INSECTS AND OTHER INVERTEBRATES

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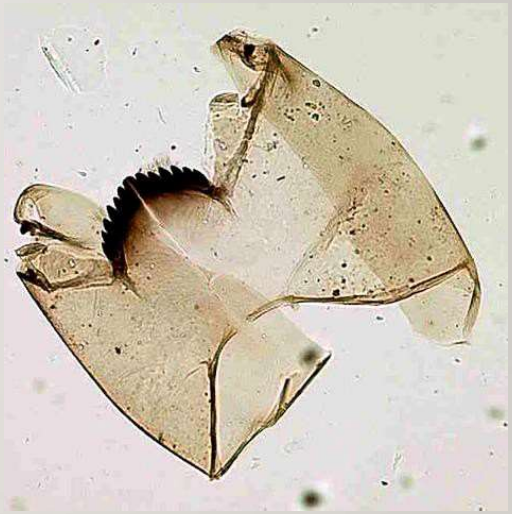
BACKGROUND

- Insects reflect rapid environmental and climatic change events more rapidly than any other indicators
- With winged insects this can be very fast i.e. in the space of a few hours
- Most invertebrates are very tiny and require a specialist to even notice.
- Never pick them out yourselves unless you know what you're doing!

- Types of arthropod remains used as indicators:
  - Chironomidae (non-biting midges)
  - other Diptera (flies)
  - Caddis (Trichoptera)
  - Coleoptera (Beetles)
  - Mites (Acari)
  - Fleas (Siphonaptra)
  - Lice (Anoplura/Mellophaga)
  - The vast majority of archaeological applications concentrate on beetles and flies



Flies (dipteran puparia), flea (*Pulex irritans; Early medieval Irelane*) & body louse (*Pediculus humanus; Norse Greenland*); Chironomid head capsule (*Orthocladius* sp.) and caddis frontoclypeal apotome (Limnephilidae). Beetle – *Cartodere constricta* (Van project)

WHY INSECTS?

- **Stenotopic – Limited to a specific environment:** Many taxa have highly specialised niche
- **Monophagous (Only eating one thing):** Many taxa (esp. Weevils and Chrysomelids) have specific dietary preferences e.g. *Donacia crassipes* only on waterlilly
- **Stenothermic – Limited to narrow temperature range:** Many taxa have specific temperature preferences e.g. *Diacheila arctica* arctic stenotherm ground beetle

PRESERVATION AND ISOLATION OF CHITINOUS REMAINS

Insects have a hard exoskeleton fortified with chitin, a very tough polymer present in insects and fungi

Usually preserved in states of either permanent wetness or permanent dryness. In cess pits by mineralization too

Damaged by wet/dry cycles (as David said too)

Isolated by 'paraffin flotation' technique which relies upon hydrophobic nature of chitin.

Large samples required – ideally 5-10 litres plus. Depends on material

PROCESSING: PARAFFIN (KEROSENE) FLOTATION

Samples are disaggregated with water over a 300µ (i.e. 0.3 mm) sieve, to wash out the clay-silt component.

Remainder is mixed well with paraffin, then topped up with cold water.

Hydrophobic chitin 'sticks' to the paraffin and floats up with it to the top of the mixture.

Leave for plant matter to settle out, then gently decant off paraffin (plus insects!) through 300µ sieve.

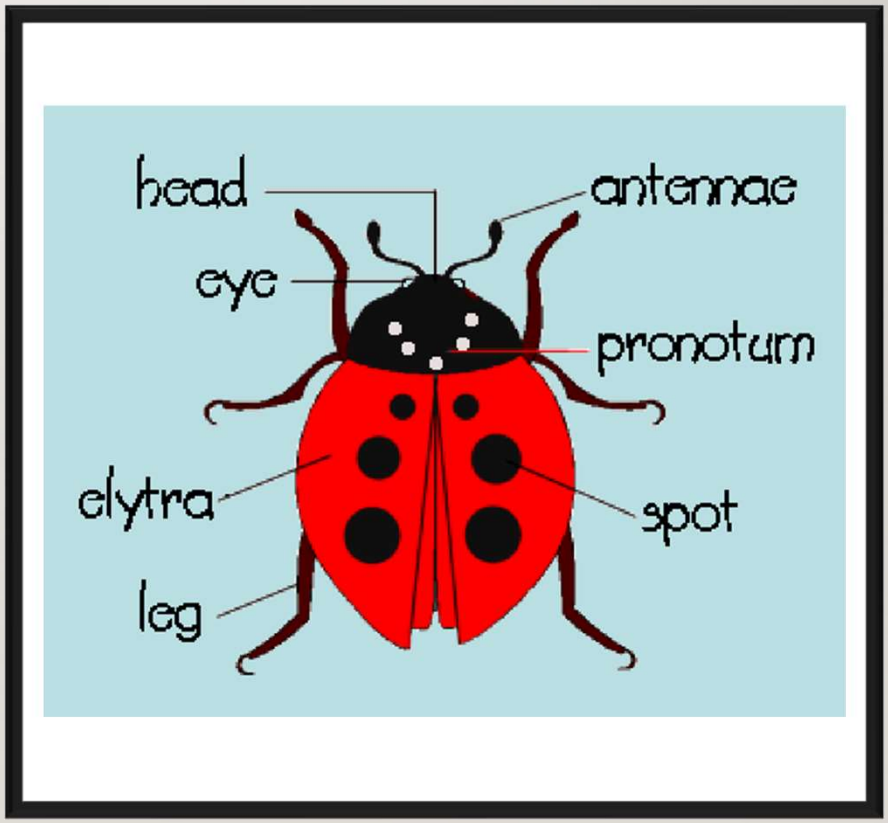
Wash off paraffin in sieve with detergent. Final wash with alcohol. Wash into a sample jar in 100% alcohol.

