Online ISSN: 2299-9884
Polish Journal of Entomology 93(1):23–62 (2024) DOI: 10.5604/01.3001.0054.7999

Interesting species of beetles (Coleoptera) in burnt part of the Augustów Forest (NE Poland)

Jerzy M. Gutowski [1], Krzysztof Sućko[1], Jerzy Borowski [2], Adam Byk[2], Tomasz Gazurek[2], Czesław Greń[3], Wojciech Jędryczkowski[4], Karol Komosiński[5], Szymon Konwerski[6], Roman Królik[7], Daniel Kubisz[8], Andrzej Lasoń[3], Miłosz A. Mazur[9], Andrzej Melke[10], Marek Miłkowski[11], Tomasz Mokrzycki[2], Radosław Plewa[12], Rafał Ruta[13*]

[1] Department of Natural Forests, Forest Research Institute, Park Dyrekcyjny 6, 17-230 Białowieża, Poland

[2] Department of Forest Protection, Institute of Forest Sciences, Warsaw University of Life Sciences, Nowoursynowska 159/34, 02-776 Warszawa, Poland

[3] Department of Natural History, Upper Silesian Museum, Jan III Sobieski Square 2, 41-902 Bytom, Poland

[4] Sucharskiego 3/93, 01-390 Warszawa, Poland

[5] Department of Zoology, University of Warmia and Mazury in Olsztyn, Oczapowskiego 5, 10-718 Olsztyn, Poland

[6] Natural History Collections, Faculty of Biology, Adam Mickiewicz University in Poznań, Uniwersytetu Poznańskiego 6, 61-614 Poznań, Poland

[7] Mickiewicza 8, 46-200 Kluczbork, Poland

[8] Institute of Systematics and Evolution of Animals, PAS, Św. Sebastiana 9, 31-049 Kraków, Poland

[9] Institute of Biology, University of Opole, Oleska 22, 45-052 Opole, Poland

[10] Św. Stanisława 11/5, 62-800 Kalisz, Poland

[11] Królowej Jadwigi 19/21, 26-600 Radom, Poland

[12] Department of Forest Protection, Forest Research Institute, Sękocin Stary, Braci Leśnej 3, 05-090 Raszyn, Poland

[13] Department of Biodiversity and Evolutionary Taxonomy, University of Wrocław, Przybyszewskiego 65, 51-148 Wrocław, Poland

* Corresponding author: rafal.ruta@uwr.edu.pl

Abstract: In April 2019, 25.4 ha of woodland in the Płaska Forest District in the SE part of the Augustów Forest were damaged by fire. Between 2020-2022 a survey of beetles in the burnt and unburnt (control) parts of the forest was carried out. The insects were collected in IBL-2bis window (= flight interception) traps. 781 species classified in 67 families were identified. Among these species, *Acrotrichis strandi* (Ptiliidae) was found in Poland for the first time, and 41 species were new records for the Masurian Lake District. During the studies, two species protected in Poland (*Boros schneideri*, *Cucujus cinnaberinus*), and several more from the Polish Red List of Animals, the Polish Red Book of Animals and the European Red List of Saproxylic Beetles, were recorded. Fifteen of the beetles recorded are relicts of primeval forests in Central Europe: *Boros schneideri* (Boridae); *Stephanopachys linearis* (Bostrichidae); *Ampedus tristis* (Elateridae); *Leiestes seminiger* (Endomychidae); *Platylomalus complanatus*, *Platysoma deplanatum* (Histeridae); *Corticaria longicornis*, *Latridius brevicollis* (Latridiidae); *Peltis grossa* (Peltidae); *Stagetus borealis* (Ptinidae); *Tachyusida gracilis* (Staphylinidae); *Corticeus fasciatus*, *C. suturalis*, *Prionychus melanarius* (Tenebrionidae); *Colydium filiforme* (Zopheridae). The present paper lists the beetles recorded and gives brief characteristics of rare species, primeval forest relicts and a selection of species from the Polish Red List of Animals.

Keywords: Coleoptera, new localities, *Acrotrichis strandi*, NE Poland, Masurian Lake District, Augustów Forest, forest fires

Introduction

The paper discusses part of the results of a study on beetles (Coleoptera) in a large area of burnt forest in the Płaska Forest District of the Augustów Forest (NE Poland) situated in Masurian Lake District, close to the border with Podlasie (Burakowski et al. 1973).

Fire ecology and the impact of fire on the subsequent evolution of invertebrate assemblages have been relatively well studied in northern Europe and in the Mediterranean region. In central Europe, on the other hand, knowledge of these issues is very fragmentary and superficial. The colonization of fire-damaged trees by beetles was studied by Ehnström *et al.* (1995), Wikars (1997a, 2002) and Forsslund *et al.* (2011), among others, and the dynamics of carabid beetles in a burnt forest by Gongalsky *et al.* (2003, 2006). The possibility of monitoring the presence of beetles in the environment with experimentally produced smoke was also investigated (Milberg *et al.* 2015). Research into tree damage caused by insects during controlled fire conditions was done in Finland and focused on various beetles, e.g. *Tomicus* spp. (Martikainen *et al.* 2006), *Hylobius abietis* (Linnaeus, 1758) and *H. pinastri* (Gyllenhal, 1813) (Pitkänen *et al.* 2005). Beetle diversity in managed boreal forests was also studied (Hyvärinen *et al.* 2009, Toivanen & Kotiaho 2010). The impact of fires on beetle assemblages in pine-dominated forests was explored in managed forests and nature reserves in northern Estonia (Süda *et al.* 2009), as was the short-term impact of fires on the beetle fauna of the western taiga (Muona & Rutanen 1994). The species richness and abundance of insects in post-fire areas was surveyed in Turkey by Kaynaş & Gürkan (2008) and in Slovenia by Jurc (2001). The significant impact of fires on ambrosia beetles inhabiting cork oaks was reported in Portugal (Catry *et al.* 2022). In Spain, relationships were analysed between the occurrence of fires and the population dynamics of scolytines feeding on pines by Lombardero & Ayres (2011) and Santolamazza-Carbone *et al.* (2011), as was the impact of fires on species of Cetoniinae (Pausas *et al.* 2018). Moretti & Barbalat (2004) and Moretti *et al.* (2004) examined the long-term impact of fires on xylophagous beetles in deciduous forests in Switzerland, while Feng *et al.* (2022) studied beetles interacting with mammalian carrion on burnt heathlands in Germany. A great many studies of the impact of forest fires have been carried out in North America: for instance, the consequences of fires for beetles and forest management by e.g. Santoro *et al.* (2001), Jenkins *et al.* (2008), Boulanger *et al.* (2010, 2013), Castello *et al.* (2011), Azeria *et al.* (2012), Andrus *et al.* (2016) and Meigs *et al.* (2016). An overview of American publications covering this subject is provided by Zwolak (2007). In Australia, Eliott *et al.* (2019) investigated the impact of fires on the occurrence of longhorn beetles (Cerambycidae).

In Poland, as elsewhere in Central Europe, the beetle fauna of burnt forests has rarely been studied, and the few investigations carried out have focused on narrow aspects of this problem. The occurrence of insects considered harmful by forest management in post-fire forests was studied by Schnaider (1954) and, on a large area of burnt forest in the Potrzebowice forest district, by Luterek (2000). The adaptation of ground beetle assemblages (Carabidae) to the conditions obtaining in burnt forests was investigated by Szyszko (1984, 2001), Skłodowski (1994) and Zdzioch (2003). Harasimowicz & Kawa (2001) studied the impact of fires on epigeic insects, Szpojda (1984) examined the impact of fires on cambio- and xylophagous insects, and Kuśka & Kuśka-Ciba (2002) analysed the species composition of phytophagous beetles in a burnt forest 6–8 years after the fire. Kolk (1998) summarized the problems of protecting forests from insects in post-fire areas. The dynamics of *Phaenops cyanea* (Fabricius, 1775) inhabiting pines on the edges of burnt forest areas was studied by Bilański 2013. The results of a survey of beetles inhabiting burnt woodland areas in the Kampinos National Park

was published by Marczak *et al.* 2018. A broader study of the impact of fire on beetles was carried out in poor pine forests in the Myszyniec Forest District (Plewa & Borowski 2018), but detailed results have yet to be published. Most of the above studies focused on pine monocultures of younger age classes. More comprehensive research in old-growth forests and in the natural pine-spruce forests of the Białowieża National Park was done by Borowski *et al.* (2018), Gutowski & Kurzawa (2019) and Gutowski *et al.* 2020b.

Fire, a natural factor responsible for the creation of dead wood, is also indispensable to the development of many rare and endangered coleopteran species. In 2022, an estimated 6096 beetle species were known from Poland (Polish Biodiversity Information Network), c. 1500 of which require dead wood, (Gutowski 2006, Gutowski & Jaroszewicz 2004), including wood damaged by fire. Controlled forest fires are initiated in order to protect rare and endangered pyrophilous species (including saproxylic beetles) in the boreal coniferous forests of Scandinavia (Granström 2001, Lindberg *et al.* 2020, Shorohova *et al.* 2023). Controversies surrounding this method and its negative social impact have hitherto precluded its application in Poland.

The present paper summarizes data on the most interesting species of beetles collected during studies of burnt forest areas and the control site. Results highlighting general ecological processes will be published separately (Gutowski *et al.*, in prep.).

Material and methods

The study took place in the south-eastern part of the Augustów Forest, in an area of burnt forest (Fig. 1) located in the Płaska Forest District (Wołkusz and Trzy Kopce forest divisions) in forest compartments: 282, 283, 296, 297 and 298 (geographical coordinates of the centre: 53.8353N, 23.4999E) and on a control site in forest compartment 299. The burnt forest area lies to the north of the village of Lubinowo, c. 4 km from the border with Belarus. The burnt forest and control site are situated in UTM square FE66. The fire occurred on 24.04.2019 over an area of 25.36 ha, of which 6.86 ha was completely destroyed (a tree plantation not studied during the research described here); in the remaining area of 18.50 ha, the fire was restricted to the soil cover. Later in 2019, the majority of the scorched trees were removed (salvage logging). Three groups of trees in the centre of the burnt forest were left for biodiversity protection and research purposes.

The burnt forest area consisted mainly of old-growth pine forest, with an admixture of spruce, and single birch and oak trees. Fresh coniferous forest (Bśw) and fresh mixed coniferous forest (BMśw) were the dominant forest habitats. A small area of fresh mixed coniferous forest supported a tree plantation and a thicket. For the exact positions of the insect traps on the study sites, see Table 1 and Fig. 1.

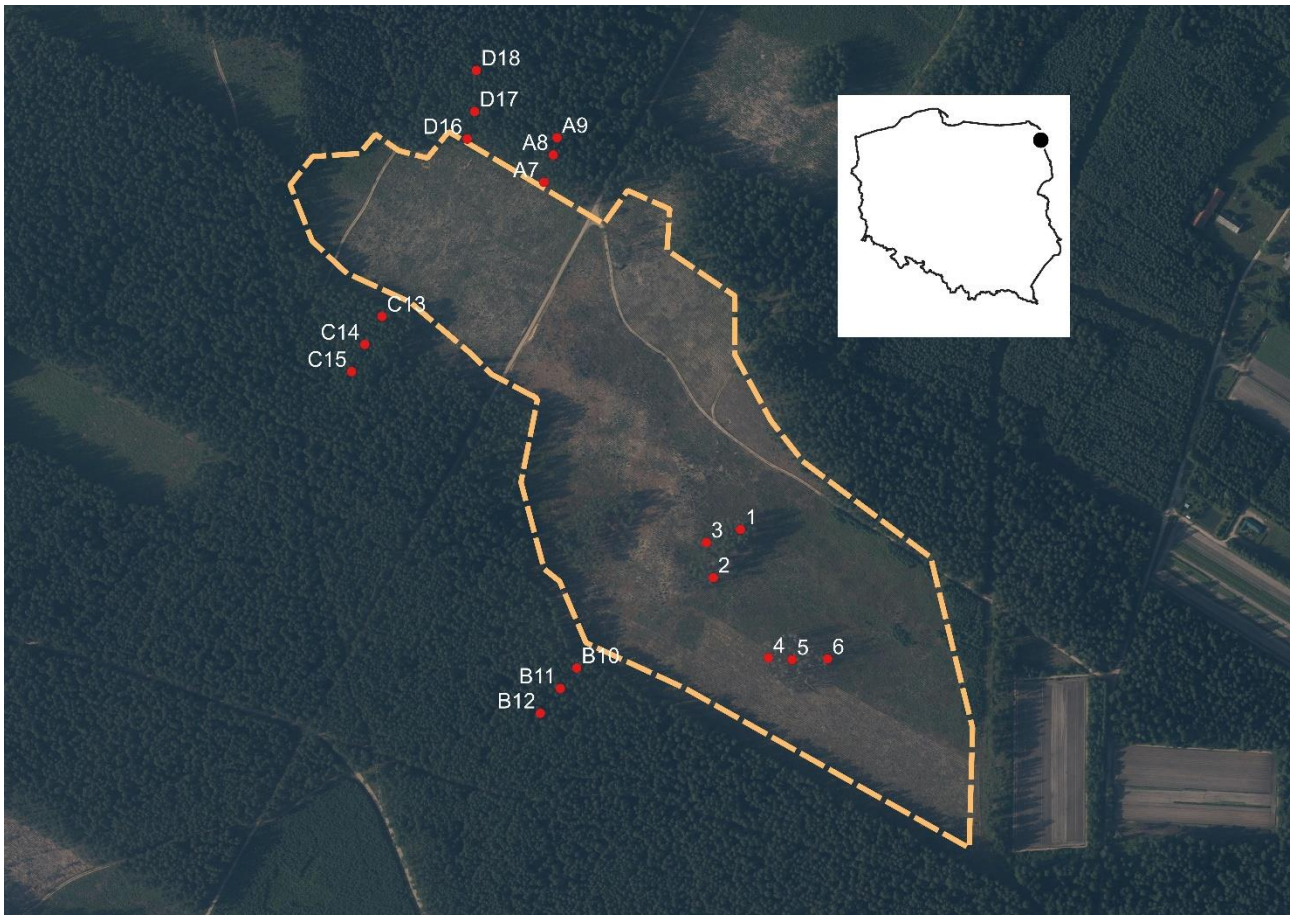

Fig. 1. Burnt forest in the Płaska Forest District (Augustów Forest). Locations of the areas surveyed: 1-6 – traps deployed in patches of burnt old-growth forest, A7-D18 – traps deployed in the area surrounding the burnt forest.

Table 1. Positions of traps on the study sites in the Augustów Forest (Płaska Forest District) [1-6 – traps in "forest islands" within the burnt forest; A7-D18 – traps on 4 transects outside the area from which wood was removed after the fire; K19-K21 traps on the control site].

Trap number	Longitude	Latitude	Forest compartment
1	23.5016	53.8344	297k
2	23.5011	53.8340	297k
3	23.5011	53.8343	297k
4	23.5019	53.8332	297k
5	23.5022	53.8331	297k
6	23.5028	53.8331	297k
A7	23.5010	53.8372	296a
A8	23.5012	53.8375	296a
A9	23.5016	53.8380	296a
B10	23.4988	53.8333	298c
B11	23.4986	53.8331	298c
B12	23.4982	53.8329	298c
C13	23.4963	53.8367	283h
C14	23.4960	53.8364	283h
C15	23.4958	53.8362	283h
D16	23.4979	53.8383	282b
D17	23.4981	53.8385	282b
D18	23.4982	53.8389	282b
K19	23.4929	53.8267	299a
K20	23.4927	53.8269	299a
K21	23.4915	53.8273	299a

The field studies were conducted between 2020-2022. Three areas were surveyed: the **burnt forest** – zone zero, left without human intervention, isolated groups of burnt tree stands located in the centre of the burnt forest (Fig. 2), surrounded by a deforested area (Fig. 3); the **surroundings** – a fire-affected strip of forest surrounding the deforested area, 5-100 m (usually 40-70 m) wide (Fig. 4); the **control area** – forest not impacted by fire, of a similar habitat, tree composition and age, at a distance of c. 1.5 km from the burnt forest. Sanitary cutting took place, e.g. dying trees were removed, in both the surrounding zone and the control area.

Fig. 2. One of the patches of old-growth forest left without human intervention after the fire in 2019; 30.06.2020 (photo J. M. Gutowski).

Fig. 3. Burnt forest – the area from which damaged trees were removed; 12.05.2020 (photo J. M. Gutowski).

Fig. 4. Burnt forest – the surroundings, where scorched trees were left; 15.04.2020 (photo J. M. Gutowski).

In each of the three zones, beetles were collected using identical methods and over a comparable period. Unbaited IBL2-bis type window traps were used to collect the beetles. A total of 21 traps were installed between trees at a height of 1-2 m (Fig. 5): 6 in zone zero, 12 on 4 transects in the surrounding zone, and 3 in the control area. The transects (A, B, C, D) ran more or less at right angles to the burnt forest to the forest surrounding the deforested area. The conserving fluid in the traps was ethylene glycol.

Fig. 5. An IBL2-bis type window trap used to collect beetles in the burnt forest and the control plot (photo J. M. Gutowski).

In 2020, the traps were installed on 15.04, emptied on 12.05, 2.06 and 1.07 (2.5 months of continuous collecting). In 2021 the traps were deployed on 9.04 and emptied on 12.05, 8.06 and 7.07 (almost 3 months of continuous collecting). In 2022, the traps were set up on 11.04, and emptied on 16.05, 13.06 and 12.07 (3 months of continuous collecting).

The voucher specimens are deposited in the collection of the Department of Natural Forests in Białowieża and in the collections of the experts identifying particular groups.

The nomenclature follows the Catalogue of Palaearctic Coleoptera (Löbl & Smetana 2007, 2010, 2011, 2013; Löbl & Löbl 2015, 2016, 2017; Danilevsky 2020; Iwan & Löbl 2020) and papers by Alonso-Zarazaga et al. (2023), Zamoroka *et al.* (2019) and Zamoroka (2021).

Results

During the survey (2020-2022) in the burnt forest, its near surroundings and on the control site, specimens of 781 species belonging to 67 families of beetles were collected. Many of them are interesting from the faunistic perspective (they are rarely collected), as well as from the conservation biology perspective (they are relicts of primeval forests) (Eckelt *et al.* 2018); moreover, some species are on the Polish Red List of Animals (Pawłowski *et al.* 2002) or on the European Red List of Saproxylic Beetles (Cálix *et al.* 2018). A list of 97 rare species from the above-mentioned groups is given below, together with comments on their distribution in Poland, biology and ecology.

Selected interesting species of beetles – a faunistic overview

The abbreviations used in the text: AF – Augustów Forest, det. – identified by, ex., exx. – specimen, specimens, comp. – forest compartment, distr. – forest district, res. – nature reserve, Mts. – mountains, NP – national park.

The initials of the coleopterists involved in species identification: AB – Adam Byk, AL – Andrzej Lasoń, AM – Andrzej Melke, BP – Bartłomiej Pacuk, CG – Czesław Greń, JB – Jerzy Borowski, JG – Jerzy M. Gutowski, KK – Karol Komosiński, KS – Krzysztof Sućko, MAM – Miłosz A. Mazur, MM – Marek Miłkowski, RK – Roman Królik, RP – Radosław Plewa, RR – Rafał Ruta, SK – Szymon Konwerski, TG – Tomasz Gazurek, TM – Tomasz Mokrzycki, WJ – Wojciech Jędryczkowski.

All the specimens were collected by J. M. Gutowski in Augustów Forest, in Płaska Forest District.

***Acupalpus exiguus* Dejean, 1829 (Carabidae)**

Comp. 282b, 12.05-2.06.2020 – 1 ex.; comp. 296a, 6.04-11.05.2020 – 1 ex., 12.05-2.06.2020 – 1 ex., 3.06-1.07.2020 – 2 exx., 13.05-2.06.2021 – 1 ex.; comp. 297k, 12.05-

2.06.2020 – 1 ex.; comp. 299a, 12.05-2.06.2020 – 1 ex.; det. BP & TG.

On the Polish Red List of Animals (Pawłowski *et al.* 2002), category VU (vulnerable).

***Cercyon sternalis* Sharp, 1918 (Hydrophilidae)**

Comp. 296a, 6.04-12.05.2020 – 1 ex., det. CG.

A European species, known mainly from central, southern and south-eastern Europe, but also recorded in Iran and western Siberia (Fikáček *et al.* 2015). Known from 11 faunistic regions in Poland, but only single specimens collected, and rather rare. Recently recorded in the Białowieża Primeval Forest (Greń *et al.* 2017) and the Knyszyn Forest (Greń *et al.* 2022). Ripicolous – occurs on the edges of waters, in sand, sludge, and among decaying organic remains (Boukal *et al.* 2007). A new record for the Masurian Lake District.

***Abraeus granulum* Erichson, 1839 (Histeridae)**

Comp. 296a, 3.06-1.07.2020 – 1 ex., 17.05-13.06.2022 – 1 ex., det. JG & RK.

Rather rarely collected. Recently recorded in the projected Turnicki NP (Buchholz & Melke 2018) and the Świętokrzyski NP (Buchholz *et al.* 2021). New to the Masurian Lake District.

***Acritus homoeopathicus* Wollaston, 1857 (Histeridae)**

Comp. 297k, 3.06-1.07.2020 – 1♂, 1♀, 13.05-8.06.2021 – 1 ex., det. RK.

Known from the Wielkopolska-Kujawy Lowland (Ruta *et al.* 2004b), Lasowice Małe in Upper Silesia (Królik 1999) and the vicinity of Przemyśl (Trella 1928). On the Polish Red List of Animals (Pawłowski *et al.* 2002), category VU (vulnerable). New to the Masurian Lake District.

