

On the fauna of carrion beetles (Coleoptera, Silphidae) of Mazurian lakeland (north-eastern Poland)

OLEG ALEKSANDROWICZ, University of Warmia and Mazuria, 10-727 Olsztyn-Kortowo, Lodzki Sq. 3, Poland, e-mail: oleg.aleksandrowicz@uwm.edu.pl

KAROL KOMOSIŃSKI, University of Warmia and Mazuria, 10-727 Olsztyn-Kortowo, Lodzki Sq. 3, Poland, e-mail: kurcik@uwm.edu.pl

Abstract: A check-list of Carrion beetles (*Coleoptera, Silphidae*) of Mazurian Lakeland (north-eastern Poland) is provided. At present the list includes 19 species. Other data (20 species) are cited by the latest German work (Bercio, Folwaczny 1979). The comparative characteristic of *Silphidae* species' composition in entire Mazurian Lakeland is presented. Beetles were collected in pitfall traps with carrion and standard Barbers' traps with glycol (25%) in forest and meadow habitats. During sampling periods (April–November 1997–2002) there were captured 18654 specimens. Five species: *Thanatophilus sinuatus*, *Oiceoptoma thoracica*, *Nicrophorus investigator*, *N. vespillo*, and *N. vespilloides* were most numerous.

Key words: *Silphidae*, fauna, distribution, check-list, Mazurian Lakeland, Poland

Introduction

The family of carrion beetles (*Silphidae*) is represented in the world fauna by 250 species. In Europe known about 40 species are known (Mroczkowski 1955), and in the Baltic region 20 species are revealed so far (Silfverberg 1992).

There were no special studies on this family in north-eastern Poland after World War II, the prewar faunistic data were summarized by Bercio & Folwaczny (1979).

Many of carrion beetles are very important in ecosystems, consuming corpses of animals and promoting thus matter turnover and acceleration of circulation of biogenic substances. Some of *Silphidae* species the economically important pests (*Aclypea opaca*, *A. undata*) and predators (*Silpha carinata*, *Phosphuga atrata*, *Dendroxena quadrimaculata*) (Koch 1989).

Therefore, the survey of carabid fauna has had two objectives: the purely scientific one and the applied science interest as well.

Place and methods of investigation

Field research was conducted in 1997–2002 in the Masurian Lakeland in north-eastern Poland (Fig. 1). Investigations were carried out in different forest communities: 12 types of pine forest, 14 types of deciduous forests (11 types of hornbeam, and 4 types of wet alder forest), and 22 types of open areas: 11 moist meadows, 9 dry meadows, 2 pastures.

In Masurian Lakeland 100 self-catching traps containing bait in the form of carrion were placed along two transects which crossed in the Olsztyn centre. They were placed from May to August during 3 years (1997–1999) and controlled every two weeks. Those traps were situated in 5 clusters (4 traps in every cluster) in each line running from Olsztyn (towards Ostroda, Dobre Miasto, Mragowo and Olsztynek). In every cluster were fixed 4 different habitats. From May to September 1997 we surveyed the necrophilous beetle assemblages collected during 2 checks of all traps. Thus a total of 160 samples were studied (73 and 87 from every check respectively (Fig. 1).

