# 6th

**European symposium and workshop on the conservation of saproxylic beetles**

*June 15-17, 2010, Ljubljana*

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# Program and Abstracts

## Objectives:

To present the state of the art on research concerning saproxylic organisms (primarily saproxylic beetles), alongside with research dealing with transversal approaches related the environmental problems faced by different ecosystems, factors affecting the biodiversity of saproxylic beetles, phylogeography, taxonomy and the introduction of new saproxylic species, conservation and the management of saproxylic beetles.

To develop stronger cooperation and promote a saproxylic organism research network between the different researchers around the world.

**Organizing Committee:**

Maja Jurc, Andreja Repe, Gregor Meterc, Danijel Borkovič (University of Ljubljana, Biotechnical Faculty, Department of Forestry and Renewable Forest Resources, Večna pot 83, 1000 Ljubljana, Slovenia)

Jošt Jakša, Jožef Mrakič, Marko Sameja, Nenad Zagorac, Alojz Pučko (Slovenia Forest Service, Večna pot 2, 1000 Ljubljana, Slovenia)

**Scientific Committee:**

Maja Jurc (Slovenia)
Keith Alexander (UK)
Sylvie Barbalat (Switzerland)
Jörn Buse (Germany)
Dušan Devetak (Slovenia)
Esko Hyvärinen (Finland)
Dušan Jurc (Slovenia)
Ferenc Lakatos (Hungary)
Jiri Schlaghamerský (Czech Republic)
Lidija Zadnik-Stirn (Slovenia)
Vincent Vignon (France)

*Proofreader:*
Terry T. Jackson

*Design:*
Bojan Jurc



# Program

15 June 2010

8.30 Arrival of participants and registration

9.00 Opening session

Opening speech

Prof. Dr. Franc Štampar – Dean of Biotechnical Faculty, University of Ljubljana

Mladen Berginc – Ministry of the Environment and Spatial Planning

Jošt Jakša – Slovenia Forest Service

## Section I

### Red Listing and Monitoring

10.00 ORAL PRESENTATIONS
Session Moderators: Jiri Schlaghamerský, Maja Jurc

1. The European Red List: status and distribution of European saproxylic beetles
Nieto, A., Alexander, K.N.A.

2. The European Red List of Saproxylic Beetles: some thoughts on the conclusions, recommendations, and the next steps
Alexander, K.N.A.

3. The 2010 Red List of Finland and Conservation of Saproxylic Beetles
Hyvärinen, E.

4. National Guidelines for Monitoring and Conservation of Saproxylic Coleopterans in Italy: A Contribution to Implementing the Habitats Directive
Campanaro, A., Bardiani, M., Spada, L. , Carnevali, L., Montalto, F., Antonini, G., Audisio, P., Mason, F.

5. Monitoring of *Lucanus cervus* (Coleoptera, Lucanidae) by means of remains of predation, a preliminary study
Campanaro, A., Toni, I. , Hardersen, S., Grasso, D.A.

6. Global site assessment for Cerambycidae: a realistic proposition?
Ramsay, A.J.

11.40 POSTER PRESENTATIONS

7. Saproxylic beetles of Habitats Directive: Surveillance in the Czech Republic
Chobot, K.

8. Monitoring scheme of saproxylic beetles in the scope of Natura 2000 in Slovenia
Ambrožič, Š., Kapla, A., Vrezec, A.

12.00 Lunch time

# Section II

## Population Studies

13.30 ORAL PRESENTATIONS
Session Moderators: Keith Alexander, Esko Hyvärinen

9. Sparsity of *Osmoderma eremita* populations in two sites in the north-west of France: conservation perspectives
Vignon, V.

10. Viability of an *Osmoderma barnabita* population in a pollard willow stand at Vojkovice (Czech Republic)
Šebek, P., Čížek, L., Hauck, D., Schlaghamerský, J.

11. Phenology and mating behavior of *Morimus funereus* (Coleoptera, Cerambycidae)
Polak, S.

12. Biology and ecology of flightless cerambycid *Morimus funereus* (Mulsant, 1862) as a background for monitoring application: laboratory and large-scale field study
Vrezec, A., Ambrožič, Š., Kapla, A.

13. Historical overview and recent situation on the knowledge of *Osmoderma eremita* (Scopoli, 1763) status in Slovenia
Pirnat , A., Vrezec, A.

15.00 POSTER PRESENTATIONS and Coffee break



14. Protecting small and vulnerable populations – *Osmoderma eremita* in Norway
Sverdrup-Thygeson, A., Flåten, M., Hanssen, O.

15. Habitat preferences and population size of the last population of the Alpine Longhorn *Rosalia alpina* (Coleoptera: Cerambycidea) in Bohemia
Drag, L., Hauck, D., Pokluda, P., Čížek, L.

16. *Cucujus cinnaberinus* in Norway
Laugsand, A., Olberg, S. , Sverdrup-Thygeson, A.

17. Status and seasonal dynamic of *Cucujus cinnaberinus* (Scopoli, 1763) in Slovenia
Kapla, A., Ambrožič, Š., Vrezec, A.

18. Current and future resource base of *Osmoderma barnabita* and *Cerambyx cerdo* in the floodplain forest of the lower Thaya River (Czech Republic)
Platek, M., Čížek, L.

19. Roads for Nature: restoring habitat continuity for the hermit beetle in Poland
Oleksa, A., Tyszko-Chmielowiec, P.

# Section III

## Saproxylic Beetle Assemblages and Environmental Gradients

15.45 ORAL PRESENTATIONS
Session Moderators: Sylvie Barbalat, Vincent Vignon

20. Response of saproxylic beetles to the successional change of basal hollows in deciduous trees
Gouix, N., Brustel, H.

21. Vertical distribution of saproxylic beetle flight activity
Schlaghamerský, J., Procházka, J., Čížek, L.

22. Exploring the “last biotic frontier”: are canopies special for saproxylic beetles in temperate forests?
Bouget, C., Brin, A., Brustel, H.

23. Saproxylic Coleoptera and their fungal microhabitats in Finnish old-growth forests
Schigel, D.S.

17.15 Welcome reception

16 June 2010

# Section III

## Saproxylic Beetle Assemblages and Environmental Gradients

9.00 ORAL PRESENTATIONS (continuation)
Session Moderators: Sylvie Barbalat, Vincent Vignon

24. Beetles of Mr. President: Saproxylic Beetles and Sun-exposure Gradient in Pasture Woodland in the Lány Game Park
Horák, J., Rébl, K. , Vávrová, E. , Horáková, J. , Neradilová, I., Loskotová, T.

25. Where does saproxylic diversity occur in European lowlands?
Vodka, S., Čížek, L.

26. A comparison of the saproxylic beetle fauna on old hollow oaks (*Quercus* spp.) in Turkey and Western Europe
Jansson, N., Avci, M., Coskun, M., Sarikaya, O., Brustel, H., Dubois, G., Wilde, I., Dagley, J., Hammond., P.

10.15 POSTER PRESENTATIONS and Coffee break

27. Preliminary results concerning the mortality processes and dead wood volume in mountainous hardwood forests in Hungary
Janik, G., Hirka, A., Koltay, A., Szőcs, L., Csóka, G.

28. Tree characteristics affecting saproxylic beetle assemblage in hollow urban tree
Peuhu, E. , Siitonen, J.

29. Species dynamics and colonization patterns of saproxylic beetles in a cut down Norway spruce tree in the altimontane belt of Alpine region of Slovenia
Podlesnik, J., Jurc, M.

30. Rove beetles (Coleoptera: Staphylinidae) of early stages of saproxylic succession on Norway spruce (*Picea abies* Karst.)
Tykarski, P , Ośko, K.

31. Polytrap 2010™ our new "soft design" window flight trap for saproxylic beetles
Brustel, H.

32. Sampling saproxylic beetles in hollow urban trees – comparison between three trap types
Thomssen, P.-M., Peuhu, E., Siitonen, J.

33. Insects reared from fruiting bodies of bracket fungi in a forest reserve in Hungary
Domboróczky, G., Janik, G., Csóka, G.



# Section IV

## Taxonomy and Phylogeography

10.45 ORAL PRESENTATIONS
Session Moderators: Jörn Buse, Al Vrezec

34. Fauna notes of the Lucanidae in Switzerland
Sprecher-Uebersax, E.

35. Molecular taxonomy of Italian *Lucanus* L. (Coleoptera, Lucanidae)
Antonini, G., Cortellessa, S., Cerretti, P., Campanaro, A., Mason, F. , Audisio, P.

12.00 Lunch time

# Section IV

## Taxonomy and Phylogeography

13.00 ORAL PRESENTATIONS (continuation)
Session Moderators: Jörn Buse, Lidija Zadnik-Stirn

36. *Morimus asper* (Sulzer, 1776) and its Western Palaearctic allies: genetically supported natural entities or taxonomic artefacts?
Antonini, G., Cerretti, P., Trizzino, M., Campanaro, A., Mason, F. , Biscaccianti, A., Audisio, P.

37. Inferring dispersal abilities of saproxylic beetles from spatial genetic structure
Oleksa, A., Chybicki, I. J.

13.45 POSTER PRESENTATIONS and Coffee break

38. Phylogeography of the stag beetle (*Lucanus cervus*)
De Gelas, K., Thomaes, A., Antonini, G.

## Section V

### Saproxylic Beetles and Forestry

14.15 ORAL PRESENTATIONS
Session Moderators: Dušan Jurc, Gloria Antonini

39. Saproxylic beetles and forestry in Tasmania, Australia
Grove, S.J.

40. Management of a forest reserve conserving saproxylic beetles: the example of the Bois de l'Hôpital (Neuchâtel, Switzerland)
Barbalat, S.

41. Saproxylic beetle assemblages in the Mediterranean region: impact of forest management on richness and structure
Buse, J., Levanony, T. , Timm, A., Dayan, T. , Assmann, T.

42. Biodiversity of saproxylic beetles in well-managed conifer forests in Slovenia
Jurc, M., Meterc, G., Pavlin, R., Repe, A., Borkovič, D., Jurc, D.

43. Diversity of saproxylic beetles in one of the southernmost Iberian beech woodlands
Méndez, M. , Rosa, de la, J., López, A.