***Myrmetes paykulli* Kanaar, 1979 (Histeridae)**

Comp. 296a, 17.05-13.06.2022 – 1 ex., det. RK.

A myrmecophilous species, relatively rare in Poland (Burakowski *et al.* 1978, Ruta *et al.* 2004b). Recorded in the Masurian Lake District by Bercio & Folwaczny (1979).

***Platylomalus complanatus* (Panzer, 1797) (Histeridae)**

Comp. 297k, 3.06-1.07.2020 – 1 ex., det. RK.

Very rare. Recently found at Rogalin near Poznań (Ruta *et al.* 2004a), near Radom (Miłkowski & Ruta 2005) and in the projected Turnicki NP (Buchholz & Melke 2018). On the Polish Red List of Animals (Pawłowski *et al.* 2002), category VU (vulnerable). According to Eckelt *et al*. (2018), a relict of central European primeval forests (*sensu lato*).

***Platysoma deplanatum* (Gyllenhal, 1808) (Histeridae)**

Comp. 296a, 6.04-12.05.2020 – 2 exx., 3.06-1.07.2020 – 1 ex., det. RK.

Rare (Burakowski *et al.* 1978), recorded by Mazur (1973) in the Masurian Lake District. According to Eckelt *et al*. (2018), a relict of Central European primeval forests (*sensu stricto*).

***Agathidium confusum* Brisout de Barneville, 1863 (Leiodidae)**

Comp. 283h, 12.05-2.06.2020 – 1 ex., det. SK.

A rare species, associated with well-preserved forests (Kilian & Borowiec 1998, Miłkowski & Ruta 2016). Included on the Polish Red List of Animals (Pawłowski *et al.* 2002), category VU (vulnerable). Recently recorded in the projected Turnicki NP (Buchholz & Melke 2018) and in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). New to the Masurian Lake District.

***Agathidium marginatum* Sturm, 1807 (Leiodidae)**

Comp. 297k, 13.05-8.06.2021 – 1 ex., det. SK.

Rather rarely collected, known mainly from localities in river valleys (Burakowski *et al.* 1978, Kilian & Borowiec 1998, Ruta 2003). New to the Masurian Lake District

***Leiodes bicolor* (Schmidt, 1841) (Leiodidae)**

Comp. 297k, 9.06-7.07.2021 – 1♂, det. SK.

Known in Poland from just a small number of localities; recorded in the Pomeranian Lake District, the Wielkopolska-Kujawy Lowland, Lower Silesia, Upper Silesia, the Mazovian Lowland and the Małopolska Upland (Burakowski *et al.* 2000; Konwerski & Sienkiewicz 2002, 2005; Miłkowski & Ruta 2016). New to the Masurian Lake District.

***Catops subfuscus* Kellner, 1846 (Leiodidae)**

Comp. 296a, 13.04-16.05.2022 – 1♂, det. SK.

Quite rare, known from scattered localities in Poland, most of them in mountainous regions (Burakowski *et al.* 1978, Mądra *et al.* 2010); according to Kočárek (2002), prefers forest habitats. Recently recorded in the projected Turnicki NP (Buchholz & Melke 2018) and the Świętokrzyskie Mts. (Buchholz *et al.* 2021). New to the Masurian Lake District.

***Acrotrichis nana* Strand, 1946 (Ptiliidae)**

Comp. 298c, 3.06-1.07.2020 – 1 ex., det. KK.

In Poland, recorded in the Masurian Lake District (Małdyty, Pawłowo) and the Kampinos NP (Komosiński & Marczak 2016). Associated with old pine forests growing on sandy soils (Komosiński & Marczak 2016).

***Acrotrichis strandi* Sundt, 1958 (Ptiliidae)** (Fig. 6)

Comp. 282b, 13.05-8.06.2021 – 1 ex., det. KK.

A boreal species, recorded in Norway, Sweden, Finland, Lithuania, Latvia, Belarus, Russia, the United Kingdom, Ireland, Denmark, Germany, Austria (Löbl & Löbl 2015) and Slovakia (Jászayová & Jászay 2017). Found in moist riparian forests and in ruderal areas; collected in very wet, rotting plant remains, and also in moist rotten wood (Koch 1989). This is its first locality in Poland.

Fig. 6. *Acrotrichis strandi* Sundt, 1958 (Ptiliidae): spermatheca – its shape is a key character used to identify the species (photo K. Komosiński).

***Baeocrara variolosa* (Mulsant & Rey, 1873) (Ptiliidae)**

Comp. 296a, 13.04-16.05.2022 – 1 ex., det. KK.

Very rare in Poland (Burakowski *et al.* 1978); recently recorded in the projected Turnicki NP (Buchholz & Melke 2018), the Suwałki Landscape Park (Gutowski *et al.* 2020a) and the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Occurs in forests and along their edges; collected in rotten tree stumps, in leaf litter, under carrion, among faeces and old tree branches (Burakowski *et al.* 1978).

***Anthobium unicolor* (Marsham, 1802) (Staphylinidae)**

Comp. 296a, 6.04-12.05.2020 – 1 ex.; comp. 282b, 13.05-8.06.2021 – 1 ex.; comp. 298c, 13.05-8.06.2021 – 1 ex.; det. AM & KK.

Rare in Poland, recently found in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Usually recorded from late autumn until spring in moist forests; collected in decaying, old tree stumps, under fallen leaves, in mosses and rotting fungi (Burakowski *et al.* 1978).

***Phloeonomus sjobergi* Strand, 1937 (Staphylinidae)**

Comp. 297k, 3.06-1.07.2020 – 1 ex.; comp. 298c, 3.06-1.07.2020 – 1 ex.; det. AM.

A boreo-alpine species, until recently known in Poland from a single locality in the Bieszczady Mts. (Burakowski *et al.* 2000). Recently recorded in the Turnicki NP (Buchholz & Melke 2018). Collected under the bark of dying coniferous trees; in the Bieszczady Mts.

collected under the bark of a spruce. New to the Masurian Lake District.

***Euplectus kirbii* Denny, 1825 (Staphylinidae)**

Comp. 282b, 283h, 296a, 297k, 298c, 299a – 30 exx. were collected between 2020-2022, det. AM & KK.

Rather rare, recently recorded in the projected Turnicki NP (Buchholz & Melke 2018), the Białowieża Primeval Forest (Gutowski *et al.* 2020b), the Świętokrzyskie Mts. (Buchholz *et al.* 2021), the Borecka Forest (Komosiński *et al.* 2021) and the Pisz Forest (Gutowski *et al.* 2022). On the Polish Red List of Animals (Pawłowski *et al.* 2002), category DD (data deficient). Its biology is poorly known; collected in rot in deciduous trees, and also in *Formica rufa* L. nests (Staniec 2003).

***Euplectus tholini* Guillebeau, 1888 (Staphylinidae)**

Comp. 297k, 13.05-8.06.2021 – 1 ex., det. KK.

Very rare, known from the Wielkopolska-Kujawy Lowland and the Białowieża Primeval Forest (Jałoszyński *et al.* 2005). For a long time, regarded as a subspecies of the common *Euplectus punctatus* Muls. & Rey. Its biology is unknown; like other members of *Euplectus* Leach, probably associated with dead wood. New to the Masurian Lake District.

***Bryophacis rufus* (Erichson, 1839) (Staphylinidae)**

Comp. 282b, 3.06-1.07.2020 – 1 ex.; comp. 299a, 13.04-16.05.2022 – 1 ex.; det AM & KK.

Rare in Poland, known mainly from the south of the country (Burakowski *et al.* 1980). Recently recorded in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). In the Masurian Lake District known from the Borecka Forest (Melke & Maciejewski 1999). Inhabits mainly mountain forests; collected under mosses, brush, fallen leaves and needles, and on tree sap (Burakowski *et al.* 1980).

***Mycetoporus baudueri* Mulsant & Rey, 1875 (Staphylinidae)**

Comp. 296a, 13.05-8.06.2021 – 1 ex., 9.06-1.07.2021 – 1 ex., det. KK.

Rare in Poland, recently recorded in the vicinity of Piła (Ruta & Melke 2011) and the Świętokrzyskie Mts. (Buchholz *et al.* 2021). A xerophilous species, inhabiting sandy fields, heathlands and pine forests; collected under mosses and fallen leaves (Koch 1989). New to the Masurian Lake District.

***Amischa bifoveolata* (Mannerheim, 1830) (Staphylinidae)**

Comp. 282b, 13.05-8.06.2021 – 1 ex.; comp. 297k, 13.05-8.06.2021 – 2 exx., 13.04-16.05.2022 – 1 ex.; det. KK.

Relatively rare in Poland, recently recorded in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Occurs in a variety of habitats – forests and their edges, gardens, meadows, fields, gravel pits and ruderal areas. Collected under fallen leaves and needles, in mounds of compost and haystacks, and on trees exuding sap (Koch 1989). New to the Masurian Lake District.

***Amischa decipiens* (Sharp, 1869) (Staphylinidae)**

Comp. 297k, 9.06-1.07.2021 – 1 ex.; comp. 296a, 13.04-16.05.2022 – 1 ex.; det. KK.

Rare in Poland, known from the Białowieża Primeval Forest (Derunkov & Melke 2001), the Bielinek res. (Borowiec 1990) and Warsaw (Burakowski *et al.* 1981). Recently recorded in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Inhabits mainly riparian forests, also ruderal areas, fields with clayey soil, gardens, marshes and moist meadows. Collected in moist litter, mosses and fallen leaves, in rotting straw and hay, and in plant detritus (Koch 1989). New to the Masurian Lake District.

***Atheta clientula* (Erichson, 1839) (Staphylinidae)**

Comp. 282b, 6.04-12.05.2020 – 1 ex.; comp. 283h, 6.04-12.05.2020 – 1 ex.; comp. 296a, 6.04-12.05.2020 – 1 ex.; comp. 297k, 6.04-

12.05.2020 – 1 ex., 3.06.2020 – 7 exx.; comp. 299a, 13.05-8.06.2021 – 1 ex.; det. AM & KK.

Fairly rare in Poland, recently recorded in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Collected among mosses, rotting hay, plant remains and fallen leaves (Burakowski *et al.* 1981). New to the Masurian Lake District.

***Atheta debilis* (Erichson, 1837) (Staphylinidae)**

Comp. 282b, 12.05-2.06.2020 – 1 ex.; comp. 296a, 12.05-2.06.2020 – 1 ex.; comp. 299a, 6.04-11.05.2020 – 1 ex., 12.05-2.06.2020 – 1 ex.; det. AM.

Rare in Poland, recently recorded in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Usually collected on moist open ground, on marshes, muddy banks of rivers and cutoffs, also in boggy meadows, mosses, clumps of sedges and rotting organic remains (Burakowski *et al.* 1981, Koch 1989). Recorded in the Masurian Lake District by Bercio & Folwaczny (1979).

***Atheta oblita* (Erichson, 1839) (Staphylinidae)**

Comp. 297k, 3.06-1.07.2020 – 1 ex., det. AM.

Very rare in Poland (Burakowski *et al.* 1981). In the Masurian Lake District, recently recorded in the Borecka Forest (Komosiński *et al.* 2021). Associated mainly with arboreal fungi, e.g. *Phellinus igniarius* (L.) Quél, *Laetiporus sulphureus* (Bull.) Murr., *Meripilus giganteus* (Pers.) P. Karst., *Sparassis crispa* (Wulf.) Fr. and *Pholiota* spp.; sometimes found on sap exudates (Koch 1989).

***Callicerus obscurus* Gravenhorst, 1802 (Staphylinidae)**

Comp. 282b, 9.04-12.05.2021 – 1 ex.; comp. 283h, 13.05-8.06.2021 – 1 ex.; det. KK.

Rare in Poland (Burakowski *et al.* 1981), recently recorded in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Occurs on the edges of water bodies, in peatbogs, moist meadows and along forest margins; collected under decaying leaves, organic remains accumulated by rivers, in wet rot and among mosses (Burakowski *et al.* 1981). New to the Masurian Lake District.

***Calodera cochlearis* Assing, 1996 (Staphylinidae)**

Comp. 298c, 6.04-12.05.2020 – 1 ex., det. AM.

Known from the Kampinos NP (Marczak *et al.* 2013) and the Świętokrzyskie Mts. (Buchholz *et al.* 2021). A relatively recently described species (Assing 1996), difficult to distinguish from three similar species in this genus, including the common *C. aethiops* (Grav.). Certain identification only possible after examination of the male genitalia. Probably much more widely distributed than might be expected on the basis of published records. Biology unknown, often collected in various types of window traps. New to the Masurian Lake District.

***Calodera rufescens* Kraatz, 1856 (Staphylinidae)**

Comp. 297k, 3.06-1.07.2020 – 1 ex., det. AM.

Very rare in Poland, with one record in the Masurian Lake District from the Borecka Forest (Melke & Maciejewski 1999). Inhabits forested swampy areas, wet alder forests, shady ditches in forests, marshy river valleys. Usually collected among mosses and under decaying plants (Burakowski *et al.* 1981).

***Crataraea suturalis* (Mannerheim, 1830) (Staphylinidae)**

Comp. 296a, 13.05-8.06.2021 – 1 ex.; comp. 297k, 3.06-1.07.2020 – 1 ex., 9.06-1.07.2021 – 1 ex.; det. AM & KK.

Rarely collected, known in the Masurian Lake District from the Borecka Forest (Melke & Maciejewski 1999). Inhabits lowlands and foothills; occurs among plant remains, straw and hay in barns and other places, often in sheep pens, sometimes near sheep grazing on fields and meadows (Burakowski *et al.* 1981).

***Deinopsis erosa* (Stephens, 1832) (Staphylinidae)**

Comp. 282b, 12.05-2.06.2020 – 1 ex. det. AM.

Rare in Poland, known in the Masurian Lake District from the Borecka Forest (Melke & Maciejewski 1999). Often collected on muddy shores of waterbodies, marshes and peat bogs under decaying plants, in organic remains accumulated by rivers and in the moist rotten wood of old willows (Burakowski *et al.* 1981).

***Enalodroma hepatica* (Erichson, 1839) (Staphylinidae)**

Comp. 296a, 17.05-13.06.2022 – 1 ex., det. KK.

Quite rare in Poland, recently recorded in the Białowieża Primeval Forest (Gutowski *et al.* 2020b) and the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Usually collected in forested areas. Occurs in the burrows of small rodents, in the nests of birds in tree hollows, but also on flowers of *Crataegus* spp. (Burakowski *et al.* 1981, Koch 1989). New to the Masurian Lake District.

***Oxypoda brachyptera* (Stephens, 1832) (Staphylinidae)**

Comp. 296a, 12.05-2.06.2020 – 1 ex., det. AM.

Not rare in Poland, but to date not recorded in the Masurian Lake District. Occurs both on wet soils on the shores of waterbodies and in more or less dry places and on sandy soils, in abandoned sand or gravel pits, on coastal dunes and salt marshes. Collected under decaying plants, in organic remains accumulated by rivers, under stones, under loose bark, also in the nests of mice, moles and ants (Burakowski *et al.* 1981).

***Oxypoda recondita* Kraatz, 1856 (Staphylinidae)**

Comp. 296a, 13.04-16.05.2022 – 1 ex.; comp. 297k, 13.05-8.06.2021 – 1 ex., 9.06-1.07.2021 – 1 ex.; comp. 298c, 13.04-16.05.2022 – 2 exx.; det. KK.

Very rare in Poland, known from the Człuchów Forest (Szujecki 1995) and the vicinity of Warsaw (Burakowski *et al.* 1981). New to the Masurian Lake District. Inhabits hollow trees colonized by birds. Collected in the vicinity of hollows, under the rotten bark of tree trunks and branches, under decaying leaves, in fungi and bracket fungi growing on old tree trunks and stumps (Burakowski *et al.* 1981).

***Phloeopora nitidiventris* Fauvel, 1900 (Staphylinidae)**

Comp. 282b, 6.04-12.05.2020 – 3 exx., det. AM.

Known from the Białowieża Primeval Forest, the Bieszczady Mts., the Western Beskid Mts., and the edge of the Noteć river valley near Byszewice (Ruta 2007). Recently recorded in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Occurs in the galleries of bark beetles under the bark of deciduous and coniferous tree trunks and branches (Burakowski *et al.* 1981). New to the Masurian Lake District.

***Phloeopora scribae* (Eppelsheim, 1884) (Staphylinidae)**

Comp. 282b, 9.04-12.05.2021 – 1 ex., 13.05-8.06.2021 – 2 exx.; comp. 283h, 9.04-12.05.2021 – 4 exx., 13.05-8.06.2021 – 5 exx., 13.04-16.05.2022 – 2 exx.; comp. 296a, 9.04-12.05.2021 – 1 ex., 13.05-8.06.2021 – 4 exx.; comp. 297k, 13.05-8.06.2021 – 2 exx., 14.06-12.07.2022 – 1 ex.; comp. 298c, 9.04-12.05.2021 – 2 exx., 13.05-8.06.2021 – 2 exx.; det. KK.

Quite rare in Poland, but recently recorded in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Though poorly known, probably occurs throughout the country, and may well be confused with the common *P. corticalis* (Grav.). Like all *Phloeopora* Er. species, collected under wet bark, mostly of deciduous trees. New to the Masurian Lake District.

***Tachyusida gracilis* (Erichson, 1837) (Staphylinidae)**

Comp. 282b, 12.05-2.06.2020 – 1 ex.; comp. 283h, 13.05-8.06.2021 – 1 ex.; comp. 299a, 13.05-8.06.2021 – 1 ex.; det. AM & KK.

Rare in Poland, recently recorded in the projected Turnicki NP (Buchholz & Melke 2018), the Białowieża Primeval Forest (Gutowski *et al.* 2020b) and the Świętokrzyskie Mts. (Buchholz *et al.* 2021). A relict of the primeval forests (*sensu stricto*) of central Europe (Eckelt *et al*. 2018). Occurs in old, fallen trunks of deciduous and, very occasionally, coniferous trees, under rotten bark, in deep layers of rotting wood (sometimes reaching deep into the roots), often together with *Lasius brunneus* (Latr.) ants (Burakowski *et al.* 1981). New to the Masurian Lake District.

***Scaphisoma balcanicum* Tamanini, 1954 (Staphylinidae)**

Comp. 282b, 13.05-8.06.2021 – 1 ex., det. KK.

Rare in Poland (Burakowski *et al.* 1978), recorded in the Masurian Lake District by Komosiński *et al.* (2009). Inhabits deciduous forests. Collected under the bark (often covered with fungi) of beeches and birches, and in the rotting wood of oaks (Koch 1989).

***Scaphisoma boreale* Lundblad, 1952 (Staphylinidae)**

Comp. 282b, 13.05-8.06.2021 – 3 exx., 17.05-13.06.2022 – 1 ex.; comp. 283h, 13.04-16.05.2022 – 1 ex.; comp. 296a, 3.06-1.07.2020 – 1 ex., 13.05-8.06.2021 – 2 exx., 17.05-13.06.2022 – 3 exx.; comp. 298c, 17.05-13.06.2022 – 1 ex.; comp. 299a, 3.06-1.07.2020 – 1 ex., 13.05-8.06.2021 – 2 exx., 17.05-13.06.2022 – 1 ex.; det. AM & KK.

Rare in Poland, recently recorded in the Suwałki Landscape Park (Gutowski *et al.* 2020a) and the Pisz Forest (Gutowski *et al.* 2022). On the Polish Red List of Animals (Pawłowski *et al.* 2002), category VU (vulnerable). Collected on various arboreal fungi (Burakowski *et al.* 1978).

***Scaphisoma inopinatum* Löbl, 1967 (Staphylinidae)**

Comp. 283h, 3.06-1.07.2020 – 1 ex.; comp. 296a, 14.06-12.07.2022 – 2 exx.; comp. 297k, 14.06-12.07.2022 – 1 ex.; det. AM & KK.

Known from scattered localities in Poland; recently recorded in the Białowieża Primeval Forest (Gutowski *et al.* 2020b) and the Pisz Forest (Gutowski *et al.* 2022). Its biology and habitat preferences are poorly known; occurs in deciduous forests (Koch 1989).

***Scaphisoma subalpinum* Reitter, 1881 (Staphylinidae)**

Comp. 282b, 13.05-8.06.2021 – 3 exx., 14.06-12.07.2022 – 1 ex.; comp. 283h, 9.04-12.05.2021 – 1 ex.; comp. 298c, 9.04-12.05.2021 – 1 ex., 13.05-8.06.2021 – 1 ex., 9.06-1.07.2021 – 1 ex.; det. KK.

Known from scattered localities in Poland. Recently recorded in the projected Turnicki NP (Buchholz & Melke 2018) and the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Inhabits arboreal fungi; also collected in the wood of stumps overgrown with fungi (Burakowski *et al.* 1978). New to the Masurian Lake District.

***Carpelimus despectus* (Baudi, 1870) (Staphylinidae)**

Comp. 296a, 3.06-1.07.2020 – 1 ex., det. AM.

Rare in Poland. In the Masurian Lake District known from Węgorzewo (Burakowski *et al.* 1979). Recently recorded in the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Inhabits tunnels that it digs in clayey and sandy soils, usually on steep river banks and the vertical walls of abandoned clay pits in former brickworks (Burakowski *et al.* 1979).

***Carpelimus heidenreichi* (Benick, 1934) (Staphylinidae)**

Comp. 296a, 3.06-1.07.2020 – 1 ex., det. AM.

