

Mass digitalisation of mayflies and stoneflies: state of the art and new pipeline to accelerate data acquisition

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Ephemeroptea (=Mayflies = Eintagsfliegen)

- 3'752 species all over the world,
534 species described in the last 10 years
- Freshwater larvae
- Widely used for bioassessment of water quality
- Adults living a few hours.
Not eating, just reproduction!



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Plecoptera (=Stoneflies = Steinsfliegen)

- 3'720 species all over the world,
436 species described in the last 10 years
- Freshwater larvae
- Widely used for bioassessment of water quality
- Aerial adults (poorly flying)

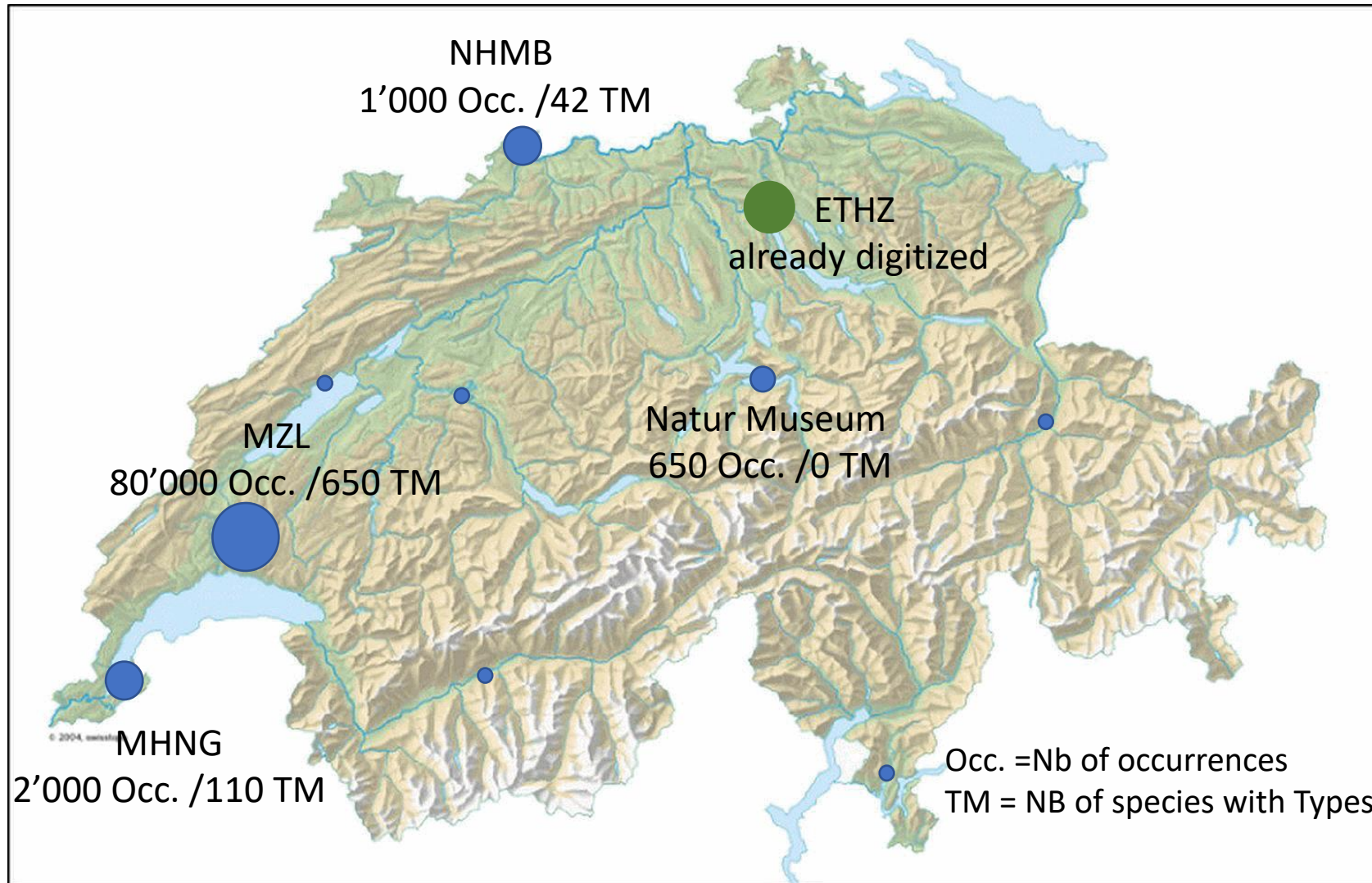


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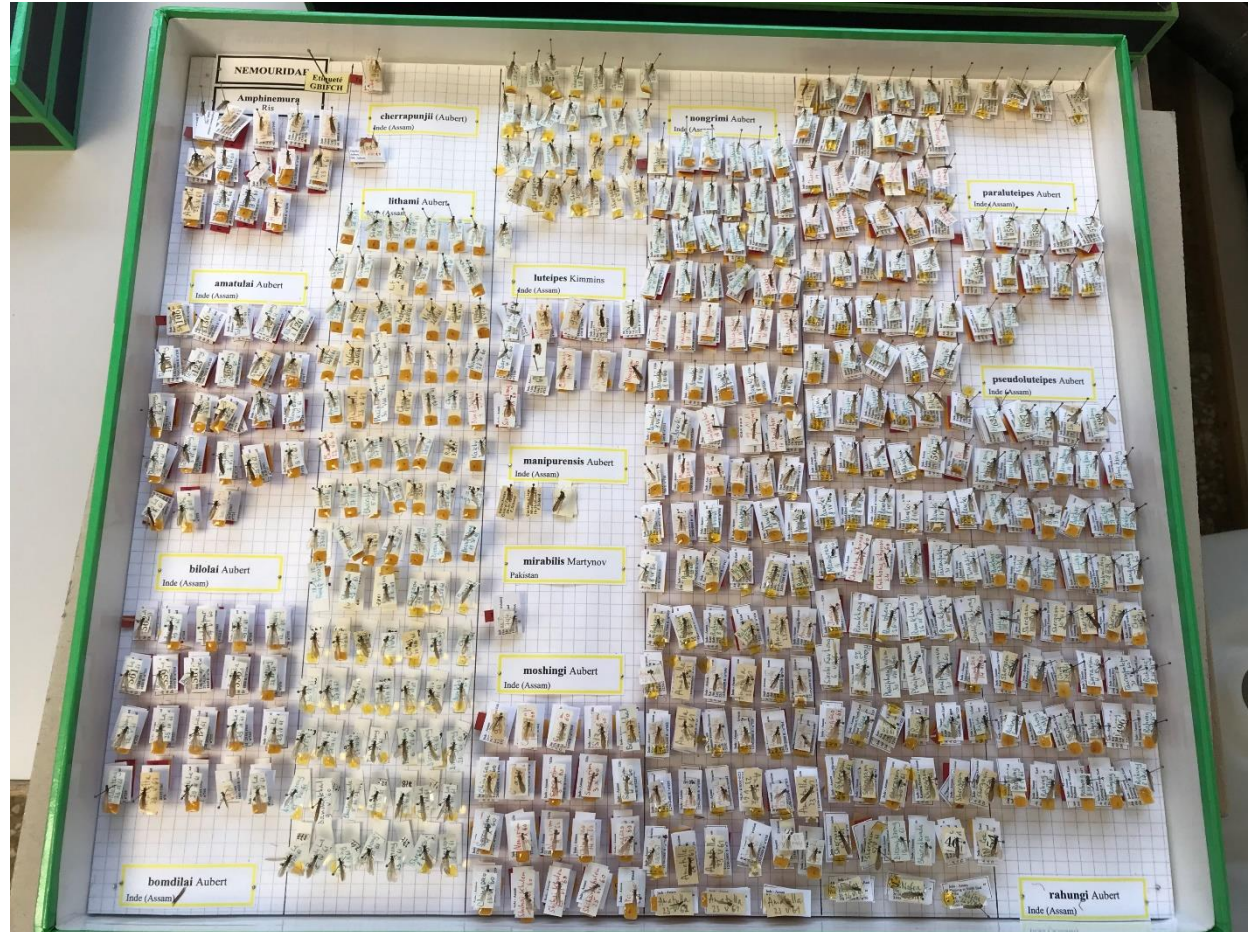
Main collections of Mayflies and Stoneflies



