Bringing the Dead Alive

Dr Erica McAlister
Senior Curator, Diptera and Siphonaptera
Diptera Collection
- 4 million specimens
NHM Mosquito Collection statistics

- So much known – so little known
- 500 drawers of pinned material – main collection
  - 57,000 specimens
- 11 drawers of pinned material – British collection
  - 2,900 specimens
- 150 drawers of slide material
- 40 jars of spirit material

1,200,000 specimens
NHM Mosquito Collection statistics

• 2,400 primary and secondary types
• 2,900 species (of 3,500)

• Individual specimen records – 2139 😞
• At current rate the mosquito collection will be digitised in 150,000 years
Axio Scan
SLR - stackshot
Explore and download the Natural History Museum's research and collections data.

Search the Natural History Museum Specimen Collection

3,810,248 of the Museum's 80 million specimens are now available online.

- 400,705 Palaeontology
- 363,550 Mineralogy
- 668,471 Botany
- 1,003,122 Entomology
- 1,374,400 Zoology
Insect soup

Image from the Australian Museum.
Axiell Sapphire – rapid digitisation work flow
Spatial surveillance

Lack of detailed data on the past and present distribution of mosquito vectors is a major limiting factor for modeling of vector-borne diseases.

Lack of data causes problems as problems of local scale within country.

Dr. Steve Le Comber
• 5423 records of mosquitoes in UK – 2900 from NHM
• Specimens are biased!
  – Dirichlet Process Mixture (DPM) model of geographic profiling
  – jack-knifing approach to estimate the bias
DNA extraction

- Underutilized genetic resource
- Most material in collections not used
  - Fragile/valuable specimens
  - DNA sampling can be destructive
  - Badly degraded DNA therefore not suitable for most PCR-based gene sequencing

- NGS – able to extract meaningful amounts
A present look into the past

... but what happened over the last 100 years?  

last 15 years

Population shifts within species and genera

Resistant to various insecticides

Permitting direct measurement of allelic changes across time – direct measures of selection
aDNA methods in a historical context

Obtaining *Anopheles* (and *Plasmodium*) genome sequences

... with minimal sample destruction

DNA preservation assessment
Developing new and implementing established aDNA methods
To date....

- Slide scanning and specimen data uploading to portal
- Pinned specimens to be made digi-ready
- Development of aDNA protocols
- Further implications - pollinators
Thanks

- The NHM and all that she encompasses
- The World and all the specimens it has provided
- Mara Lawniczak, Sanger Institute
- Steve le Comber, Queen Mary's University