Known from three localities in eastern Poland: Lublin Upland, Podlasie, Białowieża Primeval Forest (Staniec 2000, Majewski 2003,

Gutowski *et al.* 2020b). Newly recorded in the Masurian Lake District. Collected on the sandy-muddy and marshy edges of waterbodies, usually rivers. Collected on sand, under fallen willow leaves and under decaying plant remains (mostly of sedges) (Koch 1989).

***Emus hirtus* (Linnaeus, 1758) (Staphylinidae)**

Comp. 296a, 13.04-16.05.2022 – 1 ex., det. KK.

Occurs locally. Known in the Masurian Lake District from the Borecka Forest (Melke & Maciejewski 1999), Mikołajki (Pacuk *et al.* 2011), the Suwałki Landscape Park (Gutowski *et al.* 2020a), and a few other localities (Melke *et al.* 2022). On the Polish Red List of Animals (Pawłowski *et al.* 2002), category NT (near threatened). Collected in both open and forested areas, among decaying plant remains, excrement and carrion, and also in tree sap (usually birch). Predacious, feeds on the larvae of insects occurring in the microhabitats listed above (Burakowski *et al.* 1980).

***Heterothops minutus* Wollaston, 1860 (Staphylinidae)**

Comp. 297k, 3.06-1.07.2020 – 1 ex., det. AM.

Known in Poland only from Ruda Milicka in the southern part of the Wielkopolska-Kujawy Lowland (Borowiec 1991). Recently recorded in the Masurian Lake District. Usually occurs in synanthropic habitats. Collected in compost and piles of weeds; attracted to light (Borowiec 1991).

***Leptacinus intermedius* Donisthorpe, 1936 (Staphylinidae)**

Comp. 296a, 13.05-8.06.2021 – 1 ex., det. KK.

Known from scattered localities in Poland. Recorded i.a. in the Kozienice Forest by Gutowski *et al.* (2006). A general record from the Masurian Lake District was published by Szujecki (1976). Occurs in meadows, fields, ruderal areas and forest edges. Collected in rotting straw, compost and manure (Koch 1989).

***Planolinoides borealis* (Gyllenhal, 1827) (Scarabaeidae)**

Comp. 298c, 13.05-8.06.2021 – 1 ex., det. AB.

Rather rare in Poland, but may be locally common in some places. Inhabits dung in large forest complexes. Recently recorded in the Białowieża Primeval Forest (Gutowski *et al.* 2020b). Known from the Biebrza NP in the Masurian Lake District (Bunalski 2006, Gutowski *et al.* 2006).

***Agrilus integerrimus* (Ratzeburg, 1837) (Buprestidae)**

Comp. 282b, 14.06-12.07.2022 – 1 ex., det. JG.

Local and rare. Known in the Masurian Lake District from Ełk (Burakowski *et al.* 1985) and the Suwałki Landscape Park (Gutowski *et al.* 2020a). Monophagous on *Daphne mezereum* L. On the Polish Red List of Animals (Pawłowski *et al.* 2002), category NT (near threatened).

***Ampedus tristis* (Linnaeus, 1758) (Elateridae)**

Comp. 283h, 13.05-8.06.2021 – 1 ex.; comp. 296a, 17.05-13.06.2022 – 1 ex.; comp. 299a, 17.05-13.06.2022 – 1 ex.; det. KS.

A boreo-alpine species, rare in Poland. Known in the Masurian Lake District from AF (Tarnawski 1991) and the Borecka Forest (Maciejewski 1996). On the Polish Red List of Animals (Pawłowski *et al.* 2002), category DD (data deficient). A primeval forest relict (*sensu lato*) in Central Europe (Eckelt *et al.* 2018). Also on the European Red List of Saproxylic Beetles (Cálix *et al.* 2018).

***Stephanopachys linearis* (Kugelann, 1792) (Bostrichidae)**

Comp. 297k, 3.06-1.07.2020 – 1 ex., 17.05-13.06.2022 – 2 exx.; det. JB & JG.

An obligatory pyrophilous species, collected in the 2nd and 4th years after the fire in the "forest islands" that were left untouched in the middle of the burnt forest area. The species was described in 1792 from Ostróda on the basis of a single finding (Kugelann 1792). During the next 220 years it was never

recorded in Poland and as a result was placed on the Polish Red List of Animals (Pawłowski *et al.* 2002), in the category EX? (probably extinct). Rediscovered in Poland in a burnt part of the Białowieża Primeval Forest (Borowski *et al.* 2018) and in AF during the present research (Borowski & Gutowski 2022). A relict of primeval forests (*sensu lato*) of central Europe (Eckelt *et al*. 2018). On the European Red List of Saproxylic Beetles (Cálix *et al.* 2018) and also in Appendix II of the EU Habitat Directive (Gutowski & Przewoźny 2013).

***Episernus angulicollis* Thomson, 1863 (Ptinidae)**

Comp. 297k, 12.05-2.06.2020 – 1 ex., det JB.

A boreo-alpine species, recently recorded as new to the Polish fauna on the basis of specimens from the Białowieża Primeval Forest (Plewa *et al.* 2020). The locality in AF is the second one in Poland. New to the Masurian Lake District. The larvae develop in thin branches of spruce *Picea abies* (L.) Karst., but can also occasionally develop on pine *Pinus sylvestris* L. and dwarf mountain pine *P. mugo* Turra (Dodelin 2016).

***Stagetus borealis* Israelson, 1971 (Ptinidae)**

Comp. 296a, 14.06-12.07.2022 – 1 ex.; comp. 297k, 3.06-1.07.2020 – 1 ex., 13.05-8.06.2021 – 1 ex.; det JB.

Hitherto recorded in the Białowieża Primeval Forest (Gutowski *et al.* 2006, 2020b), the Myszyniec Forest District (Plewa & Borowski 2018) and the Biebrza NP (Plewa *et al.* 2021). Develops in brown pine wood decomposed by *Fomitopsis pinicola* (Sw.) Karst. A primeval forest relict (*sensu lato*) in Central Europe (Eckelt *et al*. 2018).

***Peltis grossa* (Linnaeus, 1758) (Peltidae)**

Comp. 297k, 3.06-1.07.2020 – 2 exx., 13.05-8.06.2021 – 5 exx., 17.05-13.06.2022 – 1 ex., det. KS.

Rare in Poland; more common in the mountains and the north-eastern part of the country (Miłkowski *et al.* 2019b). On the Polish Red List of Animals (Pawłowski *et al.* 2002) in the category VU (vulnerable) and the European Red List of Saproxylic Beetles (Cálix *et al.* 2018). According to Eckelt *et al*. (2018), a relict of central European primeval forests (*sensu stricto*).

***Dasytes aeratus* Stephens, 1830 (Melyridae)**

Comp. 296a, 13.04-16.05.2022 – 1 ex., det. MAM.

Known from numerous localities in Poland, but hitherto not recorded in the Masurian Lake District (Burakowski *et al.* 1986a).

***Glischrochilus grandis* (Tournier, 1872) (Nitidulidae)**

Comp. 282b, 3.06-1.07.2020 – 1 ex., 13.05-8.06.2021 – 2 exx.; comp. 296a, 9.04-12.05.2021 – 1 ex., 13.05-8.06.2021 – 4 exx., 17.05-13.06.2022 – 3 exx.; comp. 299a, 17.05-13.06.2022 – 1 ex.; det. AL.

Recorded in the Bieszczady Mts. and the Białowieża Primeval Forest as new to the Polish fauna (Lasoń & Holly 2015). Further localities later found in the Eastern Beskid Mts. (Twardy 2018), Podlasie (Mokrzycki *et al.* 2022, Lasoń 2023) and in the Biebrza NP (Plewa *et al.* 2022a).

***Silvanoprus fagi* (Guérin-Ménéville, 1844) (Silvanidae)**

Comp. 282b, 12.05-12.06.2020 – 2 exx.; comp. 296a, 9.04-12.05.2021 – 1 ex., 13.05-8.06.2021 – 1 exx.; comp. 297k, 6.04-12.05.2020 – 1 ex.; det. MM & SK.

Known from scattered localities in Poland; relatively common in Upper Silesia, rare in northern Poland (Miłkowski *et al.* 2019a). In the Masurian Lake District recorded in the vicinity of Gołdap (Burakowski *et al.* 1986b). Recently recorded in AF.

***Cucujus cinnaberinus* (Scopoli, 1763) (Cucujidae)**

Comp. 297k, 6.04-12.05.2020 – 2 exx., 3.06-1.07.2020 – 2 exx., 13.04-16.05.2022 – 2 exx., det. KS.

Rare in Poland; recently collected more often, especially in the east of the country (Burakowski *et al.* 1986b, Gutowski *et al.* 2006,

Smolis *et al.* 2012, Buchholz & Melke 2018, Jaworski *et al.* 2019, Kwiatkowski & Marczak 2020a, Buchholz *et al.* 2021). In the Masurian Lake District known from the Biebrza NP (Plewa *et al.* 2021, Sikora *et al.* 2023). A legally protected species in Poland, on the Polish Red List of Animals (Pawłowski *et al.* 2002), category LC (least concern). Also on the European Red List of Saproxylic Beetles (Cálix *et al.* 2018) and in Appendix II of the EU Habitat Directive (Gutowski & Przewoźny 2013).

***Cryptolestes duplicatus* (Waltl, 1839) (Laemophloeidae)**

Comp. 283h, 13.05-8.06.2021 – 1 ex., det. JB.

Known from numerous localities in Poland; recently recorded in the vicinity of Węgrów (Plewa *et al.* 2014a, b, 2017), the projected Turnicki NP (Buchholz & Melke 2018), the Białowieża Primeval Forest (Gutowski *et al.* 2020b) and the Świętokrzyski NP (Buchholz *et al.* 2021). New to the Masurian Lake District.

***Laemophloeus muticus* (Fabricius, 1781) (Laemophloeidae)**

Comp. 283h, 3.06-1.07.2020 – 2 exx., 13.05-8.06.2021 – 1 ex.; comp. 297k, 12.05-2.06.2020 – 1 ex., 3.06-1.07.2020 – 2 exx.; comp. 298c, 6.04-12.05.2020 – 1 ex., 13.05-2.06.2020 – 1 ex., 3.06-1.07.2020 – 1 ex.; det. JB.

An obligatory pyrophilous species, rare in Poland. Recorded in the environs of Wałbrzych, the Kampinos Forest and the Masurian Lake District (Ślipiński 1982, Burakowski *et al.* 1986b, Sawoniewicz 2014).

***Lathropus sepicola* (Müller, 1821) (Laemophloeidae)**

Comp. 297k, 3.06-1.07.2020 – 2 exx., 13.04-16.05.2022 – 1 ex.; comp. 298c, 3.06-1.07.2020 – 2 exx.; det. KS & RP.

Known from a few localities, mainly in south-western Poland (Burakowski *et al.* 1986b). New to the Masurian Lake District.

***Atomaria bella* Reitter, 1875 (Cryptophagidae)**

Comp. 299a, 3.06-1.07.2020 – 1 ex., det. JB.

Very rare, known from the Białowieża Primeval Forest (Majewski 1997a). New to the Masurian Lake District.

***Atomaria nigrirostris* Stephens, 1830 (Cryptophagidae)**

Comp. 282b, 13.05-2.06.2020 – 4 exx., 3.06-1.07.2020 – 2 exx., 13.5-8.06.2021 – 1 ex.; comp. 283h, 13.05-8.06.2021 – 1 ex., 11.04-16.05.2022 – 1 ex.; comp. 296a, 13.05-2.06.2020 – 2 exx., 9.04-12.05.2021 – 1 ex., 13.05-8.06.2021 – 2 exx.; det. JB.

Known from scattered localities in Poland (Burakowski *et al.* 1986b). Recently recorded by Majewski (1997a) and Buchholz *et al.* (2021). New to the Masurian Lake District.

***Atomaria ornata* Heer, 1841 (Cryptophagidae)**

Comp. 283h, 9.04-12.05.2021 – 1 ex., det. JB.

Rare in Poland (Burakowski *et al.* 1986b). New to the Masurian Lake District.

***Tritoma subbasalis* (Reitter, 1896) (Erotylidae)**

Comp. 283h, 15.04-12.05.2020 – 1 ex., det. AL.

Rare; known from scattered localities in eastern Poland (Burakowski *et al.* 1986c, Węgrzynowicz 2014). In the Masurian Lake District known from the Pisz Forest (Gutowski *et al.* 2010) and the Biebrza NP (Plewa *et al.* 2021). On the European Red List of Saproxylic Beetles (Cálix *et al.* 2018).

***Bothrideres bipunctatus* (Gmelin, 1790) (Bothrideridae)**

Comp. 282b, 13.05-8.06.2021 – 1 ex., 17.05-13.06.2022 – 1 ex.; comp. 283h, 15.04-12.05.2020 – 2 exx., 13.05-2.06.2020 – 1 ex.; comp. 296a, 15.04-12.05.2020 – 1 ex., 3.06-1.07.2020 – 1 ex.; comp. 297k, 15.04-12.05.2020 – 1 ex., 13.05-2.06.2020 – 2 exx., 13.05-8.06.2021 – 2 exx., 11.04-16.05.2022 – 4

exx., 17.05-13.06.2022 – 1 ex.; comp. 298c, 15.04-12.05.2020 – 1 ex., 3.06-1.07.2020 – 3 exx., 13.05-8.06.2021 – 2 exx.; det. JG & KS.

Rare in Poland (Burakowski *et al.* 1986c); recorded in the Białowieża Primeval Forest (Borowski 2021) and the Knyszyn Forest (Kwiatkowski & Marczak 2020b). In the Masurian Lake District known from the Biebrza NP (Gutowski *et al.* 2006). The first record for AF.

***Cerylon deplanatum* Gyllenhal, 1827 (Cerylonidae)**

Comp. 283h, 3.06-1.07.2020 – 1 ex., det. RK.

Known from numerous localities in Poland (i.a. Królik 1992, Ruta *et al.* 2020, Buchholz *et al.* 2021), but hitherto not recorded in the Masurian Lake District.

***Leiestes seminiger* (Gyllenhal, 1808) (Endomychidae)**

Comp. 282b, 17.05-13.06.2022 – 1 ex., det. KS.

Rare in Poland (Burakowski *et al.* 1986c); recently found in the Knyszyn Forest (Plewa *et al.* 2014a), the projected Turnicki NP (Buchholz & Melke 2018) and the Świętokrzyski NP (Buchholz *et al.* 2021). Recently recorded in the Pisz Forest in the Masurian Lake District (Gutowski *et al.* 2022). On the Polish Red List of Animals (Pawłowski *et al.* 2002), category NT (near threatened). A relict of central European primeval forests (*sensu lato*) (Eckelt *et al*. 2018).

***Arthrolips obscura* (Sahlberg, 1833) (Corylophidae)**

Comp. 283h, 13.05-8.06.2021 – 1 ex.; comp. 298c, 13.05-8.06.2021 – 1 ex.; det. KK.

Rare, known from south-western Poland; one of the more recent localities is Koło (Majewski 1994). New to the Masurian Lake District.

***Clypastraea pusilla* (Gyllenhal, 1810) (Corylophidae)**

Comp. 297k, 15.04-12.05.2020 – 2 exx., det. RR.

A very rare, saproxylic, pyrophilous species, known in Poland from a few, mainly historical, localities (Burakowski *et al.* 1986c). More recently collected on the Babia Góra Mt. (Szafraniec 1997) and in the Tatra Mts. (Tykarski 2006).

***Orthoperus punctatus* Wankowicz, 1865 (Corylophidae)**

Comp. 282b, 15.04-12.05.2020 – 1 ex., 3.06-1.07.2020 – 1 ex.; comp. 297k, 13.05-2.06.2020 – 1 ex.; det. RR.

Very rare, known from southern Poland (Burakowski *et al.* 1986c, Buchholz *et al.* 2021) and the Białowieża Primeval Forest (Borowski 2001). New to the Masurian Lake District.

***Corticaria ferruginea* Marsham, 1802 (Latridiidae)**

Comp. 282b, 13.05-2.06.2020 – 1 ex.; comp. 283h, 15.04-12.05.2020 – 1 ex.; comp. 297k, 15.04-12.05.2020 – 1 ex.; det. RP.

Seldom found in Poland, known from scattered localities (Burakowski *et al.* 1986c, Majewski 1997b). New to the Masurian Lake District. Occurs in coniferous forests, usually in cones, more rarely in decaying plants overgrown with fungi (Rücker 2020).

***Corticaria longicornis* (Herbst, 1783) (Latridiidae)**

Comp. 296a, 15.04-12.05.2020 – 1 ex.; comp. 299a, 3.06-1.07.2020 – 2 exx., 14.06-12.07.2022 – 1 ex.; det. RP.

Known from several localities in Poland (i.a. Burakowski *et al.* 1986c; Majewski 1997b; Buchholz & Melke 2018; Buchholz *et al.* 2021). Recorded in the Masurian Lake District by Bercio & Folwaczny (1979), Rutkiewicz (2007) and Komosiński *et al.* (2021). Included in the list of primeval forest relict beetles (*sensu lato*) of Central Europe (Eckelt *et al.* 2018). Prefers coniferous forests with an admixture of spruce. According to Rücker (2020), develops in relatively fresh spruce cones lying on the ground.

***Enicmus planipennis* Strand, 1940 (Latridiidae)**

Comp. 282b, 15.04-12.05.2020 – 1 ex., 13.05-8.06.2021 – 1 ex.; comp. 283h, 15.04-12.05.2020 – 3 exx., 13.05-8.06.2021 – 1 ex., 14.06-12.07.2022 – 1 ex.; comp. 296a, 15.04-12.05.2020 – 1 ex., 13.05-8.06.2021 – 1 ex., 9.06-7.07.2021 – 1 ex., 14.06-12.07.2022 – 1 ex.; comp. 297k, 3.06-1.07.2020 – 1 ex.; comp. 298c, 15.04-12.05.2020 – 1 ex., 13.05-2.06.2020 – 1 ex.; comp. 299a, 15.04-12.05.2020 – 1 ex., 17.05-13.06.2022 – 1 ex.; det. RP.

Recorded in five regions of Poland: the Białowieża Primeval Forest (Borowski 2001, Gutowski *et al.* 2020b, Plewa *et al.* 2022b), the Myszyniec Forest District (Plewa & Borowski 2018), the Świętokrzyskie Mts. (Buchholz *et al.* 2021), the environs of Pisz in the Masurian Lake District (Gutowski *et al.* 2022) the Sobibór Landscape Park (Plewa 2023) and the Notecka Forest (Plewa *et al.* 2024). Occurs in coniferous forests, also on trees damaged by fire. Develops under rotten bark, in fruiting bodies of bracket fungi (polypores), slime moulds and detritus (Rücker 2020).

***Latridius brevicollis* (Thomson, 1868) (Latridiidae)**

Comp. 296a, 13.05-8.06.2021 – 1 ex., det. RP.

Rare in Poland, known from a few scattered localities (Burakowski *et al.* 1986c). Recently recorded in the Świętokrzyski NP (Mokrzycki 2011, Buchholz *et al.* 2021) and in the Roztocze NP (Papis & Mokrzycki 2015). New to the Masurian Lake District. A relict of central European primeval forests (*sensu lato*) (Eckelt *et al*. 2018), it develops in fruiting bodies of bracket fungi like *Fomes fomentarius* (L.) Fr. and *Fomitospsis betulina* (Bull.) B.K. Cui, M.L. Han & Y.C. Dai. It has also been collected in the wood of deciduous trees densely overgrown with fungi (Rücker 2020).

***Latridius consimilis* Mannerheim, 1844 (Latridiidae)**

Comp. 283h, 17.05-13.06.2022 – 1 ex., det. RP.

A rare species, known from scattered localities in Poland (Burakowski *et al.* 1986c, Majewski 1997b); recently recorded in the Zwoleńka river valley (Plewa & Miłkowski 2018), the Świętokrzyskie Mts. (Buchholz *et al.* 2021) and the Sobibór Landscape Park (Plewa 2023). Known from the Borecka Forest in the Masurian Lake District (Komosiński *et al.* 2021). Inhabits subcortical habitats of deciduous trees overgrown with mould and fruiting bodies of bracket fungi. Also collected in mouldy hay and straw in barns (Rücker 2020).

***Stephostethus alternans* (Mannerheim, 1844) (Latridiidae)**

Comp. 296a, 15.04-12.05.2020 – 2 exx., 13.05-2.06.2020 – 1 ex.; comp. 299a, 3.06-1.07.2020 – 1 ex.; det. RP.

Rare in Poland (Burakowski *et al.* 1986c). Recently recorded in the projected Turnicki NP (Buchholz & Melke 2018), the Kozienice Forest (Plewa & Miłkowski 2018), the Eastern Beskid Mts. (Taszakowski *et al.* 2020), the Świętokrzyskie Mts. (Buchholz *et al.* 2021) and the Pisz Forest (Gutowski *et al.* 2022). Associated with deciduous forests. Usually occurs in soft, rotten wood or under the mouldy bark of trees (Rücker 2020).

***Litargus balteatus* LeConte, 1856 (Mycetophagidae)**

Comp. 282b, 13.05-2.06.2020 – 1 ex., det. AL.

A rare, adventive species in Poland. Recorded in the Masurian Lake District by Gawroński *et al.* (2008), Ruta *et al.* (2012) and Kubisz *et al.* (2015).

***Cis lineatocribratus* Mellié, 1849 (Ciidae)**

Comp. 283h, 17.05-13.06.2022 – 1 ex., det. RK.

Rare in Poland (Kubisz *et al.* 2015, Buchholz & Melke 2018, Buchholz *et al.* 2021); known in

the Masurian Lake District from the "Dęby w Krukach Pasłęckich" res. (Byk & Byk 2004).

