

Developing **protocols** for digitising bryophyte specimens at RBGE

Dr Susana Rams, University of Granada (SPAIN)

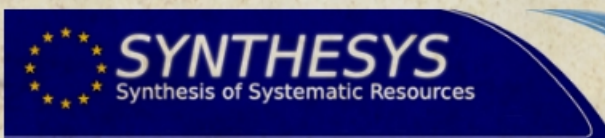
08/07/2012 - 04/08/2012

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Vascular Plants

protocols





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Cryptogamic Plants

protocols





ACCEPTED 1.2

GPI Cryptogam Photo Guidelines

16 August 2011

Purpose: This document offers guidelines for photographing lichens, bryophytes and fungi for the Global Plants Initiative (GPI). These guidelines have been reviewed and agreed upon by the members of the international dedicated Google group ([gpi-cryptogam-photo-guidelines@googlegroups.com](http://groups.google.com/group/gpi-cryptogam-photo-guidelines@googlegroups.com)) at GPI. A special thanks to Ramona Ubral, Andreas Beck, Laura Green and John Mikulka. These guidelines do not pertain to making scanned images (e.g., using HerbScans), but rather address the particular challenges of making camera images (e.g., using digital SLR or Leaf back medium format cameras).

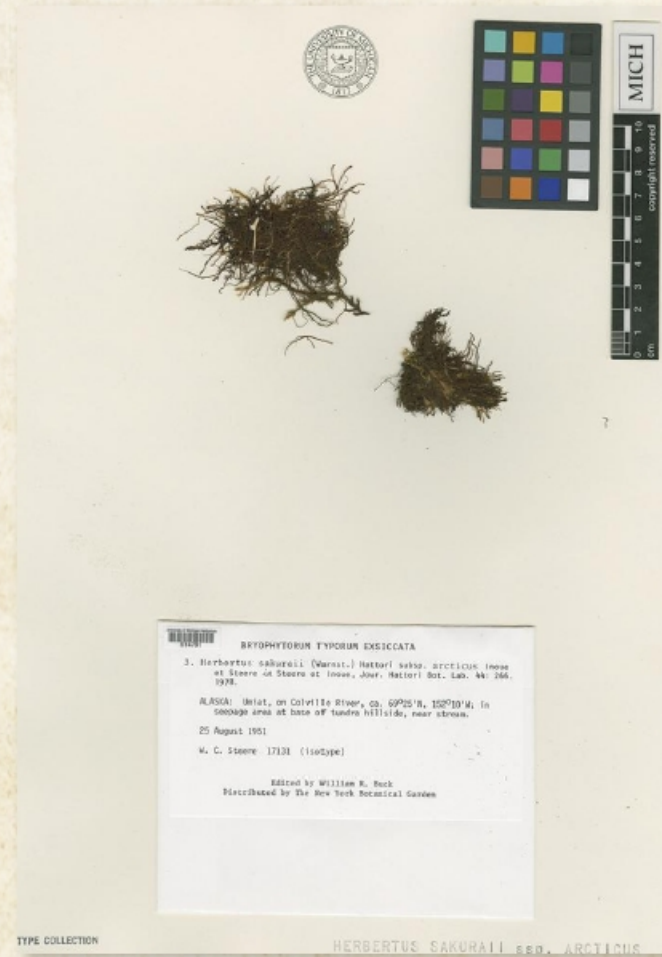
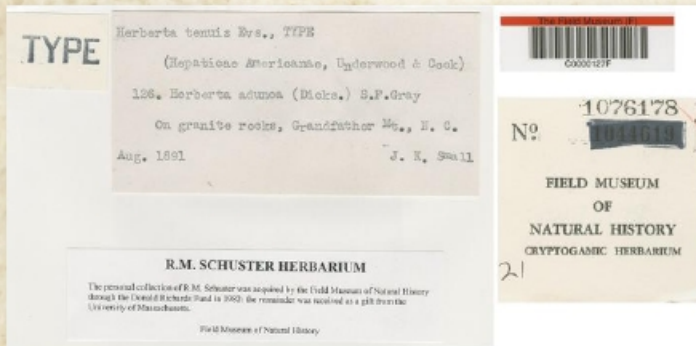
References: Previous work, mostly related to scanned images, can be found the GPI document site: <http://plants.jstor.org/action/community#resources>; general and specifically here: http://plants.jstor.org/userimages/ContentEditor/1302266643565/c_bryops.pdf

→ The above document includes findings about the work of Conservatoire et Muséum de la Ville de Genève (G), University of Helsinki (H), Paris Museum of Natural History (S). GPI images guidelines will