16.30 POSTER PRESENTATIONS

44. The Conservation of dead trees in West Dinaric Mountains
Perušek, M.

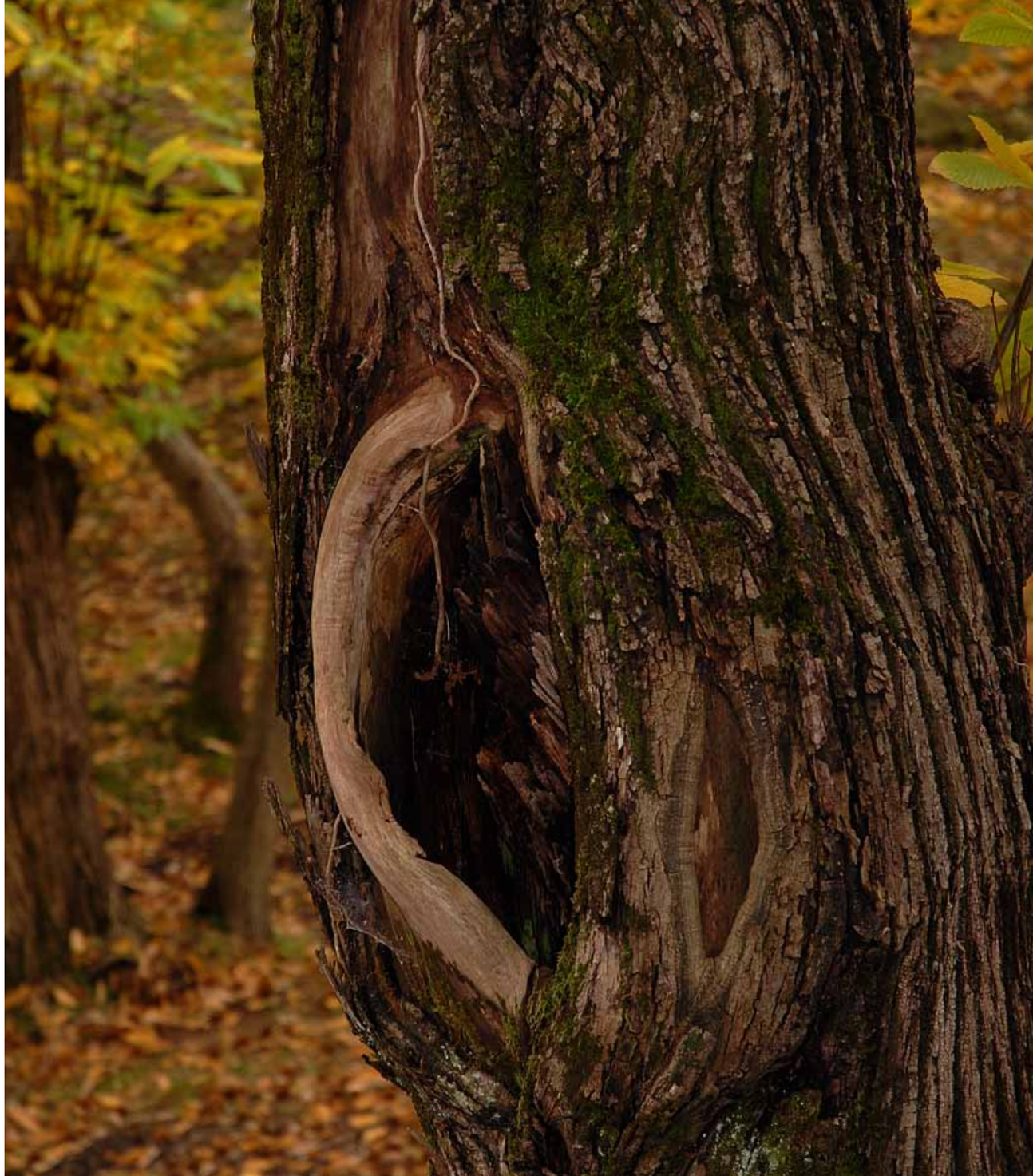
45. Beetles associated to dead wood in the forest reserves of Hungary
Kovács, K., Lakatos, F.

46. No Country for Old Trees: Forestry intensification induced loss of key habitats for endangered beetles in the March-Thaya floodplain, Czech Republic
Miklín, J., Kment, J., Riedl, V., Čížek, L.

17 June 2010

9.00 Excursion, North East Slovenia: Pohorje





# Section I

Red Listing and Monitoring

## 1 • The European Red List: status and distribution of European saproxylic beetles

*Nieto, A[1]., Alexander, K.N.A.[2]*
*[1] IUCN Regional Office for Pan Europe, 64, Boulevard Louis Schmidt, 1040 Brussels, Belgium*
*[2] Ancient Tree Forum; 59 Sweetbrier Lane, Exeter EX1 3AQ, UK*

**Keywords:** Saproxylic beetles, red list, conservation status, distribution, threats.

The European Red List is a review of the conservation status of ca. 6,000 European species (mammals, reptiles, amphibians, freshwater fishes, butterflies, dragonflies, saproxylic beetles, molluscs, and vascular plants) according to IUCN regional Red Listing guidelines. It identifies those species that are threatened with extinction at the regional level, in order that appropriate conservation action can be taken to improve their status.

The results of the European Red List of Saproxylic Beetles revealed that, overall, nearly 11% of the assessed saproxylic beetles are considered Threatened in Europe. A further 13% of saproxylic beetles are considered Near Threatened. However, for more than a quarter of the species, there was not enough scientific information to evaluate their risk of extinction, and they were classified as Data Deficient; when more data become available, many of these might also prove to be threatened.

Almost 14% of the species assessed have declining populations. Approximately 27% are more or less stable and only 2% are increasing. The population trend for 249 species (57%) remains unknown.

Saproxylic beetles in Europe are mainly threatened by habitat loss in relation to logging and wood harvesting and the decline of veteran trees throughout the landscape, as well as a lack of land management targeted at the promotion of recruitment of new generations of trees.

For saproxylic beetles, the intermediate latitudes (France, Germany, and the Slovak Republic) as well as southern Europe clearly stand out as areas of high species richness. The Balkan peninsula emerges as a hotspot of beetle biodiversity. The greatest concentrations of threatened saproxylic beetle species are found in central and eastern Europe, with the Italian peninsula, Greece and Cyprus also highlighted as having a high number of threatened species.

It is hoped that the results of this Red List will stimulate the research, monitoring and conservation action of saproxylic beetles at the local, regional and international levels.



## 2 • The European Red List of Saproxylic Beetles: some thoughts on the conclusions, recommendations, and the next steps

*Alexander, K.N.A.[1]*
*[1] Ancient Tree Forum; 59 Sweetbrier Lane, Exeter EX1 3AQ, UK*

**Keywords:** Saproxylic beetles, red list, threats, conservation planning.

The *European Red List of Saproxylic Beetles* has raised our interest in conservation administration across Europe; we need to build on this new start, identify key issues and develop a new conservation strategy.

The key long-term threats to saproxylic beetles involve i) the decline of veteran trees throughout the landscape, and ii) a general lack of land management targeted at promotion of recruitment of new generations of trees. In the cultural landscapes of Europe, these threats apply across most types of land use, e.g. forest, farmland and within settlements.

There is a need to investigate ways and means of promoting the protection of veteran trees at the landscape scale; the Natura 2000 approach appears to be too site based; there is a clear need for action at wider landscape level with regard to conservation of the key habitats, notably veteran trees, which would improve robustness of the beetle populations. The current conservation management of many Natura 2000 sites also raises many issues.

There are also big challenges for our own data gathering:

- For more than a quarter of the species (122 species / 28%), there was not enough scientific information to evaluate their risk of extinction; they were classified as Data Deficient; when more data become available, many of these might also prove to be threatened;

- The population trend for 249 species (57%) remains unknown.

There is a clear need for better monitoring of the listed species, particularly for threatened, Near Threatened and other priority species; the Red List assessment found notably little evidence of serious attempts to quantify populations and to use these to monitor change and to identify conservation priorities.

The taxonomic coverage of this Red List also requires expanding, as only a small proportion of Europe's saproxylic beetles have been assessed so far; perhaps less than 25%.

The first stage is to develop a European Saproxylic Beetle Red List Group within the IUCN.

## 3. The 2010 Red List of Finland and Conservation of Saproxylic Beetles

*Esko Hyvärinen*[1]

[1]*Metsähallitus, Natural Heritage Services; P.O.Box 36, 40100 Jyväskylä, Finland*

**Keywords:** Beetles, conservation, red list, saproxylic.

The fourth Red List of Finland will be published this year. The assessment has been done according to the IUCN standards and criteria. During the assessment process, more than 30,000 species were listed. Of 20,000 species, there was enough information for the assessment. Finnish beetle fauna is well known due to a long tradition and recent research and monitoring. Almost all of the species (3,688) assessed, there were about 800 species considered to be obligate saproxylics. Of the saproxylic species, 195 were red listed. The proportion of red-listed species is higher among saproxylics (24%) than among other beetles (19%). Several category changes took place in comparison to the previous assessment ten years ago. Most of the changes are due to the increased knowledge and changes in the assessment criteria. However, there are also 38 genuine changes among saproxylics, and most of these are positive. The changes seem to be related to the increased retention of large aspen trees and other deciduous trees in logging, and the slightly increased prescribed burning. Although 72% of the land area of Finland is covered by forests, the forest landscape is very fragmented, particularly in southern Finland, and composed of repeatedly harvested commercial stands with very low volume and poor quality of dead wood. These provide few resources for red-listed saproxylic species and increase the risk of local extinctions in isolated reserves. In such reserves, which include areas that have previously been commercial forests, the volume of dead wood has been increased through forest restoration activities. Nature reserves form the basis for the conservation of saproxylic species in Finland, but not all the species can be maintained in reserves.

## 4. National guidelines for monitoring and conservation of saproxylic coleopterans in Italy: a contribution to implementing the habitats directive

*Campanaro, A.*[1]*, Bardiani, M.*[1]*, Spada, L.*[1]*, Carnevali, L., Montalto, F., Antonini, G.*[2]*, Audisio, P.*[2]*, Mason, F.*[1]

[1]*State Forestry Service - National Centre for the Study and Conservation of Forestal Biodiversity "Bosco Fontana", Verona - Sapienza University of Rome, Strada Mantova, 29; I-46045 Marmirolo, Italy*

[2]*University of Rome "La Sapienza", Department of Animal and Human Biology, Via Alfonso Borelli 50 00161*

**Keywords:** Habitats Directive, Italy, conservation, monitoring, saproxylic coleopterans, capture-mark-recapture, transects, trapping.

The Italian Ministry of the Environment has funded a project for the monitoring and conservation of saproxylic faunas. The main goals of the project are to provide guidelines for conservation and standard methodologies for measuring population consistency and trends, as well as habitat range, as required by the Habitats Directive (92/43/EEC).
The project started in 2009 and the coleopterans listed in Annexes II, IV were chosen as target species: *Lucanus cervus* (Lucanidae), *Osmoderma eremita* (Cetoniidae), *Buprestis splendens* (Buprestidae), *Cucujus cinnaberinus* (Cucujidae), *Stephanopachys substriatus* (Bostrichidae), *Cerambyx cerdo* (Cerambycidae), *Morimus funereus* (Cerambycidae), *Rosalia alpina* (Cerambycidae).



Field campaigns were carried out in pilot-areas belonging to different forest types: floodplain forest (Northern Italy), beech woods (Apennine Mountains in central and southern Italy) and white-barked pine (*Pinus leucodermis*) habitats (southern Italy). Ancient agricultural landscapes with isolated oaks and strips of ancient trees were also investigated.

