

CLICK-BEETLES (*COLEOPTERA: ELATERIDAE*)
OF WET HABITAT IN THE "LASZY JANOWSKIE" LANDSCAPE PARK

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Summary. In the present study the groups of click-beetle of wet habitats in the "Lasy Janowskie" Landscape Park were examined. The research was carried out in the following plant communities: alder communities, wet meadows, low, transitional and high peat lands. Adults forms were collected with use of entomological draw and umbrella. In the alder complex *Sphagno squarrosi-Alnetum* larvae from open-cast soil have also been taken. 25 species of the click-beetle were found. The number of hygrophilous species in the investigated communities was over 20%. Ecological and zoogeographical analysis has also been done.

Key words: Sout-east Poland, "Lasy Janowskie" Landscape Park, beetle, click-beetle

INTRODUCTION

Most click-beetles live in forest biotopes [8]. Only few are bound with wet environment. These are mainly species belonging to the *Negastriinae* and *Elaterinae* subfamilies and few of the *Agrypninae* subfamily.

The "Lasy Janowskie" Landscape Park is placed in the western part of the Biłgoraj Plain, which is the northernmost mezoregion of the Sandomierska Valley. The characteristic features of the Plain are dunes and wet hollows containing peat, little lakes and ponds. It is a region where pine and spruce forests are prevailing, and at some places there are beech- and fir-tree forests [5]. In order to conserve and preserve the great biological values of this area, the "Lasy Janowskie" Landscape Park was set up here in 1984. Water biotopes – peat land and wet communities cover 5% of the Park area. As for the differentiation of the

woods, the Park holds the first place in Poland, and the second place – after the Poleski Landscape Park – as far as the variability of peat land is concerned [3, 4].

So far no research on click-beetles has been conducted in the area; one exception is a note on *Ampedus nigerrimus* found in wet, mixed forest in the region of Janów Lubelski [2].

MATERIALS AND METHODS

The research on the click-beetle of the wet environment in the Park (Fig. 1) was conducted in the following plant communities:

- alder (in *Sphagno squarrosi-Alnetum* and *Salicetum pentandro-cinereae* complexes), stations: 2, 4, 6, 10, 12;
- wet meadows of the *Molinio-Arrhenatheretea* (complexes: *Filipendulo-Geranium*, *Junco-Molinietum*, *Scirpetum sylvatici* and *Deschampsietum caespitosae*) and low peat lands (complexes: *Caricetum elatae*, *C. gracilis* and *C. vesicariae*), stations: 2, 3, 4, 5, 7, 11;
- transitional peat lands (complexes: *Carici-Agrostietum canine* and *Caricetum rostratae*) and high peat lands (complexes: *Ledo-Sphagnetum magellanicum* and *Sphagnetum magellanicum*), stations: 1, 4, 6, 8, 9.

The quantitative take of adult forms was made with the use of the entomological draw and umbrella. One sample consisted of 100 draw strokes (4 series with 25 sweeps each). At qualitative samples a multiplication of 25 strokes was used, depending on the size of the investigated area. The click-beetles from trees and bushes were shaken down to the entomological umbrella. For one quantitative sample the branches of five trees or bushes, accessible from the ground level, were shaken. The quantitative take of adult click-beetles was done regularly once a month in 1997 (only with the use of the draw), and twice a month (from April to August) in 1998-2001.

The samples were taken in 12 stations – 9 stationery and 3 temporary ones (Fig. 1). In the alder complex *Sphagno squarrosi-Alnetum* larvae from open-cast soil with the use of a modified Morris's device have also been taken [6]. One quantitative sample was obtained from 4 exposures sized 50 × 50 × 30cm. The quantitative research of larvae was conducted in 1999-2001, once every season – in spring, summer and autumn.

