2nd meeting of the European stag beetle group

December 5th 2009

Leiden, the Netherlands

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Programme and Abstracts

Organisation
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Cover photo: *Lucanus cervus* male. Photo R. Krekels

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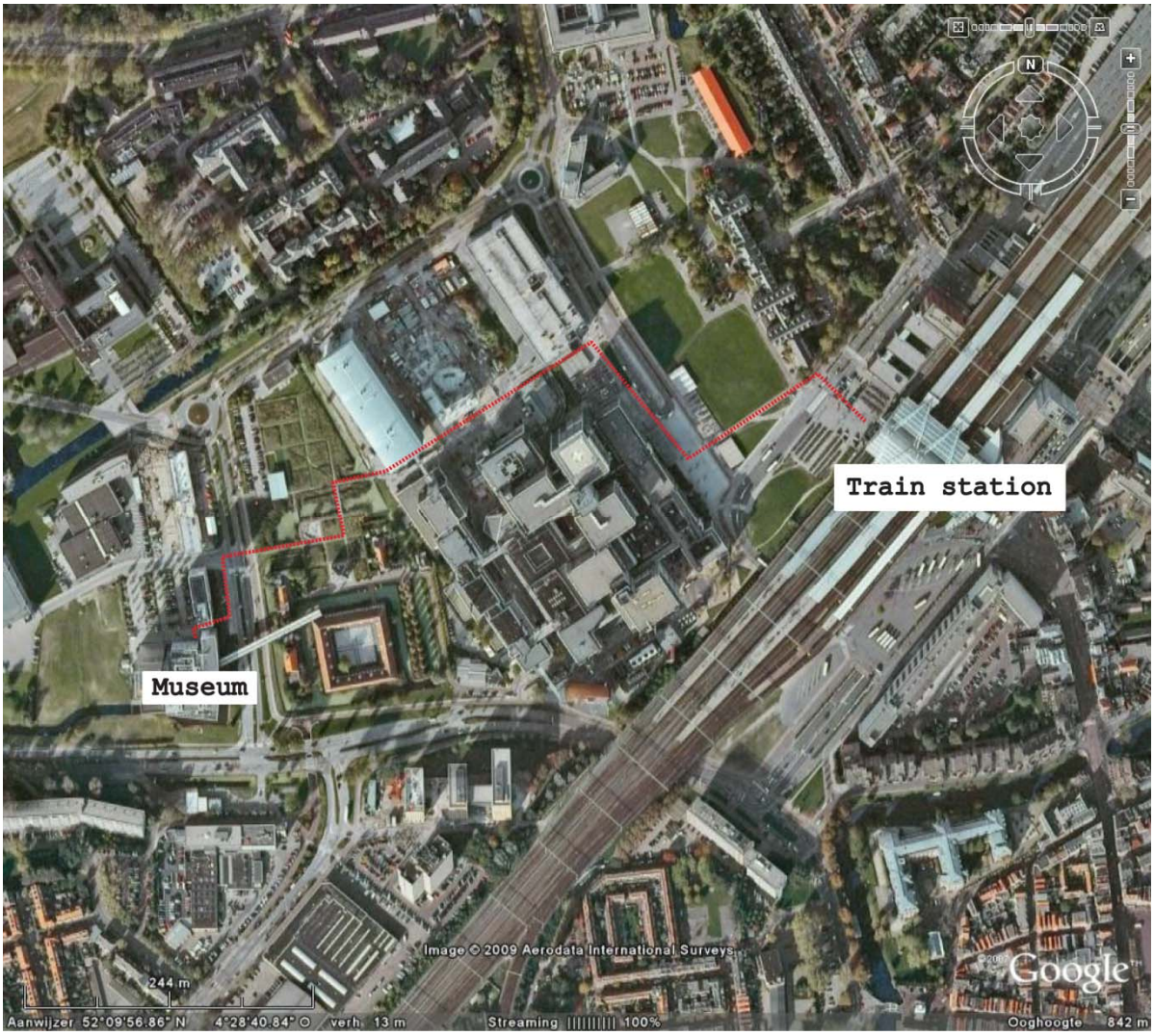
Itinerary

ROUTE FROM TRAIN STATION TO MUSEUM NATURALIS

From the train station it is a 5-10 minute walk to the museum. Take the exit (= uitgang in Dutch) 'LUMC' and 'Naturalis', which is the northwest side of the station. Outside there are signs 'Naturalis' all the way to the museum. You walk around the 'LUMC'. The signs 'Naturalis' will lead you to the main entrance of the museum, however you will need to go to the employees entrance. Therefore you will have to cross another road and walk towards the collection tower (the big grey tower, to your left from the main entrance, see figure below). There you'll find the employees entrance and at the desk, which is inside, there will be a badge awaiting you that will allow you to enter the building.



