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The soldier beetles (*Cantharidae*, *Coleoptera*) of central-eastern Poland. Evaluation of threats and changes in the fauna

Omomiłki (*Cantharidae*, *Coleoptera*) środkowowschodniej Polski. Ocena zagrożeń i zmian w faunie

SUMMARY

The study presents the *Cantharidae* of central-eastern Poland, together with the distribution of UTM. Changes that the fauna is currently undergoing have also been discussed. The regional 'red list' comprises twenty-six species, including inter alia: *Cantharis quadripunctata*, *Cantharis liburnica*, *Cantharis muelleri*, *Cantharis pallida*, *Rhagonycha fugax*, *Cantharis paludosa*, *Malthinus fasciatus, Malthinus balteatus*, *Malthodes minimus*, *and Malthodes crassicornis*.

STRESZCZENIE

W pracy przedstawiono *Cantharidae* środkowowschodniej Polski, wraz z rozmieszczeniem UTM. Omówiono zmiany, jakim obecnie podlega fauna. Sporządzona regionalna „czerwona lista" objęła 26 gatunków, na której znalazły się m.in.: *Cantharis quadripunctata*, *Cantharis liburnica*, *Cantharis muelleri*, *Cantharis pallida*, *Rhagonycha fugax*, *Cantharis paludosa*, *Malthinus fasciatus, Malthinus balteatus*, *Malthodes minimus*, *Malthodes crassicornis*.

Key words: *Cantharidae*, red list, faunistics.

INTRODUCTION

The area of investigation, the interfluve of the Vistula and the Bug rivers, is influenced by diverse biogeographical elements and it has the ecosystems that belong to the most natural ones

in Poland and in Europe. This provides an opportunity of finding many species in their natural habitats. At the same time the processes typical of Western civilization are taking place: species extermination, degradation, destruction of the environment, water-level reduction, overexploitation of forests, and changes in the agricultural landscape.

Research stations of the *Cantharidae* (numbering 325) were mainly located in the most valuable natural areas and comprised two national parks (the Roztocze and the Polesie National Parks) and seventeen landscape parks. They represented characteristic and commonly found plant communities and ecosystem complexes, for example: river valleys, peat moors and swamps, forests, xerothermic grasses, boundary strips and mid-field plantings. The area covered by the present study, called the Lublin region in many other studies, is presented in detail in Figure 1. The *Cantharidae* stations have been plotted on the UTM lattice.

Fig. 1. Physiographic division of the investigation area according to Kondracki (1994) and recorded *Cantharidae* stations — the range of conducted investigations
• own data ○ data derived from literature

Although the interest of biologists in this group of insects dates back to the seventeenth century, larger inventories of the *Cantharidae* in Poland come from the late nineteenth century and they cover the Beskidy and Sudeten Mountains, and Silesia. Tenenbaum (25–28) contributed greatly to the examination of this group of insects conducting long-standing research, among others, in Roztocze. Those were the first lists of the *Cantharidae* in the Lublin region. After World War II there was one Polish study on the soldier beetles (1), which described the species collected from rape in the vicinity of Lublin. In 1995 a monographic study of two *Cantharidae* subfamilies (*Cantharinae* and *Silinae*) appeared (22), which recapitulated the state of knowledge of Polish representatives of these taxons. Along with inventory-making, studies also began on the composition and structure of the *Cantharidae* in different ecosystems: first in the forest reserves of the Lublin Upland and the Mazovia Lowland (7, 9), later in Polesie (10, 11, 13) and in Janowskie Forests (12). A thoroughgoing study also comprised the *Cantharidae* in (23).

The materials described were collected by the author in 1984–1998. A considerable complement to these records was the collection of the Department of Zoology, Institute of Biology, Maria Curie-Skłodowska University. Altogether, these comprise twelve thousand specimens, large-

ly collected over the last 30 years, the oldest dating from 1935. Insects were collected using the entomological net and Moericke traps in order to penetrate the undergrowth layer and tree-crowns. Additionally, there were used Barber traps, deliberate search of the area (stalking the insect), and the insects were caught with light (light traps and screens) The present study is a part of the author's doctoral dissertation prepared at the Department of Zoology, Maria Curie-Skłodowska University, Lublin (14) and it opens a series of papers on the *Cantharidae* of central-eastern Poland.

