

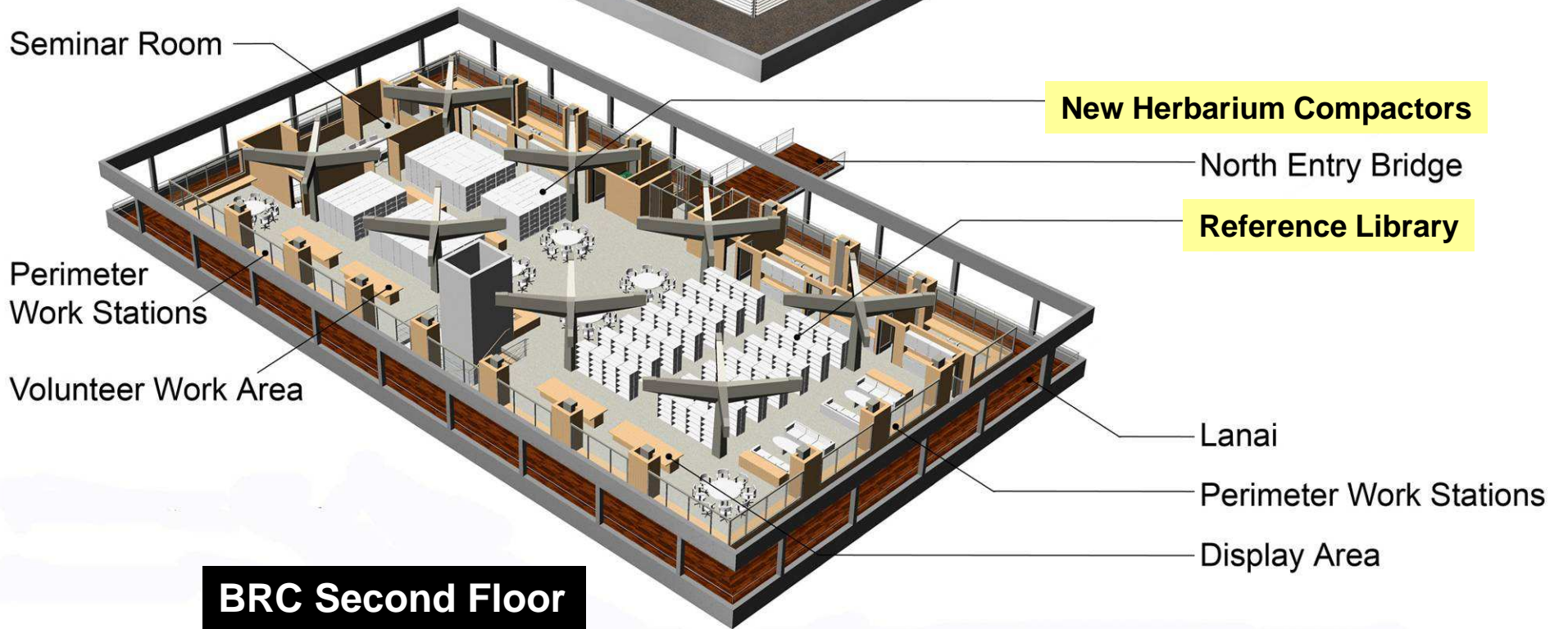
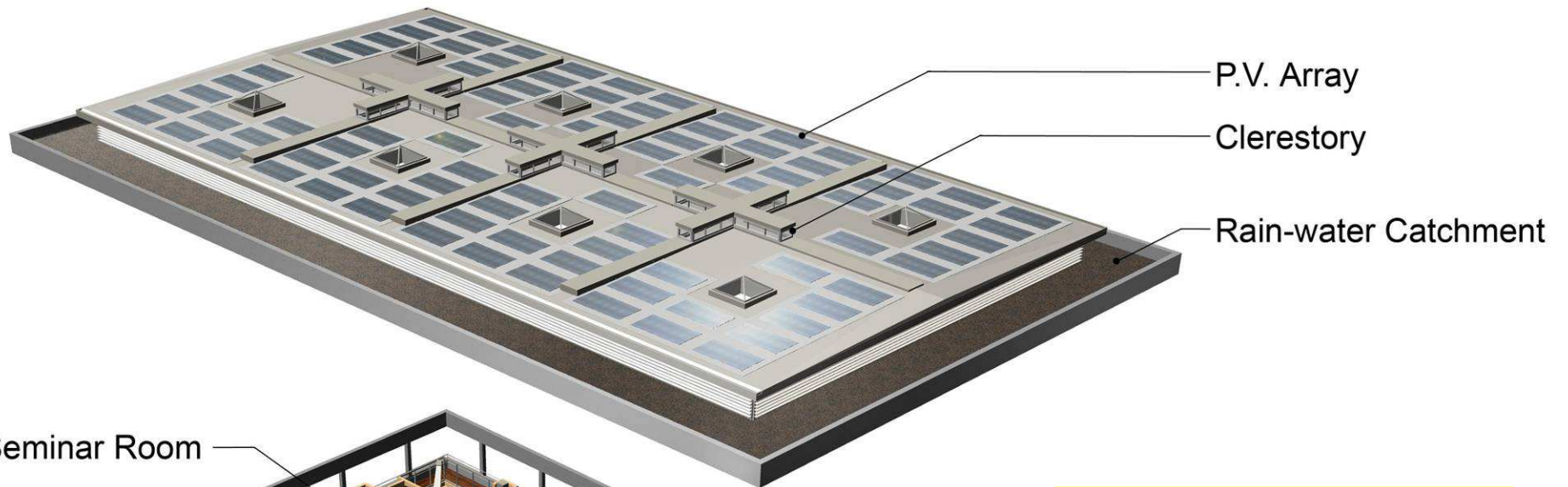


