# DIGITIZING NORTH AMERICAN LICHEN AND BRYOPHYTE SPECIMENS LBCC (powered thru http://symbiota.org)

Corinna Gries
Edward Gilbert
Thomas H. Nash III

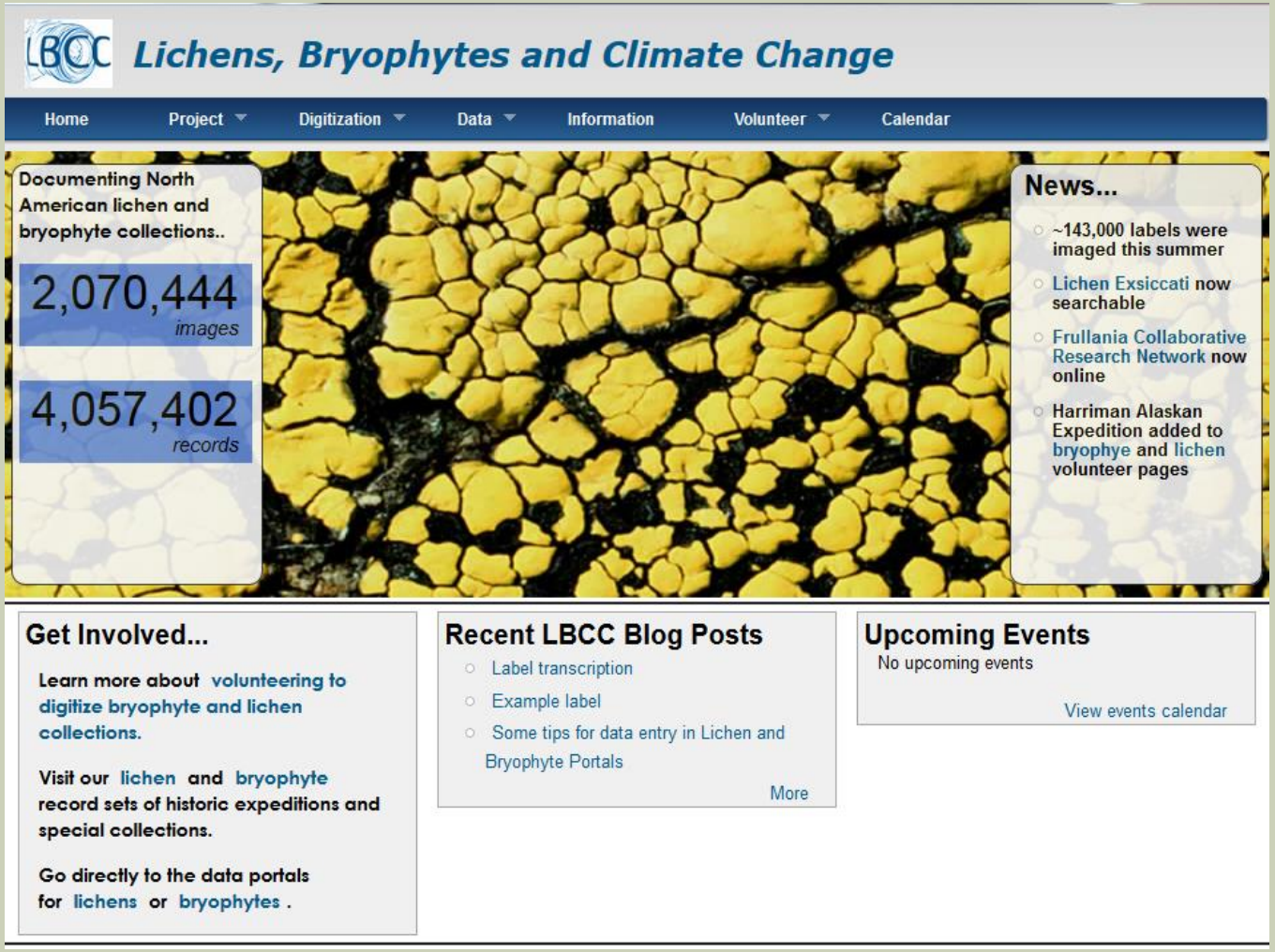
4.0 million specimens,

92 institutions,

4.3 years later

# LBCC TCN WEBSITE

## (HTTP://LBCC1.ACIS.UFL.EDU/ - OPEN SOURCE)



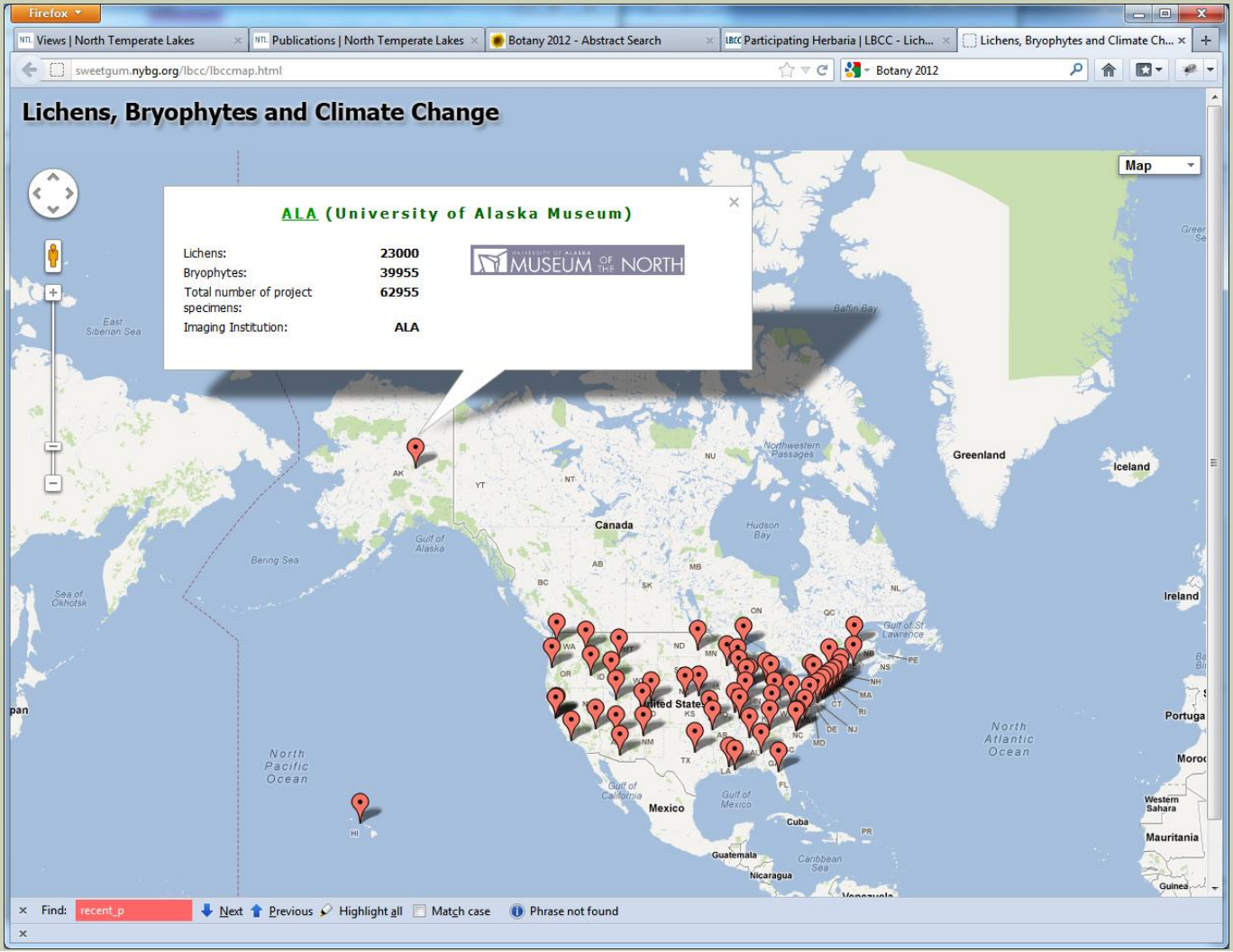
# BRYOPHYTES AND LICHENS

- Different evolutionarily but similar in size and habitats occupied (epiphytes, soil mats, and rocks)
- Both dominate much of the arctic and northern boreal regions (lichens in upland areas and bryophytes in wet habitats.
- Both also occur commonly in many other ecosystems (deserts to tropics)
- Bryophytes, particularly in peat bogs store a major part of the worlds organic carbon
- Both are very useful in deposition monitoring

