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Vertical distribution and comparative zoogeographical characteristic of dipteran fauna (Insecta: Diptera) according to the vegetation belts of the Pirin and Rila Mountains

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Abstract: A total of 1351 species from 63 families (759 species from the Pirin Mts. and 1003 species from the Rila Mts.) have been recorded from the two mountains so far. The low degree of similarity (46.2%) of the fauna between these mountains is related to their natural features and insufficient research. The greatest number of species has been found in the zone of the beech forests (409 species or 55.1% from Pirin Mts. and 736 species or 73.4% from the Rila Mts.). The degree of similarity between the dipteran fauna of the different vegetation belts of the two mountains ranges from 0% to 46.6%. The dipterans belong to 92 areographical categories, divided into two supergroups: 1) species with Mediterranean type of distribution: more thermophilic and distributed mainly in the southern parts of the Palaearctic (49 species or 6.5% from Pirin Mts. and 48 species or 4.8% from the Rila Mts.); 2) species with Palaearctic and Eurosiberian type of distribution: more eurybiontic and widely distributed in the Palaearctic (710 species or 93.5% from Pirin Mts. and 955 species or 95.2% from the Rila Mts.). The Holomediterranean and Mediterranean-Central Asian forms (from 0.6% to 1.3%) are the best represented in the first group. The European, Holarctic, Holoeurosiberian and Transpalaearctic taxa (from 7.8% to 19.0%) prevail in the second group. A total of 12-13 species (from 1.2% to 1.7%) are endemics. The distribution of the zoogeographical categories in the separate vegetation belts of the mountains is scrutinised.

Key words: Diptera, Pirin Mts., Rila Mts., areography, zoogeography, faunistic composition, Bulgaria

Introduction

The first data on Diptera from the Pirin Mts. are reported by Drensky (1929). In 82 publications there are data related to dipterans of the mountain (Hubenov, 2015b). The first data on Diptera from the Rila Mts. are reported by Joakimoff (1899) and Nedelkov (1909, 1910, 1912). In 120 publications there are data concerning dipterans of the mountain (Hubenov, 2016).

The data are fragmentary, concern separated parts of the mountains and are scattered in different articles, which are not specially referred to the Pirin or Rila Mts. There are more systematic studies (presented differently for each of the mountains) for the families Limoniidae, Cecidomyiidae, Simuliidae, Chironomidae, Syrphidae, Agromyzidae, Chloropidae, Muscidae and Tachinidae. There are systematic studies on the Pirin Mts. for the family Tachinidae (Hubenov, 1992) and the Rila Mts. – for the families Simuliidae (Kovachev, 2000) and Chironomidae (Stoichev, 2000a, 2000b, 2002, 2004; Stoichev & Cernev, 2001, Stoichev & Danova, 2003). Generalised investigations on the tachinid fauna of both mountains are reported by Hubenov (2015b, 2016).

The aim of this work is to present the distribution of Diptera in the vegetation belts of the Pirin and Rila Mountains, as well as to make a comparative zoogeographical analysis of the fauna.

Study area, materials and methods

The two mountains vary in respect of their physical geographical features. **Pirin Mts**. are situated between the valleys of the Struma and Mesta Rivers, south of the Rila Mts., from which are separated by the Predel Col (1140 m a.s.l.).

The Paril Col (1174 m a.s.l.) separates the Pirin Mts. from the situated in the south Slavyanka Mts. The Pirin Mts. stretche northwest-south-east and is about 80 km long and 40 km wide. The maximum height at Vihren Peak is 2914.3 m a.s.l.. The total area of the mountains is 2585 km^2. They are divided into North, Middle and South Pirin. In the Pleistocene glacial forms have been formed in the Pirin Mts. Gravity forms of alpine type are characteristic of its high parts. Climatically the Pirin Mts. belong to the Continental-Mediterranean climatic region and include parts of the Maleshevska-Pirin Low Mountain, Mestenski and Mountain climatic areas (Stanev, 1991). Glacial lakes are situated in the cirques of the granite part of Northern Pirin, whereas the marble part is relatively anhydrous. The Pirin Mts. belong to the region of the Illyrian Province of the European deciduous forest area. The vegetation is differentiated in a system of six vegetation belts (Stojanov, 1966; Velchev et al., 1982, 1989; Velchev, Tonkov, 1986; Bondev, 1991, 1997, 2002; Velchev, 1997, 2002): 1) Xerothermic oak forests, best presented in the west and south hillsides up to 600-700 m a.s.l.; 2) Mesophylic and xeromesophylic mixed forests, well presented in the south-west and east hillsides from 600-700 m a.s.l. to 900-1000 m a.s.l.; 3) Beech forests, best presented in the middle and south parts of the mountain from 900-1000 m a.s.l. to 1500-1600 m a.s.l.; 4) Coniferous forests from 1300-1600 m a.s.l. to 2000-2200 m a.s.l.; 5) Subalpine vegetation from 2000 to 2500 m a.s.l.; 6) Alpine vegetation above 2400-2500 m a.s.l. For the coniferous zone of the marble part of Northern Pirin, the Mediterranean plant formation of *Pinus leucodermis* Ant. is typical. The Pirin Mts. belong to the Rila-Rhodope zoogeographical region and have an Eurosiberian and Submediterranean faunistic character in the lower parts (Georgiev, 1982, 2002). The territory of the Pirin National Park includes 40332 ha with the reserves Bayuvi Dupki-Dzhindzhiritsa (2873 ha) and Yulen (3156 ha). The park's boundary descends to 800-900 m a.s.l. but usually lies significantly higher (above 1300-1700 m a.s.l.).

Rila Mts. are situated north of the Pirin Mts. They are connected with the Verila, Ihtimanska Sredna Gora and Rhodope Mountains through the Klisurska (1025 m a.s.l.), Borovetska (1305 m a.s.l.), Yundolska (1375 m a.s.l.) and Avramova (1295 m a.s.l.) Cols. The Rila Mts. stretch west-east and are over 70 km long and 50 km wide. The maximum height at Musala Peak is 2925 m a.s.l.. The total area of the mountains is 2629 km^2. They are divided into four parts: North-west, Central, East and South-west. The Rila Mts. are a silicate massif consisting essentially of granites. In the Pleistocene glacial forms have been formed. Gravity forms of alpine type are characteristic of the high parts. The Rila Mts. are under the influence of the Intermediate-Continental and Continental-Mediterranean climatic regions. They include parts of the Rila-Osogovo and Mountain climatic regions (Stanev, 1991). In the cirques of the mountains 190 glacial lakes are situated. The Rila Mts. belong to the region of the Illyrian Province of the European deciduous forest area. The vegetation is differentiated in a system of six vegetation belts (Stojanov, 1966; Velchev et al., 1982, 1989; Velchev, Tonkov, 1986; Bondev, 1991, 1997, 2002; Velchev, 1997, 2002): 1) Xerothermic oak forests, best presented in the north-east, west and south-west hillsides to 500-700 m a.s.l.; 2) Mesophylic and xeromesophylic mixed forests, well presented in the west, east and south-east hillsides from 600-700 m a.s.l. to 900-1000 m a.s.l.; 3) Beech forests, best presented in the north, north-east and west parts of the mountains from 900-1000 m a.s.l. to 1500-1600 m a.s.l.; 4) Coniferous forests, best presented in the north, east and south hillsides from 1500-1600 m a.s.l. to 2000-2200 m a.s.l.; 5) Subalpine vegetation – from 2000-2200 a.s.l. to 2500 m a.s.l.; 6) Alpine vegetation – above 2400-2500 m a.s.l. Under the human impact, the vegetation has undergone destructive changes, expressed most strongly in the first two zones. The boundaries between the vegetation belts are not defined clearly and depending on the exposure, topography and human activities there are mixed zones up to 200-300 m a.s.l. The Rila Mts. belong to the Rila-Rhodope zoogeographical region and have an Eurosiberian faunistic character (Georgiev, 1982, 2002). The mountains are the richest area in endemics (268) and relicts (230) in Bulgaria (Hubenov, 2008). The territory of the Rila National Park includes 81046 ha with the Parangalitsa (1509 ha), Central Rila (12393.7 ha), Ibar (2248.6 ha) and Skakavitsa (70.8 ha) Reserves. The park's boundary rarely descends below 1000 m a.s.l. and usually lies higher (to 1500-2000 m a.s.l.). The Rila Monastery Nature Park (27270 ha) with the Rila Monastery Forest Reserve (3678 ha) is also included in the moun-

tains' territory.

The material from the Pirin Mts. was collected from 77 localities after 1914. From the western and south-western slopes of the mountains, the territory above 300 m a.s.l. is included. The material from the Rila Mts. was collected from 160 localities after 1890. Some collectors at the beginning of the last century did not give accurate localities on the labels and indicated only Pirin Mts. or Rila Mts. There are no exact localities for 47 species from the Pirin Mts. and 111 species from the Rila Mts. For a number of widespread and numerous species, the authors did not give the localities and mentioned they occurred everywhere. Such species are included in the review only if they are reported from the Pirin Mts. or Rila Mts. The main part of the material is stored in the National Museum of Natural History and the Institute of Biodiversity and Ecosystem Research. A number of foreign entomologists have been collecting and publishing materials from Bulgaria, containing data about the Pirin and Rila Mts. The species distribution in the vegetation belts is determined according to the altitude and the landscape of the localities.

Zoogeographical analysis for the species 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. The classification of the areas follows de Lattin (1967), Malicky et al. (1983), Gorodkov (1984) and Vigna Taglianti et al. (1999). To compare the fauna, Czekanowski-Dice-Sørensen coefficient of similarity was used.

Abbreviations used: ♦ – presence of the species in the Pirin Mts., ● – presence of the species in the Rila Mts., **?** – uncertain data or lack of data, **+++** – species without exact locality in the Pirin Mts. or Rila Mts., **atm** – Afrotropical-Mediterranean, **ba** – Boreoalpine, **ban** – Balkan-Anatolian, **bm** – Boreomontane, **cee** – Central and East European, **cse** – Central and South European, **csean** – Central and South European-Anatolian, **csee** – Central and South-East European, **cseean** – Central and South-East European-Anatolian, **cseeit** – Central and South-East European-Iran-Turanian, **cseel** – Central and South-East European-Lebanonian, **cseit** – Central and South European-Iran-Turanian, **csena** – Central and South European-North African, **des** – Disjunct Eurosiberian, **dp** – Disjunct Palaearctic, **dpo** – Disjunct Palaearctic-Oriental, **e** – European, **ean** – European-Anatolian, **eanna** – European-Anatolian-North African, **Eb** – Balkan endemic, **Ebg** – Bulgarian endemic, **Ebs** – Balkan subendemic, **eca** – European-Central Asian, **eeca** – East European-Central Asian, **eit** – European-Iran-Turanian, **em** – East Mediterranean, **ena** – European-North African, **Er** – Regional endemic, **esanca** – Eurosiberian-Anatolian-Central Asian, **esca** – Eurosiberian-Central Asian, **ess** – European and South Siberian, **eswa** – European-South-West Asian, **et** – European-Turanian, **ewca** – European-West Central Asian, **h** – Holarctic, **h*** – species introduced in North America, **ha** – Holarctic-Australian, **hat** – Holarctic-Afrotropical, **hata** – Holarctic-Afrotropical-Australian, **hn** – Holarctic-Neotropical, **hnat** – Holarctic-Neotropical-Afrotropical, **hno** – Holarctic-Neotropical-Oriental, **ho** – Holarctic-Oriental, **hoa** – Holarctic-Oriental-Australian, **hoes** – Holoeurosiberian, **hom** – Holomediterranean, **hop** – Holopalaearctic, **hpt** – Holarctic-Paleotropical, **hpta** – Holarctic-Paleotropical-Australian, **hptn** – Holarctic-Paleotropical-Neotropical, **I** – introduced species (immigrants), **k** – Cosmopolitan, **m** – montane, **mca** – Mediterranean-Central Asian, **mss** – Mediterranean and South Siberian, **msws** – Mediterranean and South-West Siberian, **mt** – Mediterranean-Turanian, **mwca** – Mediterranean-West Central Asian, **nemit** – North-East Mediterranean-Iran-Turanian, **nm** – North Mediterranean, **nmca** – North Mediterranean-Central Asian, **nmt** – North Mediterranean-Turanian, **om** – Oriental-Mediterranean, **pa** – Palaearctic-Australian, **pat** – Palaearctic-Afrotropical, **pata** – Palaearctic-Afrotropical-Australian, **po** – Palaearctic-Oriental, **poa** – Palaearctic-Oriental-Australian, **ppt** – Palaearctic-Paleotropical, **ppta** – Palaearctic-Paleotropical-Australian, **ptm** – Paleotropical-Mediterranean, **se** – South European, **see** – South-east European, **sena** – South European-North African, **sess** – South European and South Siberian, **sk** – Semicosmopolitan, **sp** – South Palaearctic, **spat** – South Palaearctic-Afrotropical, **sppta** – South Palaearctic-Paleotropical-Australian, **tp** – Transpalaearctic, **wces** – West and Central Eurosiberian, **wcp** – West and Central Palaearctic, **wes** – West Eurosiberian, **wesanca** – West Eurosiberian-Anatolian-Central Asian, **wesca** – West Eurosiberian-Central Asian, **wesit** – West Eurosiberian-Iran-Turanian, **wp** – West Palaearctic, **wpat** – West Palaearctic-Afrotropical, **wpo** – West Palaearctic-Oriental.

Results and discussion

A total of 1351 species of Diptera (33.3% of the species found in Bulgaria) that belong to 63 families have been established in the Pirin and Rila Mountains so far (Tables 1, 2). The family Tachinidae was the most numerous with 231 species, followed by Syrphidae – 163, Limoniidae – 113, Chloropidae – 87, Cecidomyiidae – 85, Muscidae – 75, Chironomidae – 57 and Agromyzidae – 53 species. The remaining families contained from one to 39 species. A total of 759 dipteran species (18.5% of the Bulgarian species) from 44 families were recorded from the Pirin Mts. and 1003 species (25.1% of the Bulgarian species) from 58 families were established from the Rila Mts. A total of 403 species were common for both mountains, while 339 species were found only in the Pirin Mts., and 600 species – only in the Rila Mts. The relatively low degree of similarity of the fauna of Diptera between the two mountains (46.2%) is due to their specific natural conditions and insufficient studies. The degree of similarity was higher (over 60%) in separated families that are better studied. The wide distribution of the dipterans suggests similar fauna of the mountains in Bulgaria. Most Diptera species have vast ranges and the endemics are exceptional (1-1.5% of the Bulgarian species – Hubenov, 2008a). Usually they are newly described taxa or rare species with unclear distribution. The taxa presence in most cases was connected with the exploration of the corresponding mountain region. This was evident when comparing the established species with regard to the localities they were found.

Six areas of detailed research are outlined in the Pirin Mts. (over 70 species found: Hubenov, 2015b). First are the surroundings of Bansko (132 species) and Melnik (139 species), the most visited places at the foot of the mountains. The popular resorts and starting points for entering the Pirin Mts., Sandanski and Lilyanovo Villages, Popina laka and Razlog (from 77 to 92 species) also form a group of well-studied regions. Of the inner parts of the mountains, the surroundings of the chalets Banderitsa, Vihren, Gotse Delchev, Yavorov and Demyanitsa are better studied (from 23 to 53 species). Usually the localities from which material has been collected are concentrated around the popular tourist centers or routes.

Five areas of detailed research are outlined in the Rila Mts. (with over 80 species established: Hubenov, 2016). First are the surroundings of the Rila Monastery (266 species) and Borovets (179 species), the most visited places of the mountains. The popular starting points for entering the Rila Mts., Blagoevgrad and Yundola (89-98 species), form a group of well-studied regions. The Parangalitsa Reserve (120 species), where there is a research base of the Bulgarian Academy of Sciences, is also well studied. Of the other parts of the mountains, the surroundings of Belovo, Kostenets, Dolna Banya, Govedartsi Village, Dupnitsa and the Predela Area (from 36 to 47 species) are better studied. Of the inner parts of the mountains, the surroundings of Kravarsko Dere, Kirilova Polyana, the valley of Rilska Reka River, the Slavovo Area, and the chalets Malyovitsa and Musala (from 30 to 53 species) are better studied. Also here the localities from which a material has been collected are concentrated around the popular tourist centres.

At present, significant parts of both mountains remain unexplored and material has not been collected. This relates both to the difficulties when approaching the terrain and the insufficient investigation of the specific families. The number of the established species probably represents about 45-55% of the actual species composition of the studied territory. The dipterans are a highly mobile group and after further studies the number of the recorded taxa might reach 50-60% of the species composition of most families found in the country. The Diptera fauna of the Rila Mts. is better studied than that of the Pirin Mts. This is evident when comparing the number of localities from which material is collected, the first publications, the number of publications and the taxonomic review of the established families (Table 1, 2).

A total of 564 species have been established in the protected areas of the Rila Mts. (Hubenov 2016: Rila National Park – 379 species and Rila Monastery Nature Park – 304 species). In comparison with the Central Balkan National Park [184 species (Hubenov et al., 2000)], East Rhodopes [279 species (Hubenov, 2004)], Vitosha Mts. [1000 species (Hubenov, 2014)] and Pirin National Park [557 species (Hubenov 2015b)] the dipteran fauna of the Rila Mts. is commensurable with the fauna of the Pirin Mts. The number of taxa recorded from the Rila Mts. significantly exceeds that of the Central Balkan National Park and East Rhodopes, and decreases vis-a-vis Vitosha Mts. Vitosha Mt. is the

Table 1. Dipteran insects (Insecta: Diptera) of the Pirin and Rila Mountains

Families	Total number of the species of the two mountains		Species of the Pirin Mt.		Species of the Rila Mt.	
	number	%	number	%	number	%
Nematocera	**397**	**29.40**	**200**	**26.35**	**294**	**29.31**
Tipulidae	9	0.66			9	0.90
Limoniidae	113	8.37	84	11.06	62	6.18
Pediciidae	18	1.33	9	1.18	13	1.30
Blephariceridae	2	0.15			2	0.20
Bibionidae	4	0.30			4	0.40
Mycetophilidae	29	2.15	15	1.98	14	1.40
Bolitophilidae	7	0.52	5	0.66	4	0.40
Diadocidiidae	1	0.07	1	0.13	1	0.10
Keroplatidae	6	0.44	3	0.39	3	0.30
Macroceridae	5	0.37	4	0.53	4	0.40
Sciaridae	4	0.30			4	0.40
Cecidomyiidae	85	6.29	54	7.11	65	6.48
Trichoceridae	1	0.07			1	0.10
Scatopsidae	1	0.07			1	0.10
Ptychopteridae	2	0.15	1	0.13	1	0.10
Culicidae	9	0.66			9	0.90
Simuliidae	37	2.74	10	1.32	37	3.69
Ceratopogonidae	7	0.52	1	0.13	6	0.60
Chironomidae	57	4.22	13	1.71	53	5.28
Brachycera Orthorrhapha	**144**	**10.66**	**53**	**6.98**	**108**	**10.77**
Coenomyiidae	1	0.07			1	0.10
Stratiomyidae	14	1.04	12	1.58	5	0.50
Rhagionidae	9	0.66	8	1.05	5	0.50
Tabanidae	26	1.93	5	0.66	25	2.49
Acroceridae	1	0.07	1	0.13		
Bombyliidae	9	0.66			9	0.90
Therevidae	2	0.15			2	0.20
Asilidae	30	2.22	11	1.45	23	2.29
Empididae	15	1.11	7	0.92	8	0.80
Hybotidae	7	0.52	3	0.39	5	0.50
Dolichopodidae	30	2.22	6	0.79	25	2.49
Brachycera Cyclorrhapha	**809**	**59.92**	**506**	**66.67**	**601**	**59.92**
Platypezidae	1	0.07			1	0.10
Phoridae	3	0.22	2	0.26	1	0.10
Pipunculidae	16	1.18	14	1.84	5	0.50
Syrphidae	163	12.07	49	6.46	149	14.86
Conopidae	21	1.56	2	0.26	20	1.99
Tephritidae	10	0.74	2	0.26	8	0.80
Piophilidae	1	0.07	1	0.13		
Lauxaniidae	1	0.07			1	0.10
Cremifaniidae	1	0.07			1	0.10
Chamaemyiidae	12	0.89	12	1.58	1	0.10
Sciomyzidae	2	0.15			2	0.20
Sepsidae	1	0.07	1	0.13		
Agromyzidae	53	3.93	15	1.98	48	4.79
Opomyzidae	3	0.22	3	0.39	2	0.20
Carnidae	5	0.37	5	0.66		
Milichiidae	4	0.30	4	0.53	1	0.10
Chloropidae	87	6.44	72	9.49	61	6.08
Heleomyzidae	2	0.15			2	0.20
Sphaeroceridae	4	0.30	2	0.26	2	0.20

Table 1. Continued

Families	Total number of the species of the two mountains		Species of the Pirin Mt.		Species of the Rila Mt.	
	number	%	number	%	number	%
Camillidae	1	0.07	1	0.13		
Drosophilidae	1	0.07			1	0.10
Diastatidae	1	0.07	1	0.13	1	0.10
Ephydridae	39	2.89	33	4.35	26	2.59
Hippoboscidae	4	0.30	2	0.26	2	0.20
Scathophagidae	2	0.15			2	0.20
Anthomyiidae	3	0.22	1	0.13	3	0.30
Fanniidae	6	0.44	6	0.79	2	0.20
Muscidae	75	5.55	49	6.45	55	5.48
Calliphoridae	14	1.04	3	0.39	14	1.40
Sarcophagidae	38	2.81	18	2.37	24	2.39
Rhinophoridae	1	0.07			1	0.10
Gasterophilidae	3	0.22			3	0.30
Tachinidae	231	17.11	203	26.74	162	16.15
Families	**63**		**44**	**69.84**	**58**	**92.06**
Species	**1351**		**759**	**56.18**	**1003**	**74.24**

most well-studied Bulgarian mountain and its whole territory is used for comparison (not only Vitosha Nature Park), while the Central Balkan National Park is poorly studied with respect to the two-winged insects. When comparing the whole mountain with the Vitosha Mt., there is no difference in the number of the established species. The last studies on Diptera of the Pirin Mts. (Hubenov 2015b) allow the fauna families to be compared with these of the Rila Mts. It is expected, after further investigations, the species composition of Diptera from the Pirin Mts. to exceed most of the Bulgarian mountains. This is owing to the wide variety of natural habitats, as well as to the geographical location, which the mountains occupy in South-West Bulgaria, on the border between the Eurosiberian and Mediterranean Palaearctic subregions. Further, the Rila Mts. are expected to be similar to the most of the Bulgarian high mountains in terms of species composition of Diptera. This relates to the natural habitats of the mountain, as well as to the wide distribution of the dipterans, their high mobility and poorly expressed endemism. The great number of species, established in the Rila Monastery Nature Park (commensurable with the Rila National Park), is related to the fact that the surroundings of the Rila Monastery is the most visited region of the Rila Mts.