**We're Virtually There:  
Digitizing NTBG's  
Herbarium Collections (PTBG)**

**David H. Lorence  
Co-Director of Science/Conservation  
National Tropical Botanical Garden**

- Herbarium PTBG Founded in 1971, when Pacific Tropical Botanical Garden
- 2008 moved to Botanical Research Center (BRC)
- LEED Gold building, 40-50 years growth capacity for specimens and books





# Herbarium PTBG



- Currently c. 71,000 specimens
- Hawaiian Islands, Polynesia (Marquesas, Samoa), Micronesia, Melanesia
- Taxonomic: ferns, *Artocarpus*, Monimiaceae, Rubiaceae (some Neotropical)



# Specimens filed in color-coded folders



HERBARIUM FTBG

Specimens are separated into Pteridophytes, Gymnosperms, Monocots and Dicots. Within each group specimens are arranged alphabetically by Family and within family by Genus and then Species. Specimens are also separated and arranged geographically within each Genus. Geographic areas are arranged in the following order:

	HAWAII-Wild-collected native species
	HAWAII-Introduced, naturalized, cultivated (may include native) species
	POLYNESIA Austral Islands, Cook Islands, Gambier Islands, Hawaiian Islands, Johnston Atoll, Marquesas Islands, Midway Island, New Zealand, Niue, Pitcairn Islands, Samoa Islands, Society Islands, Tokelau, Tongan Archipelago, Tuamotu Archipelago, Tuvalu, Wallis and Futuna
	MICRONESIA Baker Island, Caroline Islands, Gilbert Islands, Guam, Howland Islands, Jarvis Island, Line Islands, Mariana Islands, Marshall Islands, Nauru, Palmyra Atoll, Phoenix Islands
	MELANESIA Fiji, New Caledonia, Papua New Guinea, Solomon Islands, Vanuatu
	AUSTRALIA
	ASIA
	AFRICA Also includes Chagos Archipelago, Comoro Islands, Madagascar, Mascarene Islands
	AMERICAS
	EUROPE



# Herbaria as sources of new species

1970–2010 data for newly named plant species

- Only 16% described within 5 years of first collection
- Majority 84% involved much older specimens
- C. 25% specimens > 50 years old
- > 50% of estimated 70,000 undescribed spp. already collected & stored in world's herbaria
- Need accessibility to collections!
- Need more taxonomists!