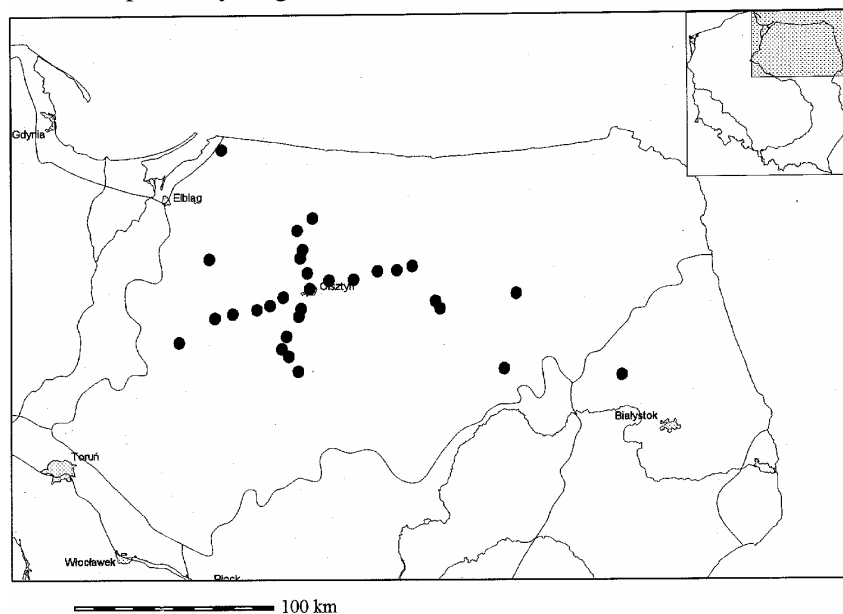


FIGURE 1. • Sites of investigation

The collected materials have been complemented with the data on *Silphidae* from Barber's pitfall traps without bait in 2002 from four sites. Those were: hornbeam forest (*Tilio-Carpinetum typicum*) in Olsztyn Municipal Forest, pasture in Gorskie near Kolno, hornbeam forest (*Carpinetum typicum*) in Balda river valley near Braniewo, and young pine forest in Dziekonie near Monki (Fig. 1). Plastic

caps 9 cm in diameter and about 12 cm deep were used as traps. They were put into hollows made with a soil sampler. The traps were filled with ethylene glycol by 1/4 of their volume. Samples were taken for 14 days each month over the growing season, i.e. from April through October.

Using the two methods, about 18,000 adult carrion beetles were collected. The list of carrion species was prepared with use of the nomenclature by Silfverberg (1992) and data of world distribution and ecology by Mroczkowski (1955) and Burakowski *et al* (1978). Gorodkov's (1984) terminology has used for the description of the areals types.

Results and discussion

In total for the period of researches 18654 specimens of carrion beetles which basic part are stored in the collections of Zoological Museum of the University of Warmia and Mazuria in Olsztyn.

The list of Carrion species was prepared with use of the nomenclature by Silfverberg (1992) and data of world distribution and ecology by Mroczkowski (1955), Burakowski *et al.* (1978), and Koch (1989).

The Roman figures designate months of imago activity.

The list of species of carrion beetles fauna of north-eastern Poland

Nicrophorus germanicus Linnaeus, 1758. The Westpalaearctic necrophagous species. Not found.

Nicrophorus humator Olivier, 1790. The Westpalaearctic necrophagous species. It is common mainly in forests, sometimes in mushrooms. V–XI.

Nicrophorus fossor Erichson, 1837. The Transpalaearctic necrophagous species. In our materials it is very rare. Found one specimen only: DE86 Tumiany near Barczewo, dry meadow, 1997.09.08.

Nicrophorus investigator Zetterstedt, 1824 The Transpalaearctic necrophagous species. It is common eurybiont species. VII–VIII; in August (fly on light).

Nicrophorus vespillo (Linnaeus, 1758). The Holarctic necrophagous species. Distributed in open areas mainly. It is the most widespread and numerous species of a genus. V–XI.

Nicrophorus vespilloides Herbst, 1783. The Transpalaearctic necrophagous species. It is very numerous in the forests, on carrion and in putrid mushrooms. IV–IX.

Nicrophorus vestigator Herbst, 1807. The Euro-Siberian necrophagous species. It is common mainly in open areas. VII–X.

Nicrophorus sepultor Charpentier, 1825. The Euro-Siberian necrophagous species. It is rare, in our materials the majority of finds from the open areas: DE52 Waplewo, dry meadow, 1997.09.10 – 4 exx., 1998.07.27 – 4 exx., 1998.09.02 – 5 exx., 1999.07.17 – 1 ex., 1999.09.18 – 2 exx.; DE86 Tumiany near Barczewo, dry meadow, 1997.09.08 – 1 ex.; DE96 Parleza Wielka, dry meadow, 1997.09.08 – 6 exx., EE17 Lasowiec near Mragowo, wet meadow, 1997.09.08 – 1 ex.; DE24 Tyrowo, near Ostroda, wet meadow, 1997.09.09 – 3 exx.; DE52 Dobrzyn, dry meadow, 1997.09.10 – 10 exx.; DE55 Naglady, dry meadow, 1998.08.29 – 5 exx.; FE21 Dziękonie near Mońki, cope pine forest, 2002.07.17, DF22 2 exx.; Balda river valley near Braniewo, hornbeam forest, 2002.10.27 – 1 ex.

Necrodes littoralis (Linnaeus, 1758). The European necrophagous species. It is common, is more often on large carrion and fossils at the river- and lakeside. V– VIII; (fly on light).

Thanatophilus dispar (Herbst, 1793). The transpalaearctic necrophagous species. It is rare: DE55 Naglady, dry meadow, 1997.09.09 – 1 ex.; DE35 Lubajny, wet meadow, 1997.08.02 – 5 exx.; DE65 Dorotowo, wet meadow, 1997.08.05 – 1 ex.; DE68 Smolajny, dry meadow, 1997.08.12 – 1 ex.; EE06 Sorkwity, wet meadow, 1998.06.14 – 1 ex.