Additionally, in the alder communities the material was collected by searching rotting stumps, lying logs and the soil covering the fallen tree roots. The analysis included biocenotic indices: domination (D%), species variability index

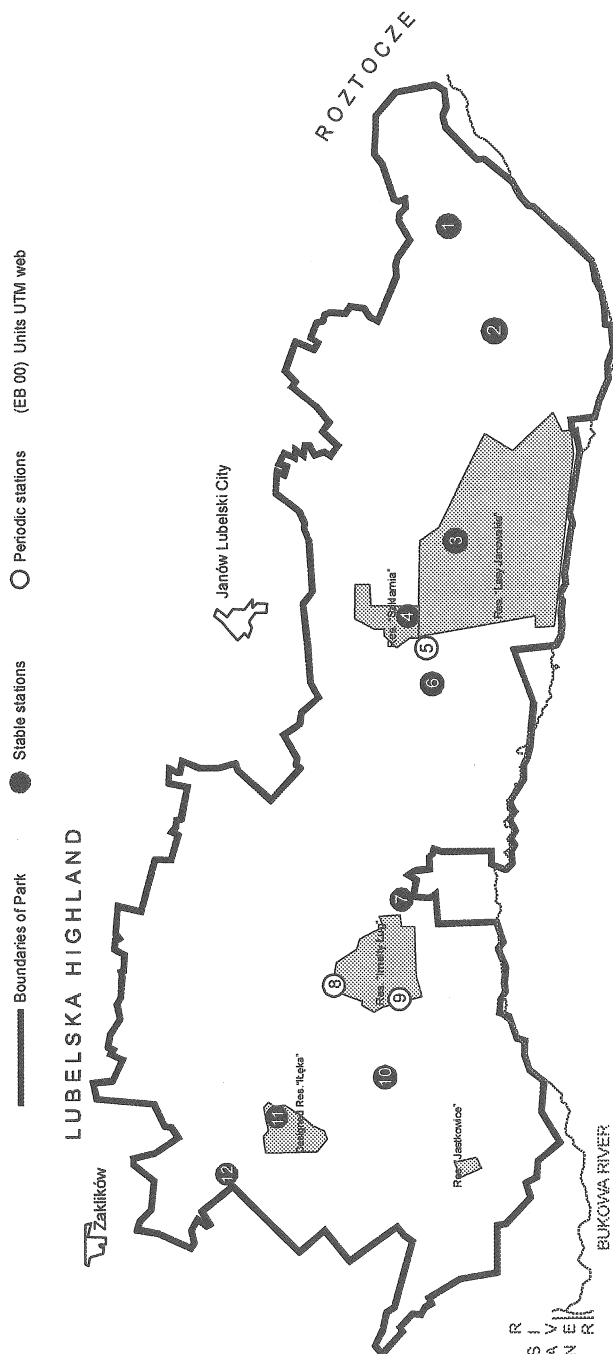


Fig. 1. The distribution of examined stations on the area of "Lasy Janowskie" Landscape Park. Examined stations: 1. Boreczki (FB 10), 2. Władysławów-Dychy (FB 10), 3. Porytów Wzgórze in res. „Lasy Janowskie” (FB 00), 4. reservation „Szkłarnia” (FB 00), 5. village Szkłarnia (FB 00), 6. Mountain Kowalikowa/Mountains Tułowe (EB 90), 7. Łązek Ordynacki (EB 90), 8. Gwizdów in res. „Imielny Łąg” (EB 81), 9. Dębowiec in res. „Imielny Łąg” (EB 80), 10. Kochany (EB 81), 11. designed reservation „Lęka” (FB 81), 12. Gielnia (EB 71)

(d) in accordance with Simpson formula and qualitative similarity (J) in accordance with the I Jaccard formula [7] and quantitative similarity (P) after Bieśiadka and Kowalik formula [1]. Ecological and zoogeographical analysis has also been done.

RESULTS AND DISCUSSION

In the research 272 *Elateridae* specimens belonging to 25 species, including 22 species of adult beetles and 7 species of larvae were collected (Tab. 1). The species composition of click-beetles in the wet environment of the Park was significantly influenced by a close neighbourhood of other types of habitats. However, the number of hygrophilous species in the investigated communities was over 20%. The species biologically linked with wet areas were: *Ampedus pomonae*, *Actenicerus siaelandicus*, *Denticollis linearis*, *Paraphotistus nigricornis* and *Sericus brunneus*.