Programme

Saturday 5 December

10.00 Arrival and coffee

11.00 Opening

11.00 **A. Thomaes & K. De Gelas**
Phylogeography of the stag beetle *Lucanus cervus*: outline and perspectives

11.30 **G. Antonini, S. Cortellessa, P. Cerretti1, A. Campanaro, F. Mason & P. Audisio**
Molecular taxonomy of the genus *Lucanus* L. in Italy

12.00 **J.T. Smit & R. Krekels**
Conservation of the stag beetle *Lucanus cervus* in the Netherlands

12.30 Lunch

14.00 **C. Hawes**
Radio-telemetric monitoring of stag beetles *Lucanus cervus* at two sites in the United Kingdom: limited dispersal and its implications for conservation

14.30 **E. Sprecher-Uebersax**
New pictures of the stag beetle *Lucanus cervus* in Art and Mythology

15.00 **M. Mendez**
Introduction on the discussion of possible joint future projects

Abstracts

Molecular taxonomy of the genus *Lucanus* L. in Italy

Antonini1 G., Cortellessa1 S., Cerretti1,2 P., Campanaro A1,2., Mason2 F. & Audisio1 P.

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The European Stag beetle *Lucanus cervus* (Linnaeus 1758) is one of the best-known, familiar and easy to determine coleopteran species listed in Annex II of the European Habitat Directive and is considered a flagship species for conservation of saproxylic insects. A second closely related species, *Lucanus tetraodon* Thunberg, 1806 is mainly distributed in central and southern Italy (recently also recorded from a relict locality in Lombardy, Ticino valley: Zillioli & Pittino, 2004). The two species are syntopic in some areas of central and central-northern peninsular Italy where are known to occur individuals morphologically in-between *L. cervus* and *L. tetraodon* ("*L.* sp. cf. *cervus*"). We therefore used molecular methods to analyse some samples of these apparently "intermediate" specimens. A 750 bp fragment of mtDNA cytochrome C oxidase I gene (COI) was sequenced from 23 Italian individuals belonging to three sample groups, i.e. *L. cervus* (13), *L. tetraodon* (2) and *L.* sp. cf. *cervus* (8).
Intra-group TN93 distances ranged from 0.0 % to 2.8% and inter-group TN93 divergences ranged from 3.3 % to 12.8 %.
The examined populations of *L.* sp. cf. *cervus* (sampled in overlapping areas of the two species) are genetically close to those of *L. cervus*, and markedly different from those of *L. tetraodon*. Moreover, these preliminary results show a marked differentiation between *L. cervus* and *L. tetraodon* (mean genetic distance 12.8%), at least by means of mitochondrial DNA..
This preliminary taxonomical scenario is to be confirmed by more data on mtDNA sequences, and by additional slower nuclear markers (in order to investigate on hypothetical phenomena of hybridization or past introgression between the two species) in the next future.

Radio-telemetric monitoring of stag beetles *Lucanus cervus* L. (Coleoptera: Lucanidae) at two sites in the United Kingdom: limited dispersal and its implications for conservation

Colin Hawes

School of Biological Sciences, Royal Holloway University of London

Stag beetle movements at two sites, a private householder's garden (habitat 1) and a tree surgeon's woodyard (habitat 2), both of which contained plentiful supplies of decaying wood, were monitored radio-telemetrically. Beetles were captured from the ground and in flight when they emerged from over-wintering. A miniature transmitter (tag) was attached to the pronotum of each beetle, which was then radio-tracked until its transmitter battery-life was over (15-26 days). Monitoring was carried out for three consecutive years (2007-2009) using a total of 15 tagged males and 15 tagged females. At both sites, male behaviour comprised frequent flights commencing at a height of 8-9 m from resting places in trees. The maximum distance recorded for a single flight by a male was 50 m, and the maximum displacement distance 225 m. Few males were observed to fly beyond the habitat at both sites. Female behaviour consisted almost entirely of consecutive movements on the ground towards suitable habitat for oviposition. The maximum distance travelled recorded for a single movement by a female was 20 m, and total displacement 29 m. Data suggest that in general female beetles remain at the site where they emerge, walking instead of flying, if a plentiful supply of suitable decaying wood is at hand. At such sites it seems that the majority of males fly in search of females but remain in the vicinity of the habitat that the females occupy. It is suggested that in such habitats where larval pabulum is plentiful, females do not travel far, thus conserving energy, which can better used for digging to find suitable underground ovipositing sites. Dispersal capacity, which is dependent on female beetles, seems to be limited at these sites and thus would limit the colonisation of new sites. It is suggested that the poor dispersal capacity of females at both habitats 1 and 2 would lead to an increased probabilty of local extinction. The role of the few males that travelled beyond the habitat at both sites would seem to be that of maintaining the gene flow between neighbouring populations. The limited dispersal of males shown in this study would therefore limit this gene flow. These findings have implications for stag beetle conservation, especially in terms of siting artificial deadwood/log-pile habitat for these insects.

