	●	●							e, csei
Weberia digramma (Meigen, 1824)		●	●											mt
Lophosia fasciata Meigen, 1824				●	●									po
Cylindromyia auriceps (Meigen, 1838)	●	●	●	●	●	●								tp
Cylindromyia bicolor (Olivier, 1812)	●	●	●	●	●	●	●							cseit
Cylindromyia brassicaria (Fabricius, 1775)	●	●	●	●	●	●	●	●	●					po, ? hop
Cylindromyia brevicornis (Loew, 1844)	●	●	●	●	●	●	●							des
Cylindromyia crassa (Loew, 1845)	●	●	●	●	●	●								mss
Cylindromyia hermonensis Kugler, 1974		●												? hom
Cylindromyia intermedia (Meigen, 1824)	●	●	●	●	●	●	●							hn
Cylindromyia interrupta (Meigen, 1824)				●	●	●	●							h
Cylindromyia pilipes (Loew, 1844)	●	●	●	●	●	●								wcp
Cylindromyia pusilla (Meigen, 1824)				●	●	●	●							tp
Cylindromyia rubida (Loew, 1854)					●									swppt
Cylindromyia rufifrons (Loew, 1844)	●	●												nmwca, ? mwca

	0-200	200-400	400-600	600-800	800-1000	1000-1200	1200-1400	1400-1600	1600-1800	1800-2000	2000-2200	2200-2400	2400-2600	
Cylindromyia rufipes (Meigen, 1824)		●	●	●										swppt
Cylindromyia xylotina (Egger, 1860)		●	●	●										cse
Hemyda obscuripennis (Meigen, 1824)		●	●	●										dpo
Hemyda vittata (Meigen, 1824)				●	●	●								hoes, ? tp
Besseria anthophila (Loew, 1871)							●							h
Besseria dimidiata (Zetterstedt, 1844)		●	●	●	●	●								cse
Besseria lateritia (Meigen, 1824)	●	●	●											mit
Besseria melanura (Meigen, 1824)			●	●	●									wcp
Besseria reflexa Robineau-Desvoidy, 1830		●	●	●										cse
Phania curvicauda (Fallén, 1820)				●	●	●								ei
Phania funesta (Meigen, 1824)	●	●	●	●	●									ei
Phania incrassata Pandellé, 1894		●	●	●										cse
Phania speculifrons (Villeneuve, 1919)			●											cse, ? e
Total 432 species	**167**	**291**	**296**	**298**	**244**	**210**	**170**	**79**	**57**	**38**	**15**	**14**	**4**	**Areographical categories**
	334			**317**		**220**			**60**			**14**		

Table 2. Degree of similarity wihin the family Tachinidae according to the hypsometric belts (coefficient of similarity according to Czekanowski-Dice-Sørensen).

200-400 m	**87.4**		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
400-600 m	**62.3**	**89.3**										
600-800 m	**58.6**	**78.1**	**85.9**									
800-1000 m	**61.9**	**62.4**	**68.5**	**82.7**								
1000-1200 m	**59.6**	**56.7**	**60.9**	**70.1**	**85.0**							
1200-1400 m	**52.4**	**46.9**	**50.6**	**56.4**	**71.5**	**83.2**						
1400-1600 m	**34.3**	**26.5**	**28.8**	**32.9**	**43.3**	**51.2**	**61.8**					
1600-1800 m	**24.2**	**19.2**	**20.4**	**24.8**	**31.9**	**39.7**	**48.5**	**83.4**				
1800-2000 m	**14.8**	**12.2**	**12.6**	**16.1**	**19.9**	**25.0**	**31.7**	**58.1**	**75.8**			
2000-2200 m	**8.8**	**6.5**	**6.4**	**7.7**	**9.3**	**12.4**	**16.2**	**31.9**	**40.0**	**56.6**		
2200-2400 m	**6.7**	**5.9**	**5.8**	**7.1**	**10.1**	**11.6**	**15.2**	**30.1**	**39.4**	**53.8**	**96.6**	
2400-2600 m	**2.3**	**2.0**	**2.0**	**2.6**	**3.2**	**3.7**	**4.5**	**9.3**	**13.1**	**19.0**	**42.1**	**44.4**
Hypsometric belts	**0-200 m**	**200-400 m**	**400-600 m**	**600-800 m**	**800-1000 m**	**1000-1200 m**	**1200-1400 m**	**1400-1600 m**	**1600-1800 m**	**1800-2000 m**	**2000-2200 m**	**2200-2400 m**

Note. **1** – 0-10%; **2** – 10-20%; **3** – 20-30%; **4** – 30-40%; **5** – 40-50%; **6** – 50-60%; **7**– 60-70%; **8** – 70-80%; **9** – 80-90%; **10** – 90-100%.

