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Stanisław HURUK

Current knowledge about the carabid beetles (*Carabidae*, *Col.*) of the Świętokrzyski National Park

Abstract. This paper contains an inventory of 120 species registered to date from the area of the Holy Cross (Świętokrzyskie) Mountains. The carabid fauna recorded in the area includes 12 species belonging to the genus *Carabus* L., classified as legally protected species in Poland, 6 mountain-associated species and 2 species, *Pterostichus burmeisterii* HERR and *Amara erratica* (DUFT.), occurring at isolated locations. *A. erratica* is regarded as a postglacial relic within the Park.

Key words: Poland, Świętokrzyski National Park, *Carabidae*, *Coleoptera*

Author's address: Pedagogical University, Institute of Biology, Department of Zoology, Konopnickiej 15, 25-406 Kielce, Poland

The gathering of knowledge about the carabid beetles of the Świętokrzyski National Park has been progressing at a very slow pace. In spite of a 50-year history of the studies, our current knowledge of this taxon is still far from satisfactory, even though new species are regularly registered in the Park.

Fragmentary information on carabid beetles in the Holy Cross (Świętokrzyskie) Mountains, including the area of the Świętokrzyski National Park, found in various papers have been collated in the Catalogue of the Fauna of Poland (BURAKOWSKI et al. 1973, 1974), where 70 species were marked as registered from this National Park. Later studies by various authors (KOWALCZYK, WATAŁA 1988; LEŚNIAK 1990, 1994; HURUK 1993; MEŻYK 1997; HURUK A. 1998; LEŚNIAK, OLSZEWSKI 1999) have added more species to the list, which now numbers 120 species.

The list of carabid species given in this paper includes data on the habitats where they occur, most often described as plant associations or specific forest stands (columns 12-14). The following species were found outside the habitats listed: *Cicindela campestris* L., *C. hybrida* L., *Bembibion stephensii* CROTCH,

B. ustulatum (L.), *Pterostichus kugelanni* (PANZ.), *Harpalus rufitarsis* (DUFT.) in the Święty Krzyż forest division; *Cicindela germanica* L., *Amara erratica* (DUFT.), *Dromius laeviceps* MOTSCH., *D. quadraticollis* A. MOR., *D. quadrimaculatus* (L.), *D. spilotus* (ILL.), *D. nigriiventris* THOMS. in the Święta Katarzyna forest division; *Zabrus tenebrioides* (GOEZE) in the Podgórze forest division; *Dromius spilotus* (ILL.) in the Święty Krzyż and Podgórze forest divisions. Exact identification of the site where they were found was not possible, hence their exclusion from the inventory. Wherever possible, species dominant in a given habitat in the Łysogóry Mts. and in the Chełmowa Góra forest division, the latter detached from the main complex, are indicated by means of the indexes DŁ and DCh, respectively. Identification of dominant species was not possible for certain habitats.

A qualitative zoogeographical breakdown reveals a dominance of the Palearctic element, represented by 59 species (49.2%). Forms belonging to the European forest realm also have a significant share, with 18 species (11.7%). Other zoogeographical elements are represented by smaller numbers of species, with 10 species (8.3%) from the Holarctic realm, 9 species from the Mediterranean realm, 6 species from the European mountain realm and 4 species from the Euroarctic realm listed in the inventory. The above classification is based on LEŚNIAK (1987).

Papers by some authors (LEŚNIAK 1987; HURUK S. 1993; HURUK A. 1998) provide quantitative data on material obtained from the National Park. This makes possible a quantitative zoogeographical analysis, which reveals a much bigger share to mountain-associated species. In the beech forests of the Łysogóry mountain range their share is as high as 90% (LEŚNIAK 1990), with *Carabus linnaei* as the dominant species. In the beech forest of the Chełmowa Góra area, on the other hand, the share of mountain elements exceeds 44%, with *Pterostichus burmeisteri* being the most abundant (HURUK S. 1993; HURUK A. 1998). Mountain-associated species are also numerous represented in the Serwis forest range, where their share exceeds 30% in the older stands and *Abax carinatus* is the most abundant (HURUK S. 1993; HURUK A. 1998).

