

**The unknown natural habitat of *Rosalia alpina* (L.)
(Coleoptera: Cerambycidae) and its trophic association with
the mountain elm *Ulmus glabra* in Poland
– a change of habitat and host plant**

JAKUB MICHALCEWICZ*, MICHAŁ CIACH**, JAN BODZIARCZYK***

*Department of Forest Entomology, University of Agriculture,
Al. 29 Listopada 46, 31-425 Kraków, Poland,
e-mail: j.michalcewicz@ur.krakow.pl;

**Department of Nature-Cultural Heritage, Animal Ecology and Wildlife Management,
University of Agriculture, Al. 29 Listopada 46, 31-425 Kraków, Poland,
e-mail: michal.ciach@ur.krakow.pl;

***Department of Forest Botany and Nature Conservation,
University of Agriculture, Al. 29 Listopada 46, 31-425 Kraków, Poland,
e-mail: rlbodzia@cyf-kr.edu.pl

ABSTRACT. A unique natural habitat of *Rosalia alpina* (L.) located in the Beskid Niski mountain range (Carpathians) and consisting of a forest clearing community in the stage of succession with the mountain elm *Ulmus glabra*, in part dying and dead, is described. Results of the laboratory rearing of this longhorn beetle from elm wood as well as field observations of its adults in this natural habitat are given. This habitat and trophic association of *R. alpina* with *U. glabra* are discussed in connection with the known trophic relations of this insect species with host plants of the genus *Ulmus*.

KEY WORDS: Coleoptera, Cerambycidae, *Rosalia alpina*, host plant, *Ulmus glabra*, Beskid Niski Mts, Carpathians.

INTRODUCTION

Rosalia alpina (L.) occurs mainly in central and southern Europe. In Poland this very rare insect species, protected by law, occurs most numerously in the Beskid Niski and

Bieszczady ranges of the Carpathians (STARZYK 2004). In central Europe *R. alpina* inhabits mainly old montane beech forests (BURAKOWSKI et al. 1990). Ecologically, this longhorn beetle is associated with *Fagus* (SAMA 2002), but also other species, including those of the genus *Ulmus*, have been reported as its larval host plants (e.g. ŠVÁCHA & DANILEVSKY 1988, BURAKOWSKI et al. 1990, BENSE 1995, SLÁMA 1998, SAMA 2002, BENSE et al. 2003, BINNER & BUSSLER 2006, CIACH et al. 2007). Recently, the development of *R. alpina* in *Ulmus* was observed in the Beskid Niski Mts in Poland, since adults of this species were reared from elm wood collected in that area (CIACH et al. 2007, CIACH & MICHALCEWICZ 2009). In June 2007 a natural habitat of *R. alpina* was discovered in the Żmigród Forest Range; wood from *Ulmus glabra* in this locality had earlier been collected for laboratory rearing (CIACH et al. 2007, CIACH & MICHALCEWICZ 2009).

LOCATION AND BIOLOGICAL CHARACTERISTICS OF THE HABITAT

The locality described in this paper is situated near Myscowa, in the Żmigród Forest Range of the Dukla Forest District (UTM: EV48). This area borders the Magurski National Park and is located within the boundaries of a Natura 2000 area (Fig. 1).