During the first phase of the project (summer 2009, spring 2010), herein described, the main efforts were directed toward *L. cervus*, *R. alpina* and *C. cerdo*. Specific protocols were developed and preliminarily tested in the field. The methods proposed involve minimal impact on the species and consist of direct observations along transects, capture-mark-recapture and trapping. Concurrently, a relational database has been implemented to store the information available on the geographic distribution of the species and ecological aspects, in order to provide a common tool for collecting and managing data.

The work plan is based on three operative levels: fieldwork in the Nature 2000 network of sites and collection of data by qualified operators; data storage and elaboration; implementation of the format on the main results of the surveillance under Article 11 of the Habitats Directive.

## 5. Monitoring of *Lucanus cervus* (Coleoptera, Lucanidae) by means of remains of predation, a preliminary study

*Campanaro, A.*[1]*, Toni, I.*[1]*, Hardersen, S., Grasso, D.A.*

[1]*State Forestry Service - National Centre for the Study and Conservation of Forestal Biodiversity "Bosco Fontana", Verona - Sapienza University of Rome, Strada Mantova, 29; I-46045 Marmirolo, Italy*

## 6. Global site assessment for Cerambycidae: a realistic proposition?

*Ramsay, A.J.*

*Thomson Ecology, Calls Wharf, 2 The Calls, Leeds LS2 7JU, UK*

**Keywords:** Site Assessment; Cerambycidae; Global; Indicator Groups

Site assessment using a range of saproxylic beetles has been proposed in Britain which uses a rarity score to apply a value to each species, and as the saproxylic fauna in Britain is relatively species-poor it includes a range of different saproxylic beetle families. Given the underworked faunas which exist in tropical counties where diversity of species is high the broad application of this system is likely to to be difficult, and with a tendency to undervalue cryptic species with poorly known biologies. A system which uses a 'flagship indicator' groups to help in initial assessment is likely to be useful at least in beginning to place assemblages from known sites into a local, regional, national and international context. Examples are taken here from Europe and South America using Cerambycidae, a species-rich and almost entirely saproxylic beetle family and a ranking system based on apparent rarity to try and establish a site assessment system which is feasible in countries which are relatively under-recorded and contain intact natural ecosystems.

## 7. Saproxylic beetles of Habitats Directive: Surveillance in the Czech Republic

*Chobot, K.*[1]

[1]*Agency for Nature Conservation and Landscape Protection, Nuselska 39, Praha 4, Czech Republic*

The Habitats Directive (92/43/EEC) is a main pillar of the Nature Conservation at the EU level. Beside the creation of the system of Natura 2000 sites, member states are obliged to survey (both monitor and report the results) all the phenomena listed in directive´s annexes, including saproxylic beetles. These obligations are widely known, the composition of the lists had been, in some way, a reaction to the increased efforts for saproxylic beetle conservation; however, recently the listing has been one of the main factors of increased research activity. Less known are the official surveillance systems (or ways of fulfilling the HabDir obligations). The poster will present the surveillance system in the Czech Republic, one of the EU-member states trying to build on a solid data and knowledge base. The partial results of the surveillance of seven saproxylic beetle species, provided by methodological summaries, distribution maps and recognized trends, will be presented.

## 8. Monitoring scheme of saproxylic beetles in the scope of Natura 2000 in Slovenia

*Ambrožič, Š.*[1]*, Kapla, A.*[1]*, Vrezec, A.*[1]

[1]*National Institute of Biology, Večna pot 111, 1000 Ljubljana, Slovenia*

**Keywords:** Distribution monitoring, population monitoring, Natura 2000, saproxylic beetles, Slovenia.

Among the 23 saproxylic beetles listed at EU Habitat Directive, the occurrence of 11 species was confirmed in Slovenia. The distribution knowledge and determination of the Natura 2000 sites for most saproxylic beetles in Slovenia is still insufficient. Therefore, the projects regarding species distribution and population ecology provided key background for the establishment of species monitoring. For seven species, tests of monitoring protocols were conducted (*Lucanus cervus, Morimus funereus, Rosalia alpina, Cerambyx cerdo. Cucujus cinnaberinus, Rhysodes sulcatus, Osmoderma eremita*). In general, large scale species monitoring should provide insight into two issues: distribution and population trends. The distribution monitoring is aimed at detecting trends in species distribution patterns, and population monitoring to detect changes at the population level, taking into account abundance fluctuations and habitat changes. To establish appropriate monitoring protocols for a long-term population survey, we tested (in background studies) the efficiency of several sampling methods and studied seasonal population dynamics of imagos. The methods were based on non-lethal sampling methods and included biometry studies to measure the physiological fitness of animals (mass index calculated as mass per total length). The distribution monitoring protocol was based on natural-geographic regions in Slovenia, which were determined by unique climate and habitat conditions. The presence/absence of species is planned to be detected in the period of five years with the sampling methods used in the population monitoring scheme. Additionally for the stag beetle (*Lucanus cervus*), a popularization action campaign was developed to collect data of accidental observations from lay observers.



# Section II

## Population Studies

### 9. Sparsity of *Osmoderma eremita* populations in two sites in the north-west of France: conservation perspectives

*Vignon, V.*[1]
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**Keywords:** *Osmoderma eremita*, trees with cavities, trees network, conservation.

*Osmoderma eremita* is a rare species, which lives in old broad-leaved trees with cavities. We evaluated the number of cavities inhabiting the species. In hedgerow networks, it is about 1% of pollarded trees (Orne department). In chestnut orchards, it is about 10% of grafted trees (Sarthe department, located at 120 km south of the previous site). An evaluation of the density of the populations was completed after a five-year survey period in Orne and a six-year survey period in Sarthe.

The populations are clustered in patches of populations. We followed the emergences of adults in all the occupied trees during our survey period of at least five years. An analysis of the occupation of cavities shows that the species is declining in its habitats, even in the tree networks that appear to be the densest.

These changes are analyzed to define guidelines for conservation of the species.

### 10. Viability of an *Osmoderma barnabita* population in a pollard willow stand at Vojkovice (Czech Republic)

*Šebek, P.*[1]*, Čížek, L.*[2]*, Hauck, D., Schlaghamerský, J.*[1]
[1]*Masaryk University, Department of Botany and Zoology, Kotlarska 2, CZ-61137 Brno, Czech Republic*
[2]*Faculty of Science, University of South Bohemia and Institute of Entomology, Biology Centre of the Czech Academy of Science, Branisovska 31, 370 05, Ceske Budejovice, Czech Republic*

**Keywords:** *Osmoderma barnabita*, pollard willows, tree cavities.

The Vojkovicka vrbovna (osier plantation at Vojkovice, South Moravia) is a stand of ca. 400 old willow trees, formerly managed with traditional pollarding. Gradual ceasing of management within recent decades has resulted in a decrease



in cavity willows suitable for cavity-dwelling saproxylic beetles. The site is rather isolated and young trees, which could substitute for the present hollow trees in the future, are almost entirely lacking. The site has been known to host a population of the hermit beetle (*Osmoderma barnabita*, according to its geographic situation). In 2006 and 2009, we assessed the size of this *O. barnabita* population by a mark-recapture study, using frequently checked pitfall traps without preservant that were placed in the cavities. We also analysed the habitat preferences of other trapped saproxylic beetles. The estimated population size of *O. barnabita* was ca. 600 adults in 2006 and ca. 300 adults in 2009. These numbers seem to be at or below the threshold of a minimum viable population size and indicate a high risk of extinction of this local population.

In 2006, willows inhabited by *O. barnabita* hosted fewer other saproxylic beetle species compared to those willows without *O. barnabita*, whereas results from 2009 show a rather opposite pattern. The role of the hermit beetle as an indicator of saproxylic beetle species richness in willow trees seems questionable.

### 11. Phenology and mating behavior of *Morimus funereus* (Coleoptera, Cerambycidae)

*Polak, S.*[1]
[1]*Notranjski muzej Postojna, Ljubljanska 10, 6230 Postojna, Slovenia*

**Keywords:** *Morimus funereus*, phenology, behavior, mating.

Since having been listed on the Natura 2000 species list, the longhorn beetle *Morimus (Morinus) funereus* has been a species of high conservation concern. It is known that it takes several years for its larvae to develop within the trunks and old stumps of some deciduous tree species. Surprisingly enough, little is known about species' behaviour and its occurrence in space and time. A field study was carried out in a small, 2,000 $m^2$ large oak (*Quercus* spp.) clearing in the sub-Mediterranean part of Slovenia in 2007. A total of 58 specimens (28 males and 30 females) were captured, measured, marked and released. Among the marked specimens, 24 (41%) specimens were recaptured at least once. The time of the specimens' occurrence, the sun exposure, the temperature and the animals' behaviour was monitored on 14 selected oak stumps during the whole season. In the relatively small study area, an unexpected specimen turnover was recorded. This suggests a wider home range of the species. Two seasonal picks in the occurrence of the animals have been detected. Single males have been observed to occupy tree stumps and defend them against the rival males for a longer period. Despite each of the tree stumps mostly harbouring one and rarely more males; the density of the displaying males recorded within the small study area was locally high. Such mating congregations could indicate a lekking behavior. The females were observed to forage among the tree stumps searching both for mating and egg deposition. The observed mating activity was higher in evenings and late afternoons on warmer days. A reduction in mating activity during bad weather, at temperatures below 10 $^{o}C$ and at hot temperatures around midday, was detected.

## 12. Biology and ecology of flightless cerambycid *Morimus funereus* (Mulsant, 1862) as a background for monitoring application: laboratory and large-scale field study

*Vrezec, A.[1], Ambrožič, Š.[1], Kapla, A.[1]*
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**Keywords:** *Morimus funereus*, seasonal dynamics, diurnal activity, food preferences, altitudinal distribution, habitat, monitoring method, Slovenia.

The cermbycid *Morimus funereus* (Mulsant, 1862) is a polyphagous flightless large-sized beetle typical for lowland and montane forests of E and SE Europe. It is one of the saproxylic beetles included to EU Habitat Directive for which Natura 2000 sites are declared; monitoring should be established. However, the species biology and ecology is quite poorly known, and (according to the Web of Science list) there has been only one paper published so far on this topic. In general, it is known that the species is daytime active animal attracted to freshly cut down wood and stumps, where it also lays eggs, predominantly in the spring. Additionally, the adults can hibernate during their two-year lifespan. In 2008 and 2009, we conducted an intensive species survey on freshly-cut wood, predominantly stumps (n=3,090), between end of April and the first half of August within the known distribution range in Slovenia. In the laboratory, we measured the species' diurnal activity and the food preferences of imagos according to consumed amount of tree bark. Our results indicate that *Morimus funereus* is a predominantly nocturnal animal with a peak of activity between 8 pm and 3 am in the summer time. According to data from entomological collections, the species is active between March and September. We have found that there were two peaks of activity; the first in the first half of May, and the second in the second half of June, which probably correspondeds to two generations of beetles. After each peak, there was a steep decrease in activity. Copulation was observed throughout the whole period of activity. Proportionally, the species significantly more frequently selected stumps or wood of *Quercus* sp. and *Abies alba*, but less so for *Fagus sylvatica* and *Picea abies*. In other tree species, we found no significant selection. Also in the laboratory, the species showed significant food preferences with strong preferences to the *Sambucus*, *Juglans, Quercus, Alnus, Populus* and *Tilia* tree species. The species was found over large altitudinal span ranging from 150 to 1,240 m asl. However, the species was significantly more abundant at lower elevations (median 673 m asl) and significantly preferred deciduous and mixed forest stands. For the purpose of monitoring the survey method, we tested the efficiency of two methods in the field: a survey of freshly cut wood and trapping method. The trapping method appeared to be significantly more efficient and is suggested to be used in a monitoring scheme for this species.