Among the most valuable habitats in the National Park is the mixed coniferous forest (*Pino-Quercetum*), with its 65 species in total, 10 legally protected species, and 5 mountain-associated species; *Abietetum polnicum* fir forests with 58 species, including 10 legally protected and 5 mountain-associated species; *Arrhenatheretum medioeuropaeum* meadows, with 52 species, including 10 legally protected and 2 mountain-associated species; and *Dentario glandulosae-Fagetum* beech forests with 49 species, including 9 legally protected and 6 mountain-associated species.

Much fewer species have been registered from the other habitats (boulder fields, marshy coniferous forests, reed grass coniferous forests, spruce woods, xerothermal habitats). Even so, the faunal resources of some of them should still be regarded as valuable, particularly in view of a high share of legally protected species there: 6 out of the 13 species found in alder carrs are legally protected and so are 8 out of the 17 species found in spruce woods.

None of the species listed in Table I has been found in all of the habitats listed. The most ubiquitous species is *Carabus violaceus*, recorded in 13 out of

the 15 habitats listed, with the exception of the marshy coniferous forest *Vaccinio uglinosi-Pinetum* and the wet forest *Calamagrostio villosae-Pinetum*. Other frequently encountered species included *Carabus coriaceus*, which was only absent from very moist habitats, i.e. the marshy coniferous forests, the wet coniferous forests and *Junco-Nardetum* meadows, and *Pterostichus niger*, absent only from the marshy coniferous forests, wet coniferous forests and an association of the rowan *Sorbetum santae-crucianum*. These species are very valuable because of their large numbers and, consequently, an important role they play in these habitats.

Species of the genus *Carabus* L. are worthy of special attention because they are legally protected. 12 species of this genus have been found in the Świętokrzyski National Park, accounting for 40% of Poland's resources of this genus. These beetles are valuable because they are large predators that can eliminate pests at all developmental stages. There are no grounds for regarding any of them as endangered in the Park.

Mountain-associated species are an interesting group, too. There being only 6 of them in the Park, they occupy the dominant position in many of the habitats (Table I) and that is why their importance is much greater than when judged by species number alone. *Pterostichus burmeisteri* is worthy of special attention as its locations within the Park are considered to be isolated from its main continuous range, extending up to the Carpathian and Sudetian Foothills (BURAKOWSKI et al. 1974). It occurs particularly numerous in the beech woods of Chełmowa Góra (HURUK S. 1993; HURUK A. 1998), where it accounts for up to 44% of a community. It is much less abundant in the Łysogóry range (0.2–8.2% of a community).

Amara erratica, mentioned above, is also an interesting species. It is thought to be a postglacial relic in the Holy Cross Mountains (BURAKOWSKI et al. 1974), whose locations there are detached from its continuous range, extending northwards of the 64th north parallel.

Carabid beetles in the National Park are also diversified in terms of their ecological preferences. Forest species (45 species or 37.5%) and open-area species (42 species or 35%) are the dominant groups. Species collected in traps placed on the shores of water bodies (13 species or 10.8%) as well as those occurring in forests and open areas (8 species or 6.7%) alike are less numerous. One species, *Aechmites terricola*, might be regarded as a synanthrope. The ecological requirements of a further 9 species are difficult to describe. These species have been found (BURAKOWSKI et al. 1973, 1974) in forests, vistas, clearings, open areas, peatlands, heathlands, burned-off areas, fire clearings, seaside and inland dunes, arable fields, fallows, etc.

Evaluation of the value of individual habitats is not fully objective, which is because carabid material has been acquired systematically from some habitats over a number of years (LEŚNIAK 1990; HURUK S. 1993; MEŻYK 1997; HURUK A. 1998), but only occasionally from others. In order to obtain a more complete picture field studies should be undertaken in less penetrated habitats, in particular in all habitats of the Bukowa Góra site, in meadows within

the Park, boulder fields, marshy coniferous forests and reed grass coniferous forests and on the escarpment near the village of Cząstkowo.

Data acquired from the better studied habitats also need to be supplemented. For example, species of the genus *Dromius* BONELLI are missing from lists of species obtained from most forest divisions. This shows that studies conducted so far have generally ignored late autumn and winter, when these species can be collected.