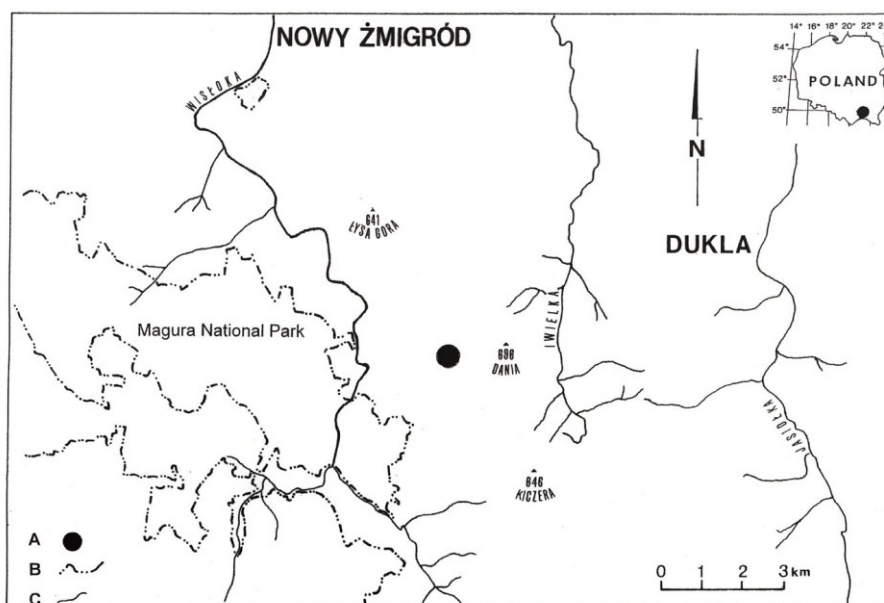


Fig. 1. Location of the *Rosalia alpina* habitat in the Żmigród Forest Range (Dukla Forest District) in the Beskid Niski Mts. A – site of the locality, B – boundary of the Magurski National Park, C – rivers.

The locality is situated within a forest clearing (Fig. 2A), where plant succession has been taking place spontaneously for several decades at least. It is situated at a height of 480 m above sea level on a 15°-18° slope with a north-easterly aspect. At present, around the edges of this clearing there is a thin growth of mountain elm *Ulmus glabra* (some trees are dying or dead), the dominant species, along with common ash *Fraxinus excelsior*, sycamore *Acer pseudoplatanus* and European larch *Larix decidua*. There are also single specimens of silver birch *Betula pendula*, Norway spruce *Picea abies*, and wild cherry *Cerasus avium*. The four elms selected for examination were 28, 35, 38 and 40 years old. The undergrowth consists of *U. glabra*, *A. pseudoplatanus*, *Fagus sylvatica*, *Abies alba* and *Corylus avellana*.

The species composition of the herbaceous vegetation in the clearing indicates a very advanced stage of succession. In the vegetation of the meadow the woodland species typical of the surrounding fertile Carpathian beech forest (*Dentario glandulosae-Fagetum*) are dominant, and there are small numbers of species associated with fresh and moist meadows, such as *Valeriana sambucifolia*, *Cirsium rivulare*, *Carex remota*, *Juncus conglomeratus* and *Juncus effusus*.



Fig. 2A. Natural habitat of *Rosalia alpina* in the Żmigród Forest Range (Dukla Forest District), Beskid Niski Mts – a general view (June 2009). (Photo by J. Michalcewicz).



Fig. 2B. Natural habitat of *Rosalia alpina* in the Żmigród Forest Range (Dukla Forest District), Beskid Niski Mts – a dead mountain elm *Ulmus glabra* (July 2009). (Photo by J. Michalcewicz).



Fig. 2C. A pair of *Rosalia alpina* on an *Ulmus glabra* trunk (6 July 2008). (Photo by J. Michalcewicz).

This clearing, a mosaic of vegetation of indefinite phytosociological status, consists of various successional stages leading to a fertile beech forest community. From an analysis of the herbaceous vegetation and its general physiognomy it was concluded that the plant community in the clearing most closely resembles low-altitude tall-herb meadows: this is indicated by the presence of a number of nitrophilous species and tall perennials such as *Senecio nemorensis*, *Stellaria nemorum*, *Rubus idaeus*, *Epilobium montanum*, *Urtica dioica*, *Scrophularia nodosa*, *Actaea spicata* and *Melandrium rubrum* (Appendix). Some decades ago it was very likely a meadow of the class *Molinio-Arrhenatheretea*.

LABORATORY REARING AND OBSERVATIONS OF *ROSALIA ALPINA* IN THE NATURAL ENVIRONMENT

During laboratory rearing from the wood of *Ulmus glabra*, collected in the vicinity of Myscowa in October 2006 and April 2007, twenty adult beetles (15 males and 5 females) and one larva of *R. alpina* were obtained during 2007-2008 (CIACH et al. 2007, CIACH & MICHALCEWICZ 2009, unpublished data).

In this natural habitat the adults of *R. alpina* were observed on several, mainly dead, mountain elms, and also in their vicinity, on 30 June, 3, 4 and 29 July 2007, 6 July 2008, and also 9, 10 July and 2 August 2009. The beetles were observed on the trunks of these trees at different heights above the ground; they also mated there (Fig. 2B, C). The mean circumference of the trunks 1.3 m above the ground was 73.1 cm (SD = 17.8; min-max: 40-93; N = 10). One of these trees (trunk circumference = 170 cm) was much bigger than the others. In the same locality exit holes of *R. alpina* were found on an elm tree crown, 43 cm in circumference, which had broken off and was lying on the ground.

