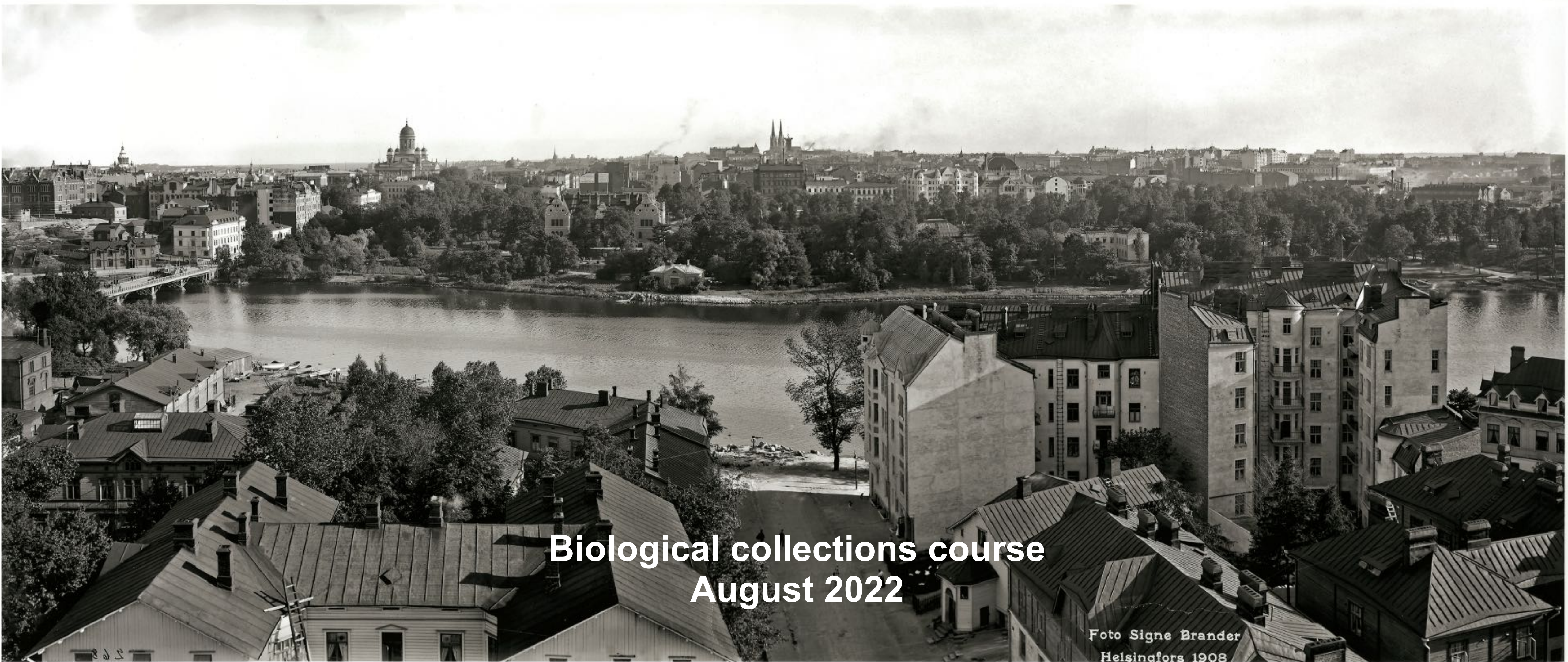


Storage and curation of collections in Luomus



Biological collections course
August 2022

Foto Signe Brander
Helsingfors 1908

What is Luomus and what does it do?

- Universities Act 72§: *The Finnish Museum of Natural History is attached to the University of Helsinki and is responsible for the preservation, accumulation and exhibition of the national natural history collections and for research and education relating to them.*
- Legally binding tasks also from
 - laws of nature protection, geographical information infrastructure, and information management
 - some intergovernmental treaties
- In addition, the duties of the Finnish Museum of Natural History include:
 - conduct research in its focal fields and provide teaching based on the research
 - serve as a comprehensive expert in chronological and isotopic methods
 - serve as a consulting specialist in society in its fields
 - provide its collection for use in research and teaching, particularly in the fields of zoology, geology, botany, and mycology
 - coordinate the collaboration of Finnish natural history museums and botanic gardens

Natural history collections and curation

- A natural history/science collection is a compilation of systematically organised natural science specimens and their metadata



Luomus General Collections Policy

- Geology collection policy
- Living plant collections policy
- Plant and fungi herbarium collection policy
- Invertebrate collection policy
- Vertebrate collection policy
- DNA and tissue sample collection policy
- Palaeontology collection policy

Luomus' collections



- The collections constitute an archive of biological and geological diversity and of the changes in our environment caused by natural phenomena and human intervention as well as the connections between them.
- The purpose of the collections is to offer **reliable, high-standard research material** for the future needs of humanity.

Accumulation principles

- 1) Scientifically valuable specimens of a high technical quality which support the strengths of Luomus and are **important for current or future research**
- 2) Specimens which **complement existing scientifically valuable collections and increase their scope** (e.g., represent missing stages of development, add to time series or increase the geographical or taxonomic scope of the collection)
- 3) Specimens with no immediate research value, but which may serve **other social interests** such as environmental education or the exhibition of biodiversity

Accepting specimens

- What is the number of specimens, and how much space do they require?
- Do the specimens have scientific significance or historical value?
- Do the specimens genuinely expand the content of the collection, or do they duplicate existing collections?
- How do the specimens promote Luomus' strengths and the goals laid down in its collection and research policies?
- Is the data associated with the specimens reliable and sufficient as defined in the collection-specific policies?
- Were the specimens collected in an ethical and legal manner?

- In addition, the following aspects must be considered before deciding to accept large collections:
 - To what extent will these collections be stored in Luomus?
 - How will the specimens be preserved before their addition to the collection?
 - How much time and resources will be needed to curate the new collection?
 - What are the long-term overall costs of the collection's maintenance, curation, storage and metadata management?
 - What are the logistics required to receive the collection, what are its costs, and how will funding be arranged?

Enhancing the content of the collections

- **Enhancing the content of the collections** seeks to increase their scientific value in a way that is financially sustainable.
- The content of the collections is enhanced through **quality criteria** which guide accumulation and deaccessioning and pertain to specimens and their metadata.
- The scientific and perceived value of the Luomus collections is ultimately dependent on their **accessibility**.

Preservation

- The **preservation** of the national collections as a reliable, high-quality research resource is one of the **duties set for Luomus in the Universities Act**.



Use of the collections

- The collections are to be used primarily for [scientific research and university teaching](#), and secondarily for other types of education and environmental education.
- Research use of the collections takes place [in Luomus facilities](#), and collection material may be [loaned outside](#) Luomus free of charge according to international museum practices.

-
- Before lending Luomus collection specimens to other organisations, the **person responsible** for the loan must determine that the **person receiving the loan represents a scientific institution** or is otherwise undeniably qualified to handle the specimens and to use them for scientific purposes.

Deaccessioning specimens

- The purpose of deaccessioning is to **remove poor-quality** material from the collections and thus streamline collections maintenance and the use of space **without compromising the scientific value** of the collection.
- Before deaccessioning, it should be considered whether an **image of the specimen** could be created and its metadata stored.
- Deaccessioning may also seek to **reduce duplicates**, in which case the deaccessioned specimens can be used for **swaps**

Botanical and mycological collections in Luomus



Contents

- Why botanical collections and what is their profile?
- What and where are the botanical collections?
- What is a botanic garden?
- Different botanical and mycological collections
 - Kumpula botanic garden
 - Kaisaniemi botanic garden
 - Greenhouse collections
 - Herbarium collections (“botanical museum”)
 - Seed bank

Why botanical collections and what is their profile?