Table 3. Zoogeographical characteristic of the family Tachinidae according to the vegetation belts of Bulgaria.

Classification of the areas	Total number	Vegetation belts				
		Xerothermic oak forests (to 600-700 m)	Mixed forests (to 900-1000 m)	Beech forests (to 1500-1600 m)	Coniferous forests (from 1300-1600 m to 2000-2200 m)	Subalpine vegetation (to 2500 m)
Species distributed in Palaearctic and out of it	**137 (31.8)**	**112 (33.6)**	**107 (33.8)**	**78 (35.5)**	**19 (31.7)**	**5 (35.7)**
North type	**122 (28.3)**	**100 (30.0)**	**97 (30.6)**	**73 (33.2)**	**18 (30.0)**	**5 (35.7)**
Cosmopolitan	1 (0.2)	1 (0.3)	1 (0.3)	1 (0.5)	1 (1.7)	
Semicosmopolitan	1 (0.2)	1 (0.3)				
Holarctic-Paleotropical-Australian	2 (0.5)	2 (0.6)	2 (0.6)	2 (0.9)	1 (1.7)	
Holarctic-Neotropical-Oriental	2 (0.5)	2 (0.6)	2 (0.6)	1 (0.5)		
Holarctic-Oriental	9 (2.1)	8 (2.4)	7 (2.2)	7 (3.2)	2 (3.3)	
Holarctic-Neotropical	1 (0.2)	1 (0.3)	1 (0.3)	1 (0.5)		
Holarctic	12 (2.8)	7 (2.1)	7 (2.2)	6 (2.7)	2 (3.3)	1 (7.1)
Palaearctic-Paleotropical-Australian	4 (0.9)	4 (1.2)	4 (1.3)	2 (0.9)		
Palaearctic-Oriental-Australian	1 (0.2)	1 (0.3)	1 (0.3)	1 (0.5)		
Palaearctic-Paleotropical	6 (1.4)	6 (1.8)	5 (1.6)	5 (2.3)	1 (1.7)	
Palaearctic-Afrotropical	3 (0.7)	3 (0.9)	3 (0.9)	3 (1.4)		
Palaearctic-Oriental	60 (13.9)	51 (15.3)	49 (15.4)	36 (16.4)	10 (16.7)	3 (21.4)
West Palaearctic-Afrotropical	1 (0.2)	1 (0.3)	1 (0.3)			
West Palaearctic-Oriental	1 (0.2)	1 (0.3)	1 (0.3)	1 (0.5)		
Disjunct Palaearctic-Oriental	17 (3.9)	10 (3.0)	12 (3.8)	7 (3.2)	1 (1.7)	1 (7.1)
European-Oriental	1 (0.2)	1 (0.3)	1 (0.3)			
South type	**15 (3.5)**	**12 (3.6)**	**10 (3.2)**	**5 (2.3)**	**1 (1.7)**	
South Palaearctic-Paleotropical-Australian	2 (0.5)	2 (0.6)	2 (0.6)	2 (0.9)		
South Palaearctic-Paleotropical	1 (0.2)	1 (0.3)	1 (0.3)			
Southwest Palaearctic-Paleotropical	2 (0.5)	1 (0.3)	2 (0.6)			
South Palaearctic-Afrotropical	1 (0.2)	1 (0.3)	1 (0.3)	1 (0.5)		
Southwest Palaearctic-Afrotropical	1 (0.2)		1 (0.3)			
South Palaearctic-Oriental	4 (0.9)	3 (0.9)	2 (0.6)	2 (0.9)	1 (1.7)	
Paleotropical-Mediterranean	2 (0.5)	2 (0.6)				
Afrotropical-Mediterranean	2 (0.5)	2 (0.6)	1 (0.3)			
Species with Palaearctic distribution	**294 (68.2)**	**221 (66.4)**	**210 (66.2)**	**142 (64.5)**	**41 (68.3)**	**9 (64.3)**
Palaearctic type	**131 (30.4)**	**107 (32.1)**	**104 (32.8)**	**78 (35.5)**	**21 (35.0)**	**6 (42.9)**
Holopalaearctic	2 (0.5)	2 (0.6)	2 (0.6)	2 (0.9)	2 (3.3)	
Transpalaearctic	45 (10.4)	38 (11.4)	41 (12.9)	36 (16.4)	10 (16.7)	2 (14.3)
West and Central Palaearctic	29 (6.7)	23 (6.9)	22 (6.9)	17 (7.7)	6 (10.0)	4 (28.6)
West Palaearctic	10 (2.3)	8 (2.4)	7 (2.2)	6 (2.7)	1 (1.7)	
Disjunct Palaearctic	15 (3.5)	13 (3.9)	10 (p.2)	3 (1.4)		
Southwest Palaearctic	5 (1.2)	5 (1.5)	4 (1.3)	2 (0.9)		

