



# Automated mass-digitisation line for individual insect specimens

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Finnish digitisation service centre specialised in high-performance (mass -, large scale -) digitisation of natural history collections

In University of Eastern Finland, Joensuu campus

**Co-operation with the Finnish Museum of Natural History (= Luomus, in University of Helsinki) and the National Digital Library of Finland** 



www.digitarium.fi







#### **Tasks**

- Development of methods and processes
- Research (e.g. tools for automatic processing of data)
- Training of specialists, knowledge dissemination
- Digitisation services for museums



European Union European Regional Development Fund European Social Fund





## **Insect collections in Finland**

- At Luomus: around 9 million specimens, mostly butterflies, beetles and two-winged Diptera
- + other museums and private collections: total of 20 million specimens

# *Of the specimens, less than 5 % have been imaged and 15 % databased*





# **Imaging of insects: challenges**

variable sizes



reflective exoskeleton



### number and position of labels

### fragile structures



### small morphological details

3D...





# Imaging process at Digitarium: insects

- Before arriving to Luomus, insect collections will be digitised at Digitarium
- Only specimens, images and metadata are welcomed to Luomus
- -> imaging of individual specimens





# Is it possible to digitise insect specimens using conveyor belts?

#### ...this is what we have...



#### Maybe a smaller version..?



## A couple of months later:

Automated digitisation line for insects, Buggy, was born

- Individual insects are transferred through conveyor belt system on pallets
- Specimens and labels remain pinned
- Cameras produce top (insect) and side images (insect and labels)

https://www.youtube.com/watch?v=Z2tW1NkxEd U&feature=youtu.be



## **Buggy: present perfomance**



- Specimen size 0.5 35 mm
- New specimen imaged every 14 s (max)
- Max 250 specimens per hour
- In practise, process = 4 min
- 2 operators: ±500
  specimens / day / line
- Resolution of images: from the top 25 Mpix, from the side 14 Mpix



## **On-going Coleoptera test drive, outcomes**

- Digitisation of a specimen produces 2 TIFFs, 3 JPEGs, properties file, metadata file = 10 MB
- Presently 12 000 / 13 000 specimens digitised (in 1.5 months)
- Metadata: collector's name, taxon, (date) (data entry by Digitarium)
- Collector's accession books have been digitised and databased (accession number, locality, date; data entry by Luomus):

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## **Obstacles during the development**

- ID labels have to be really small (handling difficult) dublex printing: same information on both sides
- Not available palletts that carry the specimens are selfmade out of plastic by using a 3D-printer
- Mirror writing to make text (dates) from mirrors human readable, software produces third image





# **Future for Buggy**

- Buggy will be part of the everyday digitisation process
- New property: focus stacking by using automated StackShot<sup>™</sup> camera rail Test with parasitoid wasp collection (*Parasitica*)
- Testing with differently pinned / glued specimens
- Need for in-demand label printing
- Pre- and post-processing development (*need for speed*)



## digitise!

### Thank you