## 13. Historical overview and recent situation on the knowledge of *Osmoderma eremita* (Scopoli, 1763) status in Slovenia

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**Keywords:** *Osmoderma,* habitat, Slovenia, saproxylic beetles, rare species.

The species *Osmoderma eremita* was first described from Slovenia in 1763 by G. A. Scopoli. The taxonomic status in Slovenia is still unclear since the area is on the border of two *Osmoderma* taxa: *O. eremita* and *O. barnabita*. In the 19th century, the species was infrequently mentioned in catalogs of different regions in Slovenia. Since that time, the knowledge about *O. eremita* in Slovenia was restricted mainly to entomological collections and accidental findings. These indicate that the imagos are active between May to September with peak activity in July and August, when the bulk of data were obtained. In 2008, systematic research on the whole territory of Slovenia was conducted with 215 tree holes searched. Only in 26 (12%) was the species presence confirmed, indicating that *Osmoderma eremita* is still rare, although in Slovenia widespread species. The bulk of the population was found in the eastern part of Slovenia. The species was significantly confined to willow trees (*Salix*) in hedgerows. It appeared that the most suitable are horizontal holes in thick trunk trees regardless the exposition. Besides *O. eremita*, we found 22 beetle species in the tree holes including *Rhamnusium bicolor*, which was assumed to be extinct in Slovenia. That indicates the still low level of knowledge about saproxylic beetle fauna in Slovenia, which was also shown in the recently published European Red List of Saproxylic Beetles.

## 14. Protecting small and vulnerable populations – *Osmoderma eremita* in Norway

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**Keywords:** *Osmoderma eremita*, hollow trees, monitoring methods, dispersal, Action Plan.

In 2008, *Osmoderma eremita* was rediscovered in Norway. This was the first time in more than 100 years that live individuals were found, although fragments have been found in hollow oaks in another part of southern Norway. The species was found to inhabit hollow ash trees on a churchyard in Tønsberg, southern Norway. The nearest location is more than 60 km away (directly); in Tanum in Sweden.

In 2009, an Action Plan for *O. eremita* was proposed. In parallel, an inventory was initiated. In the late summer of 2009, we performed a field search in the location and the closest surroundings. We looked for individuals or feces in the wood mould in nearby hollow trees, and supplemented the search by using a new method: a camera mounted on a flexible rod, which could be inserted through small openings of otherwise inaccessible areas. With this instrument, we could watch the beetle walking on the surface of the wood mould in the inhabited trees.

*O. eremita* was present in only three trees in the known site, and we found no other occurrences in hollow trees in the landscape. There has been a rather large sampling effort in association with hollow oaks the past 10 years in Norway, but *O. eremita* has not been found in any other locations. Possible means suggested in the Action Plan to increase the viability of the Norwegian population include both increasing the amount of suitable habitat nearby today's only known occurrence and the possibility of transferring individuals to new locations. We consider possible reasons for the very isolated population pattern of *O. eremita*, and discuss how to proceed with the work of protecting the species in Norway.

## 15. Habitat preferences and population size of the last population of the Alpine Longhorn *Rosalia alpina* (Coleoptera: Cerambycidea) in Bohemia

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**Keywords:** Population size, Cerambycidae, mark-recapture, POPAN, longhorn beetle, conservation.

*Rosalia alpina* is highly endangered species protected by the EU Habitats Directive. Despite being one of the most attractive European insects, there is no sound information about its biology and habitat preferences, which may compromise conservation efforts. We performed a mark-recapture study the last population of this species in Bohemia. The population inhabits several hilltops covered by fragments of old beech forest in the Ralská pahorkatina upland (central Bohemia).

In 2008, subpopulations inhabiting three hilltops were studied and 598 individuals were marked, while a single subpopulation was studied in 2009, when 383 individuals were marked. The POPAN formulation in the MARK program was used to analyze the data. The total number of *R. alpina* longhorn on the three hilltops was estimated at about 2,300 adults per year. Given the three-year lifecycle of the species, the total population approaches 7,000 individuals.

Study of *R. alpina* habitat preferences revealed that the species prefers open old open-grown beechs (*Fagus silvatica*) with reasonable amounts of sunlight exposure. Adults avoid direct sunlight. However, they do prefer shaded trunks still warm from previous sun exposure. For oviposition, females prefer dry, hard wood, and avoid freshly fallen and decaying trunks. Alpine longhorn is a rather mobile species; 1.5 km is the maximum distance flight recorded.

Despite a reasonable population size and strict legal protection of the species in the Czech Republic, the future of the population is uncertain. The inhabited forest fragments are extremely small (1–20 ha), surrounded by pine plantations. The fragments are subject to clear-cut logging, dead-wood removal, whilst others are left unmanaged. This hands-off approach leads to increasing canopy closure, and will probably result in a future lack of trees and habitats suitable for *R. alpina*.

The study was supported by MSM6007665801, LC06073.



## 16. *Cucujus cinnaberinus* in Norway

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**Keywords:** *Cucujus cinnaberinus*, Cucujidae, distribution, habitat choice, action plan.

*Cucujus cinnaberinus* (Scopoli, 1763) (Cucujidae) is considered to be near threatened (NT) on the IUCN list of Globally Threatened Species and listed in the Bern Convention's Appendix II of strictly protected species in Europe. Although the species is expanding in certain areas of central Europe, *C. cinnaberinus* is considered to be a declining species in northern Europe. In Norway, the main threat to *C. cinnaberinus* is logging, but land-use changes, the planting of spruce as well as an oversized moose population are other potential decimating factors.

Until 2009, very little was known about the status of *C. cinnaberinus* in Norway. An action plan for *C. cinnaberinus* presented goals and measures for the management of the species. The first step in fulfilling this plan was undertaken in 2009; we surveyed 49 potential localities in the two municipalities: Drangedal and Froland in southern Norway. We encountered *C. cinnaberinus* in 35 locations. In total, we searched 270 logs and snags that we judged as suitable for the species, and found *C. cinnaberinus* in 87 of these (77 aspen, 9 oak and 1 spruce). In total, only four imagos were found.

Based on our present data, it is not possible to evaluate any population trends. The data suggest, however, that even though the southern parts of Norway are on the northern edge of the species' distribution, quite large populations of *C. cinnaberinus* are present in this area. Our results might indicate that the species is not as demanding in habitat choice as earlier expected in Norway. In contrast, population source-sink dynamics might mask that the species is dependent on a few larger source populations in the long run.

## 17. Status and seasonal dynamic of *Cucujus cinnaberinus* (Scopoli, 1763) in Slovenia

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**Keywords:** *Cucujus cinnaberinus*, Slovenia, seasonal dynamic, sampling method efficiency, abundance.

The cucujid *Cucujus cinnaberinus* was first described by G. A. Scopoli, using specimens from Slovenia in 1763. It is a poorly known saproxylic beetle in Europe. The species is frequently found in riverbank softwood forests. Imagos and larvae are predatory and live under the bark of dead standing or lying tree trunks predominantly of *Populus*, *Salix*, *Ulmus*, *Quercus*, *Fraxinus*, *Acer* and *Aesculus*, and rarely in coniferous trees. The relative abundance of larvae and imagos increases in tree trunks with thickness above 70 cm. Although data from Slovenia are scarce, the species appears to be widely distributed. It is known from lowland as well as from montane forests. The first intensive studies were conducted in 2009 in lowland softwood forests by the Mura and Sava Rivers. The occupation rate of dead tree truncks by larvae and imagos was 41% at the Sava and 12% at the Mura Rivers, respectively; this is high according to other European data. Additionally, we have used intercept traps to estimate the relative abundance and seasonal activity of imagos as well to estimate trapping

efficiency for use in monitoring scheme. The relative abundance corresponded well to the results obtained with the method of searching under bark. The last method is destructive and thus less appropriate for monitoring use; therefore, our results support intercept traps being used in population monitoring schemes. The peak seasonal activity of imagos was reached in early spring, i.e. the beginning of April. An abrupt peak of activity in early spring was followed by quick decrease, although imagos were active in low numbers over the entire spring and summer period. For the establishment of population monitoring, we propose using intercept traps set in early spring, but for obtaining species distribution at a large scale, the method of beetle fauna search under bark appears to be the most efficient.

## 18. Current and future resource base of *Osmoderma barnabita* and *Cerambyx cerdo* in the floodplain forest of the lower Thaya River (Czech Republic)

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**Keywords:** Conservation, management, Natura 2000.

The Thaya floodplain forests are saproxylic-diversity hotspot in the Czech Republic, classified as a Site of Community Importance (SCI) with *Osmoderma barnabita* (OB) and *Cerambyx cerdo* (CC) among the target species. The forests are subject to rapid clear-cut logging; a mainly hands-off approach is applied in reserves (ca. 2% of the area).

OB inhabits tree hollows, while CC inhabits large oaks; both highly prefer open-grown trees in the area. To evaluate the current and future resource bases of both species, we performed an inventory of trees suitable and potentially suitable for both species in the largest reserve of the area: the Krive jezero National Nature Reserve (124 ha). We inventoried (i) formerly occupied trees – dead trees with OB frass in hollows; dead oak with exit holes of CC; (ii) currently occupied trees – living trees with frass; living oaks with exit holes; (iii) – potentially suitable trees – open-grown trees with or without hollows; open-grown oaks (diameter >40 cm) not attacked by CC. The inventory covered 60% of the reserve and included 328 willows, all formerly pollarded, 232 hollowed, frass of OB larvae found in 111 willows. The young generation is nearly missing; unmanaged pollards suffer from breaking and shading by surrounding vegetation. Of the 37 oaks found, three are healthy, 12 are half-dry and 22 are dead. CC exit-holes were found on 24 trees, 14 of them dead.

The results show that the number of trees for OB is currently sufficient. It, however, will decrease unless the management is restored. The number of oaks for CC is critically low and will decrease further. Restoration of management (i.e. pollarding, regrowth removal, establishment of young generation of open-grown oaks and willow pollards) is vital for the long-term survival of both species on the site. We suggest pasture combined with pollarding as the most suitable management measures.