Scanned Images

HerbScan™

Global Plants Initiative
Resources for the Digitisation of Herbarium Specimens



Scanned Images

HerbScan™

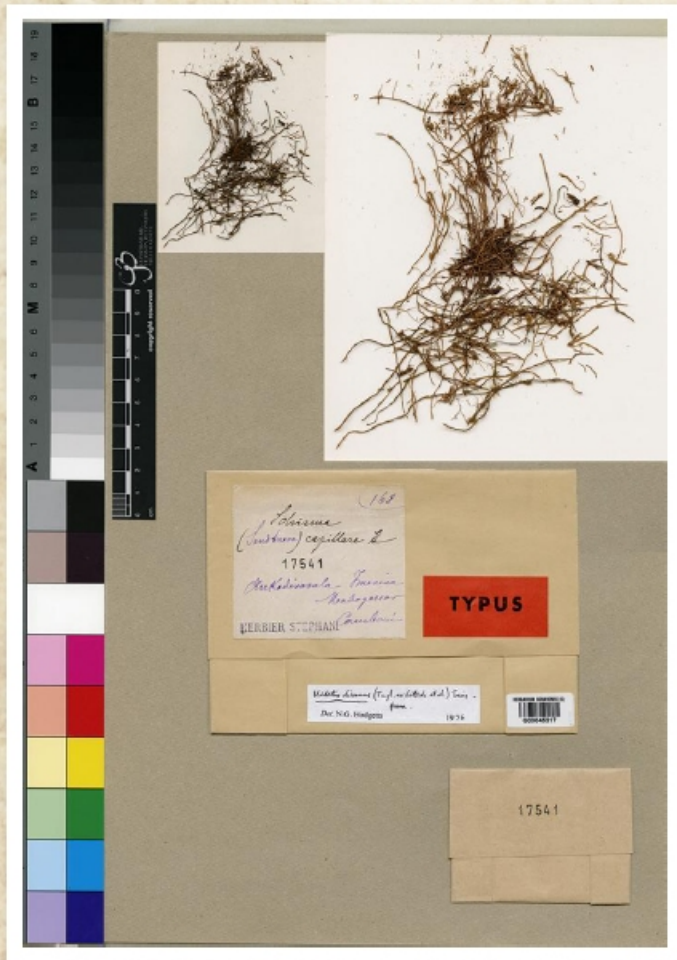
Global Plants Initiative
Resources for the Digitisation of Herbarium Specimens



Scanned Images

HerbScan™

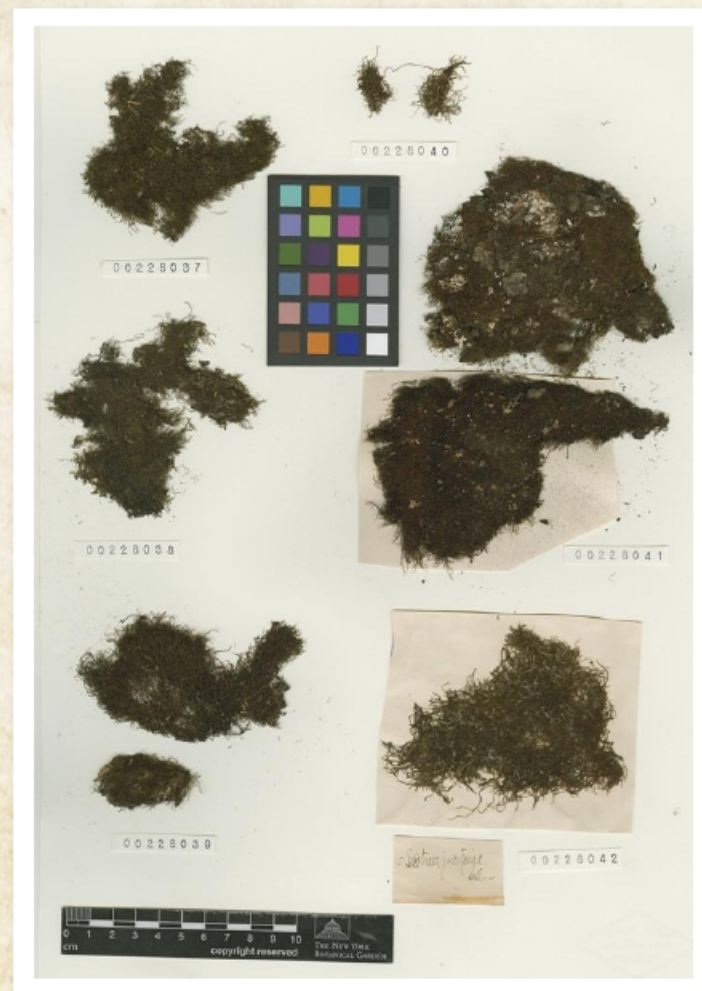
Global Plants Initiative
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Scanned Images

HerbScan™

Global Plants Initiative
Resources for the Digitisation of Herbarium Specimens



Scanned Images

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Scanned Images
lack good quality
for details

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Scanned Images
are time-consuming

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Cryptogamic Plants

protocols

**HIGH
RESOLUTION
DIGITAL
CAMERAS**

80 Mpx





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COMPOUND MICROSCOPE

specific
plant features





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What is our goal?