PROCESSING

- **Picking**. Insects usually only make up a small proportion of the flot. Even then not all of the chitinous stuff that floats is useful
- **Sorting**. Sort picked insect remains to lowest taxonomic resolution. This depends on what you are being asked to do
- Once initial sort is complete re-sort into, sub-families and genera, then take to the comparative collection for final identification if a full species list is required
- Also makes use of specialist literature

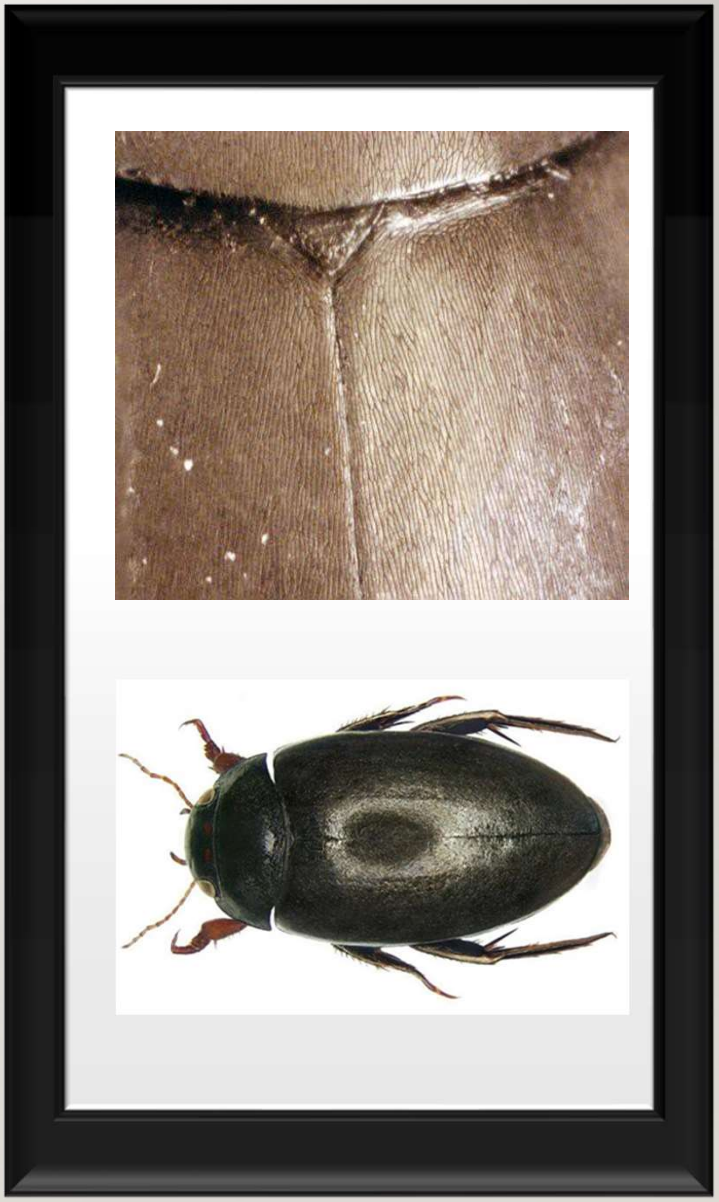
SIMPLIFIED BEETLE ANATOMY

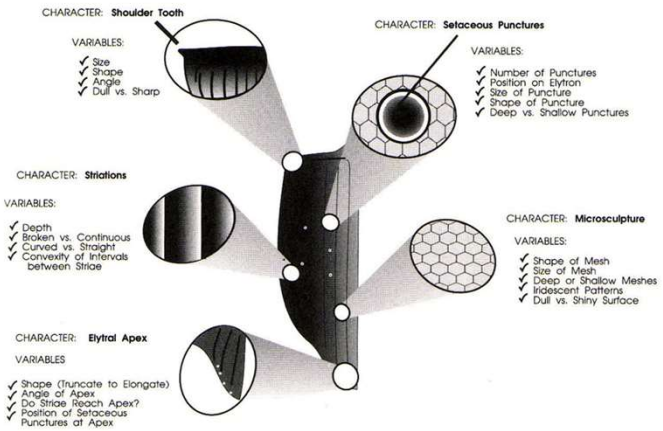
- Individual body parts known as '**sclerites**'
- Hardened wing-cases known as **elytra** (singular **elytron**)
- **Thorax** also known as **pronotum**
- These are almost always disarticulated in palaeo-samples
- Some (e.g. legs/antennae) often of little use in i.d.