Historically and currently, herbarium specimens are accessed in person, or on loan

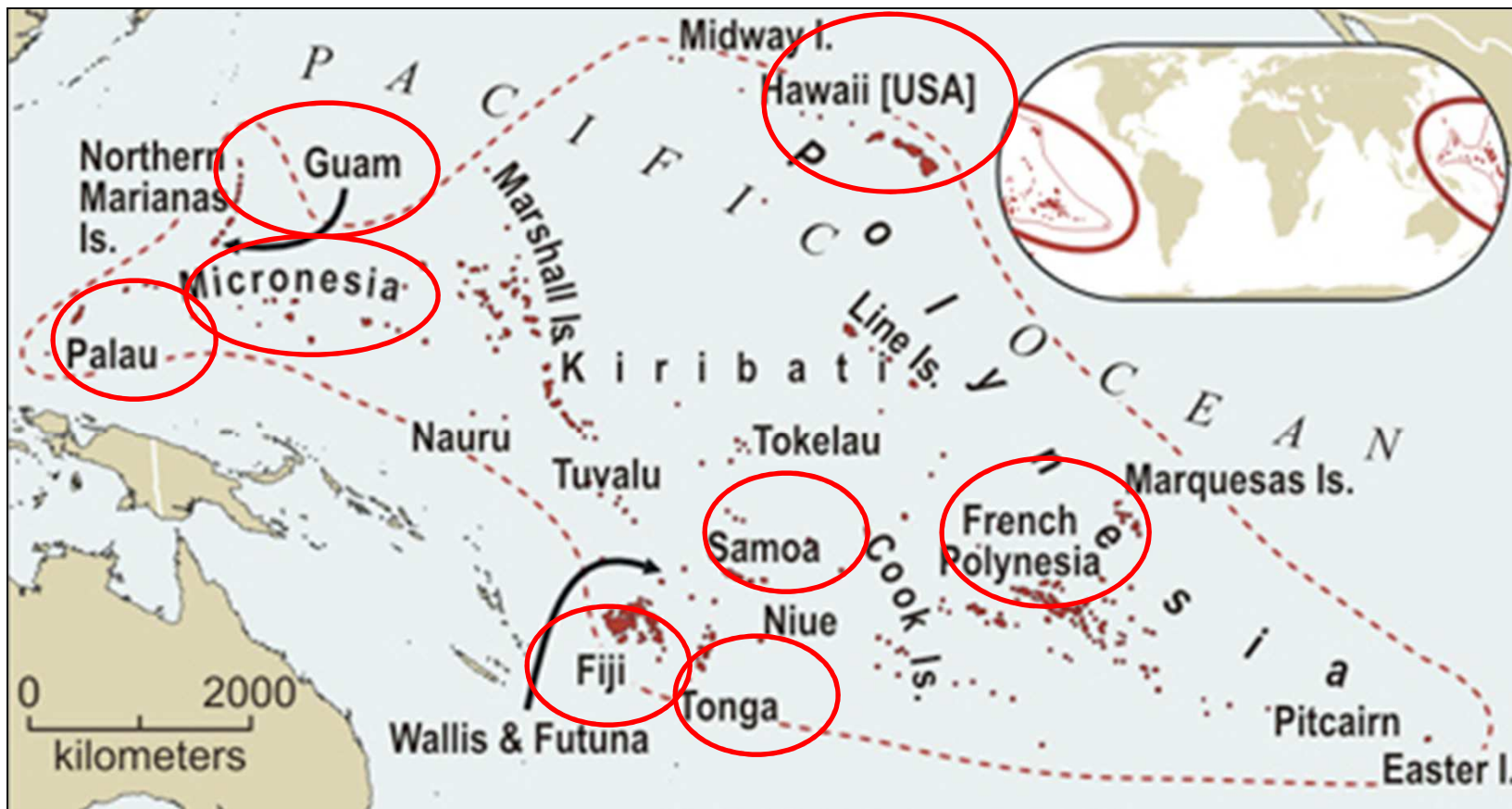


\*Need to make it easier to access collections  
\*2010 Mellon Foundation Grant,  
PTBG types scanned & available on JSTOR



# Important botanical research collections scattered throughout Pacific

## Polynesia-Micronesia Hotspot (PMH)



Est. 530,000 P-M Hotspot Region specimens



# Consortium of Pacific Herbaria (CPH) Proposal for 3-year project submitted to NSF by Bishop Museum, NTBG, UH-Manoa, Funded 2011-2014

Major goal of CPH project:  
Make herbarium specimen images and data  
from Polynesia & Micronesia  
available to the world