The biggest number of species (18) was noticed in alder communities. The group of click-beetle in that community had also the highest value of the species variability index ($d = 6.3$). The adult forms represented 16 species. One of them – *Melanotus castanipes*, came from the qualitative samples only (rotten fir trunk). The structure of domination was as follows: eudominants (D_5) – *Dalopius marginatus* (46.7%) and *Athous subfuscus* (23.9%); dominants (D_4) – *Ampedus pomonae* (7.6%) and *Actenicerus siaelandicus* (6.5%); subdominants (D_3) – *Ampedus balteatus* (3.3%) and *Melanotus villosus* (2.2%); recedents (D_2) – *Denticollis linearis*, *Ctenicera pectinicornis*, *Paraphotistus nigricornis*, *Ampedus praeustus*, *A. pomorum*, *A. nigrinus*, *A. erythrogonus*, *Adrastus rachifer* and *Ectinus aterrimus* (1.1% each); subrecedents (D_1) – none.

Among the click-beetles larvae also *Athous subfuscus* ($D_5 = 51.7\%$) and *Dalopius marginatus* ($D_5 = 41\%$) were the dominants. *Ampedus balteatus* and *Ectinus aterrimus* were in the subdominant class. Considering the number of larvae collected in particular seasons of the year, it has been stated that the biggest number of larvae was obtained in summer (48.2%), fewer in spring (41.1%) and the fewest in autumn (10.7%). In all seasons – in summer as well – they were present most numerously (92.8%) 10cm deep in the soil layer. This results from the fact that in this layer they had appropriate thermal, humidity and trophic conditions. The larvae were not found at all in the 20-30 cm layer. Tree-tops protect the surface of the soil from strong sunshine, and from over-drying. A high level of ground-water ensured the right humidity of the soil. The average density of soil

larvae was 9.3 specimens m⁻². The larvae *Ampedus sanguineus*, *A. cinnabarinus* and *Melanotus villosus* were collected only from rotting stumps and fallen trunks. In the alder community we noted the predominance of saproxylic species over soil species.

Table 1. Number of larvae and adults of click-beetles in quantitative samples and qualitative in examined plant community of "Łasy Janowskie" Landscape Park in 1997-2001 years.
L 1 – alder, L 2 – wet meadows and low peat lands, L 3 – transitional peat lands and high peat lands

Species	Plant community				Examined stations	
	L 1	L 2	L 3	L		
<i>Agrypnus murinus</i> (LINNAEUS, 1758)	-	3	-	3	3, 5	
<i>Hemicrepidius hirtus</i> (HERBST, 1784)	-	3	-	3	2	
<i>Hemicrepidius niger</i> (LINNAEUS, 1758)	-	2	-	2	2, 3	
<i>Athous subfuscus</i> (O. F. MÜLLER, 1764)	51	14	14	79	1, 3, 4, 6, 7, 9, 11, 12	
<i>Denticolis linearis</i> (LINNAEUS, 1758)	1	3	-	4	3, 11	
<i>Ctenicera pectinicornis</i> (LINNAEUS, 1758)	1	-	-	1	2	
<i>Actenicerus siaelandicus</i> (O.F.MÜLLER, 1764)	6	17	8	31	1, 2, 3, 4, 7, 8, 10	
<i>Prosternon tessellatum</i> (LINNAEUS, 1758)	-	-	3	3	1, 7	
<i>Paraphotistus nigricornis</i> (PANZER, 1799)	1	-	-	1	12	
<i>Ampedus praeustus</i> (FABRICIUS, 1792)	1	-	-	1	10	
<i>Ampedus balteatus</i> (LINNAEUS, 1758)	7	-	5	12	1, 4, 6, 10	
<i>Ampedus sanguineus</i> (LINNAEUS, 1758)	1	-	-	1	4	
<i>Ampedus cinnabarinus</i> (ESCHSCHOLTZ, 1829)	1	-	-	1	4	
<i>Ampedus pomonae</i> (STEPHENS, 1830)	7	-	4	11	1, 4, 10	
<i>Ampedus pomorum</i> (HERBST, 1784)	2	-	1	3	4, 10	
<i>Ampedus nigrinus</i> (HERBST, 1784)	1	-	1	2	1	
<i>Ampedus erythrogonus</i> (MÜLLER, 1821)	2	-	2	4	4	
<i>Melanotus villosus</i> (GEOFFROY, 1785)	9	-	-	9	4	
<i>Melanotus castanipes</i> (PAYKULL, 1800)	1	-	-	1	4	
<i>Sericus brunneus</i> (LINNAEUS, 1758)	-	-	3	3	1, 7, 8	
<i>Synaptus filiformis</i> (FABRICIUS, 1781)	-	11	-	11	3	
<i>Adrastus rachifer</i> (FOUCROY, 1785)	1	-	-	1	4	
<i>Dalopius marginatus</i> (LINNAEUS, 1758)	66	10	3	79	1, 2, 4, 5, 8, 9, 10, 11, 12	
<i>Ectinus aterrimus</i> (LINNAEUS, 1761)	4	1	-	5	4, 10, 11	
<i>Agriotes obscurus</i> (LINNAEUS, 1758)	-	1	-	1	2	
Sum	Specimens	163	65	44	272	-
	Species	18	10	10	25	-