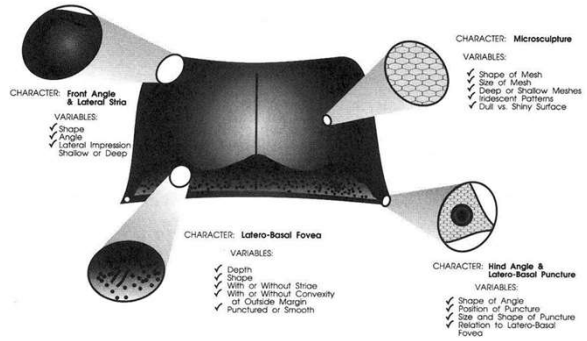


IDENTIFICATION

- Important features:
  - General form (shape, eye form, scutellum etc.)
- Size (not always a good guide though)
- Ornamentation (scales, hairs)
  - Microsculpture (pores, patterns, serrations, notches etc.).
  - Colour often useful but not always reliable.
- These should enable you to reduce the number of possibilities and narrow the identification down to at least family level
- These are quite conserved, even between regions







Identification characteristics – Elias (1994)

SAMPLING STRATEGIES

- Can be either:
  - Stratigraphically constrained (e.g. midden deposits, natural accumulations such as channel fills, peats). **This can be used to look for subtle change over time**
  - Context driven (e.g. excavated surfaces, post holes etc.). **This can also look for spatial variation**
  - **Mostly judgement-based sampling**
- As a result of large sample size, insect analysis is usually only recommended from exposures or (very) large core samples
- Even with good exposures, in practice sample resolution is usually a minimum of 5 cm

PICKING UP ON SOME EARLIER POINTS

- Because you can't see insects it doesn't mean there are no insects. Most of them are very tiny!
- Because you can't see stratigraphic change it doesn't mean there is none
- The importance of a sample is not necessarily in what it tells you alone but in a bigger narrative (e.g. Ellen's discussion on fulacht fuel use)
- If in doubt, ask…

DISADVANTAGES – WHY NOT ALWAYS USE INSECTS?

- Large samples required (for beetles). Can make temporal resolution problematic
- Difficult! Needs a lot of effort to get to reasonable standard – so few specialists around
- Standard aids to identification not very useful (unless you already know roughly what it is!)
- Needs access to a good reference collection

SIGNATURE ASSEMBLAGES

- Using insects and a variety of other indicators we can form ‘indicator groups’ for specific human activities (or, in fact natural processes)
- Approach pioneered by Harry Kenward and continued by David Smith
- These can be based on experimental archaeological evidence (with certain caveats)
  - So, by looking at a modern cess pit we can get a good idea of what an archaeological cess pit assemblage might look like

SIGNATURE ASSEMBLAGES: STABLE MANURE

- Manure derived from animals kept indoors
- Includes a distinctive indicator package of bugs
  - Things from buildings (Spider beetles, structural pests) – ‘house fauna’
  - Things from food (grain weevil, saw toothed grain beetle, meadow stuff)
  - Things from dung (dung beetles)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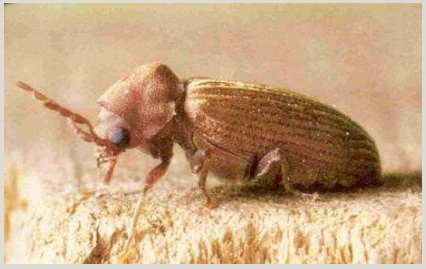
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Insect components of the cesspit fauna

House fauna (i.e. related to buildings)	• Woodworm; ptinids
Stable manure	• Dung beetles; meadow taxa
Foul/rotting vegetation	• *Cercyon* spp. for example
Stored product pests	• e.g. *Sitophilus*; *Oryzaephilus*
Decaying vegetation (not so foul as above!)	• Many staphs
Cess	• Flies! In particular…

TIE-INS WITH OTHER METHODS

- One of the things that struck me earlier is that we need to stress that these methods work together
- So, the burnt mound stuff – the insects also say clearings, wet woodland; understanding the natural environment is important and neglected
- We can see evidence of trade and exchange (e.g. movement of *Aglenus*; *Tenebroides*)
- We see partitioning of space; human health and hygiene; industry (e.g. tanning)
- But it is a bigger story. When we look at one sample from one cess pit someone might well say 'so what'?, but when you have a hundred samples from different times and places then you have a narrative