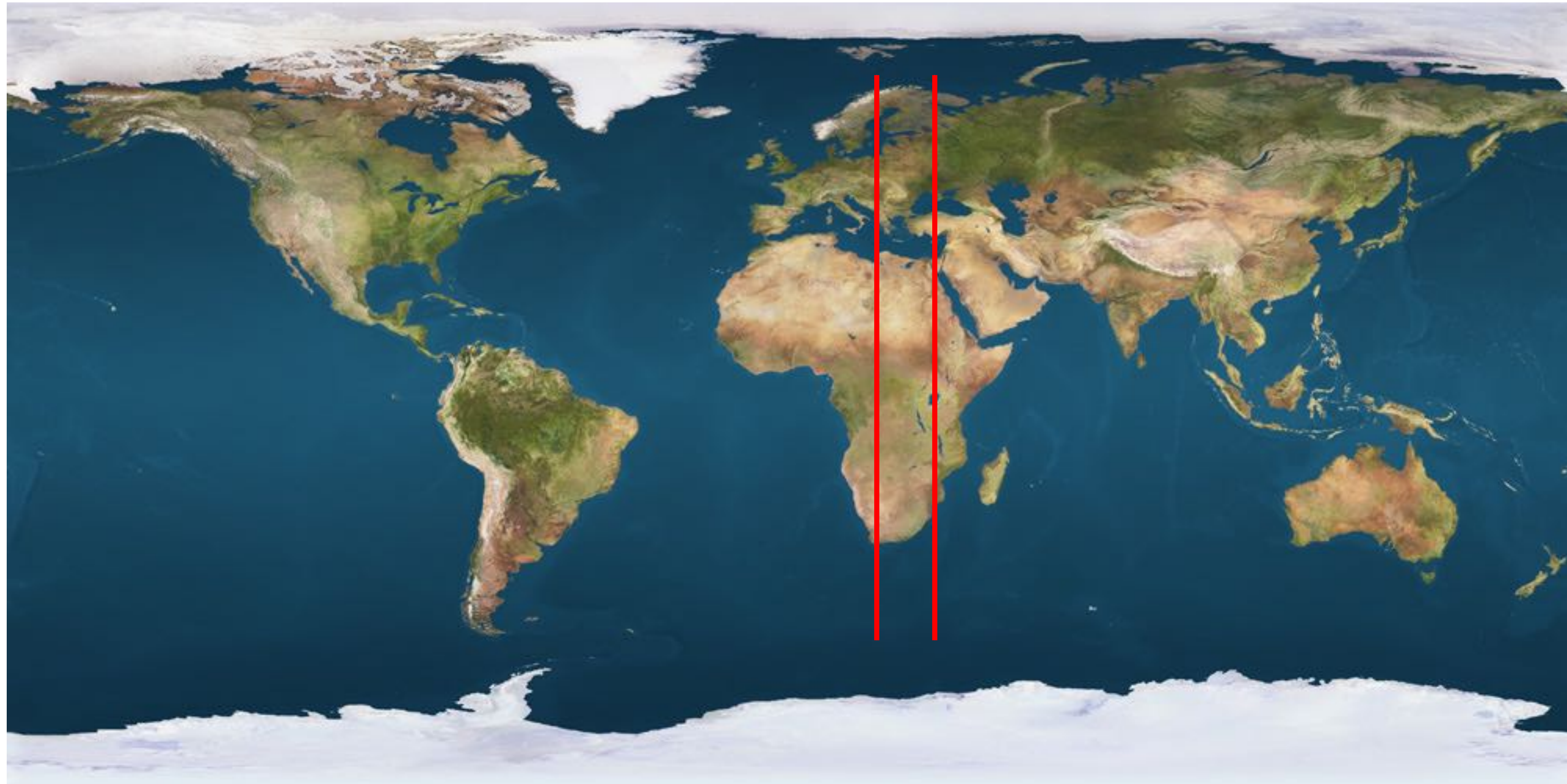
Luomus as a whole is profiling three equally important sectors:

1. scientific collections and datasets, i.e., research infrastructure
2. research (and teaching)
3. expert functions (including public education)

Botanical collections largest in Finland, internationally significant

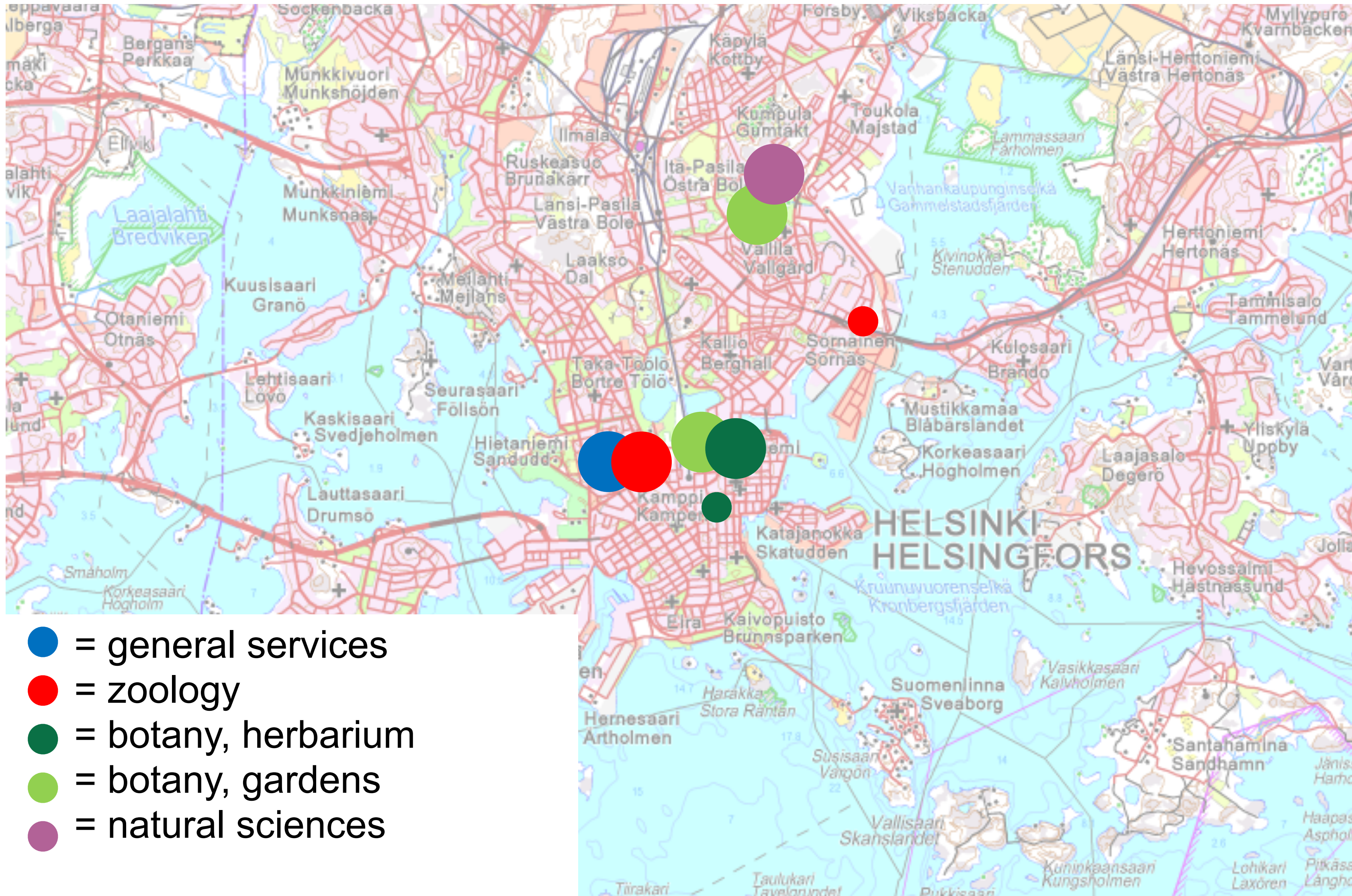
- global coverage in herbarium collection (botanical and mycological)
- in outdoor living collections Southern Finland and similar climatic areas
- in greenhouse collections — the longitude rule (especially in tropics)
- these are defined in collection policies:
 - General collection policy
 - Living collections policy
 - Herbarium collection policy

The longitude rule (from 21°E to 29°E)



Hyvärinen, M. et al. (2020) Living plant collections policy of the Finnish Museum of Natural History. RIO <https://doi.org/10.3897/rio.6.e60450>

What and where are the botanical collections?



LUONNUS

What is a botanic garden?

Definition of a botanic garden by BGCI

A reasonable degree of permanence

An underlying scientific basis for the collections

Proper documentation of the collections, including wild origin

Monitoring of the plants in the collections

Adequate labelling of the plants

Open to the public

Communication of information to other gardens, institutions and the public

Exchange of seed or other materials with other botanic gardens, arboreta or research institutions

Undertaking of scientific or technical research on plants in the collections

Maintenance of research programs in plant taxonomy in associated herbaria.