Conservation of the stag beetle *Lucanus cervus* in the Netherlands; a practical approach

John T. Smit[1] and René F.M. Krekels[2]

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International legislation compels all member states of the European community to actively protect the stag beetle *Lucanus cervus* (Linnaeus, 1758). In the period 2003-2008 several projects have been executed for the conservation of this species in the Netherlands. An overview of the approach in the Netherlands is given: from a status report via a national survey to regional conservation plans. The status report was based on all available information from the literature and scientific collection. This report provided the basis for a more focused national and regional survey carried out with the help of the general public through a publicity campaign, resulting in very accurate distribution maps. The improved knowledge on the distribution made it possible to draw up regional conservation plans, describing the actual status, the threats and bottlenecks and the measurements needed at population level. Enlisting the help of the general public however also has obvious disadvantages in terms of record validation.

New pictures of the Stag beetle *Lucanus cervus* in Art and Mythology

Eva Sprecher-Uebersax

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Since the role of the conspicuous and largest European beetle, *Lucanus cervus*, was largely studied (Sprecher & Taroni, 2004), many new pictures were found. Thanks to the ability to stimulate people's imagination and its ability to be transformed into a variety of roles, the stag beetle appears in a rich variety not only in wonderful illustrations but also in all kind of objects. It is included in the repertory of decorative art, on porcelain, on jewellery, on stamps and on a variety of consumer goods. It has incessantly captured the imagination and fascination of mankind and has been known in Europe since the antiquity. The first written sources, in which it is mentioned, appear in ancient Greece and the last are very recent paintings from the 21st century, demonstrating a very impressive span for this charismatic beetle. The stag beetle's popularity is based not only on the mythological tales, but also on its magical powers. By the time, it slowly rid itself of the once assigned symbolic meaning and took on a descriptive and decorative function, finally becoming the favourite subject of many artists, transforming table settings, still-life portraits and forest scenes with its sheer presence.

Phylogeography of the stag beetle *Lucanus cervus*: outline and perspectives

Arno Thomaes & Koen De Gelas

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Molecular markers allow for a detection of cryptic variation and can shed a light on the long term history of a species, as well as on the radiation among closely related species. With this phylogeographic study of the stag beetle *Lucanus cervus* (L, 1758) we want to elucidate the colonisation history and timing of this species from putative southern refugia after the last ice-age. Furthermore, the study will allow us to delineate evolutionary significant units, helping to evaluate the current taxonomic status of the stag beetle and detect hidden variation. If cryptic variation is detected, we plan to analyse whether this variation is associated with morphological differences.

To reach the goals of our project, two regions of the mitochondrial DNA will be sequenced and evaluated for variation among individuals. We will sequence approximately 700 basepairs of the 5' end of the mitochondrial Cytochrome Oxidase I gene (COI), the so-called 'barcoding region'. Another segment of approximately 850 basepairs at the 3' end of the COI gene will be analysed. Our samples currently (n=213) cover 64 localities (17 countries) with 1 to 10 samples for each locality. From these samples approximately 28 are determined as the forma '*turcicus*' (Sturm, 1843). Besides these we have access to samples from *Pseudolucanus barbarossa* (Fabricius, 1801), *L. tetraodon* (Thunberg, 1806) and *L. cervus* '*akbesianus*' (Planet, 1896). If possible we hope to include *L. ibericus* (Motschulsky, 1845) and *L. cervus judaicus* (Planet, 1902) as well.

The current geographic distribution of genetic lineages (haplotypes) will be used to infer colonisation patterns and can help to outline a protection strategy based on the genetic variation of the species. The knowledge on historical colonisation processes can help us to better understand the limitations in the colonisation capacity of this species and to formulate protection measures on a landscape scale. Possibly, the division between major phylogroups can be dated and compared with other data from colonization patterns of tree species. Given the saproxylic nature of the beetles we can expect to find some associations.

The results on large scale genetic patterns will also help to put contemporary patterns in the genetic structure of the stag beetles in perspective, e.g. a higher genetic diversity for microsatellite markers in certain geographic regions. Microsatellite markers are currently developed by D. Harvey and P. Shaw (RHUL) and will open up the possibility for detailed research on interactions within and among populations.

List or Participants

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