

The ground beetles (Coleoptera: Carabidae) of the Monospitovo wetland (southeastern part of North Macedonia)

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Abstract

The ground beetle (Coleoptera: Carabidae) fauna of the Monospitovo wetland (southeastern Republic of North Macedonia) is presented in this paper. Collection of the material was carried out in the period 2004-2010 in different types of habitats: swamps, marshes, wet meadows and seminatural and anthropogenic habitats. In total 1,834 adult specimens were collected by hand and pitfall trapping. We recorded 129 species of ground beetles. Two taxa are recorded for the first time in the fauna of the Republic of North Macedonia – *Dyschirius (Dyschiriodes) chalybeus gibbifrons* Apfelbeck, 1899 and *Acupalpus (Acupalpus) planicollis* Schaum, 1857. The importance of the Monospitovo wetland for the diversity of ground beetles in the Republic of North Macedonia is supported by the presence of 49 species that are known from 1-3 localities in the country. Comments on some interesting ground beetle taxa are also provided.

Key words: Carabidae, wetland habitats, Republic of North Macedonia

Introduction

The ground beetle (Coleoptera: Carabidae) fauna of the lowland wetlands in the Republic of North Macedonia has not been systematically studied. There are some data on the ground beetles of the Belčišta wetland (Hieke 1981), the Ohrid and the former Struga wetlands (Hristovski and Mihajlova 2021), Lepenec River riparian habitats (Hristovski 2017), as well as a few data on other wetlands in the country (Hristovski and Guéorguiev 2015).

Monospitovo wetland is the largest wetland in the Republic of North Macedonia (Melovski et al. 2010). It is listed in the group of the most threatened national wetlands (MoEPP 2018). So far, only few records were published (Melovski et al. 2010; Hristovski and Guéorguiev 2015) from the region in question, which were a part of this investigation. In this paper we will present the complete results of research on the diversity of ground beetle fauna of the Monospitovo wetland.

Study area

Monospitovo wetland is situated in the Strumica valley in the southeastern part of the Republic of North Macedonia at altitudes between 202 and 240 m a.s.l. (Fig. 1). The total wetland area was estimated at ca. 400 ha (Melovski et al. 2010).

The average annual temperature of the Strumica valley is 12.9°C, with July being the warmest (23.8°C) and January being the coldest month (1.6°C). The average annual precipitation (583 mm) is low (Lazarevski 1993).

The vegetation of the Monospitovo wetland is represented by permanently or temporarily flooded marsh vegetation, wet meadows with cloves (*Trifolium* spp.), sedges (*Carex* spp.) and royal fern (*Osmunda regalis* L.), as well as swamp vegetation of alder and willow woodlands (Melovski et al. 2010).

Materials and Methods

The material of ground beetles was collected by hand and pitfall trapping in the period 2004-2010 at the

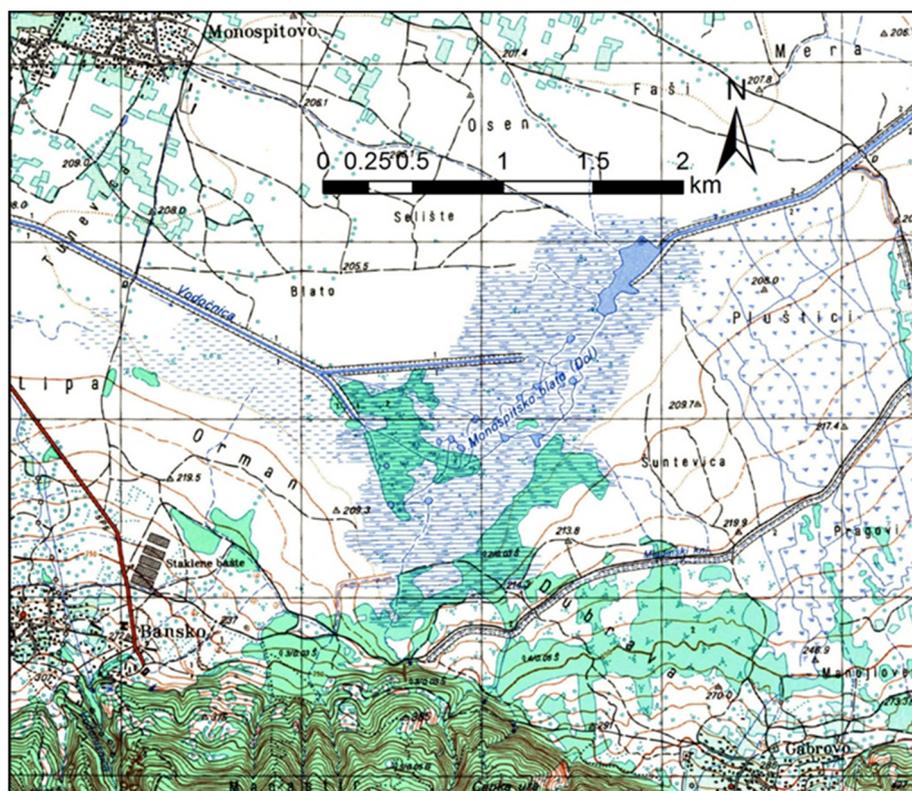


Fig. 1. A topographic map of the Monospitovo wetland.