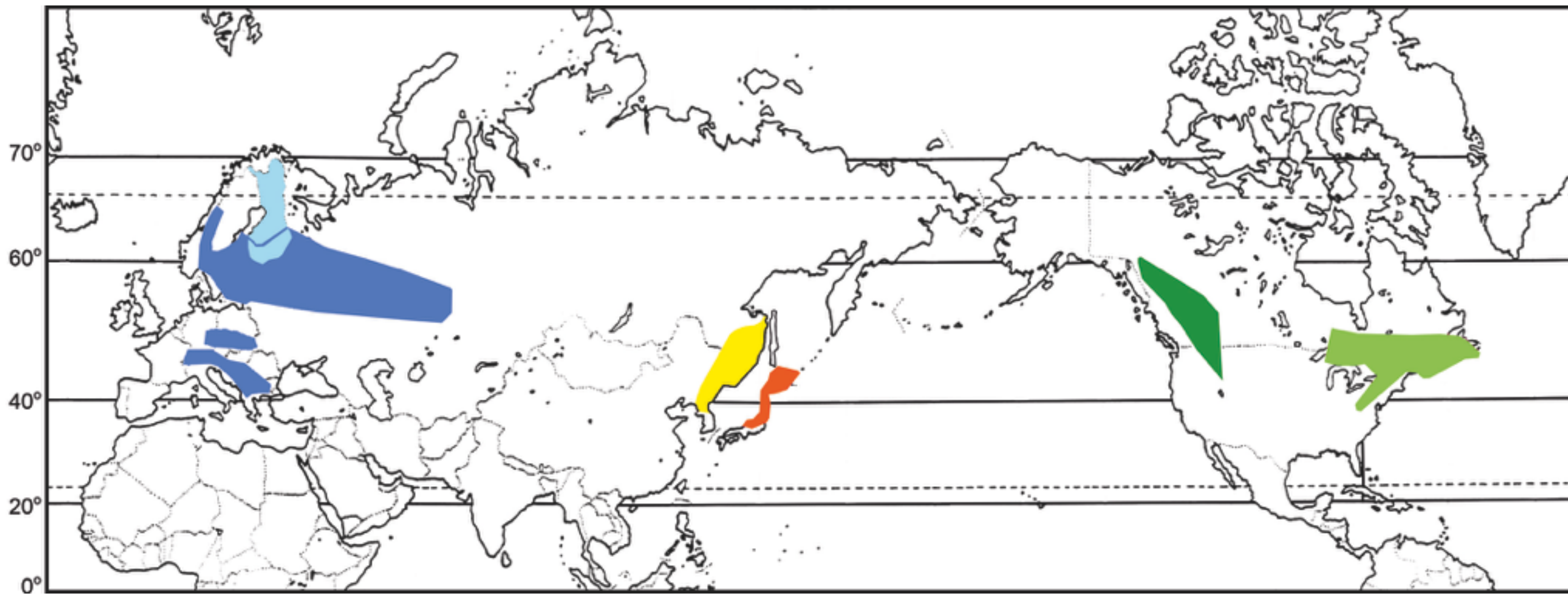


BGCI

Plants for the Planet

Collections more in detail: Kumpula botanic garden

Geographic sections (Hortus geobotanicus) and economic plants + traditional medicinal garden (Hortus ethnobotanicus), *ex situ* conservation



Area: 6 ha
Accessions: c. 5400
(inc. seed collection)
Taxa: 2800

Of wild origin!

LUONNUS
LUONNUS
LUONNUS

LUONNONTIETEELLINEN KESKUSMUSEO
NATURHISTORISKA CENTRALMUSEET
FINNISH MUSEUM OF NATURAL HISTORY



Kaisaniemi botanic garden

Evolution tree (systematic section)

Lichen garden

Moss garden

Rock garden

Sensory garden

Arboretum (trees)

Traditional ornamentals



LUONNONS

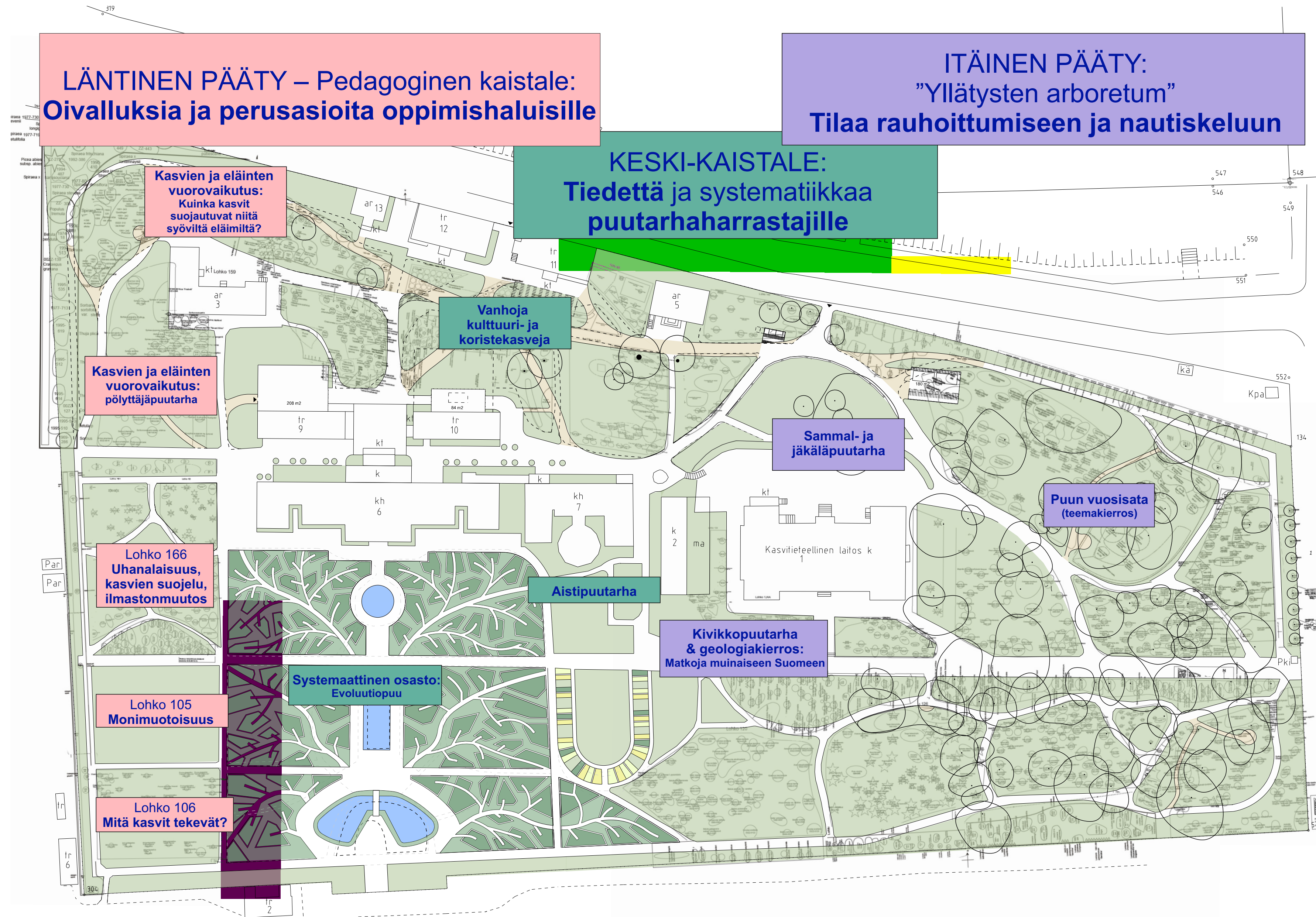
LUONNONTIETEELLINEN KESKUSMUSEO
NATURHISTORISKA CENTRALMUSEET
FINNISH MUSEUM OF NATURAL HISTORY

Area: 5 ha
Accessions: 1300
Taxa: 840

Accessions: e.g.
through seed
exchange

LUONNONS

LUONNONTIETEELLINEN KESKUSMUSEO
NATURHISTORISKA CENTRALMUSEET
FINNISH MUSEUM OF NATURAL HISTORY



Greenhouse collections

Accessions: 1240

Taxa: 1050

Tropical rainforest

Palm house

Savanna

Dry forest

Island room

Victoria house

Mediterranean

Desert

Saintpaulia room (ex situ collection)



LUOMUS

The herbarium

Total no of specimens c. 3.5. million (rank 15. -17. in the world)