Thanatophilus rugosus (Linnaeus, 1758). The Transpalaearctic necrophagous species. It is common mainly in open areas. V–VIII.

Thanatophilus sinuatus (Fabricius, 1775). The Transpalaearctic necrophagous species; it is very numerous in open areas, V–VIII.

Aclypea opaca Linnaeus, 1758. The Holarctic phytophagous species. It is common in the fields, pest of sugar beet. One-year generation; imago hibernates in litter and under bark. IV–VIII.

Aclypea undata O.F. Müller, 1776. The European phytophagous species. As a whole it is rare: EE62 Gorskie near Kolno, pasture, 2002.05.14 – 2 exx.

Oiceoptoma thoracica (Linnaeus, 1758). The Transpalaearctic necrophagous species. It is common species; distributed mainly in woods. Imago and larva sometimes is found in *Phallus* sp. Mushrooms; V–X.

Silpha carinata Herbst, 1783. The Euro-Siberian predaceous species. It is distributed and common in forests; imago hibernates under a bark of trees; V–X.

Silpha obscura Linnaeus, 1758. The Euro-Siberian mainly predaceous species. It is very numerous in open areas. Imago hibernates in litter and soil; V–X.

Silpha tristis Illiger, 1798. The Euro-Siberian mainly predaceous species. In our gathering it is rare. Imago hibernates in litter and soil; VI–XI.

Dendroxena quadrimaculata (Scopoli, 1772). The European species living in crowns of deciduous trees. The predator, exterminates caterpillars of an unpaired silkworm and other butterflies. In our materials it is rare. All specimens are caught

during an output from wintering or during migrations: DE03 Karas Lake Reservation, beach forest, 1997.06.10 – 1 ex.; DF22 Balda river valley near Braniewo, hornbeam forest, 2002.09.04 – 1 ex.; DE65 Olsztyn Municipal Forest, hornbeam forest, 2002.05.02 – 1 ex.

Phosphuga atrata (Linnaeus, 1758). The Transpalearctic predaceous species. It is common in the deciduous and mixed forests. Winters imagines under a bark, sometimes in litter. It is common, IV–XII.

Conclusion

A total of 19 carrion species were recorded in the NE Poland under study. The species composition is almost identical to those in the Baltic states (Silfverberg 1992) and in Belarus (Aleksandrowicz & Pisanenko 1987). We have not found *Nicrophorus germanicus* only. This species was noted from former East Prussia in first half of the 20 century (Bercio & Folwaczny 1979). *N. germanicus* was known also from Latvia, Sweden, Denmark (Silfverberg 1992), and Belarus (Aleksandrowicz & Pisanenko 1987).

The largest number of species represented the Transpalearctic element (8 species, 42.1%), with Euro-Siberian (5 species, 26.3%) and Holarctic (2 species, 10.5%) species as another element with large geographical ranges (Fig. 2). European

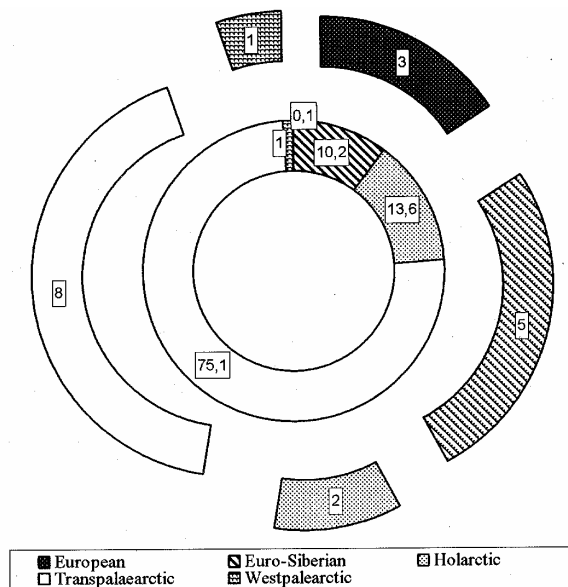


FIGURE 2. Zoogeographical structure of carrion beetle's fauna in Mazurian Lakeland. Number of species – in outer ring; number of specimen, % – inner ring

element represented by three species (15.8%). In terms of the number of individuals, the fauna was clearly dominated by Transpalearctic species (75.1%), with a high percentage of Holarctic (13.6%) and Euro-Siberian (10.2%) species.

