

THE BIBIONIDAE (DIPTERA) FROM THE KERKINI AREA (MACEDONIA, NORTHERN GREECE)

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Abstract

The occurrence of 13 species of Bibionidae is reported from Greece, mainly from the Kerkini area (Macedonia, Northern Greece). Nine of them (*Bibio clavipes* Meigen, 1818, *B. johannis* (L., 1767), *B. marci* (L., 1758), *B. varipes* Meigen, 1830 and *B. venosus* Meigen, 1804, *Dilophus bispinosus* Lundström, 1913, *D. clavicornus* Skartveit & Kaplan, 1996, *D. febrilis* (L., 1758) and *D. humeralis* (Zetterstedt, 1850) are recorded for the first time from this country. *Dilophus clavicornus* is also recorded for the first time from Europe as a whole. An updated checklist of the Bibionidae of Greece is provided.

Key-words: Diptera, Bibionidae, *Bibio*, *Dilophus*, Greece, faunistics, checklist

Introduction

Lake Kerkini is situated in the northwest part of the prefecture of Serres, in Central Macedonia, Northern Greece. It is an artificial lake, created in 1932 on the river Strymon immediately south of the Greek border with Bulgaria and 80 km north of Thessaloniki. The area was originally an inland delta, a huge marsh where the river unloaded the debris it had collected on its journey past the Rila and Pirin mountains of Bulgaria. To the north the lake is bounded by the 2,000 m Serbo-Macedonian massif, the Kerkini Oros (Kerkini mountains) which forms the border with Bulgaria but which is split by the narrow Ruppel Gorge through which the river enters Greece. To the southwest the lake is bordered by the 1,000 m Mavrovouni Oros (Mavrovouni mountains). Lake Kerkini National Park was established 2006 to protect this area, a RAMSAR and NATURA2000 site as well as one of the ten Wetlands of International Importance in Greece. The nature reserve includes parts of both of these mountain ranges, extending to the summit of the Kerkini Oros, all of the riverine habitat between the border and the lake (about 20 km), and has a total area of about 200 square km. The vegetation of the area is classified as para-mediterranean and mountainous mediterranean.

The Kerkini Wetland Biodiversity Project (Ramel 2009) conducted during 2005-2010 by the second author (GR) allowed to gather an important material and substantially increased our knowledge of the

The Bibionidae from the Kerkini area



Fig. 1. Map of Greece with studied area (red-lined rectangle) (Source Maps of Europe).

database (Skartveit 2013) mentions only five species for this country, namely *Bibio femoralis* Meigen, 1838, *B. graecus* Duda, 1930, *B. hortulanus* (Linnaeus, 1758), *B. siculus* Loew, 1847 and *Dilophus lingens* Loew, 1869 (the latter recorded only from Rhodes, Dodecanese Islands). However two of these (*B. graecus* and *B. siculus*) are mere colour varieties of *B. hortulanus* (see below under this species). On the other hand *B. picinitarsis* Brullé, 1832 was erroneously recorded as occurring in Sicily, instead of Greece (see below ‘Updated checklist of Bibionidae of Greece’) and the record of *B. handlirschi* Duda, 1930 by Papp & Haenni (2007) was overlooked in Fauna Europaea. This leaves finally five species of Bibionidae known from Greece before the present work.

The material collected in the frame of the Kerkini Wetland Biodiversity Project proved to be rich and diverse, with 12 species of Bibionidae recorded, several of them for the first time in Greece and one of them for the first time in Europe. Some material gathered by the first author (JPH) in various areas from Greece (including Kerkini) and by other collectors is also included under each relevant species. Finally an updated checklist of the family Bibionidae in Greece is provided.