- Vascular plants c. 1.8 M

 - c. 20 000 type specimens

- Fungi (inc. lichens) c. 0.9 M

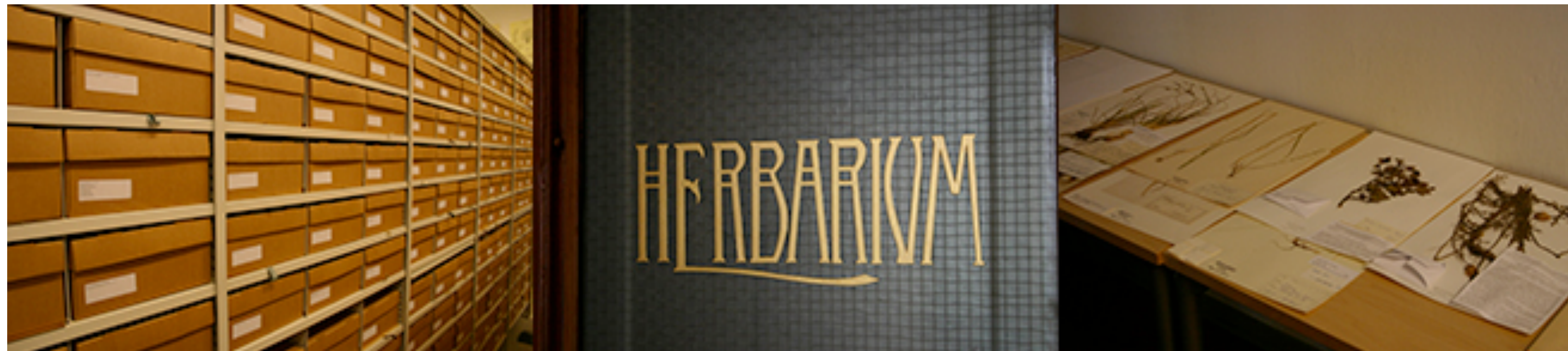
 - Separate collections: e.g. Erik Achariuses fungal collection, William Nylander's lichen collection

 - c. 19 000 type specimens (12 t lichenized, 7 t non-lichenized)

- Bryophytes c. 0.6 M

 - Separate collections: Viktor Ferdinand Brotherus, Sextus Otto Linberg

 - 25 000 type specimens



The seed bank

Accessions: c. 550
Taxa: 350



LUONNUS

LUONNONTIETEELLINEN KESKUSMUSEO
NATURHISTORISKA CENTRALMUSEET
FINNISH MUSEUM OF NATURAL HISTORY

Curation of collections

Scientific curation

- taxonomic and literature research
- work on scientific nomenclature
- re-organisation
- renaming
- relabelling etc.

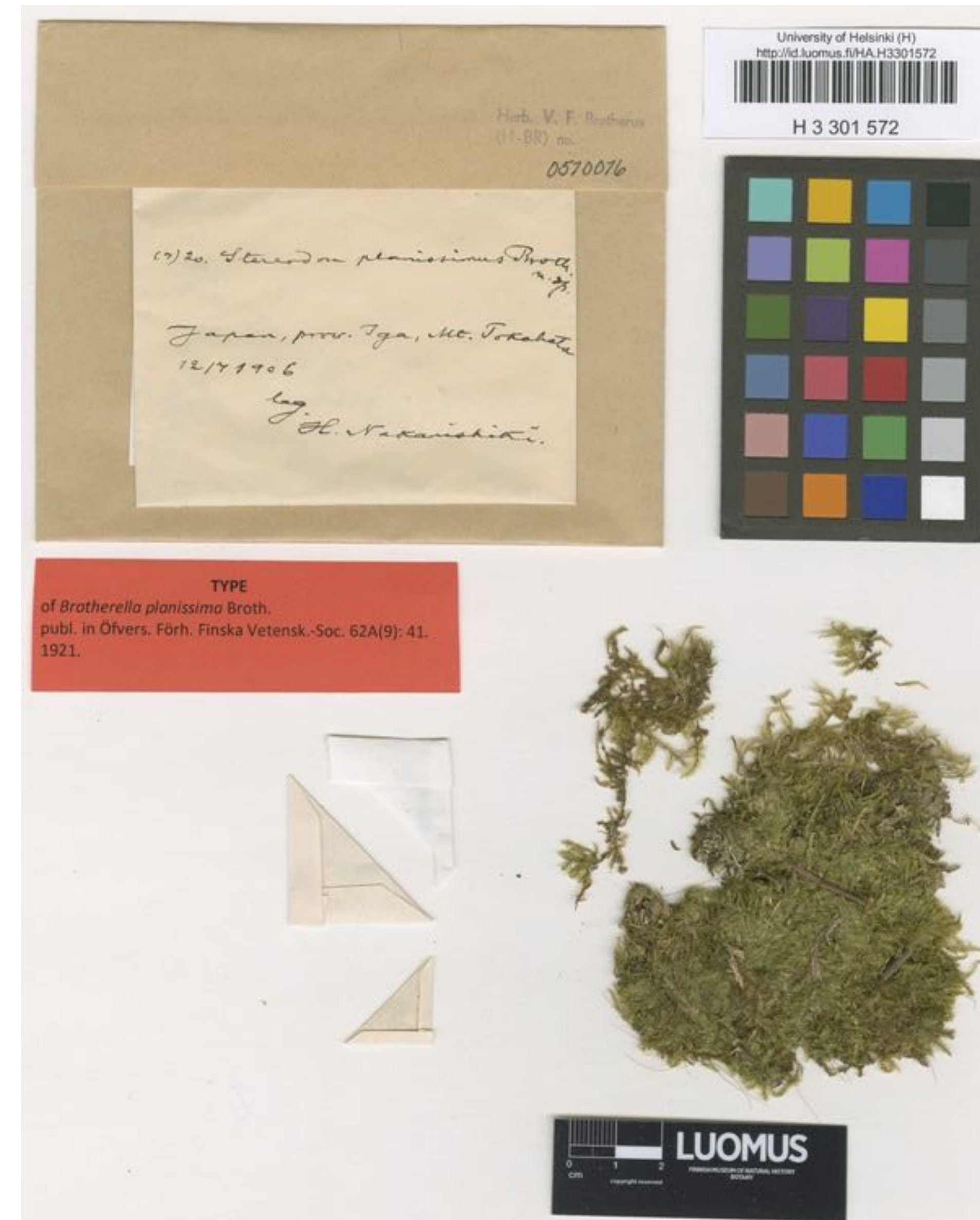
Technical curation

- preparation
- re-organisation
- loans/exchange
- database management

Digital curation

- digitisation
- scientific
- re-organisation of databases

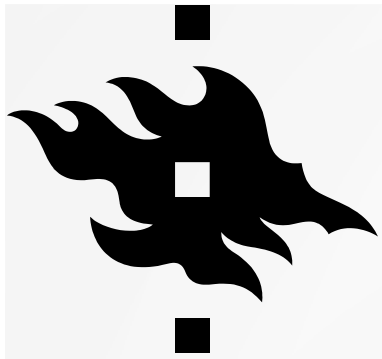
- changing/adding information on specimens and collections