TO OFFER **RELEVANT**
TAXONOMIC INFORMATION
UP TO A CERTAIN LEVEL



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What is our goal?

USEFULNESS





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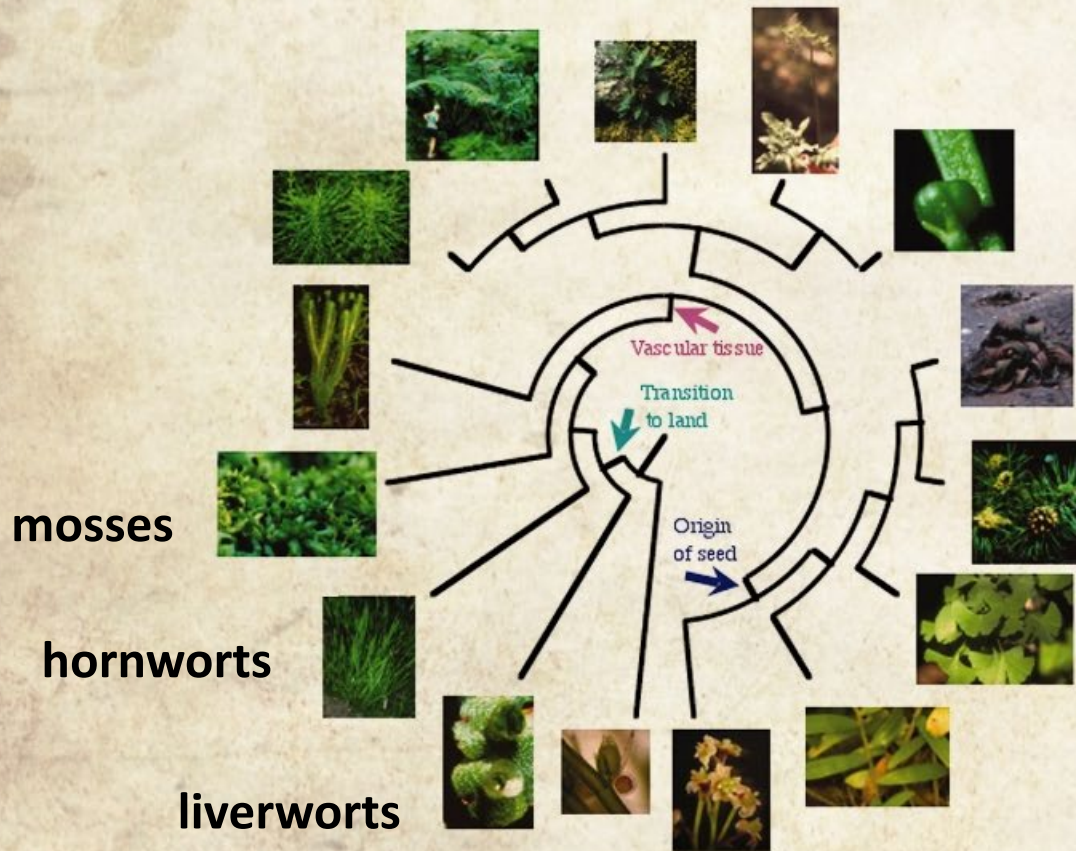
What is our goal?

TO AVOID UNNECESSARY LOANS



What are bryophytes?