***Hadreule elongatula* (Gyllenhal, 1827) (Ciidae)**

Comp. 283h, 9.06-7.07.2021 – 1 ex.; comp. 297k, 9.06-7.07.2021 – 1 ex.; det. RK.

Rare in Poland (Kubisz *et al.* 2015, Buchholz & Melke 2018, Buchholz *et al.* 2021); known from the Pisz Forest in the Masurian Lake District (Gutowski *et al.* 2022). Included in the Polish Red List of Animals (Pawłowski *et al.* 2002), category VU (vulnerable).

***Orthocis reflexicollis* (Abeille de Perrin, 1874) (Ciidae)**

Comp. 282b, 13.05-2.06.2020 – 1 ex.; comp. 296a, 13.05-2.06.2020 – 1 ex., 9.04-12.05.2021 – 1 ex., 13.05-8.06.2021 – 1 ex.; comp. 297k, 3.06-1.07.2020 – 2 exx., 13.05-2.06.2020 – 1 ex., 9.06-7.07.2021 – 1 ex., 11.04-16.05.2022 – 1 ex.; comp. 298c, 3.06-1.07.2020 – 1 ex., 9.04-12.05.2021 – 1 ex., 13.05-8.06.2021 – 1 ex., 11.04-16.05.2022 – 1 ex.; det. RK.

A rare species (Kubisz *et al.* 2015), new to the Masurian Lake District.

***Wanachia triguttata* (Gyllenhal, 1810) (Melandryidae)**

Comp. 297k, 13.05-8.06.2021 – 1 ex., 17.05-13.06.2022 – 2 exx., det. JG & KS.

A species rarely observed in Poland (Kubisz *et al.* 2014). Recorded in the Pisz Forest in the Masurian Lake District (Gutowski *et al.* 2010). New to AF.

***Curtimorda maculosa* (Naezén, 1794) (Mordellidae)**

Comp. 297k, 3.06-1.07.2020 – 4 exx., det. AL.

Rather rare in Poland, recorded somewhat more often from the south of the country (Kubisz *et al.* 2015). Also known from north-eastern Poland, i.a. from the Białowieża Primeval Forest (Kubisz *et al.* 2010), and from Jedwabne (Bercio & Folwaczny 1979) and the Pisz Forest (Borowiec & Kubisz 1999, Gutowski *et al.* 2010) in the Masurian Lake District. Develops on the fruiting bodies of *Gloeophyllum sepiarium* (Wulfen) P. Karst. and in wood overgrown with this fungus. *G. sepiarium* inhabits coniferous trees, mostly spruces and pines, growing on bark-free patches on stumps and logs, and often also on wooden objects such as fences and buildings (Burakowski *et al.* 1987).

***Colydium filiforme* Fabricius, 1792 (Zopheridae)**

Comp. 296a, 17.05-13.06.2022 – 1 ex., det. KS.

Relatively rare in Poland (Kubisz *et al.* 2015, Buchholz *et al.* 2021). A relict of primeval forests (*sensu lato*) in Central Europe according to Eckelt *et al*. (2018). New to the Masurian Lake District.

***Corticeus fasciatus* (Fabricius, 1790) (Tenebrionidae)**

Comp. 282b, 3.06-1.07.2020 – 1 ex., 9.06-7.07.2021 – 1 ex.; comp. 283h, 3.06-1.07.2020 – 2 exx.; comp. 297k, 3.06-1.07.2020 – 1 ex.; comp. 298c, 3.06-1.07.2020 – 1 ex.; det. JG, SK & TG.

A rather rare and not numerous species in Poland (Iwan *et al.* 2012). A relict of central European primeval forests (*sensu lato*) (Eckelt *et al*. 2018). On the European Red List of Saproxylic Beetles (Cálix *et al.* 2018). These are the first records from the Masurian Lake District.

***Corticeus suturalis* (Paykull, 1800) (Tenebrionidae)**

Comp. 297k, 13.05-8.06.2021 – 1 ex., det. TG.

A rare, boreo-alpine species, known from a few localities in Poland (Iwan *et al.* 2012). In the Masurian Lake District recorded in the Biebrza NP (Hilszczański 2008). On the European Red List of Saproxylic Beetles (Cálix *et al.* 2018). According to Eckelt *et al*. (2018), a relict of primeval forests (*sensu stricto*) in Central Europe.

***Prionychus melanarius* (Germar, 1813) (Tenebrionidae)**

Comp. 296a, 9.06-7.07.2021 – 2 exx.; comp. 297k, 3.06-1.07.2020 – 9 exx., 9.06-7.07.2021 – 10 exx., 14.06-12.07.2022 – 2 exx.; comp. 299a, 9.06-7.07.2021 – 1 ex.; det. KS, SK & TG.

Known from numerous localities in Poland (Kubisz *et al*. 2014). A relict of central European primeval forests (*sensu lato*) (Eckelt *et al*. 2018). On the European Red List of Saproxylic Beetles (Cálix *et al.* 2018).

***Boros schneideri* (Panzer, 1796) (Boridae)**

Comp. 297k, 15.04-12.05.2020 – 1 ex., 3.06-1.07.2020 – 1 ex., 9.04-12.05.2021 – 1 ex., det. JG & KS.

A rare species in Poland, although more localities have been reported recently, mostly from the eastern part of the country (Burakowski *et al.* 1987, Buchholz *et al.* 2012, Iwan *et al.* 2012, Gutowski *et al.* 2014, Buchholz & Melke 2018). In the Masurian Lake District, recently recorded in AF (Gutowski & Sućko 2015, Bohdan *et al.* 2021). A relict of primeval forests (*sensu stricto*) in Central Europe (Eckelt *et al*. 2018). Strictly protected in Poland. On the Polish Red List of Animals (Pawłowski *et al.* 2002) the European Red List of Saproxylic Beetles (Cálix *et al.* 2018), and also in the Polish Red Book of Animals – Invertebrates in the category EN (endangered) (Głowaciński & Nowacki 2004) and Appendix II of the EU Habitat Directive (Gutowski & Przewoźny 2013).

***Sphaeriestes stockmanni* (Biström, 1977) (Salpingidae)**

Comp. 283h, 3.06-1.07.2020 – 1 ex., 9.06-1.07.2021 – 1 ex.; comp. 296a, 13.05-2.06.2020 – 1 ex., 13.05-8.06.2021 – 1 ex.; comp. 297k, 13.05-2.06.2020 – 4 exx., 3.06-1.07.2020 – 7 exx., 13.05-8.06.2021 – 2 exx., 9.06-1.07.2021 – 1 ex.; comp. 298c, 13.05-2.06.2020 – 1 ex., 3.06-1.07.2020 – 1 ex., 13.05-8.06.2021 – 1 ex., 9.06-1.07.2021 – 1 ex.; det. AL., JG & MM.

Rare in Poland (Burakowski *et al.* 1987, Jałoszyński *et al.* 2012, Kubisz *et al.* 2015, Plewa & Borowski 2018). According to Wikars (1992), an obligatory pyrophilous species.

***Acmaeops marginatus* (Fabricius, 1781) (Cerambycidae)**

Comp. 296a, 3.06-1.07.2020 – 2 exx.; comp. 297k, 3.06-1.07.2020 – 4 exx., 13.05-8.06.2021 – 2 exx., 17.05-13.06.2022 – 1 ex.; det. JG.

Rarely collected in Poland, but known from several localities, including some in the Masurian Lake District (Burakowski *et al.* 1990, Gutowski 1995, Plewa & Borowski 2018). On the European Red List of Saproxylic Beetles (Cálix *et al.* 2018). Prefers pine forests damaged by fire (Wikars 1992, Miłkowski 2004).

***Acmaeops septentrionis* (Thomson, 1866) (Cerambycidae)**

Comp. 297k, 13.05-2.06.2020 – 1 ex., 13.05-8.06.2021 – 1 ex., det. JG.

Rather rare in Poland, but known from several localities (Burakowski *et al.* 1990, Gutowski 1995). In the Masurian Lake District recorded in the Biebrza NP (Plewa 2010). On the European Red List of Saproxylic Beetles (Cálix *et al.* 2018). Prefers pine forests damaged by fire (Wikars 1992).

***Monochamus saltuarius occidentalis* Sláma, 2017 (Cerambycidae)**

Comp. 297k, 13.05-2.06.2020 – 1 ex., det. JG.

Known from several localities in Poland, also in the Masurian Lake District (Burakowski *et al.* 1990, Gutowski 1995). On the European Red List of Saproxylic Beetles (Cálix *et al.* 2018). Usually develops in dying and recently dead lower branches of standing spruces (unpublished data).

***Altica aenescens* (Weise, 1888) (Chrysomelidae)**

Comp. 297k, 13.05-8.06.2021 – 1 ex., det. TG.

Rare in Poland (Burakowski *et al.* 1991), recently recorded by Ścibior (2002) and Byk (2007). In the Masurian Lake District known from the Suwałki Landscape Park (Gutowski *et*

al. 2020a). Develops on birches – *Betula pubescens* Ehrh. and *B. humilis* Schrank – rarely also on *B. pendula* Roth (Burakowski *et al.* 1991).

***Altica brevicollis* Foudras, 1861 (Chrysomelidae)**

Comp. 296a, 13.05-2.06.2020 – 1 ex., 11.04-16.05.2022 – 1 ex.; comp. 297k, 11.04-16.05.2022 – 1 ex.; det. WJ.

A widely distributed species in Europe. Occurs all across Poland, but is known from only a few localities (Burakowski *et al.* 1991, Warchałowski 1998). Recently recorded by Ścibior (2010). Associated with forest margins, clearings and clearcuts. New to the Masurian Lake District.

***Podagrica fuscicornis* (Linnaeus, 1767) (Chrysomelidae)**

Comp. 283h, 14.06-12.07.2022 – 1 ex., det. WJ.

Known from numerous localities in Poland (Burakowski *et al.* 1991). Occurs on roadsides and in ruderal habitats. More numerous populations are known from southern Poland (Warchałowski 1998). New to the Masurian Lake District.

***Platyrhinus resinosus* (Scopoli, 1763) (Anthribidae)**

Comp. 297k, 13.05-8.06.2021 – 1 ex., det. MAM.

Known from numerous localities in Poland (Burakowski *et al.* 1992, Wanat *et al.* 2011); usually found in well-preserved forests. An obligatory pyrophilous species (Wikars 1992, 1997b). New to the Masurian Lake District.

***Pityophthorus carniolicus* Wichmann, 1910 (Curculionidae)**

Comp. 283h, 13.05-2.06.2020 – 1 ex., 3.06-1.07.2020 – 3 exx., 13.05-8.06.2021 – 8 exx., 9.06-7.07.2021 – 1 ex., 17.05-13.06.2022 – 1 ex.; comp. 296a, 3.06-1.07.2020 – 1 ex., 17.05-13.06.2022 – 2 exx.; comp. 297k, 13.05-8.06.2021 – 3 exx., 11.04-16.05.2022 – 1 ex., 17.05-13.06.2022 – 1 ex.; comp. 298c, 13.05-8.06.2021 – 1 ex.; comp. 299a, 3.06-1.07.2020 – 1 ex.; det. TM.

First recorded in Poland fairly recently (Wanat & Mokrzycki 2005), and again in several new localities in the last few years (Byk *et al.* 2006, Mokrzycki *et al.* 2011, Buchholz & Melke 2018, Buchholz *et al.* 2021). New to the Masurian Lake District.

***Polygraphus punctifrons* Thomson, 1886 (Curculionidae)**

Comp. 296a, 17.05-13.06.2022 – 1 ex., det. RK.

Rare in Poland (Burakowski *et al.* 1992, Mazur 1996). Recorded in the Masurian Lake District by Szczepański (1960).

***Xylechinus pilosus* (Ratzeburg, 1837) (Curculionidae)**

Comp. 299a, 13.05-2.06.2020 – 1 ex., det. TM.

Quite rare in Poland (Burakowski *et al.* 1992), but recently recorded in the projected Turnicki NP (Buchholz & Melke 2018) and the Świętokrzyskie Mts. (Buchholz *et al.* 2021). Also recorded in the former Tabórz distr. (currently the Miłomłyn distr.) in the Masurian Lake District (Bałazy & Michalski 1962).

Apart from the above-mentioned rare species, the other beetle species recorded during the survey of the burnt forest and its surroundings in the Płaska distr. are listed below in systematic order. The taxonomy is according to the Catalogue of Palaearctic Coleoptera, that of Meligethinae follows Audisio *et al.* (2009). **Dytiscidae:** *Graptodytes granularis* (Linnaeus, 1767), *Hygrotus impressopunctatus* (Schaller, 1783), *Ilybius neglectus* (Erichson, 1837); **Carabidae:** *Cicindela sylvatica* Linnaeus, 1758, *Loricera pilicornis* (Fabricius, 1775), *Notiophilus biguttatus* (Fabricius, 1779), *N. palustris* (Duftschmid, 1812), *Clivina fossor* (Linnaeus, 1758), *Dyschirius aeneus* (Dejean, 1825), *D. angustatus* (Ahrens, 1830), *Bembidion gilvipes* Sturm, 1825, *B. guttula* (Fabricius, 1792), *B. lampros* (Herbst, 1784), *B. obliquum*

Sturm, 1825, *B. quadrimaculatum* (Linnaeus, 1760), *Tachyta nana* (Gyllenhal, 1810), *Acupalpus flavicollis* (Sturm, 1825), *A. meridianus* (Linnaeus, 1761), *A. parvulus* (Sturm, 1825), *Amara aenea* (De Geer, 1774), *A. communis* (Panzer, 1797), *A. curta* Dejean, 1828, *A. famelica* Zimmermann, 1832, *A. familiaris* (Duftschmid, 1812), *A. lunicollis* Schiødte, 1837, *A. plebeja* (Gyllenhal, 1810), *A. similata* (Gyllenhal, 1810), *A. tibialis* (Paykull, 1798), *Badister meridionalis* Puel, 1925, *Dicheirotrichus placidus* (Gyllenhal, 1827), *Dromius agilis* (Fabricius, 1787), *D. quadraticollis* Morawitz, 1862, *Harpalus froelichii* Sturm, 1818, *H. laevipes* Zetterstedt, 1828, *H. latus* (Linnaeus, 1758), *H. luteicornis* (Duftschmid, 1812), *H. rubripes* (Duftschmid, 1812), *H. signaticornis* (Duftschmid, 1812), *H. solitaris* Dejean, 1829, *Microlestes maurus* (Sturm, 1827), *M. minutulus* (Goeze, 1777), *Poecilus versicolor* (Sturm, 1824), *Pterostichus quadrifoveolatus* Letzner, 1852, *P. vernalis* (Panzer, 1796); **Helophoridae:** *Helophorus granularis* (Linnaeus, 1761); **Hydrophilidae:** *Anacaena lutescens* (Stephens, 1829), *Cymbiodyta marginella* (Fabricius, 1792), *Enochrus coarctatus* (Gredler, 1863), *Hydrobius fuscipes* (Linnaeus, 1758), *Cercyon convexiusculus* Stephens, 1829, *C. lateralis* (Marsham, 1802), *C. pygmaeus* (Illiger, 1801), *C. quisquilius* (Linnaeus, 1760), *Cryptopleurum minutum* (Fabricius, 1775), *Megasternum concinnum* (Marsham, 1802); **Histeridae:** *Acritus minutus* (Herbst, 1791), *Plegaderus caesus* (Herbst, 1792), *P. vulneratus* (Panzer, 1797), *Gnathoncus buyssoni* Auzat, 1917, *G. nannetensis* (Marseul, 1862), *Dendrophilus punctatus* (Herbst, 1792), *Paromalus flavicornis* (Herbst, 1791), *P. parallelepipedus* (Herbst, 1792), *Eurosomides minor* (Rossi, 1792), *Margarinotus carbonarius* (Hoffmann, 1803), *M. marginatus* (Erichson, 1834), *M. obscurus* (Kugelann, 1792), *M. striola succicola* (Thomson, 1862), *Platysoma angustatum* (Hoffmann, 1803), *P. elongatum* (Thunberg, 1787), *P. lineare* Erichson, 1834; **Leiodidae:** *Agathidium atrum* (Paykull, 1798), *A. laevigatum* Erichson, 1845, *A. rotundatum* (Gyllenhal, 1827), *A. seminulum* (Linnaeus, 1758), *Anisotoma axillaris* Gyllenhal, 1810, *A. castanea* (Herbst, 1791), *A. glabra* (Fabricius, 1787), *A. humeralis* (Herbst, 1791), *Ptomaphagus sericatus* Chaudoir, 1845, *Sciodrepoides fumatus* (Spence, 1813), *S. watsoni* (Spence, 1813); **Silphidae:** *Nicrophorus humator* (Gleditsch, 1767), *N. vespilloides* Herbst, 1783; **Ptiliidae:** *Ptenidium nitidum* (Heer, 1841), *Acrotrichis brevipennis* (Erichson, 1845), *A. fascicularis* (Herbst, 1793), *A. grandicollis* (Mannerheim, 1844), *A. intermedia* (Gillmeister, 1845), *A. montandonii* (Allibert, 1844), *A. sitkaensis* (Motschulsky, 1845); **Staphylinidae:** *Phloeocharis subtilissima* Mannerheim, 1830, *Euconnus claviger* (Müller & Kunze, 1822), *Neuraphes carinatus* (Mulsant et Rey, 1861), *Stenichnus collaris* (Müller & Kunze, 1822), *S. godarti* (Latreille, 1806), *S. scutellaris* (Müller & Kunze, 1822), *Acidota crenata* (Fabricius, 1793), *Anthobium atrocephalum* (Gyllenhal, 1827), *Lesteva longoelytrata* (Goeze, 1777), *Omalium rivulare* (Paykull, 1789), *Phloeonomus pusillus* (Gravenhorst, 1806), *Phloeostiba lapponica* (Zetterstedt, 1838), *P. plana* (Paykull, 1792), *Proteinus brachypterus* (Fabricius, 1792), *Batrisodes venustus* (Reichenbach, 1816), *Bibloplectus ambiguus* (Reichenbach, 1816), *Bibloporus bicolor* (Denny, 1825), *B. minutus* Raffray, 1914, *Bryaxis bulbifer* (Reichenbach, 1816), *Euplectus karstenii* (Reichenbach, 1816), *E. nanus* (Reichenbach, 1816), *E. punctatus* Mulsant & Rey, 1861, *Plectophloeus fischeri* (Aubé, 1833), *P. nubigena* Reitter, 1877, *Rybaxis longicornis* (Leach, 1817), *Trichonyx sulcicollis* (Reichenbach, 1816), *Trimium brevicorne* (Reichenbach, 1816), *Tyrus mucronatus* (Panzer, 1803), *Bolitobius castaneus* (Stephens, 1832), *B. cingulatus* Mannerheim, 1830, *Bryophacis crassicornis* (Mäklin, 1847), *Lordithon trinotatus* (Erichson, 1839), *Mycetoporus bimaculatus* Lacordaire, 1835, *M. lepidus* (Gravenhorst, 1806), *M. punctus* (Gravenhorst, 1806), *Sepedophilus*

immaculatus (Stephens, 1832), *S. littoreus* (Linnaeus, 1758), *S. marshami* (Stephens, 1832), *S. testaceus* (Fabricius, 1793), *Tachinus laticollis* Gravenhorst, 1802, *T. subterraneus* (Linnaeus, 1758), *Tachyporus chrysomelinus* (Linnaeus, 1758), *T. hypnorum* (Fabricius, 1775), *T. pusillus* Gravenhorst, 1806, *T. transversalis* Gravenhorst, 1806, *Habrocerus capillaricornis* (Gravenhorst, 1806), *Acrotona aterrima* (Gravenhorst, 1802), *A. benicki* (Allen, 1940), *A. parens* (Mulsant & Rey, 1852), *Aleochara bilineata* Gyllenhal, 1810, *A. binotata* Kraatz, 1856, *A. bipustulata* (Linnaeus, 1761), *A. curtula* (Goeze, 1777), *A. lanuginosa* Gravenhorst, 1802, *A. tristis* Gravenhorst, 1806, *Aloconota gregaria* (Erichson, 1839), *Amischa analis* (Gravenhorst, 1802), *A. nigrofusca* (Stephens, 1832), *Anomognathus cuspidatus* (Erichson, 1839), *Atheta aeneicollis* (Sharp, 1869), *A. celata* (Erichson, 1837), *A. corvina* (Thomson, 1856), *A. crassicornis* (Fabricius, 1792), *A. elongatula* (Gravenhorst, 1802), *A. fungi* (Gravenhorst, 1802), *A. gagatina* (Baudi, 1848), *A. graminicola* (Gravenhorst, 1806), *A. hypnorum* (Kiesenwetter, 1850), *A. inquinula* (Gravenhorst, 1802), *A. laevana* (Mulsant & Rey, 1852), *A. laticollis* (Stephens, 1832), *A. macrocera* (Thomson, 1856), *A. myrmecobia* (Kraatz, 1856), *A. orbata* (Erichson, 1847), *A. orphana* (Erichson, 1837), *A. palustris* (Kiesenwetter, 1844), *A. picipes* (Thomson, 1856), *A. ravilla* (Erichson, 1839), *A. sodalis* (Erichson, 1837), *Calodera aethiops* (Gravenhorst, 1802), *Dadobia immersa* (Erichson, 1837), *Dexiogyia corticina* (Erichson, 1837), *Dinaraea aequata* (Erichson, 1837), *D. angustula* (Gyllenhal, 1810), *D. linearis* (Gravenhorst, 1802), *Euryusa castanoptera* Kraatz, 1856, *Haploglossa marginalis* (Gravenhorst, 1806), *H. villosula* (Stephens, 1832), *Homalota plana* (Gyllenhal, 1810), *Ischnoglossa prolixa* (Gravenhorst, 1802), *Liogluta alpestris* (Heer, 1839), *Lomechusa emarginata* (Paykull, 1789), *Meotica filiformis* (Motschulsky, 1860), *Myllaena dubia* (Gravenhorst, 1806), *M. intermedia* Erichson, 1837, *M. minuta* (Gravenhorst, 1806), *Nehemitropia lividipennis* (Mannerheim, 1830), *Oligota pusillima* (Gravenhorst, 1806), *Oxypoda abdominalis* Mannerheim, 1830, *O. alternans* (Gravenhorst, 1802), *O. brevicornis* (Stephens, 1832), *O. opaca* (Gravenhorst, 1802), *O. procerula* Mannerheim, 1830, *O. vicina* Kraatz, 1856, *O. vittata* Märkel, 1842, *Pella cognata* (Märkel, 1842), *P. limbata* Paykull, 1789, *P. lugens* Gravenhorst, 1802, *Phloeopora corticalis* (Gravenhorst, 1802), *P. teres* (Gravenhorst, 1802), *P. testacea* (Mannerheim, 1830), *Placusa atrata* (Mannerheim, 1830), *P. complanata* Erichson, 1839, *P. depressa* Mäklin, 1845, *P. tachyporoides* (Waltl, 1838), *Tachyusa constricta* (Erichson, 1837), *Thamiaraea cinnamomea* (Gravenhorst, 1802), *Thiasophila angulata* (Erichson, 1837), *Zyras collaris* (Paykull, 1800), *Scaphidium quadrimaculatum* Olivier, 1790, *Scaphisoma agaricinum* (Linnaeus, 1758), *S. assimile* Erichson, 1845, *S. boleti* (Panzer, 1793), *Anotylus rugosus* (Fabricius, 1775), *A. tetracarinatus* (Block, 1799), *Bledius erraticus* Erichson, 1839, *B. gallicus* (Gravenhorst, 1806), *B. opacus* (Block, 1799), *Carpelimus corticinus* (Gravenhorst, 1806), *C. elongatulus* (Erichson, 1839), *C. gracilis* (Mannerheim, 1830), *C. rivularis* (Motschulsky, 1860), *Coprophilus striatulus* (Fabricius, 1793), *Platystethus arenarius* (Geoffroy, 1785), *P. cornutus* (Gravenhorst, 1802), *Stenus ater* Mannerheim, 1830, *Lithocharis nigriceps* Kraatz, 1859, *Scopaeus laevigatus* (Gyllenhal, 1827), *Bisnius fimetarius* (Gravenhorst, 1802), *B. subuliformis* (Gravenhorst, 1802), *Erichsonius cinerascens* (Gravenhorst, 1802), *Gabrius appendiculatus* Sharp, 1910, *G. breviventer* (Sperk, 1835), *G. nigritulus* (Gravenhorst, 1802), *G. osseticus* (Kolenati, 1846), *G. splendidulus* (Gravenhorst, 1802), *G. trossulus* (Nordmann, 1837), *Gyrohypnus angustatus* Stephens, 1833, *G. punctulatus* (Paykull, 1789), *Heterothops dissimilis* (Gravenhorst, 1802), *H. praevius niger* Kraatz, 1868, *H. quadripunctulus* (Gravenhorst, 1806),

