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Grasshoppers and crickets (Orthoptera), earwigs (Dermaptera) and cockroaches (Blattodea) of the Bory Tucholskie National Park (Poland)

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Abstract: This paper presents the results of the study on grasshoppers and crickets (Orthoptera), earwigs (Dermaptera) and cockroaches (Blattodea) of the Bory Tucholskie National Park (=BTNP) (part of Tuchola Forest, northern Poland), conducted in the years 2001, 2013 and 2014. The insects were caught using Moericke traps at 9 sites, capturing respectively: 2001 – 11 ind., 2013 – 1115 ind. and 2014 – 228 ind. An additional visual record was made at the tenth site, where no traps were set. In total, 24 species of grasshoppers and crickets, 3 species of earwigs and 1 species of cockroach were recorded in the BTNP. *Tettigonia cantans* (Fuessly), *Roeseliana roeselii* (Hagenb.), *Pholidoptera griseoaptera* (Deg.), *Chelidurella acanthopygia* (Géné) and *Labidura riparia* (Pall.) were found for the first time within the whole Tuchola Forest. The research method used is noteworthy, as the capture of such a large number of orthopteroid insects in Moericke traps is rare in Poland.

Key words: Tuchola Forest, faunistic valorisation, insect trapping, Moericke traps, new records

INTRODUCTION

Grasshoppers and crickets (Orthoptera), earwigs (Dermaptera) and cockroaches (Blattodea) are among the most useful insects in faunistic valorisation of protected areas, even despite their species diversity in Poland is rather low. The level of study of these insects in individual Polish national parks varies greatly (Banaszak et al. 2004).

During entomological studies carried out in the Bory Tucholskie National Park (BTNP), located within Tuchola Forest in northern Poland, a rich material of Orthoptera was collected, as well as a small number of earwigs and cockroaches. Until now only seven species found by J. Wendzonka in 2001 have been reported from the park itself (Banaszak et al. 2002). Scattered records of these insects from places located within the whole Tuchola Forest are found in several publications (Rübsaamen 1901, La Baume 1911, 1913, 1920, Herold 1916, Schulz 1923, Wodziczko et al. 1938, Haber 1953, Bazyluk 1958, Liana 1973, 1977, Bieniecka 1978, Żurawlew et al. 2022).

The aim of this study is to present the complete results of the research on these insects in the Bory Tucholskie National Park on the background of the whole Tuchola Forest.

STUDY AREA

Tuchola Forest (Polish: Bory Tucholskie) is an area of about 36 000 km² in northern Poland consisting of a mosaic of forest habitats (mainly coniferous forests), open areas, lakes and river valleys. The forests are strongly affected by forest management. Large area deforestation took place here in the mid-19th century, followed by planned planting, mainly of *Pinus sylvestris* L.

and other conifers. Fresh coniferous forest habitats prevail, accompanied by dry coniferous forest and mixed coniferous forest. Pine forests with admixture of oaks are dominant, and in wet places swamp forests have developed. The area of Tuchola Forest is traversed by river valleys, with the Brda and Wda rivers forming the main hydrological axis. There are about 60 lakes in the area, the largest of which are Wdzydze and Charzykowskie Lakes (Rydzkowski et al. 2010).

Established in 1996, the Bory Tucholskie National Park (Polish: Park Narodowy „Bory Tucholskie") lies in the western part of the Tuchola Forest complex. It covers an area of 46.13 km², of which 83% is covered by forests, 11.5% by waters (mainly lakes) and 5.5% by other landscape forms. Forest areas almost entirely consist of pine forests (98%), the remaining forests are mainly fragments of alder forests in depressions near lakes and rivers (www.pnbt.com.pl). According to the regionalisation of Poland used in the „Catalogue of Polish Fauna", the area is situated in the Pomeranian Lake District (Bazyluk & Liana 2000).