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## 19. Roads for Nature: restoring habitat continuity for the hermit beetle in Poland

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**Keywords:** Avenues, tree-lined roads, Osmoderma, conservation measures.

**Background**. Tree-lined roads are a hallmark of Central Europe. Since the early 18th century, the kings of Prussia mandated the planting of trees along every road of their realm. Today these avenues through the agricultural landscapes of eastern Germany and western and northern Poland are mainstays of biodiversity. One of most celebrated inhabitants of roadside trees is the hermit beetle (*Osmoderma eremita* complex), an animal protected by the EU's Habitat Directive as a priority species. This species depends exclusively on old-growth trees with hollows. At present, its survival in Poland depends mainly on avenues. Being a poor flyer, it uses rows of trees as ecological corridors, maintaining ecological connectivity between populations.

Nowadays, many roadside trees are giving way to road upgrades; very few are being planted to restore this vital resource. The need for infrastructure development and traffic safety improvement is understandable. However, improved transport capacity should not happen at the expense of our natural and cultural heritage. Far too many trees are being cut unnecessarily due to rash, arbitrary decisions made without considering viable alternatives. If the loss of roadside trees continues at the current pace, the hermit beetle will soon be lost. Conservationists have been very vocal in protesting the removal of old roadside trees. The issue, however, has elicited very little meaningful dialogue between diverse parties seeking a lasting solution.

**Solution.** The good news is that there is still room for both cars and trees along Polish roads. Many roads, even after improvements, still have space available to replant trees. Trees on many other roads can even be preserved when other safety measures are applied, such as barriers, trunk markings, or speed limits. These methods have already been successfully implemented in Germany and other countries.

The "Roads for Nature" project sets a framework for forming successful partnerships between road maintenance service providers, conservationists and local authorities. A number of roads where tree replanting is feasible have already been identified. Priority is given to routes that can serve as ecological corridors for the hermit beetle. A pilot project was launched in 2008 north of Wroclaw, along a three kilometre-long route where a tree-lined avenue is being restored by a coalition of road management office, community activists and conservationists. These positive results have created new opportunities for more and more tree-lined avenues to be restored or saved. Corporate efforts to couple carbon offsetting with landscape restoration and biodiversity conservation make way for significant private-sector involvement in the initiative.

**Trees, not borders.** A new transnational avenue is currently in the planning phase at a crossing point between Poland and Germany, near Zgorzelec/Goerlitz. This high-profile initiative not only celebrates borders that join nations, it also educates the general public and local authorities about the significance of tree-lined avenues for the natural world, our rural landscapes and our quality of life. Local authorities in Poland have already granted permission for the plantings. Consultations with German authorities are currently under way. A presentation of the initiative during a joint meeting of environment ministers from Poland and Germany and was enthusiastically received. We will work to have the ministers not only as patrons of this event, but also as main participants.

# Section III

Saproxylic Beetle Assemblages and Environmental Gradients

## 20. Response of saproxylic beetles to the successional change of basal hollows in deciduous trees

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**Keywords:** Hollow trees, *Limoniscus violaceus*, saproxylic beetles, species assemblages.

Beetles associated with hollow trees are among the most threatened species in temperate deciduous forests. According to the location of the cavity in the trunk, beetle assemblages differ in relation to their ecological specificities. Moreover, trunk hollowing is a dynamic process resulting in a modification of the species assemblages over time. Based on our field knowledge, we categorized hollow process formation into five classes, from filled to totally hollowed cavities. Saproxylic beetle fauna inhabiting the cavities were studied by using emergence traps.

The numbers of saproxylic species and diversity per cavities do not differ among hollow classes. However, species assemblages obviously change. Cavicolous species are increasingly present along the gradient of hollowing. *Elateridae* is the most diverse family among these species.

They are represented, in the most evolved cavities, by the rare violet click-beetle (*Limoniscus violaceus*). Our results imply that hollow trees are not only favorable to cavicolous species, but also to numerous saproxylic species belonging to different families. These species constitute complementary and successional assemblages that play a fundamental role in the excavation of the cavity and the transformation of wood into wood-mould.

## 21. Vertical distribution of saproxylic beetle flight activity

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**Keywords:** Dead wood, floodplain, Coleoptera, forest strata, flight interception traps.

In 2007, flight interception traps (vane type, transparent panels, unattractive saturated salt solution) were employed at different strata of floodplain forests at the confluence of the Morava and Dyje Rivers in south Moravia (Czech Republic). Four ancient woodlands of a size between 9 and 22 ha were selected (farthest sites 8 km apart), all stands of "hard-wood floodplain forest" dominated by pedunculate oak and narrow-leaved ash. The oldest trees were ca. 450 year-old oaks; the highest trees reached ca. 35 m. Traps were installed in 15 "vertical transects" at heights of 21 m (lower part of canopy), 14 m, 7 m, 1.5 m and 0.6 m above ground (upper edge of panels) and operated from April to September. One of the major objectives was to learn about the vertical distribution of saproxylic beetle flight activity. This contribution focuses on the consequences of our findings for the design of studies employing flight interception traps and on the interpretation of data from such studies. We found distinct preferences of individual families and species for specific strata. *Buprestidae, Dasytidae* and *Anobiidae* were mostly trapped in the highest stratum (canopy). *Ciidae, Cryptophagidae, Prostomidae, Monotomidae*, and *Tenebrionidae* preferred the strata close to the ground (up to 1.5 m; in the latter case, avoiding the zone below 0.6 m). Families and subfamilies such as *Erotylidae, Latridiidae, Cerambycidae*, and *Scolytinae* did not show a distinct preference for any of the strata. This might be due to a high number of trapped species with differing preferences as with *Cerambycidae* or *Scolytinae*. *Elateridae* showed some preference for the medium strata. The heights at which flight interception traps are installed in most studies will therefore not yield a catch representative of the entire saproxylic beetle assemblage, although heights about 1.5 m seem to provide reasonable coverage of many important groups.

## 22. Exploring the "last biotic frontier": are canopies special for saproxylic beetles in temperate forests?

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**Keywords:** Canopy; France; understory; forest stratification.

Conserving saproxylic beetles in a complex forest landscape will require knowledge about the habitat requirements of most species in order to prioritize actions or to make informed decisions. As well as tropical forests, temperate forests are stratified but patterns are not well established. There remains great uncertainty about how much temperate forest canopies contribute to global species richness estimates and the relative specialization of insect species to vertical zones.

Are canopies special? How valuable are fauna lists based on ground sampling? Would canopy-based sampling help establish more realistic estimates of species diversity in temperate hardwood forests?

To compare diversity patterns of canopy and understory saproxylic beetles, we merged three French datasets in this study: the two first originated from an investigation of the fauna of different canopy or understory oak and maritime dead pine branches using emergence traps in lowland forests, and the third compared flying beetle faunas at canopy and understory levels in beech-fir stands in highland forests.

Canopy vs understory saproxylic beetle assemblages were compared in terms of species richness, species composition and nestedness, indicator and discriminating species, and basic guild structure.

Overall, the highest cumulative and mean species richness was observed in understory samples. More characteristic species were identified in understory deadwood than in canopy dead branches, and a low overlap of shared species was measured. Assemblage composition significantly differed between canopy and understory. The dominant underlying process in the community divergence between understory and the canopy was spatial turnover and not nestedness in all cases. The three tree species showed significant differences in guild structure in understory and canopy samples.

Our investigation demonstrated a significant but not sharp vertical stratification of saproxylic beetle assemblages in temperate forests and a lower contribution of forest canopy compared with understory strata to saproxylic beetle diversity.

## 23. Saproxylic Coleoptera and their fungal microhabitats in Finnish old-growth forests

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**Keywords:** Beetles, fungi, dead wood, *Basidiomycetes*, fruit body.

The relationships of fruit bodies and spores of wood-decaying basidiomycete fungi *versus* larvae and adults of *Coleoptera* were documented in Finnish old-growth forests. The study area consists of eleven old-growth spruce- and pine-dominated forests rich in dead wood, plus natural-like forests in southern Finland and the Åland Islands. Nearly 200 species of Finnish polypores (poroid, non-bolete, mostly lignicolous basidiomycete fungi) were examined for associated *Coleoptera*. Adult beetles were collected from polypore basidiocarps in the wild, while their larvae were reared into adults in the lab.

New data on the biology of individual species of fungivorous *Coleoptera* were collected, including records from resupinate and/or annual polypores. More than 100 species of Finnish polypores were discovered to host adults and/or larvae of 179 species from 20 *Coleoptera* families. Over 600 new fungus–beetle species interaction pairs were found, 80% of which were polypore fruit body–adult *Coleoptera* species co-occurrences, and 20% fruit body–larva interrelations. In Finland, the potential fungus–beetle interaction matrix exceeds 35,000 polypore–beetle associations. Only a small fraction (<2%) of this potential has been documented. This fungus–beetle interaction spectrum is structured by the spatial and temporal characteristics of the fungal assemblages, hyphal and structural characteristics of the polypore fruit bodies, and

morphological, such as mouthpart, adaptations of the associated *Coleoptera*.

Forty-one percent of polypore species were neither visited by adults nor colonized by larvae of *Coleoptera*. These polypores with apparently insecticide fruit bodies belonged to the genera in which beetle associations are known, and nevertheless *Coleoptera* at any life stage ignored the living and dead fruit bodies of such fungi. Many of the ignored fungi belonged to taxonomically discrete genera, or were characterized by small, thin, annual, and ephemeral fruit bodies with irregular fructification.

## 24. Beetles of Mr. President: Saproxylic Beetles and Sun-exposure Gradient in Pasture Woodland in the Lány Game Park

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**Keywords:** Sun-exposure, host woody plant, oak, beech, stage of decay, microhabitat, pasture woodland.

Saproxylic beetles are key group for assessing forest biodiversity. We studied this group in the Lány Game Park (Czech Republic), which is a remnant of former pasture woodlands 30 $km^2$ in size. The whole area has been protected since the Middle Ages for the enjoyment of Czech kings (historically) and presidents (recently).

We used trunk-flying interception traps fixed to large diameter trees. Four variables were studied: (i) host woody plant (oak or beech), (ii) sun-exposure (sun-exposed, semi-shaded or shaded), (iii) stage of decay (dead, dying or live tree) and (iv) microhabitat (presence or absence). Eight fortnightly visits from June 13$^{th}$ to August 26$^{th}$ were made.

A model with backward stepwise selection showed the sun-exposure gradient as the only important and significant predictor variable for species richness and population densities. Species richness and population densities in sun-exposed habitats were approximately two times higher than in shaded habitats. Sun-exposed habitats differed in species richness from shaded as well as semi-shaded habitats. However, semi-shaded and shaded habitats were not different. Population densities in sun-exposed habitats were higher than in shaded ones. Sun-exposed vs. semi-shaded, and semi-shaded vs. shaded habitats were not different.