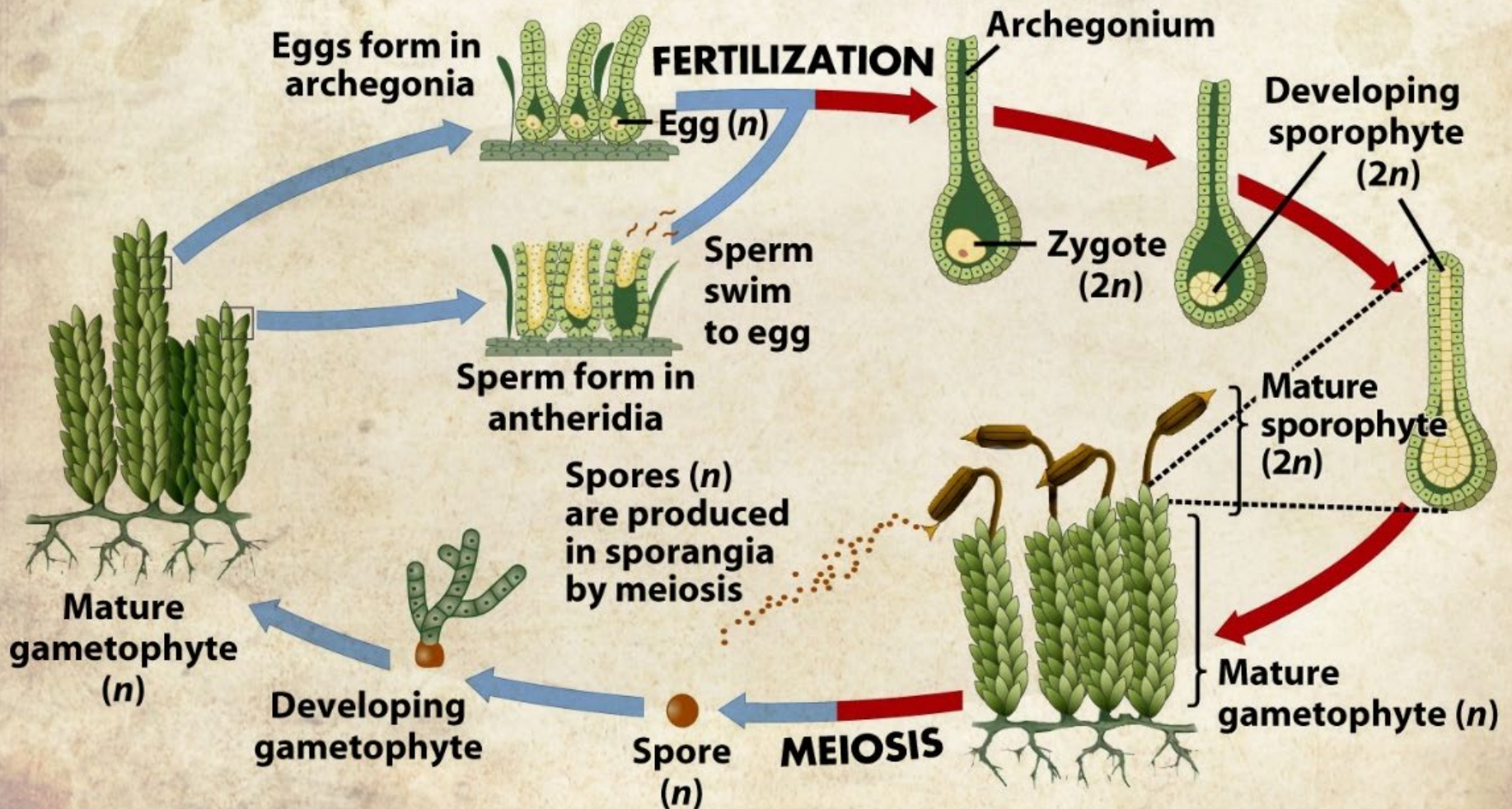
PHYLOGENETIC POSITION



3
LINEAGES

What are bryophytes?

LIFE CYCLE



Why a new protocol?

NEW CHALLENGES



Why a new protocol?

MANY DIFFERENT LIFE FORMS



(c) 2011 chasingmirages.com

Why a new protocol?