REFERENCES

- BURAKOWSKI B., MROCZKOWSKI M., STEFAŃSKA J., MAKÓLSKI J., PAWŁOWSKI J. 1973. Chrząszcze (*Coleoptera*), Biegaczowate – *Carabidae*. Katalog fauny Polski, 23, 2. Warszawa, 233 pp.
- BURAKOWSKI B., MROCZKOWSKI M., STEFAŃSKA J., MAKÓLSKI J., PAWŁOWSKI J. 1974. Chrząszcze (*Coleoptera*), Biegaczowate – *Carabidae*. Katalog fauny Polski, 23, 3. Warszawa, 430 pp.
- HURUK A. 1998. Studium ekologiczno-porównawcze nad zgrupowaniami biegaczowatych (*Carabidae*, *Coleoptera*) leśnictwa Chelmowa Góra Świętokrzyskiego Parku Narodowego (doctors thesis).
- HURUK S. 1993. Studia nad zgrupowaniami biegaczowatych (*Carabidae*, *Coleoptera*) uroczysk Chelmowa Góra i Serwis w Świętokrzyskim Parku Narodowym. *Fragm. faun.*, 36: 339–371.
- KOWALCZYK J. K., WATAŁA C. 1988. Materiały do znajomości biegaczowatych (*Carabidae*, *Coleoptera*) Świętokrzyskiego Parku Narodowego. *Acta Univ. Lodz., Folia zool. anthr.*, 6: 25–37.
- LEŚNIAK A. 1987. Zoogeographical analysis of the *Carabidae* (*Coleoptera*) of Poland. *Fragm. faun.*, 30: 297–312.
- LEŚNIAK A. 1990. Biegaczowate (*Coleoptera*, *Carabidae*) głównych typów siedliskowych lasu w Świętokrzyskim Parku Narodowym. *Fragm. faun.*, 33: 247–259.
- LEŚNIAK A. 1994. Monitoring zgrupowań *Carabidae* (*Coleoptera*) na powierzchniach Święty Krzyż i Góra Malik w latach 1992 i 1993. *Monitoring Środowiska Regionu Świętokrzyskiego* 2: 83–86.
- LEŚNIAK A., OLSZEWSKI R. (1999). Zgrupowania biegaczowatych (*Carabidae*, *Coleoptera*) Bukowej Góry – obszaru przyłączonego do Świętokrzyskiego Parku Narodowego. *Rocznik Świętokrzyski* (in press).
- MEŻYK Z. 1997. Comparison of Carabid (*Carabidae*, *Coleoptera*) Communities Trapped at Different Forest Habitats in the Świętokrzyskie Mountains. *Folia Forest. Pol.*, 39: 39–59.

SUMMARY

[Tytuł: Stan zbadania biegaczowatych (*Carabidae*, *Col.*) Świętokrzyskiego Parku narodowego]

W określonych zbiorowiskach roślinnych Świętokrzyskiego Parku Narodowego stwierdzono występowanie 105 gatunków *Carabidae* (Tab.). Ponadto wymieniono 15 gatunków, w przypadku których niemożliwe jest ustalenie środowisk ich występowania. Łączna liczba gatunków znanych z parku wynosi więc 120, o 50 więcej niż podaje Katalog Fauny Polski (BURAKOWSKI i in. 1973, 1974). Wśród nich stwierdzono: 12 gatunków podlegających prawnej ochronie, 6 gatunków górskich, dwa na stanowiskach wyspowych – *Pterostichus burmeisteri* i *Amara erratica*. *A. erratica* uważana jest w Parku za relikwit polodowcowy. Duże zróżnicowanie środowisk oraz słabe zbadanie niektórych z nich pozwalają sądzić, że w przyszłości lista *Carabidae* ŚPN zostanie uzupełniona o kolejne gatunki.

Table I. List of carabid beetle species in the Świętokrzyski National Park.

