Masters in dendrochronology at the WSL (Zurich, Switzerland)

Analysis of the influence of May bug outbreaks on oak wood anatomy

Research background

Cockchafer (*Melolontha melolontha* L., colloquially also called *May bug*) is an insect beetle very abundant throughout Europe and which represented a major pest in the periodical years of "mass flight" especially prior to the use of pesticide introduced in the 1980s. Because of long development time as larvae, cockchafers appear in a cycle of every three or four years, and in colder climates even five years. These years vary from region to region. The imagos (adults) have a voracious appetite and thus have been and sometimes continue to be a major problem in agriculture and forestry where they feed by eating the fresh developing leaves.
During insect outbreaks trees can be completely defoliated which impacts tree growth and ring formation. These marks, which can be found in oak (*Quercus robur* and *Quercus petraea*) tree rings as well as in archaeological wood, can therefore be used to reconstruct past life cycles and to relate them to different climatic periods.

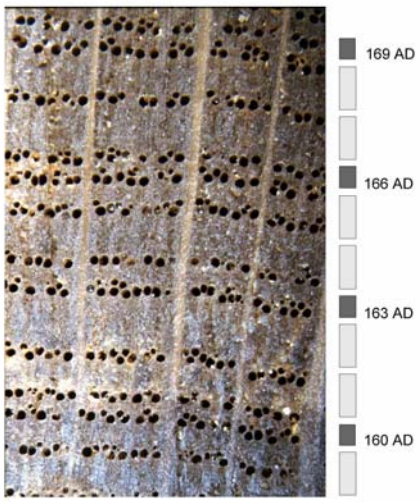
Aims

The goal of this master project is to identify wood anatomical structure in oak tree-rings that can be directly and uniquely related to May bug outbreaks.
- Is it possible to identify anatomical characteristics which are typical for outbreak years?
- Do outbreak years result in smaller annual rings with different anatomical structures?
- Is it possible to develop methods for the identification of outbreak years in order to build long term outbreaks chronologies?
- If possible, build a long outbreak chronology (several centuries).

Shaking cockchafers from a tree: In the pre-industrialized era, the main mechanism to control their numbers was to collect and kill the adult beetles, thereby interrupting the cycle.

Methods

Outbreak years should be collected based on outbreak maps, and/or air photographs from outbreak regions. Analyses can be performed on oaks from Oberrheingebiet (3 year cycles) and from the Valais (3 year cycles). Work can be performed at the Institute for Forest Growth with a short stay at the WSL in Zurich (CH).
- Measure and cross-date tree-ring widths
- Measure earlywood vessels on dated rings with image analysis
- Develop a method to identify and reconstruct the outbreak signal
- Write a scientific report



Example of 3 year cycles outbreak recognizable on a archeological wood piece

Referenten

Willy Tegel, Institute for forest growth (http://www.iww.uni-freiburg.de/)
Patrick Fonti, WSL (http://www.wsl.ch/personal_homepages/fonti)

Links and references

Introduction to Dendrochronology (web.utk.edu/~grissino)
Institute for forest growth (http://www.iww.uni-freiburg.de/)
WSL Dendro Science Unit (www.wsl.ch; www.wsl.ch/forschung/forschungsunits/dendro)

Your profile

You have a background in natural sciences and are motivated about learning innovative dendrochronological methods.

Interested?

For further information, please contact Willy Tegel. To apply, please send your letter of interest, CV, and addresses of potential referees to tegel@dendro.de