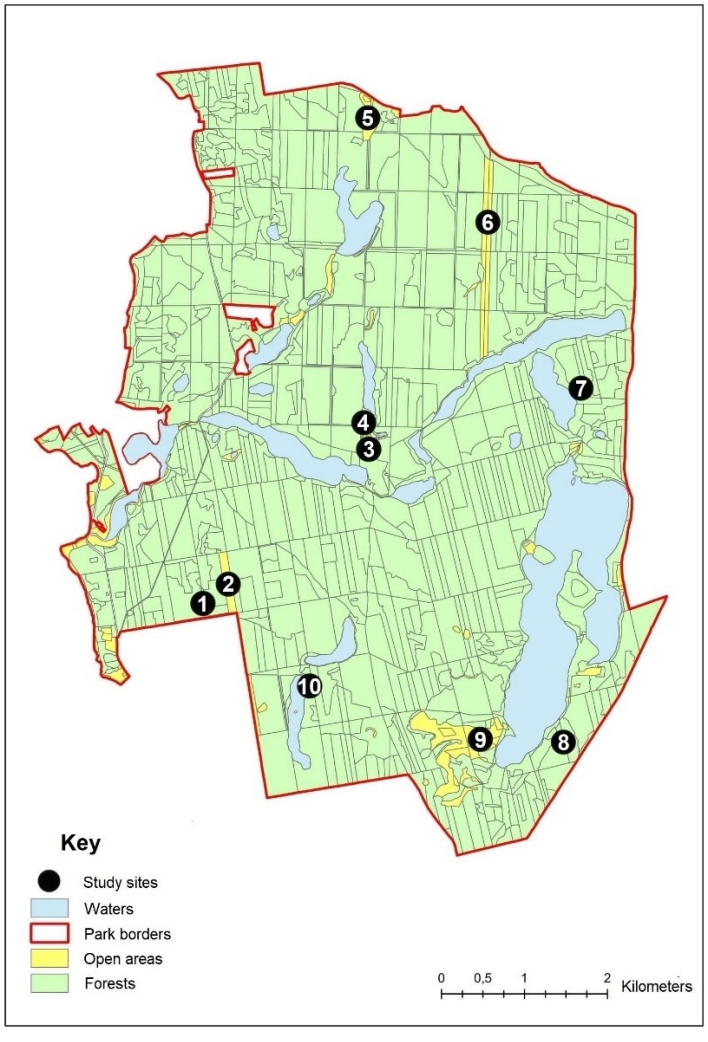

Fig. 1. Map of the Bory Tucholskie National Park with study sites (indicated by numbers).

MATERIAL AND METHODS

Insect trapping was conducted in the following periods: Apr–Aug 2001, Jun–Sep 2013 and Mar–Jun 2014, using Moericke traps at nine sites. At each site, 10 white bowls (15 cm diameter, 0,5 l volume) were placed on the ground at intervals of about 10 m (Fig. 1). Visual observations of Orthoptera were also conducted in 2001. Total number of captured insects were as follow: Orthoptera – 1326 ind., Dermaptera – 3 ind. and Blattodea – 25 ind. All specimens were preserved in ethanol and deposited in the Natural History Collection of the Faculty of Biology, Adam Mickiewicz University in Poznań. Research within the BTNP was conducted on permanent monitoring plots established for the study of bees (Anthophila). Also included is a visual record of *Gryllotalpa gryllotalpa* (L.) at site 10, where no traps were set. The study sites are described below, including the following information: the name of the nearest settlement, the letter and number designation of the 10 × 10 km square of the Military Grid Reference System (a derivative of the Universal Transverse Mercator spatial coordinate system – UTM) in square brackets, geographical coordinates, forest division number and habitat description.

Study sites

1. Bachorze [XV66], 53°47’48”N, 17°31’40”E, forest division 122c, 1.8 km NW of Wielkie Gacno lake. Narrow fire belt in fresh coniferous forest *Leucobryo-Pinetum* W. Mat. with *Calluna vulgaris* (L.), *Vaccinium myrtillus* L. and *V. vitis-idaea* L.

2. Bachorze [XV66], 53°47’53”N, 17°32’19”E, forest division 120a, 1 km NW of Wielkie Gacno lake. Approximately 100 m wide dune fire belt overgrown with initial psammophilous grassland *Calluno-Genistetum* R. Tx. and lichens. Large patches of loose sand and post-felling stumps. Surrounded by pine forests aged 30–90 years.

3. Małe Swornegacie [XV66], 53°48’58”N 17°33’50”E, forest division 84f, h, 0.5 km S of Nierybno lake. Swamp coniferous forest *Vaccinio uliginosi-Pinetum* Kleist. aged 90 years. In the undergrowth, *Vaccinum uliginosum* L. and *Rhododendron tomentosum* Harmaja.

4. Małe Swornegacie [XV66], 53°49’02”N, 17°33’20”E, forest division 84d, 0.4 km S of Nierybno lake. Fresh coniferous forest *Leucobryo-Pinetum* aged 115 years. In the undergrowth, *Vaccinium myrtillus* L. and *V. vitis-idaea* L.

5. Drzewicz [XV67], 53°51’03”N, 17°33’41”E, forest division 3f. Moist (partly hay) meadow surrounded by different phases of fresh coniferous forest *Leucobryo-Pinetum.*

6. Drzewicz [XV76], 53°50’27”N, 17°35’05”E, forest division 26 a, 1 km S of Dybrzyk lake. Approximately 100 m wide dune fire belt overgrown with initial psammophilous grassland *Calluno-Genistetum*, *Cetraria aculeata* (Schreb.) Fr., *Cladonia mitis* Sandst., *C. uncialis* (L.) Weber ex F.H. Wigg. Large patches of loose sand, locally modest stands of *Betula pendula* L. and *Populus tremula* L., surrounded by pine forest (Fig. 2).