traps), 225 m a.s.l., 03.2008, leg.: Gj. Ivanov

M08: Bansko (Garlieva Češma), meadow (pitfall traps), 225 m a.s.l., 17.06-03.07.2007, leg.: S. Hristovski & M. Komnenov

M09: Bansko (Garlieva Češma), meadow (pitfall traps), 225 m a.s.l., 03.07-10.09.2007, leg.: S. Hristovski & M. Komnenov

M10: Bansko (Garlieva Češma), meadow (pitfall traps), 225 m a.s.l., 12.09.2007, leg.: S. Hristovski & M. Komnenov

M11: Bansko (Garlieva Češma), meadow (pitfall traps), 225 m a.s.l., 22.04.2008, leg.: Gj. Ivanov

M12: Bosilovo, yard, 210 m a.s.l., 20.06.2004, leg.: Gj. Ivanov

M13: Bosilovo, yard, 210 m a.s.l., 01-05.07.2005, leg.: Gj. Ivanov

M14: Bosilovo, yard, 210 m a.s.l., 02.07.2007, leg.: Gj. Ivanov

M15: Bosilovo, ruderal site, 210 m a.s.l., 08-10.08.2007, leg.: Gj. Ivanov

M16: Bosilovo, ruderal site, 210 m a.s.l., 08.08.2009, leg.: Gj. Ivanov

M17: Bosilovo, ruderal site, 210 m a.s.l., 20-30.08.2010, leg.: Gj. Ivanov

M18: Dubrava, sedges, 230 m a.s.l., 22.04.2008, leg.: S. Hristovski

M19: Dubrava, alder woodland, 230 m, 23.04.2008, leg.: S. Hristovski

M20: Gabrovo, dry pond, 240 m a.s.l., 23.04.2008, leg.: S. Hristovski

M21: Kolešino, alder woodland, 240 m a.s.l., 23.05.2008, leg.: S. Hristovski

M22: Orman, wet meadow, 210 m a.s.l., 24.04.2006, leg.: S. Hristovski

M23: Orman, wet acres, 210 m a.s.l., 23.04.2008, leg.: S. Hristovski

M24: Parking near the Vodočnica stream, 205 m a.s.l., cattail stand (pitfall traps), 24.04.2008, leg.: Gj. Ivanov

M25: Prosenikovo graveyard, grassland, 225 m a.s.l., 15.06.2008, leg.: Gj. Ivanov

M26: Ribnik, wet acres, 210 m a.s.l., 17.05.2007, leg.: S. Hristovski

M27: Ribnik, cattail stand, 210 m a.s.l., 03.07.2007, leg.: S. Hristovski

M28: Ribnik, poplar stand (pitfall traps), 210 m a.s.l., 12.09.2007, leg.: S. Hristovski & M. Komnenov

M29: Ribnik, willow stand (pitfall traps), 210 m a.s.l., 11.09.2007, leg.: S. Hristovski & M. Komnenov

M30: Ribnik, willow stand (pitfall traps), 210 m a.s.l.,

following habitats: swamps (poplar stand, willow stand, alder woodland), marsh (reed beds, cattail stand, dry pond), wet meadows (sedges, royal fern stand) and other seminatural and anthropogenic habitats (acres, ruderal sites, channels, home gardens).

Most samples were collected at altitudes between 205 and 230 m a.s.l., with the exception of localities near the village of Bansko (260-270 m a.s.l.). The material was collected by Gjorgje Ivanov, Slavčo Hristovski, Marjan Komnenov and Trajče Mitev. The following list presents the sampled sites and habitats and sampling dates:

M01: Bansko, meadow, 260 m a.s.l., 23.05.2008, leg.: S. Hristovski

M02: Bansko, ruderal site, 270 m a.s.l., 24.09.2004, leg.: S. Hristovski

M03: Bansko-Dubrava, ruderal site, 220 m a.s.l., 17.06.2007, leg.: S. Hristovski

M04: Bansko (Garlieva Češma), *Osmunda* stand (pitfall traps), 225 m a.s.l., 12.09.2007, leg.: M. Komnenov

M05: Bansko (Garlieva Češma), *Osmunda* stand (pitfall traps), 225 m a.s.l., 17.06-03.07.2007, leg.: S. Hristovski & M. Komnenov

M06: Bansko (Garlieva Češma), *Osmunda* stand (pitfall traps), 225 m a.s.l., 03.07-10.09.2007, leg.: S. Hristovski & M. Komnenov