85'000 occurrences
800 species with types
(=10% of the species known in the world!)

Dry (pinned) + in fluid (alcohol) + slides

10% of the occurrences

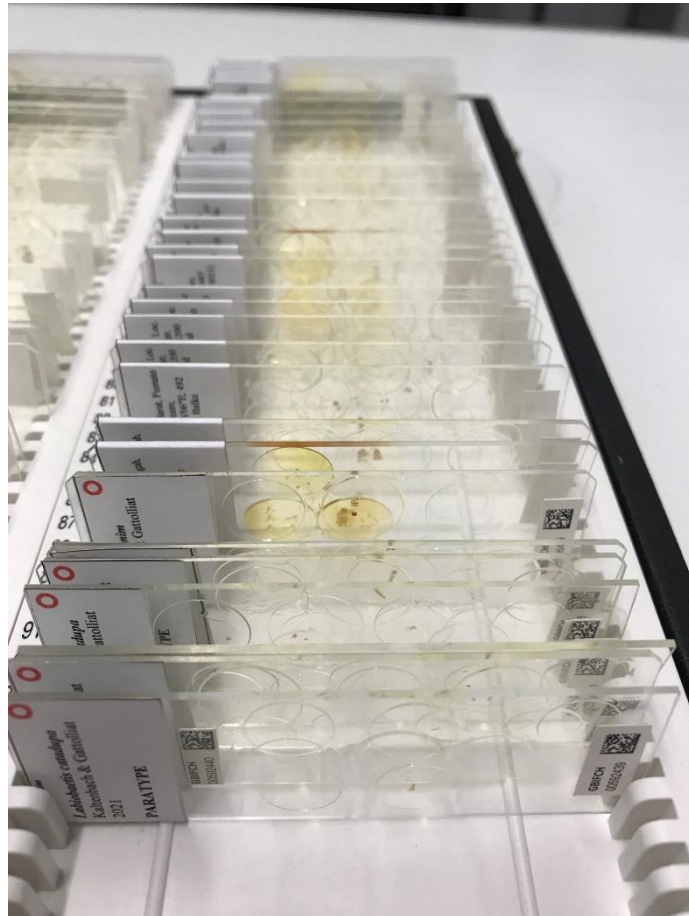


Dry (pinned) + **in fluid (alcohol)** + slides
75% of the occurrences



Dry (pinned) + in fluid (alcohol) + slides

15% of the occurrences



Type material-Historical material-Mass survey-Exotic material

THAILAND ; Kanchanaburi
province, Thong Pha Phum district,
Huai Khayeng stream, Ban Pra Chum
Mai ; 14°34'57.9"N,
98°34'52.0"E ; 269 m ;
20.XII.2019 ; leg. B. Boonsoong

Baetidae
Cymbalclleon sartorii
Suttinun, Gattolliat & Boonsoong,
2020
PARATYPE

GBIFCH
00673236



Baetidae
Cymbalclleon sartorii
Suttinun, Gattolliat &
Boonsoong, 2020
PARATYPE

GBIFCH
00673096



THAILAND
Loei province, Phu Luang
district, Ban Non Pattana,
17°06'24.0"N, 101°
28'43.4"E, 527 m,
18.XII.2018
Leg. C. Suttinun

Specimens, labels & slides:
acquisition of pictures with
a digital microscope
(i.e. Keyence)