The difference between sun-exposed and shaded habitats was striking. Sun-exposed habitats surpassed shaded ones in both species richness and population densities. Furthermore, we did not find any family of endangered species preferring shade. Majority of the endangered beetles preferred sun-exposed or at least semi-shaded habitats.

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## 25. Where does saproxylic diversity occur in European lowlands?

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**Keywords:** Old trees, evidence-based conservation, endangered beetles, lowland forest.

Forest cover and average stand age are increasing across Europe; the genuine efforts of foresters result in forests with a more natural tree species composition. Despite this, the saproxylic diversity depending on old trees experiences severe decline. We studied saproxylic beetles in oak woodlands of the Thaya floodplain (Czech Republic). Window (FIT) traps were placed in five areas: canopy and understory of closed forest edge and interior, as well as open-grown trees in wooded meadows during the whole vegetation season in 2006. Beetle distribution was related to parameters of the tree with a trap and its surroundings.

In total, we caught 7,302 individuals of 355 saproxylic species; 86 species are included in national red list. Open-grown trees hosted the majority of red-listed species. Species richness and composition of assemblages on open-grown trees starkly differed from assemblages of any closed-forest treatment. Insolation and tree diameter were the main factors affecting the distribution of saproxylic beetles; their effects were independent, as revealed by variance partitioning.

We thus conclude that large and currently the most vulnerable portion of saproxylic biodiversity in lowland forests depends on old open-grown trees. In closed forests, trees lack insolation, and (most significantly) competition prevents them from reaching the age and habitus required by many saproxylic species. Restoration of open-canopy woodlands is therefore crucial to conserve the biodiversity of lowland forests. Suitable management include woodland pasture, coppicing and/or partial cutting. The hands-off approach, however, is the management most often applied to lowland forest reserves and national parks in Central Europe. It leads to increasing canopy closure and will result in the gradual depletion of lowland forest biodiversity. It is necessary to develop and apply evidence-based conservation strategies; otherwise, conservation will not only fail to stop the loss of European forest biodiversity, but will also be one of its causes.

The study was supported by projects MSM6007665801 and LC06073.

## 26. A comparison of the saproxylic beetle fauna on old hollow oaks (*Quercus* spp.) in Turkey and western Europe

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Old oaks (*Quercus* spp.) are known to have very rich saproxylic beetle fauna. This fauna is today threatened all over Europe and in neighbouring areas because of a lack of suitable trees. In this project, similar methods have or will be used in Israel, Turkey, Italy, France, UK, the Czech Republic and Sweden. The aim with the study is to compare the diversity and similarity of this fauna in these countries. Preliminary results from the ongoing analysis are presented. Eight stands with old hollow oaks in four areas were studied in Turkey during 2005–2009. The saproxylic beetles were caught with traps on 10 trees per stand in one season. In this preliminary presentation, only 12 saproxylic beetle families were included and only data from France, UK and Sweden. A comparison shows that both the total species richness per stand and the medium number of species per tree was in most cases higher in Turkey than in the other countries. Only 10% of the species caught with window traps in Turkey and the countries from western Europe were in common. Many of the beetle species found in Turkey were found for the first time in the country and so far 25 species were identified as new to science and 13 of these belong to the Elateridae family.

## 27. Preliminary results concerning the mortality processes and dead wood volume in mountainous hardwood forests in Hungary

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**Keywords:** Tree mortality, dead wood, hardwood forests, beech, Hungary.

Dead wood plays an irreplaceable role in forest ecosystems from both the nature preservation and forest protection points of view. It provides necessary habitats for a large number of rare and protected species and also for many organisms, which definitely benevolent for forest health. Therefore, it is important to know the spatial and temporal patterns in natural tree mortality processes in the forests.

The Department of Forest Protection of the Hungarian Forest Research Institute maintains a network of more than 140 health-monitoring plots with an average of 100 sample trees at each. The oldest ones among these plots were established in 1983. The plots are visited once or twice a year and the health status (including their death) of individually marked trees are scored. On the poster, we present the data collected on 14 beech monitoring plots during an 18-year period.



## 28. Tree characteristics affecting saproxylic beetle assemblage in hollow urban tree

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**Keywords:** Saproxylic beetles, hollow trees, urban.

Many rare and threatened saproxylic beetles live in hollow trees. Tree cavities provide a very diverse environment, hosting many specialized species. There are some studies about the habitat preferences of cavity-associated beetle species, but quantitative data on factors affecting species occurrence and species assemblages in cavities are still scarce.

The aim of this study is to find out which tree characteristics are important for the saproxylic species assemblage. We collected saproxylic beetles in five parks in the Helsinki metropolitan area, Finland, from May to August in 2006. Inside each of the 21 standing hollow trees, we placed a total of six traps, two of each of the trap types used (window, aluminium foil and pitfall). The measured tree characteristics were tree species, diameter at breast height, height of the tree, size and compass direction of the entrance hole, size of the hollow and depth of wood mould inside the hollow.

By clarifying those tree characteristics that are the most important in explaining species richness and the occurrence of threatened species, it may be possible to develop guidelines for identifying and preserving at least the most important trees for biodiversity. In Finland, hollow trees exist mainly in urban and semiurban areas where, however, they are constantly being removed because of land-use pressures but also for the sake of public safety.

## 29. Species dynamics and colonization patterns of saproxylic beetles in a cut down Norway spruce tree in the altimontane belt of Alpine region of Slovenia

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**Keywords:** Saproxylic beetles, dynamics of colonization, phenology, Alpine region.

Colonization of a dying tree by saproxylic organisms is the first part of the decomposition chain. The dynamics of their colonization and development mostly depends on abiotic factors. The research area was in an 80-year-old forest community of *Avenello flexuosae-Piceetum*on, the plot of an intensive monitoring program in Slovenia's Pohorje region. The altitude was 1,304 m a.s.l.; the research location was the Pohorska ecological region; the parent material was dioritoid (tonalite); the soil unit was dystric cambisols; the main tree species *Picea abies* with an average defoliation of 32.9%, and the share of damaged trees was 63.7%.

A Norway spruce tree was felled and left in a stand gap from May 2009 to October 2009. The length of the trunk was 23.8 m; the area of the bark was 54.848 $m^2$, breast diameter was 55 cm, thickness of the bark was 4-7 mm. On different sides of the tree, we measured the temperature and moisture under the bark (T button, H button, Dallas Semioconductor, USA; accuracy 0.5$^0$C, 1%, 30 min., 21 days). We also collected data about direct solar radiation and other GIS data relevant to the research area.

We systematically collected 100×100 mm squares of bark from the felled tree and analyzed the characteristics of the bark and biotic component under the bark (different developmental stages of beetles and other arthropods). We also scanned squares of the collected bark with the OLYMPUS SOFT IMAGING SYSTEM, analysis 3.1 and analyzed galleries of colonists. We collected parts of the trunk (100 to 250mm in diameter). After nine months' rearing in eclectors, they were cut to 20-cm sections and signs of infestation as well as larvae and adult insects were noted. All invertebrates that were found under that bark were also sampled. The collected insects were the primary saproxylic beetles from the *Curculionidae* fam. (*Scolytinae* as floemofagous and Ambrosia beetles), from fam. *Cerambycidae* and *Anobiidae*. The correlation between ecological conditions in the field, the microclimatic condition under the bark (in the field and in the control condition in laboratory) and the development succession of some primary and secondary saproxylic beetles was found and explained.

## 30. Rove beetles (Coleoptera: Staphylinidae) of early stages of saproxylic succession on Norway spruce (*Picea abies* Karst.)

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**Keywords:** Saproxylic succession, *Staphylinidae*, pheromones, bark beetles.

The research was conducted in two areas in Poland, using window traps emitting volatiles-pheromones for bark beetles, terpenoids and ethanol. We have analysed the species composition and a guild structure, treating the occurrence of species in traps as a possible marker of the existing chemical preferences. We also present observed changes in time and regional differences of the beetles caught in the traps.



## 31. *Polytrap 2010*™ our new "soft design" window flight trap for saproxylic beetles

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Over the last 30 years, the "multidirectional" window flight trap has been regularly used in saproxylic beetle studies, baited or not. Trapping saproxylic *coleoptera*, generally cryptic, is useful for different purposes. *Polytrap*™ is our multi-usage, manufactured window flight trap improved for saproxylic beetle inventories, to assess biological value in conservation programs, as well as ecological research. Our 15 years trapping experience is presented in terms of i) efficiency for saproxylic beetle species richness; ii) selectivity: (*Coleoptera* trapped vs other arthropods killed); iii) easy management to mount, to transport and to check traps (examples).

## 32. Sampling saproxylic beetles in hollow urban trees – comparison between three trap types

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**Keywords:** Saproxylic beetles, window trap, pitfall trap, aluminium foil trap, hollow trees, urban trees, trapping methods.

Dead wood and saproxylic species are very important items in biodiversity studies. The large-scale decrease in dead wood is a major reason for the species becoming threatened. About one fourth (25%) of saproxylic beetles in Finland are red-listed due to the human-induced decrease in dead wood. The remaining suitable environments for saproxylics can also be found in urban areas. Several beetle species are specialized in old hollow deciduous trees, which nowadays are mainly found in urban and semiurban surroundings. Many of these species are known to be threatened. A few studies concerning these species have already been carried out; however, less attention has been paid to the methods used in sampling these insects. Sampling insects and sorting the samples in the laboratory is time-consuming work. Choosing a proper method and trap type depends on the aims of the study and restrictions in time and other resources. Previous studies indicate that there are some differences between trapping methods in the species caught. In this study, we focus on comparing the species assemblage trapped with three trap types, i.e. trunk window, pitfall and aluminium foil traps. Furthermore, we compare the time spent on sorting the sample of each trap type. The insects were sampled in 21 hollow trees in the Helsinki metropolitan area in 2006. The trees were located in five parks. The results can be used in planning and optimizing future sampling of beetles associated with hollows.

# 33. Insects reared from fruiting bodies of bracket fungi in a forest reserve in Hungary

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**Keywords:** Insects living in fungi, tinder, photo-eclector, Hungary, Bükk-mountains.

The dead and decaying wood in forests provide important habitats both directly (the deadwood itself) and indirectly (i.e. bracket fungi living on dead wood). While the saproxylic fauna of the decomposing wood is slightly better studied, the faunas related to the bracket fungi are hardly known in Hungary. On the poster we report from the preliminary results of our collections and rearings done in 2004–2005 in the Bükk mountain (NE Hungary).

Twenty species of bracket fungi, collected at 183 locations were put in rearing photo-eclectors. We could rear insects from fungi collected at 85 locations. Most species and most specimens of insects emerged from fruiting bodies of *Fomes fomentarius* and *Phellinus robustus*.

The most abundant beetle species were *Dorcatoma minor* and *Dorcatoma robusta* (*Anobiidae*). *Ropalodontus perforatus (Ciidae)* and *Bolitophagus reticulatus (Tenebrionidae)* were reared from the most samples. In addition to the beetles, three species of *Lepidoptera* were reared from seven fruiting bodies belonging to four species of fungi.