M07: Bansko (Garlieva Češma), *Osmunda* stand (pitfall

- 12.09.2007, leg.: S. Hristovski & M. Komnenov
- M31:** Ribnik, poplar stand (pitfall traps), 210 m a.s.l., 17.06-03.07.2007, leg.: S. Hristovski & M. Komnenov
- M32:** Ribnik, willow stand (pitfall traps), 210 m a.s.l., 03.07-09.08.2007, leg.: S. Hristovski & M. Komnenov
- M33:** Ribnik, willow stand (pitfall traps), 210 m a.s.l., 09.08-23.12.2007, leg.: S. Hristovski & M. Komnenov
- M34:** Ribnik, willow stand (pitfall traps), 210 m a.s.l., 17.06-03.07.2007, leg.: S. Hristovski & M. Komnenov
- M35:** Ribnik, willow stand (pitfall traps), 210 m a.s.l., 22.04.2008, leg.: Gj. Ivanov
- M36:** Selište, meadow (pitfall traps), 205 m a.s.l., 24.04-04.05.2006, leg.: S. Hristovski & Gj. Ivanov
- M37:** Selište, acres (pitfall traps), 205 m a.s.l., 04-26.05.2006, leg.: S. Hristovski & Gj. Ivanov
- M38:** Selište, reed bed (pitfall traps), 205 m a.s.l., 04-26.05.2006, leg.: S. Hristovski & Gj. Ivanov
- M39:** Selište, acres, 205 m a.s.l., 17.06.2007, leg.: S. Hristovski
- M40:** Selište, cattail stand (pitfall traps), 205 m a.s.l., 04.05-03.07.2007, leg.: S. Hristovski & M. Komnenov
- M41:** Selište, dry acres, 205 m a.s.l., 09.06.2007, leg.: S. Hristovski
- M42:** Selište, meadow (pitfall traps), 205 m a.s.l., 09.06-03.07.2007, leg.: S. Hristovski & M. Komnenov
- M43:** Selište, reed bed and cattail stand (traps), 205 m a.s.l., 09.08-11.09.2007, leg.: S. Hristovski & M. Komnenov
- M44:** Selište, reed bed, 205 m a.s.l., 29.03.2007, leg.: S. Hristovski
- M45:** Selište, wet acres, 205 m a.s.l., 09.06.2007, leg.: S. Hristovski
- M46:** Selište, wet meadow, 205 m a.s.l., 17.06.2007, leg.: S. Hristovski
- M47:** Selište, dry ruderal site, 205 m a.s.l., 22.04.2008, leg.: Gj. Ivanov
- M48:** Selište, cattail stand (pitfall traps), 205 m a.s.l., 23.03-24.04.2008, leg.: Gj. Ivanov
- M49:** Selište, cattail stand (pitfall traps), 205 m a.s.l., 24.04-12.07.2008, leg.: Gj. Ivanov
- M50:** Selište, reed bed and cattail stand (pitfall traps), 205 m a.s.l., 12.07-03.08.2008, leg.: Gj. Ivanov
- M51:** Selište, reed bed and cattail stand (pitfall traps), 205 m a.s.l., 24.04-12.07.2008, leg.: Gj. Ivanov
- M52:** Vodočnica, reed bed, 205 m a.s.l., 28.03.2007, leg.: S. Hristovski
- M53:** Vodočnica, channel, 205 m a.s.l., 29.03.2008, leg.: Gj. Ivanov
- M54:** Vodočnica, channel (pitfall traps), 205 m a.s.l., 24.04.2008, leg.: Gj. Ivanov
- M55:** Vodočnica, small channel (pitfall traps), 205 m a.s.l., 28.05.2008, leg.: Gj. Ivanov

The material is kept in the private collection of the first author.

Results and Discussion

In total 1,834 adult specimens belonging to 129 ground beetle species from 45 genera (arranged in 65

Table 1. A list of recorded ground beetle species in the Monospitovo wetland [abbreviations of localities M1-M55 are presented in the Materials and Methods chapter].

Species/subspecies	Localities (number of adult specimens)	Total adult specimens
<i>Abax (Abacopercus) carinatus carinatus</i> (Duftschmid, 1812)	M10 (1)	1
<i>Acupalpus (Acupalpus) brunnipes</i> (Sturm, 1825)	M05 (3); M08 (1)	4
<i>Acupalpus (Acupalpus) exiguus</i> Dejean, 1829	M34 (1)	1
<i>Acupalpus (Acupalpus) luteatus</i> (Duftschmid, 1812)	M21 (1)	1
<i>Acupalpus (Acupalpus) maculatus</i> (Schaum, 1860)	M05 (1); M20 (1); M23 (2); M36 (1)	5
<i>Acupalpus (Acupalpus) meridianus</i> (Linnaeus, 1761)	M36 (1)	1
<i>Acupalpus (Acupalpus) parvulus</i> (Sturm, 1825)	M19 (1); M22 (1)	2
<i>Acupalpus (Acupalpus) planicollis</i> Schaum, 1857	M22 (1); M55 (1)	2