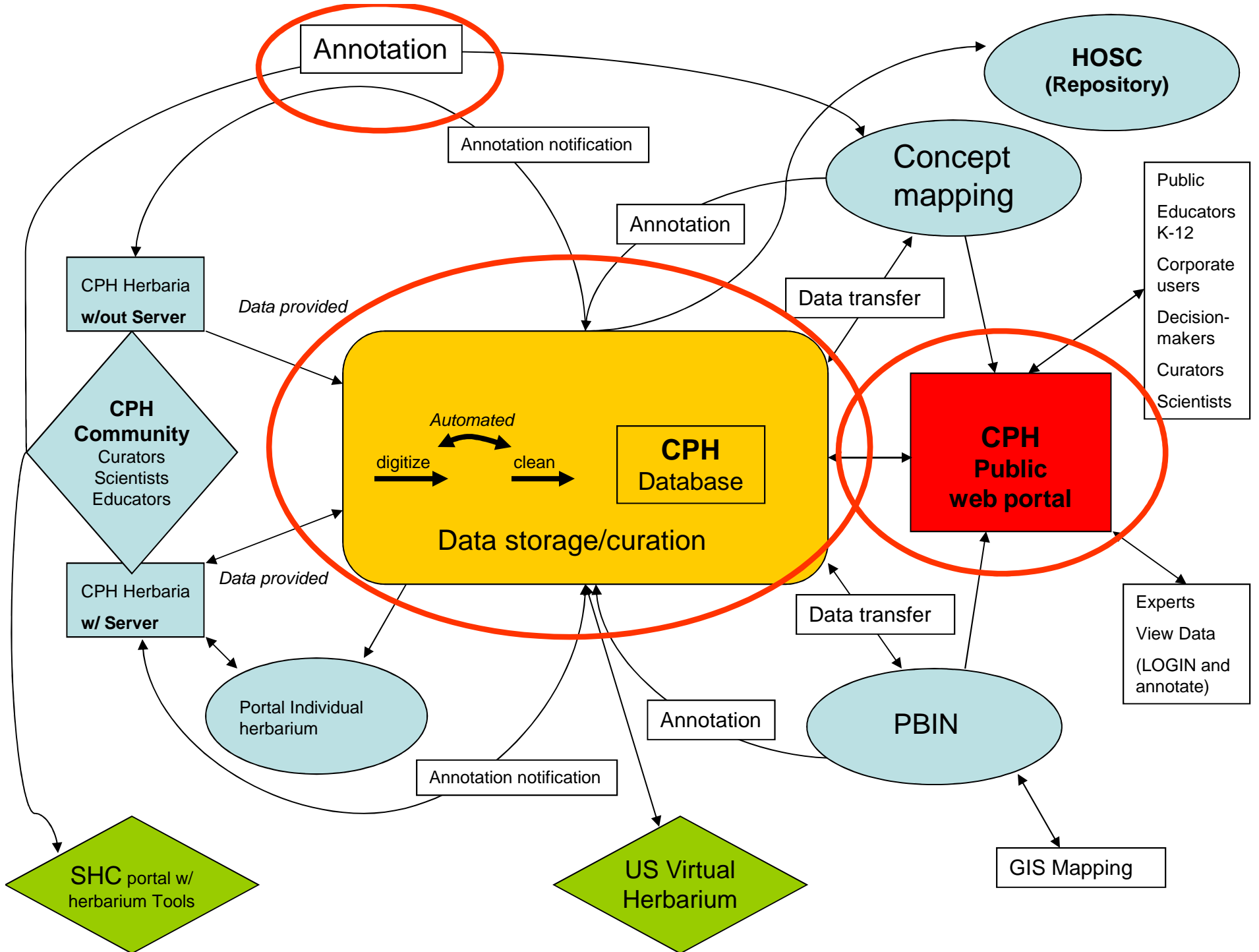


The Consortium of Pacific Herbaria: A new research and collections network for Oceania  
14 participating herbaria / institutions