SIGNIFICANT DIFFERENCES IN SIZE



1 cm

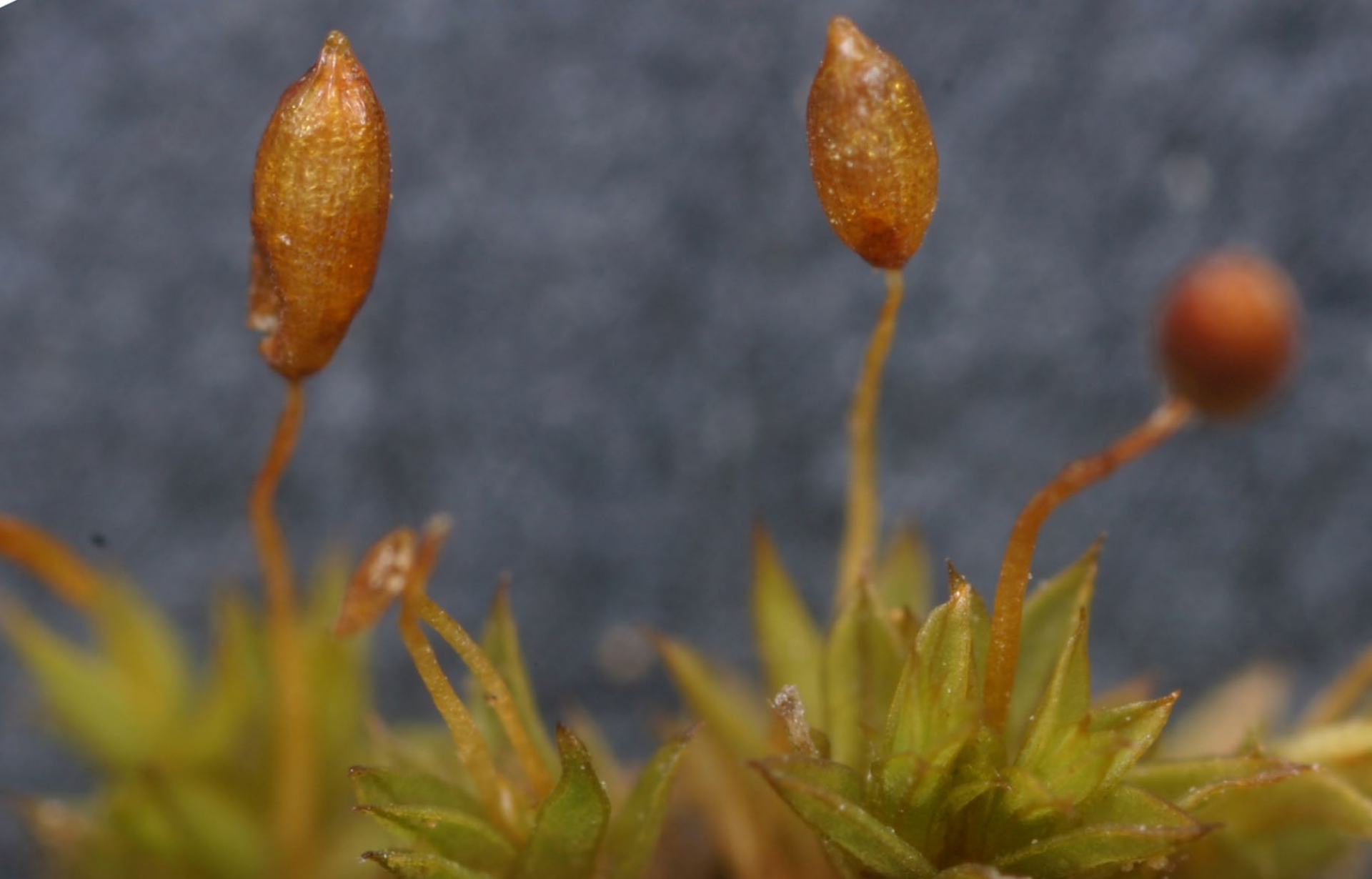
Why a new protocol?

THEY CAN BE REWETTING





Herbertus noreus D.G. Long, D. Bell & H.H. Blom



Microbryum fosbergii (E.B. Bartram) Ros, O. Werner & Rams

What is new?

Terminology

Overview image: a photograph of the labels and underlying paper packet material that the labels are attached to. Unattached labels may be photographed separately as an auxiliary image, or composited in with the overview image if taken at the same resolution and focal distance. Minimal PhotoShop work should be done to straighten or otherwise pretty up the image, EXCEPT to rotate the labels and barcode so that they all face right-side up. The barcode may be left vertical, but may never be upside-down.

Constituents of the overview image

1) herbarium ruler

2) colour checker

3) herbarium barcode

4) the plant specimen - optional only if it is so small that it might be lost in handling.

5) the overview image file's name is the barcode.tif -

What is new?

Auxiliary image: a photograph of additional labels and notes
Constituents of the Auxiliary 'paper' image

- 1) herbarium ruler
- 2) colour checker - optional
- 3) affix a suffix of _a, _b, etc. to the image file name

Auxiliary image: a close-up photograph of the plant material
Constituents of the Auxiliary specimen close-up image

- 1) small scale herbarium ruler, optional herbarium name visible
- 2) colour checker - nano, partial or cut are acceptable
- 3) the plant specimen
- 4) affix a suffix of _a, _b, etc. to the image file name

Modifications on the GPI protocol

OVERVIEW IMAGE

- (1) Remove one stem.
- (2) Take two pictures of it: dry and wet.
- (3) Shorten the focus distance.

AUXILIARY IMAGE

- (4) Add extra type of auxiliary image: compound microscope.

Modifications on the GPI protocol



Modifications on the GPI protocol



Modifications on the GPI protocol



Modifications on the GPI protocol



Modifications on the GPI protocol



200 μm

e.g. recurved
margins



200 μm



***Herbertus* Gray (1821)**

Methods and Materials

This work has been done with four taxa from the genus *Herbertus* and one taxon from *Tortula*:

<i>H. aduncus</i> subsp. <i>aduncus</i> -----	37
<i>H. aduncus</i> subsp. <i>hutchinsiae</i> -----	5
<i>H. aduncus</i> subsp. <i>tenuis</i> -----	8
<i>H. dicranus</i> -----	4
<i>Tortula lanceola</i> -----	10

Methods and Materials

Camera Leaf Aptus II 10
(LeafCapture 11.3)



Microscope Zeiss Axioskop
Camera MRc 5 (Axiovision)