Species/subspecies	Localities (number of adult specimens)	Total adult specimens
<i>Acupalpus (Acupalpus) suturalis</i> Dejean, 1829	M23 (1)	1
<i>Agonum (Agonum) marginatum</i> (Linnaeus, 1758)	M22 (4)	4
<i>Agonum (Agonum) muelleri</i> (Herbst, 1784)	M22 (3); M31 (1)	4
<i>Agonum (Olisares) permoestum</i> Puel, 1938	M22 (5); M24 (6); M34 (18); M36 (1); M51 (2)	32
<i>Agonum (Olisares) viridicupreum viridicupreum</i> (Goeze, 1777)	M18 (3); M22 (24); M23 (4); M26 (1); M35 (1); M42 (1); M45 (3); M46 (1)	38
<i>Agonum (Olisares) angustatum</i> Dejean, 1828	M11 (2); M18 (5); M22 (16); M24 (18); M29 (1); M34 (17); M35 (11); M36 (1); M51 (12);	89
<i>Amara (Amara) aenea</i> (De Geer, 1774)	M04 (1); M08 (1); M11 (1); M16 (1); M17 (1); M35 (1); M36 (1); M39 (2); M41 (7); M53 (1);	18
<i>Amara (Amara) anthobia</i> A. Villa & G. B. Villa, 1833	M55 (2)	2
<i>Amara (Amara) littorea</i> C. G. Thomson, 1857	M34 (1)	1
<i>Amara (Amara) lucida</i> (Duftschmid, 1812)	M54 (1)	1
<i>Amara (Amara) ovata</i> (Fabricius, 1792)	M24 (1); M34 (2); M55 (4)	7
<i>Amara (Amara) similata</i> (Gyllenhal, 1810)	M36 (1)	1
<i>Amara (Bradytus) apricaria</i> (Paykull, 1790)	M17 (1)	1
<i>Amara (Zezea) plebeja</i> (Gyllenhal, 1810)	M08 (1)	1
<i>Amblystomus metallescens</i> (Dejean, 1829)	M34 (1)	1
<i>Anisodactylus (Anisodactylus) binotatus</i> (Fabricius, 1787)	M22 (2); M24 (4); M32 (3); M36 (1); M54 (1)	11
<i>Anisodactylus (Anisodactylus) nemorivagus</i> (Duftschmid, 1812)	M06 (1); M08 (1); M11 (1); M34 (1)	4
<i>Anisodactylus (Pseudodichirus) intermedius</i> Dejean, 1829	M10 (1)	1
<i>Anisodactylus (Pseudanisodactylus) signatus</i> (Panzer, 1796)	M13 (2); M31 (1); M45 (1)	4
<i>Anthracus longicornis</i> (Schaum, 1857)	M18 (1); M22 (1); M54 (1)	3
<i>Asaphidion flavipes</i> (Linnaeus, 1761)	M24 (1); M28 (5); M30 (3); M31 (37); M32 (2); M33 (1); M34 (39); M40 (7); M54 (2);	100
<i>Badister (Badister) lacertosus</i> Sturm, 1815	M28 (1); M40 (1); M 54(1)	3
<i>Badister (Badister) meridionalis</i> Puel, 1925	M31 (3)	3
<i>Badister (Baudia) collaris</i> Motschulsky, 1844	M34 (1)	1
<i>Bembidion (Bembidion) quadrimaculatum quadrimaculatum</i> (Linnaeus, 1760)	M34 (1)	1
<i>Bembidion (Emphanes) tenellum tenellum</i> Erichson, 1837	M18 (2); M22 (1); M23 (8)	11
<i>Bembidion (Metallina) lampros</i> (Herbst, 1784)	M05 (1); M08 (1); M22 (1); M23 (8); M36 (1); M42 (1)	13
<i>Bembidion (Metallina) properans</i> (Stephens, 1828)	M12 (3); M22 (2); M34 (4); M41 (1)	10
<i>Bembidion (Nepha) vseteckai dissimile</i> G. Müller, 1943	M01 (1); M19 (2); M20 (2); M22 (1)	6
<i>Bembidion (Notaphus) varium</i> (Olivier, 1795)	M23 (1)	1

Species/subspecies	Localities (number of adult specimens)	Total adult specimens
<i>Bembidion (Philochthus) biguttatum</i> (Fabricius, 1779)	M24 (1); M31 (1); M34 (3); M35 (2); M36 (3); M40 (1); M51 (1); M52 (1)	13
<i>Bembidion (Philochthus) inoptatum</i> Schaum, 1857	M22 (3); M35 (2); M52 (1)	6
<i>Bembidion (Philochthus) lunulatum</i> (Geoffroy, 1785)	M22 (1); M23 (1)	2
<i>Bembidion (Principidium) punctulatum punctulatum</i> Drapiez, 1820	M22 (1)	1
<i>Bembidion (Trepanes) articulatum</i> (Panzer, 1796)	M18 (8); M19 (1); M22 (16); M24 (1); M32 (1)	27
<i>Bembidion (Trepanes) octomaculatum</i> (Goeze, 1777)	M23 (1)	1
<i>Brachinus (Brachinus) crepitans</i> (Linnaeus, 1758)	M17 (1)	1
<i>Brachinus (Brachinus) elegans</i> Chaudoir, 1842	M54 (1)	1
<i>Brachinus (Brachinus) psophia</i> Audinet-Serville, 1821	M45 (1)	1
<i>Brachinus (Brachynidius) explodens</i> Duftschmid, 1812	M13 (1)	1
<i>Broscus cephalotes</i> (Linnaeus, 1758)	M14 (1); M17 (1)	2
<i>Calathus (Calathus) fuscipes</i> (Goeze, 1777)	M17 (2); M25 (2)	4
<i>Calathus (Neocalathus) cinctus</i> Motschulsky, 1850	M17 (4); M30 (2)	6
<i>Carabus (Carabus) granulatus interstitialis</i> Duftschmid, 1812	M11 (1); M24 (16); M35 (3); M38 (2); M42 (1); M49 (30); M52 (1)	54
<i>Carabus (Procrustes) coriaceus cerisyi</i> Dejean, 1826	M10 (1)	1
<i>Chlaenius (Chlaeniellus) nigricornis</i> (Fabricius, 1787)	M06 (2); M22 (4); M32 (1); M38 (2); M51 (1)	10
<i>Chlaenius (Chlaeniellus) nitidulus</i> (Schrank, 1781)	M05 (1); M22 (1); M55 (2)	4
<i>Chlaenius (Chlaeniellus) tristis tristis</i> (Schaller, 1783)	M22 (2)	2
<i>Chlaenius (Chlaeniellus) vestitus</i> (Paykull, 1790)	M22 (1); M54 (3)	4
<i>Chlaenius (Chlaenius) festivus festivus</i> (Panzer, 1796)	M22 (1)	1
<i>Cicindela (Cicindela) campestris campestris</i> Linnaeus, 1758	M11 (3)	3
<i>Clivina (Clivina) fossor fossor</i> (Linnaeus, 1758)	M11 (1); M18 (1); M28 (1)	3
<i>Clivina (Reichardtula) laevifrons</i> Chaudoir, 1842	M26 (1)	1
<i>Cylindera (Cylindera) germanica germanica</i> (Linnaeus, 1758)	M05 (1); M08 (1); M39 (2)	4
<i>Demetrius (Demetrius) monostigma</i> Samouelle, 1819	M22 (2)	2
<i>Demetrius (Aetophorus) imperialis</i> (Germar, 1823)	M44 (1)	1
<i>Diachromus germanus</i> (Linnaeus, 1758)	M45 (1)	1
<i>Dolichus halensis</i> (Schaller, 1783)	M17 (1); M32 (1)	2
<i>Drypta (Drypta) dentata</i> (P. Rossi, 1790)	M42 (1)	1

