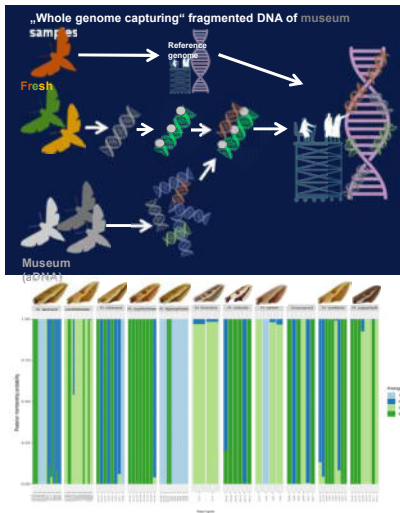


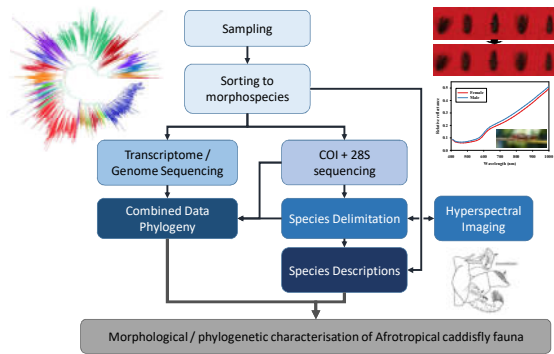
Motivation and Results

Four Senckenberg projects with a financial volume of nearly 1M € explore new methods to better understand speciation processes and facilitate biodiversity assessment.

- Palearctic *Hyles* moths show conflict between wing patterns and genetic clusters (Fig. 1).
- Proteomic fingerprinting facilitates long-term monitoring of zooplankton (Fig. 2).
- Hyperspectral imaging and DNA barcoding accelerates species detection in caddisflies (Fig. 3).
- Integration of citizen science and molecular species assignment works well for lichens (Fig. 4).



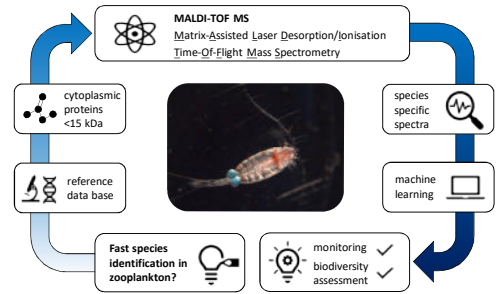
1 Hybridization is frequent in *Hyles* moths. Mitochondrial DNA from historical museum collections sheds light on how many genomes mix to produce hybrid species helps to clarify the enigmatic taxonomy.



3 The diversity of African caddisflies is severely under-explored. Combining hyperspectral imaging with a DNA barcoding approach and a transcriptome-based phylogenetic backbone allows us to rapidly detect, describe and illustrate undescribed species.

Contribution to SGN Program Portfolio

- The four projects contribute to Senckenberg's **CORE MISSION** by describing, analyzing and documenting biodiversity in an earth-system context.
- The **COLLECTION-BASED** development of novel approaches and integration of a broad spectrum of methods is a key element of our **COLLECTOMICS** approach.
- The development of practical assessment tools helps to monitor **ANTHROPOCENE BIODIVERSITY LOSS**.
- The integration of citizen scientists into research enables direct and bi-directional transfer of knowledge between **SCIENCE AND SOCIETY**.



2 **Proteome fingerprinting of zooplankton:** Sustainable management of marine ecosystems under human pressure requires detailed biodiversity monitoring. Zooplankton responds rapidly to changing environmental conditions and is an ideal biomonitor, but identification is difficult and time-consuming. Proteome fingerprinting by MALDI-TOF MS can greatly facilitate species identification.



4 A major bottleneck for lichen taxonomy is the lack of proficient collectors with access to molecular data. *Lecanomics* joins citizen science with molecular species detection. Geographic coverage of inconspicuous and rarely collected taxa is massively improved by this approach.

Outlook

Explore the joint application of novel methods for species detection and identification aids using:

- automated image detection (*Hyles*),
- integrated proteomic, genetic, and morphological datasets (zooplankton),
- hyperspectral imaging (African caddisflies), and
- probabilistic species assignment based on multiple data sources (*Lecanomics*).

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