Hypnogyra angularis (Ganglbauer, 1895), *Leptacinus sulcifrons* (Stephens, 1833), *Nudobius lentus* (Gravenhorst, 1806), *Philonthus albipes* (Gravenhorst, 1802), *P. carbonarius* (Gravenhorst, 1802), *P. concinnus* (Gravenhorst, 1802), *P. debilis* (Gravenhorst, 1802), *P. fumarius* (Gravenhorst, 1806), *P. micans* (Gravenhorst, 1802), *P. nigrita* (Gravenhorst, 1806), *P. quisquiliarius* (Gyllenhal, 1810), *P. succicola* Thomson, 1860, *P. tenuicornis* Mulsant & Rey, 1853, *Platydracus fulvipes* (Scopoli, 1763), *Quedius brevis* Erichson, 1840, *Q. fuliginosus* (Gravenhorst, 1802), *Q. lucidulus* Erichson, 1839, *Q. scitus* (Gravenhorst, 1806), *Q. xanthopus* Erichson, 1839, *Rabigus tenuis* (Fabricius, 1793), *Xantholinus longiventris* Heer, 1839; **Lucanidae:** *Platycerus caraboides* (Linnaeus, 1758); **Trogidae:** *Trox sabulosus* (Linnaeus, 1758); **Geotrupidae:** *Trypocopris vernalis* (Linnaeus, 1758); **Scarabaeidae:** *Acrossus depressus* (Kugelann, 1792), *A. rufipes* (Linnaeus, 1758), *Agoliinus nemoralis* (Erichson, 1848), *Agrilinus ater* (De Geer, 1774), *Aphodius pedellus* (De Geer, 1774), *Bodilopsis sordida* (Fabricius, 1775), *Calamosternus granarius* Linnaeus, 1767, *Chilothorax distinctus* (Müller, 1776), *Esymus pusillus* (Herbst, 1789), *Euorodalus coenosus* (Panzer, 1798), *E. paracenosus* Balthasar & Hrubant, 1960, *Eupleurus subterraneus* Linnaeus, 1758, *Melinopterus prodromus* (Brahm, 1790), *Planolinus fasciatus* Olivier, 1789, *Volinus sticticus* (Panzer, 1798), *Onthophagus fracticornis* (Preyssler, 1790), *O. nuchicornis* (Linnaeus, 1758), *Melolontha melolontha* (Linnaeus, 1758), *Serica brunnea* (Linnaeus, 1758), *Anomala dubia* (Scopoli, 1763), *Phyllopertha horticola* (Linnaeus, 1758), *Cetonia aurata* (Linnaeus, 1758), *Tropinota hirta* (Poda von Neuhaus, 1761), *Valgus hemipterus* (Linnaeus, 1758); **Eucinetidae:** *Eucinetus haemorrhoidalis* (Germar, 1818); **Scirtidae:** *Contacyphon ochraceus* (Stephens, 1830), *C. padi* (Linnaeus, 1758), *C. variabilis* (Thunberg, 1787), *Microcara testacea* (Linnaeus, 1767); **Buprestidae:** *Anthaxia godeti* Gory & Castelnau, 1839, *A. quadripunctata* (Linnaeus, 1758), *Buprestis haemorrhoidalis* Herbst, 1780, *B. novemmaculata* Linnaeus, 1767, *Chalcophora mariana* (Linnaeus, 1758), *Chrysobothris igniventris* (Reitter, 1895), *Phaenops cyanea* (Fabricius, 1775), *Agrilus betuleti* (Ratzeburg, 1837), *A. sulcicollis* Lacordaire, 1835; **Byrrhidae:** *Byrrhus pustulatus* (Forster, 1771), *Cytilus sericeus* (Forster, 1771), *Morychus aeneus* (Fabricius, 1775); **Eucnemidae:** *Hylis procerulus* (Mannerheim, 1823), *Melasis buprestoides* (Linnaeus, 1761); **Throscidae:** *Aulonothroscus brevicollis* (Bonvouloir, 1859), *Trixagus carinifrons* (Bonvouloir, 1859), *T. dermestoides* (Linnaeus, 1767); **Elateridae:** *Drapetes mordelloides* (Host, 1789), *Agrypnus murinus* (Linnaeus, 1758), *Anostirus castaneus* (Linnaeus, 1758), *Athous haemorrhoidalis* (Fabricius, 1801), *A. subfuscus* (Müller, 1764), *Cidnopus aeruginosus* (Olivier, 1790), *Denticollis linearis* (Linnaeus, 1758), *Paraphotistus impressus* (Fabricius, 1792), *Prosternon tesselatum* (Linnaeus, 1758), *Selatosomus aeneus* (Linnaeus, 1758), *Ampedus balteatus* (Linnaeus, 1758), *A. erythrogonus* (Müller, 1821), *A. nigrinus* (Herbst, 1784), *A. pomonae* (Stephens, 1830), *A. pomorum* (Herbst, 1784), *A. praeustus* (Fabricius, 1792), *A. sanguineus* (Linnaeus, 1758), *Dalopius margiantus* (Linnaeus, 1758), *Melanotus castanipes* (Paykull, 1800), *M. villosus* (Geoffroy in Fourcroy, 1785), *Sericus brunneus* (Linnaeus, 1758), *Cardiophorus ruficollis* (Linnaeus, 1758); **Lycidae:** *Dictyoptera aurora* (Herbst, 1784), *Lygistopterus sanguineus* (Linnaeus, 1758); **Lampyridae:** *Lampyris noctiluca* (Linnaeus, 1758); **Cantharidae:** *Rhagonycha lignosa* (Müller, 1764), *Malthinus flaveolus* (Herbst, 1786), *M. frontalis* (Marsham, 1802), *Malthodes marginatus* (Latreille, 1806); **Dermestidae:** *Dermestes ater* De Geer, 1774, *D. murinus* Linnaeus, 1758, *Attagenus schaefferi* (Herbst, 1792), *Anthrenus pimpinellae* Fabricius, 1775, *A. scrophulariae* (Linnaeus, 1758), *Ctesias serra* (Fabricius, 1792), *Globicornis emarginata*

(Gyllenhal, 1808), *Megatoma undata* (Linnaeus, 1758); **Ptinidae:** *Dryophilus pusillus* (Gyllenhal, 1808), *Ernobius abietinus* (Gyllenhal, 1808), *E. abietis* (Fabricius, 1792), *E. longicornis* (Sturm, 1837), *E. mollis* (Linnaeus, 1758), *Cacotemnus rufipes* (Fabricius, 1792), *Hadrobregmus pertinax* (Linnaeus, 1758), *Microbregma emarginatum* (Duftschimd, 1825), *Ptilinus fuscus* (Geoffroy, 1785), *Dorcatoma dresdensis* Herbst, 1792, *D. lomnickii* Reitter, 1903, *D. punctulata* Mulsant et Rey, 1864, *D. robusta* Strand, 1938, *Ptinus coarcticollis* Sturm, 1837, *P. dubius* Sturm, 1837, *P. rufipes* Olivier, 1790, *P. subpillosus* Sturm, 1837; **Lymexylidae:** *Elateroides dermestoides* (Linnaeus, 1761); **Peltidae:** *Peltis ferruginea* (Linnaeus, 1758); **Trogossitidae:** *Nemozoma elongatum* (Linnaeus, 1761); **Cleridae:** *Thanasimus femoralis* (Zetterstedt, 1828), *T. formicarius* (Linnaeus, 1758), *Trichodes apiarius* (Linnaeus, 1758); **Melyridae:** *Cordylepherus viridis* (Fabricius, 1787), *Aplocnemus impressus* (Marsham, 1802), *Dasytes niger* (Linnaeus, 1761), *D. plumbeus* (Müller, 1776); **Sphindidae:** *Aspidiphorus orbiculatus* (Gyllenhal, 1808), *Sphindus dubius* (Gyllenhal, 1808); **Nitidulidae:** *Epuraea aestiva* (Linnaeus, 1758), *E. marseuli* Reitter, 1873, *E. marseuli* Reitter, 1873, *E. pygmaea* (Gyllenhal, 1808), *E. rufomarginata* (Stephens, 1830), *E. unicolor* (Olivier, 1790), *Brassicogethes aeneus* (Fabricius, 1775), *B. coeruleovirens* (Förster, 1849), *B. subaeneus* (Sturm, 1845), *Genistogethes carinulatus* (Förster, 1849), *Meligethes denticulatus* (Heer, 1841), *Cychramus luteus* (Fabricius, 1787), *C. variegatus* (Herbst, 1792), *Cyllodes ater* (Herbst, 1792), *Ipidia binotata* Reitter, 1875, *Omosita depressa* (Linnaeus, 1758), *Glischrochilus hortensis* (Geoffroy, 1785), *G. quadripunctatus* (Linnaeus, 1758), *G. quadrisignatus* (Say, 1835), *Pityophagus ferrugineus* (Linnaeus, 1761), *Soronia grisea* (Linnaeus, 1758); **Monotomidae:** *Rhizophagus bipustulatus* (Fabricius, 1792), *R. depressus* (Fabricius, 1792), *R. dispar* (Paykull, 1800), *R. fenestralis* (Linnaeus, 1758), *R. ferrugineus* (Paykull, 1800), *R. nitidulus* (Fabricius, 1798); **Silvanidae:** *Dendrophagus crenatus* (Paykull, 1799), *Uleiota planatus* (Linnaeus, 1761), *Silvanus unidentatus* (Olivier, 1790); **Laemophloeidae:** *Cryptolestes corticinus* (Erichson, 1846), *C. ferrugineus* (Stephens, 1831), *Leptophloeus alternans* (Erichson, 1846); **Phalacridae:** *Olibrus corticalis* (Panzer, 1797), *O. pygmaeus* (Sturm, 1807); **Cryptophagidae:** *Cryptophagus cellaris* (Scopoli, 1763), *C. dentatus* (Herbst, 1793), *C. denticulatus* Heer, 1841, *C. dorsalis* Sahlberg, 1819, *Telmatophilus typhae* (Fallén, 1802), *Atomaria analis* Erichson, 1846, *A. lewisi* Reitter, 1877, *A. turgida* Erichson, 1846, *A. umbrina* (Gyllenhal, 1827), *A. vespertina* Mäklin, 1853, *Episthemus globulus* (Paykull, 1798); **Erotylidae:** *Dacne bipustulata* (Thunberg, 1781), *Triplax aenea* (Schaller, 1783), *T. rufipes* (Fabricius, 1781), *T. russica* (Linnaeus, 1758), *Tritoma bipustulata* Fabricius, 1775; **Byturidae:** *Byturus tomentosus* (De Geer, 1774); **Cerylonidae:** *Cerylon fagi* Brisout de Barneville, 1867, *C. ferrugineum* Stephens, 1830, *C. histeroides* (Fabricius, 1792), *C. impressum* Erichson, 1845; **Endomychidae:** *Endomychus coccineus* (Linnaeus, 1758), *Mycetina cruciata* (Schaller, 1783); **Coccinellidae:** *Hyperaspis campestris* (Herbst, 1783), *Nephus quadrimaculatus* (Herbst, 1873), *Scymnus ferrugatus* (Moll, 1784), *S. frontalis* (Fabricius, 1787), S. *nigrinus* Kugelann, 1794, *S. suturalis* Thunberg, 1795, *Chilocorus bipustulatus* (Linnaeus, 1758), *C. renipustulatus* (Scriba, 1791), *Exochomus quadripustulatus* (Linnaeus, 1758), *Adonia variegata* (Goeze, 1777), *Anatis ocellata* (Linnaeus, 1758), *Aphidecta obliterata* (Linnaeus, 1758), *Calvia quatuordecimguttata* (Linnaeus, 1758), *Coccinella quinquepunctata* Linnaeus, 1758, *C. septempunctata* Linnaeus, 1758, *Coccinula quatuordecimpustulata* (Linnaeus, 1758), *Halyzia sedecimguttata* (Linnaeus, 1758), *Harmonia axyridis* (Pallas, 1773), *Hippodamia variegata* (Goeze, 1777), *Myrrha octodecimguttata* (Linnaeus, 1758),

Myzia oblongoguttata (Linnaeus, 1758), *Propylea quatuordecimpunctata* (Linnaeus, 1758), *Psyllobora vigintiduopunctata* (Linnaeus, 1758), *Tytthaspis sedecimpunctata* (Linnaeus, 1761), *Subcoccinella vigintiquatuorpunctata* (Linnaeus, 1758); **Corylophidae:** *Orthoperus corticalis* (Redtenbacher, 1845), *O. nigrescens* Stephens, 1830, *Sericoderus lateralis* (Gyllenhal, 1827); **Latridiidae:** *Cartodere constricta* (Gyllenhal, 1827), *C. nodifer* (Westwood, 1839), *Corticaria elongata* (Gyllenhal, 1827), *C. rubripes* Mannerheim, 1844, *C. serrata* (Paykull, 1798), *Corticarina lambiana* (Sharp, 1910), *C. minuta* (Fabricius, 1792), *C. similata* (Gyllenhal, 1827), *Cortinicara gibbosa* (Herbst, 1793), *Enicmus fungicola* Thomson, 1868, *E. rugosus* (Herbst, 1793), *E. testaceus* (Stephens, 1830), *E. transversus* (Olivier, 1790), *Latridius hirtus* Gyllenhal, 1827, *L. minutus* (Linnaeus, 1767), *L. porcatus* Herbst, 1793, *Melanophthalma distinguenda* (Comolli, 1837), *M. maura* Motschulsky, 1866, *Stephostethus rugicollis* (Olivier, 1790); **Mycetophagidae:** *Litargus connexus* (Geoffroy in Fourcroy, 1785), *Mycetophagus piceus* (Fabricius, 1777), *M. populi* Fabricius, 1798, *M. quadriguttatus* Müller, 1821, *M. quadripustulatus* (Linnaeus, 1760); **Ciidae:** *Cis boleti* (Scopoli, 1763), *C. comptus* Gyllenhal, 1827, *C. fagi* Waltl, 1839, *C. festivus* (Panzer, 1793), *C. fusciclavis* Nyholm, 1953, *C. jacquemartii* Mellié, 1849, *C. micans* (Fabricius, 1792), *C. punctulatus* Gyllenhal, 1827, *C. rugulosus* Mellié, 1849, *C. submicans* Abeille de Perrin, 1874, *Ennearthron cornutum* (Gyllenhal, 1827), *Orthocis alni* (Gyllenhal, 1813), *Ropalodontus strandi* Lohse, 1969, *Sulcacis nitidus* (Fabricius, 1792); **Melandryidae:** *Dolotarsus lividus* (Sahlberg, 1833), *Melandrya dubia* (Schaller, 1783), *Orchesia fasciata* (Illiger, 1798), *O. micans* (Panzer, 1793), *O. undulata* Kraatz, 1853, *Xylita laevigata* (Hellenius, 1786), *Zilora obscura* (Fabricius, 1794); **Mordellidae:** *Mordella aculeata* Linnaeus, 1758, *M. holomelaena* Apfelbeck, 1914, *Tomoxia bucephala* Costa, 1854, *Variimorda villosa* (Schrank von Paula, 1781); **Zopheridae:** *Bitoma crenata* (Fabricius, 1775), *Colydium elongatum* (Fabricius, 1787), *Synchita humeralis* (Fabricius, 1792); **Tenebrionidae:** *Lagria hirta* (Linnaeus, 1758), *Bolitophagus reticulatus* (Linnaeus, 1767), *Melanimon tibialis* (Fabricius, 1781), *Palorus depressus* (Fabricius, 1790), *Uloma rufa* (Piller & Mitterpacher, 1783), *Mycetochara axillaris* (Paykull, 1799), *M. flavipes* (Fabricius, 1792), *Pseudocistela ceramboides* (Linnaeus, 1758), *Alphitophagus bifasciatus* (Say, 1824), *Corticeus fraxini* (Kugelann, 1794), *C. linearis* (Fabricius, 1790), *C. longulus* (Gyllenhal, 1827), *C. unicolor* Piller & Mitterpacher, 1783, *Diaperis boleti* (Linnaeus, 1758); **Oedemeridae:** *Calopus serraticornis* (Linnaeus, 1758); **Pyrochroidae:** *Pyrochroa coccinea* (Linnaeus, 1760), *Schizotus pectinicornis* (Linnaeus, 1758); **Salpingidae:** *Salpingus planirostris* (Fabricius, 1787), *S. ruficollis* (Linnaeus, 1760), *Sphaeriestes bimaculatus* (Gyllenhal, 1810); **Aderidae:** *Anidorus nigrinus* (Germar, 1842); **Anthicidae:** *Notoxus monoceros* (Linnaeus, 1760); **Scraptiidae:** *Anaspis frontalis* (Linnaeus, 1758), *A. rufilabris* (Gyllenhal, 1827), *A. thoracica* (Linnaeus, 1758); **Cerambycidae:** *Prionus coriarius* (Linnaeus, 1758), *Anastrangalia dubia reyi* (Heyden, 1889), *A. sanguinolenta* (Linnaeus, 1761), *Cortodera femorata* (Fabricius, 1787), *Dinoptera collaris* (Linnaeus, 1758), *Judolia sexmaculata* (Linnaeus, 1758), *Oxymirus cursor* (Linnaeus, 1758), *Pseudovadonia livida bicarinata* (Arnold, 1869), *Rhagium inquisitor* (Linnaeus, 1758), *R. mordax* (De Geer, 1775), *Stenurella melanura* (Linnaeus, 1758), *Stictoleptura maculicornis* (De Geer, 1775), *S. rubra* (Linnaeus, 1758), *Arhopalus rusticus* (Linnaeus, 1758), *Asemum striatum* (Linnaeus, 1758), *Spondylis buprestoides* (Linnaeus, 1758), *Tetropium castaneum* (Linnaeus, 1758), *T. fuscum* (Fabricius, 1787), *Molorchus minor* (Linnaeus, 1758), *Phymatodes testaceus* (Linnaeus, 1758), *Xylotrechus rusticus* (Linnaeus, 1758), *Acanthocinus griseus* (Fabricius, 1792), *Leiopus taeniatus* Gmelin,