INVENTORY OF SPECIES

56 species of *Cantharidae* were reported in the Lublin region, almost 70% of the Poland's fauna. The result obtained shows a high species abundance, the more so that mountain taxons have a considerable share of Poland's fauna. Out of the physiographic units, where investigations were conducted, the highest numbers of the soldier beetles were recorded in Roztocze. Together with the data from literature, the occurrence of 49 species was recorded, 9 of which having appeared exclusively in this part of the Lublin region. These were polytopic coleopterons (*Malthinus fasciatus*, *Malchinus nigrinus*), hygrophilous (*Cantharis paludosa*, *C. pallida, Malthodes lobatus*), xerothermophilous (*Cantharis liburnica*) and coleopterons of the mountain and foreland zone (*Cantharis pagana*, *Rhagonycha translucida*, *Absidia rufotestacea*). Fewer taxons were recorded in the Lublin Upland (39 species), of which 4 were found only there: hygrophilous *Cantharis muelleri*, boreal-montane *C. quadripunctata*, as well as *Malthodes holdhausi* and *Rhagonycha fugax*. 34 species were reported in Polesie, in the Sandomierz Basin — 33. In the Volhynia Upland and in the South-Podlasie Lowland many fewer *Cantharidae* were reported: 20 and 16 species respectively. The reason why the fauna is in such condition is not only the narrower scope of investigations but also the smaller diversity of ecosystems, especially in the Volhynia Upland.

A short description of the species was presented below, together with the figures representing their location in the Lublin region plotted in the UTM lattice.

1. *Podabrus alpinus* (P a y k u l l, 1798) — a species that occurs all over Poland, although it is rarely found in lowland areas. In the Lublin region 13 specimens were caught: in hornbeam woods, oak forests, in marshy and fir coniferous forests, and in xerothermic shrubs, mostly in the Roztocze area. In Poland, as a boreal-montane species, it prefers beech and fir stands in the lower mountain-forest zone. (22). The stations in the Lublin region indicate that it is widening its habitat spectrum and becoming a forest polytope.

2. *Ancistronycha cyanipennis* (F a l d e r m a n n, 1835) is found in the foreland and mountain zone of southern Poland. In the lowland it is regarded as very rare, only five stations have been known so far. In the Lublin region it occurred in

the ravine dry-ground forest of the Kazimierz Landscape Park and in the South--Roztocze Landscape Park.

3. *Cantharis fusca* Linnaeus, 1758 is one of the most common species in the Lublin region and in Poland. It was found in all regions, in most stations investigated, preferring grassy and sun-lit sites. It is the most frequently found *Cantharis* in the agricultural landscape (1), it is also found in great numbers in towns.

4. *Cantharis rustica* Fallén, 1807 — a common eurytope, not reported, however, in investigations in the Volhynia Upland. Like *C. fusca* it is a thermophilous species, occurring in greatest numbers in the agricultural landscape (1), and commonly found in urban green areas.

5. *Cantharis pellucida* Fabricius, 1792 — regarded until recently as a sparse species (5), it has now increased its numbers and it is a common eurytope all over Poland, preferring arborescent and shrubby communities. It chooses sun--lit, mainly ecotone sites; in the forests it stays most often in the crown layer. It is one of the basic species of urban green areas, especially in parks.

6. *Cantharis flavilabris* Fallén, 1807 — a common hygrophilous species. Despite its definite preference for low moors and transitional peat moors, it also occurs in more moist crops and in mid-field boundary strips. Studies confirmed the phenomenon of appearance of its single specimens as early as in mid-May, almost a month and a half before the peak of its numbers begins.

7. *Cantharis nigra* De Geer, 1774 — it has similar habitat requirements as *C. flavilabris*, without, however, avoiding trees: it occurs in the crown zone. Its occurrence in the Lublin region has two clear centres: in Polesie and in the river valleys of the eastern part of the Lublin Upland, and in the zone of wet areas of the Sandomierz Basin and Roztocze.

8. *Cantharis paludosa* Fallén, 1807 — a hygrophilous species, found exclusively in sedge communities, with a local occurrence in the Lublin region, limited to Central Roztocze.

9. *Cantharis obscura* Linnaeus, 1758 — it is a species that prefers pine forests. Although it can reach a high numerical strength in Poland's coniferous forests (8), only few specimens were trapped in the Lublin region. Its distribution clearly indicates isolated, concentrated areas of occurrence. Anasiewicz (1) caught these species in nets on rape crops.

10. *Cantharis liburnica* Depoli, 1912 — a rare, xerophilous cantharis recorded only in four stations in Poland (22), which, except one in the Świętokrzyskie Mountains (20), date back to the beginning of the twentieth century. The specimen collected in the Lublin region is dated at 1921 (the F. Fejfer collection, Polish Academy of Sciences Museum and Zoology Institute in Warsaw).

11. *Cantharis lateralis* Linnaeus, 1758 — a clearly thermophilous cantharis, highly characteristic of the agricultural landscape, found in great numbers in the mid-field boundary strips. In other habitats it is always found as single specimens.

12. *Cantharis nigricans* (O. F. Müller, 1776) — a thermophilous, eurytopic species. In the Lublin region it is one of the most common and numerous of those collected in most habitats: it prefers shining forests and the tree-crown layer. Found in great numbers in ecotonic habitats and in the urban green.