Despite its limited development, in the xerothermic oak forest belt of the Pirin Mts. 273 species (36.8%) were established. This is connected with its open spaces enabling species from the Sandanski-Petrich Valley and the belt above it to penetrate. In the same belt of the Rila Mts. the number of species was smaller by 11.3% (25.5%, or 256 species). In this mountain, the xerothermic oak forests were with quite limited development but here also in the open areas species from neighbouring valleys penetrate. Most taxa were found in the beech forests (409 species or 55.1% in the Pirin Mt. and 736 species or 73.4% in the Rila Mts.) and the mesophilic and xeromesophilic mixed forests (349 species or 47.0% in the Pirin Mts. and 351 species or 35.0% in the Rila Mts.). The border between beech and coniferous forests of the Pirin Mts. and Rila Mts. is not clear and depending on the exposure, relief and anthropogenic impact, there are wide areas of mixing. This determined the high species richness in the beech belt, the great number of common species and the similarity of the dipteran fauna from vegetation belts 2, 3 and 4 for each mountain. When comparing the respective belts between the two mountains (Table 3) the degree of similarity was low (from 30.7% to 46.6%). Regarding the hypsometric belts, the maximum number of species was recorded between 900 and 1300 m a.s.l. in the Pirin Mts. and between 1000 and 1500 m a.s.l. in the Rila Mts. For family Tachinidae, such investigations have been carried out for the whole country and the maximum number of species was established between 400 and 1000 m a.s.l. as there are differences in the mountains of ±200 m (Hubenov, 1993, 1995, 2015c). There were considerable dif-

Table 2. Species composition and distribution of the two-winged insects (Insecta: Diptera) of the Pirin and Rila Mountains

Taxa	Distribution			Vegetation belts of the Pirin Mts.						Vegetation belts of the Rila Mts.					
	Vertical		Areo-graphy	Xerothermic oak forests – up to 600-700 m a.s.l.	Mesophyllic and xeromesophyllic oak-hornbeam forests – from 600-700 m to 900-1000 m a.s.l.	Beech forests – from 900-1000 to 1500-1600 m a.s.l.	Coniferous forests – from 1500-1600 m to 2000-2200 m a.s.l.	Subalpine vegetation – from 2000-2200 m to 2500 m a.s.l.	Alpine vegetation – over 2400-2500 m a.s.l.	Xerothermic oak forests – up to 500-700 m a.s.l.	Mesophyllic and xeromesophyllic oak-hornbeam forests – from 600-700 m to 900-1000 m a.s.l.	Beech forests – from 900-1000 to 1500-1600 m a.s.l.	Coniferous forests – from 1500-1600 m to 2000-2200 m a.s.l.	Subalpine vegetation – from 2000-2200 m to 2500 m a.s.l.	Alpine vegetation – over 2400-2500 m a.s.l.
	Pirin Mts.	Rila Mts.													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
NEMATOCERA															
Tipulomorpha															
Tipulidae															
Tanyptera (*Tanyptera*) *atrata* (Linnaeus, 1758)		1147	tp, ? hoes									●			
Nephrotoma cornicina (Linnaeus, 1758)		1147	ho									●			
Tipula (*Acutipula*) *maxima* Poda, 1761		1147	ena									●			
Tipula (*Lunatipula*) *lunata* Linnaeus, 1758		1147	hoes									●			
Tipula (*Lunatipula*) *vernalis* Meigen, 1804		550-2100	e							●	●	●	●		
Tipula (*Vestiplex*) *excisa* Schummel, 1833		550-2900	hoes							●	●	●	●	●	●
Tipula (*Vestiplex*) *nubeculosa* Meigen, 1804		1350	eca									●			
Tipula (*Vestiplex*) *scripta* Meigen, 1830		550-2100	wces							●	●	●	●		
Tipula (Yamatotipula) montium Egger, 1863		1350	wces									●			
Limoniidae															
**Phyllolabis pubipennis* Lackschewitz, 1940	1200-1850	2389	csee			♦	♦							●	
Paradelphomyia (*Oxyrhiza*) *fuscula* (Loew, 1873)		1147	eit									●			
Austrolimnophila (*Austrolimnophila*) *ochracea* (Meigen, 1804)	1250		eit			♦									
Austrolimnophila (*Archilimnophila*) *unica* (Osten Sacken, 1869)		1876	h										●		
Dactylolabis (*Dactylolabis*) *transversa* (Meigen, 1804)	1700		cse				♦								
Epiphragma (*Epiphragma*) *ocellare* (Linnaeus, 1761)	1250	1147	h			♦						●			
**Eloeophila apicata* (Loew, 1871)	900-1000		et		♦										
Eloeophila maculata (Meigen, 1804)	1142	1147	et			♦						●			
Eloeophila mundata (Loew, 1871)	1230-2000	2389	e			♦	♦							●	

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Eloeophila trimaculata (Zetterstedt, 1838)		2389	e											●	
Euphylidorea lineola (Meigen, 1804)		2389	wp											●	
Neolimnomyia (*Brachylimnophila*) *nemoralis* (Meigen, 1818)	1230-1810	1147-2389	tp			♦	♦					●	●	●	
Phylidorea (*Macrolabina*) *alexanderi* (Starý, 1974)	1750		Ebg				♦								
Phylidorea (*Paraphylidorea*) *fulvonervosa* (Schummel, 1829)		1876	des										●		
Phylidorea (*Phylidorea*) *ferruginea* (Meigen, 1818)		1700	esca										●		
Pilaria fuscipennis (Meigen,1818)	1960-2914		des				♦	♦	♦						
**Prionolabis cognata* (Lackschewitz 1940)	1200-1700		Eb			♦	♦								
Prionolabis hospes (Egger, 1863)	1300-2200	1360-2389	cse			♦	♦	♦				●	●	●	
Pseudolimnophila (*Pseudolimnophila*) *lucorum* (Meigen, 1818)		1147	esca									●			
Pseudolimnophila (*Pseudolimnophila*) *sepium* (Verrall, 1886)	2100	1147	eit				♦					●			
Hexatoma (*Hexatoma*) *bicolor* (Meigen, 1818)		1147	csean									●			
Chionea (*Sphaeconophilus*) *lutescens* Lundstrom, 1907		2000	ean										●		
Crypteria limnophiloides Bergroth, 1913		1230-1390	ean									●			
Neolimnophila carteri (Tonnoir, 1921)		1700-2389	ean										●	●	
Erioptera (*Erioptera*) *divisa* (Walker, 1848)		1700-2389	ean										●	●	
Erioptera (*Erioptera*) *flavata* (Westhoff, 1882)		1700	wes										●		
Erioptera (*Erioptera*) *griseipennis* Meigen, 1838	1000		e		♦	♦									
Erioptera (*Erioptera*) *lutea* Meigen, 1804	1200-1700	1147-1876	wcp			♦	♦					●	●		
Erioptera (*Mesocyphona*) *bivittata* (Loew, 1873)		2389	esca											●	
Gonempeda flava (Schummel, 1829)	1000		e		♦	♦									
Scleroprocta balcanica Starý, 1976	1230-1350	1147	Eb			♦						●			
Symplecta (*Symplecta*) *hybrida* (Meigen, 1804)	900-1000	930-1000	ho		♦						●	●			
**Cheilotrichia* (*Cheilotrichia*) *meridiana* Mendl, 1974	450-650		nmt	♦											
Cheilotrichia (*Empeda*) *stary* Mendl, 1973	1900-2300	1230-1390	cse				♦	♦				●			
Erioconopa symplectoides (Kuntze,1914)	2100		hom				♦								
Erioconopa trivialis (Meigen, 1818)	1900-2000	2389	eit				♦							●	
Hoplolabis (*Parilisia*) *yezoana* (Alexander, 1924)		1180-1250	esca									●			
Ilisia maculata (Meigen, 1804)	1000		eit		♦	♦									
Molophilus (*Molophilus*) *aduncus* Starý, 1978	900-1000		nmt		♦										
Molophilus (*Molophilus*) *appendiculatus* (Staeger, 1840)	1950	1230-1390	wes				♦					●			
Molophilus (*Molophilus*) *bifidus* Goetghebuer, 1920		1147	eit									●			
Molophilus (*Molophilus*) *brevihamatus* Bangerter, 1947	900-1230		csee		♦	♦									
Molophilus (*Molophilus*) *crassipygus* Meijere, 1918		1147-1250	e									●			
Molophilus (*Molophilus*) *curvatus* Tonnoir, 1920	1230		e			♦									
Molophilus (*Molophilus*) *directidens* Starý, 1976	1230-2000	1147-1450	Ebg			♦	♦					●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Molophilus (*Molophilus*) *flagellatus* Starý, 1976	1900-2000	1230-1390	Ebg				♦					●			
**Molophilus* (*Molophilus*) *griseus* (Meigen, 1804)	900-1000		wp		♦										
Molophilus (*Molophilus*) *lackschewitzianus* Alexander, 1953			csean												
Molophilus (*Molophilus*) *lanceolatus* Starý, 1971	1400		Er			♦									
Molophilus (*Molophilus*) *lautereri* Stary, 1974		2666	Ebg												●
Molophilus (*Molophilus*) *medius* Meijere, 1918	1500	1147-1700	e			♦						●	●		
Molophilus (*Molophilus*) *obscurus* (Meigen, 1818)	1000	1147-1700	e			♦						●	●		
Molophilus (*Molophilus*) *obsoletus* Lackschewitz, 1940	1700	2389	Ebs				♦							●	
Molophilus (*Molophilus*) *ochraceus* (Meigen, 1818)	1000		e		♦	♦									
Molophilus (*Molophilus*) *priapoides* Starý, 1971	1000-1850		e			♦	♦								
Molophilus (*Molophilus*) *propinqueus* (Egger, 1863)	900-1200	1147-1700	tp		♦	♦						●	●		
Molophilus (*Molophilus*) *scutellatus* Goetghebuer, 1929		2389	cse											●	
**Molophilus* (*Molophilus*) *stroblianus* Nielsen, 1953	1000		csee		♦	♦									
Ormosia (*Ormosia*) *albitibia* Edwards, 1921		1230-1390	cse									●			
Ormosia (*Ormosia*) *bifida* (Lackschewitz, 1940)	1700-2000		e, ? cse				♦								
Ormosia (*Ormosia*) *clavata* (Tonnoir, 1920)		1230-1390	e									●			
Ormosia (*Ormosia*) *fascipennis* (Zetterstedt, 1838)	1200-1900	2389	h			♦	♦							●	
Ormosia (*Ormosia*) *pirinensis* Starý, 1971	1400	1230-1390	Ebg			♦						●			
Ormosia (*Ormosia*) *staegeriana* Alexander, 1953	1400-1800	1230-1390	e			♦	♦					●			
Rhypholophus bifurcatus Goetghebuer, 1920	2000		e				♦								
Rhypholophus haemorrhoidalis (Zetterstedt, 1838)	2000	1147-1850	e				♦					●	●		
Rhypholophus obtusistyla (Stary, 1976)		1147-1850	Ebg									●	●		
Rhypholophus phryganopterus Kolenati, 1860	1700-2400		cse, ? e				♦	♦							
**Tasiocera* (*Dasymolophilus*) *fuscescens* (Lackschewitz, 1940)	1200		e			♦									
Dicranoptycha cinerascens (Meigen, 1818)	2000		e				♦								
Dicranoptycha fuscescens (Schummel, 1829)	1230-1350		wp			♦									
Dicranoptycha livescens Loew, 1871	2000	1147-1250	cse				♦					●			
Dicranoptycha paralivescens Starý, 1972	2000	1147-1250	cse				♦					●			
**Ellipteroides* (*Protogonomyia*) *alboscutellatus* (von Roser, 1840)	450-700		ena, ? csena	♦											
**Gnophomyia viridipennis* (Gimmerthal, 1847)	300-400		wes	♦											
Gonomyia (*Gonomyia*) *conoviensis* Barnes, 1924	1230-1350		eit			♦									
Gonomyia (*Gonomyia*) *lucidula* Meijere, 1920	1000-1350		e			♦									
Gonomyia (*Gonomyia*) *tenella* (Meigen, 1818)	900-2000		ena		♦	♦	♦								
**Gonomyia* (*Prolipophleps*) *abbreviata* Loew, 1873	300-400		eswa	♦											
Gonomyia (*Teuchogonomyia*) *edwardsi* Lackschewitz, 1925	1200		e			♦									
Idiocera (*Idiocera*) *pulchripennis* (Loew, 1856)	1000		? mwca		♦	♦									

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Lipsothrix errans (Walker, 1848)	1230-1350	1147	e			♦						●			
**Lipsothrix nobilis* Loew, 1873	450-700		e, ? csean	♦											
Lipsothrix remota (Walker, 1848)	1230-1350	1147	e			♦						●			
Antocha (*Antocha*) *vitripennis* (Meigen, 1830)	1810		ewca				♦								
Antocha (*Orimargula*) *alpigena* (Mik, 1883)	1230-2000	1147-1850	csean			♦	♦					●	●		
Orimarga (*Orimarga*) *attenuata* (Walker, 1848)	2000-2200		ena				♦								
Orimarga (*Orimarga*) *juvenilis* (Zetterstedt, 1851)	1000		e		♦	♦									
**Achyrolimonia decemmaculata* (Loew, 1873)	1200		eswa			♦									
Dicranomyia (*Dicranomyia*) *chorea* (Meigen, 1818)	1200-1700		h			♦	♦								
Dicranomyia (*Dicranomyia*) *conchifera* (Strobl, 1901)	1230-1350		cse, ? e			♦									
Dicranomyia (Dicranomyia) luteipennis Goetghebuer, 1920		1147-1475	cse									●			
Dicranomyia (*Dicranomyia*) *mitis* (Meigen, 1830)	1300-1900	1147-1850	wp			♦	♦					●	●		
**Dicranomyia* (*Dicranomyia*) *ornata* (Meigen, 1818)	300-1000		ean	♦	♦										
Dicranomyia (*Dicranomyia*) *signata* (Lackschewitz, 1941)	1000		em		♦										
Dicranomyia (*Melanolimonia*) *caledonica* Edwards, 1926	1300-1800		hoes			♦	♦								
**Dicranomyia* (*Melanolimonia*) *morio* (Fabricius, 1787)	300-450		wp	♦											
Dicranomyia (*Numantia*) *fusca* (Meigen, 1804)	1900-2000		h				♦								
Discobola annulata (Linnaeus 1758)		1147-1250	hoa									●			
Limonia flavipes (Fabricius, 1787)	1230-1810	1147	ena			♦	♦					●			
Limonia hercegovinae (Strobl, 1898)	1200		? eit			♦									
Limonia macrostigma (Schummel, 1829)	1200-1700	1147-1250	po			♦	♦					●			
Limonia nigropunctata (Schummel, 1829)	1300-1800		e			♦	♦								
Limonia nubeculosa Meigen, 1804	2000		h				♦								
Limonia pannonica (Kowarz, 1868)	1230-1350		cse			♦									
Limonia phragmitidis (Schrank, 1781)	1230-1350	1147	wp			♦						●			
Limonia stigma (Meigen, 1818)	1250-2300		e			♦	♦	♦							
Limonia sylvicola (Schummel, 1829)	1600-1700	1147-1850	wces			♦	♦					●	●		
Limonia taurica (Strobl, 1895)	1300-1800		ean			♦	♦								
Limonia trivittata (Schummel, 1829)		1230-1390	esca									●			
Metalimnobia (*Metalimnobia*) *zetterstedti* (Tjeder, 1968)		1876	hoes										●		
Neolimonia dumetorum (Meigen, 1804)	1230-1350	1174-1700	e			♦						●	●		
Rhipidia (*Rhipidia*) *maculata* Meigen, 1818	1200-1950	1147-1390	h			♦	♦					●			
Pediciidae															
Dicranota (*Dicranota*) *bimaculata* (Schummel, 1829)		1876	wp										●		
Dicranota (*Ludicia*) *lucidipennis* (Edwards, 1921)	1230-1810	1174-1876	cse			♦	♦					●	●		
Dicranota (*Paradicranota*) *brevicornis* Bergroth, 1891		1876	cse										●		
Dicranota (*Paradicranota*) *flammatra* Stary, 1981		1147	cse									●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
**Dicranota* (*Paradicranota*) *landrocki* Czizek, 1931	450-650		? wp, ? eit	♦											
Dicranota (*Paradicranota*) *pallens* Lackschewitz, 1940		1876-2389	csee										●	●	
**Dicranota* (*Paradicranota*) *schistacea* Lackschewitz, 1940	450-700		csee	♦											
Dicranota (*Paradicranota*) *simulans* Lackschewitz, 1940		1147	csea									●			
Dicranota (*Paradicranota*) *subtilis* Loew, 1871	1230-1350		e			♦									
Pedicia (*Amalopis*) *occulta* (Meigen, 1830)	1600-2000	1147-2389	eswa				♦					●	●	●	
Pedicia (*Crunobia*) *littoralis* (Meigen, 1804)		1147	e									●			
Pedicia (*Crunobia*) *riedeli* (Lackschewitz, 1940)		1250	cse									●			
Pedicia (*Pedicia*) *rivosa* (Linnaeus, 1758)	1750	1230-1390	wes				♦					●			
Pedicia (*Crunobia*) *spinifera* Stary, 1974		1876	Ebs										●		
Tricyphona (*Tricyphona*) *immaculata* (Meigen, 1804)	1900-2200		? wp				♦								
Tricyphona (*Tricyphona*) *livida* Madarassy, 1881	2000	1230-1390	e				♦					●			
**Tricyphona* (*Tricyphona*) *zwicki* Mendl, 1973	1200		se			♦									
Ula (*Ula*) *mollissima* Haliday 1833		1230-1390	ean									●			
Blephariceromorpha															
Blephariceridae															
Blepharicera fasciata (Westwood, 1842)		1400	? cseit									●			
Liponeura cinerascens Loew, 1844		1230-2925	csean									●	●	●	●
Bibionomorpha															
Bibionidae															
Bibio hortulanus (Linnaeus, 1758)		1147	wp									●			
Bibio lanigerus Meigen, 1818		550-2100	e							●	●	●	●		
Bibio marci (Linnaeus, 1758)		400	ena, ? wp							●					
Bibio pomonae (Fabricius, 1775)		850-1000	des								●				
Mycetophilidae															
Mycomya (*Mycomya*) *cinerascens* (Macquart, 1826)	1740	1230-1390	ho				♦					●			
Mycomya (*Mycomya*) *disa* Vaisanen, 1984		1450	e									●			
Mycomya (*Mycomya*) *flavicollis* (Zetterstedt, 1852)	1740		e				♦								
Mycomya (*Mycomya*) *marginata* (Meigen, 1818)	1740		po				♦								
Mycomya (*Mycomya*) *prominens* (Lundström, 1913)		930-1000	e, ? wes								●	●			
Mycomya (*Mycomya*) *ruficollis* (Zetterstedt, 1852)		1450	h									●			
Mycomya (*Mycomya*) *tenuis* (Walker, 1856)	1740	1450	? h				♦					●			
Mycomya (*Mycomyopsis*) *trilineata* (Zetterstedt, 1838)	1740		hoes				♦								
Boletina gripha Dziedzicki, 1885		2389	hoes											●	
Boletina plana (Walker, 1856)	1740		hoes				♦								
Boletina sciarina Staeger, 1840	1740-1800	1000-1100	h				♦					●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Acnemia nitidicollis (Meigen, 1818)	1740		des				♦								
Polylepta guttiventris (Zetterstedt, 1852)	1740		h				♦								
Sciophila lutea Macquart, 1826	1142		tp			♦									
Sciophila rufa Meigen, 1830	1142		hoes			♦									
Leia bimaculata (Meigen, 1804)	1142		tp			♦									
Leia winthemii Lehmann, 1822		1230-1390	ho									●			
Novakia scatopsiformis Strobl, 1893		1230-1390	ena									●			
Cordyla murina Winnertz, 1863		2200	hoes										●	●	
Exechia fusca (Meigen, 1804)		550-2100	h							●	●	●	●		
Exechiopsis (*Exechiopsis*) *clypeata* (Lundstrom, 1911)		2389	e											●	
Sceptonia membranacea Edwards, 1925		1147-1524	e									●	●		
Sceptonia pilosa Bukowski, 1934		1147	e									●			
Mycetophila blanda Winnertz, 1863	2000		wces				♦								
Mycetophila confluens Dziedzicki, 1884	2000		des				♦								
Mycetophila czizekii Landrock, 1911	2000		e				♦								
Mycetophila marginata Winnertz, 1863	2000		e				♦								
Mycetophila ocellus Walker, 1848	2000		h				♦								
Mycetophila stylata (Dziedzicki, 1884)	2000		hoes				♦								
Bolitophilidae															
Bolitophila (*Bolitophila*) *cinerea* Meigen, 1818	1740	1500	hoes				♦					●	●		
Bolitophila (*Bolitophila*) *saundersii* (Curtis, 1836)	1740-1800	1500	tp				♦					●	●		
Bolitophila (*Bolitophila*) *tenella* Winnertz, 1863		1500	des									●	●		
Bolitophila (*Cliopisa*) *hybrida* (Meigen, 1804)		+++	hoes												
Bolitophila (*Cliopisa*) *occlusa* Edwards, 1913	1740		des				♦								
Bolitophila (*Cliopisa*) *pseudohybrida* Landrock, 1912	600		des	♦											
Bolitophila (*Cliopisa*) *rossica* Landrock, 1912	2000		des				♦								
Diadocidiidae															
Diadocidia (*Diadocidia*) *spinosula* Tollet, 1948	1740	1147-1500	e				♦					●	●		
Keroplatidae															
Antlemon (*Antlemonopsis*) *brevimanum* (Loew, 1871)		1147-1500	cse, ? csee									●	●		
Orfelia nemoralis (Meigen, 1818)	500		e	♦											
Orfelia tristis (Lundström, 1911)	1430		e			♦									
Orfelia unicolor (Stæger, 1840)		1475	hoes									●			
Platyura marginata Meigen, 1804		900	des								●				
Pyratula zonata (Zetterstedt, 1855)	550		e	♦											

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Macroceridae															
Macrocera centralis Meigen, 1818	1700-1820	1350-1450	wes				♦					●			
Macrocera grandis Lundström, 1912		1150	cee									●			
Macrocera inversa Loew, 1869	1740	1300	wes				♦					●			
Macrocera parva Lundström, 1914	1740		wces				♦								
Macrocera stigmoides Edwards, 1925	1700-1820	1300	e				♦					●			
Sciaridae															
Phytosciara (*Phytosciara*) *halterata* (Lengersdorf, 1926)		1150	e									●			
Phytosciara (*Phytosciara*) *macrotricha* (Lengersdorf, 1926)		1150	cee									●			
Sciara analis Schiner, 1864		550-2100	csee, ? wes							●	●	●	●		
Sciara hemerobioides (Scopoli, 1763)		545-1150	po							●	●	●			
Cecidomyiidae															
Lasioptera eryngii (Vallot, 1829)	850	850-900	ena		♦						●				
Lasioptera rubi (Schrank, 1803)		800-1000	des								●	●			
Bayeriola capitigena (Bremi, 847)	850-1300	850-1150	e		♦	♦					●	●			
Bayeriola thymicola (Kieffer, 1888)	850	400-900	ena		♦					●	●				
Cystiphora taraxaci (Kieffer, 1888)	980		e		♦										
Dasineura acrophila (Winnertz 1853)		850	h								●				
Dasineura asperulae (Löw, 1875)	850	850	cse, ? e		♦						●				
Dasineura crataegi (Winnertz, 1853)	350-850	800-1300	e	♦	♦						●	●			
Dasineura filicina (Kieffer, 1889)	1500-2500		des, ? dp			♦	♦	♦	♦						
Dasineura fraxinea Kieffer, 1907		850	e								●				
Dasineura galiicola (Löw, 1880)	1100	1150	e			♦						●			
Dasineura hyperici (Bremi, 1848)	850-1300	800-1150	e		♦	♦					●	●			
Dasineura irregularis (Bremi, 1847)		1200	cse, ? e									●			
Dasineura medicaginis (Bremi, 1847)		850	wes								●				
Dasineura papaveris (Winnertz, 1890)		400-850	cseean							●	●				
Dasineura plicatrix (Loew, 1850)	1100-1300	400	ena			♦				●					
Dasineura potentillae (Wachtl, 1885)	1300		e			♦									
Dasineura pteridicola (Kieffer 1901)		850	wes, ? e								●				
Dasineura pyri (Bouché 1847)		400	ha							●					
Dasineura rosae (Bremi, 1847)	850-1300	400-1200	dp, ? h		♦	♦				●	●	●			
Dasineura rossi Rübsaamen, 1914		850	wes								●				
Dasineura schulzei (Rübsaamen, 1917)	1100-1300	1150	csee, ? e			♦						●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Dasineura sisymbrii (Schrank, 1803)	980-1000		e		♦	♦									
Dasineura thomasiana (Kieffer, 1888)	980		e		♦	♦									
Dasineura tortilis (Bremi, 1847)	1000-1100	1150	e			♦						●			
Dasineura tortrix (Löw, 1877)	1100-1300	400-1200	e			♦				●	●	●			
Dasineura trifolii (Löw, 1874)	900-1100	900-1150	h		♦	♦					●	●			
Dasineura ulmaria (Bremi, 1847)	1000		des, ? dp			♦									
Dasineura urticae (Perris, 1840)	980-1100	900-1150	des, ? dp		♦	♦					●	●			
Euphorbomyia loewii (Mik, 1882)		400	csee							●					
Rabdophaga heterobia (Loew, 1850)	1100-1300	1150	dp			♦						●			
Rabdophaga saliciperda (Dufour, 1841)	1300		dp, ? tp			♦									
Rabdophaga salicis (Schrank, 1803)	1300		h			♦									
Rabdophaga terminalis (Loew, 1850)	980-1300	1150	tp, ? dp		♦	♦						●			
Dryomyia circinans (Giraud, 1861)	450		dp	♦											
Geocrypta galii (Loew, 1850)	1100-1300	1100-1200	? des, ? dp			♦						●			
Gephyraulus raphanistri (Kieffer, 1886)		800	e								●				
Hartigiola annulipes (Hartig, 1839)	+++	800-1200	dp								●	●			
Iteomyia capreae (Winnertz, 1853)	1100	1150	tp			♦						●			
Jaapiella bryoniae (Bouche, 1847)	980-1000	900	ena		♦						●				
Jaapiella cucubali (Kieffer, 1909)	850		cse		♦										
Jaapiella jaapiana (Rubsaamen, 1914)		400	e							●					
Jaapiella veronicae (Vallot, 1827)	1100	800-1200	e			♦					●	●			
Fabomya medicaginis (Rübsaamen, 1912)	850		wes, wesca		♦										
Janetiella fallax Kieffer, 1904		850-900	e								●				
Janetiella lemeei (Kieffer, 1904)		400	ean							●					
Janetiella thymi (Kieffer, 1888)	1100-1300	1150	e			♦						●			
Macrolabis heraclei Kaltenbach, 1862	980	1150	e		♦							●			
Macrolabis lamii Rübsaamen, 1916	980		e		♦										
Macrolabis stallariae (Liebel, 1889)	980		e		♦										
Mayetiola poae (Bosc, 1817)		+++	e												
Phegomyia fagicola (Kieffer, 1901)	1100	1150	e			♦						●			
Physemocecis ulmi (Kieffer, 1909)		400-1150	e							●	●	●			
Mikiola fagi (Hartig, 1839)	1100	800-1200	e, ? des			♦					●	●			
Mikiola orientalis Kieffer 1909		1230-1400	ban									●			
Mikomya coryli (Kieffer, 1901)		850-1150	ean								●	●			
Oligotrophus juniperinus (Linnaeus, 1758)	850-1300	850-2500	e		♦	♦					●	●	●	●	