7. Męcikał [XV76], 53°49’25”N, 17°36’01”E, forest division 63b,f, 0.2 km E of Zielone lake. Fresh coniferous forest *Leucobryo pinetum* aged 137 years. In the undergrowth: *Vaccinium myrtillus* and *V. vitis-idaea*.

8. Józefowo [XV76], 53°46’47”N, 17°35’44”E, forest division 150i,k, 0.5 km SE of Ostrowite lake. Fire belt with large birch regrowth. In earlier surveys classified as initial *Calluno-Genistetum*, now as shady birch coppice.

9. Józefowo [XV76], 53°47’02”N, 17°35’03”E, forest division 157b. Moist (partly hay) meadow with *Alnus* L., *Salix* L., *Dactylorhiza incarnata* (L.) Soó, *Epipactis palustris* (L.) Crantz and *Ophioglossum* L. in the sward (Fig. 3).

10. Bachorze [XV66], 53°47’22”N, 17°33’09”E, forest division 145c. Sandy shore of Gacno Małe lobelian lake (no traps – visual observation only).

Fig. 2. Study site no 6, a fire belt in Drzewicz (Photo by J. Wendzonka).

Fig. 3. Study site no 9, a moist meadow in Józefowo (Photo by J. Wendzonka).

RESULTS

During the surveys, 24 species of orthopterans, 3 species of earwigs and 1 species of cockroach were found. Following numbers of insects were caught in particular years: 2001 – 11 ind., 2013 – 1115 ind. and 2014 – 228 ind. (Table 1). *Gryllotalpa gryllotalpa* was only recorded visually in 2001. *Myrmeleotettix maculatus* (Thunb.) was by far the most abundant species (554 ind., 41.8% of all Orthoptera), followed by *Omocestus viridulus* (L.) (220 ind, 16.6%), *Oedipoda caerulescens* (L.) (110 ind., 8.3%), *Tetrix undulata* (Sowerby) (84 ind., 6.3%) and *Platycleis albopunctata* (Goeze) (72 ind., 5.4%). High densities of these species in sandy grasslands and wet meadows are noteworthy. Other Orthoptera were caught in the quantity of 1–46 ind. Almost all recorded species are widespread in Poland. The most interesting among them are those associated with specific habitats: *Metrioptera brachyptera* (L.) and *Sphingonotus caerulans* (L.). The following species were found for the first time in the entire Tuchola Forest complex: *Tettigonia cantans* (Fuessly), *Roeseliana roeselii* (Hagenb.), *Pholidoptera griseoaptera* (Deg.), *Chelidurella acanthopygia* (Géné) and *Labidura riparia* (Pall.).

Table 1. Grasshoppers and crickets (Orthoptera), earwigs (Dermaptera) and cockroaches (Blattodea) recorded at the studied sites in the Bory Tucholskie National Park in 2001, 2013 and 2014, with the number of collected specimens. A visual record without collecting specimen is denoted by the plus sign (+). Systematic order of species is after Bazyluk & Liana 2000 (Orthoptera), Bazyluk 1976b (Dermaptera) and Bazyluk 1976a (Blattodea).

Species	Site	2001	2013	2014	Total
ORTHOPTERA					
1. *Barbitistes constrictus* Br. Wat.	1,2,4,6,7,8	-	24	-	24
2. *Conocephalus dorsalis* (Latr.)	9	-	1	-	1
3. *Tettigonia cantans* (Fuessly)	9	-	1	-	1
4. *Metrioptera brachyptera* (L.)	1,2,6	-	7	17	24
5. *Roeseliana roeselii* (Hagenb.)	2,5,9	-	29	5	34
6. *Platycleis albopunctata* (Goeze)	2,6	-	64	8	72
7. *Pholidoptera griseoaptera* (Deg.)	9	-	-	1	1
8. *Gryllus campestris* L.	2,9	-	8	-	8
9. *Gryllotalpa gryllotalpa* (L.)	10	+			+
10. *Tetrix bipunctata* (L.)	3	1	2	-	3
11. *Tetrix subulata* (L.)	2,3,4,5,6,8,9	4	2	13	19
12. *Tetrix undulata* Sowerby	5,6,9	1	4	79	84
13. *Chrysochraon dispar* (Germ.)	3,5,9	-	10	2	12
14. *Stenobothrus lineatus* (Panz.)	1,9	-	18	-	18
15. *Omocestus viridulus* (L.)	5,9	-	195	11	206
16. *Myrmeleotettix maculatus* (Thunb.)	1,2,5,6,9	3	489	62	554
17. *Chorthippus apricarius* (L.)	9	-	22		22
18. *Chorthippus biguttulus* (L.)	1,2,5,9	-	30	-	30
19. *Chorthippus brunneus* (Thunb.)	2,5,9	-	9	-	9
20. *Chorthippus albomarginatus* (Deg.)	9	-	13	6	19
21. *Chorthippus dorsatus* (Zett.)	5,9	-	27		27
22. *Stethophyma grossum* (L.)	5	-	2	-	2
23. *Oedipoda caerulescens* (L.)	2,6	2	107	1	110
24. *Sphingonotus caerulans* (L.)	2,6	-	46	-	46
DERMAPTERA					
1. *Labidura riparia* (Pall.)	2	-	1	-	1
2. *Chelidurella acanthopygia* (Géné)	8	-	-	1	1
3. *Forficula auricularia* L.	5	-	-	1	1
BLATTODEA					
1. *Ectobius lapponicus* (L.)	1,4,7,8	-	4	21	25