# LICHENS BRYOPHYTES CLIMATE CHANGE

- Original NSF ADBC funding 2011
  - ~ 2.3 million specimen (90%)
    - 900,000 lichens
    - 1.4 million bryophytes
  - 65 non-governmental US herbaria (95%)
  - 16 digitization centers (collaborators)
  - Mobilizing additional existing digital records (25+ added so far)
- 4 PENs funded 2012, 2013 & 2014
  - Add 220,000 specimens and 5 digiti-
  - zation centers (CINC, COLO, FLAS, MIN,
  - YPM – not shown).

# PARTICIPATING HERBARIA

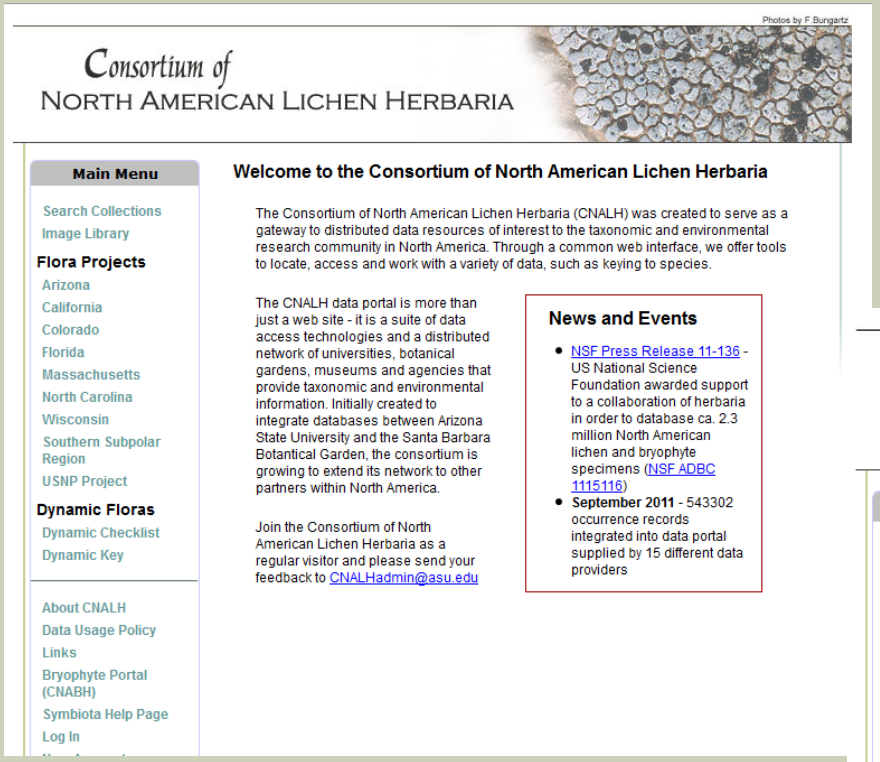


# LICHENS BRYOPHYTES CLIMATE CHANGE

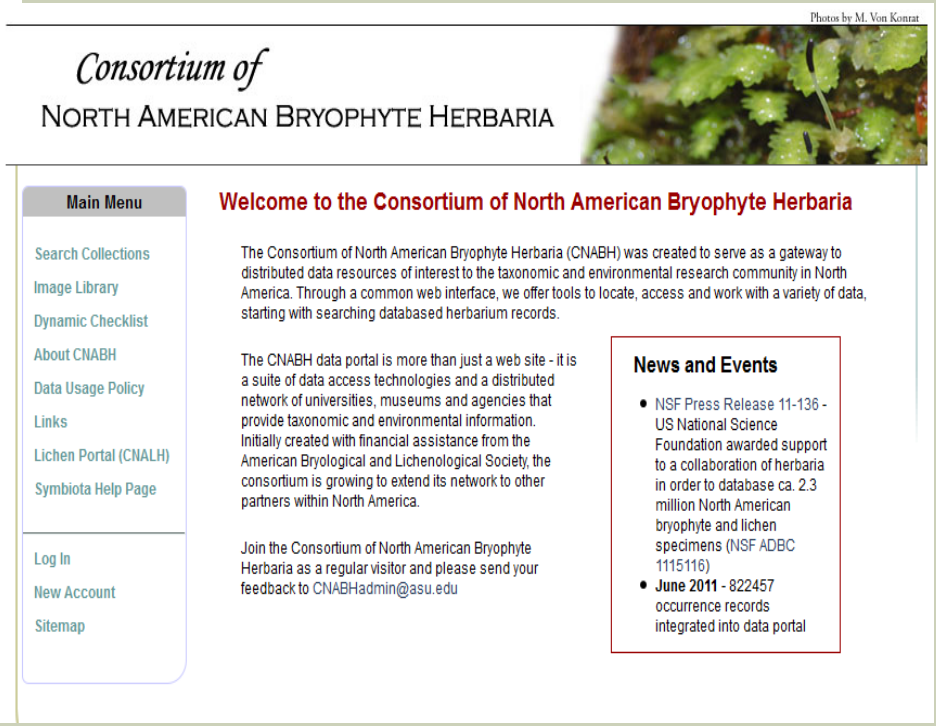
**Research Questions:**

- **How are changes in distribution patterns of lichens and bryophytes over time correlated with man-made environmental changes?**
- **How accurately can we predict where specific species can be found using existing herbarium data?**

# PORTALS




- Lichen portal (http://lichenportal.org)
- Open source




- Bryophyte portal (http://bryophyteportal.org)
- Open source

# Overall Project Workflow (data management)

- Label imaging with key metadata (searchable thereby) – images to HUB server (proofed by Julie Smith - WIS).
- OCR (optical character recognition) & NLP (natural language programming run on all images –coordinated by Robert Anglin
- Images and transcription pages available side by side through the two portals as powered by Symbiota.
- Transcription thru editors, students, volunteers (with a national coordinator – Mari Roberts - NY ).
- Georeferencing in batches through Geolocate, including STR conversions (Robert Anglin and Julie Smith, both WIS).