Species/subspecies	Localities (number of adult specimens)	Total adult specimens
<i>Dyschirius (Dyschiriodes) chalybeus gibbifrons</i> Apfelbeck, 1899	M18 (6); M20 (2); M22 (8); M23 (12); M31 (1)	29
<i>Dyschirius (Dyschiriodes) intermedius</i> Putzeys, 1846	M23 (1)	1
<i>Dyschirius (Eudyschirius) globosus</i> (Herbst, 1784)	M05 (2); M11 (5); M19 (1); M31 (5)	13
<i>Elaphrus (Elaphrus) weissi</i> Dostal, 1996	M18 (6); M22 (14); M23 (1)	21
<i>Elaphrus (Neoelaphrus) uliginosus</i> Fabricius, 1792	M22 (8); M34 (2); M35 (1); M53 (1)	12
<i>Harpalus (Cryptophonus) tenebrosus</i> Dejean, 1829	M42 (2)	2
<i>Harpalus (Harpalus) affinis</i> (Schrank, 1781)	M46 (1)	1
<i>Harpalus (Harpalus) atratus</i> Latreille, 1804	M08 (1)	1
<i>Harpalus (Harpalus) cupreus fastuosus</i> Faldermann, 1836	M45 (1)	1
<i>Harpalus (Harpalus) dimidiatus</i> (P. Rossi, 1790)	M24 (1)	1
<i>Harpalus (Harpalus) distinguendus distinguendus</i> (Duftschmid, 1812)	M12 (5); M18 (1); M24 (2); M26 (1); M41 (1); M45 (2); M46 (1); M53 (1)	14
<i>Harpalus (Harpalus) rubripes</i> (Duftschmid, 1812)	M08 (3); M10 (2); M11 (1)	6
<i>Harpalus (Harpalus) rufipalpis rufipalpis</i> Sturm, 1818	M09 (1); M55 (2)	3
<i>Harpalus (Harpalus) serripes serripes</i> (Quensel, 1806)	M12 (1); M41 (1)	2
<i>Harpalus (Semiophonus) signaticornis</i> (Duftschmid, 1812)	M11 (1)	1
<i>Harpalus (Harpalus) smaragdinus</i> (Duftschmid, 1812)	M13 (1)	1
<i>Harpalus (Harpalus) tardus</i> (Panzer, 1796)	M55 (1)	1
<i>Harpalus (Harpalus) zabroides</i> Dejean, 1829	M03 (1)	1
<i>Harpalus (Pseudoophonus) calceatus</i> (Duftschmid, 1812)	M15 (1); M16 (1)	2
<i>Harpalus (Pseudoophonus) griseus</i> (Panzer, 1796)	M02 (1); M10 (1); M15 (4); M16 (2); M34 (1)	9
<i>Harpalus (Pseudoophonus) rufipes</i> (De Geer, 1774)	M05 (2); M13 (2); M15 (1); M28 (3); M40 (1); M41 (1)	10
<i>Licinus (Licinus) depressus</i> (Paykull, 1790)	M02 (1); M28 (4); M40 (1)	6
<i>Lionychus (Lionychus) quadrillum</i> (Duftschmid, 1812)	M22 (1)	1
<i>Nebria (Nebria) brevicollis</i> (Fabricius, 1792)	M07 (1); M20 (2); M22 (7); M31 (1); M36 (1); M55 (1)	13
<i>Odacantha (Odacantha) melanura</i> (Linnaeus, 1767)	M44 (3)	3
<i>Oodes helopioides helopioides</i> (Fabricius, 1792)	M18 (1); M22 (4); M35 (7); M52 (1)	13
<i>Ophonus (Metophonus) puncticeps</i> Stephens, 1828	M15 (2)	2
<i>Ophonus (Metophonus) schaubergerianus</i> (Puel, 1937)	M10 (1)	1
<i>Ophonus (Metophonus) veluchianus</i> (J. Müller, 1931)	M16 (1)	1