STORAGE AND CURATION OF ZOOLOGICAL COLLECTIONS IN LUOMUS

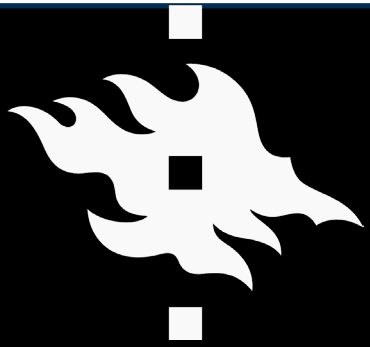


NATURAL HISTORY COLLECTION



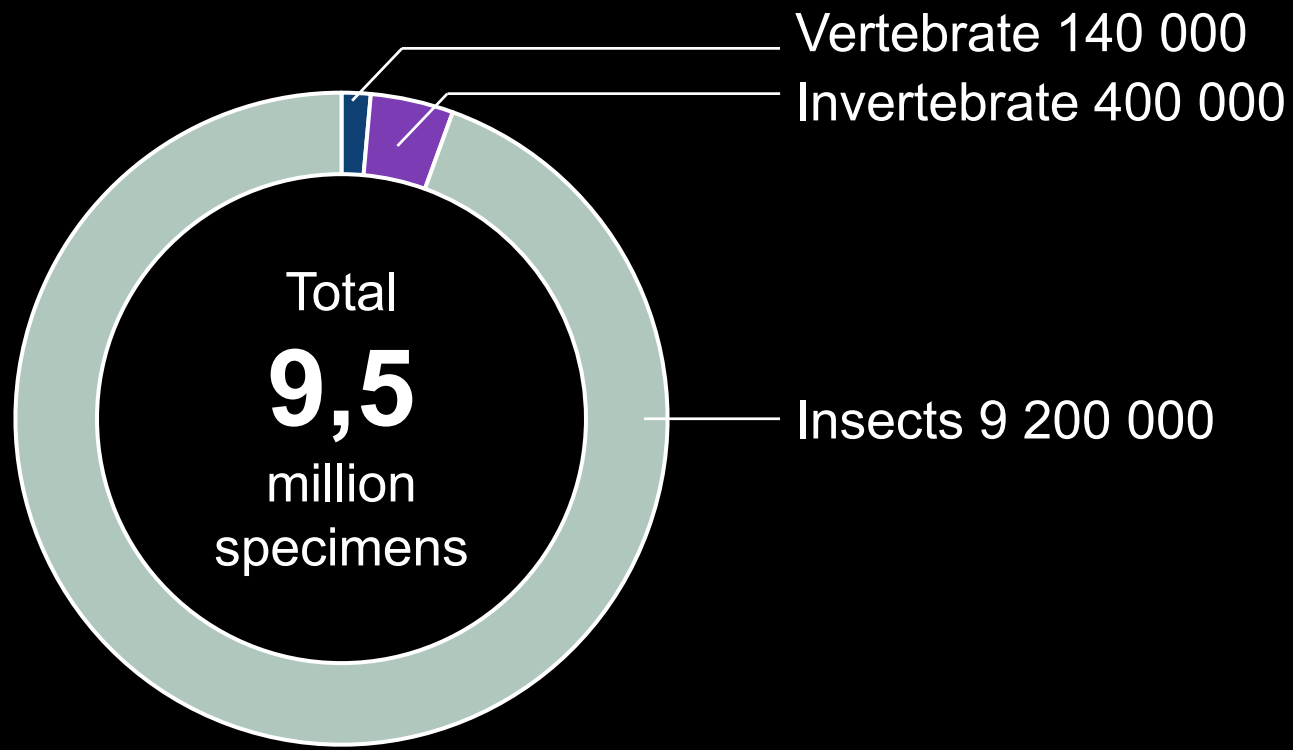
- "Compilation of systematically organized specimens and their metadata from which the specimens can be retrieved either based on the associated collection data files or on the physical placement of the specimens."

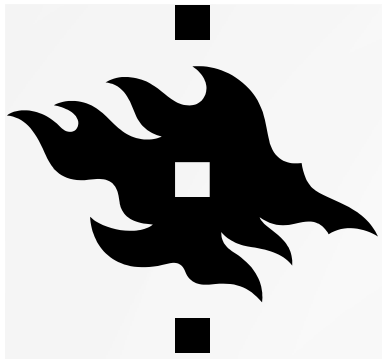




ZOOLOGY COLLECTIONS

5 mm





ZOOLOGY UNIT

65 persons

- Staff about 35 persons: unit director, senior curators, curators, DNA laboratory manager, coordinators, senior museum technicians, taxidermists, post doctoral researchers, PhD students, research assistants
- Visiting researchers about 30 persons: grant researchers, emeritus staff

ZOOLOGY UNIT UNIT DIRECTOR

ENTOMOLOGY TEAM

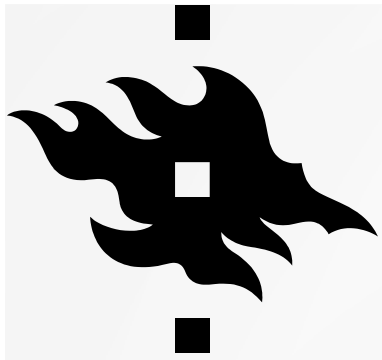
Collections, research, teaching, societal interaction

METAZOA TEAM

Collections, research, teaching, taxidermy, societal interaction

MONITORING TEAM

Monitoring, mapping survey, research, teaching, societal interaction

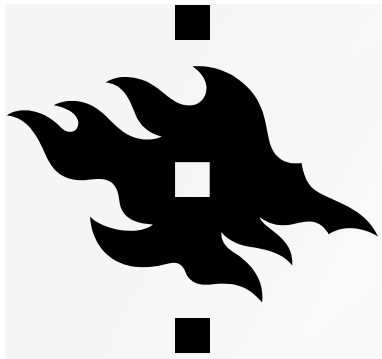


VERTEBRATE COLLECTION

- 140 000 specimens
- Majority of samples are from Finland
 - skeletons, skins, wings, nests
 - bird egg collection
- Frozen tissue collection, suitable for molecular work
- > 90 % specimens are digitised

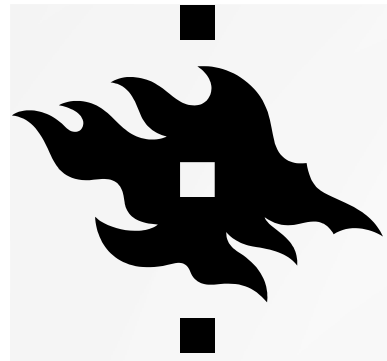


INVERTEBRATE COLLECTION



- 400 000 specimens
- Majority of samples are from Finland
 - spiders, mites, molluscs, oligochetes and turbellarians
- Mostly stored in ethanol
- > 30 % specimens are digitised

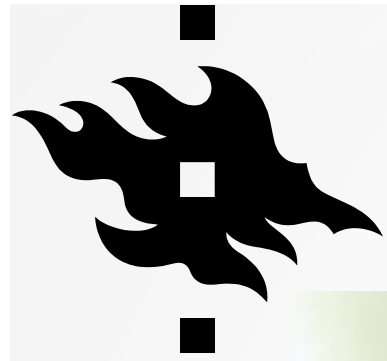




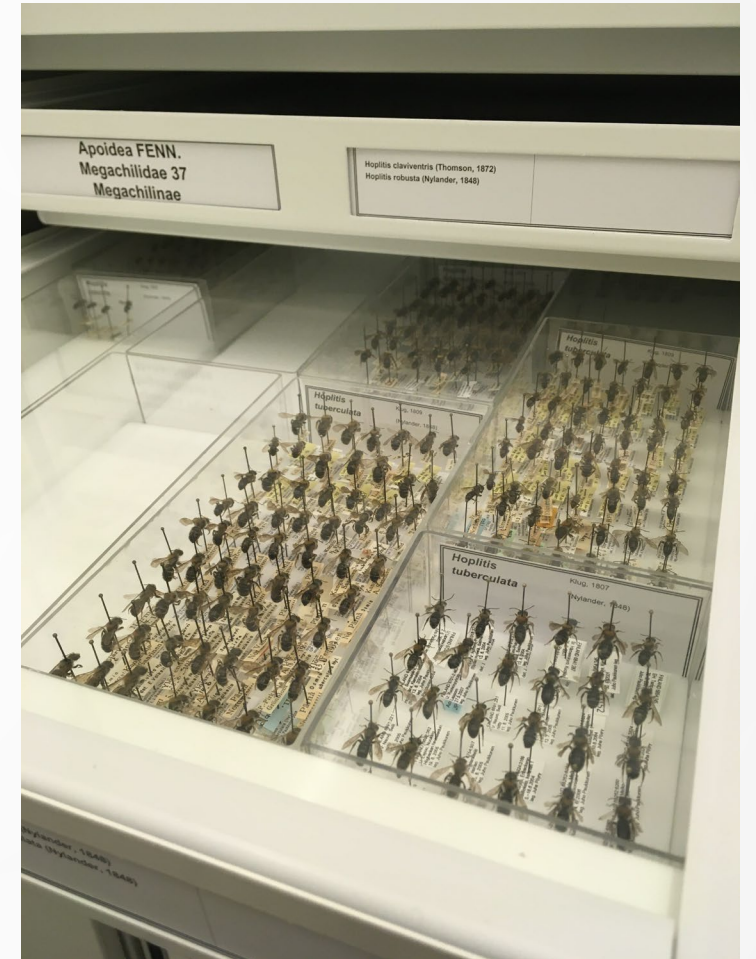
ENTOMOLOGY COLLECTION

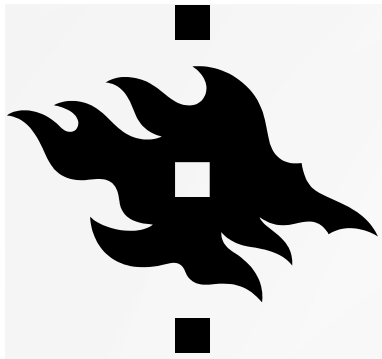
- 9 200 000 specimens
- Majority of samples are from Finland
 - Coleoptera, Hymenoptera, Lepidoptera, Diptera largest collections
 - Includes also immature stages
- Mostly dry, pinned specimens
- Separate room for ethanol samples
- > 10 % specimens are digitised