DISCUSSION

The trophic association of *R. alpina* with *Ulmus* L. has already been reported from other countries in different habitats, including lowland localities: Maccarese, Italy, situated near sea level (LUIGIONI 1923, 1927), although this finding has been questioned (Gianfranco SAMA – personal information); the Tellermanovsky forest in the Voronezh district of Russia (MAMAEV & DANILEVSKY 1975, ŠVÁCHA & DANILEVSKY 1988); Jachenau in the Bavarian Alps (BUSSLER & SCHMIDL 2000); the Schwäbische Alb plateau in Baden-Württemberg (U. BENSE – personal information, BENSE 2006) in Germany; and periodically inundated forests near Břeclav (Soutok Game Park) in the Czech Republic (CIZEK et al. 2009).

In the habitat of *Rosalia alpina* in the Beskid Niski Mts, described in this paper, we are dealing with an interesting ecological process connected with habitat succession changes.

In this stage of succession the presence of dead and dying *U. glabra* in the ecotone between the clearing and the beech forest has created favourable conditions for the occurrence and development of *R. alpina*. The results of laboratory rearing as well as field observations have demonstrated that in the locality investigated *U. glabra* is an attractive breeding material for this longhorn beetle. It is to be expected, however, that without human interference, natural succession will turn this habitat into a forest stand with greater shading and a different species composition. This may greatly affect the occurrence of *R. alpina* in this locality. It may well be that such a trophic association used to occur in this region, but perhaps not in such a spectacular form as in this case owing to the local dying of *U. glabra*. The habitat described here is worth protecting because such places may be unwittingly destroyed by the removal of dead *U. glabra*.

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APPENDIX

A description of the plant community of the *Rosalia alpina* habitat in the Žmigrod Forest Range (Dukla Forest District), Beskid Niski Mts. The BRAUN-BLANQUET (1964) method was applied; scientific names are according to MIREK et al. (2002).

Date: 27.06.2009, altitude: 480 m, slope aspect: NE, inclination: 15-18°, relevé area: 800 m², cover of trees: 30%, cover of shrub layer: 10%, cover of herb layer: 100%; Trees, A: *Ulmus glabra* 2, *Acer pseudoplatanus* 1, *Larix decidua* 1, *Betula pendula* 1, *Picea abies* 1, *Cerasus avium* 1; B: *Abies alba* 2, *Fagus sylvatica* 2, *Salix caprea* +, *Fraxinus excelsior* +, *Acer pseudoplatanus* 1; Shrubs: *Corylus avellana* 2, *Sambucus nigra* 1; Herbs: *Equisetum arvense* +, *Athyrium filix-femina* 1, *Dryopteris affinis* +, *Dryopteris carthusiana* +, *Dryopteris dilatata* +, *Dryopteris filix-mas* 2, *Actaea spicata* +, *Anemone nemorosa* +, *Ranunculus repens* 2, *Urtica dioica* 1, *Melandrium rubrum* +, *Stellaria nemorum* 2, *Rumex obtusifolius* 1, *Hypericum maculatum* +, *Hypericum perforatum* +, *Dentaria bulbifera* +, *Lysimachia nemorum* +, *Lysimachia nummularia* +, *Geum urbanum* +, *Rubus hirtus* 1, *Rubus idaeus* 2, *Chrysosplenium alternifolium* +, *Medicago lupulina* +, *Vicia cracca* +, *Impatiens noli-tangere* 1, *Oxalis acetosella* +, *Geranium robertianum* +, *Circaea lutetiana* 1, *Epilobium montanum* +, *Anthriscus nitida* +, *Chaerophyllum aromaticum* +, *Chaerophyllum hirsutum* +, *Galium odoratum* 1, *Sambucus nigra* +, *Valeriana sambucifolia* 1, *Myosotis palustris* 1, *Scrophularia nodosa* +, *Veronica montana* +, *Plantago major* +, *Ajuga reptans* +, *Galeobdolon luteum* +, *Glechoma hirsuta* +, *Salvia glutinosa* +, *Stachys sylvatica* 1, *Campanula patula* subsp. *abietina* +, *Cirsium rivulare* +, *Senecio nemorensis* 3, *Tussilago farfara* +, *Juncus conglomeratus* +, *Juncus effusus* 1, *Carex pallescens* 1, *Carex remota* +, *Carex sylvatica* 1, *Brachypodium sylvaticum* 3,

Dactylis glomerata 1, *Deschampsia caespitosa* +, *Festuca gigantea* 1, *Glyceria plicata* +, *Milium effusum* +, *Poa pratensis* +.

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