No	Species	Habitat													
		3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	<i>Calosoma inquisitor</i> (L.)			+	+										
2	<i>Carabus coriaceus</i> L. !	+	+	+	+			+	+		+	+	+	+	+
3	<i>C. intricatus</i> L. !											+			
4	<i>C. violaceus</i> L. !	+	+	+	+	+	+	+		+	+	+	+	+	+
5	<i>C. auronitens</i> FABR. !	+	+	+	+							+	+		+
6	<i>C. convexus</i> FABR. !														+
7	<i>C. granulatus</i> L. !	+	+	+	+						+	+		+	
8	<i>C. cancellatus</i> ILL. !	+	+	+	+							+	+		
9	<i>C. arcensis</i> HERBST. !	+	+	+	+					+		DŁ		+	+
10	<i>C. nemoralis</i> O. F. MÜLL. !	+			+							+			
11	<i>C. hortensis</i> L. !	+	+	DCh	DCh							+	+	+	+
12	<i>C. glabratus</i> PAYK. !	+	+	+	+						+	+	+		+
13	<i>C. linnaei</i> DUFT. !	DŁ	DŁ	DŁ	DŁ			+			DŁ		DŁ	+	+
14	<i>Cychrus caraboides</i> (L.)	+	+	+				+				+	+	+	+
15	<i>Leistus rufomarginatus</i> (DUFT.)	+	+												
16	<i>L. ferrugineus</i> L.	+	+	+	+										
17	<i>L. rufescens</i> FABR.	+		+	+										
18	<i>L. piceus</i> FROL.	+	+	+			+				+				
19	<i>Nebria brevicollis</i> (FABR.)	+	+		+							+			
20	<i>Notiophilus aquaticus</i> L.	+	+		+										
21	<i>N. biguttatus</i> (FABR.)	+	+	+	+							+			
22	<i>N. palustris</i> (DUFT.)	+	+		+										
23	<i>Elaphrus ullrichi</i> G. REDT.				+										
24	<i>Loricera caerulescens</i> (L.)	+	+	+	+						+	+			
25	<i>Clivina fossor</i> (L.)	+			+							+			
26	<i>Brosicus cephalotes</i> (L.)											+			
27	<i>Asaphidion flavipes</i> (L.)	+	+	+								+			

Table I. cont.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
28	<i>Bembidion pygmaeum</i> (FABR)								+						
29	<i>B. lampros</i> (HERBST)	+	+	+	+							+			
30	<i>B. properans</i> (STEPH)	+													
31	<i>B. varium</i> (OLIV.)								+						
32	<i>B. tibiale</i> (DUFT.)								+						
33	<i>B. quadripustulatum</i> AUD.-SERV.								+						
34	<i>B. quadrimaculatum</i> (HERBST)	+										+			
35	<i>B. mannerheimii</i> (C. SAHLB)				+		+								
36	<i>Epaphius secalis</i> (PAYK.)	+	+	+	+	+	+					+			
37	<i>Trechus quadristriatus</i> (SCHRANß)	+	+					+				+			
38	<i>Patrobus atrorufus</i> (STROEM)	+	+	+	+						+	+			
39	<i>Amara plebeja</i> (GYLL)	+	+	+	+		+					+			
40	<i>A. aenea</i> (DE GEEß)	+			+							+			
41	<i>A. curta</i> DEJ.		+		+										
42	<i>A. eyrinota</i> (PANZ.)											+			
43	<i>A. familiaris</i> (DUFT.)				+							+			
44	<i>A. littorea</i> THOMS				+										
45	<i>A. lunicollis</i> SCHIODTE				+										
46	<i>A. nitida</i> STURM											+			
47	<i>A. similata</i> (GYLL)		+	+	+							+			
48	<i>A. bifrons</i> (GYLL)			+	+										
49	<i>A. pallens</i> STURM				+										
50	<i>A. brunnea</i> (GYLL)		+												
51	<i>A. fulva</i> (O. F. MÜLL.)											+			
52	<i>Pterostichus caerulescens</i> (L.)		+									+			
53	<i>P. cupreus</i> (L.)		+	+	+			+		DŁ		+			
54	<i>P. virens</i> (O. F. MÜLL.)							+				+			
55	<i>P. vernalis</i> (PANZ.)			+	+							+			
56	<i>P. angustatus</i> (DUFT.)	+	+		+										