13. *Cantharis pagana* Rosenhauer, 1847 — a montane, meso-alpine species (22), described from Roztocze by Tenenbaum (26, 27); there are no evidence specimens, however; whereas investigations conducted in Roztocze did not confirm its presence.

14. *Cantharis muelleri* Hicker, 1955 — a hygrophilous *Cantharis*, described comparatively recently, found very rarely, in Poland known from several stations, mostly found on the turn of the nineteenth century. According to Kuśka (22) it is classified in the category of vulnerable species. In the Lublin region a male individual was found (19.05.1986 — one specimen) in a rush-plant community of Snopków, in the immediate vicinity of Lublin.

15. *Cantharis quadripunctata* (O. F. Müller, 1776) — a sub-alpine species occurring in the southern borderland of Poland. A station in the Lublin region is dated at 1935 (a specimen with a label: 2. 6. 35. Lublin is kept at the University's Zoology Department's collection) and like two other, equally old lowland stations, located on the Baltic Coastland and in the Great Poland-Kujawy Lowland (5), it probably no longer exists.

16. *Cantharis decipiens* Baudi, 1871 — is a coleopteron recently listed in Poland (4). Apart from the Lublin region, its present-day stations are located in the south of Poland. The species is probably increasing its numerical strength rapidly, because in older collections there is only one individual coming from the turn of the nineteenth century (22). The oldest specimens collected in the Lublin region are dated at 1952 (9). In the studied area it is currently a common forest polytope preferring leafy tree stands.

17. *Cantharis livida rufipes* Herbst, 1784 — it is a common eurytopic, thermophilous species, occurring especially in great numbers in xerothermic communities, mid-field tree-plantings and in crops (1). Numerous specimens are also found in the urban green.

18. *Cantharis rufa* Linnaeus, 1758 — a common hygro- and thermophilous coleopteron occurring in the areas all over the Lublin region. The only cantharis in Poland's fauna with a Holarctic range.

19. *Cantharis pallida* Goeze, 1777 — on the national scale this species has a status of a vulnerable species (under threat of extinction) (22). The only

specimen coming from the Lublin region was found in 1914 in Roztocze (the F. Fejfer collection — the Polish Academy of Sciences Museum and Zoology Institute). Other scattered lowland stations in Poland come from the same period. The present-day range of this species is probably confined to the south of Poland.

20. *Cantharis figurata* Mannerheim, 1843 — the most numerous hygrophilous *Cantharis* in the Lublin region, occurring massively in peat swamps and wet meadows.

21. *Metacantharis clypeata* (Illiger, 1798) — a xerophilous species, whose stations in the Lublin region, dated from 30 years ago, are located in the edge zone of the Lower Vistula, while the Roztocze station dates back to the beginning of the twentieth century (26). During the present investigations this cantharis was not found in the Lublin region.

22. *Absidia rufotestacea* (Letzner, 1845) — the only stations in the macro-region of this boreal-montane species are located in Roztocze. Apart from isolated stations in the Białowieża Forest and in the Mazurian Lake District, the species inhabits the mountainous areas of southern Poland.

23. *Absidia schoenherri* (Dejean, 1837) — a boreal-montane cantharis, rarely found in the lowland, which occurs in the Lublin region in Polesie and in the zone of the wet terrain of the Sandomierz Basin and Roztocze. It is a characteristic element of well-developed marshy coniferous forests, where it occurs in great numbers. It is reported exclusively in pine-grown stations: probably the pine is needed for larval development.

24. *Rhagonycha lutea* (O. F. Müller, 1764) — a xerothermophilous, eurytopic, dendrophilous species, found comparatively rarely and in scarce numbers in Poland. In the Lublin region it is reported in warm forests, xerothermic communities, and in tree planting strips along transport routes. The location of stations on the map indicates the concentration nature of its occurrence. In Roztocze, a black-coloured form of *banatica* Rosenh. was found, which occurs in the south of Europe and in Podolia (23).

25. *Rhagonycha fulva* (Scopoli, 1763) — a common, eurytopic, hygrophilous coleopteron, highly widespread in the Lublin region, present in most habitats investigated, in especially great numbers along drain ditches, on wet meadows, and in not flooded peat bogs. In summer there are characteristic mass manifestations of this species on the inflorescence of umbellifers plants.

26. *Rhagonycha translucida* (Krynicki, 1832) — a montane, Central-European *Cantharis*, occurring in the foreland and mountain zone of southern Poland. In the Lublin region it was reported only in Roztocze.

27. *Rhagonycha testacea* (Linnaeus, 1758) — a common, eurytopic, hygro- and dendrophilous species, especially found in great numbers in swampy forests and in wet mid-field tree plantings.

28. *Rhagonycha limbata* Thomson, 1864 — the *Cantharis* with requirements similar to those of *Rh. testacea*, often co-occurring with it, yet caught in nets less often and decidedly in smaller numbers.