Species/subspecies	Localities (number of adult specimens)	Total adult specimens
<i>Ophonus (Ophonus) diffinis</i> (Dejean, 1829)	M10 (1)	1
<i>Oxytselaphus obscurus</i> (Herbst, 1784)	M32 (1); M34 (1); M43 (1)	3
<i>Paratachys bistriatus</i> (Duftschmid, 1812)	M18 (4); M22 (3); M31 (2); M34 (3)	12
<i>Parophonus (Ophonomimus) hirsutulus</i> (Dejean, 1829)	M17 (1)	1
<i>Parophonus (Parophonus) dejeani</i> (Csiki, 1932)	M12 (1); M32 (1); M55 (4)	6
<i>Parophonus (Parophonus) maculicornis</i> (Duftschmid, 1812)	M54 (10)	10
<i>Poecilus (Poecilus) anatolicus</i> (Chaudoir, 1850)	M41 (1); M47 (1)	2
<i>Poecilus (Poecilus) cupreus cupreus</i> (Linnaeus, 1758)	M11 (10); M18 (2); M22 (12); M24 (10); M26 (2); M27 (2); M29 (3); M34 (20); M35 (3); M36 (12); M37 (2); M38 (43); M42 (567); M43 (29); M45 (14); M46 (2); M48 (31); M50	768
<i>Poecilus (Poecilus) rebeli</i> (Apfelbeck, 1904)	M34 (1)	1
<i>Pterostichus (Argutor) cursor</i> (Dejean, 1828)	M11 (2); M24 (1); M32 (1); M34 (1); M52 (1)	6
<i>Pterostichus (Argutor) leonisi</i> Apfelbeck, 1904	M34 (10); M35 (1); M36 (1)	12
<i>Pterostichus (Argutor) vernalis</i> (Panzer, 1796)	M36 (1); M42 (2)	3
<i>Pterostichus (Melanius) elongatus</i> (Duftschmid, 1812)	M22 (1)	1
<i>Pterostichus (Morphnosoma) melanarius melanarius</i> (Illiger, 1798)	M10 (1); M22 (1)	2
<i>Pterostichus (Phonias) strenuus</i> (Panzer, 1796)	M35 (3); M51 (1)	4
<i>Pterostichus (Platysma) niger niger</i> (Schaller, 1783)	M07 (1); M10 (1); M17 (1); M28 (1); M29 (2); M32 (1); M33 (1); M34 (2); M36 (6); M42 (2);	37
<i>Pterostichus (Pseudomaseus) anthracinus anthracinus</i> (Illiger, 1798)	M07 (1); M11 (3); M18 (1); M22 (4); M24 (3); M29 (1); M31 (5); M32 (2); M34 (10); M35 (4); M36 (3); M38 (1); M40 (1); M43 (5); M48 (30); M50 (1); M51 (8); M52 (1)	84
<i>Pterostichus (Pseudomaseus) minor</i> (Gyllenhal, 1827)	M19 (1); M22 (1); M32 (1); M34 (1)	4
<i>Pterostichus (Pseudomaseus) nigrita</i> (Paykull, 1790)	M22 (1)	1
<i>Scarites (Parallelomorpha) terricola</i> Bonelli, 1813	M08 (8); M09 (3); M36 (2); M42 (3)	16
<i>Stenolophus (Stenolophus) discophorus</i> (Fischer von Waldheim, 1823)	M15 (1); M22 (6); M32 (1); M45 (3)	11
<i>Stenolophus (Egadroma) marginatus</i> Dejean, 1829	M12 (2); M16 (3); M17 (1); M22 (1); M45 (1)	8
<i>Stenolophus (Stenolophus) abdominalis persicus</i> Mannerheim, 1844	M31 (1); M43 (1)	2
<i>Stenolophus (Stenolophus) mixtus</i> (Herbst, 1784)	M08 (1); M22 (1); M32 (1); M34 (3); M35 (2); M54 (5)	13
<i>Stenolophus (Stenolophus) proximus</i> Dejean, 1829	M24 (1); M43 (1)	2
<i>Stenolophus (Stenolophus) skrimshiranus</i> Stephens, 1828	M17 (1)	1
<i>Stenolophus (Stenolophus) teutonius</i> (Schrank, 1781)	M06 (3); M13 (2); M22 (13); M23 (3); M24 (1); M36 (1); M37 (1); M42 (1); M51 (1)	26

Species/subspecies	Localities (number of adult specimens)	Total adult specimens
<i>Syntomus obscuroguttatus</i> (Duftschmid, 1812)	M17 (2)	2
<i>Tachyura (Sphaerotachys) hoemorroidalis</i> (Ponza, 1805)	M17 (2); M18 (7); M19 (1); M20 (19); M22 (14); M23 (11); M26 (1); M34 (1); M45 (1)	57
<i>Tachyura (Tachyura) parvula</i> (Dejean, 1831)	M08 (5); M 11(1)	6
<i>Trechus (Trechus) austriacus</i> Dejean, 1831	M17 (3)	3
<i>Trechus (Trechus) quadristriatus</i> (Schrank, 1781)	M30 (1); M31 (1); M34 (1); M36 (1)	4
<i>Zabrus (Pelor) spinipes insignis</i> J. Müller, 1931	M25 (3)	3

subgenera) were collected and determined (Tab. 1). The richest in species are the following genera: *Harpalus* (16 species), *Bembidion* (12), *Pterostichus* (10), *Acupalpus* and *Amara* (8 each), as well as *Stenolophus* (7). The most abundant species was *Poecilus (Poecilus) cupreus* with 768 adult specimens, followed by *Asaphidion flavipes* (100), *Agonum (Olisares) angustatum* (89) and *Pterostichus (Pseudomaseus) anthracinus* (84). These four species constitute about 57% of all specimens collected.