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Oligotrophus panteli (Kieffer, 1898)	850-1300	850-900	ena		♦	♦					●	●			
Rhopalomyia foliorum (Loew, 1850)		850-900	e								●	●			
Semudobia betulae (Winnertz, 1853)	850-1100	400-1150	h		♦	♦				●	●	●			
Semudobia skuhravae Roskam, 1977	850-1100		h		♦	♦									
Wachtliella stachydis (Bremi, 1847)	1100	1150	e			♦						●			
Zygiobia carpini (Löw, 1874)	1100	1100-1200	e			♦						●			
Asphondylia cytisi Frauenfeld, 1873	1300		wes			♦									
Asphondylia hornigi Wachtl, 1880		800	e								●				
Acodiplodis inulae (Loew, 1847)		900	e								●				
Aschistonyx carpinicolus Rübsaamen, 1917	1100	1100-1150	e, ? cse			♦						●			
Contarinia anthobia (Löw, 1877)	1300		e			♦									
Contarinia baeri (Prell, 1931)	850-1300		des		♦	♦									
Contarinia carpini Kieffer, 1897		1200	e									●			
Contarinia coryli (Kaltenbach, 1859)		800	esca								●				
Contarinia craccae Loew, 1850		400	wes							●					
Contarinia fagi Rübsaamen, 1921	1100	800-1100	e			♦					●	●			
Contarinia gei Kieffer, 1909		1200	e									●			
Contarinia hypochoeridis (Rübsaamen 1891)		850-900	e								●				
Contarinia lamii Kieffer, 1909		1140	e, ? cse									●			
Contarinia nasturtii (Kieffer, 1888)	850-1100	800-1100	ean, i, h		♦	♦					●	●			
Contarinia quinquenotata (Löw, 1888)	980		ean		♦										
Contarinia steini (Karsch, 1881)		1140	e									●			
Drisina glutinosa Giard, 1893		1200	e									●			
Harmandiola cavernosa (Rübsaamen, 1899)		1400	wes									●			
Harmandiola globuli (Rübsaamen, 1889)		1400	wes									●			
Harmandiola tremulae (Winnertz, 1853)		1400	wes, ? esca									●			
Mycodiplosis coniophaga (Winnertz, 1853)	1300	1140	h			♦						●			
Mycodiplosis saundersi Barnes, 1927	1000		e		♦	♦									
Putoniella pruni Kaltenbach, 1872	850	400-850	e		♦					●	●				
Trichoceridae															
Trichocera (*Trichocera*) *hiemalis* (De Geer, 1776)		2000	h										●		
Scatopsidae															
Colobostema nigripenne (Meigen, 1830)		1150-1500	ena									●			
Ptychopteridae															
Ptychoptera (*Ptychoptera*) *albimana* (Fabricius, 1787)	500		h	♦											

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ptychoptera (*Ptychoptera*) *scutellaris* Meigen, 1818		2100	h										●		
CULICOMORPHA															
Culicidae															
Anopheles (*Anopheles*) *maculipennis* Meigen, 1818		2190-2200	hoes, ? tp										●	●	
Culiseta (*Culiseta*) *annulata* (Schrank, 1776)		1230-1390	ena									●			
Culiseta (*Culiseta*) *glaphyroptera* (Schiner, 1864)		1230-1390	csee, m									●			
Ochlerotatus (*Ochlerotatus*) *communis* (De Geer, 1776)		1230-1390	h									●			
Ochlerotatus (*Ochlerotatus*) *pullatus* (Coquillett, 1904)		1230-2300	h, ba									●			
Ochlerotatus (*Ochlerotatus*) *punctor* (Kirby, 1837)		1230-1390	h									●			
Ochlerotatus (*Finlaya*) *geniculatus* (Olivier, 1791)		1230-1390	wp, ? tp									●			
Culex (*Culex*) *pipiens* Linnaeus, 1758		550-2100	hnat							●	●	●	●		
Culex (*Maillotia*) *hortensis* Ficalbi 1889		1230-1390	wpo									●			
Simuliidae															
Prosimulium (*Prosimulium*) *fulvipes* (Edwards, 1921)		1300-2400	cseea, des									●	●	●	
Prosimulium (*Prosimulium*) *hirtipes* (Fries, 1824)		1300-2450	tp, ? h									●	●	●	
Prosimulium (*Prosimulium*) *latimucro* (Enderlein, 1925)		1200-2400	e									●	●	●	
Prosimulium (*Prosimulium*) *petrosum* Rubtsov, 1955		1100-2235	see									●	●	●	
Prosimulium (*Prosimulium*) *rufipes* (Meigen, 1830)	1200-1400	1300-2300	ena			♦						●	●	●	
Prosimulium (*Prosimulium*) *tomosvaryi* (Enderlein, 1921)		850-2000	des								●	●	●		
Simulium (*Nevermannia*) *angustitarse* (Lundstrom 1911)		1000-1700	wcp, ? dp									●	●		
Simulium (*Nevermannia*) *bertrandi* Grenier et Dorier, 1959	1950	1950-2300	e				♦						●	●	
Simulium (*Nevermannia*) *brevidens* (Rubtsov, 1956)		450-2350	e							●	●	●	●	●	
Simulium (*Nevermannia*) *carpathicum* (Knoz, 1961)	2000	400-2000	e				♦			●	●	●	●		
Simulium (*Nevermannia*) *carthusiense* Grenier & Dorier, 1959		1000-2300	e									●	●	●	
Simulium (*Nevermannia*) *codreanui* (Serban, 1958)	1950	1300-2150	e				♦					●	●		
Simulium (*Nevermannia*) *costatum* Friederichs, 1920		1100-2300	ena									●	●	●	
Simulium (*Nevermannia*) *crenobium* (Knoz, 1961)		1400	csee									●			
Simulium (*Nevermannia*) *cryophilum* (Rubzov, 1959)	700-750	750-2200	eanna, ? tp		♦						●	●	●		
Simulium (*Nevermannia*) *curvans* (Rubtsov & Carlsson, 1965)		1200-2100	hoes									●	●		
Simulium (*Nevermannia*) *latigonia* (Rubzov, 1956)		1100-2000	e									●	●		
Simulium (*Simulium*) *argenteostriatum* Strobl, 1898	700-1300	700-2100	? csena		♦	♦					●	●	●		
Simulium (*Simulium*) *argyreatum* Meigen, 1838		400-2400	e							●	●	●	●	●	
Simulium (*Simulium*) *bezzii* (Corti, 1914)		1200-2200	ena, mwca									●	●		
Simulium (*Simulium*) *degrangei* Dorier et Grenier, 1959	700	700-2200	cse		♦						●	●	●		
Simulium (*Simulium*) *ibariense* Zivkovitch & Grenier, 1959		868	csee								●				
Simulium (*Simulium*) *maximum* Knoz, 1961	450	450-2200	e, cse	♦						●	●	●	●		

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Simulium (*Simulium*) *monticola* Friederichs, 1920		600-2200	ena							●	●	●	●		
Simulium (*Simulium*) *morsitans* Edwards, 1915		1400-2000	des									●	●		
Simulium (*Simulium*) *noelleri* Friederichs, 1920		800-1800	wces								●	●	●		
Simulium (*Simulium*) *colombaschense* (Scopoli, 1780)		1800-2250	cse										●	●	
Simulium (*Simulium*) *ornatum* (Meigen, 1818)		780-960	tp, ? e								●				
Simulium (*Simulium*) *reptans* (Linnaeus, 1758)		800-2000	hoes, h								●	●	●		
Simulium (*Simulium*) *tuberosum* (Lundstrom, 1911)		500-2300	h							●	●	●	●	●	
Simulium (*Simulium*) *variegatum* Meigen, 1818		400-2300	e, ? wp							●	●	●	●	●	
Simulium (*Simulium*) *verecundum* **Stone & Jamnback, 1955**		1000-2000	h, bm									●	●		
Simulium (*Hellichiella*) *latipes* Meigen, 1804	2060	900-2200	tp, ? h				♦				●	●	●		
Simulium (*Eusimulium*) *angustipes* Edwards, 1915	2240	900-2240	wp					♦			●	●	●	●	
Simulium (*Eusimulium*) *aureum* Fries, 1824		700-2000	wes, ? h								●	●	●		
Simulium (*Eusimulium*) *velutinum* (Santos Abreu, 1922)		1000-2000	ena									●	●		
Simulium (*Obuchovia*) *auricoma* Meigen, 1818		1000-2400	ena ? dp									●	●	●	
Ceratopogonidae															
Culicoides (*Avaritia*) *obsoletus* (Meigen, 1818)		1230-1390	h									●			
Culicoides festivipennis Kieffer, 1914		+++	tp												
Culicoides (*Silvaticulicoides*) *pallidicornis* Kieffer, 1919		1230-1390	tp									●			
Culicoides pictipennis (Staeger, 1839)		2400-2900	wcp											●	●
Dasyhelea (*Dasyhelea*) *bilineata* Goetghebuer 1920	2090-2190		? tp				♦								
Dasyhelea (*Dasyhelea*) *flavifrons* (Guerin, 1833)		2200	tp, ? hoes										●	●	
Forcipomyia (*Forcipomyia*) *pallidipes* Santos Abreu, 1918		1230-1390	mwca									●			
Chironomidae															
Anatopynia plumipes (Fries, 1823)		2283-2340	e											●	
Guttipelopia guttipennis (Wulp, 1861)		2250-2324	h											●	
Larsia curticalcar (Kieffer, 1918)	2020-2365	800-2440	e				♦	♦			●	●	●	●	
Trissopelopia flavida Kieffer, 1923		340-900	et							●	●				
Zavrelimyia melanura (Meigen, 1804)		1070-1850	tp									●	●		
Diamesa (*Diamesa*) *insignipes* Kieffer, 1908		1500-2440	h									●	●	●	
Potthastia gaedii (Meigen, 1838)		1070-1850	ho									●	●		
Pseudodiamesa (*Pseudodiamesa*) *branickii* (Nawicki, 1873)	1140-1950		ho			♦	♦								
Pseudodiamesa (*Pseudodiamesa*) *nivosa* (Goetghebuer, 1928)		1040	wcp									●			
Prodiamesa olivacea (Meigen, 1818)		1040-2196	h									●	●		
Acricotopus lucens (Zetterstedt, 1850)	1140-1950	1140-1950	h			♦	♦					●	●		
Brillia bifida (Kieffer, 1909)		1040-2535	po									●	●	●	●
Corynoneura celeripes Winnertz, 1852		2178	h										●	●	

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Cricotopus (*Cricotopus*) *algarum* (Kieffer, 1911)	2020-2394	400-2394	e, ? wes				♦	♦		●	●	●	●	●	
Cricotopus (*Cricotopus*) *annulator* Goetghebuer, 1927	2365	480-2030	h					♦		●	●	●	●		
Cricotopus (*Cricotopus*) *fuscus* (Kieffer, 1909)		340	h							●					
Cricotopus (*Cricotopus*) *tremulus* (Linnaeus, 1758)		2250	h											●	
Cricotopus (*Isocladius*) *sylvestris* (Fabricius, 1794)	2020-2365	370-2535	hno				♦	♦		●	●	●	●	●	●
Eukiefferiella brevicalcar (Kieffer, 1911)		1568	wp									●			
Eukiefferiella clypeata (Thienemann, 1919)		1550	wp									●			
Eukiefferiella gracei (Edwards, 1929)		1170-1200	h									●			
Eukiefferiella similis Goetghebuer, 1939		900-2350	tp								●	●	●	●	
Limnophyes minimus (Meigen, 1818)		860-900	hptn								●				
? *Orthocladius murvanidzei* (Chernovskij, 1949)		2250-2440	wces											●	●
? *Paracladius inaequalis* Kieffer, 1926		800-1200	? e								●	●			
Psectrocladius (*Psectrocladius*) *psilopterus* (Kieffer, 1906)		2250-2324	h											●	
Psectrocladius (*Psectrocladius*) *simulans* (Johannsen, 1937)		2228-2324	h											●	
Rheocricotopus (*Rheocricotopus*) *effusus* (Walker, 1856)	1140-1950	850-1150	ho			♦	♦				●	●			
Synorthocladius semivirens (Kieffer, 1909)		980-2250	h								●	●	●	●	
Thienemannia gracilis Kieffer, 1909		1070-1850	e									●	●		
Thienemanniella acuticornis (Kieffer, 1912)		512	wp							●					
Thienemanniella flaviforceps Kieffer, 1925		350-1850	e							●	●	●	●		
Tvetenia bavarica (Goetghebuer, 1934)		480	h							●					
Tvetenia calvescens (Edwards, 1929)		400-2250	wp							●	●	●	●	●	
Zalutschia mucronata (Brundin, 1949)		350-1000	wes							●	●				
Chironomus (*Lobochironomus*) *dorsalis* Meigen, 1818		2353-2535	h											●	●
Chironomus (*Chironomus*) *plumosus* (Linnaeus, 1758)	2020-2394	2250-2324	hno				♦	♦						●	
Chironomus (*Chironomus*) *riparius* Meigen, 1804	2020-2365	400-2535	hn				♦	♦		●	●	●	●	●	●
Cryptochironomus (*Cryptochironomus*) *defectus* (Kieffer, 1913)	2020-2394	2020-2545	pa				♦	♦					●	●	●
Orthocladius (*Eudactylocladius*) *fuscimanus* (Kieffer, 1908)		800-1000	wp								●				
Demicryptochironomus (*Demicryptochironomus*) *vulneratus* (Zetterstedt, 1838)		1568-2228	po									●	●	●	
Dicrotendipes nervosus (Staeger, 1839)		1568-2440	ho									●	●	●	
Einfeldia longipes (Staeger, 1839)		2324-2440	h											●	
Endochironomus dispar (Meigen, 1830)		800-1000	hes								●				
Glyptotendipes (*Glyptotendipes*) *pallens* (Meigen, 1804)		1550-1568	po									●			
Paratendipes nudisquama (Edwards, 1929)		440-1140	hno							●	●	●			
Polypedilum (*Pentapedilum*) *exsectum* (Kieffer, 1916)		2200	des										●	●	

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Polypedilum (*Pentapedilum*) *sordens* (van der Wulp, 1875)		2250	h											●	
Polypedilum (*Polypedilum*) *nubeculosum* (Meigen, 1804)		2228-2535	h											●	●
Polypedilum (*Tripodura*) *scalaenum* (Schrank, 1803)		440-2003	ho							●	●	●	●		
Cladotanytarsus (*Cladotanytarsus*) *mancus* (Walker, 1856)		400-1000	h							●	●				
Stictochironomus pictulus (Meigen, 1830)	2020-2394		h				♦	♦							
Micropsectra junci (Meigen, 1818)		400-2368	h							●	●	●	●	●	
Micropsectra lindrothi Goetghebuer, 1931	1142		h			♦									
Micropsectra notescens (Walker, 1856)	1950		ena				♦								
Micropsectra radialis Goetghebuer 1939		2545-2709	po												●
Tanytarsus gregarius Kieffer, 1909		400-2709	h							●	●	●	●	●	●
BRACHYCERA ORTHORRHAPHA															
STRATIOMYOMORPHA															
Coenomyiidae															
Coenomyia ferruginea (Scopoli, 1763)		1147	h									●			
Stratiomyidae															
Beris chalybata (Forster, 1771)	+++		e												
Chloromyia formosa (Scopoli, 1763)	300-1000	800-1147	h	♦	♦						●	●			
Chloromyia speciosa (Macquart, 1834)	300-400		tp	♦											
Odontomyia hydroleon (Linnaeus, 1758)	300-400		tp	♦											
Oplodontha viridula (Fabricius, 1775)	300-400		tp	♦											
Stratiomys chamaeleon (Linnaeus, 1758)	900-1000		esca		♦										
Stratiomys ruficornis (Macquart, 1838)	1200		? cseeit			♦									
Stratiomys singularior (Harris, 1776)		550	tp							●					
Lasiopa balius (Walker, 1849)	300-1000	300-1000	ban	♦	♦					●	●				
Lasiopa calva (Meigen, 1822)		1147	cse									●			
Lasiopa villosa (Fabricius, 1794)	350-450		? cseit	♦											
Oxycera nigricornis Olivier, 1812	300-500		e	♦											
Oxycera trilineata (Linnaeus, 1758)	300-400		wcp	♦											
Pachygaster atra (Panzer, 1798)	350-450	1700	eswa	♦									●		
TABANOMORPHA															
Rhagionidae															
Chrysopilus cristatus (Fabricius, 1775)	1000-1200	1200	e			♦						●			
Chrysopilus maerens Loew, 1873		1147-2600	cseel									●	●	●	●
Chrysopilus pullus (Löw, 1869)	1000		e		♦	♦									
Chrysopilus splendidus (Meigen, 1820)	1000		e		♦	♦									

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Rhagio conspicuus Meigen, 1804	1700-1800	550-1800	e				♦			●	●	●	●		
Rhagio lineola Fabricius, 1794	1000-1100		des			♦									
Rhagio scolopaceus (Linnaeus, 1758)	1000	1150	wes			♦						●			
Rhagio tringarius (Linnaeus, 1758)	350-450	550	wes	♦						●					
Rhagio vitripennis (Meigen, 1820)	1000		e		♦	♦									
Tabanidae															
Nemorius vitripennis (Meigen, 1820)		+++	cseit												
Chrysops (*Chrysops*) *caecutiens* (Linnaeus, 1758)		400-900	hoes. ? tp							●	●				
Chrysops (*Petersenichrysops*) *hamatus* Loew, 1858	300-400		ban	♦											
Atylotus fulvus (Meigen, 1804)		900-2550	tp								●	●	●	●	●
Hybomitra aterrima (Meigen, 1820)	1500	900-2654	cse, m			♦					●	●	●	●	●
Hybomitra auripila (Meigen, 1820)	1500	900-2550	e			♦					●	●	●	●	●
Hybomitra ciureai (Séguy, 1937)		1200-1800	esca									●	●		
Hybomitra distinguenda (Verrall, 1909)		1800	hoes, ? tp										●		
Hybomitra micans (Meigen, 1804)		1150-2100	e									●	●		
Hybomitra montana (Meigen, 1820)		900-1390	hoes, ? tp								●	●			
Hybomitra tropica (Linnaeus, 1758)		900-1390	e								●	●			
Tabanus bovinus Linnaeus, 1758		1200-1800	tp, ? hop									●	●		
Tabanus bromius Linnaeus, 1758		550-1800	wp							●	●	●	●		
Tabanus cordiger Meigen, 1820		1200-1800	wp									●	●		
Tabanus glaucopis Meigen, 1820		550-1800	esca							●	●	●	●		
Tabanus maculicornis Zetterstedt, 1842		1200-1600	wes									●	●		
Tabanus miki Brauer, 1880		900-1600	eit								●	●			
Tabanus quatuornotatus Meigen, 1820		1200	wp									●			
Tabanus spodopterus Meigen, 1820	1000	1200-2550	? csean			♦						●	●	●	●
Tabanus tergestinus Egger, 1859		1200-1600	eit									●	●		
Tabanus unifasciatus Loew, 1858		1200-1600	? wp									●	●		
Haematopota grandis Meigen, 1820		1200-1400	wp									●			
Haematopota italica Meigen, 1804		+++	eanna												
Haematopota pluvialis (Linnaeus, 1758)		1600	wcp									●	●		
Philipomyia aprica (Meigen, 1820)	+++	900-1400	eit, ? cseit								●	●			
Philipomyia graeca (Fabricius, 1794)		900-2000	csea								●	●	●		
Acroceridae															
Ogcodes (*Ogcodes*) *lautereri* Chvala, 1980	2000-2500		hom, ? mm				♦	♦							
Bombyliidae															

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Bombylella atra (Scopoli, 1763)		550-2100	tp							●	●	●	●		
Bombylius (*Bombylius*) *major* Linnaeus, 1758		545-1900	ho							●	●	●	●		
Bombylius (*Bombylius*) *medius* Linnaeus, 1758		545-2100	wcp							●	●	●	●		
Bombylius (*Bombylius*) *minor* Linnaeus, 1758		1147	esca									●			
Lomatia sabea (Fabricius, 1781)		550	? mwca							●					
Exoprosopa capucina (Fabricius, 1781)		+++	hoes, ? tp												
Hemipenthes maura (Linnaeus, 1758)		+++	esca												
Hemipenthes morio (Linnaeus, 1758)		+++	h												
Villa hottentotta (Linnaeus, 1758)		550	tp							●					
Therevidae															
Pandivirilia eximia (Meigen, 1820)		1200-1400	e									●			
Thereva tuberculata Loew, 1847		1200-1400	sena									●			
Asilidae															
Choerades fimbriata (Meigen, 1820)		1200	wes									●			
Choerades fuliginosa (Panzer, 1798)	1000		? wces			♦									
Choerades ignea (Meigen, 1820)		900	wes								●				
Laphria flava (Linnaeus, 1761)	1000	900-2500	po		♦	♦					●	●	●	●	●
Laphria gibbosa (Linnaeus, 1761)		1200-1400	hoes									●			
Dioctria cothurnata Meigen, 1820		+++	wces												
Dioctria oelandica (Linnaeus, 1758)	1000	550-1200	e		♦	♦				●	●	●			
Pycnopogon fasciculatus (Loew, 1847)	300-400		hom	♦											
Molobratia teutonus (Linnaeus, 1767)	1000		eca		♦	♦									
Leptarthrus brevirostris (Meigen, 1804)	1000		e		♦	♦									
Lasiopogon cinctus (Fabricius, 1781)		1789-2600	e										●	●	●
Lasiopogon montanus Schiner, 1862		1374	? cse									●			
Cyrtopogon ruficornis (Fabricius, 1794)		1374	e									●			
Dasypogon diadema (Fabricius, 1781)		+++	wp												
Leptogaster cylindrica (De Geer, 1776)		550	tp							●					
Didysmachus picipes (Meigen, 1820)	1000	550-2100	wes		♦	♦				●	●	●	●		
Dysmachus cephalenus Loew, 1871		1374	ban									●			
Dysmachus fuscipennis (Meigen, 1820)		1500	? wes									●			
Dysmachus stylifer (Loew, 1854)	1000	1374	cse			♦						●			
Erax barbatus Scopoli, 1763		350-400	e							●					
Eutolmus rufibarbis (Meigen, 1820)		+++	tp												
Machimus caliginosus (Meigen, 1820)	1000		csean		♦	♦									