29. *Rhagonycha lignosa* (O. F. Müller, 1764) — a common forest cantharis in the areas of the whole Lublin region, dominant in most coniferous and leafy tree stands. Found as single specimens also in mid-field tree plantings.

30. *Rhagonycha elongata* Fallén, 1807 — a stenotopic species, characteristic of Polish pine coniferous forests, far more often caught in tree crowns (8). Rare in the Lublin region, it occurred in two stations only.

31. *Rhagonycha atra* (Linnaeus, 1767) — a mountain species, also with scattered stations in the lowland part of Poland. In the Lublin region it was reported in the zone of mixed, pine and fir forests of the Sandomierz Basin and Roztocze. Found also in a spruce old-growth forest in an isolated station in Polesie.

32. *Rhagonycha fugax* Mannerheim, 1843 — a very rare lowland cantharis known in Poland from several stations. It has the status of a vulnerable species (22). In the Lublin region it was found in Puławy in 1911.

33. *Rhagonycha gallica* Pic, 1923 — an oligotopic species characteristic of leafy forests. Most stations of this coleopteron are located in the south of Poland, in the foreland and mountain zone. Lowland stations are very few. In the Lublin region it is also rarely reported, mainly in leafy and mixed forests.

34. *Silis nitidula* (Fabricius, 1792) — it is an oligotopic, forest cantharis, collected in the Lublin region in small numbers, most frequently in pine and mixed coniferous forests, almost exclusively in the undergrowth layer.

35. *Silis ruficollis* (Fabricius, 1775) — an oligotopic species, characteristic of low moors and transitional peat moors, regarded as rare on the national scale, with an endangered species status (22). In the Lublin region it is known from numerous stations, finding favourable conditions for development.

36. *Malthinus punctatus* (Fourcroy, 1785) — a common eurytopic, dendrophilous species. It was present in most habitats; in greatest numbers, however, in wet leafy and mixed forests.

37. *Malthinus fasciatus* (Olivier, 1790) — rare all over Poland, a cantharis always collected in very small numbers, many of its stations being based on the nineteenth-century data. In the Lublin region recorded in two stations located in Roztocze.

38. *Malthinus balteatus* Suffrian, 1851 — a thermophilous, very rare species all over Central Europe. In the Lublin region a male individual was found in the xerothermic thicket.

39. *Malthinus facialis* Thomson, 1864 — until recently it was regarded as extremely rare in Poland (5). At present in the Lublin region it is a common, poly-

topic forest species that prefers, however, leafy tree stands, especially hornbeams. It is probably widening its range of occurrence and increasing its numbers.

40. *Malthinus biguttatus* (Linnaeus, 1758) — known in Poland from very few scattered stations. It is a forest polytope, in the Lublin region found mainly in the forest zone of the Sandomierz Basin and Roztocze. Although it can occur in great numbers locally, (21), in the area investigated it was caught rarely and most often as single specimens.

41. *Malthinus frontalis* (Marsham, 1802) — a species probably occurring all over Poland, it has similar habitat requirements as *M. biguttatus*. In Lublin region it was caught rarely in diverse forest habitats.

42. *Malchinus nigrinus* Schaufuss, 1866 — a cantharis known until recently only from the vicinity of Przemyśl (5). As a result of investigations, abundant populations of the species were found in the xerothermic thicket and single specimens in shining oak forests in Roztocze.

43. *Malthodes dispar* (Germar, 1824) — it is a hygrophilous coleopteron, rarely found and in very small numbers. In the Lublin region only eight individuals of the species were collected in sedge communities, in wet hay--growing meadows and in the wet fir coniferous forest.

44. *Malthodes europaeus* Wittmer, 1970 — a recently described coleopteron, in Poland known from several xerothermic stations located along the Vistula river. The conducted studies clearly demonstrated that it is a species connected with the zone of riverside willow scrub, where it can reach a considerable numerical strength. Moreover, its single specimens were found in the mixed forest, in the immediate vicinity of the Wieprz river, and in a ravine dry-ground forest several kilometres away from the Vistula.

45. *Malthodes fibulatus* Kiesenwetter, 1852 — a polytopic, dendrophilous species, known from several stations of over a hundred years old, recently reported in the Świętokrzyskie Mountains (20). Rarely found also in the Lublin region. In the course of investigations only ten specimens of the species were collected, most of them in the ravine dry-ground forest in the Wrzelowiecki Landscape Park, and one individual in mid-field tree plantings.

46. *Malthodes fuscus* (Waltl, 1838) — an oligotopic, fairly infrequently caught species connected with pine coniferous forests, also swampy ones, where it locally reached a great numerical strength. In the Lublin region its occurrence area is confined to Polesie and the Sandomierz Basin.