The most recent studies on ground beetle fauna of the wetlands on the Balkans concern the Srebarina wetland in Bulgaria (Jocque et al. 2016) and the floodplains of the Vjosa River in Albania (Paill et al. 2018). In the case of the Srebarina wetland, a total of 1,728 adult specimens of 116 ground beetle species were collected by light trapping during 11 evenings. The ground beetle fauna of the floodplains of the Vjosa River consists of 112 species. Namely, 2,327 specimens of ground beetles were collected in the mentioned floodplains by hand, intensive pitfall trapping in a short period of time and by light trapping). Monospitovo wetland is inhabited by 129 species of ground beetles, which were collected in a longer period of time compared to the respective studies in Bulgaria and Albania.

Dyschirius (Dyschiriodes) chalybeus gibbifrons and *Acupalpus (Acupalpus) planicollis* are new taxa for the fauna of the Republic of North Macedonia. Actually, Monospitovo wetland is the single known locality in the country for these two and eight more ground beetle species [*Tachyura (Tachyura) parvula*, *Anisodactylus (Pseudodichirus) intermedius*, *Acupalpus (Acupalpus) brunripes*, *A. (A.) exiguus*, *Anthracus longicornis*, *Badister (Badister) meridionalis*, *Licinus (Licinus) depressus* and *Amara (Zezea) plebeja*] (Hristovski and Guéorguiev 2015). Additional 39 taxa may be considered as rare in the Republic of North Macedonia

(known from only 2-3 localities, mostly wetlands): *Acupalpus (Acupalpus) luteatus*, *A. (A.) parvulus*, *A. (A.) planicollis*, *A. (A.) suturalis*, *A. (O.) angustatum*, *Agonum (Agonum) marginatum*, *A. (Olisares) permoestum*, *Amblystomus metallescens*, *Anisodactylus (Pseudanisodactylus) signatus*, *Badister (Badister) lacertosus*, *Bembidion (Philochthus) biguttatum*, *B. (P.) inoptatum*, *B. (P.) lunulatum*, *B. (Emphanes) tenellum tenellum*, *Brachinus (Brachinus) elegans*, *B. (B.) psophia*, *Broscus cephalotes*, *Chlaenius (Chlaeniellus) nigricornis*, *C. (C.) tristis tristis*, *Clivina (Reichardtula) laevifrons*, *Demetrias (Aetophorus) imperialis*, *D. (Demetrias) monostigma*, *Dolichus halensis*, *Drypta (Drypta) dentata*, *D. (D.) chalybeus gibbifrons*, *Elaphrus (Neoelaphrus) uliginosus*, *E. (Elaphrus) weissii*, *Harpalus (Semiophonus) signaticornis*, *Harpalus (Harpalus) zabroides*, *Odacantha (Odacanth) melanura*, *Oodes helopioides helopioides*, *Ophonus (Ophonus) diffinis*, *O. (Metophonus) veluchianus*, *Poecilus (Poecilus) anatolicus*, *P. (P.) rebeli*, *Pterostichus (Argutor) vernalis*, *Stenolophus (Stenolophus) proximus*, *S. (S.) skrimshiranus* and *Tachyura (Sphaerotachys) hoemorroidalis*. However, it can be expected that many of these taxa will be found in other wetlands in the Republic of North Macedonia in the future.

Most of the recorded species are distributed in Europe or the Palaearctic. However, some of them have southern distribution and are restricted to the Balkan Peninsula, southeastern Europe or the Mediterranean, or they are distributed in southeastern Europe, Asia Minor and the Middle East. Comments on some of these interesting findings are presented in the following text.

Elaphrus (E.) weissii is distributed in the southern part of the Balkan Peninsula, Turkey and Israel (Arndt 2011). The specimens from the Monospitovo wetland were incorrectly identified as *Elaphrus (Elaphrus) ripari-*

us (Linnaeus, 1758) and thus cited in the catalogue of ground beetles of the Republic of North Macedonia (Hristovski and Guéorguiev 2015). There is one more record of *E. (E.) riparius* known for the country – from a wetland near the town of Bitola (Hristovski and Guéorguiev 2015). Hence, this species might be absent from the Republic of North Macedonia. Furthermore, all specimens of *E. (E.) riparius* from the southern part of the Balkans should be re-examined.

Clivina (R.) laevifrons is a rare species in the Republic of North Macedonia. So far, it was known in the country only from the Badar Gorge of the Pčinja River. It is distributed in the Mediterranean (Bulirsch and Stachowiak 2017). This species is known from the neighbouring region (Sandanski-Petrich Valley) in Bulgaria (Guéorguiev and Guéorguiev 1995).