# Section IV

Taxonomy and Phylogeography

## 34. Fauna notes of the Lucanidae in Switzerland

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**Keywords:** Lucanidae, Switzerland, occurrence, faunistical data, dead wood.

In Switzerland, the family Lucanidae is represented with seven species: the well known *Dorcus parallelepipedus* and *Lucanus cervus*, the less frequent *Platycerus caprea, P. caraboides* and *Sinodendron cylindricum* and finally the rare *Aesalus scarabaeoides* and *Ceruchus chrysomelinus*.

The main part of the country is situated north of the Alps and a smaller part is on the southern side, where the climate is generally warmer. Thus, species with thermophile tendencies are widespread in Ticino but less common in other parts of the country.

*Aesalus scarabaeoides* is found only in a few localities in the western part of Switzerland; there are no recent findings. Also *Ceruchus chrysomelinus* is rather rare. There are some findings mainly in the Valais, partly quite recent from the last decade. *Sinodendron cylindricum* is found from Basel to Geneva and in Valais and Ticino.

Usually, we expect *Platycerus caprea* in rather mountainous regions and *P. caraboides* in lower zones, but in the planes we find both species together. Looking to the maps, *P. caprea* occurs in higher and lower regions as well while *P. caraboides* is found in deeper altitudes in a belt from the Lake Geneva to the Lake Constance. The two species are not always easy to determine, but Franciscolo (1997) gives a clear key to distinguish them. *Dorcus parallelepipedus* and *Lucanus cervus* are widely spread in nearly all parts of the country, especially in Ticino, Valais and western regions.

All species need dead wood for their development. While *Dorcus parallelepipedus* develops in all kind of wood of different decay stages, *Aesalus, Ceruchus* and *Sinodendron* need old forests with red rotten wood. For improvements of the nesting sites, we focus mainly on *Lucanus cervus* and collect all available data to better understand his requirements.



## 35. Molecular taxonomy of Italian *Lucanus* L. (Coleoptera, Lucanidae)

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**Keywords:** *Lucanus*, mtDNA, saproxylic beetles, flagship species, Italy.

The European stag beetle *Lucanus cervus* (Linnaeus, 1758) is one of the best-known, familiar and easy-to-identify coleopteran species listed in Annex II of the European Habitat Directive; it is considered a flagship species for conservation of saproxylic insects. A second closely related southern European species, *Lucanus tetraodon* (Thunberg, 1806) is mainly distributed in central and southern Italy (recently also recorded from a relict locality in Lombardy, Ticino valley: Zilioli & Pittino, 2004). The two species are sympatric in some areas of central and central-northern peninsular Italy where are known to occur individuals morphologically in-between *L. cervus* and *L. tetraodon*. We therefore used molecular methods to analyse some sampled specimens of these apparently "intermediate" morphotypes. A 792 bp fragment of mtDNA cytochrome C oxidase I gene (COI) was sequenced.

The examined populations sampled in overlapping areas of the two species are genetically to be referred to *L. cervus*, and markedly different from *L. tetraodon*. Moreover, these preliminary results show a marked differentiation between *L. cervus* and *L. tetraodon* at least by means of mitochondrial DNA. This preliminary taxonomical scenario is to be confirmed by more data on mtDNA sequences, nuclear markers and a geometric morphometric analysis.

## 36. *Morimus asper* (Sulzer, 1776) and its Western Palaearctic allies: genetically supported natural entities or taxonomic artefacts?

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**Keywords:** *Morimus asper, M. funereus*, molecular analysis, European Habitats Directive.

As with many other taxa, nominal species ascribed to the genus *Morimus*, included in the European Habitats Directive, were not exempt from arbitrary interpretations, thus rendering taxonomy and nomenclature of this group very unstable. Muller (1950) was the first author to deal with the difficult subject of morphological variability in the European *Morimus*. He observed that because of the existence of several "transitional forms" in the thus-far considered diagnostic characters, a correct and unequivocal identification of several specimens is often difficult. For these reasons, he considered the European *Morimus* a single, morphologically variable species [*Morimus asper* (Sulzer, 1776)]. Later, the same problem was addressed by Dajoz (1976), using a simple biometric approach. Dajoz, without noting significant and constant differences, excluding the shorter antennal length in *M. funereus*, reported markedly different conclusions from those of Muller: he synonymised *M. orientalis* Reitter, 1894 with *M. funereus* Mulsant, 1863, while treating the other previously recognized taxa [*M. ganglbaueri* Reitter, 1894 and *M. verecundus* (Falderman, 1836)] as valid species. As observed by Sama (1988), Dajoz's

conclusions could be strongly biased by the inadequacy of the sample, in particular referring to the *M. funereus* specimens, all coming from Peloponnese, therefore not representative of the variability of the taxon.

The aim of research presented here is to verify the validity of European nominal species belonging to the genus *Morimus* using molecular data, chiefly in order to discuss both taxonomic status and conservation role of *Morimus funereus,* a taxon included in the European Habitat Directive (Annexe II) and IUCN red lists. Our preliminary results suggest that the European *Morimus* actually represent a single, genetically and morphologically variable, species.

## 37. Inferring dispersal abilities of saproxylic beetles from spatial genetic structure

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**Keywords:** Habitat fragmentation, spatial genetic structure, isolation-by-distance, AFLP, *Osmoderma barnabita, Protaetia marmorata, Elater ferrugineus.*

Dispersal plays a pivotal role in population dynamics and genetics, and thus it shapes the chances of population survival. In particular, estimates of dispersal abilities are of critical importance in designing conservation strategies for populations living in a highly fragmented habitat. In Europe, saproxylic insects dependent on different forms of dead wood are among the most threatened species, experiencing strong habitat fragmentation. However, knowledge about dispersal range for these species is scarce, except for a few large-bodied model organisms. This is caused mainly by the fact that methods usually applied for studying animal dispersal (direct observation of movement, mark-release-recapture or radio tracking) are logistically difficult to set up in small-bodied insects. Because dispersal in most instances leads to gene flow, molecular markers can be used to quantify effective dispersal, that which is accompanied by gene flow. Information on dispersal distances may be inferred from patterns of population spatial genetic structure by fitting the Wright's model of isolation-by-distance, where genetic variation among individuals is not random due to limited dispersal. The slope of a log-linear regression of observed kinship on distance between individuals and the knowledge about effective population density allows for the estimation of an axial variance of dispersal, a measure of a total gene flow close to the average distance of dispersal. Using this approach, we compared dispersal of *Osmoderma barnabita* and *Protaetia marmorata* (Cetoniidae), two endangered scarab beetles connected to tree hollows, and their larval predator, *Elater ferrugineus*. Our results are in line with the theory that dispersal distances of more specialized species are more restricted than those of generalists. Additionally, because dispersal distances is related with a degree of spatial continuity of a population, the results allow also for the optimization of conservation measures, including such problems as required density of conserved habitats.



## 38. Phylogeography of the stag beetle (*Lucanus cervus*)

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**Keywords:** Phylogeny, Lucanidae, *Lucanus cervus.*

This phylogeography of the stag beetle *Lucanus cervus* (L,1758) aims to elucidate the colonisation history and timing of this species from putative southern refuges after the last ice-age. The study will allow us to delineate evolutionary significant units, help to evaluate the current taxonomic status of the stag beetle and related species and detect hidden variation. The results will contribute to the conservation strategy of this species.

We sequenced a fragment of approximately 750 basepairs at the 3' end of the Cytochrome Oxidase I gene (COI). In total, we analysed 130 samples covering more than 50 localities distributed over its natural range. Our samples include the morphotypes *cervus, pentaphyllus* and *turcicus*. We also analysed *L. ibericus* (Motschulsky,1845), *L. tetraodon* (Thunberg,1806) and *Pseudolucanus barbarossa* (Fabricius,1801).

Our results show that most of Europe is occupied by closely related haplotypes differing for only one or two nucleotides. Recolonisation happened by two different haplotypes from a single refugium, Spain or Italy. The samples from Greece and Bulgaria cluster together and are clearly differentiated form the other European haplotypes. This group shows a higher degree of diversity, indicative for large and stable populations but apparently this group was not the source for the recolonisation of Europe. The morphotypes *cervus* and *turcicus* from these countries are interspersed, which suggests that these are not genetically differentiated. We did not find genetic support for a subspecies status of the morphotype *pentaphyllus*. The haplotypes of *L. tetraodon* and *P. Barbarossa* are clearly different from the *L. cervus-ibericus* group.

From a conservation point of view, we conclude that most of the European range is genetically homogeneous and can be managed as such. Populations from Greece and Bulgaria are a clearly separate management unit. More variable markers, such as microsatellites, will be needed to study fine-scale differentiation patterns.

# Section V

Saproxylic Beetles and Forestry

## 39. Saproxylic beetles and forestry in Tasmania, Australia

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**Keywords:** Tasmania, wet eucalypt forests, forestry, conservation management, dead wood, saproxylic beetles.

Forestry in Tasmania takes place in a very different ecological, social and management contexts from those in most of Europe. In Tasmania, European occupation stretches back only two hundred years, and intensive forestry only about a quarter of that time; consequently, there are still large areas of near-natural forests, including old-growth (much of which is reserved), while many other areas are only in their first silvicultural rotation. However, most native forest types are fire-prone, so in the wider forest landscape old-growth is no more the natural state than are earlier seral stages. This situation presents different challenges for conservation management than those faced in Europe, while also presenting learning opportunities for practitioners in both regions. The challenges and learning opportunities are particularly apparent when considering the conservation of saproxylic beetles and their dead-wood habitat. Unlike in Europe, most Tasmanian species are poorly known taxonomically and ecologically, and there is little prospect of this changing soon. Yet much has been achieved through a targeted research programme focusing on the lowland wet eucalyptus forests, where pressures from intensive forestry are greatest. This presentation will outline some of this research, and how it is feeding into practical management outcomes that should allow Tasmania to avoid the regional extinctions that have occurred in Europe, while still catering for the needs of today's forestry.

## 40. Management of a forest reserve conserving saproxylic beetles: the example of the Bois de l'Hôpital (Neuchâtel, Switzerland)

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**Keywords:** Saproxylic beetle conservation, forest reserve, Switzerland.

The goal of this study is to propose specific actions aiming at preserving saproxylic beetle populations and especially rare species, taking into account the general management of a forest reserve.

The study site is a periurban forest above the city of Neuchâtel in western Switzerland. The studied habitats are the downy oak (*Quercus pubescens*) forest on the southern slope, the beech (*Fagus sylvatica*) forest on flat areas alternating with dry meadow patches and large black pine (*Pinus nigra*) plantations.

The general management goal of this forest reserve is to conserve rare plant associations, to preserve characteristic fauna and flora and especially rare species. In order to achieve these goals, the following management actions were undertaken: preserve open habitats, reduce black pine occurrence, restore and enhance oak forest and preserve old tree islands.