1790, *Pogonocherus decoratus* Fairmaire, 1855, *P. fasciculatus* (De Geer, 1775), *Tetrops praeustus* (Linnaeus, 1758); **Chrysomelidae:** *Bruchus affinis* Frölich, 1799, *B. pisorum* (Linnaeus, 1758), *Oulema melanopus* (Linnaeus, 1758), *Cassida nobilis* Linnaeus, 1758, *C. vittata* Villiers, 1789, *Chrysomela populi* Linnaeus, 1758, *Phratora laticollis* (Suffrian, 1851), *P. vulgatissima* (Linnaeus, 1758), *Plagiodera versicolora* (Laicharting, 1781), *Altica quercetorum saliceti* Weise, 1888, *Chaetocnema hortensis* (Geoffroy, 1785), *Longitarsus melanocephalus* (De Geer, 1775), *L. nasturtii* (Fabricius, 1792), *Phyllotreta flexuosa* (Illiger, 1794), *P. striolata* (Illiger, 1803), *P. vittula* (Redtenbacher, 1849), *Cryptocephalus sericeus* (Linnaeus, 1758), *Bromius obscurus* (Linnaeus, 1758); **Cimberididae:** *Cimberis attelaboides* (Fabricius, 1787), *Doydirhynchus austriacus* (Olivier, 1807); **Anthribidae:** *Allandrus undulatus* (Panzer, 1795), *Anthribus nebulosus* Forster, 1770, *Dissoleucas niveirostris* (Fabricius, 1798), *Platystomos albinus* (Linnaeus, 1758), *Tropideres albirostris* (Schaller, 1783); **Attelabidae:** *Apoderus coryli* (Linnaeus, 1758), *Byctiscus betulae* (Linnaeus, 1758), *Deporaus betulae* (Linnaeus, 1758); **Brentidae:** *Betulapion simile* Kirby, 1811, *Protapion nigritarse* (Kirby, 1808); **Curculionidae:** *Brachyderes incanus* (Linnaeus, 1758), *Charagmus gressorius* (Fabricius, 1792), *C. griseus* (Fabricius, 1775), *Otiorhynchus carinatopunctatus* (Retzius, 1783), *O. ovatus* (Linnaeus, 1758), *Phyllobius arborator* (Herbst, 1797), *P. glaucus* (Scopoli, 1763), *P. maculicornis* Germar, 1823, *P. pyri* (Linnaeus, 1758), *Polydrusus cervinus* (Linnaeus, 1758), *Sitona lineatus* (Linnaeus, 1758), *S. macularius* (Marsham, 1802), *Strophosoma capitatum* (De Geer, 1775), *Hylobius abietis* (Linnaeus, 1758), *H. pinastri* (Gyllenhal, 1813), *Magdalis carbonaria* (Linnaeus, 1758), *M. duplicata* Germar, 1819, *M. exarata* (Brisout de Barneville, 1862), *M. frontalis* (Gyllenhal, 1827), *M. nitida* (Gyllenhal, 1827), *M. phlegmatica* (Herbst, 1797), *M. violacea* (Linnaeus, 1758), *Pissodes pini* (Linnaeus, 1758), *Hypera nigrirostris* (Fabricius, 1775), *H. postica* (Gyllenhal, 1813), *Rhyncolus elongatus* (Gyllenhal, 1827), *R. sculpturatus* Waltl, 1839, *Baris artemisiae* (Panzer, 1794), *Anthonomus phyllocola* (Herbst, 1795), *Brachonyx pineti* (Paykull, 1792), *Cionus thapsus* (Fabricius, 1792), *Gymnetron rostellum* (Herbst, 1795), *Mecinus pyraster* (Herbst, 1795), *Rhinusa collina* (Gyllenhal, 1813), *Sibinia pyrrhodactyla* (Marsham, 1802), *Auleutes epilobii* (Paykull, 1800), *Ceutorhynchus erysimi* (Fabricius, 1787), *C. pallidactylus* (Marsham, 1802), *Rhinoncus bruchoides* (Herbst, 1784), *R. pericarpius* (Linnaeus, 1758), *Dryophthorus corticalis* (Paykull, 1792), *Anisandrus dispar* (Fabricius, 1792), *Cryphalus asperatus* (Gyllenhal, 1813), *Crypturgus cinereus* (Herbst, 1793), *C. hispidulus* Thomson, 1870, *C. pusillus* (Gyllenhal, 1813), *C. subcribrosus* Eggers, 1933, *Dendroctonus micans* (Kugelann, 1794), *Dryocoetes autographus* (Ratzeburg, 1837), *Hylastes angustatus* (Herbst, 1793), *H. ater* (Paykull, 1800), *H. attenuatus* Erichson, 1836, *H. cunicularius* Erichson, 1836, *H. opacus* Erichson, 1836, *Hylesinus varius* (Fabricius, 1775), *Hylurgops palliatus* (Gyllenhal, 1813), *Hylurgus ligniperda* (Fabricius, 1787), *Ips acuminatus* (Gyllenhal, 1827), *I. amitinus* (Eichhoff, 1872), *I. duplicatus* (Sahlberg, 1836), *I. sexdentatus* (Boerner, 1776), *I. typographus* (Linnaeus, 1758), *Orthotomicus laricis* (Fabricius, 1792), *O. longicollis* (Gyllenhal, 1827), *O. suturalis* (Gyllenhal, 1827), *Phloeosinus thujae* (Perris, 1855), *Pityogenes bidentatus* (Herbst, 1783), *P. chalcographus* (Linnaeus, 1760), *P. quadridenes* (Hartig, 1834), *Pityophthorus lichtensteinii* (Ratzeburg, 1837), *P. pityographus* (Ratzeburg, 1837), *Polygraphus poligraphus* (Linnaeus, 1758), *Scolytus intricatus* (Ratzeburg, 1837), *S. ratzeburgii* Janson, 1856, *Tomicus minor* (Hartig, 1834), *T. piniperda* (Linnaeus, 1758), *Trypodendron domesticum* (Linnaeus, 1758), *T. lineatum* (Olivier, 1800), *T. signatum* (Fabricius, 1792), *Xyleborinus attenuatus* (Blandford, 1894),

X. saxesenii (Ratzeburg, 1837), *Xyleborus cryptographus* (Ratzeburg, 1837).

Discussion

Just one of the beetles collected – *Acrotrichis strandi* (Ptiliidae) – was a first record for Poland, while 41 species had not hitherto been recorded in the Masurian Lake District (sensu Burakowski *et al.* 1973). Two legally protected beetles were found (*Boros schneideri*, *Cucujus cinnaberinus*), along with numerous species from the Polish Red List of Animals (Pawłowski *et al.* 2002) and the European Red List of Saproxylic Beetles (Cálix *et al.* 2018). The new locality of *Stephanopachys linearis* (Bostrichidae) is one of the most interesting findings. It had been considered extinct in Poland (Pawłowski *et al.* 2002), but after 220 years, its occurrence in Poland was confirmed on the basis of specimens collected in the Białowieża Primeval Forest (Borowski *et al.* 2018) and during the present study (Borowski & Gutowski 2022). It is a very rare, pyrophilous species, listed in Appendix II of the EU Habitat Directive. Fifteen of the species collected are relicts of primeval forests (Eckelt *et al.* 2018): *Boros schneideri* (Boridae); *Stephanopachys linearis* (Bostrichidae); *Ampedus tristis* (Elateridae); *Leiestes seminiger* (Endomychidae); *Platylomalus complanatus*, *Platysoma deplanatum* (Histeridae); *Corticaria longicornis*, *Latridius brevicollis* (Latridiidae); *Peltis grossa* (Peltidae); *Stagetus borealis* (Ptinidae); *Tachyusida gracilis* (Staphylinidae); *Corticeus fasciatus*, *C. suturalis*, *Prionychus melanarius* (Tenebrionidae) and *Colydium filiforme* (Zopheridae).

Surprisingly, the obligatory pyrophilous species *Melanophila acuminata* (De Geer) (Buprestidae) was not among the beetles collected, either in AF, or in burnt forest areas of the Białowieża Primeval Forest (Gutowski *et al.* 2020b), the Kampinos NP (Marczak *et al.* 2018) and in the Myszyniec Forest District [2014 – c. 100 ha of pine forests affected by fire; 2015-2017 – field survey] (Plewa & Borowski 2018). It had been recorded in north-eastern Poland in previous years (Burakowski *et al.* 1985, Gutowski 1995, Gutowski & Ługowoj 2000), but there are no new data on its occurrence in Poland, apart from the records from the Kozienice Forest and the environs of Radom, where fires break out every year (Gutowski & Miłkowski 2008).

The literature (e.g. Lundberg 1984; Wikars 1992, 2002, 2006; Muona & Rutanen 1994; Ehnström *et al.* 1995; Granström 2001; Dahlberg & Stokland 2004; Hyvärinen *et al.* 2009; Toivanen & Kotiaho 2010; Gutowski *et al.* 2020b) and the results of this study lead us to infer that numerous species of beetles need forest fires if they are to maintain a stable population size. The lack of fires can result in the disappearance of certain species from particular regions. It is likely that the absence of *M. acuminata* in the area studied, as well as in three other large areas of burnt forests in north-eastern Poland, may be due to its local extinction, as it was last recorded in this region (in the Białowieża Primeval Forest) in 1995 (Gutowski & Ługowoj 2000). In earlier decades, the average area affected by a single forest fire was significantly larger; this was due to faults in the fire detection system and to less effective methods of extinguishing fires (Szczygieł *et al.* 2008). It also used to be common practice to burn the remains of branches and trees after tree felling, which could provide breeding material for pyrophilous insects. Another possible explanation for the absence of *M. acuminata* is its phenology. This particular fire broke out at the end of April, so the beetles would have been unable to detect it, as they are active mainly in June and August, only exceptionally earlier. This species prefers a smouldering forest as a site for mating and ovipositing (Evans 2010). A few months after the fire, scorched trunks are probably no longer attractive egg-laying sites, and they certainly do not emit infrared radiation, which can be detected by sensors on the thorax of adults of

this species (Schmitz & Bleckmann 1997). Another obligatory pyrophilous beetle – *Sericoda quadripunctata* (De Geer, 1774) (Carabidae) – was also absent from the above-mentioned burnt forests. This species has been recorded at several localities in Poland, but has recently become increasingly rare (Burakowski *et al.* 1974, Byk 2007). The lack of specimens of this species in the material collected can be put down to the methods used. Being an epigeic species, it is most often collected in pitfall rather than window traps. On the other hand, it flies readily, so if it had been common in the areas studied, it might have been collected in the window traps as well.

Fire in the pine-spruce forest in AF had a positive impact on shaping the species diversity of saproxylic beetles, created habitats for pyrophilous species, including rare and faunistically interesting ones. From the perspective of nature conservation, repeated ground-cover fires in forests are indispensable for maintaining their biodiversity.

Acknowledgements

Bartłomiej Pacuk kindly identified selected species of Carabidae. We thank chief forester Roman Rogoziński and his deputy Ścibor Zawiślak, employees of the Płaska Forest District, for their assistance during the field studies. Professor Oleg Aleksandrowicz is thanked for his valuable comments on the previous version of the manuscript and for verifying the identification of selected ground beetles. This research was financed by the Ministry of Education and Science within the framework of the Forest Research Institute's statutory research No. 900-611.

References

Alonso-Zarazaga MA, Barrios H, Borovec R, Bouchard P, Caldara R, Colonnelli E, Gültekin L, Hlaváč P, Korotyaev B, Lyal CHC, Machado A, Meregalli M, Pierotti H, Ren L, Sánchez-Ruiz M, Sforzi A, Silfverberg H, Skuhrovec J, Trýzna M, Velázquez de Castro AJ, Yunakov NN. 2023. Cooperative Catalogue of Palaearctic Coleoptera Curculionoidea. 2nd Ed. *Monografías electrónicas SEA*: 14, 729 pp.

Andrus RA, Veblen TT, Harvey BJ, Hart SJ. 2016. Fire severity unaffected by spruce beetle outbreak in spruce-fir forests in southwestern Colorado. *Ecological Applications*, 26(3): 700-711.

Assing V. 1996. A revision of the European species of *Calodera* Mannerheim (Coleoptera, Staphylinidae, Aleocharinae). *Beiträge zur Entomologie*, 46(1): 3-24.

Audisio P, Cline AR, de Biase A, Antonini G, Mancini E, Trizziono M, Costantini L, Strika S, Lamanna F, Cerretti P. 2009. Preliminary re-examination of genus-level taxonomy of the pollen beetle subfamily Meligethinae (Coleoptera: Nitidulidae). *Acta Entomologica Museum Naturalae Prague*, 49: 341-504.

Azeria ET, Ibarzabal J, Boucher J, Hébert C. 2012. Differential effects of post-fire habitat legacies on beta diversity patterns of saproxylic beetles in the boreal forest. *Écoscience*, 19(4): 316-327.

Bałazy S, Michalski J. 1962. Fauna korników (Scolytidae, Col.) nadleśnictwa Tabórz. *Folia Forestalia Polonica*, A, 8: 197-214.

Bercio H, Folwaczny B. 1979. *Verzeichnis der Käfer Preussens*. Verlag Parzeller & Co., Fulda, 369 pp.

Bilański P. 2013. Dynamika zasiedlenia drzewostanów sosnowych na obrzeżach pożarzyska przez przypłaszczka granatka *Phaenops cyanea* (Fabricius, 1775) (Coleoptera: Buprestidae) w Nadleśnictwie Kędzierzyn na przykładzie Leśnictwa Niezdrowice. In: Ząbecki W. (Ed.). *Rola i udział owadów w funkcjonowaniu ekosystemów leśnych*. Wydawnictwo Uniwersytetu Rolniczego w Krakowie, Kraków, pp. 83-97.

Bohdan A, Bartos W, Sulej A. 2021. The first record of *Rhysodes sulcatus* (Fabricius, 1787) in the Augustów Forest and the first

record of *Boros schneideri* (Panzer, 1796) in the Romincka Forest. *Wiadomości Entomologiczne*, 40(3); online 9N: 3-4. [in Polish]

Borowiec L. 1990. New records of Polish Staphylinidae (Coleoptera). *Polskie Pismo Entomologiczne*, 59: 817-820.

Borowiec L. 1991. New and rare Polish Coleoptera. *Wiadomości Entomologiczne*, 10(4): 197-205. [in Polish]

Borowiec L, Kubisz D. 1999. A faunistic review of Polish Mordellidae (Coleoptera: Tenebrionoidea). *Polskie Pismo Entomologiczne*, 68(3): 283-317.

Borowski J. 2001. Próba waloryzacji lasów Puszczy Białowieskiej na podstawie chrząszczy (Coleoptera) związanych z nadrzewnymi grzybami. In: Szujecki A. (Ed.). *Próba szacunkowej waloryzacji lasów Puszczy Białowieskiej metodą zooindykacyjną*. Wydawnictwo SGGW, Warszawa, pp. 287-317.

Borowski J, Gutowski JM. 2022. New locality of *Stephanopachys linearis* (Kugelann, 1792) (Coleoptera: Bostrichidae) in Poland. *Wiadomości Entomologiczne*, 41(1); online 6N: 11-13. [in Polish]

Borowski J, Gutowski JM, Sławski M, Sućko K, Zub K. 2018. *Stephanopachys linearis* (Kugelann, 1792) (Coleoptera, Bostrichidae) in Poland. *Nature Conservation*, 27: 75-84.

Boukal DS, Boukal M, Fikáček M, Hájek J, Klečka J, Skalický S, Šťasný J, Trávníček D. 2007. Catalogue of water beetles of the Czech Republic. *Klapalekiana*, 43 (Suppl.): 1-289.

Boulanger Y, Sirois L, Hébert C. 2010. Distribution of saproxylic beetles in recently burnt landscape of the northern boreal forest of Québec. *Forest Ecology and Management*, 260: 1114-1123.

Boulanger Y, Sirois L, Hébert C. 2013. Distribution patterns of three long-horned beetles (Coleoptera: Cerambycidae) shortly after fire in boreal forest: adults colonizing stands versus progeny emerging from trees. *Environmental Entomology*, 42(1): 17-28.

Buchholz L, Komosiński K, Melke A, Sikora-Marzec P. 2021. Beetles (Coleoptera) of the Świętokrzyski National Park. *Wiadomości Entomologiczne*, 40(Supplement): 1-273. [in Polish]

Buchholz L, Melke A. 2018. Owady – chrząszcze Coleoptera. In: Boćkowski MD, Bara I, Michalski R. (Eds.). *Projektowany Turnicki Park Narodowy. Stan walorów przyrodniczych – 35 lat od pierwszego projektu parku narodowego na Pogórzu Karpackim*. Fundacja Dziedzictwo Przyrodnicze, Nowosiółki Dydyńskie, pp. 314-377.

Buchholz L, Olbrycht T, Melke A. 2012. The occurrence of *Boros schneideri* (Panzer, 1796) (Coleoptera: Boridae) in south-east Poland. *Wiadomości Entomologiczne*, 31(3): 207-209. [in Polish]

Bunalski M. 2006. *Lamellicorn beetles* (Coleoptera: Scarabaeoidea) *of eastern border of Poland. A faunistic and ecological study of the northern and central part*. Akademia Rolnicza im. A. Cieszkowskiego w Poznaniu. [in Polish]

Burakowski B, Mroczkowski M, Stefańska J. 1973. Chrząszcze Coleoptera, Biegaczowate − Carabidae, część 1. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 2: 1-232.

Burakowski B, Mroczkowski M, Stefańska J. 1974. Chrząszcze Coleoptera, Biegaczowate – Carabidae, część 2. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 3: 1-430.

Burakowski B, Mroczkowski M, Stefańska J. 1978. Chrząszcze Coleoptera, Histeroidea i Staphylinoidea prócz Staphylinidae. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 5: 1-356.

Burakowski B, Mroczkowski M, Stefańska J. 1979. Chrząszcze Coleoptera, Kusakowate – Staphylinidae, cz. 1. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 6: 1-310.

Burakowski B, Mroczkowski M, Stefańska J. 1980. Chrząszcze Coleoptera, Kusakowate – Staphylinidae, część 2. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 7: 1-272.

Burakowski B, Mroczkowski M, Stefańska J. 1981. Chrząszcze Coleoptera, Kusakowate – Staphylinidae, część 3: Aleocharinae. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 8: 1-330.

Burakowski B, Mroczkowski M, Stefańska J. 1985. Chrząszcze Coleoptera, Buprestoidea, Elateroidea i Cantharoidea. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 10: 1-401.

Burakowski B, Mroczkowski M, Stefańska J. 1986a. Chrząszcze Coleoptera, Dermestoidea, Bostrichoidea, Cleroidea i Lymexyloidea. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 11: 1-243.

Burakowski B, Mroczkowski M, Stefańska J. 1986b. Chrząszcze Coleoptera, Cucujoidea, część 1. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 12: 1-266.

Burakowski B, Mroczkowski M, Stefańska J. 1986c. Chrząszcze Coleoptera, Cucujoidea, część 2. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 13: 1-278.

Burakowski B, Mroczkowski M, Stefańska J. 1987. Chrząszcze Coleoptera, Cucujoidea, część 3. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 14: 1-309.

Burakowski B, Mroczkowski M, Stefańska J. 1990. Chrząszcze Coleoptera, Cerambycidae i Bruchidae. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 15: 1-312.

Burakowski B, Mroczkowski M, Stefańska J. 1991. Chrząszcze Coleoptera, Stonkowate – Chrysomelidae, część 2. *Katalog Fauny Polski*, PWN, Warszawa, XXIII, 17: 1-227.

Burakowski B, Mroczkowski M, Stefańska J. 1992. Chrząszcze Coleoptera, Ryjkowcowate prócz ryjkowców – Curculionoidea prócz Curculionidae. *Katalog Fauny Polski*, MiIZ PAN, Warszawa, XXIII, 18: 1-324.

Burakowski B, Mroczkowski M, Stefańska J. 2000. Chrząszcze Coleoptera. Uzupełnienia tomów 2-21. *Katalog Fauny Polski*, MiIZ PAN, Warszawa, XXIII, 22: 1-252.

Byk A. 2007. Waloryzacja lasów Gór Świętokrzyskich na podstawie struktury zgrupowań chrząszczy saproksylicznych. In: Borowski J, Mazur S. (Eds). *Waloryzacja ekosystemów leśnych Gór Świętokrzyskich metodą zooindykacyjną*. Wydawnictwo SGGW, Warszawa. pp. 57-118.

Byk A, Byk S. 2004. Saproxylic beetles of the nature reserve "Dęby w Krukach Pasłęckich". *Parki Narodowe i Rezerwaty Przyrody*, 23(4): 555-580. [in Polish]

Byk A, Mokrzycki T, Perliński S, Rutkiewicz A. 2006. Saproxylic beetles – in the monitoring of anthropogenic transformations of Białowieża Primeval Forest. In: Szujecki A. (Ed.). *Zooindication-based monitoring of anthropogenic transformations in Białowieża Primeval Forest*. Warsaw Agricultural University Press, Warsaw. pp. 325-397.

Cálix M, Alexander KNA, Nieto A, Dodelin B, Soldati F, Telnov D, Vazquez-Albalate X, Aleksandrowicz O, Audisio P, Istrate P, Jansson N, Legakis A, Liberto A, Makris C, Merkl O, Mugerwa Pettersson R, Schlaghamersky J, Bologna MA, Brustel H, Buse J, Novák V, Purchart L. 2018. *European Red List of Saproxylic Beetles*. Brussels, Belgium: IUCN. http://www.iucnredlist.org/initiatives/europe/publications

Castello SL, Negrón JF, Jacobi WR. 2011. Wood-boring insect abundance in fire-injured ponderosa pine. *Agricultural and Forest Entomology*, 13: 373-381.

Catry FX, Branco M, Moreira F, Sousa E, Rego F. 2022. Ambrosia Beetle Attacks in Mediterranean Cork Oak Forests Following Fire: Which Factors Drive Host Selection? *Fire*, 5, 115: 1-17. DOI: 10.3390/fire5040115

Dahlberg A, Stokland JN. 2004. Vedlevande arters krav på substrat – sammanställning och analys av 3600 arter. *Skogsstyrelsen, Jönköping, Rapport*, 7: 1-63.