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Neoitamus cothurnatus (Meigen, 1820)		+++	e												
Neoitamus cyanurus (Loew, 1849)		1200-1450	hoes									●			
Neoitamus impudicus (Gerstaecker, 1862)	1000		Eb		♦	♦									
Philonicus albiceps (Meigen, 1820)	1000		tp		♦	♦									
Neomochtherus geniculatus (Meigen, 1820)		+++	e, ? cse												
Stilpnogaster aemula (Meigen, 1820)		850-1300	e								●	●			
Tolmerus atricapillus (Fallen, 1814)		1200-1400	hoes, ? tp									●			
Tolmerus bolgaricus Lehr, 1981		1000-1100	Ebg									●			
Empididae															
Hilara discoidalis Lundbeck, 1910	2500		e					♦	♦						
Hilara setipes Straka, 1976	1230-1900		Ebg			♦	♦								
Empis (*Euempis*) *ciliata* Fabricius, 1787		1200	des									●			
Empis (*Empis*) *prodromus* Loew, 1867	900-1000		e		♦										
Empis (*Euempis*) *tessellata* Fabricius, 1794		545-2100	hop							●	●	●	●		
Empis (*Polyblepharis*) *opaca* Meigen, 1804		+++	e												
Rhamphomyia (*Rhamphomyia*) *morio* (Zetterstedt, 1838)	1950-2230		e				♦	♦							
Rhamphomyia (*Rhamphomyia*) *sulcata* (Meigen, 1804)		+++	hoes												
Rhamphomyia (*Rhamphomyia*) *tibialis* Meigen, 1822		1200	des									●			
Rhamphomyia (*Pararhamphomyia*) *simplex* (Zetterstedt, 1849)	1810		e				♦								
Rhamphomyia (*Holoclera*) *culicina* (Fallen, 1816)		+++	e												
Rhamphomyia (*Holoclera*) *trigemina* Oldenberg, 1927	1810		e				♦								
Phaeobalia dimidiata (Loew, 1869)	+++		e, ? cse												
Chelifera precabunda Collin, 1961		+++	? e												
Wiedemannia (*Chamaedipsia*) *lota* Walker, 1851		+++	eswa												
Hybotidae															
Bicellaria nigra (Meigen, 1824)		930-1000	e								●	●			
Platypalpus maculipes (Meigen, 1829)	+++	930-1000	e								●	●			
Platypalpus niger (Meigen, 1804)		930-1000	e								●	●			
Platypalpus nigritarsis (Fallén, 1816)	+++		e												
Platypalpus pallidicornis (Collin, 1926)		930-1000	e								●	●			
Crossopalpus humilis (Frey, 1913)	+++		wces												
Drapetis (Drapetis) assimilis (Fallen, 1815)		930-1000	e, ? h								●	●			
Dolichopodidae															
Rhaphium crassipes (Meigen, 1824)		1374-1400	wes									●			
Rhaphium monotrichum Loew, 1850		1374-1400	wces									●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Hydrophorus balticus (Meigen, 1824)	2020-2394	1374-1400	ppt				♦	♦				●			
Sympycnus desoutteri Parent, 1925		1374-1400	e									●			
Syntormon denticulatum (Zetterstedt, 1843)		1374-1400	wes									●			
Syntormon fuscipes (von Roser,1840)		1374-1400	e									●			
Syntormon monile (Haliday, 1815)		1374-1400	wp									●			
Syntormon pallipes (Fabricius, 1794)		1374-1400	wp									●			
Syntormon pumilum (Meigen, 1824)		1374-1400	wp									●			
Campsicnemus curvipes (Fallén, 1823)		1374-1400	ena									●			
Argyra auricollis (Meigen, 1824)		1374-1400	e									●			
Chrysotus gramineus (Fallén, 1823)		1374-1530	tp									●			
Chrysotus laesus (Wiedemann, 1817)		1374-1400	hoes									●			
Chrysotus pulchellus Kowarz, 1874		1374-1400	po									●			
Gymnopternus angustifrons (Stæger, 1842)		1374-1400	wes									●			
Gymnopternus brevicornis (Stæger 1842)		1374-1400	e									●			
Hercostomus fugax (Loew, 1857)	2000		hoes				♦								
Hercostomus labiatus (Loew, 1857)	1600-2200		e, cse			♦	♦								
Hercostomus sahlbergi (Zetterstedt, 1838)		1000-1750	e									●	●		
Dolichopus albipalpus Negrobov, 1973	2000-2200		dp				♦	♦							
Dolichopus beschovskii Negrobov & Kechev, 2010	2200		Er				♦	♦							
Dolichopus lepidus Staeger, 1842		1374-1400	po									●			
Dolichopus pennatus Meigen, 1824		1374-1400	po									●			
Dolichopus phaeopus Haliday, 1851		2000	e										●		
Dolichopus picipes Meigen, 1824		1374-1400	wes									●			
Dolichopus pyrenaicus Parent, 1920	1800-2200		wes				♦								
Dolichopus plumipes (Scopoli, 1783)		1374-1400	hno									●			
Dolichopus popularis Wiedemann, 1817		1374-1400	wces									●			
Dolichopus simplex Meigen, 1824		1374-1400	wes									●			
Dolichopus ungulatus (Linnaeus, 1758)		1374-1400	h									●			
BRACHYCERA CYCLORRHAPHA															
Aschiza															
Platypezidae															
Callomyia saibhira Chandler, 1976		930-1000	des								●	●			
Phoridae															
Aenigmatias franzi Schmitz, 1950	2270		des, ? ess					♦							
Triphleba antricola (Schmitz, 1918)	1648		e				♦								

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Triphleba bicornuta (Strobl, 1910)		2000-2100	e										●		
Syrphidae															
Dasysyrphus albostriatus (Fallén, 1817)		1200-1400	tp									●			
Dasysyrphus venustus (Meigen, 1822)		1200-2000	h									●	●		
Didea alneti (Fallen, 1817)		2925	h												●
Doros profuges (Harris 1780)		1200-1400	hoes									●			
Epistrophe diaphana (Zetterstedt, 1843)		1200-1400	esca									●			
Epistrophe eligans (Harris, 1780)	1000	1200-1400	et		♦	♦						●			
Epistrophe grossulariae (Meigen, 1822)		+++	h												
Epistrophe nitidicollis (Meigen, 1822)		1200-1400	h									●			
Epistrophella euchroma (Kowarz, 1885)		1500-1550	hoes									●			
Episyrphus balteatus (De Geer, 1776)		1147	poa									●			
Leucozona lucorum (Linnaeus, 1758)		1500-2300	h									●	●	●	
Melangyna lasiophthalma (Zetterstedt, 1843)		1800	esca										●		
Meligramma guttata (Fallen, 1817)		1200-1400	h									●			
Meligramma triangulifera (Zetterstedt, 1843)		1200-1400	h									●			
Meliscaeva auricollis (Meigen, 1822)		1200-1400	wp									●			
Meliscaeva cinctella (Zetterstedt, 1843)	+++	1170-1200	ho									●			
Eupeodes lapponicus (Zetterstedt, 1838)	+++	1200-1400	h									●			
Eupeodes corollae (Fabricius, 1794)	300-1000	900-1550	ppta	♦	♦						●	●			
Eupeodes latifasciatus (Macquart, 1829)		1147	ho									●			
Eupeodes luniger (Meigen, 1822)	1000	1200-1400	ho		♦	♦						●			
Eupeodes nitens (Zetterstedt, 1843)	1500	400-1374	tp			♦				●	●	●			
Parasyrphus lineolus (Zetterstedt, 1843)	1500	1200-1800	h			♦						●	●		
Parasyrphus malinellus (Collin, 1952)	1500	1800	des			♦							●		
Scaeva pyrastri (Linnaeus, 1758)	1000	1200-1400	ho		♦	♦						●			
Sphaerophoria menthastri (Linnaeus, 1758)		1200-1400	hop									●			
Sphaerophoria philantha (Meigen, 1822)		550-650	h							●					
Sphaerophoria scripta (Linnaeus, 1758)	1000	550-1900	ho		♦	♦				●	●	●	●		
Syrphus ribesii (Linnaeus, 1758)	1000-1500	800-1100	h			♦					●	●			
Syrphus torvus Osten-Sacken, 1875	1500		ho			♦									
Syrphus vitripennis Meigen, 1822	1500	800-1000	ho			♦					●	●			
Xanthogramma pedissequum (Harris, 1776)		1500-1550	tp									●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Baccha elongata (Fabricius, 1775)	+++	1147	h									●			
Chrysotoxum arcuatum (Linnaeus, 1758)		400-1550	tp							●	●	●			
Chrysotoxum elegans Loew, 1841		1200-1550	e									●			
Chrysotoxum fasciolatum (De Geer, 1776)		1200-1550	h									●			
Chrysotoxum festivum (Linnaeus, 1758)	1500	450-1147	po			♦				●	●	●			
Chrysotoxum intermedium (Meigen, 1822)		1500-1550	wp									●			
Chrysotoxum octomaculatum Curtis, 1837		1200-1400	wes									●			
Chrysotoxum vernale Loew, 1841	1500	350-450	esca			♦				●					
Melanostoma mellinum (Linnaeus, 1758)	300-1800	540-2100	h	♦	♦	♦	♦			●	●	●	●		
Xanthandrus comtus (Harris, 1780)		1200-1550	po									●			
Platycheirus ambiguus (Fallén, 1817)		1200-1400	ho									●			
Platycheirus albimanus (Fabricius, 1781)	1500	1800	ho			♦							●		
Platycheirus clypeatus (Meigen, 1822)		1147	h									●			
Platycheirus fulviventris (Macquart, 1829)		1200-1400	esca									●			
Platycheirus manicatus (Meigen, 1822)		900-1400	h								●	●			
Platycheirus melanopsis Loew, 1856		1800	des										●		
Platycheirus peltatus (Meigen, 1822)		1147-1550	h									●			
Platycheirus podagratus (Zetterstedt, 1838)		900	h								●				
Platycheirus scutatus (Meigen, 1822)	+++	1170-1400	h									●			
Paragus albifrons (Fallen, 1817)		1147	tp									●			
Paragus bicolor (Fabricius, 1794)		400-1374	h							●	●	●			
Paragus cinctus Schiner & Egger, 1853			? mt												
Paragus haemorrhous Meigen, 1822		1200-1400	hat									●			
Paragus quadrifasciatus Meigen, 1822		1500-1550	tp									●			
Paragus tibialis (Fallén, 1817)	+++	400-1400	ho							●	●	●			
Heringia pubescens (Delucchi & Pschorn-Walcher, 1955)	+++		h												
Pipiza austriaca Meigen, 1822		1374-1400	hoes									●			
Pipiza quadrimaculata (Panzer, 1804)		+++	h												
Pipizella virens (Fabricius, 1805)	1800	900-1200	tp				♦				●	●			
Trichopsomyia flavitarsis (Meigen, 1822)		900	hoes								●				
Triglyphus primus Loew, 1840		1500-1550	hoes, ? tp									●			
Chamaesyrphus scaevoides (Fallén, 1817)	1810	1200	des				♦					●			
Cheilosia albitarsis (Meigen, 1822)	1500	1200-1800	h			♦						●	●		
Cheilosia antiqua (Meigen, 1822)	1800		e, ? cse				♦								
Cheilosia barbata Loew, 1857		900	e								●				

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Cheilosia bureschi (Delkeskamp, 1942)	900-1000		Ebg		♦										
Cheilosia canicularis (Panzer, 1801)		900-1400	hoes								●	●			
Cheilosia carbonaria Egger, 1860	1500		wces			♦									
Cheilosia flavipes (Panzer, 1798)	1500		wces			♦									
Cheilosia frontalis Loew, 1857	900-1000		e		♦										
Cheilosia gagatea Loew, 1857	1200-1400		cse			♦									
Cheilosia illustrata (Harris, 1780)		1200-1550	hoes									●			
Cheilosia impressa Loew, 1840	900-1000	1200-1800	hoes		♦							●	●		
Cheilosia latifrons (Zetterstedt, 1843)		1200-1400	wp									●			
Cheilosia melanopa (Zetterstedt, 1843)		400-1550	e							●	●	●			
Cheilosia melanura (Becker, 1894)		1800	des										●		
Cheilosia montana Egger, 1860	1500		wes			♦									
Cheilosia morio (Zetterstedt, 1838)		400-1550	wces							●	●	●			
Cheilosia mutabilis (Fallén, 1817)	1500-2000	1200-1400	wcp			♦	♦					●			
Cheilosia nebulosa (Verrall, 1871)	1800		e				♦								
Cheilosia pagana (Meigen, 1822)		1500-1550	h									●			
Cheilosia pallipes Loew, 1863		1500-1550	h									●			
Cheilosia proxima (Zetterstedt, 1843)	+++	1150-1400	hoes									●			
Cheilosia pubera (Zetterstedt, 1838)	1800	1800	e				♦						●		
Cheilosia rhynchops Egger, 1860		1800	e										●		
Cheilosia ruralis (Meigen, 1822) [*Ch. urbana* (Meigen, 1822)]	300-1800	1150	hoes, ? tp	♦	♦	♦	♦					●			
Cheilosia sahlbergi Becker, 1894	1810		e				♦								
Cheilosia schineri Egger, 1860		1500-1550	se									●			
Cheilosia semifasciata (Becker, 1894)		+++	e												
Cheilosia variabilis (Panzer, 1798)	1500	1350-1475	wcp			♦						●			
Cheilosia velutina Loew, 1840	+++	400-1000	hoes							●	●				
Cheilosia vernalis (Fallén, 1817)	1800	1200-1400	hoes				♦					●			
Cheilosia vulpina (Meigen, 1822)		1200-1400	e									●			
Ferdinandea cuprea (Scopoli, 1763)		1200-1400	tp									●			
Pelecocera tricincta Meigen, 1822		1200-1400	des									●			
Rhingia campestris Meigen, 1822		1350-1475	hoes									●			
Rhingia rostrata (Linnaeus, 1758)		1200-1400	wes									●			
Volucella bombylans (Linnaeus, 1758)		1150-2500	h									●	●	●	●
Volucella inanis (Linnaeus, 1758)		1150-2000	esca									●	●		
Volucella pellucens (Linnaeus, 1758)		+++	po												
Volucella zonaria (Poda, 1761)		1150-1400	tp									●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Brachyopa bicolor (Fallén, 1817)		1500-1550	? hoes									●			
Brachyopa panzeri Goffe, 1945		1147	des									●			
Melanogaster parumplicata (Loew, 1840)		1200-1400	? hoes									●			
Chrysogaster solstitialis (Fallén, 1817)		900-1400	ena								●	●			
Pipizella viduata (Linnaeus, 1758)	1000-1500	550-1800	e			♦				●	●	●	●		
Lejogaster metallina (Fabricius, 1781)	1000-1500	1200-1400	tp			♦						●			
Lejogaster tarsata (Meigen, 1822)	300-400	900-1550	esca, ? tp	♦							●	●			
Orthonevra elegans (Meigen, 1822)		1200-1400	hoes									●			
Orthonevra geniculata (Meigen 1830)		1500-1550	hoes									●	●		
Orthonevra nobilis (Fallén, 1817)		1170-1400	esca									●			
Neoascia annexa (Müller, 1776)		+++	e												
Neoascia podagrica (Fabricius, 1775)		550-650	wcp							●					
Neoascia meticulosa (Scopoli, 1763)		1800	hoes,? esca										●		
Neoascia geniculata (Meigen, 1822)		1800	wces										●		
Sphegina clunipes (Fallen, 1816)		1200-1800	des									●	●		
Sphegina montana Becker, 1921		1200-1400	e									●			
Arctophila bequaerti Herve-Bazin, 1913		900-1000	ban								●	●			
Arctophila bombiforme (Fallén, 1810)		1150-2145	e									●	●		
Sericomyia lappona (Linnaeus, 1758)		1800	hoes										●		
Sericomyia silentis (Harris, 1776)		1150-1400	hoes									●			
Eumerus strigatus (Fallén, 1817)		800-1500	ha, ? i								●	●			
Merodon aberrans Egger, 1860		1150	ena									●			
Merodon aeneus Meigen, 1822		1150-1400	ena									●			
Merodon avidus (Rossi, 1790)		1150-1400	ena									●			
Merodon cinereus (Fabricius, 1794)		+++	cse												
Merodon clavipes (Fabricius, 1781)		1500-1550	ena									●			
Merodon equestris (Fabricius, 1794)		+++	ha												
Merodon loewi van der Goot, 1964		1500-1550	? e									●			
Merodon ruficornis Meigen, 1822	300-400	800-1800	ena	♦							●	●	●		
Merodon rufus Meigen, 1838		+++	ena												
Merodon testaceus Sack, 1913		1500-1550	nm									●			
Psilota anthracina Meigen, 1822		400-1550	e							●	●	●			
Psarus abdominalis (Fabricius, 1794)		1500-1550	e									●			
Ceriana conopsoides (Linnaeus, 1758)		1200-1400	tp									●			
Eristalinus aeneus (Scopoli, 1763)		350-400	hpta, ? sk							●					

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Eristalinus sepulchralis (Linnaeus, 1758)		1150	po									●			
Eristalis arbustorum (Linnaeus, 1758)	1000	550-1800	ho		♦	♦				●	●	●	●		
Eristalis horticola (De Geer, 1776)		1200-1800	po									●	●		
Eristalis intricaria (Linnaeus, 1758)		1150	hoes,? esca									●			
Eristalis jugorum Egger, 1858		1800	e										●		
Eristalis nemorum (Linnaeus, 1758) ?		350-1400	h							●	●	●			
Eristalis cryptarum (Fabricius, 1794)		1200-1400	e									●			
Eristalis similis (Fallén, 1817)		1150-1800	wp									●	●		
Eristalis rupium Fabricius, 1805		1200-1800	h									●	●		
Eristalis tenax (Linnaeus, 1758)		550-1374	k							●	●	●			
Myathropa florea (Linnaeus, 1758)	1000		ena		♦	♦									
Helophilus hybridus Loew, 1846		350-1374	h							●	●	●			
Helophilus trivittatus (Fabricius, 1805)		550-1150	tp							●	●	●			
Helophilus pendulus (Linnaeus, 1758)		800-1000	hoes								●				
Blera fallax (Linnaeus, 1758)		1200-1400	hoes									●			
Spilomyia saltuum (Fabricius, 1794)		1200-1400	cse									●			
Syritta pipiens (Linnaeus, 1758)	900-1000	550-1000	hno, ? sk		♦	♦				●	●				
Brachypalpus laphriformis (Fallen, 1816)		1200-1400	e									●			
Chalcosyrphus femoratus (Linnaeus, 1758)		2100-2300	hoes,? esca										●	●	
Xylota ignava (Panzer, 1798)		1200-1400	tp									●			
Xylota segnis (Linnaeus, 1758)		1200-1400	h									●			
Xylota sylvarum (Linnaeus, 1758)		1200-1400	hoes									●			
Microdon devius (Linnaeus, 1761)		1350-1475	wces									●			
Microdon mutabilis (Linnaeus, 1758)	1000-1600		hoes			♦									
Pipunculidae															
Verrallia aucta (Fallén, 1817)	300-400		h	♦											
Pipunculus campestris Latreille, 1805		800-1000	ho								●				
Eudorylas fusculus (Zetterstedt, 1844)	1500		e			♦									
Eudorylas jenkinsoni Coe, 1966		2729	e												●
Eudorylas ruralis (Meigen, 1824)	300-1750		ena, ? wp	♦	♦	♦	♦								
Eudorylas subterminalis Collin, 1956	400-1400		e	♦	♦	♦									
Eudorylas terminalis (Thompson, 1869)	1250-1430		e			♦									
Eudorylas zonellus (Collin, 1956)	400-950		e	♦	♦										
Dasydorylas horridus (Becker, 1897)	300-400		e	♦											
Dorylomorpha (*Dorylomorpha*) *confusa* (Verrall, 1901)	1250-1900		e			♦	♦								

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Dorylomorpha (*Dorylomyia*) *incognita* (Verrall, 1901)	1900-2000	930-1700	e				♦				●	●	●		
Tomosvaryella coquilletti (Kertész, 1907)	400-1900	360	ho	♦	♦	♦	♦			●					
Tomosvaryella geniculataq (Meigen, 1824)	300-400	1350-1475	e	♦								●			
Tomosvaryella kuthyi (Aczél, 1944)	400-950		ean	♦	♦										
Tomosvaryella nutata (Becker, 1898)	650		hom	♦											
Tomosvaryella sylvatica (Meigen, 1824)	450-2350		ho	♦	♦	♦	♦	♦							
Schizophora															
Acalyptrata															
Conopidae															
Conops (*Asiconops*) *elegans* Meigen, 1824		900	hom								●				
Conops (*Conops*) *quadrifasciatus* De Geer, 1776		1200-1400	esanca									●			
Conops (*Conops*) *scutellatus* Meigen 1804		1150-1550	e									●			
Conops (*Conops*) *silaceus* Wiedemann in Meigen, 1824		1500-1550	se									●			
Conops (*Conops*) *vesicularis* Linnaeus, 1761		1150	tp									●			
Conops (*Conops*) *vitellinus* Loew, 1847		400-450	nm							●					
Physocephala chrysorrhoea (Meigen, 1824)		1200-1400	tp, ? hop									●			
Physocephala nigra (De Geer, 1776)		900	tp, ? hop								●				
Physocephala pusilla (Meigen, 1824)	300-400		wcp	♦											
Physocephala variegata (Meigen, 1824)		1200-1400	sp									●			
Zodion cinereum (Fabricius, 1794)		1150-1500	po									●			
Zodion erythrurum Rondani, 1865		1200-1400	sp, ? tp									●			
Zodion notatum (Meigen, 1804)		800-1200	hop									●			
Myopa buccata (Linnaeus, 1758)	1800	1150-1800	tp				♦					●	●		
Myopa dorsalis Fabricius, 1794		1200-1400	wpo									●			
Myopa testacea (Linnaeus, 1767)		800-1700	ho								●	●	●		
Melanosoma bicolor (Meigen 1824)		1200	wp									●			
Myopotta pallipes (Wiedemann in Meigen, 1824)		400	wesanca							●					
Thecophora atra (Fabricius, 1775)		1150	po									●			
Thecophora pusilla (Meigen, 1824)		1000-1400	hop								●	●			
Sicus ferrugineus (Linnaeus, 1761)		1150-1700	po									●	●		
Tephritidae															
Acidia cognata (Wiedemann, 1817)		1150-1300	e									●			
Euleia heraclei (Linnaeus, 1758)		2200	wp										●	●	
Terellia (*Terellia*) *colon* (Meigen 1826)		1200	wp									●			
Aciura coryli (Rossi, 1790)	900-1000		mwca		♦										