Eurosiberian-Central Asian	17 (3.9)	12 (3.6)	12 (3.8)	8 (3.6)	2 (3.3)	
West Eurosiberian-Central Asian	1 (0.2)	1 (0.3)	1 (0.3)			
European-Central Asian	3 (0.7)	2 (0.6)	1 (0.3)	1 (0.5)		
European-Southwest Asian	1 (0.2)	1 (0.3)	1 (0.3)	1 (0.5)		
European-Iranian	3 (0.7)	2 (0.6)	3 (0.9)	2 (0.9)		
Species distributed in one subregion	**163 (37.8)**	**114 (34.2)**	**106 (33.4)**	**64 (29.1)**	**20 (33.3)**	**3 (21.4)**
EUROSIBERIAN	**115 (26.7)**	**69 (20.7)**	**83 (26.2)**	**52 (23.6)**	**19 (31.7)**	**3 (21.4)**
Holoeurosiberian	17 (3.9	11 (3.3)	14 (4.4)	11 (5.0)	3 (5.0)	1 (7.1)
Transeurosiberian	4 (0.9)	4 (1.2)	3 (0.9)	1 (0.5)		
West and Central Eurosiberian	12 (2.8)	6 (1.8)	9 (2.8)	8 (3.6)	3 (5.0)	1 (7.1)
West Eurosiberian	12 (2.8)	4 (1.2)	9 (2.8)	8 (3.6)	1 (1.7)	
Disjunct Eurosiberian	22 (5.1)	13 (3.9)	16 (5.0)	8 (3.6)	3 (5.0)	
European and South Siberian	8 (1.9)	7 (2.1)	6 (1.9)	4 (1.8)	3 (5.0)	1 (7.1)
European	26 (6.0)	15 (4.5)	16 (5.0)	10 (4.5)	5 (8.3)	
East European	2 (0.5)	1 (0.3)	2 (0.6)			
Central and South European and South Siberian	1 (0.2)		1 (0.3)	1 (0.5)		
Central and South European	11 (2.6)	8 (2.4)	7 (2.2)	1 (0.5)	1 (1.7)	
MEDITERRANEAN	**48 (11.1)**	**45 (13.5)**	**23 (7.3)**	**12 (5.5)**	**1 (1.7)**	
Mediterranean and South Siberian	2 (0.5)	1 (0.3)	2 (0.6)	1 (0.5)		
Mediterranean-Far East	1 (0.2)	1 (0.3)				
South European and South Far East	1 (0.2)	1 (0.3)				
Mediterranean-Central Asian	6 (1.4)	6 (1.8)	3 (0.9)	1 (0.5)		
Mediterranean-West Central Asian	5 (1.2)	4 (1.2)	3 (0.9)	2 (0.9)		
Mediterranean-Iran-Turanian	3 (0.7)	3 (0.9)	1 (0.3)	1 (0.5)		
Mediterranean-Iranian	2 (0.5)	2 (0.6)	1 (0.3)			
Mediterranean-Turanian	2 (0.5)	2 (0.6)	1 (0.3)	1 (0.5)		
East Mediterranean-Iranian	1 (0.2)	1 (0.3)				
North Mediterranean-West Central Asian	3 (0.7)	3 (0.9)	1 (0.3)			
North Mediterranean-Iranian	1 (0.2)	1 (0.3)	1 (0.3)	1 (0.5)		
South European and South Siberian	1 (0.2)	1 (0.3)	1 (0.3)			
Central and South European-West Central Asian	1 (0.2)	1 (0.3)	1 (0.3)	1 (0.5)		
Central and South European-Iran-Turanian	1 (0.2)	1 (0.3)	1 (0.3)	1 (0.5)		
Central (Middle) and South European-Iranian	2 (0.5)	2 (0.6)	2 (0.6)	1 (0.5)		
Central and South European-North African	3 (0.7)	3 (0.9)				
Holomediterranean	6 (1.4)	6 (1.8)	2 (0.6)			
East Mediterranean	3 (0.7)	3 (0.9)				
North Mediterranean	3 (0.7)	3 (0.9)	2 (0.6)	1 (0.5)		
South European	1 (0.2)		1 (0.3)	1 (0.5)	1 (1.7)	
Total	**432**	**334 (77.3)**	**317 (73.4)**	**220 (50.9)**	**60 (13.9)**	**14 (3.2)**