Tachyura (T.) parvula is also rare in the Republic of North Macedonia, with the Monospitovo wetland being the only known locality in the country (Hristovski and Guéorguiev 2015). It is considered a rare Euromediterranean species too (Aleksandrowicz 2012). Six specimens of this species were collected by pitfall trapping in the Monospitovo wetland in a wet meadow close to a stand of royal fern.

Bembidion (Nepha) vseteckai dissimile is generally distributed on the Balkan Peninsula and Italy (Basilicata, Calabria and Sicily) (Bonavita and Taglianti 2010). In the Republic of North Macedonia it is frequently found along rivers and streams in both lowlands and mountainous areas (Hristovski and Guéorguiev 2015).

Acupalpus (A.) planicollis is known from Bulgaria (Sandanski-Petrich Valley and southern Black Sea coast), Albania (Velipojë, Vlorë, Butrint, Vjosa) and Greece (Peloponnese, Thessaly), as well as from north-eastern Italy (Guéorguiev and Guéorguiev 1995; Guéorguiev 2007; Jaeger et al. 2016; Paill et al. 2018). The record of this species from the Monospitovo wetland is the first one for the Republic of North Macedonia.

Poecilus (P.) anatolicus can be easily distinguished from other European congeners by the presence of pubescence on the terminal part of the third antennomere. It was described from Turkey (Wrase 1992) and it is with a few known localities on the Balkan Peninsula (Bousquet 2017). It is associated with humid habitats (wetlands). In the Republic of North Macedonia it was

previously known from the area of the village of Mralino (Cvetkovska-Gjorgjievska et al. 2011).

Poecilus (P.) rebeli was recorded so far in the Republic of North Macedonia only from Mt. Galičica, in the vicinity of a small pond and wetlands surrounded by meadows close to Glajšo stream (Hristovski and Guéorguiev 2015). This species is known from all Balkan countries with the exception of Bulgaria (Bousquet 2017). The record from the Monospitovo wetland is the second one for the Republic of North Macedonia.

Pterostichus (P.) anthracinus includes four subspecies [*anthracinus* (Illiger, 1798), *biimpressus* (Küster, 1853), *hespericus* (Bucciarelli & Sopracordevole, 1958) and *depressiusculus* (Chaudoir, 1844)], out of which the nominotypical subspecies and ssp. *biimpressus* are reported for most Balkan countries (Bousquet 2017). The latter subspecies was described based on the specimens from Omiš, Dalmatia. It is with uncertain taxonomic status (Paill et al. 2018). The specimens from the floodplains of the Vjosa River (Albania) differ from the ones of the nominotypical subspecies by apically broadened elytra with microsculpture consisting of transverse meshes in both sexes. Specifically in males of the nominotypical subspecies, the impression on the last visible sternum is shallower and doesn't reach the apicomedial border, while the aedeagus is deeply notched in its right-angled part (Paill et al. 2018). The specimens from the Monospitovo wetland and other localities in the Republic of North Macedonia are assigned to the nominotypical subspecies and there are no records of ssp. *biimpressus* in the country (Hieke 1981; Krpač et al. 2013; Hristovski and Guéorguiev 2015). Examination of the nominotypical subspecies from the Monospitovo wetlands showed that all females have a deep excision on each elytron before the tip (Fig. 2a), which was previously considered a diagnostic feature of ssp. *biimpressus* (Schatzmayr 1942; Guéorguiev and Skoupý 2010). We compared the aedeagus of the specimens from the Monospitovo wetland with that of the specimens from the floodplains of the Vjosa River (Paill et al. 2018, p.294). The median lobe of the aedeagus of the specimens from the former area (Fig. 2b) shows great similarity to that of ssp. *anthracinus*: the general form is almost identical, it lacks the notch, but the apex of the aedeagus is somewhat longer than that of ssp. *anthracinus*. The impression on the last visible sternum in males is clearly visible and

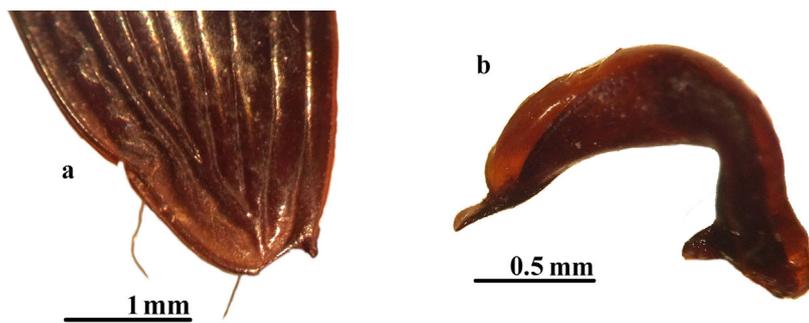


Fig. 2. *Pterostichus (Pseudomaseus) anthracinus anthracinus* from the Monospitovo wetland. a) Tip of left elytron of a female, dorsal view; b) Median lobe of aedeagus, right lateral view.

reaches the apicomedial border. The last two characteristics point out to the conclusion that the specimens from the Monospitovo wetland belong to the nominotypical subspecies of *P. (P.) anthracinus*. The form of the aedeagus is very similar to the one of *P. (P.) anthracinus*

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