Material and methods

Most of the material was obtained in the frame of the Kerkini Wetland Biodiversity Project conducted in Central Macedonia (Northern Greece, former Serres Nomos) (Fig. 1) during 2005-2010 by the second author, Gordon Ramel (GR). Samples from 40 localities, at elevations ranging from 36-1600 m a.s.l. in the vicinity of the Kerkini Lake and in the vicinuous mountainous ranges of Kerkini Oros and Mavrovouni Oros were taken by means of Malaise traps (MT), yellow pan traps (YP), pitfall traps (PT) and sweeping (SW). Full description of localities may be found in Ramel (2009) and Černý (2011). Collections were sorted at family level by GR, with specimens of Bibionidae found in 18 localities. This material is preserved in alcohol in the collections of the Muséum d’histoire naturelle of Neuchâtel, Switzerland (MHNN). All identifications were made by the first author, Jean-Paul Haenni (JPH). Limited additional material was collected incidentally in 1981 in the same area by the first author (JPH). Moreover various unpublished material from other parts of Greece from several collections (CMB, MHNG, MHNN) has also been studied.

invertebrate fauna of this area and of Greece as a whole, in particular for what concern many groups generally less studied, like Diptera (Ramel 2008).

Bibionidae is a small family of nematoceran Diptera, with robust, brachycerous-like habitus and marked sexual dimorphism. The adults are often abundant in open to wooded habitats, most frequent and diverse in semi-open and mosaic agricultural wooded landscapes. The larvae of most species live in mass-aggregations up to several hundred specimens. They usually develop in decaying vegetal matter, mainly in leaf-litter and soils rich in humus and their role in decomposition of leaf-litter is important. About 45 species are present in Europe (Skartveit 2013) but the Bibionidae of Greece have been given very little attention up to now and our knowledge of the family there is extremely fragmentary. The Fauna Europaea

Acronyms of collections:

- CMB : Collection Miroslav Barták, Prague, Czech Republic
MHNG : Muséum d'histoire naturelle, Genève, Switzerland
MHNN : Muséum d'histoire naturelle, Neuchâtel, Switzerland

Results

***Bibio clavipes* Meigen, 1818**

Material: **Central Macedonia - Serres:** Vironia, Beabies Site, 41°19'15.4N, 23°13'39.6E, 1150m, MT, 29.IX-5.X.2008, 2♂♂; same, 6-12.X.2008, 1♂ 6♀♀; same, 13-19.X.2008, 4♂ 4♀♀; same, 3-9.XI.2008, 1♂; Neo Petritsi, Sultanitsa Site, 41°19'02.1N, 23°12'05.0E, 1485m, MT, 17-22.IX.2008, 1♂; same, 22-28.IX.2008, 2♀♀; same, 29.IX-5.X.2008, 6♂♂ 14♀♀; same, 6-12.X.2008, 8♂♂ 9♀♀; same, 13-19.X.2008, 9♂♂, 4♀♀; same, 20-26.X.2008, 2♂♂ 5♀♀; same, 27.X-2.XI.2008, 1♂ 11♀♀, all. G. Ramel leg., MHNN.

Collected in two mountainous forested zones (*Fagus*, *Abies*) of Kerkini Oros, between 1150 and 1485m, along stream.

A common and widespread species in Europe, with autumnal flight period. Recorded so far from SE Europe only from Croatia (Langhoffer 1917) and Romania (Iacob 1980). **New record for Greece.**

***Bibio femoralis* Meigen, 1838**

Material: **Central Macedonia - Serres:** Kerkini, Elodia Café Site, 41°12'46.8N 023°05'42.9E, 40 m, MT, 4-10.II.2008, 26♂♂; Neo Petritsi, Petritsi Stream Site, 41°17'43.7N, 23°17'12.6E, 250m, MT, 2-8.II.2008, 3♂♂ 1♀; same, 9-15.II.2008, 1♀; same, 18-24.II.2008, 1♂ 3♀♀, all. G. Ramel leg., MHNN.

Recovered from two low altitude localities, along an ancient river bed near the lake and in a thermophilous forest near stream.

An uncommon species in SE and Central Europe with very early flight period (end of winter-beginning of spring).

***Bibio handlirschi* Duda, 1930**

Material: **Central Macedonia - Serres:** Kerkini, Elodia Café Site, 41°12'46.8N, 023°05'42.9E, 40m, MT, 7-13.IV.2008, 2♀♀; Mezias 4 Site, 41°23'02N, 23°17'52E, 255m, YP, 5.IV.2010, 2♀♀; Neo Petritsi, Petritsi Stream Site, 41°17'43.7N, 23°17'12.6E, 250m, MT, 31.III-6.IV.2008, 1♂ 2♀♀; same, 7-13.IV.2008, 3♂♂; same, 14-20.IV.2008, 1♀; Promachonas, Roupel's Gorge Site, 41°18'18N, 23°20'00E, 78m, YP, 2.IV.2010, 1♂, all. G. Ramel leg., MHNN.