47. *Malthodes minimus* (Linnaeus, 1758) — a hygrophilous, rarely caught coleopteron, known in Poland from scattered stations of the turn of the nineteenth century. Recently reported in the Białowieża Forest (21). The Lublin region stations are located in the Lublin Upland, Polesie, and Roztocze (25). The latter was not confirmed during the recent investigations. Worth noting is the fact that

out of 13 individuals reported, eleven were collected in the alder carr and marshy meadow of the Wieprz Landscape Park.

48. *Malthodes guttifer* Kiesenwetter, 1852 — probably a hygrophilous, polytopic species, in the Lublin region it was not reported only from the Lublin Upland and the South-Podlasie Lowland. Usually found as single specimens, mainly in swampy coniferous forests and marshy meadows.

49. *Malthodes marginatus* (Latreille, 1806) — a polytopic forest cantharis, caught most often as single specimens in leafy forests, also reported in mid-field tree plantings.

50. *Malthodes mysticus* Kiesenwetter, 1852 — a foreland and mountain species, with very few, scattered stations also in the lowland of Poland. In Lublin region it is found only in Roztocze. Reported in the vicinity of Zwierzyniec by Tenenbaum (26) and confirmed during recent studies in marshy meadows in two stations.

51. *Malthodes pumilus* (Brébisson, 1835) — the most common representative of the genus, a polytopic, thermophilous coleopteron, caught in very large numbers in pine coniferous forests, also found in other tree stands, including swampy ones. The species is probably growing in numbers. Until recently it was regarded as rare, especially males, which are not included in Polish museum collections. Three males were found in the Lublin region.

52. *Malthodes spathifer* Kiesenwetter, 1852 — a polytopic forest species, rarely found in the Lublin region, mostly in leafy and mixed forests.

53. *Malthodes lobatus* Kiesenwetter, 1852 — probably a very rare, hygrophilous species. In Poland only several specimens are known. Like with *M. pumilus*, males are extremely rare. The individual found was a female.

54. *Malthodes crassicornis* (Maeklin, 1946) — a rare cantharis on the national scale, with unknown habitat requirements. In the Lublin region it was recorded in two small areas: in Polesie in swampy coniferous forests, in greatest numbers in the Moszne Lake reserve, and in the Sandomierz Basin as single specimens in a mixed coniferous forest and in an oak forest.

55. *Malthodes holdhausi* Kaszab, 1955 — a comparatively recently described species, in Poland recorded only in the Białowieża Forest (21). In the Lublin region a pair *in copula* was found in the ravine dry-ground forest of the Kazimierz Landscape Park.

56. *Malthodes brevicollis* (Paykull, 1798) — a polytopic, forest cantharis, probably occurring all over Poland. In the Lublin region it occurred locally. It was caught in greater numbers in different types of tree stands, mainly in Polesie, as single specimens in the Kozłowieckie and Janowskie Forests.

CHANGES IN THE FAUNA

In the Lublin region significant changes in the flora and fauna are now taking place. Most of them are the effect of human activities and they most affect aquatic-peatmoor and meadow ecosystems. The Lublin region, especially the areas of Polesie, have so far had unique hydrogenic ecosystems, but the rapid lowering of the ground water level causes that they quickly disappear and become overgrown with the forest. Already during the investigations many stations in Polesie ceased to exist or their home range decreased (13). With the shrinking of natural ecosystems, the problem of their progressive isolation arises. Large peatmoor fields are reduced to tiny marshy communities in depressions. The hygrophilous fauna, which has difficult migrating conditions on account of habitat requirements, is highly affected by isolation. Under such conditions the home range of specialized hydrophilous species is shrinking fast, including: *Absidia schoenherri*, *Silis ruficollis*, *Malthodes minimus* and *M. guttifer*. The fauna of hydrogenic environments is being impoverished, driven out by less specialized species, eurytopic and polytopic: *Cantharis pellucida*, *C. figurata*, *Rhagonycha fulva*, *Rh. testacea*. Desiccation processes do not occur with equal intensity in the whole area of the macro-region. Due to specific geomorphological conditions this phenomenon is not reported at such intensity in the Sandomierz Basin and Roztocze, which is reflected in the fauna (12).

Progressive impoverishment of forests can be observed, which is connected with their exploitation and "rearing". One example is the floristically poor, most often mono-cultural pine coniferous forests of Polesie and thr South-Podlasie Lowland. This is clearly manifested in the form of poor fauna of the *Cantharidae*. Species typical of the coniferous forest: *Rhagonycha elongata*, *Silis nitidula*, *Malthodes fuscus* are a scant, rarely found element of the fauna as compared with other Polish coniferous forests (8). There has been a rapid drop in the area of forests with old timber wood, mainly in leafy forests. The whole of thr Lublin Upland and Polesie have almost entirely rejuvenated oak forests. Exploitation of the ash accounts for the quick disappearance of riparian forests. The only enclaves of these communities with the diversified *Cantharidae* fauna, are located in the Wieprz Landscape Park. Negative effects are also produced by the removal of dead trees and fascine, which causes the considerable impoverishment of microfauna, and the shrinking of ecological niches and the food base of many species. Investigations in the Janowskie Forests demonstrated that neglected farm forests have a far wealthier range of the *Cantharidae* than the well-managed state forests.