DISCUSSION

So far, orthopterans and – less frequently – earwigs and cockroaches have been studied in the following national parks in Poland: Białowieża NP (Koźmiński 1925, Liana 2001), Kampinos NP (Liana 1962, 1966, Borowiak & Liana 2009), Ojców NP (Bazyluk 1970, Warchałowska-Śliwa et al. 1992), Bieszczady NP (Bazyluk 1971, Liana 2000b, Theuerkauf et al. 2005), Wielkopolska NP (Kaczmarek & Knapik 1974, Wołyńska 1975, Naskręcki 1992), Roztocze NP (Liana 1978, 1994), Pieniny NP (Bazyluk 1978, Liana 2000a), Wigry NP (Liana 1981), Wolin NP (Grobelny 1983), Świętokrzyski NP (Liana 1990), Polesie NP (Kočárek 2000), Tatra NP (Liana 2013) and Gorce NP (Liana & Armatys 2015). The finding of 24 orthopteran, 3 earwig and 1 cockroach species during the present study can be considered a good result considering the low diversity of habitats in the study area. The research method used is noteworthy, as catching such a large number of orthopteroid insects in Moericke traps is rare in Poland.

In total, 44 species of Orthoptera, 3 species of Dermaptera and 3 species of Blattodea have been reported from the whole area of Tuchola Forest by the earlier researchers and us. After critically reviewing available sources, we excluded some of these species from the checklist of Orthoptera, Dermaptera and Blattodea of the Tuchola Forest (Table 2). Specifically, La Baume (1911, 1920) listed *Leptophyes punctatissima* (Bosc.) after reexamining specimens collected by E. H. Rübsaamen and determined by Th. Kuhlgatz as *L. albovittata* (Koll.) (Rübsaamen 1901). However, Liana (1973, 1977) and Bazyluk & Liana (2000) considered La Baume's determination erroneous due to the fact that during later extensive orthopterological studies in the neighbouring areas *L. punctatissima* was not found and *L. albovittata* was common. Liana (1973, 1977) listed *Tetrix tenuicornis* (Sahlb.) for Tuchola Forest, citing La Baume (1913, 1920). However, Bazyluk & Liana (2000) subsequently synonymised La Baume's records with *T. bipunctata* (L.) and we follow their decision.

Table 2. Grasshoppers and crickets (Orthoptera), earwigs (Dermaptera) and cockroaches (Blattodea) recorded from the whole Tuchola Forest. Systematic order of species is after Bazyluk & Liana 2000 (Orthoptera), Bazyluk 1976b (Dermaptera) and Bazyluk 1976a (Blattodea). Sources in brackets only cite previous works without giving new data.

	Species	Source	Remarks
ORTHOPTERA			
1.	*Phaneroptera falcata* (Poda)	J. Przybylska, unpublished data	Record details: Tleń ad Świecie [CE14], 2017
2.	*Leptophyes albovittata* (Koll.)	Rübsaamen 1901, (La Baume 1911, 1920, Liana 1973, 1977, Grobelny & Naskręcki 1989)	
3.	*Barbitistes constrictus* Br. Wat.	Haber 1953, Liana 1973, 1977, Bieniecka 1978, (Banaszak et al. 2002), present work	
4.	*Meconema thalassinum* (Deg.)	Rübsaamen 1901, La Baume 1920, (Liana 1973, 1977), Bieniecka 1978, (Banaszak et al. 2002)	
5.	*Conocephalus dorsalis* (Latr.)	Rübsaamen 1901, La Baume 1920, Liana 1973, 1977, present work	Liana (1973, 1977) also cites La Baume (1911), who recorded this species in the vicinity of Obrowo ad Tuchola (Abrauer Moor, Kreis Tuchel), but this site is located outside of Tuchola Forest.
6.	*Tettigonia cantans* (Fuessly)	present work	
7.	*Tettigonia viridissima* (L.)	Rübsaamen 1901, La Baume 1920, Liana 1973, 1977, Bieniecka 1978, (Banaszak et al. 2002)	
8.	*Decticus verrucivorus* (L.)	La Baume 1920, (Liana 1973, 1977)	