Type material-Historical material-Mass survey-Exotic material



Average: 5-8 labels per pin

Type material-Historical material-Mass survey-exotic material



- In MHNG: historical collection of F-J Pictet contains
- 33 types of Mayflies (353 specimens)
 - 29 types of Stoneflies



Type material-Historical material-**Mass survey**-Exotic material



Type material-Historical material-Mass survey-**Exotic material**



State of the art after six months & Average time per occurrence

Type material (MZL + MHNG): **1378 occurrences**

Historical material (MHNG): **1060 occurrences**

600 in alcohol, 450 pined and 10 slides

Large collection (MZL): **17'400 occurrences**

State of the art after six months & Average time per occurrence

Type material (MZL + MHNG): **1378 occurrences**

Historical material (MHNG): **1060 occurrences**

600 in alcool, 450 pined and 10 slides

Large collection (MZL): **17'400 occurrences**

 **85'000 occurrences in 24 months!**

State of the art after six months & Average time per occurrence

Type material: **7- 15 min/** occurrence

Historical material: **5 min/** occurrence

Large collection: **2.5 min/** occurrence



How to save time?

- Not possible for pinned specimens because of the numerous labels... and the fragility of the specimens

How to save time?

In fluid

- By taking picture:
 - Of the label(s)?
-> label data capture
 - Of the specimen(s)?

Impossible with a single picture



VILE: Vial Imaging and Label Extraction

Developed by the Natural History Museum, London



VILE: <https://doi.org/10.5281/zenodo.3462015>

VILE: Vial Imaging and Label Extraction

Workflow

Imaging:

1. A vial is placed in the centre of the rotating stage
2. Images are taken every second
(= at 72°, 144°, 216°, 288° and 360°)



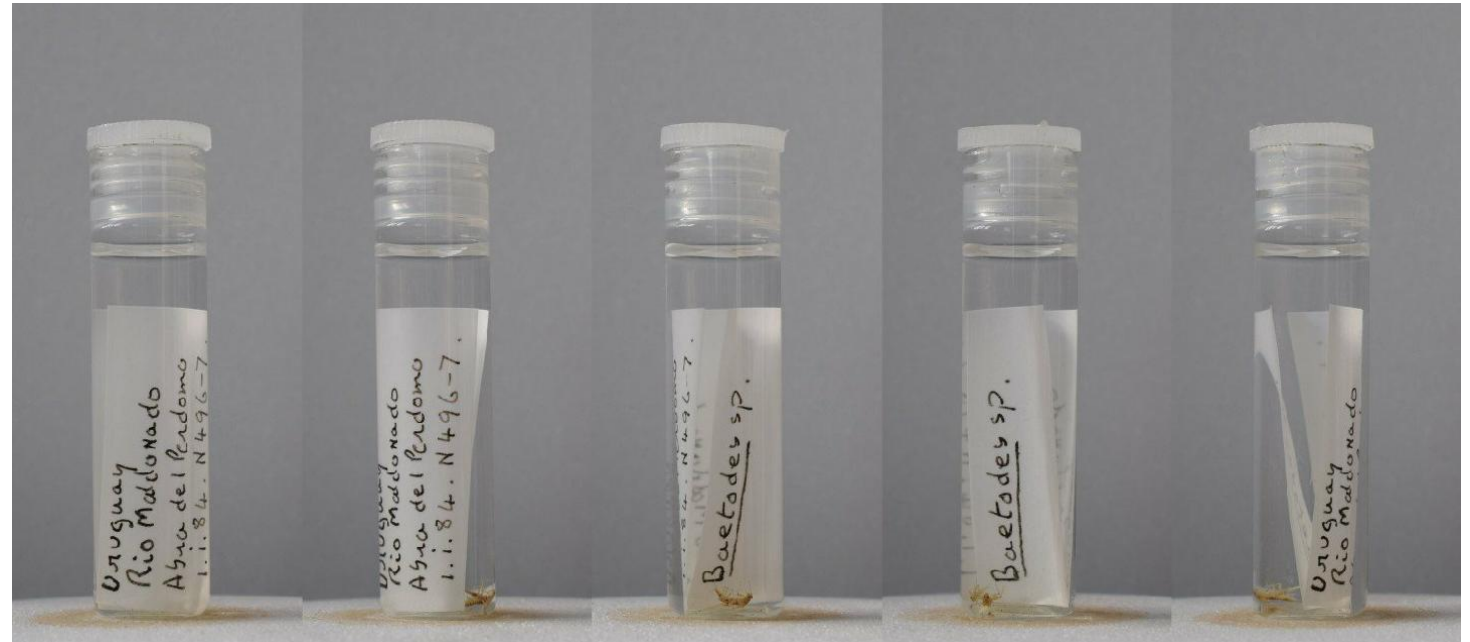
Rotating stage
5 seconds per turn
-> one picture every second