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
57	<i>P. oblongopunctatus</i> (FABR)	+	DCh	+	+		DL				+	+	+	+	+
58	<i>P. niger</i> (SCHALL)	+	+	+	+				+	+	+	+	+	DL	DL
59	<i>P. vulgaris</i> (L.)	+	+	+	+					+	+	+	+	+	+
60	<i>P. nigrita</i> (FABR)	+	+	+	+		+					+		+	+
61	<i>P. diligens</i> (STURM)			+			+								
62	<i>P. strenuus</i> (PANZ.)	+		+	+							+			
63	<i>P. aethiops</i> PANZ.														+
64	<i>P. burmeisteri</i> HEER	+	+	+	+						+				
65	<i>Abax carinatus</i> (DUFT.)	DCh	+	+	+							+	+		+
66	<i>A. ovalis</i> (DUFT.)	+	+	+	+		+					+		+	+
67	<i>Molops piceus</i> (PANZ.)		+	+	+										
68	<i>Calathus ambiguus</i> (PAYK)							+							
69	<i>C. erratus</i> (C. R. SAHLB)		+									+			
70	<i>C. fuscipes</i> (GOEZE)	+	+		+			+							
71	<i>C. melanocephalus</i> (L.)	+													
72	<i>C. micropterus</i> (DUFT.)	+	+	+	+		+				+				
73	<i>Aechmites terricola</i> (HERBST)				+										
74	<i>Dolichus halensis</i> (SCHALL)				+										
75	<i>Synuchus nivalis</i> (PANZ.)	+	+	+	+										
76	<i>Olisthopus rotundatus</i> (PAYK)	+													
77	<i>Agonum gracilipes</i> (DUFT.)		+												
78	<i>A. muelleri</i> (HERBST)		+		+										
79	<i>A. sexpunctatum</i> (L.)	+								+		+			
80	<i>A. assimile</i> (PAYK)	+	+	+	+							+	+	+	+
81	<i>A. obscurum</i> (HERBST)	+			+		+								
82	<i>A. dorsale</i> (PONT.)	+										+			
83	<i>A. fuliginosum</i> (PANZ.)	+		+	+		+								
84	<i>A. gracile</i> STURM				+										
85	<i>A. micans</i> (NIC.)	+		+			+				+	+			
86	<i>Badister bipustulatus</i> (FABR)				+										

Table I. cont.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
87	<i>Chlaenius nitidulus</i> (SCHRANß)														+
88	<i>Diachromus germanus</i> (L.)				+										
89	<i>Anisodactylus binotatus</i> (FABR)	+		+	+							+			
90	<i>A. nemorivagus</i> (DUFT.)		+												
91	<i>A. signatus</i> (PANZ.)				+										
92	<i>Harpalus rufipes</i> (DE GEEß)	+		+	+							+			
93	<i>H. affinis</i> (SCHRANß)	+						+				+			
94	<i>H. fuliginosus</i> DUFT.	+	+		+										
95	<i>H. latus</i> (L.)	+	+	+	+	+	+					+			
96	<i>H. tardus</i> PANZ.				+										
97	<i>H. psittaceus</i> (FOURCR)								+						
98	<i>H. quadripunctatus</i> DEJ.	+	+	+	+		+		+			+			
99	<i>H. rubripes</i> (DUFT.)											+			
100	<i>Bradycellus csiki</i> LACZÓ						+								
101	<i>Acupalpus dubius</i> SCHILSKY						+								
102	<i>Acupalpus skrimshirani</i> (STEPH.)				+										
103	<i>Dromius agilis</i> (FABR)	+													
104	<i>D. fenestratus</i> (FABR)	+													
105	<i>D. schneideri</i> CROTCH	+													
Total		58	49	44	65	3	17	10	8	6	14	52	13	13	17

Legend:

! – legally protected species status

– mountain species

– species in isolated location

DCh – dominant at Chelmowa Góra

DŁ – dominant at Lysogóry Mts.

Habitats and/or locations

3 – *Abietetum polonicum*4 – *Dentario glandulosae-Fagetum*5 – *Tilio-Carpinetum*6 – *Pino-Quercetum*7 – *Vaccinio uliginosi-Pinetum*8 – *Calamagrostio villosae – pinetum*9 – *Sorbetum santae-crucianum*10 – carr association with *Brachypodium pinnatum*, *Peucedano-Coryletum* and*Carpino-Prunetum* bush11 – *Junco-Nardetum* meadow12 – *Caricetum rostrae* meadow13 – *Arrhenatheretum medioeuropaeum* meadow

14 – pine forest stands

15 – alder carrs

16 – spruce woods