	Species	Source	Remarks
ORTHOPTERA			
9.	*Metrioptera brachyptera* (L.)	La Baume 1911, 1913, 1920, Liana 1973, 1977, present work	
10.	*Roeseliana roeselii* (Hagenb.)	present work	
11.	*Platycleis albopunctata* (Goeze)	Rübsaamen 1901, La Baume 1920, (Liana 1973, 1977), present work	
12.	*Pholidoptera griseoaptera* (Deg.)	present work	
13.	*Gryllus campestris* L.	Rübsaamen 1901, La Baume 1920, (Liana 1977), present work	
14.	*Gryllotalpa gryllotalpa* (L.)	Rübsaamen 1901, La Baume 1920, (Liana 1973, 1977), Banaszak et al. 2002, present work	
15.	*Tetrix bipunctata* (L.)	Rübsaamen 1901, La Baume 1913, (1920), Bazyluk 1958, (Liana 1973, 1977), Bieniecka 1978, Banaszak et al. 2002, present work	
16.	*Tetrix subulata* (L.)	Rübsaamen 1901, (La Baume 1920, Liana 1977), Banaszak et al. 2002, present work	
17.	*Tetrix undulata* Sowerby	Bazyluk 1958, Banaszak et al. 2002, present work	
18	*Podisma pedestris* (L.)	La Baume 1911, 1913, (1920), Schulz 1923, (Liana 1973, 1977)	
19.	*Calliptamus italicus* (L.)	La Baume 1920, (Liana 1973, 1977)	
20.	*Chrysochraon dispar* (Germ.)	Bieniecka 1978, (Banaszak et al. 2002), present work	Liana (1973, 1977) also cites La Baume (1911, 1920), who recorded this species in the vicinity of Obrowo ad Tuchola (Abrauer Moor, Kreis Tuchel), but this site is located outside of Tuchola Forest.
21.	*Stenobothrus lineatus* (Panz.)	La Baume 1911, 1913, 1920, Liana 1973, 1977, Bieniecka 1978, (Banaszak et al. 2002), present work	
22.	*Stenobothrus nigromaculatus* (H.-Sch.)	La Baume 1911, 1913, (1920), (Liana 1973, 1977), Bieniecka 1978*, (Banaszak et al. 2002*)	*Highly dubious records (the species was reported in high numbers in moist habitats – possibly misindentified *Pseudochorthippus* sp.).
23.	*Omocestus haemorrhoidalis* (Charp.)	La Baume 1911, 1920, (Liana 1973, 1977), Bieniecka 1978, (Banaszak et al. 2002)	
24.	*Omocestus viridulus* (L.)	Rübsaamen 1901, (La Baume 1920), Liana 1973, 1977, Bieniecka 1978, (Banaszak et al. 2002), present work	
25.	*Myrmeleotettix maculatus* (Thunb.)	Rübsaamen 1901, La Baume 1913, (1920), Liana 1973, 1977, Bieniecka 1978, Banaszak et al. 2002, present work	
26.	*Chorthippus apricarius* (L.)	La Baume 1911, (1920), Liana 1973, 1977, present work	
27.	*Chorthippus biguttulus* (L.)	Rübsaamen 1901, (La Baume 1920), Liana 1973, 1977, Bieniecka 1978, (Banaszak et al. 2002), present work	
28.	*Chorthippus brunneus* (Thunb.)	Liana 1973, 1977, Bieniecka 1978, (Banaszak et al. 2002), present work	
29.	*Chorthippus albomarginatus* (Deg.)	Liana 1973, 1977, Bieniecka 1978, (Banaszak et al. 2002), present work	

	Species	Source	Remarks
ORTHOPTERA			
30.	*Chorthippus dorsatus* (Zett.)	Rübsaamen 1901, (La Baume 1920), Liana 1973, (1977), Bieniecka 1978, (Banaszak et al. 2002), present work	
31.	*Pseudochorthippus montanus* (Charp.)	Liana 1973, 1977, (Bazyluk & Liana 2000)	
32.	*Pseudochorthippus paralellus* (Zett.)	Rübsaamen 1901, (La Baume 1920, Liana 1973, 1977)	
33.	*Stethophyma grossum* (L.)	Rübsaamen 1901, La Baume 1920, (Liana 1973, 1977), present work	Liana (1977) also cites La Baume (1913), who recorded this species in the vicinity of Obrowo ad Tuchola (Abrauer Moor, Kreis Tuchel), but this site is located outside of Tuchola Forest.
34.	*Locusta migratoria* (L.)	La Baume 1920, (Liana 1973, 1977)	
35.	*Oedipoda caerulescens* (L.)	Rübsaamen 1901, (La Baume 1920), Liana 1973, 1977, Bieniecka 1978, Banaszak et al. 2002, present work	
36.	*Psophus stridulus* (L.)	Rübsaamen 1901, La Baume 1911, 1913, 1920, (Herold 1916), Wodziczko et al. 1938, (Liana 1973, 1977)	
37.	*Sphingonotus caerulans* (L.)	La Baume 1920, present work	
DERMAPTERA			
1.	*Labidura riparia* (Pall.)	present work	
2.	*Chelidurella acanthopygia* (Géné)	present work	
3.	*Forficula auricularia* L.	Żurawlew et al. 2022, present work	
BLATTODEA			
1.	*Blatta orientalis* L.	La Baume 1920	
2.	*Ectobius lapponicus* (L.)	Rübsaamen 1901, La Baume 1920, present work	
3.	*Ectobius sylvestris* (Poda)	Żurawlew et al. 2022	