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Oxyna flavipennis (Loew, 1844)		1200-1400	wces									●			
Oxyna nebulosa (Wiedemann, 1817)	1800		eswa				♦								
Tephritis bardanae (Schrank, 1803)		1150-1300	wes									●			
Tephritis vespertina (Loew, 1844)		1200-1400	ena									●			
Trypeta artemisiae (Fabricius, 1794)		1150	ess									●			
Stemonocera cornuta (Scopoli, 1763)		1150-1300	wces									●			
Piophilidae															
Liopiophila varipes (Meigen, 1830)	1800		h				♦								
Lauxaniidae															
Calliopum aeneum (Fallén, 1820)		900	e								●				
Cremifaniidae															
Cremifania bulgarica L. Papp, 2010		2250	Er											●	
Chamaemyiidae															
Parochthiphilla (*Euestelia*) *coronata* (Loew, 1858)	350-2350		tp	♦	♦	♦	♦	♦							
Chamaemyia aestiva Tanasijtshuk, 1970	1800-2200		tp				♦								
Chamaemyia aridella (Fallén, 1823)	300-2200		e	♦	♦	♦	♦								
Chamaemyia bicolor Bheschovski, 1994	+++		Ebg												
Chamaemyia juncorum (Fallén, 1823)	350-2200		tp, ? hop	♦	♦	♦	♦								
Chamaemyia polystigma (Meigen, 1830)	350-650		tp, ? hop	♦											
Chamaemyia subjuncorum Tanasijtshuk, 1970	600-1000	2500	dp, ? tp	♦	♦									●	●
Leucopis (*Leucopis*) *aphidiperda* Rondani, 1847	300-650		esca	♦											
Leucopis (*Leucopis*) *atritarsis* Tanasijtshuk, 1958	350-450		h	♦											
Leucopis (*Leucopis*) *gliphinivora* Tanasijtshuk, 1958	350-700		ho	♦	♦										
Leucopis (*Leucopis*) *pseudomelanopus* Tanasijtshuk, 1961	350-450		esca	♦											
Leucopis (*Leucopis*) *revisenda* Tanasijtshuk, 1970	350-450		esca	♦											
Sciomyzidae															
Pherbellia cinerella (Fallén, 1820)		900	wpo								●				
Tetanocera ferruginea Fallen, 1820		1150-1300	h									●			
Sepsidae															
Sepsis fulgens Meigen, 1826	1800		tp				♦								
Agromyzidae															
Agromyza alnibetulae Hendel, 1931		1150-1300	e									●			
Agromyza lithospermi Spencer, 1963	900-1000		e		♦										
Agromyza nana Meigen 1830		1374	wpo									●			
Agromyza pseudoreptans Nowakowski, 1967		1374	h									●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Agromyza reptans Fallen, 1823	900-1000	1700	ho		♦								●		
Agromyza rufipes Meigen, 1830		1700	wpo										●		
Ophiomyia heringi Stary, 1930		1150-1300	e									●			
Ophiomyia labiatarum Hering, 1937		1150-1300	h									●			
Ophiomyia maura (Meigen, 1838)		1150-1300	h									●			
Amauromyza (*Amauromyza*) *lamii* (Kaltenbach, 1858)		1700	e										●		
Amauromyza (*Amauromyza*) *morionella* (Zetterstedt, 1848)	900-1000	1300	ena		♦							●			
Amauromyza (*Cephalomyza*) *flavifrons* (Meigen, 1830)		580-1150	h							●	●	●			
Amauromyza (Cephalomyza) gyrans (Fallen 1823)		1150-1200	e									●			
Amauromyza (*Cephalomyza*) *labiatarum* (Hendel, 1920)	900-1000	1150-1200	e		♦							●			
Amauromyza (*Cephalomyza*) *verbasci* (Bouché, 1847)		1150-1200	e									●			
Cerodontha (*Poemyza*) *pygmaea* (Meigen 1830)		1374	h									●			
Liriomyza amoena (Meigen, 1830)		580	wpo							●					
Liriomyza artemisicola de Meijere, 1924		1150-1200	wpo									●			
Liriomyza buhri Hering, 1937		580-660	e							●					
Liriomyza congesta (Becker, 1903)		580-1374	po							●	●	●			
Liriomyza demeijerei Hering, 1930		1150-1200	e									●			
Liriomyza eupatorii (Kaltenbach, 1873)	900-1000	1150-1200	h		♦							●			
Liriomyza pascuum (Meigen, 1838)		1374	e									●			
Liriomyza puella (Meigen, 1830)		1150-1200	e									●			
Liriomyza sonchi Hendel, 1931		580-1200	ho							●	●	●			
Liriomyza strigata (Meigen, 1830)		580-1200	po							●	●	●			
Liriomyza taraxaci Hering, 1927		1150-1374	h									●			
Phytoliriomyza melampyga (Loew, 1869)		1150-1200	h									●			
Phytoliriomyza variegata (Meigen, 1830)		580-1200	po							●	●	●			
Calycomyza artemisiae (Kaltenbach, 1856)		1150-1200	hno									●			
Aulagromyza similis (Brischke, 1880)		1150-1200	e									●			
Aulagromyza tridentata (Loew, 1858)		580-1200	ewca, ? eca							●	●	●			
Pseudonapomyza europaea Spencer, 1973	1800		h				♦								
Phytomyza affinis Fallén, 1823		580-660	e, ? h							●					
Phytomyza alpina Groschke, 1957	2000	1374	e, ? h				♦					●			
Phytomyza artemisivora Spencer, 1971	900-1000	1150-1200	ewca		♦							●			
Phytomyza chaerophylli (Kaltenbach, 1856)	900-1000	580-1374	e		♦					●	●	●			
Phytomyza cirsii Hendel, 1923		1150-1200	e									●			
Phytomyza conyzae Hendel, 1920	900-1000		wpo		♦										

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Phytomyza erigerophila Hering 1927		580-660	e							●					
Phytomyza eupatorii Hendel 1927		1150-1200	wpo									●			
Phytomyza notata Meigen 1830		1374	e									●			
Phytomyza obscura Hendel 1920		1374	e, ? ena									●			
Phytomyza obscurella Fallén, 1823	900-1000		e		♦										
Phytomyza pastinacae Hendel 1923		1150-1200	h									●			
Phytomyza petoei Hering, 1924	900-1000	1150-1374	wpo		♦							●			
Phytomyza ranunculivora Hering, 1932		1374	e									●			
Phytomyza salviae (Hering, 1924)	900-1000	1150-1374	e		♦							●			
Phytomyza senecionis Kaltenbach 1869		1150-1200	e									●			
Phytomyza spondylii Robineau-Desvoidy 1851		1150-1200	ho									●			
Phytomyza tetrasticha Hendel 1927		580-1374	e, ? eswa							●	●	●			
Phytomyza tussilaginis Hendel 1925	900-1000	1374	h		♦							●			
Chromatomyia saxifragae (Hering, 1924)	2000		csee				♦								
Opomyzidae															
Opomyza florum (Fabricius, 1794)	300-1800	1200-2389	e	♦	♦	♦	♦					●	●	●	
Opomyza germinationis (Linnaeus, 1758)	300-450		h	♦											
Geomyza tripunctata Fallén, 1823	1800-2575	2389	h				♦	♦	♦					●	
Carnidae															
Meoneura alpina Hennig, 1948	2000		csee				♦								
Meoneura flavifacies Collin, 1930	2000		h				♦								
Meoneura flavifrons Papp, 1981	1800-2700		e				♦	♦	♦						
Meoneura glaberrima Becker, 1910	450-1800		wp	♦	♦	♦	♦								
Meoneura graeca Hennig, 1972	350-450		Eb	♦											
Milichiidae															
Desmometopa sordida (Fallén, 1820)	600-1000		ho	♦	♦										
Leptometopa niveipennis (Strobl, 1900)	350-650		wp	♦											
Leptometopa rufifrons Becker, 1903	350-650		mca	♦											
Madiza glabra Fallén, 1820	1000-1200	1400-2100	h		♦	♦						●	●		
Chloropidae															
Rhodesiella fedtschenkoi Nartshuk, 1978	350-450		nemit	♦											
Aphanotrigonum femorellum Collin, 1948	350-450		wp	♦											
Aphanotrigonum parahastatum Dely-Draskovits, 1981	350-500		hom	♦											
Aphanotrigonum trilineatum (Meigen, 1830)	350-1150	800-1150	wces	♦	♦	♦					●	●			
Conioscinella frontella (Fallén, 1820)	1000-2200	1500-1550	hoes			♦	♦					●	●		

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Conioscinella sordidella (Zetterstedt, 1848)		1400	e									●			
Dicraeus (*Dicraeus*) *ingratus* (Loew, 1866)	1800		h				♦								
Dicraeus (*Dicraeus*) *nigropilosus* Becker, 1910	1000-1100	800-1150	eit			♦					●	●			
Dicraeus (*Dicraeus*) *raptus* (Haliday, 1838)	1000-1250	800-1150	e			♦					●	●			
Dicraeus (*Dicraeus*) *tibialis* (Macquart, 1835)	800-1000	800-1150	ha		♦						●	●			
Elachiptera cornuta (Fallén, 1820)	600-1100	800-1400	hop	♦	♦	♦					●	●			
Elachiptera diastema Collin, 1946		2000-2100	ena										●		
Elachiptera submediterranea Beschovski, 1980	1230		Eb			♦									
Elachiptera tuberculifera (Corti, 1909)	600-1200		hop	♦	♦	♦									
Gaurax fascipes Becker, 1910		1400	e									●			
Hapleginella laevicollis (Zetterstedt, 1858)		1400	hoes									●			
Incertella albipalpis (Meigen, 1830)	600-1800	800-1500	hoes	♦	♦	♦	♦				●	●			
Incertella kerteszi (Becker, 1910)		1400	hoes									●			
Lasiambia palposa (Fallén, 1820)		1400	? hoes									●			
Lipara lucens Meigen, 1830		400-650	h*, ? wp							●					
Lipara pullitarsis Doskocil & Chvala, 1971		460	e							●					
Lipara similis Schiner, 1854	500-700	460	? wp	♦						●					
Microcercis trigonella (Duda, 1933)	450-650		wes	♦											
Oscinella (*Oscinella*) *alopecuri* Balachovsky & Mesnil, 1935	850-1100	800-1150	e		♦	♦					●	●			
Oscinella (*Oscinella*) *cariciphila* Collin, 1946	300-2700	360	wces	♦	♦	♦	♦	♦	♦	●					
Oscinella (*Oscinella*) *frit* (Linnaeus, 1758)	300-2700	800-1400	hpta, k	♦	♦	♦	♦	♦	♦		●	●			
Oscinella (*Oscinella*) *maura* (Fallén, 1820)	350-1000	1400	wes	♦	♦							●			
Oscinella (*Oscinella*) *nigerrima* (Macquart, 1835)	700-2500	360-2100	e		♦	♦	♦	♦	♦	●	●	●	●		
Oscinella (*Oscinella*) *nitidissima* (Meigen, 1838)	300-2100	400-1400	h	♦	♦	♦	♦			●	●	●			
Oscinella (*Oscinella*) *phlei* Nartshuk, 1955	600-2500		e	♦	♦	♦	♦	♦	♦						
Oscinella (*Oscinella*) *pusilla* (Meigen, 1830)	600-2700	800-1150	hop	♦	♦	♦	♦	♦	♦		●	●			
Oscinella (*Oscinella*) *vastator* (Curtis, 1845)	1000-1740	800-1300	e			♦	♦				●	●			
Oscinella (*Oscinella*) *ventricosi* Nartshuk, 1955	2200	400-450	wes				♦	♦		●					
Oscinimorpha arcuata (Duda, 1932)	300-1230		eswa	♦	♦	♦									
Oscinimorpha minutissima (Strobl, 1900)	350-2000	850-1400	wp	♦	♦	♦	♦				●	●			
Oscinimorpha sordidissima (Strobl, 1903)	1000-1200	850-1400	e			♦					●	●			
Polyodaspis ruficornis (Macquart, 1835)	300-650	400-450	po	♦						●					
Rhopalopterum anthracinum (Meigen, 1830)	300-650		wces ?	♦											
Siphonella oscinina (Fallén, 1820)		1400	h									●			
Trachysiphonella pygmaea (Meigen, 1838)	300-1000		wes ?	♦	♦										

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Trachysiphonella ruficeps (Macquart, 1835)	350-500	1150-1600	e	♦								●	●		
Trachysiphonella scutellata von Roser, 1840	900-1600		eca		♦	♦									
Tricimba (*Nartshukiella*) *cincta* (Meigen, 1830)	300-1400	800-1150	h	♦	♦	♦					●	●			
Tricimba (*Nartshukiella*) *humeralis* (Loew, 1858)	300-400		hop	♦											
Cetema (*Cetema*) *cereris* (Fallén, 1820)	700-1800	850-1450	hoes		♦	♦	♦				●	●			
Cetema (*Cetema*) *elongatum* (Meigen, 1830)	300-1200	850-1600	h	♦	♦	♦					●	●			
Cetema (*Cetema*) *myopinum* (Loew, 1866)	350-1000	1350-1800	wesca	♦	♦							●	●		
Cetema (*Cetema*) *neglectum* Tonnoir, 1921		1450	e									●			
Chlorops (*Chlorops*) *calceatus* Meigen, 1830	350-1200	800-1400	wces	♦	♦	♦					●	●			
Chlorops (*Chlorops*) *fasciatus* Meigen, 1830	1900		wces				♦								
Chlorops (*Chlorops*) *finitimus* Becker, 1910	1230-2350		ewca			♦	♦	♦							
Chlorops (*Chlorops*) *geminatus* Meigen, 1830	1000-1900	1450	wces			♦	♦					●			
Chlorops (*Chlorops*) *hypostigma* Meigen, 1830	900-1000	1150-1200	e		♦	♦						●			
Chlorops (*Chlorops*) *meigenii* Loew, 1866	1000-1430		hoes			♦									
Chlorops (Chlorops) pumilionis (Bjerkander, 1778)		1200-1400	wp, ? wcp									●			
Chlorops (*Chlorops*) *ringens* Loew, 1866	1000-1200		wces			♦									
Chlorops (*Chlorops*) *scalaris* Meigen, 1830	1000-1430		wces			♦									
Chlorops (*Chlorops*) *speciosus* Meigen, 1830	1140-2500	850-1450	wes			♦	♦	♦	♦		●	●			
Chlorops (*Chlorops*) *troglodytes* (Zetterstedt, 1848)	1000-2000	400-1450	wces			♦	♦			●	●	●			
Chlorops (*Sclerophallus*) *limbatus* Meigen, 1830		360-400	? hoes							●					
Diplotoxa messoria (Fallén, 1820)	300-1230	800-1400	h	♦	♦	♦					●	●			
Elachiptereicus italicus Duda, 1933	350	360	se	♦						●					
Lasiosina albipila (Loew, 1866)	350-500		des ?	♦											
Lasiosina herpini (Guérin-Menéville, 1843)	600-1400	400-1374	tp	♦	♦	♦				●	●	●			
Meromyza (*Meromyza*) *athletica* Fedoseeva, 1974	450-1200	1450-1600	csee	♦	♦	♦						●	●		
Meromyza (*Meromyza*) *bohemica* Fedoseeva, 1962	350-500	1600	e	♦								●	●		
Meromyza (*Meromyza*) *femorata* Macquart, 1835	350-1200	1400-1450	e	♦	♦	♦						●			
Meromyza (*Meromyza*) *meigeni* Nartshuk, 2006	1600		wes			♦	♦								
Meromyza (*Meromyza*) *mosquensis* Fedoseeva, 1960		900-1450	e								●	●			
Meromyza (*Meromyza*) *nigriseta* Fedoseeva, 1960	1100-1200	850-1150	wces			♦					●	●			
Meromyza (*Meromyza*) *nigriventris* Macquart, 1835	350-2200	1150-1600	h	♦	♦	♦	♦					●	●		
Meromyza (*Meromyza*) *pluriseta* Péterfi, 1961	1000-1200		wces			♦									
Meromyza (*Meromyza*) *pratorum* Meigen, 1830		1400-1450	h									●			
Meromyza (*Meromyza*) *rohdendorfi* Fedoseeva, 1974	1140	850-1150	e			♦					●	●			
Meromyza (*Meromyza*) *rufa* Fedoseeva, 1962	350-1140	900-1600	e	♦	♦	♦					●	●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Meromyza (*Meromyza*) *saltatrix* (Linnaeus, 1761)	950-2200	850-1450	h		♦	♦	♦				●	●			
Meromyza (*Meromyza*) *triangulina* Fedoseeva, 1960	950-1200	850-1150	e		♦	♦					●	●			
Meromyza (Meromyza) variegata Meigen 1830		1150-1200	e									●			
Meromyza (*Meromyza*) *zahvatkini* Fedoseeva, 1960	450-1800	1600	des	♦	♦	♦	♦					●	●		
Parectecephala longicornis (Fallén, 1820)	350-500		eswa	♦											
Phyladelphus thalhammeri Becker, 1910	350-500		e, ? cse	♦											
Thaumatomyia elongatula (Becker, 1910)	350-500		e, ? cse	♦											
Thaumatomyia glabra (Meigen, 1830)	1000-1800	360-1450	h			♦	♦			●	●	●			
Thaumatomyia hallandica Andersson, 1966	350-1450	1400-1450	wces	♦	♦	♦						●			
Thaumatomyia notata (Meigen, 1830)	600-2200	850-1450	ppt	♦	♦	♦	♦				●	●			
Thaumatomyia rufa (Macquart, 1835)	1500		hop			♦									
Thaumatomyia sulcifrons (Becker, 1907)	600-1000		wcp	♦	♦										
Heleomyzidae															
Orbellia borisregis Czerny, 1930		2005	Er										●		
Scoliocentra (*Leriola*) *nigrinervis* (Wahlgren, 1918)		2000	wces, ? bm										●		
Sphaeroceridae															
Copromyza equina Fallén, 1820		1500	hno									●			
Crumomyia rohaceki Norrbom & Kim, 1985		2005	e										●		
Pseudocollinella humida (Haliday, 1836)	+++		pat												
Rachispoda lutosa (Stenhammar, 1855)	2020-2392		h				♦	♦							
Camillidae															
Camilla atrimana Strobl, 1910	1000-1200		eswa			♦									
Drosophilidae															
Scaptomyza (*Scaptomyza*) *flava* (Fallén, 1823)		1150-1200	h									●			
Diastatidae															
Diastata costata Meigen, 1830	1230	1400	e, ? h			♦						●			
Ephydridae															
Psilopa nitidula (Fallén, 1813)	300-2575	400-1600	pat	♦	♦	♦	♦	♦	♦	●	●	●			
Psilopa obscuripes Loew, 1860	300-2000		wp	♦	♦	♦	♦								
Psilopa polita (Macquart, 1835)	600-2200	400-1600	dp	♦	♦	♦	♦	♦		●	●	●			
Hydrelia griseola (Fallén, 1813)	600-2500	850-2196	sk	♦	♦	♦	♦	♦	♦		●	●	●	●	
Hydrelia maura Meigen, 1838	2200-2500	1500-1600	wp					♦	♦			●	●		
Dichaeta caudata (Fallén, 1813)		400	h							●					
Notiphila (*Notiphila*) *cinerea* Fallén, 1813		1400	tp, ? hop									●			
Notiphila (*Notiphila*) *dorsata* Stenhammar, 1844		400	dp, ? wcp							●					