Recovered from the same localities as the preceding species, plus an additional low altitude locality, situated in a *Pinus* plantation near river.

A still very poorly known SE European species described from Hungary and Austria by Duda (1930) on the basis of material from the 19th century. *Bibio handlirschi* had never been recorded again until Papp & Haenni (2007) redescribed it from Hungary and Greece (Thessalia). This vernal species appears not to be rare in Northern Greece where it was captured in four localities during the Kerkini Wetland Biodiversity Program. Recorded recently from Croatia by Skartveit & al. (2013). Its occurrence in other countries of SE Europe may be expected.



Fig. 2. *Bibio handlirschi* Duda, 1930: habitus of male (photograph Jessica Litman).

***Bibio hortulanus* (Linnaeus, 1758)**

=*graecus* Duda, 1930 **syn. rev.**

=*siculus* Loew, 1846

Material: **Central Macedonia - Serres:** Ano Poroia, 41°17'34N, 23°02'12E, 475m, SW, 24.IV.2008, 1♂; Kerkini, Elodia Café Site, 41°12'46.8N, 023°05'42.9E, 40m, MT, 7-13.IV.2008, 1♂, all. G. Ramel leg., MHNN; near Kerkini, SW, 25.IV.1981, 2♂♂, J.-P. Haenni leg, MHNN. **Eastern Macedonia and Thrace - Evros:** Samothraki isl., near Paleopolis, 3m, SW, 16.IV.1981, 1♂, J.-P. Haenni leg. MHNN; Samothraki isl., near Lakkoma, 2m, SW, 17.IV.1981, 5♂♂ 3♀♀, J.-P. Haenni leg., MHNN; **Kavala:** near Krinides, SW, 23.IV.1981, 3♂♂ 1♀, J.-P. Haenni leg. MHNN. **Thessalia - Trikala:** Trikala, 3km S, along Pinios, 14.IV.1979, 21♂♂ 6♀♀, M. Dethier & N. Stiernet leg., MHNN; Kalambaka, 15.IV.1979, 2♂♂, 1♀, M. Dethier & N. Stiernet leg., MHNN; Kalambaka, 16.IV.1979, 1♀, M. Dethier & N. Stiernet leg., MHNN; Kalambaka, 17.IV.1979, 2♂♂ 1♀, M. Dethier & N. Stiernet leg., MHNN. **Peloponnesos - Messenia:** Olympia, 30km ESE, Loutra, 2.V.2005, 1♂ 1♀, M. Kadlecová leg., CMB; Kalamata, 5km NE, 24.IV.2005, 1♀, J. Halada leg., CMB; **Laconia:** Sparti, 12km WNW, 26-27.IV.2005, 1♀, J. Halada leg., CMB. **Creta - Hania:** Stylos, 5.III.1979, 1♂ 1♀, P. Neuenschwander leg., MHNG; Kakodiki, SW, 16.II.1979, 1♂, P. Neuenschwander leg., MHNG; Hania, Sougia, 22.IV.2000, 1♂, J.-P. Haenni leg., MHNN.

Collected only from the vicinity of lake and the foothills of Kerkini Oros. The records from other regions are also from low altitude localities.

A widespread species in whole of Europe, common in lowlands, generally in open or semi-open habitats. This vernal species is apparently widespread in Greece. The specimens studied present the pattern of colouration of the variety *graecus*. Variability is important in southern Palaearctic forms

and several varieties of coloration have been described, later elevated at species level by Krivosheina (1986) but the characters concerned are only colour of thorax and abdomen, and colour of pilosity, which are not reliable at the specific level within *Bibio* Geoffroy, as recently pointed out by Skartveit (2006). For this reason we follow Duda (1930), who treated *B. siculus* and *B. graecus* (as well as other forms) as mere varieties of *B. hortulanus*.

***Bibio johannis* (Linnaeus, 1767)**

Material: **Central Macedonia - Serres:** Vironia, Kerkini Oros, 41°18'45N, 23°13'02E, 1550m, SW, 22.IV.2008, 1♂, G. Ramel leg., MHNN.