We also consider several orthopterans listed by Bieniecka (1978) and Banaszak et al. (2002) but not by the other sources as questionable, because these species are extinct in Poland, have not been found elsewhere in the northern part of the country, or had been reported from unsuitable habitats. Therefore, we excluded *Arcyptera microptera* (Fisch.-Waldh.), *Stenobothrus stigmaticus* (Ramb.), *Omocestus rufipes* (Zett.), *Chorthippus mollis* (Charp.) and *Chorthippus vagans* (Eversm.) from the checklist. Occurence of these species in Tuchola Forest needs confirmation before they can be reliably included in the list.

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REFERENCES

BANASZAK J., KRIGER R. & WENDZONKA J. 2002. Przegląd badań nad owadami i pająkami Borów Tucholskich. In: BANASZAK J. & TOBOLSKI K. (eds), Park Narodowy Bory Tucholskie na tle projektowanego rezerwatu biosfery, pp. 229–242. Park Narodowy Bory Tucholskie, Charzykowy, Wydawnictwo Homini, Kraków, 359 pp.

BANASZAK J., BUSZKO J., CZACHOROWSKI S., CZECHOWSKA W., HEBDA G., LIANA A., PAWŁOWSKI J., SZEPTYCKI A., TROJAN P. & WĘGIEREK P. 2004. Przegląd badań inwentaryzacyjnych nad owadami w parkach narodowych Polski. Wiadomości Entomologiczne 23, Supl. 2: 5–56.

BAZYLUK W. 1958. Tetrigidae (Orthoptera) Polski. Fragmenta Faunistica 7: 379–409.

BAZYLUK W. 1970. Prostoskrzydłe (Orthoptera) Ojcowskiego Parku Narodowego. Fragmenta Faunistica 15: 365–378.

BAZYLUK W. 1971. Prostoskrzydłe (Orthoptera) Bieszczadów Zachodnich wraz z opisem *Isophya posthumoidalis* n. sp. Fragmenta Faunistica 17: 127–159.

BAZYLUK W. 1976a. Karaczany i modliszki Blattodea et Mantodea. Katalog Fauny Polski. Instytut Zoologii PAN, Warszawa, 17, 1: 31 ss. + mapa.

BAZYLUK W. 1976b. Skorki Dermaptera. Katalog Fauny Polski. Instytut Zoologii PAN, Warszawa, 17, 3: 19 ss. + mapa.

BAZYLUK W. 1978. Karaczany (Blattodea), prostoskrzydłe (Orthoptera) i skorki (Dermaptera) Pienin i góry Wżar. Fragmenta Faunistica 22: 7–50.

BAZYLUK W. & LIANA A. 2000. Prostoskrzydłe Orthoptera. Katalog Fauny Polski. Muzeum i Instytut Zoologii PAN, Warszawa, 17, 2: 156 ss. + mapa.

BIENIECKA M. 1978. Prostoskrzydłe (Orthoptera) wybranych siedlisk Borów Tucholskich [Orthoptera of selected habitats of Tuchola Forest]. Master Thesis. Nicolaus Copernicus University, Department of Animal Ecology, 25 pp.

BOROWIAK M. & LIANA A. 2009. Zmiany w faunie prostoskrzydłych (Orthoptera) w ciągu 50 lat istnienia Kampinoskiego Parku Narodowego. In: ANDRZEJEWSKA A. & LUBAŃSKI A. (eds), Trwałość i efektywność ochrony przyrody w polskich parkach narodowych. Kampinoski Park Narodowy, pp. 373–385. Izabelin 463 pp.

GROBELNY S. 1983. Skorki Dermaptera i zadomkowate Blattodea: Ectobiidae Wolińskiego Parku Narodowego. Parki Narodowe i Rezerwaty Przyrody 4: 51–57.

GROBELNY S. & NASKRĘCKI P. 1989. *Leptophyes punctatissima* (Bosc d'Antic 1792) (Orthoptera, Tettigoniidae) w Polsce. Badania Fizjograficzne nad Polską Zachodnią, 38, Seria C-Zoologia: 137–140.