Danilevsky M. (Ed.). 2020. *Catalogue of Palaearctic Coleoptera. Vol. 6: Chrysomeloidea I (Vesperidae, Distenidae, Cerambycidae)*. Updated and Revised Second Edition. Brill, Leiden / Booton: XXVII + 712 pp.

Derunkov A, Melke A. 2001. Familia (rodzina): Staphylinidae bez [without] Micropeplinae i [and] Pselaphinae. In: Gutowski JM, Jaroszewicz B. (Eds). *Katalog fauny Puszczy Białowieskiej*. Instytut Badawczy Leśnictwa. Warszawa. pp. 133-147.

Dodelin B. 2016. On the Palaearctic *Episernus* (Col., Ptinidae, Ernobiinae). *Bulletin mensuel de la Société linnéenne de Lyon,* 85(9-10): 278-302.

Eckelt A, Müller J, Bense U, Brustel H, Bußler H, Chittaro Y, Čížek L, Frei A, Holzer E, Kadej M, Kahlen M, Köhler F, Möller G, Mühle H, Sanchez A, Schaffrath U, Schmidl J, Smolis A, Szallies A, Németh T, Wurst C, Thorn S, Haubo R, Christensen B, Seibold S. 2018. "Primeval forest relict beetles" of Central Europe: a set of 168 umbrella species for the protection of primeval forest remnants. *Journal of Insect Conservation*, 22, 15-28.

Ehnström B, Långström B, Hellqvist C. 1995. Insects in burnt forests – forest protection and fauna conservation (preliminary results). *Entomologica Fennica*, 6: 109-117.

Eliott M, Lawson S, Hayes A, Debuse V, York A, Lewis T. 2019. The response of cerambycid beetles (Coleoptera: Cerambycidae) to long-term fire frequency regimes in subtropical eucalypt forest. *Austral Ecology*, 44: 609-620.

Evans WG. 2010. Reproductive role of infrared radiation sensors if *Melanophila acuminata* (Coleoptera: Buprestidae) at forest fires. *Annals of the Entomological Society of America*, 103 (6): 823-826.

Feng L, Lysakowski B, Eisenschmidt J, Birkhofer K. 2022. The impact of wildfire and mammal carcasses on beetle emergence from heathland soils. *Ecological Entomology*, 47: 883-894.

Fikáček M, Angus RB, Gentili E, Jia F, Minoshima YN, Prokin A, Przewoźny M, Löbl I, Löbl D. (Eds). 2015. *Catalogue of Palaearctic Coleoptera. Volume 2. Revised and Updated Edition.* Brill, Leiden, Boston: 1702 pp.

Forsslund A, Johansson N, Hedin J, Johansson T, Jansson N, Nordlind E. 2011. *Brandgynnade arter i sydöstra Sverige*. Länsstyrelsen Kalmar Län, Länsstyrelserna Meddelande, 16: 90 pp.

Gawroński R, Lasoń A, Oleksa A. 2008. Nitidulidae and Mycetophagidae (Coleoptera) new for the Masurian Lake District. *Wiadomości Entomologiczne*, 27(3): 169-170. [in Polish]

Głowaciński Z, Nowacki J. (Eds). 2004. *Polska czerwona księga zwierząt. Bezkręgowce*. Instytut Ochrony Przyrody PAN, Kraków, Akademia Rolnicza, Poznań, 447 pp.

Gongalsky KB, Midtgaard F, Overgaard HJ. 2006. Effects of prescribed forest burning on carabid beetles (Coleoptera: Carabidae): a case study in south-eastern Norway. *Entomologica Fennica*, 17: 325-333.

Gongalsky KB, Wikars L-O, Persson T. 2003. Dynamics of pyrophilous carabids in burnt pine forest in Central Sweden. *Baltic Journal of Coleopterology*, 3(2): 107-111.

Granström A. 2001. Fire Management for Biodiversity in the European Boreal Forest. *Scandinavian Journal of Forest Research*, Suppl., 3: 62-69.

Greń C, Lubecki K, Przewoźny M. 2017. Materials to the knowledge of water beetles (Coleoptera: Adephaga, Hydrophiloidea, Byrrhoidea, Myxophaga) of the Białowieża Primeval Forest. *Acta Entomologica Silesiana*, 25(online 010): 1-13. [in Polish]

Greń C, Lubecki K, Sućko K. 2022. Water Beetles (Coleoptera: Hydradephaga, Hydrophiloidea, Hydraenidae, Dryopoidea) of the Knyszyn Primeval Forest, NE Poland. *Rocznik Muzeum Górnośląskiego w*

Bytomiu. Przyroda, 28(online 012): 1-35. [in Polish]

Gutowski JM. 1995. Changes in communities of longhorn and buprestid beetles (Coleoptera: Cerambycidae, Buprestidae) accompanying the secondary succession of the pine forests of Puszcza Białowieska. *Fragmenta Faunistica*, 38: 389-409.

Gutowski JM. 2006. Saproksyliczne chrząszcze. *Kosmos*, 55(1): 53-73.

Gutowski JM, Buchholz L, Kubisz D, Ossowska M, Sućko K. 2006. Saproxylic beetles as indicator of deformation of pine forest ecosystems. *Leśne Prace Badawcze*, 4: 101-144. [in Polish]

Gutowski JM, Jaroszewicz B. 2004. Białowieża Primeval Forest as a refuge of the European entomofauna. *Wiadomości Entomologiczne*, 23, supl. 2: 67-87. [in Polish]

Gutowski JM, Kubisz D, Sućko K, Borowski J, Byk A, Królik R, Lasoń A, Mazur MA, Melke A, Mokrzycki T, Plewa R. 2022. Interesting species of beetles (Coleoptera) from the Piska Forest. *Polish Journal of Forestry*, 21(4): 301-321. [in Polish]

Gutowski JM, Kubisz D, Sućko K, Komosiński K, Mazur MA, Pacuk B, Greń C. 2020a. *The beetles (Coleoptera) of the Suwalski Landscape Park. Monograph*. Instytut Badawczy Leśnictwa, Sękocin Stary, 391 pp. [in Polish]

Gutowski JM, Kubisz D, Sućko K, Zub K. 2010. The succession of saproxylic beetles (Coleoptera) on windthrow areas in the Scots pine stands of the Piska Forest. *Leśne Prace Badawcze*, 71(3): 279-298 + aneks. [in Polish]

Gutowski JM, Kurzawa J. 2019. New data on the distribution, biology and morphology of *Asemum tenuicorne* Kraatz, 1879 (Coleoptera: Cerambycidae), with new records from Poland. *Entomologica Fennica*, 30(2): 57-71.

Gutowski JM, Ługowoj J. 2000. Buprestidae (Coleoptera) of the Białowieża Primeval Forest. *Polskie Pismo Entomologiczne*, 69(3): 279-318.

Gutowski JM, Miłkowski M. 2008. Buprestidae (Coleoptera) of the Kozienicka Forest. *Parki Narodowe i Rezerwaty Przyrody*, 27(2): 49-85. [in Polish]

Gutowski JM, Przewoźny M. 2013. Natura 2000 as a tool to conserve beetles (Coleoptera) in Poland. *Wiadomości Entomologiczne*, 32 Supl.: 5-40. [in Polish]

Gutowski JM, Sućko K. 2015. *Boros schneideri* (Panzer, 1796) (Coleoptera: Boridae) in Augustów Forest. *Wiadomości Entomologiczne*, 34(2): 66-68. [in Polish]

Gutowski JM, Sućko K, Borowski J, Kubisz D, Mazur MA, Melke A, Mokrzycki T, Plewa R, Żmihorski M. 2020b. Post-fire beetle succession in a biodiversity hotspot: Białowieża Primeval Forest. *Forest Ecology and Management*, 461: 1-9.

Gutowski JM, Sućko K, Zub K, Bohdan A. 2014. Habitat Preferences of *Boros schneideri* (Coleoptera: Boridae) in the Natural Tree Stands of the Białowieża Forest. *Journal of Insect Science*, 14, 1(276), DOI: 10.1093/jisesa/ieu138.

Harasimowicz H, Kawa A. 2001. Naziemna entomofauna terenów popożarowych. *Przegląd Leśniczy*, 11: 17.

Hilszczański J. 2008. Bark of dead infested spruce trees as an overwintering site of insect predators associated with bark and wood boring beetles. *Leśne Prace Badawcze*, 69(1): 15-19. [in Polish]

Hyvärinen E, Kouki J, Martikainen P. 2009. Prescribed burning and retention trees help to conserve beetle diversity in managed boreal forest despite their transient negative effects on some beetle groups. *Insect Conservation and Diversity*, 2(2): 93-105.

Iwan D, Kubisz D, Tykarski P. 2012. *Coleoptera Poloniae: Tenebrionoidea (Tenebrionidae, Boridae). Crytical checklist, distribution in Poland and meta-analysis*. University of Warsaw – Faculty of Biology, Natura optima dux Foundation, Warszawa.

Iwan D, Löbl I. (Eds). 2020. *Catalogue of Palaearctic Coleoptera, vol. 5. Tenebrionoidea*. Revised and Updated Second Edition. Brill, Leiden – Boston, 945 pp.

Jałoszyński P, Gawroński R, Kaźmierczak M, Gutowski JM. 2005. New for Poland, and rare beetles of the genus *Euplectus* Leach (Coleoptera: Staphylinidae: Pselaphinae). *Wiadomości Entomologiczne*, 24(3): 147-152. [in Polish]

Jałoszyński P, Wanat M, Ruta R, Miłkowski M. 2012. New records of Salpingidae (Insecta: Coleoptera) in Poland. *Wiadomości Entomologiczne*, 31(3): 162-170. [in Polish]

Jászayová A, Jászay T. 2017. Epigeická fauna chrobákov (Coleoptera: Clambidae, Ptiliidae, Staphylinidae) lesných spoločenstiev masívu Stebníckej Magury. *Folia Oecologica*, 9(2): 32-48.

Jaworski T, Plewa R, Tarwacki G, Sućko K, Hilszczański J, Horak J. 2019. Ecologically similar saproxylic beetles depend on diversified deadwood resources: From habitat requirements to management implications. *Forest Ecology and Management*, 449: 1-9.

Jenkins MJ, Hebertson E, Page W, Jorgensen CA. 2008. Bark beetles, fuels, fires and implications for forest management in the Intermountain West. *Forest Ecology and Management*, 254(1): 16-34.

Jurc M. 2001. Vpliv požarov na entomofauno–predvsem subkortikalno, v monokulturah črnega bora (*Pinus nigra* Arn.) na slovenskem Krasu. *Zbornik gozdarstva in lesarstva*, 66: 39-64.

Kaynaş BY, Gürkan B. 2008. Species richness and abundance of insects during post-fire succession of a *Pinus brutia* forest in mediterranean region. *Polish Journal of Ecology*, 56(1): 165-172.

Kilian A, Borowiec L. 1998. Revision of Polish species of the genus *Agathidium* Panzer, 1797 (Coleoptera: Leiodidae). *Polskie Pismo Entomologiczne*, 67: 65-102.

Kočárek P. 2002. Small carrion beetles (Coleoptera: Leiodidae: Cholevinae) in Central European lowland ecosystem: seasonality and habitat preference. *Acta Societatis Zoologicae Bohemicae*, 66: 37-45.

Koch K. 1989. *Die Käfer Mitteleuropas. Ökologie. Band 1.* Goecke & Evers, Krefeld, 440 pp.

Kolk A. 1998. Problemy ochrony lasu przed owadami na terenach popożarowych. *Postępy Techniki w Leśnictwie*, 68: 26-32.

Komosiński K, Browarski B, Bujnik B. 2009. Inwentaryzacja entomologiczna. In: *Studium Techniczno-Ekonomiczno-Środowiskowe. Etap I dla inwestycji polegającej na rozbudowie drogi krajowej nr 16 na odcinku Sorkwity-Mrągowo-Orzysz-Ełk - warianty dodatkowe*. pp. 162-172.

Komosiński K, Marczak D. 2016. *Ptiliolum caledonicum* (Sharp, 1872) and *Baeocrara japonica* (Matthews, 1885) (Coleoptera: Staphylinoidea: Ptiliidae) New to Poland, with Additional Polish Records of *Acrotrichis nana* Strand, 1946. *The Coleopterists Bulletin*, 70(1): 87-90.

Komosiński K, Tatur-Dytkowski J, Ruta R, Miłkowski M, Buchholz L, Greń C, Lubecki K, Pacuk B. 2021. Materials to the knowledge on beetles (Insecta: Coleoptera) of "Mazury" nature reserve in Puszcza Borecka forest. *Przegląd Przyrodniczy*, 22(3): 19-43. [in Polish]

Konwerski S, Sienkiewicz P. 2002. *Leiodes bicolor* (W. L. Schmidt, 1841) and *L. ferruginea* (Fabricius, 1787) (Coleoptera: Leiodidae) – leiodid beetle new to Wielkopolsko-Kujawska Lowland. *Wiadomości Entomologiczne*, 20(3-4): 174. [in Polish]

Konwerski S, Sienkiewicz P. 2005. Leiodidae (Coleoptera) of the Biedrusko range in Western Poland. In: Skłodowski J, Huruk S, Barševskis A, Tarasiuk S. (Eds). *Protection of Coleoptera in the Baltic Sea Region*. Warsaw

Agricultural University Press, Warsaw, pp. 129-136.

Królik R. 1992. New records of some Polish Cerylidae (Coleoptera). *Wiadomości Entomologiczne*, 11(1): 61. [in Polish]

Królik R. 1999. Contribution to the knowledge of beetles (Coleoptera) in the Upper Silesia. *Acta Entomologica Silesiana*, 5-6: 15-20. [in Polish]

Kubisz D, Gawroński R, Gutowski JM, Wanat M. 2010. The Mordellidae (Coleoptera: Tenebrionoidea) of north-eastern Poland, a faunistic synopsis. *Polish Journal of Entomology*, 79: 235-251.

Kubisz D, Iwan D, Tykarski P. 2014. *Tenebrionoidea: Tetratomidae, Melandryidae, Ripiphoridae, Prostomidae, Oedemeridae, Mycteridae, Pythidae, Aderidae, Scraptiidae. Critical checklist, distribution in Poland and meta-analysis*. Coleoptera Poloniae, 2, University of Warsaw – Faculty of Biology, Natura optima dux Foundation, Warszawa.

Kubisz D, Iwan D, Tykarski P. 2015. *Tenebrionoidea: Mycetophagidae, Ciidae, Mordellidae, Zopheridae, Meloidae, Pyrochroidae, Salpingidae, Anthicidae. Critical checklist, distribution in Poland and meta-analysis*. Coleoptera Poloniae, 3, University of Warsaw – Faculty of Biology, Natura optima dux Foundation, Warszawa.

Kugelann JG. 1792. Verzeichniss der in einigen Gegenden Preussens bis jetzt entdeckten Käfer-Arten nebst kurzen Nachrichten von denselben. *Neuestes Magazin für die Liebhaber der Entomologie, herausgegeben von David Hinrich Schneider*, 1(2-4): 252-306, 477-512.

Kuśka A, Kuśka-Ciba A. 2002. Liczebność i różnorodność zgrupowań chrząszczy upraw leśnych na pożarzysku w Rudach na Górnym Śląsku. In: Huruk S. (Ed.). *Zmiany liczebności i różnorodności zgrupowań chrząszczy w badanych środowiskach*. VII Międzynarodowe Sympozjum Karabidologów i XXVII Sympozjum Sekcji Koleopterologicznej PTE, Huta Szklana k./Św. Krzyża, 9-12 maja 2002, Kielce, pp. 30-37.

Kwiatkowski A, Marczak D. 2020a. *Cucujus cinnaberinus* (Scop.), *Cucujus haematodes* (Erich.) (Coleoptera: Cucujidae) and *Boros schneideri* (Panz.) (Coleoptera: Boridae) in the Knyszyńska Forest. *Wiadomości Entomologiczne*, 39(2); online 10A: 23-26. [in Polish]

Kwiatkowski A, Marczak D. 2020b. Occurrence of rare saproxylic beetle species in timberland of the Knyszyńska Forest (Regional Directorate of State Forests in Białystok, Poland). *Fragmenta Floristica et Geobotanica Polonica*, 27(1): 55-71. [in Polish]

Lasoń A. 2023. *Glischrochilus tremulae* Clayhills, Audisio & Cline, 2016 a new species for the Polish fauna and summary of the state of knowledge about the distribution of beetles from the Kateretidae and Nitidulidae families in Podlasie (Coleoptera). *Rocznik Muzeum Górnośląskiego w Bytomiu. Przyroda,* 29(online 017): 1-25. [in Polish]

Lasoń A, Holly M. 2015. *Glischrochilus grandis* Tournier, 1872 – new species of beetle for the Polish fauna and new data on the occurrence of genus *Glischrochilus* Reitter, 1873 (Coleoptera: Nitidulidae: Cryptarchinae). *Acta Entomologica Silesiana*, 23(online 005): 1-4. [in Polish]

Lindberg H, Punttila P, Vanha-Majamaa I. 2020. The challenge of combining variable retention and prescribed burning in Finland. *Ecological Processes*, 9(4): 1-12.

Löbl I, Löbl D. (Eds). 2015. *Catalogue of Palaearctic Coleoptera, vol. 2. Hydrophiloidea – Staphylinoidea*. Revised and Updated Edition. Brill, Leiden – Boston, 1702 pp.

Löbl I, Löbl D. (Eds). 2016. *Catalogue of Palaearctic Coleoptera, vol. 3. Scarabaeoidea – Scirtoidea – Dascilloidea – Buprestoidea – Byrrhoidea*. Revised and Updated Edition. Brill, Leiden – Boston, 983 pp. + index.

Löbl I, Löbl D. (Eds). 2017. *Catalogue of Palaearctic Coleoptera, vol. 1. Archostemata – Myxophaga – Adephaga*. Revised and Updated Edition. Brill, Leiden – Boston, 1443 pp.

Löbl I, Smetana A. (Eds). 2007. *Catalogue of Palaearctic Coleoptera, vol. 4. Elateroidea – Derodontoidea – Bostrichoidea – Lymexyloidea – Cleroidea – Cucujoidea*. Apollo Books, Stenstrup, 935 pp.

Löbl I, Smetana A. (Eds). 2010. *Catalogue of Palaearctic Coleoptera, vol. 6. Chrysomeloidea*. Apollo Books, Stenstrup, 924 pp.

Löbl I, Smetana A. (Eds). 2011. *Catalogue of Palaearctic Coleoptera, vol. 7. Curculionoidea I*. Apollo Books, Stenstrup, 373 pp.

Löbl I, Smetana A. (Eds.). 2013. *Catalogue of Palaearctic Coleoptera, vol. 8. Curculionoidea II*. Apollo Books, Stenstrup, 700 pp.

Lombardero MJ, Ayres MP. 2011. Factors Influencing Bark Beetle Outbreaks After Forest Fires on the Iberian Peninsula. *Environmental Entomology*, 40(5): 1007-1018.

Lundberg S. 1984. Den brända skogens skalbaggsfauna i Sverige. *Entomologisk Tidskrift*, 105: 129-141.

Luterek R. 2000. Studies on the occurrence and changes of harmful entomofauna in the post-fire areas of Notecka Primaeval Forest. *Roczniki Akademii Rolniczej w Poznaniu*, 326: 87-112. [in Polish]

Maciejewski KH. 1996. Studies on the beetles (Coleoptera) of Puszcza Borecka forest. Part I. The superfamily click beetles (Elateroidea). *Wiadomości Entomologiczne*, 1995, 14(3), 135-145. [in Polish]

Majewski T. 1994. New localities of Corylophidae (Coleoptera) in Poland. *Wiadomości Entomologiczne*, 1993, 12(4): 303-304. [in Polish]

Majewski T. 1997a. Cryptophagidae (Coleoptera) in Poland. *Wiadomości Entomologiczne*, 1996, 15(3): 147-159. [in Polish]

Majewski T. 1997b. New data on the distribution of Latridiidae (Coleoptera) in Poland. *Wiadomości Entomologiczne*, 15(4): 227-236. [in Polish]

Majewski T. 2003. Distribution and ecology of Laboulbeniales in the Białowieża Forest. *Phytocoenosis*, 15: 1-144.

Marczak D, Melke A, Masiarz J. 2013. *Calodera cochlearis* Assing, 1996 (Coleoptera: Staphylinidae) new to the Polish fauna, and other rare species of rove beetles new to the Masovian Lowland. *Wiadomości Entomologiczne*, 32(3): 165-178. [in Polish]

Marczak D, Pepłowska-Marczak D, Masiarz J, Tyburski Ł. 2018. Forest fires and jewel beetles *Phaenops* as factors shaping the biodiversity of pine forests in Kampinos National Park. *Studia i Materiały CEPL w Rogowie*, 20, 54(4): 49-57. [in Polish]

Martikainen P, Kouki J, Heikkala O, Hyvärinen E, Lappalainen H. 2006. Effects of green tree retention and prescribed burning on the crown damage caused by the pine shoot beetles (*Tomicus* spp.) in pine-dominated timber harvest areas. *Journal of Applied Entomology*, 130(1): 37-44.

Mazur A. 1996. On the occurrence of *Polygraphus punctifrons* Thoms. (Coleoptera, Scolytidae) in the Sudety Foreland. *Wiadomości Entomologiczne*, 1995, 14(3): 149-152. [in Polish]

Mazur S. 1973. Część XIX. Chrząszcze – Coleoptera. Sphaeritidae i Gniliki – Histeridae. *Klucze do Oznaczania Owadów Polski*, 79, 11-12, Warszawa.