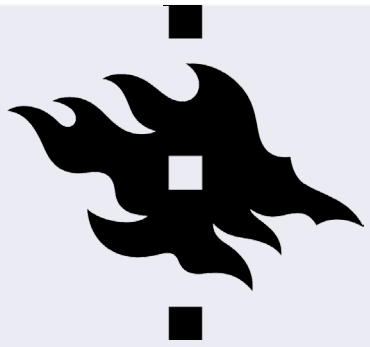
ENTOMOLOGY DRY COLLECTION





ENTOMOLOGY WET COLLECTION

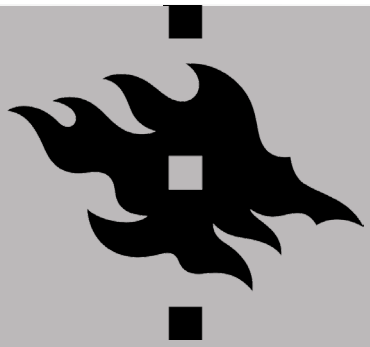




ENTOMOLOGY FOSSIL COLLECTION

- Few hundred specimens
- Majority of samples are non-Finnish
 - Coleoptera, Hymenoptera, Lepidoptera, Diptera largest collections
- Samples in amber
- Few samples digitised for research purposes





PRESERVATION EXAMPLES

- Mounted skins (taxidermy): mammals, fish, birds
- Non-mounted skins: mammals, birds
- Dry, pinned: insects
- Dry, card mounted: insects
- Dry: shells, skeletons, bird eggs, corals
- Ethanol: insects, other invertebrates, fish
- Microscope slides: animal parts, small insects

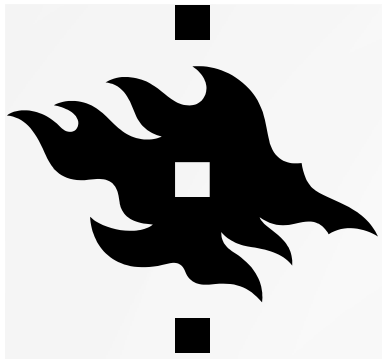


 <http://id.luomus.fi/>
GAC.16249
CHINA Shaanxi Qin Lin
Shan Mt.
wgs:84dms: 33.51 N,
106.47 E
7.-19.VII.1996
Kleinfeld & Schütze leg.

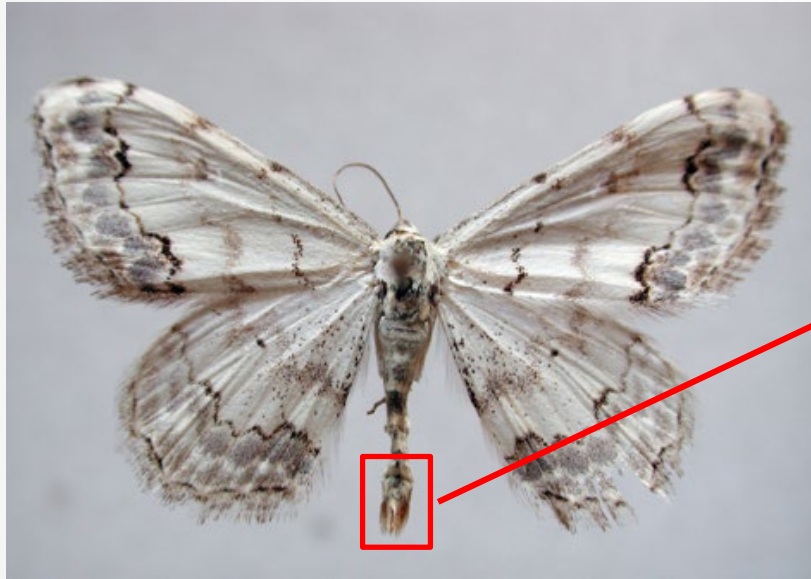
P A R A T Y P U S
Pterostichus
(Sinoreophilus)
strigosus n. sp.
Sciaky & Wrase des. 1997

Photographed
2016
Pekka Malinen

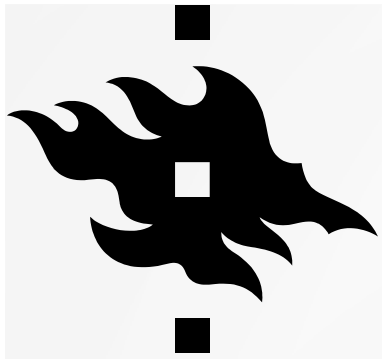
CHINA (Shaanxi)
Qin Ling Shan/108.47E
33.51 N/ Mt. W pass
autoroute km 70.47 km
S Xian 2350-2500 m
7.-19. VII. 1996
Kleinfeld & Schütze



MICROSCOPE SLIDES

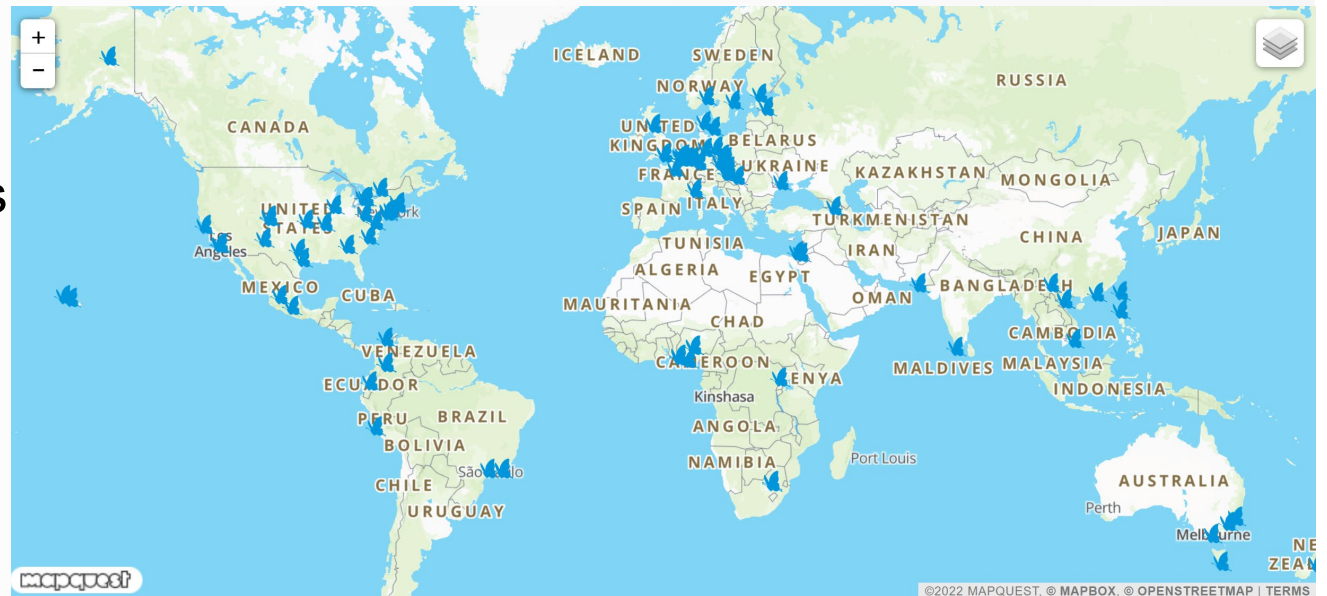


USSR, Tadzhikistan
39° N 71° E, 2050m
8.6.1991
U.Jürivete leg.