Image processing (all steps automatically made):

1. Images are renamed
(logiciel [Gouda](https://github.com/NaturalHistoryMuseum/gouda): <https://github.com/NaturalHistoryMuseum/gouda>)
2. Images are cropped
(Logiciel XNConvert v1.76)
3. Stitch 5 images together
(Logiciel ImageMagick 7.0.7 <https://github.com/ImageMagick>)

VILE: Vial Imaging and Label Extraction

Result: Pictures of the vial under different angles allowing a good reading of the labels and a rough view of the specimens



3 minutes per vial

(including time for manual transcription of the data)

ephemeroptera



Help ? Advanced - Query Query Reset Resources

preservative ~ spirit

associatedMedia exists

2,599 results with images

showing 401-500 of 2,599 results total

Cite Share Download

Table List Gallery

100 images associated with results 401 - 500



Portal of the Natural History Museum, London
(2599 results for Mayflies)

AI: Can we imagine a more efficient process in the future?

1) Stitching of the label



2) OCR (optical character recognition)

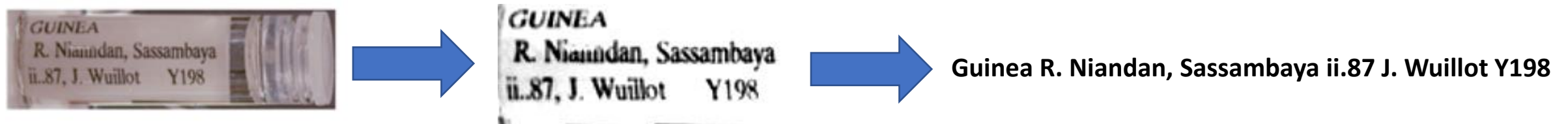


AI: Can we imagine a more efficient process in the future?

1) Stitching of the label



2) OCR (optical character recognition)



But

- Time consuming: several steps still need to manually made
- OCR: Too many mistakes with handwriting labels

Many thanks to those who work to the success of the project
(Museum of Natural History, Lausanne)