Mądra A, Konwerski S, Sienkiewicz P, Dąbrowicz K. 2010. Cholevinae (Coleoptera: Leiodidae) of upland mixed fir forest — *Abietetum polonicum* in "Święty Krzyż" protective district in Świetokrzyski National Park. *Wiadomości Entomologiczne*, 29(3): 167-179. [in Polish]

Meigs GW, Zald HSJ, Campbell JL, Keeton WS, Kennedy RE. 2016. Do insect outbreaks reduce the severity of subsequent forest

fires? *Environmental Research Letters*, 11(4), 045008: 1-10.

Melke A, Maciejewski KH. 1999. Studies on the beetles (Coleoptera) of Puszcza Borecka forest. Part V. Rove beetles (Staphylinidae). *Wiadomości Entomologiczne*, 18(3), 143-151. [in Polish]

Melke A, Ruta R, Mazur A, Erdmann K, Górz A, Grodzki W, Hilszczański J, Jaworski T, Konwerski S, Komosiński K, Kościelny T, Nowosad A, Olbrycht T, Orzechowski R, Pacuk B, Pietras-Couffignal K, Plewa R, Rutkowski T, Sapieja M, Sienkiewicz P, Staniec B, Stańska M, Szołtys H, Tarnawski DJ, Tatur-Dytkowski J, Tarwacki G, Twardy D, Wanat M, Wojas T. 2022. 6. Faunistic review of species. In: Mazur A, Melke A. (Eds). *Staphylinina (Coleoptera: Staphylinidae) of Poland*. Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, Poznań, pp. 69-248.

Milberg P, Bergman K-O, Norman H, Pettersson RB, Westerberg L, Wikars L-O, Jansson N. 2015. A burning desire for smoke? Sampling insects favoured by forest fire in the absence of fire. *Journal of Insect Conservation*, 19(1): 55-65.

Miłkowski M. 2004. Cerambycid beetles Cerambycidae (Coleoptera) of the Kozienicka Forest. *Kulon*, 9(1): 81-116. [in Polish]

Miłkowski M, Ruta R. 2005. Histerid beetles (Coleoptera: Histeridae) of the vicinity of Radom. *Wiadomości Entomologiczne*, 24(1): 11-20. [in Polish]

Miłkowski M, Ruta R. 2016. Leiodidae (Insecta: Coleoptera) of the environs of Radom. *Wiadomości Entomologiczne*, 35(1): 14-30. [in Polish]

Miłkowski M, Ruta R, Grzywocz J, Tatur-Dytkowski J, Greń C, Komosiński K, Królik R, Lasoń A, Szołtys H. 2019a. New distributional data on the Silvanidae (Coleoptera) in Poland. *Wiadomości Entomologiczne*, 38(2): 91-115. [in Polish]

Miłkowski M, Tatur-Dytkowski J, Gutowski JM, Ruta R, Grzywocz J, Konwerski S, Królik R, Kubisz D, Lasoń A, Melke A, Olbrycht T, Szołtys H, Wanat M. 2019b. Trogossitidae, Lophocateridae, Peltidae and Thymalidae (Coleoptera: Cleroidea) of Poland: distribution, biology and conservation. *Polish Journal of Entomology*, 88(3): 215-274.

Mokrzycki T. 2011. Saproxylic beetle assemblages (Coleoptera) of stumps of chosen tree species – comparative study. *Rozprawy Naukowe i Monografie*. Wydawnictwo SGGW, Warszawa, 135 pp. + 35 fot. [in Polish]

Mokrzycki T., Bohdan A., Kowal B., Lasoń A., Sztabkowska I. 2022. Rare and new species of beetles (Coleoptera) for the Knyszyńska Forest. *Wiadomości Entomologiczne*, 41(3); online 16A: 20-25. [in Polish]

Mokrzycki T, Hilszczański J, Borowski J, Cieślak R, Mazur A, Miłkowski M, Szołtys H. 2011. Faunistic review of Polish Platypodinae and Scolytinae (Coleoptera: Curculionidae). *Polskie Pismo Entomologiczne*, 80(2): 343-364.

Moretti M, Barbalat S. 2004. The effects of wildfires on wood-eating beetles in deciduous forests on the southern slope of the Swiss Alps. *Forest Ecology and Management*, 187: 85-103.

Moretti M, Obrist MK, Duelli P. 2004. Arthropod biodiversity after forest fires: winners and losers in the winter fire regime of the southern Alps. *Ecography*, 27: 173-186.

Muona J, Rutanen I. 1994. The short-term impact of fire on the beetle fauna in boreal coniferous forest. *Annales Zoologici Fennici*, 31: 109-121.

Pacuk B, Melke A, Kozłowski MW. 2011. New localities of *Emus hirtus* (Linnaeus, 1758) (Coleoptera: Staphylinidae: Staphylininae) in Poland. *Wiadomości Entomologiczne*, 30(1): 58-60. [in Polish]

Papis M, Mokrzycki T. 2015. Saproxylic beetles (Coleoptera) of the strictly protected area Bukowa Góra in the Roztoczański National

Park. *Forest Research Papers*, 76(3): 229-239.

Pausas JG, Belliure J, Minguez E, Montagud S. 2018. Fire benefits flower beetles in a Mediterranean ecosystem. *PLoS ONE*, 13(6): e0198951.

Pawłowski J, Kubisz D, Mazur M. 2002. Coleoptera – chrząszcze. In: Głowaciński Z. (Ed.). *Czerwona lista zwierząt ginących i zagrożonych w Polsce*. Instytut Ochrony Przyrody PAN, pp. 88-110.

Pitkänen A, Törmänen K, Kouki J, Järvinen E, Virtii H. 2005. Effects of green tree retention, prescribed burning and soil treatment of pine weevil (*Hylobius abietis* and *Hylobius pinastri*) damage to planted Scots pine seedlings. *Agricultural and Forest Entomology*, 7: 319-331.

Plewa R. 2010. *Acmaeops septentrionis* (C. G. Thomson, 1866) (Coleoptera: Cerambycidae: Lepturinae) – current state of knowledge. *Opole Scientific Society. Nature Journal*, 43: 37-65. [in Polish]

Plewa R. 2023. Contributions to the knowledge of minute brown scavenger beetles (Coleoptera: Latridiidae) in the Sobiborski Landscape Park. *Biuletyn Częstochowskiego Koła Entomologicznego*, 21(3): 18-22. [in Polish]

Plewa R, Borowski Z. 2018. Pożytki z pożaru. *Głos Lasu*, 5: 16-17. [in Polish]

Plewa R, Dziuk A, Rutkiewicz A, Jaworski T. 2024. Minute brown scavenger beetles (Coleoptera: Latridiidae) of the Notecka Forest. *Acta Entomologica Silesiana*, 32 (online 001): 1-11.

Plewa R, Hilszczański J, Jaworski T, Sierpiński A. 2014a. New and rare saproxylic beetles (Coleoptera) of eastern Poland. *Wiadomości Entomologiczne*, 33(2): 85-96. [in Polish]

Plewa R, Jaworski T, Bystrowski C, Tarwacki G, Sućko K, Hilszczański J. 2022a. New data of rare beetles (Coleoptera) from the Biebrza National Park and its buffer zone. *Wiadomości Entomologiczne*, 41(2); online 8A: 17-25. [in Polish]

Plewa R, Jaworski T, Hilszczański J. 2014b. Dead wood and community structure of saproxylic beetles (Coleoptera) in oak stands. *Studia i Materiały CEPL w Rogowie*, 41(4): 279-299. [in Polish]

Plewa R, Jaworski T, Hilszczański J. 2021. New localities of rare beetles (Coleoptera) from Biebrza National Park, NE Poland. *Acta Entomologica Silesiana*, 29: (online 002): 1-12. [in Polish]

Plewa R, Jaworski T, Hilszczański J, Horák J. 2017. Investigating the biodiversity of the forest strata: The importance of vertical stratification to the activity and development of saproxylic beetles in managed temperate deciduous forests. *Forest Ecology and Management*, 402: 186-193.

Plewa R, Jaworski T, Tarwacki G, Sućko K, Konwerski S, Królik R, Lasoń A, Melke A, Przewoźny M, Ruta R, Szołtys H, Dodelin B, Hilszczański J. 2020. New records of beetle species (Coleoptera) from the Polish part of Białowieża Forest with special emphasis on the genus *Episernus* C.G. Thomson, 1863 (Ptinidae) in Central Europe. *Polish Journal of Entomology*, 89(1): 26-42.

Plewa R, Miłkowski M. 2018. Minute brown scavenger beetles (Coleoptera: Latridiidae) of the Kozienicka Forest and the vicinity of Radom. *Wiadomości Entomologiczne*, 37(3): 139-158. [in Polish]

Plewa R, Sućko K, Gutowski JM. 2022b. Minute brown scavenger beetles (Coleoptera: Latridiidae) of the Białowieża Primeval Forest. *Acta Scientiarum Polonorum Silvarum Colendarum Ratio et Industria Lignaria (Polish Journal of Forestry)*, 21(4): 281-300. [in Polish]

Polish Biodiversity Information Network: https://www.gbif.org/dataset/search?q=Coleoptera&publishing_org=901834aa-b711-4e59-993e-544e9ba75a14 (access: 1.07.2023)

Rücker WH. 2020. Latridiidae und Merophysiidae der West-Paläarktis. 2.

Auflage. Selbstverlag Wolfgang H. Rücker, Germany, Neuwied.

Ruta R. 2003. Contribution to the knowledge of Agathidiini (Coleoptera: Leiodidae: Leiodinae) of Poland. *Annals of the Upper Silesian Museum (Entomology)*, 12: 73-80.

Ruta R. 2007. Beetles (Insecta: Coleoptera) of the xerothermic Byszewice Hills in the Noteć River Valley. *Nowy Pamiętnik Fizjograficzny*, 5: 49-107. [in Polish]

Ruta R, Jałoszyński P, Konwerski S. 2004a. New records of the histerid beetles (Coleoptera: Histeridae) in Poland. Part 1. Onthophilinae – Dendrophilinae. *Wiadomości Entomologiczne*, 23(1): 13-20. [in Polish]

Ruta R, Jałoszyński P, Konwerski S. 2004b. New records of the histerid beetles (Coleoptera: Histeridae) in Poland. Part 2. Abraeinae and Saprininae. *Wiadomości Entomologiczne*, 23(2): 81-88. [in Polish]

Ruta R, Konwerski S, Miłkowski M, Gawroński R, Komosiński K, Melke A, Marczak D. 2012. New records of Mycetophagidae (Coleoptera: Tenebrionoidea) in Poland. *Wiadomości Entomologiczne*, 31(4): 274-287. [in Polish]

Ruta R, Melke A. 2011. Materials to the knowledge of beetles (Insecta: Coleoptera) of the "Kuźnik" nature reserve near Piła. *Wiadomości Entomologiczne*, 30(2): 84-98. [in Polish]

Ruta R, Miłkowski M, Konwerski S, Królik R, Lasoń A. 2020. New records of Cerylonidae (Coleoptera) in Poland. *Wiadomości Entomologiczne*, 39(4); online 20A: 5-17. [in Polish]

Rutkiewicz A. 2007. Analysis of cambio- and cambio-xylophagous beetles and accompanying subcortical Coleoptera fauna occurrence in Scots pine trees at the area of Reference Szast Forest. In: Skłodowski J. (Ed.). *Monitoring zooindykacyjny pohuraganowych zniszczeń ekosystemów leśnych Puszczy Piskiej*. Wydawnictwo SGGW, Warszawa, pp. 151-177. [in Polish]

Santolamazza-Carbone S, Pestaña M, Vega J. 2011. Post-fire attractiveness of maritime pines (*Pinus pinaster* Ait.) to xylophagous insects. *Journal of Pest Science*, 84: 343-353. DOI: 10.1007/s10340-011-0359-0

Santoro AE, Lombardero MJ, Ayres MP, Ruel JJ. 2001. Interactions between fire and bark beetles in an old growth pine forest. *Forest Ecology and Management*, 144: 245-254.

Sawoniewicz M. 2014. New records of *Laemophloeus muticus* (Fabricius, 1781) (Coleoptera: Laemophloeidae) in Poland. *Wiadomości Entomologiczne*, 33(1): 72-73. [in Polish]

Schmitz H, Bleckmann H. 1997. Fine structure and physiology of the infrared receptor of beetles of the genus *Melanophila* (Coleoptera: Buprestidae). *International Journal of Insect Morphology and Embryology*, 26: 205-215.

Schnaider Z. 1954. Szkodniki drzewostanów popożarowych. *Roczniki Nauk Leśnych*, 4: 145-162.

Shorohova E, Aakala T, Gauthier S, Kneeshaw D, Koivula M, Ruel J-C, Ulanova N. 2023. Natural Disturbances from the Perspective of Forest Ecosystem-Based Management. In: Girona MM, Morin H, Gauthier S, Bergeron Y. (Eds). *Boreal Forests in the Face of Climate Change. Sustainable Management*. Advances in Global Change Research, 74: 89-124.

Sikora K, Zając K, Bieniek A, Jaworski T, Kadej M, Plewa R, Gutowski JM, Ruta R, Smolis A, Eckelt A, Bonacci T, Brandmayr P, Čížek L, Davenis SA, Fuchs L, Heibl Ch, Horák J, Kapla A, Kulijer D, Olbrycht T, Merkl O, Miłkowski M, Müller J, Noordijk J, Saluk S, Thomaes A, Vrezec A, Kajtoch Ł. 2023. Phylogeography and distribution modelling reveal the history and future of a saproxylic beetle of European conservation concern. *Journal of Biogeography*, 50(7): 1299-1314.

Skłodowski J. 1994. Influence of fires of various intensity on carabid (Coleoptera, Carabidae) agglomerations living in pine stands of varied age. *Sylwan*, 12: 131-144. [in Polish]

Smolis A, Kadej M, Gutowski JM, Ruta R, Matraj M. 2012. Zgniotek cynobrowy *Cucujus cinnaberinus* (Insecta: Coleoptera: Cucujidae) – rozmieszczenie, ekologia i problemy ochrony oraz nowe stanowiska w Polsce południowo-zachodniej. *Chrońmy Przyrodę Ojczystą*, 68(5): 332-346.

Staniec B. 2000. *Carpelimus heidenreichi* Benick, 1934 and *C. similis* (Smetana, 1967) beetles new to the Polish fauna and occurrence of other species of *Carpelimus* Samouelle, 1819 (Coleoptera: Staphylinidae) in central-eastern part of the country. *Wiadomości Entomologiczne*, 19(2): 79-84. [in Polish]

Staniec B. 2003. New localities of Pselaphinae (Coleoptera: Staphylinidae) in Eastern Poland. *Wiadomości Entomologiczne*, 21(4): 243-244. [in Polish]

Süda I, Voolma K, Őunap H. 2009. Short-term monitoring of fire-adapted Coleoptera in burnt pine forest of northern Estonia. *Acta Biologica Universitatis Daugavpiliensis*, 9(1): 43-48.

Szafraniec S. 1997. Beetles (Coleoptera) new to the Babia Góra Mountain. *Wiadomości Entomologiczne*, 15(4): 207-215. [in Polish]

Szczepański H. 1960. On Chalcidoid wasps (Hymenoptera) parasiting at the bark-beetles (Coleoptera, Scolytidae) in Borecka Forest (distr. Węgorzewo, Poland). *Polskie Pismo Entomologiczne*, 30(2): 405-416. [in Polish]

Szczygieł R, Ubysz B, Piwnicki J. 2008. Wpływ zmian klimatycznych na kształtowanie się zagrożenia pożarowego lasów w Polsce. *Leśne Prace Badawcze*, 69(1): 67-72.

Szpojda A. 1984. Influence of ground fire in fresh pine-forest on subcortical beetles and xylophages. In: *IInd Symposium on the Protection of Forest Ecosystems,* pp. 227-234.

Szujecki A. 1976. Część XIX. Chrząszcze – Coleoptera. Kusakowate – Staphylinidae: Wydłużaki – Xantholininae. *Klucze do Oznaczania Owadów Polski*, 93, 24d, Warszawa.

Szujecki A. 1995. Zgrupowania kusakowatych (Col. Staphylinidae s.l.) borów sosnowych świeżych i ich antropogeniczne przeobrażenia. In: Szujecki A, Skłodowski JJW, Wojciechowska A (red.) *Antropogeniczne przeobrażenia epigeicznej i glebowej entomofauny borów sosnowych*». Warszawa, 175-251.

Szyszko J. 1984. Effect of fire stress on the plasticity of Carabidae (Coleoptera) communities. In: *IInd Symposium on the Protection of Forest Ecosystems*. Warsaw Agricultural University – SGGW-AR, pp. 205-209.

Szyszko J. 2001. The impact of forest fire on carabids (Carabidae, Col.) on the example of a post-fire site in Potrzebowice The relationship between the developmental stage and extent of destruction. *Sylwan*, 12: 29-45. [in Polish]

Ścibior R. 2002. Leaf beetles (Coleoptera: Chrysomelidae) new to south-eastern Poland. *Wiadomości Entomologiczne*, 21(1): 53-54. [in Polish]

Ścibior R. 2010. Chrysomelid beetles (Coleoptera: Chrysomelidae) new to the Podlasie. Part II. *Wiadomości Entomologiczne*, 29(3): 181-192. [in Polish]

Ślipiński SA. 1982. Część XIX. Chrząszcze – Coleoptera. Zgniotkowate – Cucujidae. *Klucze do Oznaczania Owadów Polski*, 123, 56, Warszawa.

Tarnawski D. 1991. New localities of some Elateridae (Coleoptera) in Poland. *Wiadomości Entomologiczne*, 10(3): 184. [in Polish]

Taszakowski A, Kaszyca-Taszakowska N, Szczepański WT, Karpiński L. 2020. New Data on Little-known Beetle Families and a Summary of the Project: Coleoptera of the Eastern Beskid Mts (Western Carpathians, Poland). *Journal of the Entomological Research Society*, 22(1): 13-40.

Toivanen T, Kotiaho JS. 2010. The preferences of saproxylic beetle species for different dead wood types created in forest

restoration treatments. *Canadian Journal of Forest Research*, 40(3): 445-464.

Trella T. 1928. Wykaz chrząszczów okolic Przemyśla. Trichopterygidae, Scaphidiidae, Histeridae, Dryopidae, Georyssidae, Heteroceridae, Dermestidae, Nosodendridae, Byrrhidae. *Polskie Pismo Entomologiczne*, 6(3-4): 185-188.

Twardy D. 2018. New locality of *Glischrochilus* (*Librodor*) *grandis* (Tournier, 1872) (Coleoptera: Nitidulidae: Cryptarchinae) in Poland. *Wiadomości Entomologiczne*, 37(2): 122-123. [in Polish]

Tykarski P. 2006. Beetles associated with scolytids (Coleoptera, Scolytidae) and the elevational gradient: Diversity and dynamics of the community in the Tatra National Park, Poland. *Forest Ecology and Management*, 225: 146-159.

Wanat M, Jałoszyński P, Miłkowski M, Ruta R, Sawoniewicz J. 2011. New records of occurrence of fungus weevils (Coleoptera: Anthribidae) in Poland. *Wiadomości Entomologiczne*, 30(2): 69-83. [in Polish]

Wanat M, Mokrzycki T. 2005. A new checklist of the weevils of Poland (Coleoptera: Curculionoidea). *Genus*, 16(1): 69-117.

Warchałowski A. 1998. Chrysomelidae, Stonkowate, Część VI. *Fauna Polski*, 20: 1-292.

Węgrzynowicz P. 2014. *Tritoma subbasalis* (Reitter) (Coleoptera: Erotylidae) in Poland. *The Coleopterists Bulletin*, 68(3): 619-623.

Wikars L-O. 1992. Skogsbriinder och insekter. *Entomologisk Tidskrift*, 113(4): l-12.

Wikars L-O. 1997a. Effects of forest fire and the ecology of fire-adapted insects. *Acta Univ. Ups. Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology*, 272: 35 pp.

Wikars L-O. 1997b. Brandinsekter i Orsa Finnmark: biologi, utbredning och artbevarande. *Entomologisk Tidskrift*, 118(4): 155-169.

Wikars L-O. 2002. Dependence on fire in wood-living insects: An experiment with burnt and unburnt spruce and birch logs. *Journal of Insect Conservation*, 6: 1-12.

Wikars L-O. 2006. Åtgärdsprogram för bevarande av brandinsekter i boreal skog. *Naturvärdsverket Rapport*, 5610, 78 pp.

Zamoroka AM. 2021. Is Clytini monophyletic? The evidence from five-gene phylogenetic analysis. *Proceedings of the State Natural History Museum*, Lviv, 37: 191-214.

Zamoroka AM, Semaniuk DV, Shparyk VYu, Mykytyn TV, Skrypnyk SV. 2019. Taxonomic Position of *Anastrangalia reyi* and *A. sequensi* (Coleoptera, Cerambycidae) Based on Molecular and Morphological Data. *Vestnik Zoologii*, 53(3): 209-226.

Zdzioch P. 2003. Effect of fire of various intensities on assemblages of ground beetles (Coleoptera: Carabidae) inhabiting pine-stands at different ages. *Baltic Journal of Coleopterology*, 3(2): 101-105.

Zwolak R. 2007. Fire, walk with me: Ecology and politics of forest fires in North America. *Wiadomości Ekologiczne*, 53(4): 191-200. [in Polish]

Received: 15.01.2024
Accepted: 31.07.2024
Published online: 16.10.2024