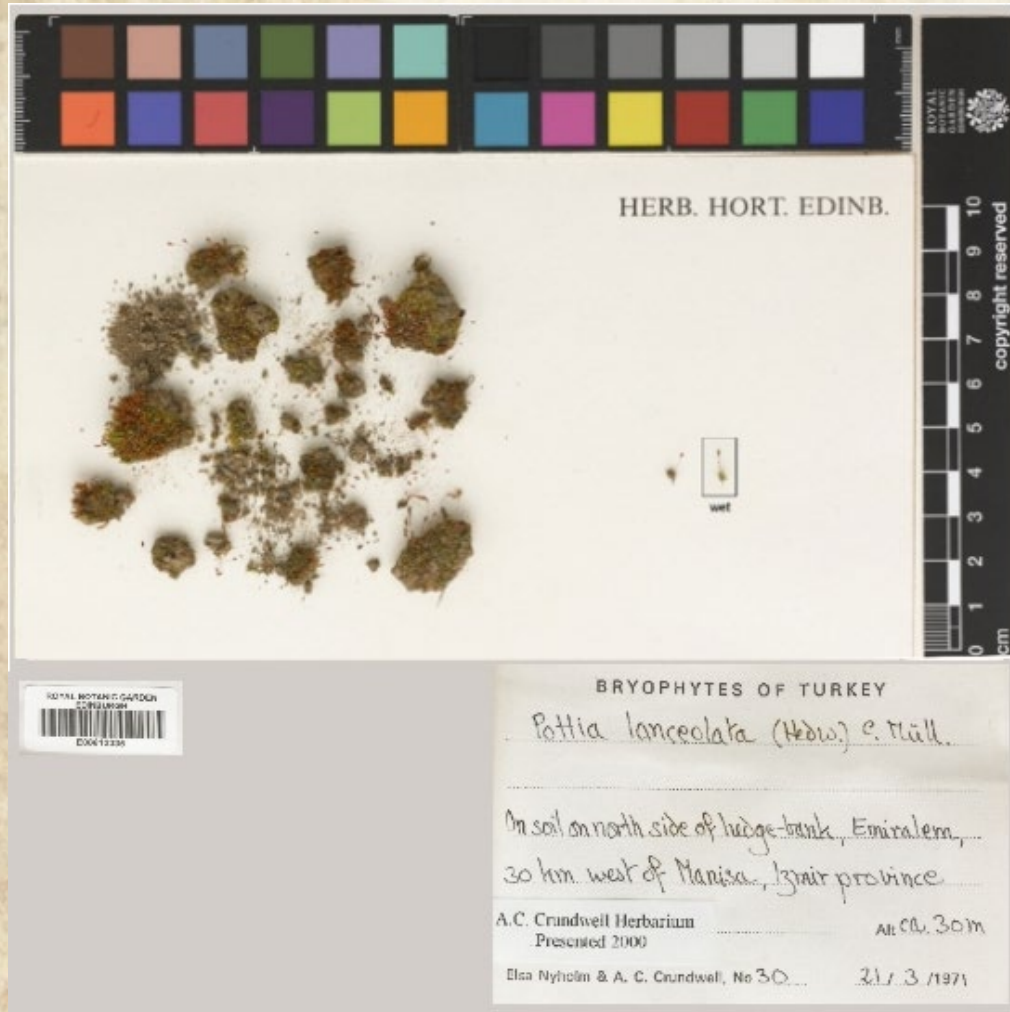
Methods and Materials

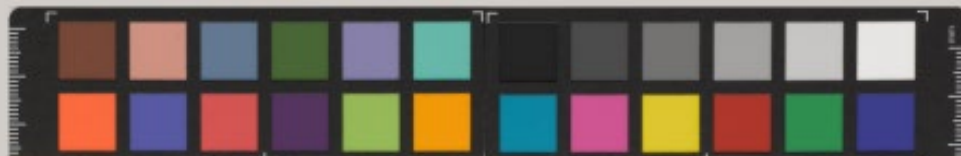
Focus distance used changes from the usual one.

56 cm - 23 cm



Results

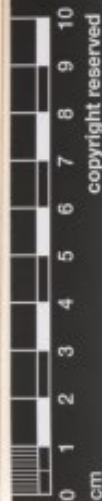




HERB. HORT. EDINB.

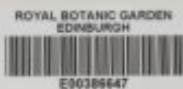


wet



Herbertus aduncus
Rogaland, Hjelmeland, Jøsenfjord, Åmekrokjuvet, N59 16087 E6 14169, 20 m a.s.l.
Hans H. Blom 2/9-2008

2



BRYOPHYTES OF NORWAY

Herbertus aduncus (Dicks.) Gray
subsp. *hutchinsiae* (Gottsche) R.M.Schust.