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Notiphila graecula Becker, 1926	1230	1400	ewca			♦						●			
Notiphila nigricornis Stenhammar, 1844	1230	1400	wcp			♦						●			
Notiphila venusta Loew, 1856	1230		dp			♦									
Athyroglossa nudiuscula Loew, 1873	350-650		cse,? csena	♦											
Athyroglossa ordinata Becker, 1896	350-650		wp	♦											
Allotrichoma laterale (Loew, 1860)	350-650		h	♦											
Dicrocerina obscurella (Fallén, 1813)	300-600	400	hnat	♦						●					
Ditrichophora calceata (Meigen, 1830)	700-750		ena		♦										
Ditrichophora fuscella (Stenhammar, 1844)	700-1230		des, ? dp		♦	♦									
Hecamedoides unispinosus (Collin, 1943)	1230		hnat			♦									
Ilythea spilota (Curtis, 1832)	900-1000		h		♦										
Nostima picta (Fallén, 1813)	2000-2190	400-2400	hn				♦			●	●	●	●	●	
Philygria posticata (Meigen, 1830)	1000-1200		des			♦									
Philygria stictica (Meigen, 1830)	600-2100	1400-2400	e	♦	♦	♦	♦					●	●	●	
Philygria vittipennis (Zetterstedt, 1838)	1000-2400		h			♦	♦	♦							
Hyadina guttata (Fallén, 1813)	600-2320	1400	tp	♦	♦	♦	♦	♦				●			
Parydra (*Chaetoapnaea*) *fossarum* (Haliday, 1833)	900-1230	2000	h		♦	♦							●		
Parydra (*Parydra*) *coarctata* (Fallén, 1813)	350-700	1500-1600	tp, ? hop	♦	♦							●	●		
Parydra (*Parydra*) *cognata* Loew, 1860	350-700	400-1600	wp	♦	♦					●	●	●			
Parydra (*Parydra*) *littoralis* (Meigen, 1830)		400-2000	wp							●	●	●	●		
Scatophila caviceps (Stenhammar, 1844)	600-2500	400	hop	♦	♦	♦	♦	♦	♦	●					
Scatophila despecta (Haliday, 1839)	2500		h					♦	♦						
Scatophila farinae Becker, 1903	300-400		hom	♦											
Limnellia quadrata (Fallén, 1813)	1000-1200	2300	h			♦								●	
Lamproscatella bimaculata Hendel, 1933	2200-2500	2000	h					♦	♦				●		
Lamproscatella sibilans (Haliday, 1833)	600-2300	2000	h	♦	♦	♦	♦	♦					●		
Lamproscatella unipunctata (Becker, 1907)	1000-2500	2000	mca			♦	♦	♦	♦				●		
Scatella (*Neoscatella*) *subguttata* (Meigen, 1830)		2000	ena, ? sk										●		
Scatella (*Scatella*) *paludum* (Meigen, 1830)		900-2000	hptn										●		
Scatella (*Scatella*) *stagnalis* (Fallén, 1813)	1230	1400-2200	hpta, sk			♦						●	●		
Scatella (*Scatella*) *tenuicosta* Collin, 1930	600-2500	1400-2200	hat	♦	♦	♦	♦	♦	♦			●	●		
CALYPTRATA															
Hippoboscidae															
Hippobosca equina Linnaeus 1758		1350-2100	ppta									●	●		
Hippobosca longipennis Fabricius 1805		1200-1400	hpt, ? shpt									●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Melophagus ovinus (Linnaeus, 1758)	1500-2000		k			♦	♦								
Ornithomyia avicularia (Linnaeus, 1758)	2340		ppta					♦							
Scathophagidae															
Norellisoma armipes (Meigen, 1826)		2500	e											●	●
Scathophaga stercoraria (Linnaeus, 1758)		550-2100	hat							●	●	●	●		
Anthomyiidae															
Delia radicum (Linnaeus, 1758)	1810	550	h				♦			●					
Egle parva Robineau-Desvoidy, 1830		400-1500	des, ? dp							●	●	●			
Hylemya vagans (Panzer, 1798)		1500	wcp									●			
Fanniidae															
Fannia canicularis (Linnaeus, 1761)	300-2300	550-1960	k	♦	♦	♦	♦	♦		●	●	●	●		
Fannia incisurata (Zetterstedt, 1838)	300-1810		hn	♦	♦	♦	♦								
Fannia lepida (Wiedemann, 1817)	1810		ho				♦								
Fannia manicata (Meigen, 1826)	1810		ho				♦								
Fannia monilis (Haliday, 1838)	1810		wcp				♦								
Fannia scalaris (Fabricius, 1794)	300-2500	550-1960	hptn	♦	♦	♦	♦	♦	♦	●	●	●	●		
Muscidae															
Muscina levida (Harris, 1780)	300-2500	550-1960	h	♦	♦	♦	♦	♦	♦	●	●	●	●		
Muscina stabulans (Fallén, 1817)	300-2500	550-1960	k	♦	♦	♦	♦	♦	♦	●	●	●	●		
Thricops cunctans (Meigen, 1826)	1500-2000	1500-2000	hoes			♦	♦					●	●		
Thricops furcatus (Stein, 1916)	1200		h			♦									
Thricops genarum (Zetterstedt, 1838)	1300-1700		des			♦	♦								
Thricops longipes (Zetterstedt, 1845)	900-2000	900-2000	hoes			♦	♦				●	●	●		
Thricops nigrifrons (Robineau-Desvoidy, 1830)		600-1900	eswa							●	●	●	●		
Thricops nigritellus (Zetterstedt, 1838)	1200-2000	1200-2000	wes			♦	♦					●	●		
Thricops simplex (Wiedemann, 1817)	200-1600		wp	♦	♦	♦									
Drymeia fasciculata (Stein, 1916)		1500-2000	se, ? m									●	●		
Hydrotaea armipes (Fallén, 1825)	1810-2500		ho				♦	♦	♦						
Hydrotaea dentipes (Fabricius, 1805)	1810		hno				♦								
Hydrotaea glabricula (Fallén, 1825)	900		hop		♦										
Hydrotaea ignava (Harris, 1780)	300-1200	400	ho	♦	♦	♦				●					
Hydrotaea irritans (Fallen, 1823)	1000-1810	1500	tp			♦	♦					●			
Hydrotaea meteorica (Linnaeus, 1758)	1810	1500	h				♦					●			
Hydrotaea similis Meade, 1887	1810	1374	tp				♦					●			
Hydrotaea tuberculata Rondani, 1866		1500	h									●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mesembrina intermedia Zetterstedt, 1849		700-1700	wces								●	●	●		
Mesembrina meridiana (Linnaeus, 1758)		1200-1400	tp									●			
Mesembrina resplendens Wahlberg, 1844		900-1900	hoes								●	●	●		
Polietes lardarius (Fabricius, 1781)		400-2000	pat							●	●	●	●		
Musca amita Hennig, 1964	300-2500	550-1960	hoes, ? tp	♦	♦	♦	♦	♦	♦	●	●	●	●		
Musca autumnalis De Geer, 1776	300-2400	550-2300	hpt	♦	♦	♦	♦	♦		●	●	●	●	●	
Musca domestica Linnaeus, 1758	300-1810	400-2200	k	♦	♦	♦	♦			●	●	●	●		
Musca larvipara Portschinsky, 1910	300-1500		wcp	♦	♦	♦									
Musca tempestiva Fallén, 1817	300-1200	400-1200	ppt	♦	♦	♦				●	●	●			
Musca vitripennis Meigen, 1826	300-2500	550-1960	po	♦	♦	♦	♦	♦	♦	●	●	●	●		
Morellia aenescens Robineau-Desvoidy, 1830		600-1500	tp							●	●	●			
Morellia hortorum (Fallén, 1817)	900-1200		po		♦	♦									
Morellia podagrica (Loew, 1857)	1000-1810	590-1400	h			♦	♦			●	●	●			
Morellia simplex (Loew, 1857)	900-1200	400-1400	tp		♦	♦				●	●	●			
Neomyia cornicina (Fabricius, 1781)	900-1200	400-1500	sk		♦	♦				●	●	●			
Pyrellia vivida Robineau-Desvoidy, 1830	300-2500	550-2000	po	♦	♦	♦	♦	♦	♦	●	●	●	●		
Dasyphora gussakovskii Zimin, 1947		1800-2000	po										●		
Dasyphora penicillata (Egger, 1865)	300-2400	550-1960	wp	♦	♦	♦	♦	♦		●	●	●	●		
Dasyphora pratorum (Meigen, 1826)	300-2400	550-1960	wp	♦	♦	♦	♦	♦		●	●	●	●		
Haematobia irritans (Linnaeus, 1758)		1200	hn								●				
Phaonia angelicae (Scopoli, 1763)		500-1800	tp							●	●	●	●		
Phaonia bitincta (Rondani 1866)		1500	e									●			
Phaonia candicans (Pandellé, 1898)	1000-1100		e		♦	♦									
Phaonia errans (Meigen, 1826)	500-1200	1200-1400	h	♦	♦	♦						●			
Phaonia fuscata (Fallén, 1825)	1000		po		♦	♦									
Phaonia lugubris (Meigen, 1826)		600-1800	h							●	●	●	●		
Phaonia rufiventris (Scopoli, 1763)		1500	? wp									●			
Phaonia scutellata (Zetterstedt, 1845)	1500	1374	ena			♦						●			
Phaonia serva (Meigen, 1826)	900-2000	1200-1400	h		♦	♦	♦					●			
Phaonia subventa (Harris, 1780)	300-1900		ena	♦	♦	♦	♦								
Phaonia tuguriorum (Scopoli, 1763)	900-1000		wcp		♦	♦									
Helina annosa (Zetterstedt, 1838)		1200-1400	h									●			
Helina ciliatocosta (Zetterstedt, 1845)		400-1500	e							●	●	●			
Helina confinis (Fallén, 1825)	300-1800		des	♦	♦	♦	♦								

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Helina depuncta (Fallén, 1825)	900-1200	1500	esca		♦	♦						●			
Helina evecta (Harris, 1780)		400-2000	ppt, ? hpt							●	●	●	●		
Helina fratercula (Zetterstedt, 1845)	900-1200		e		♦	♦									
Helina laxifrons (Zetterstedt, 1860)	1810		h				♦								
Helina latitarsis Ringdahl, 1924		1200-1400	ean									●			
Helina montana (Rondani, 1866)		1374	dpo, ? wpo									●			
Helina obscurata (Meigen, 1826)		1200-1900	h									●	●		
Helina pubiseta (Zetterstedt, 1845)		1500	e									●			
Helina reversio (Harris, 1780)		1200-1400	h, ? ho									●			
Mydaea corni (Scopoli, 1763)	1500	1500	hop			♦						●			
Mydaea electra (Zetterstedt, 1860)	300-1000		h	♦	♦										
Mydaea humeralis Robineau-Desvoidy, 1830	300-1000		esca	♦	♦										
Myospila meditabunda (Fabricius, 1781)	1000-1800	400	hno		♦	♦	♦			●					
Hebecnema fumosa (Meigen, 1826)		600-2000	po							●	●	●	●		
Hebecnema umbratica (Meigen, 1826)		1500	ho									●			
Hebecnema vespertina (Fallén, 1823)	300-1500	1150-1500	h	♦	♦	♦						●			
Graphomya maculata (Scopoli, 1763)	900-1000	1150-1300	po, ? poa		♦	♦						●			
Spilogona carbonella (Zetterstedt, 1845)		+++	ean												
Spilogona denigrata (Meigen, 1826)		1500	e									●			
Spilogona dispar (Fallén, 1823)	300-2000	1500-2000	wes	♦	♦	♦	♦					●	●		
Limnophora maculosa (Meigen, 1826)	300-1800		ewca	♦	♦	♦	♦								
Limnophora obsignata (Rondani, 1866)	900-1000		wpat		♦	♦									
Calliphoridae															
Bellardia pandia (Walker 1849)		1600	e									●	●		
Calliphora genarum (Zetterstedt 1838)		1600	h									●	●		
Calliphora vicina Robineau-Desvoidy, 1830	1810	900	k				♦				●				
Calliphora vomitoria (Linnaeus, 1758)	1810	1200-1400	ha				♦					●			
Lucilia caesar (Linnaeus, 1758)	1810	400-1300	hop				♦			●	●	●			
Lucilia richardsi Collin, 1926		900-1100	e								●	●			
Lucilia sericata (Meigen, 1826)		550-2100	k							●	●	●	●		
Lucilia silvarum (Meigen, 1826)		+++	hn												
Protophormia terraenovae (Robineau-Desvoidy, 1830)		1500	h									●			
Pollenia dasypoda Portschinsky, 1881		900-1100	wpo								●	●			
Pollenia rudis (Fabricius, 1794)		900-1600	hpta								●	●	●		
Pollenia tenuiforceps Séguy, 1928		1200-1400	ena									●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Pollenia viatica Robineau-Desvoidy, 1830		1600	ewca									●	●		
Rhyncomya cyanescens (Loew, 1844)		900-1100	hom								●	●			
Sarcophagidae															
Pterella grisea (Meigen, 1824)		1200	wcp									●			
Taxigramma stictica (Meigen, 1830)		1100	ena									●			
Metopia argyrocephala (Meigen, 1824)		1100	hno									●			
Metopia campestris (Fallén, 1810)		900-1600	h								●	●	●		
Brachicoma devia (Fallén, 1820)		1200-1800	h									●	●		
Eurychaeta muscaria (Meigen, 1826)		1200-1600	ena									●	●		
Blaesoxipha (*Blaesoxipha*) *ungulata* (Pandellé, 1896)		1600	ena									●	●		
Blaesoxipha (*Servaisia*) *erythrura* (Meigen 1826)	900-1000		eca		♦	♦									
Blaesoxipha (*Servaisia*) *rossica* Villeneuve, 191		900-1200	esca								●	●			
Ravinia pernix (Harris, 1780)	1810-2000	900-1200	po				♦				●	●			
Sarcophaga (*Bellieriomima*) *subulata* Pandellé, 1896	900-1000		wes		♦	♦									
Sarcophaga (*Helicophagella*) *agnata* Rondani, 1860		1150	e									●			
Sarcophaga (*Helicophagella*) *crassimargo* Pandellé, 1896	2000		wesca				♦								
Sarcophaga (*Helicophagella*) *maculata* Meigen, 1835	1810		sp, ? wcp				♦								
Sarcophaga (*Helicophagella*) *noverca* Rondani, 1860		1150-1600	e									●	●		
Sarcophaga (*Helicophagella*) *novercoides* (Böttcher, 1913)	2000		ena				♦								
Sarcophaga (*Helicophagella*) *rosellei* Böttcher, 1912		1150	des									●			
Sarcophaga (*Myorhina*) *nigriventris* (Meigen, 1826)	2400		dp					♦							
Sarcophaga (*Myorhina*) *socrus* Rondani, 1860	1810		e				♦								
Sarcophaga (*Myorhina*) *soror* Rondani, 1860	1950-2200		e				♦	♦							
Sarcophaga (*Sarcotachinella*) *sinuata* Meigen, 1826	1810		h				♦								
Sarcophaga (*Krameromyia*) *anaces* Walker, 1849		630-700	h							●					
Sarcophaga (*Heteronychia*) *benaci* Bottcher, 1913		1600	cse									●	●		
Sarcophaga (*Heteronychia*) *dissimilis* Meigen, 1826		400-1600	des							●	●	●	●		
Sarcophaga (*Heteronychia*) *infantilis* Böttcher, 1913	1950-2200	630-700	e				♦	♦		●					
Sarcophaga (*Heteronychia*) *mutila* Villeneuve, 1912	1950-2400		csee				♦	♦							
Sarcophaga (*Heteronychia*) *porrecta* (Böttcher, 1913)	1950-2200	1200-2200	se, m				♦	♦				●	●	●	
Sarcophaga (*Heteronychia*) *schineri* Bezzi, 1891		1150-1600	e									●	●		
Sarcophaga (*Heteronychia*) *vagans* Meigen, 1826		1150-1600	hoes									●	●		
Sarcophaga (*Heteronychia*) *vicina* Macquart, 1835	1950-2400		e				♦	♦							
Sarcophaga (*Bercaea*) *africa* (Wiedemann, 1824)	300-400	400	sk	♦						●					
Sarcophaga (*Liosarcophaga*) *jacobsoni* (Rohdendorf, 1937)		400	tp							●					

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Sarcophaga (*Liosarcophaga*) *portschinskyi* (Rohdendorf, 1937)		1200-1800	tp									●	●		
Sarcophaga (*Pandelleana*) *protuberans* Pandellé, 1896	350-2200		wces, esca	♦	♦	♦	♦	♦							
Sarcophaga (*Parasarcophaga*) *albiceps* Meigen, 182		400-1400	poa							●	●	●			
Sarcophaga (*Parasarcophaga*) *hirtipes* (Wiedemann, 1830)	350-450		ptm	♦											
Sarcophaga (*Robineauella*) *caerulescens* Zetterstedt, 1838		1200-1600	h									●	●		
Sarcophaga (*Sarcophaga*) *variegata* (Scopoli, 1763)	350-600		e	♦											
Rhinophoridae															
Stevenia umbratica (Fallén, 1820)		1000-1100	e									●			
Gasterophilidae															
Gasterophilus haemorrhoidalis (Linnaeus, 1758)		1200-1400	hata, ? k									●			
Gasterophilus intestinalis (De Geer, 1776)		1200-1400	pata, ? k									●			
Gasterophilus pecorum (Fabricius, 1794)		1200-1400	ppt									●			
Tachinidae															
Exorista (*Exorista*) *larvarum* (Linnaeus, 1758)	300-1000	360-1000	hop	♦	♦					●	●	●			
Exorista (*Podotachina*) *sorbillans* (Wiedemann, 1830)	700-1200		sppta		♦	♦									
Exorista (*Adenia*) *mimula* (Meigen, 1824)	350-1200	360-1200	hop	♦	♦	♦				●	●	●			
Exorista (*Adenia*) *rustica* (Fallén, 1810)	350-1250	450-1600	hop	♦	♦	♦				●	●	●			
Chetogena acuminata Rondani, 1859		450-1000	tp							●	●				
Chetogena filipalpis Rondani, 1859	850	450-1600	nmt		♦					●	●	●			
Chetogena obliquata (Fallén, 1810)	900-1200		tp		♦	♦									
Parasetigena silvestris (Robineau-Desvoidy, 1863)	1400	1400	des			♦						●			
Phorocera assimilis (Fallén, 1810)	500-1200	400-450	des	♦	♦	♦				●					
Phorocera grandis (Rondani, 1859)	550-650	440	dp	♦						●					
Phorocera obscura (Fallén, 1810)	700-1300	900-1000	des		♦	♦					●	●			
Bessa selecta (Meigen, 1824)	350-750		hoes	♦	♦										
Belida angelicae (Meigen, 1824)	1250		wcp			♦									
Meigenia dorsalis (Meigen, 1824)	350-1300	600-1250	hoes	♦	♦	♦				●	●	●			
Meigenia majuscula (Rondani, 1859)		400	po ?							●					
Meigenia mutabilis (Fallén, 1810)	300-2400	360-2350	wcp	♦	♦	♦	♦	♦		●	●	●	●	●	
Zaira cinerea (Fallén, 1810)	300-1300		tp	♦	♦	♦									
Steleoneura czernyi Stein, 1924		400-500	mca							●					
Medina collaris (Fallén, 1820)	700-900		hoes		♦										
Medina luctuosa (Meigen, 1824)	700-1300	1000-1200	hoes		♦	♦						●			
Lecanipa bicincta (Meigen, 1824)	800-1300		wces		♦	♦									
Admontia podomyia Brauer & Bergenstamm, 1889	2000-2300	1900-2200	e, bm				♦	♦					●	●	

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Oswaldia muscaria (Fallén, 1810)	1250		des			♦									
Oswaldia spectabilis (Meigen, 1824)	850-1250	850-1150	e		♦	♦					●	●			
Lomachantha parra Rondani, 1859	1100-1400		et			♦									
Erynniopsis antennata (Rondani, 1861)	300-450	360-545	? hom, h*	♦						●					
Blondelia nigripes (Fallén, 1810)	300-2400	360-2360	tp, h*	♦	♦	♦	♦	♦		●	●	●	●	●	
Compsilura concinnata (Meigen, 1824)	300-1300	500-1400	hoes, h*	♦	♦	♦				●	●	●			
Vibrissina turrita (Meigen, 1824)	1000-1400		dp		♦	♦									
Acemya acuticornis (Meigen, 1824)	900-1200		ess		♦	♦									
Smidtia amoena (Meigen, 1824)	450-1230	500-900	hoes	♦	♦	♦				●	●				
Winthemia quadripustulata (Fabricius, 1794)	350-1300	1150-1400	h	♦	♦	♦						●			
Nemorilla floralis (Fallén, 1810)	300-650		hop	♦											
Aplomya confinis (Fallén, 1820)	500-1350	400-1650	hop	♦	♦	♦				●	●	●	●		
Phebellia nigripalpis (Robineau-Desvoidy, 1847)	400-1400		des	♦	♦	♦									
Tlephusa cincinna (Rondani, 1859)	700-900		ess		♦										
Epicampocera succincta (Meigen, 1824)	700-1500	1200-1500	tp		♦	♦						●			
Phryxe nemea (Meigen, 1824)	400-1950	800-1900	hoes	♦	♦	♦	♦				●	●	●		
Phryxe prima (Brauer & Bergenstamm, 1889)	700-750		mt		♦										
Phryxe vulgaris (Fallén, 1810)	350-2000	1000-2000	h	♦	♦	♦	♦					●	●		
Periarchiclops scutellaris (Fallén, 1820)		500-1100	wces							●	●	●			
Pseudoperichaeta nigrolineata (Walker, 1853)	700-1450	1500	des		♦	♦						●			
Lydella stabulans (Meigen, 1824)	500-700		wes	♦											
Cadurciella tritaeniata (Rondani, 1859)	450-700		des	♦											
Drino atropivora (Robineau-Desvoidy, 1830)	300-1300	900-1300	sp	♦	♦	♦					●	●			
Drino inconspicua (Meigen, 1830)	1200-1300	1000-1300	wces			♦						●			
Drino lota (Meigen, 1824)	700-1300		pat		♦	♦									
Drino vicina (Zetterstedt, 1849)	500-1300	900	wces	♦	♦	♦					●				
Huebneria affinis (Fallén, 1810)	450-2400	900-2000	ess	♦	♦	♦	♦	♦			●	●	●		
Carcelia (*Carcelia*) *bombylans* Robineau-Desvoidy, 1830	1750-1800		des				♦								
Carcelia (*Carcelia*) *gnava* (Meigen, 1824)	700-1000	690-1000	des		♦	♦				●	●				
Carcelia (*Carcelia*) *lucorum* (Meigen, 1824)	600-1300	1400	tp	♦	♦	♦						●			
Erycia festinans (Meigen, 1824)	800-1300		wces		♦	♦									
Alsomyia capillata (Rondani, 1859)	500-1000		hom	♦	♦										
Platymya fimbriata (Meigen, 1824)	2000-2500	2200-2370	tp, bm				♦	♦	♦					●	
Eumea linearicornis (Zetterstedt, 1844)	700-1300	600-1350	hoes		♦	♦				●	●	●			
Eumea mitis (Meigen, 1824)		1300	hoes									●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Zenillia libatrix (Panzer, 1798)		1300-1600	hoes									●	●		
Clemelis pullata (Meigen, 1824)	500-2400	900-2350	wcp	♦	♦	♦	♦	♦			●	●	●	●	
Pales pavida (Meigen, 1824)	400-1300	400-1350	hop	♦	♦	♦				●	●	●			
Pales pumicata (Meigen, 1824)	350-700	1300-1600	nm	♦								●			
Phryno vetula (Meigen, 1824)	500-700		des	♦											
Bothria frontosa (Meigen, 1824)	900-1300		hoes		♦	♦									
Ceromasia rubrifrons (Macquart, 1834)		800-1400	hoes								●	●			
Allophorocera ferruginea (Meigen, 1824)	700-1950	900-1950	hoes		♦	♦	♦				●	●	●		
Allophorocera pachystyla (Macquart, 1850)	2000	1800-2000	e, m				♦						●		
Eurysthaea scutellaris (Robineau-Desvoidy, 1848)	350-700	350-800	e	♦	♦					●	●				
Elodia ambulatoria (Meigen, 1824)	700-1300		wcp		♦	♦									
Sturmia bella (Meigen, 1824)	400-1400	900-1400	po	♦	♦	♦					●	●			
Blepharipa pratensis (Meigen, 1824)	350-1400	500-1400	tp, h*	♦	♦	♦				●	●	●			
Masicera pavoniae (Robineau-Desvoidy, 1830)	400-1000	400-1000	wp	♦	♦					●	●				
Masicera silvatica (Fallén, 1810)	350-1250	900-1000	e	♦	♦	♦					●				
Prosopea nigricans (Egger, 1861)	350-1300	800-1100	wcp	♦	♦	♦					●	●			
Gaedia connexa (Meigen, 1824)	700-1400		e		♦	♦									
Gaedia distincta Egger, 1861	900-1350		ess		♦	♦									
Baumhaueria goniaeformis (Meigen, 1824)	900-1350		wp		♦	♦									
Gonia bimaculata Wiedemann, 1819	350-900	400-1000	atm	♦	♦					●	●				
Gonia capitata (De Geer, 1776)	700-2000	500-1900	wcp		♦	♦	♦			●	●	●	●		
Gonia ornata Meigen, 1826	300-450		wcp	♦											
Gonia picea (Robineau-Desvoidy, 1830)	350-650		wcp	♦											
Pseudogonia parisiaca (Robineau-Desvoidy, 1851)	300-1300		ess	♦	♦	♦									
Pseudogonia rufifrons (Wiedemann, 1830)	350-700		ppta	♦											
Spallanzania hebes (Fallén, 1820)	300-700	400-600	ho	♦						●					
Tachina (*Tachina*) *grossa* (Linnaeus, 1758)	350-1400	350-1300	hoes	♦	♦	♦				●	●	●			
Tachina (*Tachina*) *magna* (Giglio-Tos, 1890)	300-650		sess	♦											
Tachina (*Eudoromyia*) *casta* (Rondani, 1859)	350-600	500-550	nm	♦						●					
Tachina (*Eudoromyia*) *fera* (Linnaeus, 1761)	300-1900	340-1900	hop	♦	♦	♦	♦			●	●	●	●		
Tachina (*Eudoromyia*) *magnicornis* (Zetterstedt, 1844)	300-1900	350-1900	hop	♦	♦	♦	♦			●	●	●	●		
Tachina (*Eudoromyia*) *nupta* (Rondani, 1859)	300-1750	300-1750	tp	♦	♦	♦	♦			●	●	●	●		
Tachina (*Servillia*) *lurida* (Fabricius, 1781)	300-600	350-660	wp	♦						●					
Tachina (*Echinogaster*) *praeceps* Meigen, 1824	350-1300	350-1300	wp	♦	♦	♦				●	●	●			
Nowickia (*Nowickia*) *marklini* (Zetterstedt, 1838)	1250-2300	1200-2300	h, ? bm			♦	♦	♦				●	●	●	