GENOMIC RESOURCES COLLECTION

- Luomus is a member in Global Genome Biodiversity Network
- Objective is to make genomic collections discoverable for research
 - collaborate to ensure quality standards for DNA and tissue collections
 - improve best practises
 - harmonize exchange and use of material
- https://www.ggbn.org/ggbn_portal/





DIGITAL COLLECTION MANAGEMENT

- Kotka – collection management tool
<https://kotka.luomus.fi/>
- Collection management: e.g. accession, deaccession, loans, unique object identifiers
- Majority of data available online
<https://laji.fi/en>

The screenshot shows a web browser window with the URL <https://kotka.luomus.fi/view?uri=http://id.luomus.fi/GL.4285&page=1&spot=1>. The page displays a detailed record for a specimen with the ID <http://id.luomus.fi/GL.4285>.

Collection: Hemiptera World (Luomus)
Condition: good
Condition (defects):
Preservation: Dry
Date transcribed: 24.2.2015

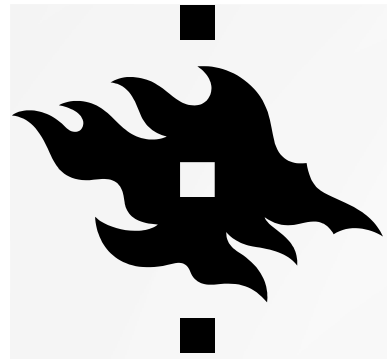
Collecting event (gathering)
Leg: Baker, Charles Fuller
Country: Philippines
Municipality: Luzon
Locality names: Laguna, Mount Banahao

Specimen/observation (unit)
Record type: Preserved specimen
Life stage: adult
Sex: F - Female
Count: 1

Identification
Species: *Sadoletus bakeri* Bergroth, 1918

Type specimen
Type: type *Sadoletus bakeri* Bergroth, 1918
Original description publication: Bergroth, E. 1918. Studies in Philippine Heteroptera, I Philippine Journal of Science" (D) 13(2): 43-73 (1918).

Four thumbnail images are displayed in a row, each with a caption below it:
1. [GL.4285_Sadoletus_bakeri.jpg](#)
2. [GL.4285_Sadoletus_bakeri_3.jpg](#)
3. [GL.4285_Sadoletus_bakeri_2.jpg](#)
4. [GL.4285_Sadoletus_bakeri_label.jpg](#)



DIGITAL COLLECTIONS

- Digitisation of entire collections > <https://laji.fi/en>
- Digitisation on demand > <https://laji.fi/en>
- Digitisation of research material > <https://laji.fi/en>, publications, data repositories
- Digital teaching material

LAJI.FI

SUOMEN LAJITIIETOKESKUS
FINLANDS ARTDATACENTER
FINNISH BIODIVERSITY INFO FACILITY

44 146 243

observations

42 856

species

471

collections



Finnish Biodiversity Information Facility

The Finnish Biodiversity Information Facility (FinBIF) is an open access data repository for researchers, government and the public. FinBIF consolidates many collections and datasets of living Finland in a single source. Our online portal, laji.fi, allows you to browse, search and download information about all forms of biological life, and to record and share your own observations. FinBIF is committed to the sharing and promotion of open access data.



Study species ?



Browse & Search ?



Submit observations ?

Latest News

[Degraded service performance / Försämrad serviceprestanda 28.6.-1.7.-](#)

technical

01.07.2022

[Fault in Notebook forms Sunday 15.5. f 0.00 to 13.00 \(GMT+3\) / Fel i anteckningsbokformulär](#)

technical

15.05.2022

[Vikatila 31.3-1.4. \(korjattu\) / Service problem 1.4. \(fixed\)](#)

technical

01.04.2022

[State-of-the-art bridge from FinBIF to GBIF](#)

release

02.02.2022

[Vihko kuvien lisäys on rikki \(korjattu\) / Adding images is broken \(fixed\)](#)





DIGITAL COLLECTIONS

- Digitisation of collection's metadata
> online

LUOMUS

LUONNONTIETEELLINEN KESKUSMUSEO

suomeksi på svenska in English по-русски

Etusivu Tule käymään Tutkimus Kokoelmat ja aineistot Osallistu Info

ETUSIVU / Coll. Richard Frey (MZH/FMNH/Luomus): taxon list part 1 - Xylophagidae to Dolichopodidae

TULE KÄYMÄÄN

TUTKIMUS

KOKOELMAT JA AINEISTOT

OSALLISTU

INFO


MEDIALLE

Coll. Richard Frey (MZH/FMNH/Luomus): taxon list part 1 - Xylophagidae to Dolichopodidae

This list documents museum samples in the Finnish Museum of Natural History (MZH/FMNH) = Luonnontieteellinen keskusmuseo (Luomus).

The list is work in progress and may contain errors, duplicates, obsolete or unpublished names and simple mistakes. The GBIF suggested names are automatically generated and have not been reviewed.

Known or suspected manuscript names present in the collection are listed as [chironyms](#).



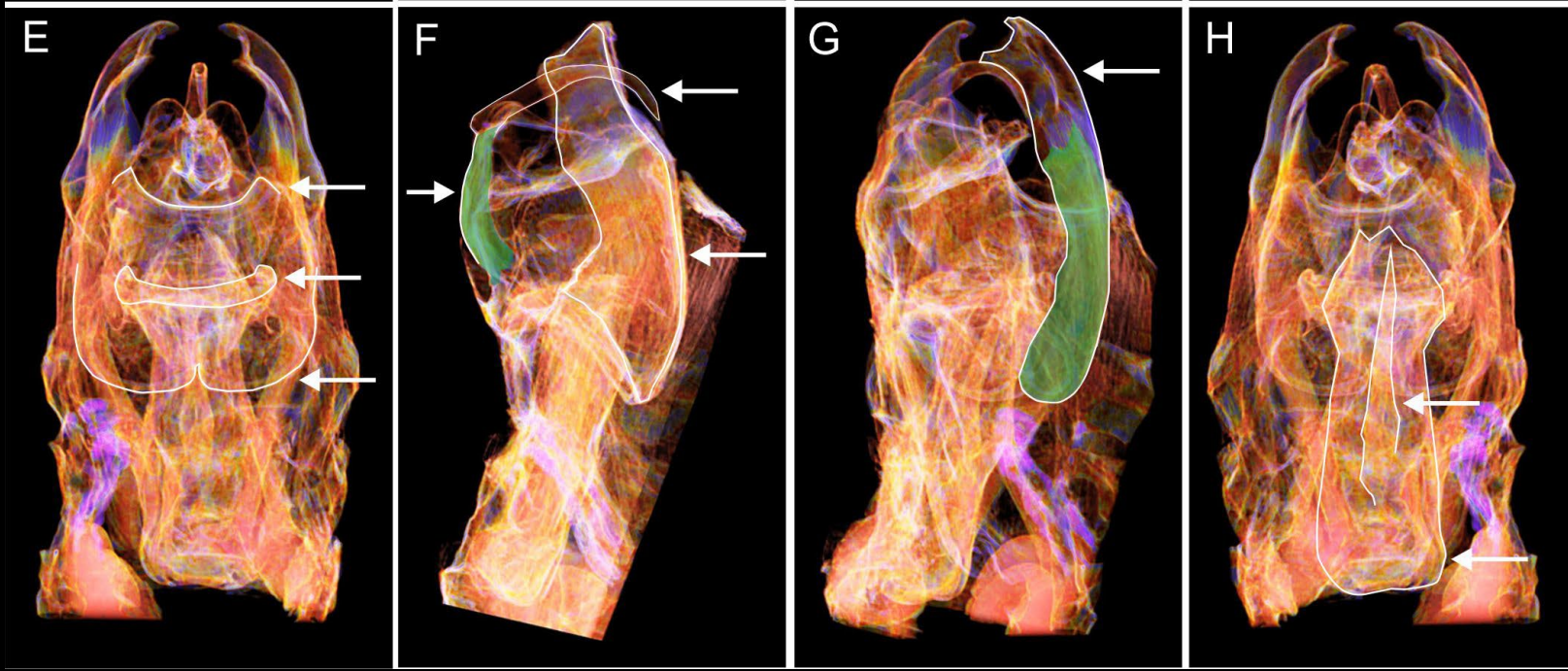
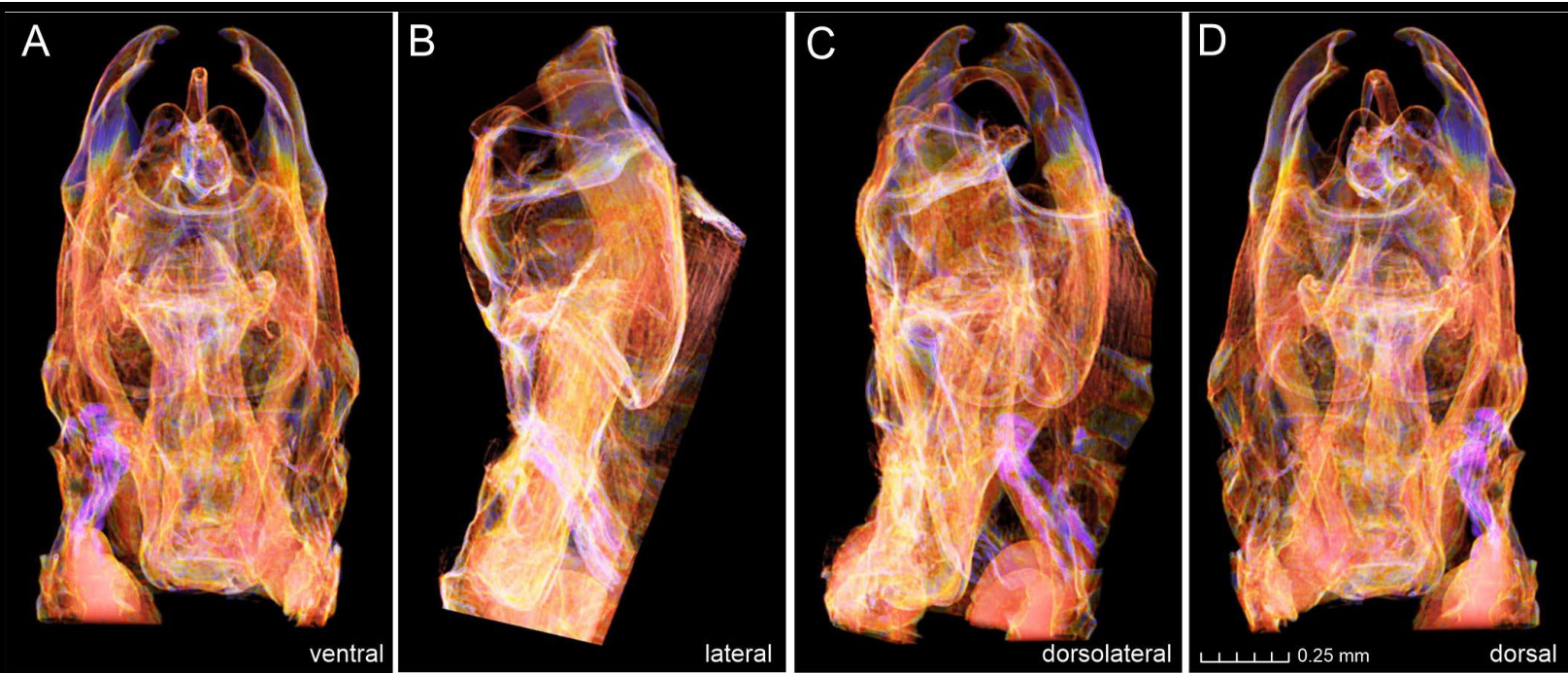
Collection: Diptera collection of Richard Frey