- Duplicates imported or handled through exsiccati module (individual transcribers – hourly hirees or volunteers).
- *GOAL:* Completed, Searchable Databases available through the Lichen and Bryophyte Portals powered by Symbiota.

# NUMBERS

- Imaging Speed 300 to 1500+ per day
- Institutions having already imaged 22
- Additional institutions providing specimens to image 50
- Total number of images generated (Oct. 2015) 2,070,000+
- Records available on bryophyte portal 2,100,000+
  - Involving 70 institutions
- Records available on lichen portal 1,900,000+
  - Involving 77 institutions

Total specimen records in the portals 4,057,000+

Involving 92 institutions

# OVERSIGHT & RESEARCH

- Project PI – Corinna Gries – financial including funds transfers, IT supervision, TCN overall reports & e-mail communication
- Project coPI – T.H. Nash III – database checking & barcodes & e-mail communication, over numbers evaluation, WIS supervisor
- Image checking & upload – J. Smith (WIS) & people at each imaging institution
- OCR & NLP – R. Anglin (WIS)
- Server maintenance – University of Florida IT personnel
- Geolocate – R. Anglin, students trained by J. Smith
- Transcription – everyone possible, including student trainees and volunteers
- If all else fails, call Ed Gilbert and/or HUB folks at UF or FSU
- Research – anyone of the hundreds of people using the lichen and/or bryophyte portals, which provide searching by institution, taxa, geographical location, date of collection, coordination of floristic projects, keying, photos, maps & taxa descriptions - & Duke team for North Carolina

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