HABER A. 1953. Opaślik sosnowiec *Barbitisces constrictus* Br. Watt. (*Locustidae* Orth.). Roczniki Nauk Leśnych 1: 71–154.

HEROLD W. 1916. Zum Vorkommen von *Psophus stridulus* L. Zeitschrift für Wissenschaftliche Insektenbiologie 12: 318–319.

KACZMAREK B. & KNAPIK K. 1974. Prostoskrzydłe (Orthoptera), karaczany (Blattodea) i skorki (Dermaptera) Wielkopolskiego Parku Narodowego. Badania Fizjograficzne nad Polską Zachodnią, Seria C – Zoologia 27: 69–82.

KOČÁREK P. 2000. Orthopteroid insects (Orthoptera, Blattaria, Dermaptera) of the Polesie National Park and its surroundings. Parki Narodowe i Rezerwaty Przyrody 19: 89–97.

KOŹMIŃSKI Z. 1925. Badania ekologiczne nad prostoskrzydłymi Puszczy Białowieskiej. – Ökologische Untersuchungen an Orthopteren des Urwalds von Białowieża. Bulletin de l'Académie Polonaise des Sciences et des Lettres, Classe des Sciences Mathématiques et Naturelles - Série B: Sciences Naturelles, 447–475.

LA BAUME W. 1911. Orthopterologisches aus Westpreussen. Entomologische Rundschau 28: 158–159.

LA BAUME W. 1913. Zweiter Beitrag zur Kenntnis der westpreußischen Geradflüglerfauna (Orthoptera). Gliederung der Fauna nach Lebensgemeinschaften. Bericht des Westpreussischen Botanisch-Zoologischen Vereins, Danzig, 35: 149–154.

LA BAUME W. 1920. Die Geradflüglerfauna Westpreussens. Dritter Beitrag zur Kenntnis der westpreussischen Ohrwürmer und Heuschrecken (*Dermaptera* und *Orthoptera*). Schriften der Naturforschenden Gesellschaft in Danzig, Neue Folge 15: 144–185.

LIANA A. 1962. Badania nad prostoskrzydłymi (Orthoptera) Puszczy Kampinoskiej. Fragmenta Faunistica 9: 233–246.

LIANA A. 1966. Prostoskrzydłe (Orthoptera) Mazowsza. Fragmenta Faunistica 12: 239–280.

LIANA A. 1973. Prostoskrzydłe (Orthoptera) w siedliskach kserotermicznych rejonu dolnej Wisły i dolnej Odry. Fragmenta Faunistica 19: 55–114.

LIANA A. 1977. Prostoskrzydłe (Orthoptera) województwa bydgoskiego i toruńskiego. Badania Fizjograficzne nad Polską Zachodnią, Seria C – Zoologia 30: 85–98.

LIANA A. 1978. Prostoskrzydłe (Orthoptera) w siedliskach kserotermicznych Wyżyny Lubelskiej. Fragmenta Faunistica 23: 83–135.

LIANA A. 1981. Prostoskrzydłe (Orthoptera) w siedliskach kserotermicznych Pojezierza Mazurskiego. Fragmenta Faunistica 25: 479–510.

LIANA A. 1990. Rozprzestrzenienie i ekologia prostoskrzydłych (*Orthoptera*) w Górach Świętokrzyskich. Fragmenta Faunistica 33: 203–246.

LIANA A. 1994. Prostoskrzydłe (Orthoptera) Roztocza. Fragmenta Faunistica 37: 141–165.

LIANA A. 2000a. Prostoskrzydłe (Orthoptera), karaczany (Blattodea) i skorki (Dermaptera). Flora i Fauna Pienin – Monografie Pienińskie 1: 151–154.

LIANA A. 2000b. Prostoskrzydłe (Orthoptera), skorki (Dermaptera) i karaczany (Blattodea) Bieszczadów. Monografie Bieszczadzkie 7: 173–189.

LIANA A. 2001. Orthoptera – Blattodea. In: GUTOWSKI J. M. & JAROSZEWICZ B. (eds), Catalogue of the fauna of Białowieża Primeval Forest, pp 92–93. Instytut Badawczy Leśnictwa, Warszawa, 403 pp.

LIANA A. 2013. Orthopterans (Orthoptera) of the Tatra Mountains and Podhale (Poland). Fragmenta Faunistica 56: 113–129.