This unique specimen was swept from an altitude meadow of the Kerkini Oros.

A common and widespread species in Europe in spring, only recorded so far from SE Europe in Croatia (Langhoffer 1917) and Romania (Iacob 1980). **New record for Greece.**

***Bibio marci* (Linnaeus, 1758)**

Material: **Central Macedonia - Serres:** Ano Poroia, Kerkini Mts., 41°18'37N, 23°03'58E, 1340m, SW, 24.IV.2008, 1♂; Ano Poroia, Kerkini Oros 41°18'59N, 23°01'55E, 20.V.2009, 1100 m, YP, 22.V.2009, 1♀; Kerkini, Kerkini Marsh Site, 41°13'32.8N, 023°05'04.2E, 45m, MT, 28.III-3.IV.2007, 1♂; Kerkini Korifoudi, Mavrovouni Mts., 41°10'N, 23°05'E, 30-300m, 5.IV.2007, 2♂♂; Promachonas, Procom Site, 41°22'38.1N, 23°21'58.8E, 60m, MT, 24-30.III.2008, 1♂; Vironia, Ramna Site, 41°17'42.5N, 23°11'33.1E, 750 m, MT, 24-30.III.2008, 1♂; Neo Petritsi, Sultanitsa Site, 41°19'02.1N, 23°12'05E, 1485m, MT, 12-18.V.2008, 12♂♂ 1♀; same, 19-15.V.2008, 25♂♂; same, 25.V-1.VI.2008, 4♂♂, all. G. Ramel leg., MHNN. **Eastern Macedonia and Thrace - Evros:** Samothraki Isl., Paleopolis, 5m, 21.IV.1981, 1♀, J.-P. Haenni leg., MHNN. **Peloponnesos - Laconia:** Mt. Taygetos, 1♀, M. Kodlecová leg., CMB. **Creta - Hania:** Hania, Lakki, 4km SW, 1.VI.2003, 1♀, C. Dufour leg., MHNN.

This species is common in various habitats in Kerkini (open, semi-open to forested) from the flood plain to the mountainous ranges.

The commonest *Bibio* in Europe, widespread in various environments. At our knowledge it has never been recorded from Greece so far, where it appears also to be widespread after the records above. **New record for Greece.**

***Bibio varipes* Meigen, 1830**

Material: **Central Macedonia - Serres:** Vironia, Beabies Site, 41°19'15.4N, 23°13'39.6E, 1150m, MT, 30.IV-4.V.2008, 1♂; same, 5-11.V.2008, 1♂; same, 12-18.V.2008, 2♂♂; Neo Petritsi, Farfara Site, 41°19'30.5N, 23°15'00.1E, 750 m, MT, 30.IV-4.V.2008, 1♂; Vironia, Ramna Site, 41°17'42.5N, 23°11'33.1E, 750m, MT, 14-20.IV.2008, 1♀; Neo Petritsi, Sultanitsa Site, 41°19'02.1N, 23°12'05E, 1485m, MT, 19-25.V.2008, 3♂♂ 1♀; same, 25.V-1.VI.2008, 14♂♂; same, 2-8.VI.2008, 1♂, all. G. Ramel leg., MHNN.

Recovered from four localities of the Kerkini Oros between 750 and 1485m, in various types of broad-leaved and mixed forests.

A common and widespread vernal species in Central, Western and Northern Europe, only reported so far from SE Europe from Romania (Iacob 1980), Croatia (Skartveit & al. 2013) and Western Ukraine (Oboňa & al. 2017). **New record for Greece.**

***Bibio venosus* (Meigen, 1804)**

Material: **Central Macedonia - Serres:** Vironia, Beabies Site, 41°19'15.4N, 23°13'39.6E, 1150m,

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MT, 30.IV-4.V.2008, 5♂♂ 1♀; same, 5-11.V.2008, 6♂♂; same, 12-18.V.2008, 17♂♂ 7♀♀; same, 19-25.V.2008, 2♀♀; Vironia, Ramna Site, 41°17'42.5N, 23°11'33.1E, 750m, MT, 14-20.IV.2008, 2♀♀; same, 21-27.IV.2008, 1♀; Neo Petritsi, Sultanitsa Site, 41°19'02.1N, 23°12'05E, 1485m, MT, 28.IV-4.V.2008, 1♀ 2♀♀; same, 5-11.V.2008, 1♂; same, 12-18.V.2008, 1♂; same, 19-25.V.2008, 1♂ 1♀; same, 25.V-1.VI.2008, 3♂♂, all. G. Ramel leg., MHNN.