Other observable changes in the fauna are connected with the shrinking area of dense forest complexes. The break-up of forests and isolation of populations most affect the group of natural rare representatives of the *Malthodes* genus. More

common forest polytopes, eurytopes and xerophiles, despite the break-up of forest complexes, have an opportunity to migrate through the still rich network of mid--field and boundary-strip tree plantings (13). "Forest islands" play an important role in the functioning of landscape, however, they do not provide conditions for the survival of the specific forest fauna, stenotopic and oligotopic species being a very small constituent of their fauna.

Simultaneously, the processes of natural flora and fauna migrations are going on. The Lublin region area is located in the zone of xerothermophilous species expansion. Among the domestic *Cantharidae* there are few species with such preferences. The only example of thermophilous species expansion can be *Malchinus nigrinus*, until recently known only by single specimens of the vicinity of Przemyśl, now having numerous populations in several Roztocze stations. The other three species: *Cantharis liburnica*, *Metacantharis clypeata* and *Malthinus balteatus* are very rare. On the other hand, an increase in the numbers of eurytopic thermophilous species can be observed, especially of the *Cantharis pellucida*. A tendency observable over the last several dozen years is the increase in woodbines and in the share of leafy species in the forests, especially the presence of hornbeam, which is reflected in the fauna. The species that have the greatest progression are the oligotopes *Cantharis decipiens* and *Malthinus facialis*, until recently regarded as rare, now being a constant and often dominant constituent of the flora of leafy and mixed forests, especially with the participation of hornbeam. Other forest species that are increasing their numerical strength are *Podabrus alpinus* and *Malthodes pumilus*. Regressive changes that can be linked with natural changes in home ranges involve two species: *Cantharis quadripunctata*, which probably no longer occurs in the lowland stations in Poland, and *Malthinus biguttatus*, which Tenenbaum (25) defined early this century as "common everywhere", while at present it is a rare species.

For many animal groups the problem of environmental pollution with industrial dust and gases is highly important. In the Lublin region this most affects the areas in the vicinity of Puławy. However, two-year investigations conducted in the immediate vicinity of the fertilizer plant did not demonstrate the effect of pollutants on the impoverishment of the *Cantharidae* fauna. This confirmed the observations by Chłodny (6), conducted in the polluted Silesian regions, that under such conditions the *Cantharidae* can even increase their numerical strength, taking advantage of the growth in numbers of some insects, mainly aphids.

THREAT STATUS OF SELECTED SPECIES

The inventory-making of the fauna of *Cantharidae* indicated endangered and rare species in the Lublin region that should be kept under constant observation.

The lists of endangered animals were repeatedly published (2, 15, 16, 24), some of which also included the *Cantharidae*. The Polish lists take into account protected species exclusively and they do not contain the *Cantharidae*. Recent studies, however, present the hazard status of the *Cantharidae*. For *Cantharinae* and *Silinae* in Poland, the hazards were listed by Kuśka (22). As part of the regional lists a detailed study of the *Cantharidae* in Upper Silesia was also compiled (19). The only list existing in the Lublin region is concerned with dragonflies (3).

On the basis of the threat categories used in the abovementioned studies, a similar list of the *Cantharidae* for the Lublin region was established. New IUCN (1994) threat categories were deliberately not used as these pertain more to the classification of higher-order animals, and if reliably treated, they can apply to very few insects. The selection of species for the following list was based on the information about the number of known stations, numerical strength and the rate of disappearance of natural habitats.

1. Ex — Extinct species

Cantharis quadripunctata (O. F. Müll.) — the only known specimen comes of 1935 from the area of the present-day Lublin agglomeration. Until now its presence also in other lowland stations has not been confirmed.

2. E — Dying out species

Cantharis liburnica Dep. — on the national scale it has the status of vulnerable species (22). The only specimen caught in the Lublin region comes of 1921.

Cantharis muelleri Hick. — a species extremely rarely found in the upland zone; the station where it was caught in 1986 (one specimen) no longer exists.

Cantharis pallida Goeze. — on the national scale it has the status of vulnerable species (22). The specimen caught in the Lublin region comes of 1914.

Rhagonycha fugax Mann. — the station in Puławy (1911), the only one in the Lublin region, not confirmed in the present investigations.

3. V — Vulnerable species (endangered by extinction)

Cantharis paludosa Fall. — a species occurring locally in the Lublin region, confined to Central Roztocze.

Malthinus fasciatus (Oliv.) — a rare cantharis, always collected in very small numbers. Many of its stations are based on the nineteenth century data. In the Lublin region it was reported in two stations.