Nicrophorus vespilloides, *Thanatophilus sinuatus*, *Nicrophorus vespillo*, *Nicrophorus investigator*, *Oiceoptoma thoracica*, *Silpha tristis*, *Silpha carinata*, *Phosphuga atrata*, *Silpha obscura* were most numerous throughout the study, at 57.23% (Tab. 1). A group of common species included *Thanatophilus rugosus*, *Nicrophorus humator*, *Nicrophorus vestigator*, *Aclypea opaca*. Such species as *Thanatophilus dispar*, *Aclypea undata*, *Necrodes littoralis*, *Dendroxena quadrimaculata*, *Nicrophorus sepultor*, *Nicrophorus fossor* were rare.

TABLE 1. Species composition and number of *Silphidae* specimens collected in Mazurian Lakeland in 1997–2003

Species	Dry meadow	Wet meadow	Pine forests	Deciduous forests	Total
<i>Aclypea opaca</i> Linnaeus, 1758	21	–	–	–	21
<i>A. undata</i> O.F. Müller, 1776	3	–	–	–	3
<i>Dendroxena quadrimaculata</i> (Scopoli, 1772)	–	–	–	7	7
<i>Necrodes littoralis</i> (Linnaeus, 1758)	11	1	–	1	13
<i>Nicrophorus fossor</i> Erichson, 1837	18	2	1	1	22
<i>N. humator</i> Olivier, 1790	32	–	92	55	179
<i>N. investigator</i> (Zetterstedt, 1824)	251	19	959	231	1460
<i>N. sepultor</i> (Charpentier, 1825)	60	8	2	–	70
<i>N. vespillo</i> (Linnaeus, 1758)	1487	526	321	188	2522
<i>N. vespilloides</i> Herbst, 1783	13	43	4046	2936	7038
<i>N. vestigator</i> (Herschel, 1807)	110	7	23	4	144
<i>Phosphuga atrata</i> Linnaeus, 1758	26	15	8	80	129
<i>Silpha carinata</i> Herbst, 1783	36	2	70	53	161
<i>S. obscura</i> Linnaeus, 1758	109	4	8	–	121
<i>S. thoracica</i> Linnaeus, 1758	11	8	494	456	969
<i>S. tristis</i> Illiger, 1798	455	117	–	22	594
<i>Thanatophilus dispar</i> Herbat, 1793	3	7	–	–	10
<i>Th. rugosus</i> Linnaeus, 1758	151	23	1	1	176
<i>Th. sinuatus</i> Fabricius, 1775	4157	850	3	5	5015
Number of stuning sites	40	42	32	50	164
Total	6954	1632	6028	4040	18654

Among collected beetles such species as *Thanatophilus dispar*, *Th. sinuatus*, *Th. rugosus*, *Aclypea opaca*, *A. undata*, *Silpha tristis*, *S. obscura*, *Necrodes littoralis*, *Nicrophorus vespillo*, *N. vestigator*, *N. fossor* and *N. sepultor* pronouncedly prefer open areas. On the other hand, *Oiceoptoma thoracica*, *Dendroxena quadrimaculata*, *Phosphuga atrata*, *Silpha carinata*, *Nicrophorus vespilloides*, *N. investigator* and *N. humator* preferred wood biocenoses.

References

- ALEKSANDROWICZ O.R., PISANENKO A.D. 1987. Review of carrion beetle (*Coleoptera*, *Silphidae*) fauna of Belarus. Vestnik Belorusskogo Universiteta, Minsk. Ser. 2, 2: 41–44. (in Russian).
- BERCIO H., FOLWACZNY B. 1979. Verzeichnis der Käfer Preußens. Verlag Parzeller und Co, Fulda: 288–315.
- BURAKOWSKI B., MROCZKOWSKI M., STEFAŃSKA J. 1978. Chrząszcze *Coleoptera* – *Histeroidea* i *Staphylinoidea* prócz *Staphylinidae*. Katalog Fauny Polski. XXIII. 5. PWN, Warszawa, 356 pp. (in Polish).
- GORODKOV K.B.: 1984. The types of areals of Insects of tundra and forest zone of the European Part of USSR. The areals of Insects of the European Part of USSR. Atlas, Maps No 179–221. Nauka, Leningrad: 3–20. (in Russian).
- KOCH K., 1989: Die Käfer Mitteleuropas. Ökologie. Band 1. Goecke & Evers, Krefeld, 440 pp.
- MROCZKOWSKI M., 1955: Klucze do oznaczania owadów Polski. № 4. Cz. XIX. Zesz. 25. *Silphidae* (*Coleoptera*). PWN, Warszawa, 29 pp. (in Polish).
- SILFVERBERG, H. 1992. Enumeratio Coelopterorum Fennoscandiae, Daniae et Baltiae, Helsingfors. 94 pp.