An inventory of four beetle families with a well-known ecology (*Cerambycidae, Buprestidae*, *Lucanidae* and *Scarabaeidae Cetoniinae*) was made by means of direct collection. Between 2004 and 2009, twenty-five collecting tours, lasting an average of 1.45 hours were performed from the beginning of May to the beginning of July. Fifty-three beetle species were caught. Their ecological requirements were assessed and, on this basis, six ecological groups were identified. For each of them, potential conflicts between saproxylic beetle conservation and general management actions were analysed. Proposals were made to solve these conflicts.

In order to find a balance between sometimes contradictory actions, the best solution in such a small area is a patchwork of forest and open biotopes. In the forest itself, tree diversity should be enhanced and old trees preserved and promoted. In the open areas, special attention should be paid to old bushes growing in the edges. They should not be removed at the time of the clearing maintenance. For this purpose, we suggest to include old trees and bushes in the management plan and to mark them in the field to avoid their logging at the time of management actions.



## 41. Saproxylic beetle assemblages in the Mediterranean region: impact of forest management on richness and structure

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**Keywords:** Mediterranean oaks, pines, beetle diversity, community ecology, Israel.

Forests cover almost 30% of the Mediterranean region today, and forest management activities have influenced the structure and composition of both natural and planted forests. To date, no study has been conducted to evaluate the impact of forest management on saproxylic beetle assemblages, although it is known that the Mediterranean is a biodiversity hotspot with a long-lasting human pressure on natural habitats. We provide an overview of the saproxylic beetle assemblages of three forest types (mature *Pinus halepensis* forests, mature *P. brutia* forests, young *Quercus calliprinos* forests) in the east Mediterranean region using a one-year sample from 12 forest plots located in the north of Israel.

The studied forest types differed in forest structure, but we found no significant difference in saproxylic beetle species richness. Aleppo pine forests showed the largest number of saproxylic beetle species. Forests dominated by *P. brutia*, a non-native tree species in Israel, show the lowest species number of all three forest types. Species composition differs substantially between oak and pine forests. A third of the species found either in *P. halepensis* or in *Q. calliprinos* forests being unique to these habitats, while a smaller proportion of unique beetle species is found in *P. brutia* forests. Several beetle species that were found both in oak and pine plots in our study develop exclusively on broadleaved shrubs or trees. This may be explained by the small distances between the studied pine trees and oaks in their proximity.

Biodiversity in pine forests can be increased when these are mixed with broad-leaved trees, e.g. oaks in the understorey layer, as can be observed the natural regrowth in most of the planted pine stands in our research area. There is some evidence from other studies that older successional stages of oak forests are likely to host more species overall than the mature pine forests studied here. In order to enhance structural diversity, foresters should allow for aging of single trees or stands, regardless of the tree species.

## 42. Biodiversity of saproxylic beetles in managed conifer forests in Slovenia

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**Keywords:** Managed forests, biodiversity, saproxylic beetles, Slovenia.

The presence of entomofauna was assesed on eight locations in three ecological regions: four were on limestone parent rock in monocultures of *Pinus nigra*, one was on flysch in the stands of *Pinus halepensis* (all mentioned locations were in the submediterranean ecological region), one location was in a stand of *Pinus sylvestris* on brown soil, one was in a stand of *Abies alba* (both were in Prealpine region), and the last one was in a stand of *Picea abies* in the western part of Slovenia (Dinaric region). All chosen locations were in well-managed, mature forests. The trapping was conducted from 2007 to 2009, and the samples were collected in one-month intervals from July to November. Entomofauna was collected with black cross-vane traps (four traps/location) by means of a wet collecting method and attractants (ethanol and α-pinene, released at about 2 g/day at 25-28° C, and pheromones Pheroprax and Gallowit). Twenty-four families from the order Coleoptera were detected: Curculionidae (and subfam. *Scolytinae*), Cerambycidae, Aderidae, Histeridae, Oedemeridae, Ostomidae, Dermestidae, Rhizophagidae, Cleridae, Staphylinidae, Elateridae, Silphidae, Nitidulidae, Cuccuidae, Buprestidae, Colydiidae, Melyridae, Scarabaeidae, Catopidae, Erotylidae, Scaphidiidae, Mordellidae, Chrysomelidae and Carabidae. The most numerous beetles in the catch belonged to the *Scolytinae* at 77% (20,857 specimens), then Cerambycidae at 8% (2,199 specimens), Curculionidae at 1.5% (412 specimens) and Buprestidae at 0.1% (36 specimens). The most important saproxylic family was Cerambycidae; 24 different taxa of longhorn beetles were collected; 21 different species were determined. The dominant species was *Spondylis buprestoides,* next were *Arhopalus rusticus, Monochamus galloprovincialis, Neoclytus acuminatus, Arhopalus ferus, Leiopus nebulosus, Stictoleptura rubra* and *Prionus coriarius*. Collected species of longhorn beetles represent ca. 10% of all known species from this family in Slovenia. With regard to our finds, we can conclude that Slovenian forestry legislation (Act of Forestry 1993 and Rules on the Protection of Forests 2009) and adopted EU legal regulations regarding the protection of forest biodiversity ensures the preservation of saproxylics at present time and in the future. The Rules on the Protection of the Forest prescribe that the amount of planned kept woody debris in forests has to be from 0.5 to 3% of woody stock; at present, the amount of dead wood left in the forest is even more than prescribed.

## 43. Diversity of saproxylic beetles in one of the southernmost Iberian beech woodlands

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**Keywords:** Species richness, accumulation curves, forest type, sampling method, Iberian peninsula.

During summer 2008 and 2009, we studied the species richness of saproxylic beetles at the Hayedo de Montejo ancient woodland, one of the southernmost beech forests in the Iberian peninsula. Although this woodland is protected and included in the list of European ancient woodlands of interest for saproxylics in the report *Saproxylic invertebrates and their conservation*, no quantitative inventory of saproxylic beetles had been carried out. We found 4,168 invididuals belonging to 182 species of saproxylic beetles in 45 families. One species (*Allandrus therondi*) was new to the Iberian list of fauna. Despite being located at the southern distribution limit, this beech forest hosted a good representation of saproxylic beetles usually found in the northern Iberian peninsula. Accumulation curves predicted 213-271 species; thus, our sampling detected 68-87% of the saproxylic beetles present at our study site. Samples taken at three kinds of forest (*Fagus sylvatica*, *Quercus petraea* and *Q. pyrenaica*) showed the highest species richness in beech forests, probably due to the older age of those trees and the greater presence of dead wood. Samples taken by using three sampling methods (window traps, funnel traps and bait traps) showed a higher number of species in window traps. However, the three methods complemented each other by capturing species not present in the other kinds of traps.



## 44. The Conservation of dead trees in West Dinaric mountains; poster presentation

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This poster presents a part of forest management in the west Dinaric mountains; it is made by Zavod za gozdove Slovenia, which is responsible for forest planning in Slovenia. Among other forest functions, the biotopic forest roole is very important. Three percent of trees are dead in the forest region of the West Dinarics. Those trees are important for the preservation of many organic species. Among others, there are the species protected by the Natura 2000 project, including many bird, mammal and beetle species. Those species use dead trees as place for living or a place where food can be found. In forestry plans, there are directions to preserve dead trees as perfect conditions for protected species.

## 45. Beetles associated to dead wood in the forest reserves of Hungary

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**Key words:** Beetles, dead wood, forest reserves, photo-eclector, window traps.

The aim of our research was to identify the insect communities living in the dead wood of Hungary's most common forest stands (beech, oak) and to test different research methods. We focused on the following families: bark beetles *(Scolytidae)*, jewel beetles *(Buprestidae)*, and longhorned beetles *(Cerambycidae)*, because some of them are considered to be serious pests of managed forests.

The investigations were carried out at two locations: ER-46 Hidegvíz-völgy (Sopron mountain), and ER-59 Vár-hegy (Bükk mountains). ER-46 is a mixed sessile oak and beech stand, while ER-59 is dominated by sessile oak. On each location, 12-12 plots were selected as follows: 4-4 plots are in the core-areas (all human intervention is prohibited); 4-4 plots are in the protective zones (this area moderates outer impacts on the reserve area); and 4-4 plots in nearby managed forests. We used trap logs of different diameters and various insect traps (eclectors, window-traps, bark beetle traps) to catch the insects.

Altogether, we collected 264 trap logs from the two sites, and placed them into photo-eclectors to rear the insects. No insects emerged from 64 logs. The evaluation and statistic analysis of the reared insects is still in progress. Of the traps, the

window trap (made of transparent foil) proved to be the most effective. The 12 window traps caught over 1,000 insects, including over 600 beetles in one year.

The statistical analysis indicates that both the sampling plots and the different areas (core area – protective area – managed forest) can be compared. The logs of different tree species and different collection-time were analysed separately. We also analysed the surrounding forest stand, the canopy-closure, the effects of the environmental factors (tree species, grade of decomposition, log diameter, light-exposure, history of the forest, etc.).

## 46. No Country for Old Trees: Forestry intensification induced loss of key habitats for endangered beetles in the March-Thaya floodplain, Czech Republic

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**Keywords:** Sustainable forestry, Natura 2000; intensification, Lower Morava Biosphere Reserve, GIS.

Old open-grown trees host numerous saproxylic species, including the jewel beetle (*Eurythyrea quercus)*, or the great capricorn (*Cerambyx cerdo*) and hermit beetle (*Osmoderma barnabita*) listed in EU Habitat directive. Such trees used to be common in pasture- and coppice-with-standard woodlands. Forestry intensification led to the abandonment of traditional forest practices.

We studied the impact of changes in forest management on the availability of open-grown trees in the Thaya-Marchfloodplains. The area is a hot-spot of saproxylic diversity classified as Sites of Community Importance (SCI) under the EU Habitats Directive. Using visual interpretation of aerial photographs from 1938 and 2006, we compared changes in total forest cover, cover of open woodlands and number of solitary trees within area of 10,000 ha.

Area of open-woodlands has decreased by 95.6% (from 651 to 29 ha) and number of solitary trees halved (decrease by 51.5%) in less than seven decades, while total forest cover increased by 3.6% (from 7,731 to 8,015 ha).

The results show a dramatic fall in potential habitats of our models, including the "target species" of Sites of Community Importance – the *C. cerdo* and *O. barnabita*. Nearly all open-woodlands disappeared and the number of solitary trees decreased within relatively short period of time. The numbers of open-grown trees will further decrease due to intensive forestry focused on closed-canopy, even-aged oak plantations. The long-term survival of species depending on old trees is thus threatened in the area. The extent of open woodlands must have been considerably larger in 19$^{th}$ century, before intensive forestry was replaced by pastureland.

Our results demonstrate that intensification of forestry created enormous extinction debt. Current management decreases biodiversity; it thus does not meet the criteria of sustainable forestry. Restoration of open woodlands is vital to meet the international obligations of the Czech Republic in the conservation of endangered species.
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