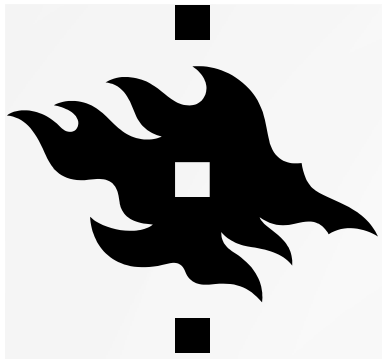
- Part 1: Xylophagidae to Dolichopodidae (this page)
- Part 2: Lonchopteridae to Tephritidae, Hippoboscidae
- Part 3: Brachycera, Helcomyzidae to Chloropidae
- Part 4: Brachycera, Muscoidea and Oestroidea
- Part 5: "Nematocera", tbd



DIGITAL COLLECTIONS MICRO CT







DIGITAL COLLECTIONS: TEACHING

- Digitised material in <https://laji.fi/en> can be use for teaching
- Pinkka: species learning environment
<https://pinkka.helsinki.fi/pinkat/#/>

Search for taxon..

Suomeksi
På Svenska

Pinkka

Species learning environment

Search in Pinkka

Search by species name, pinkka name or sub-pinkka name..

Search

Sample species cards

IPS-154 Subarctic Habitats and Biota Herbs
Cardamine bellidifolia

Rosa 'Pohjantähti'

Salix caprea
Goat willow

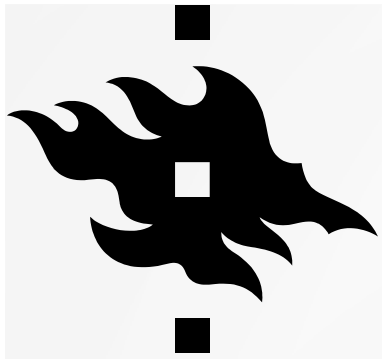
Welcome to Pinkka!

Pinkka is a species learning environment. The name refers to bundled plant samples which have traditionally been used to learn species identification.

Pinkka's wide-reaching image and description data is used to formulate information bundles for different uses and audiences - virtual Pinkkas.

Pinkkas

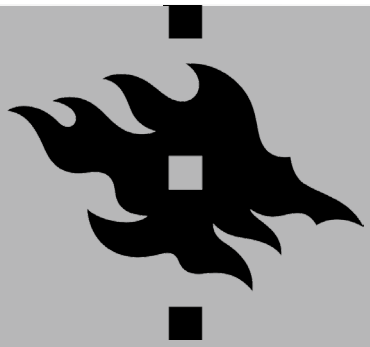
- Global peatland ecology
- Identification of fungi
- IPS-153 Flora of Subarctic Europe
- IPS-154 Subarctic Habitats and Biota
- IPS-175 Flora and vegetation of East Africa
- IPS-177 Flora of southern Finland
- IPS-178 Threatened vascular plants of Finland
- Kumpula Botanic Garden
- Nordic bryophytes and lichens
- Seedling and Propagule Identification
- Tropical Plants of Economic Importance (AGRI-247)



DIGITAL COLLECTIONS: TEACHING

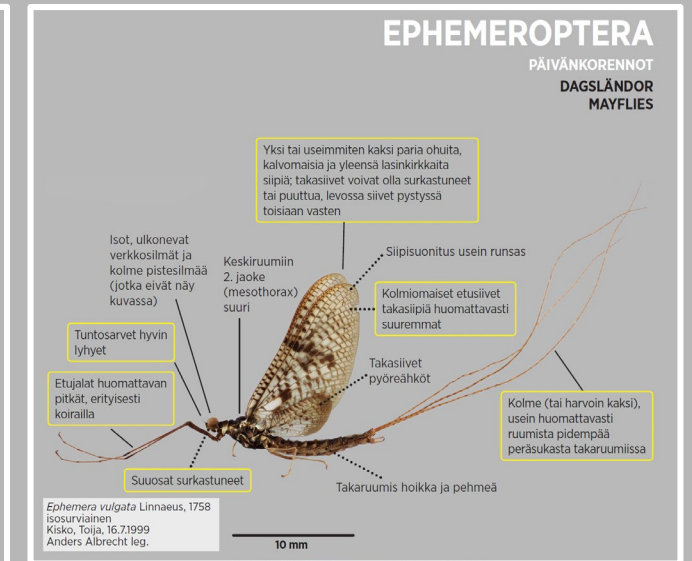
- Digitised material in <https://laji.fi/en> can be use for teaching
- Extended species identification in agricultural entomology AGRI-273
- Students digitise material

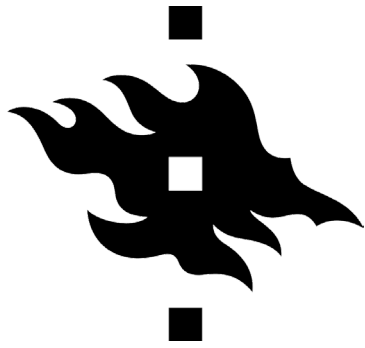




DIGITAL COLLECTIONS: TEACHING

- Digitised material in <https://laji.fi/en> can be used for teaching
- Free PDF available on <https://laji.fi/en/theme/hyonteisopas>





VIRTUAL COLLECTIONS?

- Online access to collections via virtual platform?
- Virtual reality?
- Museums' need new expertise
 - Recent: digitisation coordinator, micro CT expert
 - Potential future positions: virtual collections manager, digitisation-on-demand expertise, DNA-on-demand expertise?