Malthodes minimus (L.) — known in Poland from scattered stations of the turn of the nineteenth century. In the Lublin region its single stations are located in the Lublin Upland and in Polesie.

Malthodes crassicornis (Maekl.) — rare on the national scale. In the Lublin region it was found in two small, limited areas: in Polesie and in the Sandomierz Basin.

4. R — Rare species

Podabrus alpinus (Payk.) — Only thirteen specimens were caught in the Lublin region, mostly in Roztocze.

Ancistronycha cyanipennis (Fald.) — a mountain species, very rare in the Polish lowland; also in the Lublin region it was found only in two stations.

Absidia rufotestacea (Letzn.) — the only individual specimens of this boreal-montane species were found in Roztocze.

Rhagonycha translucida (Kryn.) — a mountain species, whose single specimens were collected only in Roztocze.

Rhagonycha elongata (Fall.) — a cantharis characteristic of pine coniferous forests in Poland. Rare in the Lublin region, it was recorded in two stations.

Rhagonycha atra (L.). — in the Lublin region it is found comparatively more often in the forest zone of the Sandomierz Basin and Roztocze. Very rare in the north of the macro-region.

Rhagonycha gallica Pic — most stations of the species are located in the south of Poland, in the foreland and mountain zone. In the Lublin region it is a rarely caught species.

Silis nitidula (Fabr.) — In the Lublin region it is found in very few numbers in several stations.

Malthinus balteatus Suffr. — one individual was found in the Volhynia Upland.

Malthinus biguttatus (L.) — In the Lublin region it is found mainly in the forest zone of the Sandomierz Basin and Roztocze, most often as single individuals.

Malthodes dispar (Germ.) — only eight individuals of this species were reported in hydrogenic communities.

Malthodes fibulatus Kiesenw. — in the course of investigations ten specimens were reported in five stations.

Malthodes mysticus Kiesenw. — a foreland and mountain species, in the Lublin region it was reported only in two Roztocze stations.

Malthodes lobatus Kiesenw. — one individual was found in thr Volhynia Upland.

Malthodes holdhausi Kaszab — in the Lublin region, one pair was found *in copula* in the Kazimierz Landscape Park.

5. I — Species with indeterminate threat status

Cantharis pagana Rosenh. — described from Roztocze by Tenenbaum (1918, 1923); there are, however, no evidence specimens, while field studies did not confirm the occurrence of this species.

Metacantharis clypeata (Ill.) — ca. thirty years ago it was reported several times in the edge zone of the Vistula valley, however, it was not found during the present investigations.

The foregoing list shows that the threat status of many species in the Lublin region is different than in Upper Silesia and in other regions of Poland. The lists of Upper Silesia and of the provinces in southern Poland include inter alia: *Cantharis decipiens*, *Malthodes pumilus* — common forest species in the Lublin region, as well as *Cantharis nigra*, *Absidia schoenherri* and *Malthodes guttifer* — a constant element of many hygrophilous environments. The Lublin list contains eight species that are characteristic of the mountains and foreland, or they have not been reported from southern Poland. Out of the list of endangered *Cantharinae* and *Silinae* of Poland the Lublin list does not contain the hygrophilous *Silis ruficollis*, which is assigned the 'rare' category on the national scale, while in the Lublin region it is known from many stations.

REFERENCES

1. Anasiewicz A. 1962. Obserwacje nad omomiłkami (*Cantharis* L.) występującymi na rzepaku ozimym. Ekol. Pol. A. 10: 295–305.
2. Blab J., Nowak U., Trautmann W., Sukopp H. H., 1984. Rote Liste der gefährdeten Tiere und Pflanzen in den Bundesrepublik Deutschland. Naturschutz Aktuell, 1. Kilda Verlag Greven, 270 pp.
3. Buczyński P. 1999. Wykaz i „czerwona lista" ważek (*Insecta*: *Odonata*) województwa lubelskiego. Chrońmy Przyr. Ojcz. 6: 23–39.
4. Burakowski B., Kuśka A. 1992. Studien an der Biologie, Ökologie und Verbreitung der Weichkäfer in Polen (*Coleoptera*, *Cantharidae*). Pol. Pismo Ent. 61: 97–118.
5. Burakowski B., Mroczkowski M., Stefańska J. 1985. Chrząszcze — *Coleoptera*. *Buprestoidea*, *Elateroidea* i *Cantharoidea*. In: Katalog fauny Polski, Warszawa, 23: 401 pp.
6. Chłodny J. 1977. Liczebność mszyc (*Aphididae*) i fauny towarzyszącej w uprawach brzozy brodawkowanej (*Betula verrucosa* Ehrh.) na obszarze Górnośląskiego Okręgu Przemysłowego. In: Entomologia a ochrona środowiska. Warszawa, 41–47.
7. Chobotow J. 1989 (1992). Omomiłki (*Cantharidae*, *Coleoptera*) rezerwatu leśnego Bachus (Wyżyna Lubelska). Ann. UMCS, sec. C, 44: 91–96.