ROGALAND: Hjelmeland, Jøsenfjord, Åmekrokjuvet, 59°
16.087'N, 06° 14.169'E

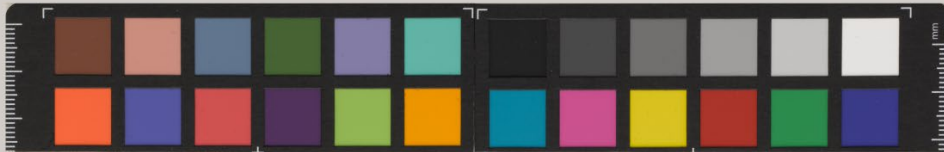
Alt. c. 20m

2 September 2008

HANS H. BLOM

No. s.n.





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BOTANIC
GARDEN
EDINBURGH

0 1 2 3 4 5 6 7 8 9 10
cm
copyright reserved

HERB. HORT. EDINB.



wet

3

Herbertus aduncus
Rogaland. Hjelmeland. Erfjord. Brattåna river gorge, N side of Mt. Gunlanut. N 59 18.434
E6 15.577. 35 m a.s.l.
Hans H. Blom 1/9-2008

ROYAL BOTANIC GARDEN
EDINBURGH



E00386649

BRYOPHYTES OF NORWAY

Herbertus aduncus (Dicks.) Gray
subsp. *hutchinsiae* (Gottsche) R.M.Schust.

ROGALAND: Hjelmeland, Erfjord, Brattåna River gorge, N
side of Mt. Gunlanut, 59° 18.434'N, 06° 15.577'E

Alt. c. 35m

1 September 2008

HANS H. BLOM

No. s.n.



Who will be the users?

✓ Taxonomists for taxonomic revisions.

- 1 Lateral leaves erect, strongly asymmetrical and postically secund, 1.5–2.2 times longer than broad; dorsal lobes ca 1.5 times wider than ventral lobes; slime papillae on single- or multicellular appendages to halfway up margin of lamina 2
Lateral leaves erecto-patent, weakly to strongly asymmetrical and postically secund, 2–3.5 times longer than broad; dorsal lobes not significantly different in size from ventral lobes; slime papillae sessile on margin at base of lamina (rarely on single-celled teeth) 3
- 2 Flagella abundant, mostly in pairs; lateral leaves 1.4–1.8 mm long, 1.5–2.2 times longer than broad; lobes 2–3(–4) times longer than broad; slime papillae on 1- to 2-celled stalks (rarely sessile) on margins towards base of lamina 1. *H. borealis*
Flagella infrequent, solitary; lateral leaves 0.8–1.2 mm long, to 1.5 times longer than broad; lobes 1.5–2 times longer than broad; slime papillae on coarse multicellular appendages on margins to halfway up leaf lamina 2. *H. sendtneri*
- 3 Lateral leaves symmetrical to weakly asymmetrical; lateral leaves 0.8–1.6 mm long, 2–2.5 times longer than broad; lobes 2–3 times longer than broad 3. *H. stramineus*
Lateral leaves asymmetrical; lateral leaves 1.4–2.2 mm long, 2.5–3.5 times longer than 4

Who will be the users?

- ✓ Nomenclaturists, since types are important for correct application of names.