Recovered from three localities of the Kerkini Oros between 750 and 1485m, in various types of broad-leaved and mixed forests.

A moderately common Central and Western European species, only recorded so far from SE Europe from Romania (Iacob 1980), with flight-period in spring. **New record for Greece.**

Dilophus bispinosus Lundström, 1913

Material: **Central Macedonia - Serres:** Vironia, Ramna Site, 41°17'42.5N, 23°11'33.1E, 750m, MT, 13-19.X.2008, 1♀; Neo Petritsi, Stratiom 2 Site, 41°17'44.9N, 23°17'36.6E, 420m, PT, 10-16.XI.2008, 1♂, all. G. Ramel leg., MHNN.

Collected only from two localities with scrub vegetation and mixed deciduous forests, situated at elevations between 420 and 750m in Kerkini Oros.

South European and thermophilous temperate species which has apparently recently extended northwards its range in Europe. Its flight period is estival and autumnal. **New record for Greece.**

Dilophus clavicornus Skartveit & Kaplan, 1996

Material: **Central Macedonia - Serres:** Neo Petritsi, Stratiom 2 Site, 41°17'44.9N, 23°17'36.6E, 420m, PT, 20-26.X.2008, 1♂, 1♀, G. Ramel leg., MHNN.

These specimens were caught in scrub near forest edge with rich herbaceous vegetation in the foothills of the Kerkini Oros.



Fig. 3. *Dilophus clavicornus* Skartveit & Kaplan, 1996: front view of female (photograph Jessica Litman).

Dilophus clavicornus was described from Israel (Skartveit & Kaplan 1996) and has never been recorded since. This is the first report of this species from Europe as a whole, where it appears to be present in the Mediterranean subregion (Haenni, in prep.). It can be recognized from all other West-Palaeartic species in both sexes by the peculiar arrangement of spines on anterior tibia, i.e. 3 subbasal spines in an oblique row, 1 isolated median spine and the usual apical circlet of spines (fig. 3). It is an autumnal species, with flight-period in October. **New record for Greece and Europe.**

***Dilophus febrilis* (Linnaeus, 1758)**

Material: **Peloponnesos - Korinthia**: Kalivia, ca. 1000m, 8.VI.1990, 1♂, J.-P. Haenni leg., MHNN. This widespread European species is common in whole of Europe. It is bivoltine and can be observed sometimes in very large numbers in various habitats. It was not caught during the Kerkini Biodiversity Survey and quite surprisingly, it had apparently never been recorded from Greece before. **New record for Greece.**

***Dilophus humeralis* Zetterstedt, 1850**

Material: **Central Macedonia - Serres**: Promachonas, Roupel's Gorge Site, 41°18'18N, 23°20'00E, 78m, YP, 14.III.2010, 1♂; Neo Petritsi, Strymon Floodplain, 41°15'51N, 23°19'25E, 48m, YP, 15.III.2010, 1♂, 2♀♀; Kerkini, Kerkini Lake Site, 41°09'06.5N, 23°11'55E, 75m, MT, 7-13.III.2005, 1♂, all. G. Ramel leg., MHNN.

Recovered only from three low altitude localities situated in floodplain, in the vicinity of river or lake. A widespread, although uncommon species at low elevations in Europe, appearing early in spring. **New record for Greece.**

***Dilophus* sp. cf. *sardous* Haenni, 2009**

Material: **Central Macedonia - Serres**: Ano Poroia, Kerkini Oros, 41°18'59N, 23°01'55E, 1000m, YP, 20.V.2009, 1♂, G. Ramel leg., MHNN.

This unique specimen strongly resembles *D. sardous*, a species recently described from Sardinia (Haenni 2009), but some differences in spiny ornamentation of the anterior tibia and genitalia prevent from attributing it to this species until more material can be studied.