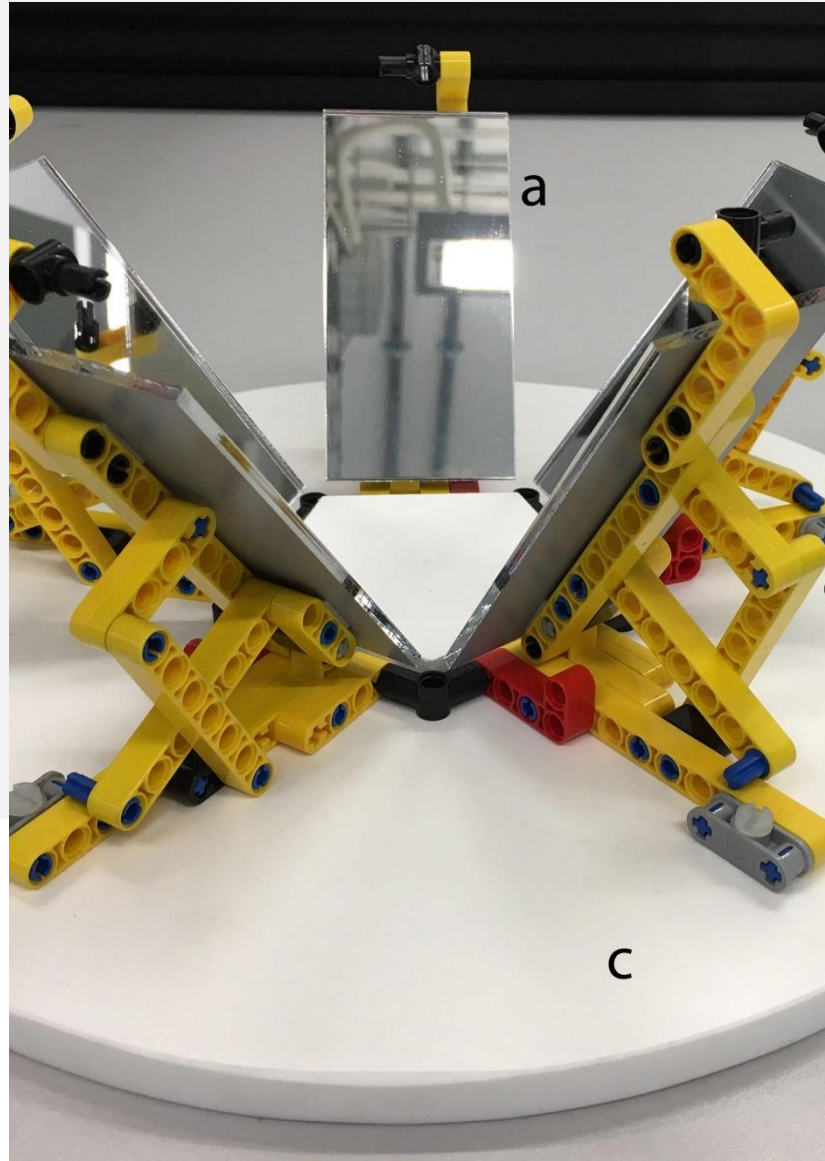
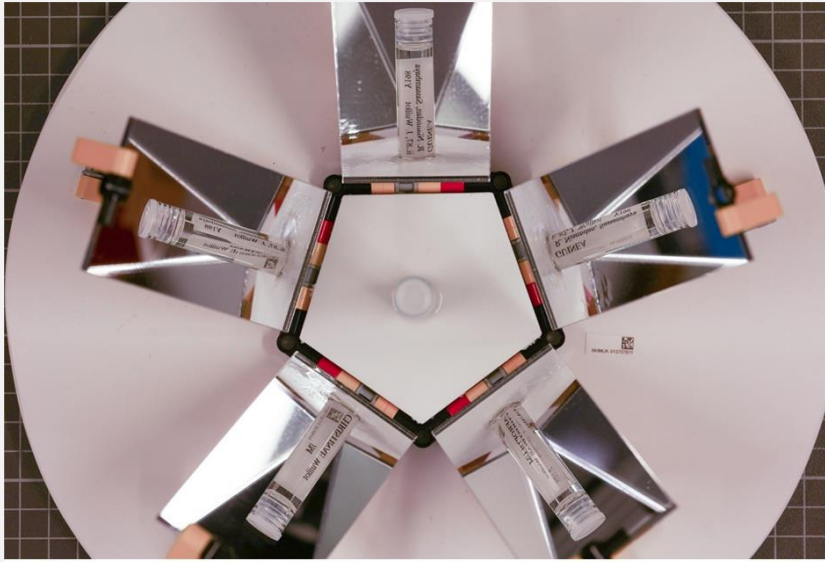


...And to those who support the project
and give access to their collections



...And to ScNat
and SwissCollNet
for the financial
support





MALICE: Mirror Angled Label Image Capture and Extraction

ReVILE