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nowickia (*Fabriciella*) *atripalpis* (Robineau-Desvoidy, 1863)	1250-2250	1150-2250	hoes, bm			♦	♦	♦				●	●	●	
Nowickia (*Fabriciella*) *ferox* (Panzer, 1809)	900-2300	900-2300	wes		♦	♦	♦	♦			●	●	●	●	
Nowickia (*Fabriciella*) *rondanii* (Giglio-Tos, 1890)	700-1600	700-1600	sess		♦	♦	♦				●	●	●		
Cnephaotachina danilevskyi (Portshinsky, 1882)	350-950		mca	♦	♦										
Peleteria abdominalis Robineau-Desvoidy, 1830	600-1300		nm	♦	♦	♦									
Peleteria ferina (Zetterstedt, 1844)	600-1300		hoes	♦	♦	♦									
Peleteria rubescens (Robineau-Desvoidy, 1830)	300-2000	400-2000	tp	♦	♦	♦	♦			●	●	●	●		
Peleteria ruficornis (Macquart, 1835)	350-500	350-500	msws	♦						●					
Peleteria varia (Fabricius, 1794)	300-1400	480-1450	ppta	♦	♦	♦				●	●	●			
Germaria ruficeps (Fallén, 1820)	700-1300		wcp		♦	♦									
Nemoraea pellucida (Meigen, 1824)	350-1500		tp	♦	♦	♦									
Linnaemya (*Linnaemya*) *comta* (Fallén, 1810)	400-1300	400-1300	ho	♦	♦	♦				●	●	●			
Linnaemya (*Bonellimyia*) *impudica* (Rondani, 1859)	350-1300	350-1300	cse	♦	♦	♦				●	●	●			
Linnaemya (*Ophina*) *haemorrhoidalis* (Fallén, 1810)	500-1850	500-1900	hoes, bm	♦	♦	♦	♦			●	●	●	●		
Linnaemya (*Ophina*) *helvetica* Herting, 1963	700-900	500-700	cse		♦					●					
Linnaemya (*Ophina*) *olsufjevi* Zimin, 1954	600-900		hoes	♦	♦										
Linnaemya (*Ophina*) *perinealis* Pandellé, 1895		400	hoes							●					
Linnaemya (*Ophina*) *picta* (Meigen, 1824)	500-1300	550-1250	po	♦	♦	♦				●	●	●			
Linnaemya (*Ophina*) *rossica* Zimin, 1954	700-1800		hoes		♦	♦	♦								
Linnaemya (*Homoeonychia*) *frater* (Rondani, 1859)		400	hom							●					
Linnaemya (*Homoeonychia*) *lithosiophaga* (Rondani, 1859)	350-700		hom	♦											
Chrysosomopsis aurata (Fallén, 1820)		900	hoes								●				
Ernestia laevigata (Meigen, 1838)	900-1430		hoes		♦	♦									
Ernestia puparum (Fabricius, 1794)		1200	hoes									●			
Ernestia rudis (Fallén, 1810)	750-1800	900-1750	tp		♦	♦	♦				●	●	●		
Eurithia anthophila (Robineau-Desvoidy, 1830)	700-1500		h		♦	♦	♦								
Eurithia caesia (Fallén, 1810)	900-1640	900-1700	hoes		♦	♦	♦				●	●	●		
Eurithia consobrina (Meigen, 1824)	1200-1400		hoes			♦									
Hyalurgus lucidus (Meigen, 1824)	1400-1800	1500-1800	wces, bm			♦	♦					●	●		
Zophomyia temula (Scopoli, 1763)	400-1750	600-1750	tp	♦	♦	♦	♦			●	●	●	●		
Cleonice callida (Meigen, 1824)	700-900		des		♦										
Loewia brevifrons (Rondani, 1856)	300-1200	400-900	nm	♦	♦	♦				●	●				
Loewia phaeoptera (Meigen, 1824)	500-900		e	♦	♦										
Pseudopachystylum gonioides (Zetterstedt, 1838)	900-1800	1350	hoes		♦	♦	♦					●			
Pelatachina tibialis (Fallén, 1810)	450-1300		hoes	♦	♦	♦									

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Macquartia chalconota (Meigen, 1824)	500-1300	900-1300	wes	♦	♦	♦				●	●	●			
Macquartia dispar (Fallén, 1820)	500-1400	600-1400	ess	♦	♦	♦				●	●	●			
Macquartia grisea (Fallén, 1810)	500-800	600-700	e	♦	♦					●	●				
Macquartia praefica (Meigen, 1824)	300-1250	600-1250	hom	♦	♦	♦				●	●	●			
Macquartia tenebricosa (Meigen, 1824)	300-1800	400-1600	wcp	♦	♦	♦	♦			●	●	●			
Macquartia tessellum (Meigen, 1824)		1300-1400	mca									●			
Phytomyptera abnormis (Stein, 1924)		1000-1500	se								●	●			
Phytomyptera cingulata (Robineau-Desvoidy, 1830)	300-400		e	♦											
Graphogaster brunnescens Villeneuve, 1907		400	ess							●					
Actia crassicornis (Meigen, 1824)	800-1500	600-1500	ess		♦	♦				●	●	●			
Actia infantula (Zetterstedt, 1844)		400-1000	wcp							●	●				
Actia pilipennis (Fallén, 1810)	300-700		hoes	♦	♦										
Peribaea tibialis (Robineau-Desvoidy, 1851)	300-1000	550-1000	spat	♦	♦					●	●				
Siphona cristata (Fabricius, 1805)	350-1000	480-1150	h	♦	♦					●	●	●			
Siphona flavifrons Staeger, 1849	1700-1900		des, h*				♦								
Siphona geniculata (De Geer, 1776)	800-1300		hoes, h*		♦	♦									
Aphria latifrons Villeneuve, 1908		900	mss								●				
Aphria longirostris (Meigen, 1824)	350-2300	600-2000	wcp	♦	♦	♦	♦	♦		●	●	●	●		
Demoticus plebejus (Fallén, 1810)	1000-1950	900-1100	wes			♦	♦				●	●			
Bithia glirina (Rondani, 1861)	350-1450	360-1450	wes	♦	♦	♦				●	●	●			
Bithia modesta (Meigen, 1824)	300-1200	460-1200	hom	♦	♦	♦				●	●	●			
Leskia aurea (Fallén, 1820)	700-900	700-900	hoes		♦						●				
Mintho rufiventris (Fallén, 1817)	350-1000	350-900	tp	♦	♦					●	●				
Microphthalma europaea Egger, 1860	700-900	500-600	? om	♦	♦					●					
Dexiosoma caninum (Fabricius, 1781)	1100-1300		des			♦									
Trixa caerulescens Meigen, 1824		400	wes							●					
Trixa conspersa (Harris, 1776)		400	wes							●					
Billaea fortis (Rondani, 1862)	650-800	650-800	des		♦					●	●				
Billaea irrorata (Meigen, 1826)		330-550	e							●					
Billaea pectinata (Meigen, 1826)	350-1250	400-1200	mca	♦	♦	♦				●	●	●			
Billaea triangulifera (Zetterstedt, 1844)	1100-1700	1000-1200	hoes			♦	♦					●			
Dinera carinifrons (Fallén, 1817)	300-2400	400-2550	hoes	♦	♦	♦	♦	♦		●	●	●	●	●	●
Dinera ferina (Fallén, 1817)	500-1600	500-1600	wes	♦	♦	♦				●	●	●			
Dinera grisescens (Fallen, 1817)		400-500	esca							●					

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Estheria bohemani (Rondani, 1862)	1000-1800		e			♦	♦								
Estheria cristata (Meigen, 1826)		1374	e									●			
Estheria petiolata (Bonsdorff, 1866)	400-1900	1000-1600	wces	♦	♦	♦	♦					●			
Estheria picta (Meigen, 1826)	300-1800	400-1600	wcp	♦	♦	♦	♦			●	●	●			
Dexia rustica (Fabricius, 1775)	350-1000	600-1100	hoes	♦	♦					●	●	●			
Prosena siberita (Fabricius, 1775)	500-1800	500-1600	hpta	♦	♦	♦	♦			●	●	●			
Zeuxia brevicornis (Egger, 1860)		400	nmca							●					
Zeuxia cinerea Meigen, 1826	500-1900	500-2000	wp	♦	♦	♦	♦			●	●	●	●		
Zeuxia erythraea (Egger, 1856)		400	nm							●					
Eriothrix apenninus (Rondani, 1862)	900-2450	1350-2350	wp		♦	♦	♦	♦	♦			●	●	●	
Eriothrix rufomaculatus (De Geer, 1776)	350-2450	1150-2300	tp	♦	♦	♦	♦	♦	♦			●	●	●	
Ramonda spathulata (Fallén, 1820)	400-1350	1350-1475	tp	♦	♦	♦						●			
Periscepsia carbonaria (Panzer, 1798)	350-700	600-700	ppt	♦	♦					●					
Athrycia impressa (Wulp, 1869)	1300		ess			♦									
Athrycia trepida (Meigen, 1824)	350-1200	400-1200	tp	♦	♦	♦				●	●	●			
Voria ruralis (Fallén, 1810)	700-1800	400-1800	k		♦	♦	♦			●	●	●	●		
Hyleorus elatus (Meigen, 1838)	350-1300		hoes	♦	♦	♦									
Phyllomya volvulus (Fabricius, 1794)	450-1750	1150-1200	hoes	♦	♦	♦	♦					●			
Thelaira nigripes (Fabricius, 1794)	350-1300	400-670	tp	♦	♦	♦				●					
Halidaya aurea Egger, 1856	350-900	900-1000	hoes	♦	♦						●	●			
Stomina caliendrata (Rondani, 1862)	350-1000	670-1100	mca	♦	♦					●	●				
Stomina iners (Meigen, 1838)		900-1000	hom								●				
Stomina tachinoides (Fallén, 1817)	350-950	400	wcp	♦	♦					●					
Rhamphina pedemontana (Meigen, 1824)	1800	800-1300	se, ? nm				♦				●	●			
Dufouria chalybeata (Meigen, 1824)	350-1300		dp	♦	♦	♦									
Dufouria nigrita (Fallén, 1810)	500-950	400-900	wcp	♦	♦					●	●				
Chetoptilia puella (Rondani, 1862)	600-900		des	♦	♦										
Eliozeta helluo (Fabricius, 1805)	300-700	400-800	tp	♦	♦					●	●				
Eliozeta pellucens (Fallén, 1820)	300-1000	400-900	des	♦	♦					●	●				
Clytiomya continua (Panzer, 1798)	350-1300	360-1000	tp	♦	♦	♦				●	●				
Ectophasia crassipennis (Fabricius, 1794)	300-1700	350-1200	tp	♦	♦	♦	♦			●	●	●			
Ectophasia leucoptera (Rondani, 1865)	300-450		nmt	♦											
Ectophasia oblonga (Robineau-Desvoidy, 1830)	300-1200	300-1150	wp	♦	♦	♦				●	●	●			
Gymnosoma clavatum (Rohdendorf, 1947)	350-1700	500-1500	tp	♦	♦	♦	♦			●	●	●			
Gymnosoma costatum (Panzer, 1800)	350-1000	800-1000	tp	♦	♦						●				
Gymnosoma desertorum (Rohdendorf, 1947)	350-1250		eeca	♦	♦	♦									
Gymnosoma dolycoridis Dupuis, 1961	350-1250	500-1200	ess	♦	♦	♦				●	●	●			

Table 2. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Gymnosoma inornatum Zimin, 1966	350-1250	380-1150	tp	♦	♦	♦				●	●	●			
Gymnosoma nitens Meigen, 1824	650-1400	1000	esca		♦	♦					●	●			
Gymnosoma nudifrons Herting, 1966	650-1300		hoes		♦	♦									
Gymnosoma rotundatum (Linnaeus, 1758)	350-1800	350-1600	tp	♦	♦	♦	♦			●	●	●			
Cistogaster globosa (Fabricius, 1775)	300-450		ess	♦											
Opesia cana (Meigen, 1824)	350-900		ess	♦	♦										
Elomya lateralis (Meigen, 1824)	350-1400	350-1400	tp	♦	♦	♦				●	●	●			
Phasia (*Phasia*) *aurulans* Meigen, 1824		400	hoes							●					
Phasia (*Phasia*) *hemiptera* (Fabricius, 1794)		400	hoes							●					
Phasia (*Phasia*) *obesa* (Fabricius, 1798)	750-1550	750-1500	tp		♦	♦					●	●			
Phasia (*Phasia*) *subcoleoptrata* (Linnaeus, 1767)	700-1300	400-1200	tp		♦	♦				●	●	●			
Phasia (*Hyalomya*) *pusilla* Meigen, 1824	350-1000	350-1100	tp	♦	♦					●	●	●			
Strongygaster globula (Meigen, 1824)	500-950		hoes	♦	♦										
Dionaea aurifrons (Meigen, 1824)	300-1250	450-600	tp	♦	♦	♦				●					
Leucostoma anthracinum (Meigen, 1824)	300-550		wces	♦											
Leucostoma tetraptera (Meigen, 1824)	350-1250	400-1300	wcp	♦	♦	♦				●	●	●			
Clairvillia biguttata (Meigen, 1824)	350-950	500-700	dp	♦	♦					●					
Labigastera forcipata (Meigen, 1824)	700-1300	900-1300	wes		♦	♦					●	●			
Labigastera pauciseta (Rondani, 1861)	350-1250		e, cse	♦	♦	♦									
Cylindromyia (*Cylindromyia*) *bicolor* (Olivier, 1812)	300-1400	400-1300	mca	♦	♦	♦				●	●	●			
Cylindromyia (*Cylindromyia*) *brassicaria* (Fabricius, 1775)	350-1800	350-1700	hop	♦	♦	♦	♦			●	●	●	●		
Cylindromyia (*Cylindromyia*) *brevicornis* (Loew, 1844)	380-1300	450-1200	des	♦	♦	♦				●	●	●			
Cylindromyia (*Cylindromyia*) *pilipes* (Loew, 1844)	500-900	480-900	wcp	♦	♦					●	●				
Cylindromyia (*Ocypterula*) *pusilla* (Meigen, 1824)		1200-1300	mss									●			
Cylindromyia (*Dupuisia*) *crassa* (Loew, 1845)	350-950	900	mss	♦	♦						●				
Cylindromyia (*Calocyptera*) *intermedia* (Meigen, 1824)	450-1250	400-1300	h	♦	♦	♦				●	●	●			
Cylindromyia (*Neocyptera*) *auriceps* (Meigen, 1838)	350-1000		tp	♦	♦										
Cylindromyia (*Neocyptera*) *interrupta* (Meigen, 1824)	500-1250		h	♦	♦	♦									
Hemyda vittata (Meigen, 1824)	600-700		hoes	♦											
Besseria anthophila (Loew, 1871)		1300	wcp									●			
Besseria dimidiata (Zetterstedt, 1844)	700-800		e		♦										
Besseria lateritia (Meigen, 1824)	300-600		? mt	♦											
Phania funesta (Meigen, 1824)	450-950	450-1000	e	♦	♦					●	●				

* – Species of Limoniidae and Pediciidae that are not included in the work concerning Pirin Mts. from 2015 (Hubenov, 2015b)

Table 3. Similarity of the Diptera fauna by vegetation belts in percentages

Vegetation belts of the Pirin Mts.	Vegetation belts of the Rila Mts.					
	1	2	3	4	5	6
1	40.8 (108)					
2		46.6 (163)				
3			40.9 (234)			
4				30.7 (83)		
5					25.7 (23)	
6						0 (0)

Note. 1 – Xerothermic oak forests, 2 – Mesophyllic and xeromesophyllic oak-hornbeam forests, 3 – Beech forests, 4 – Coniferous forests, 5 – Subalpine vegetation, 6 – Alpine vegetation; Common species are given in brackets.

ferences between the Pirin and Rila Mountains (from 11.3% to 18.3%) in the number of species in the first three vegetation belts (especially the beech belt). They are probably owing to the specific climatic conditions of the two mountains, the nature of the plant communities in the karst areas of the Pirin Mts. and the insufficient research of most families. The altitude of the localities, from which the most material was collected, is also important.

The upper limit of the coniferous zone passes into the subalpine vegetation zones with a mixture of regions at about 200 m a.s.l. Thus, most of the species were common for both vegetation belts and the number of taxa established in the subalpine belt of the two mountains increased (79 species or 10.6% in the Pirin Mts. and 99 species or 9.8% in the Rila Mts.). Among the species found in the alpine belt (29 species or 3.9% in the Pirin Mts. and 26 species or 2.6% in the Rila Mts.), only four taxa collected from the Rila Mts. were typical for this belt (*Molophilus lautereri* Stary – Bulgarian endemic of Limoniidae, *Micropsectra radialis* Goet. – Palaearctic-Oriental species of Chironomidae, *Eudorylas jenkinsoni* Coe – European species of Pipunculidae, and *Didea alneti* Fall. – Holarctic species of Syrphidae). All other species were established in the subalpine belt and most of them in other vegetation belts as well. In some cases, the finding of species at certain altitude takes place accidentally. The lack of systematic research on Diptera of the Pirin and Rila Mts., and the fragmentary data for most families do not allow explicit conclusions about the adherence of taxa to one or another vegetation zone to be made. The distribution of species in groups according to their presence in the vegetation belts had a relative character and depended on the specific features of taxa and research area, as well as on the duration of the research. There was a correlation between the horizontal and vertical distribution of Diptera. Species found in the subalpine and alpine zones (above 2200 m a.s.l.) have large areals (12 Superpalaearctic, nine Palaearctic, ten Eurosiberian and three Mediterranean species). In these two belts of the Pirin and Rila Mts. Holarctic-Oriental, Holarctic, Transpalaearctic, West and Central Palaearctic, West Palaearctic, European-North African, Holoeurosiberian, West and Central Eurosiberian, West Eurosiberian, Disjunct Eurosiberian and European species prevailed (Table 4). The differences of the taxa distribution in the subalpine and alpine zones were small: from 0.7 to 1.3% for both mountains. The differences between the separate areographical categories were higher and reached up to 5.4-7.5% (for the Holarctic species).

The zoogeographical categorisation of the species (Table 2) was made on the basis of current data about their distribution. Thus, the dipterans were divided into 92 areographical categories, combined into two main groups and six subgroups (Table 4).

Species distributed in the Palaearctic and beyond it. This group (156 species or 21.0% in the Pirin Mts. and 258 species or 25.7% in the Rila Mts.) included 29 categories, of which 24 combined species of northern type (widely distributed in the Holarctic and Palaearctic), and five – species of southern type (distributed only in the southern parts of the Palaearctic). The difference between the separate vegetation belts with respect to this group in the two mountains was from 0.4 to 23.9% (from 13 to 87 species) for the Pirin Mts., and from 0.4 to 16.1% (from 11 to 196 species) for the Rila Mts. There was a more significant difference of 10% between the mountains in the first vegetation belt. In the oth-

er vegetation belts this difference was small (0.2-5.3%). The establishment of other species of the group of the northern type in the last two vegetation belts is very likely, owing to their distribution and insufficient studies of the higher parts of the mountain. It is accepted that the species of the northern type have vast areas and ecological flexibility. In the Superpalaearctic complex the Holarctic species (72 species or 9.7% in the Pirin Mts. and 124 species or 12.4% in the Rila Mts.) prevailed as compared to the other areographical categories where the Holarctic-Oriental (23-31 species or 3.1%) and Palaearctic-Oriental (13-29 species or 1.7-2.9%) forms were present. The species of the southern type were represented in the first three vegetation belts (1-3 in the Pirin Mts. and 1-2 in the Rila Mts.). The group was not important for the zoogeographical characteristic of the dipterans in the studied region because of the small number of species (three – five species or 0.3-0.5%). Usually the species of the whole group, distributed in the Palaearctic and beyond it, were scantly presented and they were not determinant for the zoogeographical characteristic of taxa in the Bulgarian terrestrial fauna. Only in a highly mobile forms (such as Diptera), the group was well presented and could reach 20-25%. It was better represented in the Rila Mts. than in the Pirin Mts. In the two-winged insects significant numbers of synanthropic and synbovil forms with cosmopolitan or subcosmopolitan distribution occurred. They had anthropogenic areas, structured with the development of human civilisation (before the contemporary studies).

Species distributed only in the Palaearctic but in more than one subregion (**Palaearctic type**). Taxa, whose areas include more than one Palaearctic subregion in latitudinal direction, belong to this group. They were well represented in the high mobile groups and comprised about 25-35% of the species composition. Nineteen areographical categories were registered from both mountains (Table 4). A total of 204 species (27.5%) from the Pirin Mts. and 259 species (25.8%) from the Rila Mts. of this group have been established. Their character was determined by the Transpalaearctic (57 species or 7.8% from the Pirin Mts. and 78 species or 7.8% from the Rila Mts.), West Palaearctic (26 species or 3.5% from the Pirin Mts. and 46 species or 4.6% from the Rila Mts.) and European-North African (26 species or 3.5% from the Pirin Mts. and 35 species or 3.5% from the Rila Mts.) species. The correlation of these categories remained the same in the separate vegetation belts and ranged from 0.2 to 11.0% (from six to 117 species) in the Pirin Mts. and from 1.6% to 12.2% (from three to 196 species) in the Rila Mts. The Holopalaearctic, West and Central Palaearctic and Eurosiberian-Central Asian species (eight-24 species or 1.1-3.2% from the Pirin Mts. and 18-23 species or 1.8-2.3% from the Rila Mts.) were well presented. Thirteen species from the Pirin Mts. and eight species from the Rila Mts. had a longitudinal disjunction of the areas with regard to Siberia and Central Asia. Probably some of these species were represented with sparse populations and could be found as a result of further studies. Most often, a latitudinal disjunction of the areas of this group lacks (Gorodkov, 1984; Josifov, 1988; Hubenov, 2015a). Rarely single boreomontane forms are presented. A significant part of the species with wide vertical distribution (more than 25%) belonged to this group. It included from 20.7% to 37.0% (from six to 117 species) of the species composition of the separate vegetation belts of the Pirin Mts. and from 11.5% to 31.2% (from three to 196 species) of the species of the different vegetation belts of the Rila Mts. (Table 3). The vast areas and wide vertical distribution of the taxa of this group are an indication of the greater ecological flexibility of its species. This group was represented a little better in terms of relative abundance in the Pirin Mts. (with 1.7% more).

Species distributed within one subregion of the Palaearctic. This group (382 species or 51.5% from the Pirin Mts. and 486 species or 48.5% from the Rila Mts.) included species with Eurosiberian and Mediterranean type of distribution (36 areographical categories). Endemics were included in this group as well. The Mediterranean-Central Asian species are also included here according to Kryzhanovsky (1965) 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 faunistic elements (Submediterranean, Subiranian and Pontian) that could be considered separately as well (Gruev & Kusmanov, 1994, 1999; Gruev, 1995, Gruev & Bechev, 2000).