8. Chobotow J. 1993. *Cantharidae* (*Coleoptera*) of pine forests in Poland. Fragm. Faun. 36: 147–156.
9. Chobotow J. 1994. Omomiłki (*Cantharidae*, *Coleoptera*) rezerwatu leśnego Kozie Góry koło Lublina (Nizina Mazowiecka). Wiad. Entomol. 13: 29–31.
10. Chobotow J. 1995a. Uwagi o występowaniu omomiłków (*Cantharidae*, *Coleoptera*) na Podlasiu. Wiad. Entomol. 14: 57–58.
11. Chobotow J. 1995b. Omomiłki (*Cantharidae*, *Coleoptera*) Parku Krajobrazowego „Pojezierze Łęczyńskie". Materiały zjazdowe na Sympozjum „Współczesne kierunki ekologii — ekologia behawioralna" Biuletyn PTEkol. 4: 34.
12. Chobotow J. 1996. *Cantharoidea* (*Coleoptera*) wschodniej części Parku Krajobrazowego „Lasy Janowskie". In: Walory przyrodnicze Parku Krajobrazowego „Lasy Janowskie". Materiały sympozjum naukowego w Janowie Lubelskim. Radwan S., Sałata B., Szunke Z. (eds.).
13. Chobotow J. 1997. Zgrupowania omomiłków (*Cantharidae*, *Coleoptera*) Parku Krajobrazowego Pojezierze Łęczyńskie. In: Współczesne kierunki ekologii. Ekologia behawioralna. Materiały z Sympozjum Lublin, 1995. Puszkar T., Puszkar L. (eds.). 287–291.
14. Chobotow J. 1999. Omomiłki (*Coleoptera*: *Cantharidae*) Lubelszczyzny. Doctoral dissertation. Department of Zoology, Maria Curie-Skłodowska University, Lublin (typescript).
15. Głowaciński Z. et al. 1980. Stan fauny kręgowców i wybranych bezkręgowców Polski-wykaz gatunków, ich występowanie, zagrożenie i status ochronny. Studia Naturae A, 21: 1–163.
16. Głowaciński Z. (ed.). 1992. Polska czerwona księga zwierząt. PWRiL Warszawa, 352 pp.
17. IUCN, 1994. IUCN red list categories. Prep. by the IUCN Species Survival Commission, Gland, Switzerland, 21 pp.
18. Kondracki J. 1994. Geografia Polski. Mezoregiony fizyczno geograficzne. PWN Warszawa, 340 pp.
19. Kubisz D., Kuśka A., Pawłowski J. 1998. Czerwona lista chrząszczy (*Coleoptera*) Górnego Śląska. Red List of Upper Silesian Beatles (*Coleoptera*). In: Parusel J., B. (ed.) Centrum Dziedzictwa Przyrody Górnego Śląska. Raporty Opinie 3: 8–68.
20. Kuśka A. 1989. Omomiłki (*Coleoptera*: *Cantharidae*) Gór Świętokrzyskich. Fragm. Faun., 32: 357–368.
21. Kuśka A. 1994. Materiały do znajomości omomiłków *Coleoptera*, *Cantharidae* Puszczy Białowieskiej. Par. Nar. Rez. Przyr. 13: 51–55.
22. Kuśka A. 1995. Omomiłki (*Coleoptera*, *Cantharidae*): *Cantharinae* i *Silinae* Polski. Wydawnictwa Instytutu Systematyki i Ewolucji Zwierząt Polskiej Akademii Nauk, Monografie Fauny Polski 21: 1–201.
23. Kuśka A., Chobotow J. 1996. Omomiłkowate (*Cantharidae*, *Coleoptera*) Roztocza. Fragm. Faun. 39: 43–59.
24. Nowak E., Blab J., Bless R. 1994. Rote Liste der gefährdeten Wirbeltiere in Deutschland. Kilda-Verlag Bonn–Bad Godesberg, 190 pp.
25. Tenenbaum Sz. 1913. Chrząszcze (*Coleoptera*) zebrane w Ordynacji Zamojskiej w gub. Lubelskiej. Pam. Fizjogr., Warszawa, 21, III, 72 pp.
26. Tenenbaum Sz. 1918. Dodatek do spisu chrząszczy z Ordynacji Zamojskiej. Pam. Fizjogr., Warszawa, 25, 35 pp.
27. Tenenbaum Sz. 1923. Przybytki do fauny chrząszczów Polski od roku 1913. Rozpr. Wiad. Muz. Dzieduszyckich, Lwów 7–8: 136–186.
28. Tenenbaum Sz. 1938. Nowe dla Polski oraz rzadkie gatunki chrząszczy. VIII Fragm. Faun. Mus. Zool. Pol., Warszawa 3: 415–429.