LIANA A. & ARMATYS P. 2015. Prostoskrzydłe (Orthoptera) Gorców i Gorczańskiego Parku Narodowego. Ochrona Beskidów Zachodnich 6: 70–84.
NASKRĘCKI P. 1992. Owady prostoskrzydłe (Insecta, Orthoptera). In: KOSTRZEWSKI A. (ed), Wielkopolski Park Narodowy, człowiek i środowisko – wybrane problemy. Morena. Prace i Materiały Wielkopolskiego Parku Narodowego, pp. 34–35. Sorus, Poznań, Puszczykowo, 153 pp.
RÜBSAAMEN E. H. 1901. Bericht über meine Reisen durch die Tucheler Heide in den Jahren 1896 und 1897. Schriften der Naturforschenden Gesellschaft in Danzig, Neue Folge 10: 79–148.
RYDZKOWSKI P., GUENTZEL S. & ŁAWICKI Ł. 2010. Bory Tucholskie. In: WILK T., JUJKA M., KROGULEC & CHYLARECKI P. (eds), Ostoje ptaków o znaczeniu międzynarodowym w Polsce, pp. 146–149. Ogólnopolskie Towarzystwo Ochrony Ptaków, Marki, 595 pp.
SCHULZ C. 1923. Die Naturdenkmäler der Tierwelt der im Osten abgetretenen Gebiete. Beiträge zur Naturdenkmalpflege 9: 157–184.
THEUERKAUF J., ROUYS S., GREIN G. & BECKER A. 2005. New records of Orthoptera in the Bieszczady Mountains (Southeast Poland) with special regard to the genus *Isophya.* Fragmenta Faunistica 48: 9–14.
WARCHAŁOWSKA-ŚLIWA E., MARYAŃSKA-NADACHOWSKA A. & KOSTIA D. 1992. Prostoskrzydłe (Orthoptera) Wyżyny Krakowsko–Częstochowskiej. Prądnik 5: 161–180.
WODZICZKO A., KRAWIEC F. & URBAŃSKI J. 1938. Pomniki i zabytki przyrody Wielkopolski. Wydawnictwo Okręgowego Komitetu Ochrony Przyrody na Wielkopolskę i Pomorze 8: 472 pp.
WOŁYŃSKA J. 1975. Prostoskrzydłe (Orthoptera), karaczany (Blattodea) i skorki (Dermaptera) niektórych biotopów leśnych Wielkopolskiego Parku Narodowego. Polskie Pismo Entomologiczne 45: 397–413.
ŻURAWLEW P., GROBELNY S., ORZECHOWSKI R., RADZIKOWSKI P. & RUTKOWSKI T. 2022. New data about the distribution of cockroaches (Blattodea) and earwigs (Dermaptera) in Poland. Fragmenta Faunistica 65: 11–24.

STRESZCZENIE

[Prostoskrzydłe (Orthoptera), skorki (Dermaptera) i karaczany (Blattodea) Parku Narodowego „Bory Tucholskie" (Polska)]

Park Narodowy „Bory Tucholskie" utworzono w roku 1996, zajmuje on powierzchnię 46,13 km² z czego 83% zajmują tereny leśne, 11,5% wody, a 5,5% pozostałe formy terenu. Podczas badań w latach 2001, 2013 i 2014 stwierdzono na tym terenie występowanie 24 gatunków prostoskrzydłych (Orthoptera), 3 gatunków skorków (Dermaptera) i jednego gatunku karaczana (Blattodea). W poszczególnych latach liczba odłowionych osobników tych owadów wynosiła odpowiednio: w 2001 – 11, w 2013 – 1115 i w 2014 – 228. Warta uwagi jest zastosowana metoda badawcza, bowiem odłowienie tak dużej liczby owadów ortopteroidalnych w pułapki Moerickiego jest ewenementem w skali krajowej. Gatunkiem zdecydowanie najliczniejszym był *Myrmeleotettix maculatus* (Thunb.) (554 os., 41,8% wszystkich Orthoptera), kolejnymi licznie odławianymi gatunkami były: *Omocestus viridulus* (L.) (220 os., 16,6%), *Oedipoda caerulescens* (L.) (110 os., 8,3%), *Tetrix undulata* (Sowerby) (84 os., 6,3%) i *Platycleis albopunctata* (Goeze) (72 os., 5,4%). Warte uwagi są wysokie zagęszczenia wymienionych gatunków na powierzchniach badawczych: murawach napiaskowych i wilgotnych łąkach. Pozostałe gatunki odławiane były w ilości 1–46 osobników. Prawie wszystkie odnotowane gatunki należą do rozpowszechnionych na terenie Polski. Na uwagę zasługują te związane ze specyficznymi siedliskami: *Metrioptera brachyptera* (L.) i *Sphingonotus caerulans* (L.). Po raz pierwszy wykazano na obszarze Borów Tucholskich: *Tettigonia cantans* (Fuessly), *Roeseliana roeselii* (Hagenb.), *Pholidoptera griseoaptera* (Deg.), *Chelidurella acanthopygia* (Géné) i *Labidura riparia* (Pall.). Ogółem w całych Borach Tucholskich stwierdzono dotychczas występowanie 37 gatunków Orthoptera, 3 gatunków Dermaptera i 3 gatunków Blattodea. Występowanie 7 kolejnych gatunków Orthoptera podawanych we wcześniejszych pracach wymaga potwierdzenia.

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