The **Eurosiberian species** (combined into 13 areographical categories) were 328 (44.2%)

Table 4. Zoogeographical characteristic of Diptera (Insecta) from the vegetation belts of the studied mountains
Note. The percentage of main categories and these with more species is presented

Areographical categories	Total number, % – Pirin Mts.	Total number, % – Rila Mts.	Vegetation belts of the Pirin Mts.						Vegetation belts of the Rila Mts.					
			Xerothermic oak forests – up to 600-700 m a.s.l.	Mesophyllic and xeromesophyllic oak-hornbeam forests – from 600-700 m to 900-1000 m	Beech forests – from 900-1000 to 1500-1600 m	Coniferous forests – from 1400-1600 m to 2000-2200 m	Subalpine vegetation – from 2000-2200 m to 2500 m	Alpine vegetation – over 2400-2500 m	Xerothermic oak forests – up to 500-700 m	Mesophyllic and xeromesophyllic oak-hornbeam forests – from 600-700 m to 900-1000 m	Beech forests – from 900-1000 to 1500-1600 m	Coniferous forests – from 1500-1600 m to 2000-2200 m	Subalpine vegetation – from 2000-2200 m to 2500 m	Alpine vegetation – over 2400-2500 m
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Species distributed in Palaearctic and out of it	**156 21.0**	**258 25.7**	**57 20.9**	**78 22.3**	**87 21.3**	**71 26.8**	**28 35.4**	**13 44.8**	**79 30.9**	**92 26.2**	**196 26.6**	**74 26.7**	**31 31.3**	**11 42.3**
North type	**151 20.3**	**255 25.4**	**53 19.4**	**74 21.2**	**86 21.0**	**71 26.8**	**28 35.4**	**13 44.8**	**76 29.7**	**90 25.6**	**196 26.6**	**74 26.7**	**31 31.3**	**11 42.3**
Cosmopolitan (k)	6	7	3	4	5	6	2	1	6	7	6	5		
Semicosmopolitan (sk)	3	3	2	2	2	1	1	1	2	2	2	1	1	
Holarctic-Paleotropical-Neotropical (hptn)	1	3	1	1	1	1	1	1	1	2	1	2		
Holarctic-Paleotropical-Australian (hpta)	3	5	2	2	3	2	1	1	2	3	4	2		
Holarctic-Paleotropical (hpt)	1	2	1	1	1	1	1		1	1	2	1	1	
Holarctic-Neotropical-Oriental (hno)	5	9		2	2	4	2		4	3	6	1	2	1
Holarctic-Neotropical-Afrotropical (hnat)	2	2	1		1				2	1	1	1		
Holarctic-Oriental-Australian (hoa)		1									1			
Holarctic-Afrotropical-Australian (hata)		1									1			
Holarctic-Neotropical (hn)	3	4	1	1	1	3	1		2	3	2	2	2	1
Holarctic-Afrotropical (hat)	1	3	1	1	1	1	1	1	1	1	3	2		
Holarctic-Oriental (ho)	23 3.1	31 3.1	7 2.6	12 3.4	13 3.2	8 3.0	2 2.5	1 3.4	10 3.9	12 3.4	23 3.1	9 3.2	1 1.0	1 3.8
Holarctic-Australian (ha)	2	5		1		1			1	2	3			
Palaearctic-Paleotropical-Australian (ppta)	4	3	3	2	1		1		1	2	3	1		
Palaearctic-Afrotropical-Australian (pata)		1									1			
Palaearctic-Oriental-Australian (poa)		2							1	1	2			
Palaearctic-Paleotropical (ppt)	4	6	3	3	2	2	1		3	3	5	1		

Table 4. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Palaearctic-Afrotropical (pat)	3	2	1	2	2	1	1	1	2	2	2	1		
Palaearctic-Oriental (po)	13 1.7	29 2.9	5 1.8	8 2.3	9 2.2	5 1.9	2 2.5	2 6.9	11 4.3	12 3.4	26 3.5	9 3.2	3 3,0	2 7.7
Palaearctic-Australian (pa)	1	1				1	1					1	1	1
West Palaearctic-Oriental (wpo)	2	10		2					1	2	7	1		
Disjunct Palaearctic-Oriental (dpo)	1	1			1						1			
West Palaearctic-Afrotropical (wpat)	1			1	1									
Holarctic (h)	72 9.7	124 12.4	22 8.1	29 8.3	40 9.8	34 12.8	10 12.7	4 13.8	25 9.8	31 8.8	94 12.8	34 12.3	20 20.2	5 19.2
South type	**5** **0.7**	**3** **0.3**	**4** **1.5**	**4** **1.1**	**1** **0.2**				**3** **1.2**	**2** **0.6**				
South Palaearctic-Paleotropical-Australian (sppta)	1			1	1									
South Palaearctic-Afrotropical (spat)	1	1	1	1					1	1				
Paleotropical-Mediterranean (ptm)	1		1											
Afrotropical-Mediterranean (atm)	1	1	1	1					1	1				
Oriental-Mediterranean (om)	1	1	1	1					1					
Species with Palaearctic distribution	**586** **79.0**	**745** **74.3**	**216** **79.1**	**271** **77.6**	**322** **78.7**	**194** **73.2**	**51** **64.5**	**16** **55.2**	**177** **69.1**	**259** **73.8**	**540** **73.4**	**203** **73.3**	**68** **68.7**	**15** **57.7**
Palaearctic type	**204** **27.5**	**259** **25.8**	**101** **37.0**	**112** **32.1**	**117** **28.6**	**65** **24.5**	**19** **24.0**	**6** **20.7**	**80** **31.2**	**103** **29.3**	**196** **26.6**	**75** **27.1**	**24** **24.2**	**3** **11.5**
Holopalaearctic (hop)	19 2.5	18 1.8	15 5.5	14 4.0	14 3.4	7 2.6	2 2.5	2 6.9	10 3.9	13 3.7	17 2.3	7 2.5		
Transpalaearctic (tp)	58 7.8	78 7.8	33 12.1	38 10.9	37 9.0	23 8.7	5 6.3	2 6.9	30 11.7	43 12.2	61 8.3	21 7.6	8 8.1	1 3.8
West and Central Palaearctic (wcp)	24 3.2	23 2.3	15 5.5	15 4.3	15 3.7	8 3.0	2 2.5		11 4.3	11 3.1	18 2.4	6 2.2	2 2.0	1 3.8
West Palaearctic (wp)	26 3.5	46 4.6	17 6.2	14 4.0	15 3.7	10 3.8	6 7.8	2 6.9	14 5.5	14 4.0	35 4.7	16 5.8	6 6.1	
Disjunct Palaearctic (dp)	13	8	6	5	6	2	3		4	2	4	1	1	1
South Palaearctic (sp)	2	3	1	1	1	1				1	3			
European-Anatolian-North African (eanna)		1												
European-North African (ena)	26 3.5	35 3.5	3 1.1	11 3.2	9 2.2	6 2.3			4 1.6	8 2.3	27 3.7	12 4.3	3 3.0	
Eurosiberian-Anatolian-Central Asian (esanca)		1									1			
Eurosiberian-Central Asian (esca)	8 1.1	22 2.2	5 1.8	4 1.1	3 0.7				3 1.2	5 1.4	13 1.8	5 1.8	1 0.1	

Table 4. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
West Eurosiberian-Anatolian-Central Asian (wesanca)		1							1					
West Eurosiberian-Central Asian (wesca)	2	1	1	1		1					1	1		
West Eurosiberian-Iran-Turanian (wesit)		1										1	1	
European-Central Asian (eca)	3	2		3	3						1			
East European-Central Asian (eeca)	1		1	1	1									
European-West Central Asian (ewca)	5	4	1	2	3	3	1		1	1	4	1		
European-South-west Asian (eswa)	6	4	3	1	2	2			1	1	2	3	1	
European-Iran-Turanian (eit)	8	8		1	5	2				3	7	1	1	
European-Turanian (et)	3	3		1	3				1	1	2			
Eurosiberian type	**328** **44.2**	**429** **42.8**	**86** **31.5**	**139** **39.8**	**187** **45.7**	**117** **44.1**	**28** **35.4**	**9** **31.0**	**78** **30.5**	**139** **39.6**	**315** **42.8**	**119** **43.0**	**40** **40.4**	**11** **42.3**
Holoeurosiberian (hoes)	50 6.7	82 8.2	21 7.7	33 9.5	34 8.3	23 8.7	3 3.8	1 3.4	16 6.2	27 7.7	60 8.1	24 8.7	6 6.1	2 7.7
West and Central Eurosiberian (wces)	29 3.9	27 2.7	9 3.3	9 2.6	22 5.4	10 3.8	2 2.5	1 3.4	5 1.9	10 2.8	21 2.8	7 2.5	1 1.0	1 3.8
West Eurosiberian (wes)	27 3.6	42 4.2	9 3.3	11 3.2	15 3.7	11 4.1	2 2.5	1 3.4	8 3.1	14 4.0	31 4.2	8 2.9	2 2.0	
Disjunct Eurosiberian (des)	39 5.2	34 3.4	11 4.0	15 4.3	22 5.4	12 4.5	4 5.1	2 6.9	7 2.7	14 4.0	22 3.0	11 3.0	1 1.0	
European and South Siberian (ess)	11	6	5	9	8	1	1		4	4	5	1		
European-Anatolian (ean)	4	10	1	3	2	1			1	2	5	3	2	
European (e)	141 19.0	183 18.2	27 9.9	50 14.3	70 17.1	48 18.1	12 15.2	4 13.8	32 12.5	60 17.1	138 18.7	47 17.0	18 18.2	4 15.4
Central and East European (cee)		2									2			
Central and South European-Anatolian (csean) (csea)	3	5		1	3	1				1	5	4	2	2
Central and South-east European-Anatolian (cseean)		2							1	1	1	1	1	
Central and South-east European-Lebanonian (cseel)		1									1	1	1	1
Central and South European (cse)	18 2.4	25 2.5	2 0.7	5 1.4	8 2.0	7 2.6	3 3.8		2 0.8	4 1.1	18 2.4	9 3.2	4 4.0	1 3.8
Central and South-east European (csee)	6	10	1	3	3	3	1		2	2	6	3	2	
Mediterranean type	**41** **5.5**	**45** **4.5**	**28** **10.3**	**19** **5.4**	**11** **2.7**	**6** **2.3**	**3** **3.8**	**1** **3.4**	**19** **7.4**	**17** **4.8**	**23** **3.1**	**6** **2.2**	**2** **2.0**	
Mediterranean and South Siberian (mss)	1	3	1	1						2	1			

Table 4. Continued

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mediterranean and South-west Siberian (msws)	1	1	1						1					
Mediterranean-Central Asian (mca)	6 0.8	6 0.6	5 1.8	4 1.1	3 0.7	1 0.4	1 1.3	1 3.4	4 1.6	3 0.8	3 0.3	1 0.4		
North Mediterranean-Central Asian (nmca)		1							1					
Mediterranean-West Central Asian (mwca)	2	2		2	1				1		1			
Northeast Mediterranean-Iran-Turanian (nemit)	1		1											
Mediterranean-Turanian (mt)	2	1	1	1										
North Mediterranean-Turanian (nmt)	3	1	1	2					1	1	1			
South European and South Siberian (sess)	2	1	1	1	1	1				1	1	1		
Central and South European-Iran-Turanian (cseit)	1	2	1								1			
Central and South-east European-Iran-Turanian (cseeit)	1				1									
Central and South European-North African (csena)	1	1		1	1					1	1	1		
South European-North African (sena)		1									1			
Holomediterranean (hom)	10 1.3	8 0.8	9 3.3	3 0.9	2 0.5	2 0.8	1 1.3		4 1.6	5 1.4	3 0.3			
North Mediterranean (nm)	4 0.5	6 0.6	4 1.5	2 0.6	2 0.5				4 1.6	1 0.3	2 0.3			
South European (se)	3 0.4	7 0.7	1 0.4			2 0.8	1 1.3		2 0.8	1 0.3	5 0.7	2 0.7	1 1.0	
South-east European (see)		1									1	1	1	
East Mediterranean (em)	1			1										
Balkan-Anatolian (ban)	2	3	2	1					1	2	2			
Endemics	**13** **1.7**	**12** **1.2**	**1** **0.4**	**1** **0.3**	**7** **1.7**	**6** **2.3**	**1** **1.3**				**6** **0.8**	**3** **1.1**	**2** **2.0**	**1** **3.8**
Balkan subendemic (Ebs)	1	2				1						1	1	
Balkan endemic (Eb)	4	1	1	1	3						1			
Bulgarian endemic (Ebg	6 0.8	7 0.7			3 0.7	4 1.5					5 0.7	1 0.4		1 3.8
Regional endemic (Er)	2	2			1	1	1					1	1	
Total 1351 species	**759** **56.2**	**1003** **74.2**	**273** **36.8**	**349** **47.0**	**409** **55.1**	**265** **35.7**	**79** **10.6**	**29** **3.9**	**256** **25.5**	**351** **35.0**	**736** **73.4**	**277** **27.6**	**99** **9.9**	**26** **2.6**

from the Pirin Mts. and 429 (42.8%) from the Rila Mts. The European species were most numerous (141 species or 19.0% from the Pirin Mts. and 183 species or 18.2% from the Rila Mts.), followed by the Holoeurosiberian (50 species or 6.7% from the Pirin Mts. and 82 species or 8.2% from the Rila Mts.) and the Disjunct Eurosiberian (39 species or 5.2% from the Pirin Mts. and 34 species or 3.4% from the Rila Mts.) species. The ratio of these categories was different for the specific families (the Holoeurosiberian, Disjunct Eurosiberian and European species of the family Tachinidae were almost equal in number as the Eurosiberian forms were 50% in total, while in other families the Central and South European species were better represented). The number of taxa from the mentioned categories in the separate vegetation belts ranged from 1.0% to 18.7% (one – 138 species) and increased (as a percentage) with height up to 2200 m a.s.l. The West and Central Eurosiberian, West Eurosiberian and Central and South European species were well represented. Most Eurosiberian species were found in the beech and coniferous forest belts (42.8-45.7%). In the subalpine and alpine zones of the Rila Mts., the Eurosiberian species predominated over the other zoogeographical categories (40.4-42.3%), whereas in the Pirin Mts. they were poorly represented (31.0-35.4%). The differences in the Eurosiberian species (as a percentage) in the other vegetation belts of the Pirin and Rila Mts. were smaller (2.9% for the beech belt). A number of disjunctive areas were represented: longitudinal disjunction for Siberia and Central Asia (Table 2, 4) and latitudinal disjunction with the typical for the Eurosiberian complex boreomontane, boreoalpine and arctic-alpine distribution (Gorodkov, 1984; Josifov, 1988; Hubenov, 2015a). Interesting is the significant presence of Eurosiberian species in the first two vegetation belts of the Pirin and Rila Mountains, which can be explained in two ways: 1) It is possible that a part of these species have unclear Palaearctic distribution; 2) It is supposed that the humid mountain valleys characterised with cooler climate have facilitated the migration of the above-mentioned forms to the lowlands. Finding Eurosiberian boreomontane forms at low altitudes has also been reported for other insect groups as Heteroptera, Cerambycidae (Coleoptera) and Tachinidae (Diptera) (Josifov, 1963, 1976; Georgiev & Hubenov, 2006; Hubenov, 1992, 2008b). For Cerambycide this fact is due to the deforestation of conifers in the first two vegetation belts. Probably because of this, many boreomontane and montane species that feed on conifers go down below 1000 m a.s.l.. The Eurosiberian species comprised from 31.0% to 45.7% (from nine to 187 species) and from 30.5% to 43.0% (from 11 to 315 species) of the species composition of the separate vegetation belts of the Pirin and Rila Mts., respectively (Table 4). There were no significant differences in the vertical distribution of this group in the two mountains, except that in the subalpine and alpine zones some areographical categories were differently represented.

Mediterranean species (combined into 19 zoogeographical categories). These were 41 species (5.5%) from the Pirin Mts. and 45 species (4.5%) from the Rila Mts. They were represented mainly in the first three vegetation belts and their number rapidly decreased with altitude. Most of the Mediterranean species occur only in one or two vegetation belts (Table 2). A significant percentage of these species and their relatively scarce populations were due to the lower ecological flexibility of the Mediterranean forms in comparison with the Eurosiberian species. Because of the big variety of the areas, this group was divided into many subgroups with different origin, distribution and ecological peculiarities of the taxa. This complexity contributes to using various zoogeographical classifications for Bulgaria (Josifov, 1981, 1986, 1988, 1999; Gruev, 1988, 1995, 2000a, 2000b, 2000c, 2002; Heiss & Josifov, 1990, Gruev & Kusmanov, 1994; Hubenov, 1996, 2008a; Gruev & Bechev, 2000; Popov, 2002). The Mediterranean species included from 2.0% to 10.3% (from one to 28 species) of Diptera of the separate vegetation belts of the two mountains (Table 4). The difference between the first vegetation belt of the Pirin (28 species – 10.3%) and Rila Mts. (19 species – 7.4%) was due to the fact that in the neighbouring region of the Pirin Mts., the Sandanski-Petrich Valley (the region with the strongest Mediterranean influence in Bulgaria), the Mediterranean forms in some Diptera families reached 17% (Beschovski & Hubenov, 1986). The Holomediterranean (ten species – 1.3% from the Pirin Mts. and eight species – 0.8% from the Rila Mts.) and Mediterranean-Central Asian (six species each or 0.8-0.6% from the two mountains) species were the most numerous. The South European forms in the Rila Mts. were

more. In the subalpine belt four Mediterranean taxa were established: three from the Pirin and two from the Rila Mts. (*Prosimulium petrosum* Rubtsov – South-east European species of the family Simuliidae, *Ogcodes lautereri* Chvala – Holomediterranean species of the family Acroceridae, *Lamproscatella unipunctata* Becker – Mediterranean-Central Asian species of the family Ephydridae, also found in the alpine belt of the Pirin Mts., and *Sarcophaga porrecta* Böttcher – South European species of the family Sarcophagidae). These might be Montane Mediterranean forms or species with unclear distribution. When comparing with the Pirin Mts., there was a slightly higher percentage of the Mediterranean taxa which might be related to the specific natural conditions and geographical location of this mountain. There were no significant differences in the distribution of the well-represented areographical categories between the two mountains. Of the remaining categories, not all were presented in each of the mountains.

Endemics. This category included taxa, which were not distributed outside the Balkan Peninsula. The percentage of endemism was low in Diptera – 1.2-1.7% (13 species from the Pirin Mts. and 12 species from the Rila Mts.). The Bulgarian endemic forms prevailed. Endemic forms have not been established in the first two vegetation belts of the Rila Mts., unlike the Pirin Mts. The main part of the endemic species was related to the beech and coniferous belts (three – seven species or 0.8-2.3%). This suggests that these endemic species are postglacial neoendemics which are to be connected with the Eurosiberian forms. Local endemics have not been established among Diptera of the two mountains. The dipterans included rare and mostly newly described taxa (from the Pirin Mts. – one in 1862, two in 1940 and 1942, and the others after 1970; from the Rila Mts. – one in 1930, one – in 1940 and all the others after 1970).

Conclusions

A total of 1351 dipteran species from 63 families have been established in the two mountains so far. The species known from the Pirin Mts. are 759 (18.5% of the Bulgarian species) and the species known from the Rila Mts. are 1003 (25.1% of the Bulgarian species). The degree of similarity between the dipterans of the two mountains was low – 46.2%. The dipterous fauna could be divided into two main groups:

1) Species with Mediterranean type of distribution (49 species or 6.5% from the Pirin Mts. and 48 species or 4.8% from the Rila Mts.): more thermophilic and distributed mainly in the southern parts of the Palaearctic. Species of 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 (710 species or 93.5% from the Pirin Mts. and 955 species or 95.2% from the Rila Mts.): more cold-resistant and more widely distributed in the Palaearctic. Species of northern type, distributed in the Palaearctic and outside of it, can be formally related to this group, as well.

The zoogeographical character of the dipteran fauna was determined by the second group. The percentage of the typical Mediterannean species of the two mountains were similar (4.5 and 5.5%). The ratio between the two main groups was different in the separate vegetation belts of the two mountains but without great percentage differences between the mountains themselves. The differences in the first vegetation belt of the two mountains were the biggest (10%).

Xerothermic oak forests (273 species or 36.8% from the Pirin Mts. and 256 species or 25.5% from the Rila Mts.). Of the species with Mediterranean type of distribution (32 species or 11.7% from the Pirin Mts. and 22 species or 8.6% from the Rila Mts.), the Holomediterranean, Mediterranean-Central Asian, North Mediterranean and South European species were the most numerous. Of the species with Palaearctic and Eurosiberian type of distribution (241 species or 88.3% from the Pirin Mts. and 234 species or 91.4% from the Rila Mts.) the Holarctic, Transpalaearctic, Holoeurosiberian and European species were best represented. Endemic forms have not been established yet in the Rila Mts.

Mesophyllic and xeromesophyllic mixed forests (349 species or 47.0% from the Pirin Mts. and 351 species or 35.0% from the Rila Mts.). Of the species with Mediterranean type of distribution (23 species – 6.6% from the Pirin Mts. and 19 species – 5.4% from the Rila Mts.), the Mediterranean-Central Asian and

Holomediterranean prevail, and of the species with Palaearctic and Eurosiberian type of distribution (326 species or 93.4% from the Pirin Mts. and 332 species or 94.6% from the Rila Mts.) the Holarctic, Transpalaearctic, Holoeurosiberian, and European species are best represented. The number of Holarctic-Oriental, Holarctic, Transpalaearctic, European-North African, Holoeurosiberian, West Eurosiberian, Disjunct Eurosiberian, and European species is increased. The percentage of the Mediterranean species decreases. Endemic forms have not been established yet in the Rila Mts.

Beech forests (409 species or 55.1% from the Pirin Mts. and 736 species or 73.4% from the Rila Mts.). Of the species with Mediterranean type of distribution (12 species or 2.9% from the Pirin Mts. and 23 species or 3.1% from the Rila Mts.), the Mediterranean-Central Asian and Holomediterranean were the most numerous, while of the species with Palaearctic and Eurosiberian type of distribution (397 species or 97.1% from the Pirin Mts. and 713 species or 96.9% from the Rila Mts.) the Holarctic, Transpalaearctic, Holoeurosiberian, and European species were best represented. The species of southern type distributed in the Palaearctic and beyond it were not presented in the Rila Mts. The number of Holarctic-Oriental, Palaearctic-Oriental, Holarctic, West Palaearctic, Holoeurosiberian, West and Central Eurosiberian, West Eurosiberian and European species has increased. Endemics have been established in the Rila Mts. Of the endemic taxa, the Bulgarian endemics prevailed. The percentage of the Mediterranean forms decreased.

Coniferous forests (265 species or 35.7% from the Pirin Mts. and 277 species or 27.6% from the Rila Mts.). Of the species with Mediterranean type of distribution (six species each – 2.3% from the Pirin Mts. and 2.2% from the Rila Mts.), the South European species were the most numerous, while of the species with Palaearctic and Eurosiberian type of distribution (259 species or 97.7% from the Pirin Mts. and 271 species or 97.8% from the Rila Mts.), the Holarctic, Transpalaearctic, Holoeurosiberian and European species prevailed. Of the areographical categories, 26 were not presented in the Pirin Mts. and 28 – in the Rila Mts. The Cosmopolitan, Holarctic-Oriental, Palaearctic-Oriental, West Palaearctic, European-North African and Disjunct Eurosiberian species were better represented. The percentage of the Mediterranean forms considerably decreased.

Subalpine vegetation (79 species or 10.6% from the Pirin Mts. and 99 species or 9.9% from the Rila Mts.). Of the species with Mediterranean type of distribution three species have been recorded from the Pirin Mts. and two – from the Rila Mts. Of the species with Palaearctic and Eurosiberian type of distribution (32 areographical categories of the Pirin Mts. and 31 – of the Rila Mts.), the Holarctic and European species were the most numerous. This part of the two mountains is poorly explored and excluding some families, the studies are fragmentary.

Alpine vegetation (29 species or 3.9% from the Pirin Mts. and 26 species or 2.6% from the Rila Mts.). One Mediterranean species (*Lamproscatella unipunctata* Becker of the family Ephydridae) were established from the Pirin Mts. and only species with Palaearctic and Eurosiberian type of distribution belonging to 16 areographical categories were established from the Rila Mts. The Holarctic and European taxa were the most numerous. The remaining categories were represented by one – two species each. One Bulgarian endemic (*Molophilus lautereri* Stary of the family Limoniidae) was recorded from the Rila Mts. With the exception of four families, studies on the two-winged insects in this vegetation belt of the Pirin and Rila Mountains are almost lacking.

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Вертикално разпространение и сравнителна зоогеографска характеристика на диптерната фауна (Insecta: Diptera) в растителните пояси на планините Пирин и Рила

Здравко Хубенов

(Резюме)

В двете планини са установени общо 1351 вида от 63 семейства (759 вида на Пирин и 1003 вида на Рила). Ниското сходство на фауната между тези планини (46.2%) е свързано с техните специфични природни особености и недостатъчно проучване. Най-много видове са намерени в пояса на буковите гори (409 – 55.1% на Пирин и 736 – 73.4% на Рила). Сходството на диптерната фауна между растителните пояси на двете планини се колебае от 0% до 46.6%. Диптерите са разпределени в 92 ареалографски категории, обособени в 2 надгрупи 1) видове с медитерански тип на разпространение (49 вида – 6.5% на Пирин и 48 вида – 4.8% на Рила) – по-топлолюбиви и разпространени предимно в южните части на Палеарктика, към които са прибавени и видовете от южен тип, разпространени и извън Палеарктика; 2) видове с палеарктичен и евросибирски тип на разпространение (710 вида – 93.5% на Пирин и 955 вида – 95.2% на Рила) – по-еврибионтни и по-широко разпространени в Палеарктика, към които формално са отнесени и видовете от северен тип, разпространени и извън Палеарктика. От първата група най-много са холомедитеранските и медитераноцентралноазиатските форми (0.6% до 1.3%). От втората група преобладават европейски, холарктични, холоевросибирски и транспалеарктични таксони (7.8% до 19.0%). Ендемични са 12-13 вида (1.2% до 1.7%). Разгледано е разпределението на зоогеографските категории в отделните растителни пояси на планините.