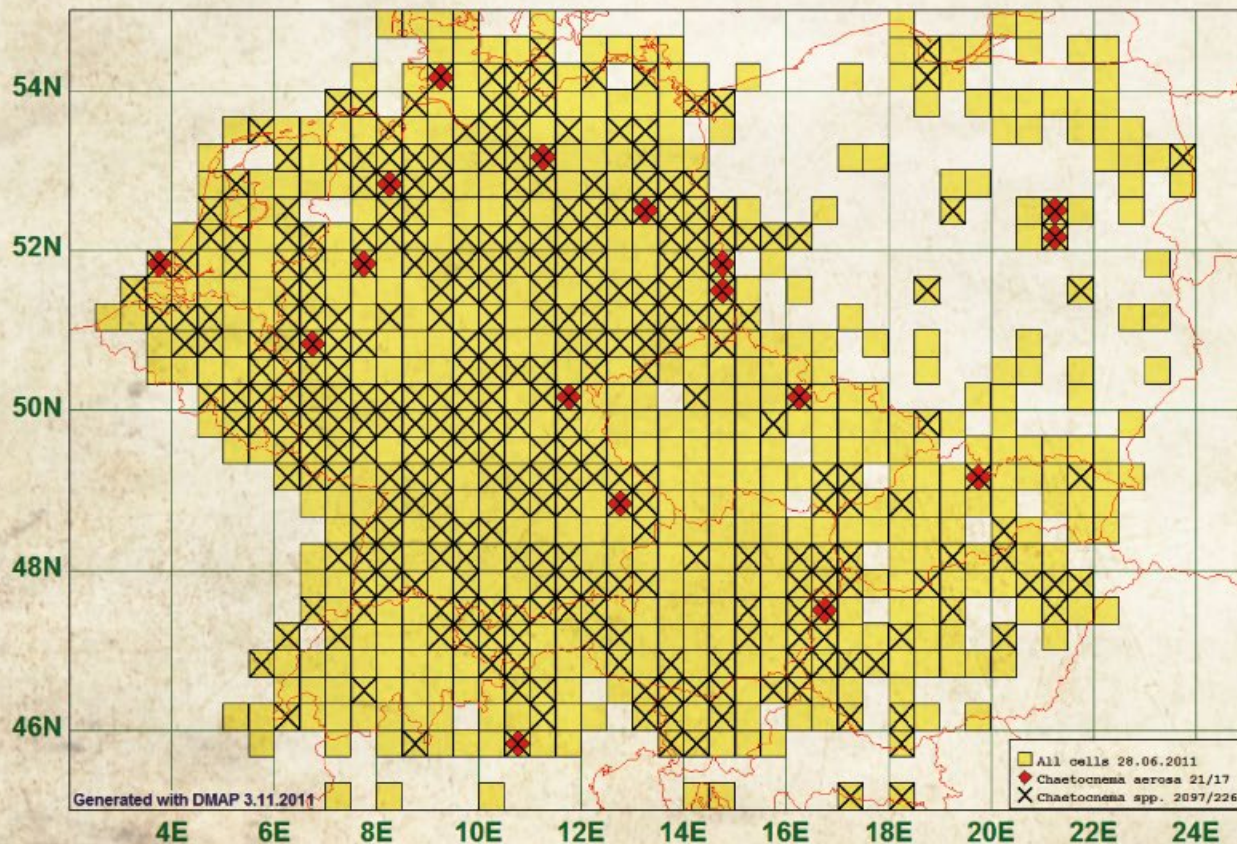
Who will be the users?

- ✓ **Conservationists who need information on rare species.**



Who will be the users?

- ✓ Flora writers compiling geographical data.



Who will be the users?

- ✓ Botanical historians researching important historical collectors.



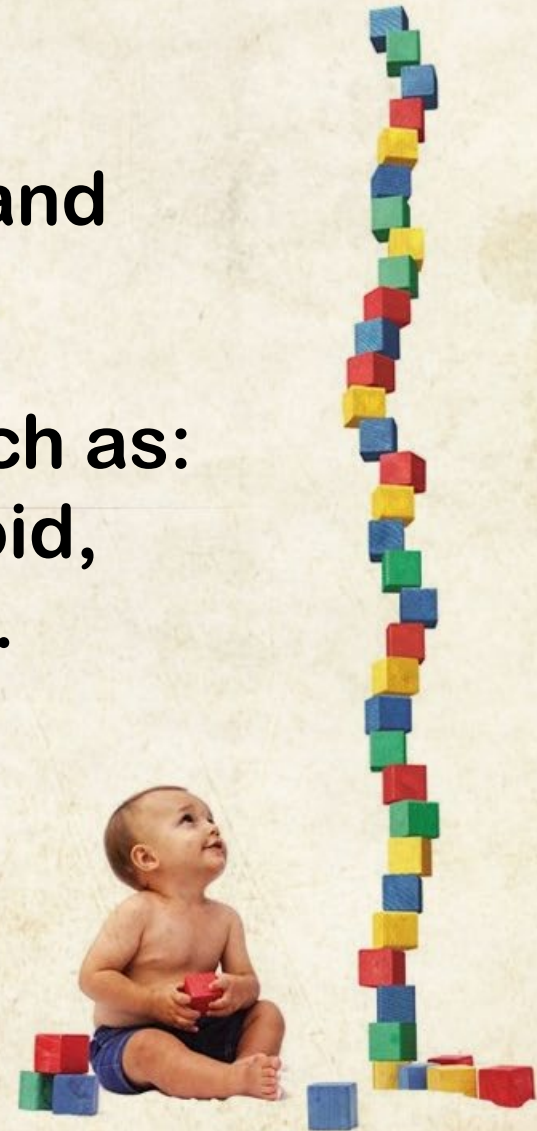
Conclusions

It works! - Just a starting point – Big task!
Time/specimen depends on many circumstances.
The final images are always a compromise.



What is next?

- (1) To complete *Herbertus* and *Tortula* at E.
- (2) To try other life forms such as: pleurocarps, complex thalloid, simple thalloid, epiphytic, ...
- (3) To develop some kind of collaboration with other institutions.



We will
keep walking...



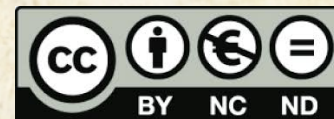
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