In the wet meadow and low peat land communities the click-beetles were collected only by means of the entomological draw. Ten species of *Elateridae* were caught. The structure of domination was: eudominants (D₅) – *Actenicerus siaelandicus* (26.2%), *Athous subfuscus* (21.5%), *Synaptus filiformis* (16.9%) and

Dalopius marginatus (15.4%); dominants (D₄) – none; subdominants (D₃) – *Agrypnus murinus*, *Hemicrepidius hirtus* and *Denticollis linearis* (4.6% each) and *Hemicrepidius niger* (3.1%); recedents (D₂) – *Ectinus aterrimus* and *Agriotes obscurus* (1.5% each); subrecedents (D₁) – none.

In the communities of high and transitional peat lands *Athous subfuscus* and *Actenicerus siaelandicus* dominated. On trees and bushes 7 species were collected: *Athous subfuscus*, *Prosternon tessellatum*, *Ampedus balteatus*, *A. pomonae*, *A. nigrinus*, *Actenicerus siaelandicus* and *Dalopius marginatus*. On herbaceous plants there were 8 species. The most numerous were *Athous subfuscus* and *Actenicerus siaelandicus*. Other species were collected in a small number (from 1 to 3 specimens) (Tab. 1). The species differentiation index "d" in these communities were 5.0 and 5.5, respectively.

The biggest qualitative (J = 40.0) and quantitative (P = 23.3) similarity was seen in the click-beetles fauna of alder communities and transitional and high peat lands. It was probably connected with the closeness of both types of community and the adult beetles migration. In all the types of community, widespread holarctic and eurosiberian elements dominated.

CONCLUSION

The number of hygrophilous species in the investigated communities was over 20%. 25 species of the click-beetle were found. The most of biodiversity was in alder community.

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SPRĘŻYKOWATE (*COLEOPTERA: ELATERIDAE*) ŚRODOWISK
WILGOTNYCH PARKU KRAJOBRAZOWEGO „LASY JANOWSKIE”

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Streszczenie. W pracy badano zgrupowania sprężykowatych środowisk wilgotnych Parku Krajobrazowego „Lasy Janowskie”. Były to: zbiorowiska olsowe, wilgotne łąki oraz torfowiska niskie, przejściowe i wysokie. Postacie dorosłe *Elateridae* zbierano za pomocą czerpaka i parasola entomologicznego. W zespole olsowym *Sphagno squarrosi-Alnetum* dokonywano także połowów larw metodą odkrywek glebowych. Ogółem złowiono 25 gatunków tych chrząszczy. Najliczniej występowały: *Athous subfuscus*, *Actenicerus siaelandicus* i *Dalopius marginatus*. Udział gatunków higrofilnych w badanych zbiorowiskach nie był mały i wynosił ponad 20%. Największe zróżnicowanie gatunkowe odnotowano w zbiorowiskach olsowych. Dokonano także analizy ekologicznej i zoogeograficznej.

Słowa kluczowe: południowo-wschodnia Polska, Park Krajobrazowy „Lasy Janowskie“, chrząszcze, sprężykowate