An updated checklist of Bibionidae of Greece

The following checklist updates the one derived from the Fauna Europaea database (Skartveit 2013). It includes several additions to the fauna (* = new record for Greece) including the correction of an erroneous country attribution for one species, and a new synonymy.

Genus *Bibio* Geoffroy, 1762

- * *clavipes* Meigen, 1818
- femoralis* Meigen, 1838
- handlirschi* Duda, 1930
- hortulanus* (Linnaeus, 1758)
- =*graecus* Duda, 1930 **syn. rev.**
- =*siculus* Loew, 1846
- * *johannis* (Linnaeus, 1767)

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- * *marci* (Linnaeus, 1758)
- (*) *picinitarsis* Brullé, 1832 (see note 1 below)
- * *varipes* Meigen, 1830
- * *venosus* Meigen, 1804

Genus *Dilophus* Meigen, 1803

- * *bispinosus* Lundström, 1913
- * *clavicornus* Skartveit & Kaplan, 1996
- * *febrilis* (Linnaeus, 1758)
- * *humeralis* Zetterstedt, 1850
- lingens* Loew, 1869

Notes:

1. *Bibio picinitarsis* Brullé, 1832 was erroneously mentioned from Sicily by Krivosheina (1995) and Skartveit (2013), although this species was described from Greece, more precisely from “Morée” [=Morea], an ancient name for Peloponnisos used until 19th century. Brullé (1832: 291) described it from “...même localité que la précédente” [=...same locality as preceding [species in his work]], that is “dans la plaine de Modon” [= in the plain of Methoni, Modon being the French name of this city situated in the former Nomos of Messenia, SW Peloponnisos)]. The origin of this mistake is due to Duda (1930: 66) who erroneously quoted Brullé’s description: he wrongly states that the locality of the preceding species is “les environs de Messène” [= the vicinity of Messini], (which is in fact the locality of the penultimate species in Brullé’s work) and he assumes then that the distribution of *B. picinitarsis* is “?Messina”, confusing thus the Sicilian city of Messina with the Greek city of Messini. *Bibio picinitarsis* has never been recorded since its original description and its precise identity remains uncertain. However the original description does not allow to confuse this vernal species with any other European described species.

2. An additional species of *Dilophus*, *D. sp. cf. sardous* Haenni, 2009, is present in Greece, though not identified with certainty for the time being (see over, under this species).

Discussion

The Kerkini survey has produced a surprisingly rich fauna of Bibionidae, with no less than 12 species present in this limited area. This is more than twice the number of species previously recorded from Greece as a whole, which appears to be seriously understudied in this respect. Of particular interest is the discovery of *D. clavicornus* which was until now known only from the Near East, more precisely North and Central Israel (Skartveit & Kaplan 1996). This species has in fact a more extended distribution in Southern Europe (Haenni, in prep.). From zoogeographical and ecological points of view, the bibionid fauna of Kerkini appears to be composed of two groups of species which are well separated regarding their fine distribution in the studied area. The most numerous group (5 species) contains the more or less strictly Mediterranean or South European species which have been caught only in low elevations localities (floodplain, foothills): This group includes *B. femoralis*, *B. handlirschi*, *D. bispinosus*, *D. clavicornus* and *D. humeralis*. Central European species (4 species) are limited to upper elevations of mountainous ranges. They include *B. clavipes*, *B. johannis*, *B. varipes* and *B. venosus*. Interestingly, practically all these species are recorded here for the first time from

Greece. Except for *B. johannis*, their presence there seems to be connected with that of broad-leaved forests. Two species do not enter in these groups: *B. hortulanus* was found to be present exclusively in the same kind of localities as the Mediterranean species. However this species is widely distributed in whole of Europe, but only at low elevations and the elevation is certainly also the limiting factor of its distribution in Northern Greece. On the other hand, the widespread and in Europe ubiquitous *B. marci* is present in Kerkini region in localities of both types mentioned above.

From a faunistic point of view this study greatly increases our knowledge of the Greek fauna, which amounts now to 14 species. There is no doubt however that some additional species will probably be discovered in the future. Finally the importance of regional biodiversity surveys like the Wetland Kerkini Biodiversity Project must be stressed out. It would be very advisable that the biodiversity of other remarkable Greek natural areas is investigated in this way in a near future.

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