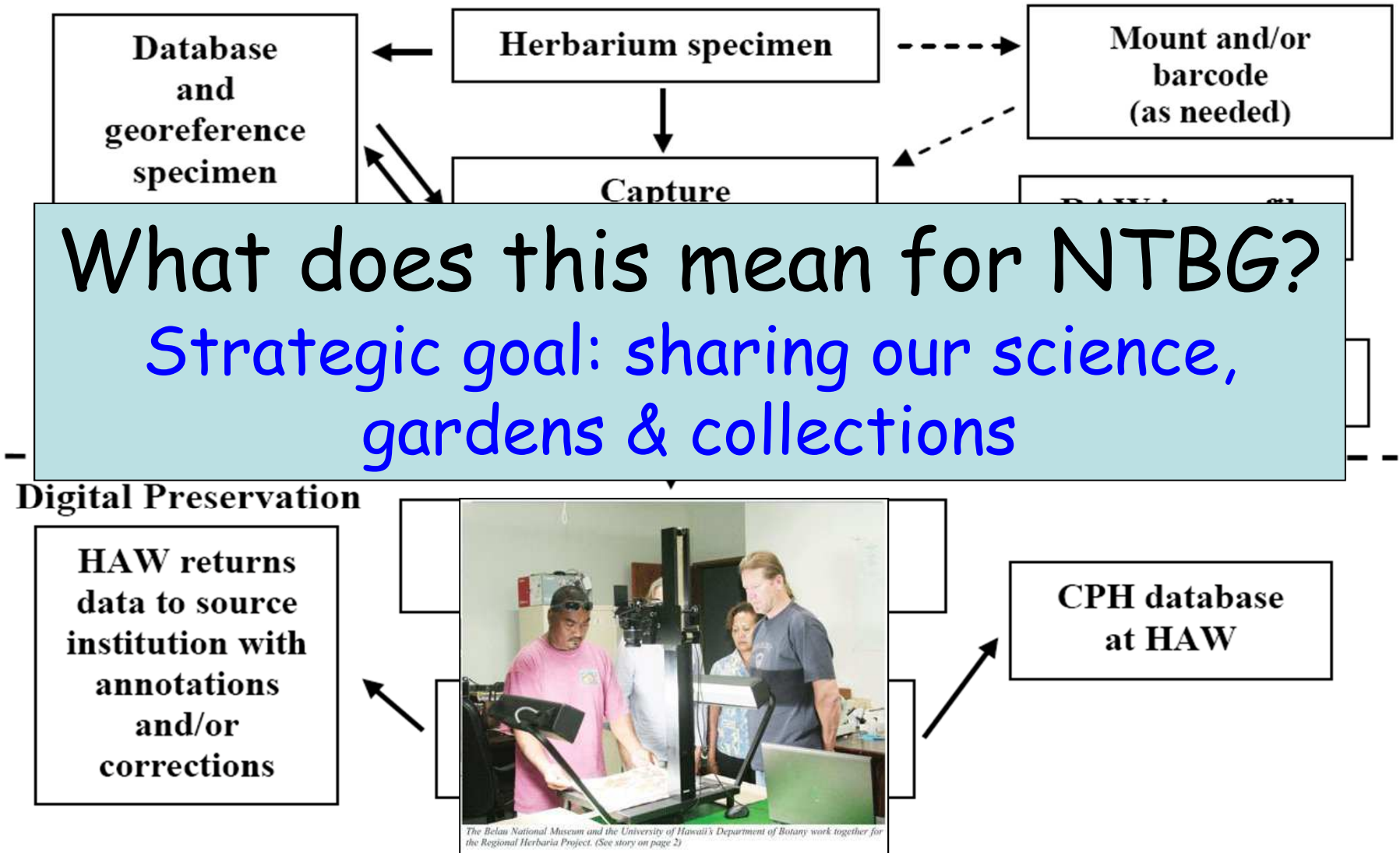
Hawaiian Islands	
<b>Bishop Museum</b>	Haleakala National Park
<b>National Tropical Botanical Garden</b>	Hawaii Volcanoes National Park
<b>University of Hawaii at Manoa</b>	National Oceanic Atmospheric Admin.
Oahu Army Natural Resource Program	Waimea Arboretum

Greater Pacific	
National Univ. of Samoa	Univ. of American Samoa
University of Guam	Belau National Museum, Palau
Univ. of South Pacific (Fiji)	Ministry of Ag. & Forestry, Tonga

**NTBG has 71,000 specimens (13.4% of total)**

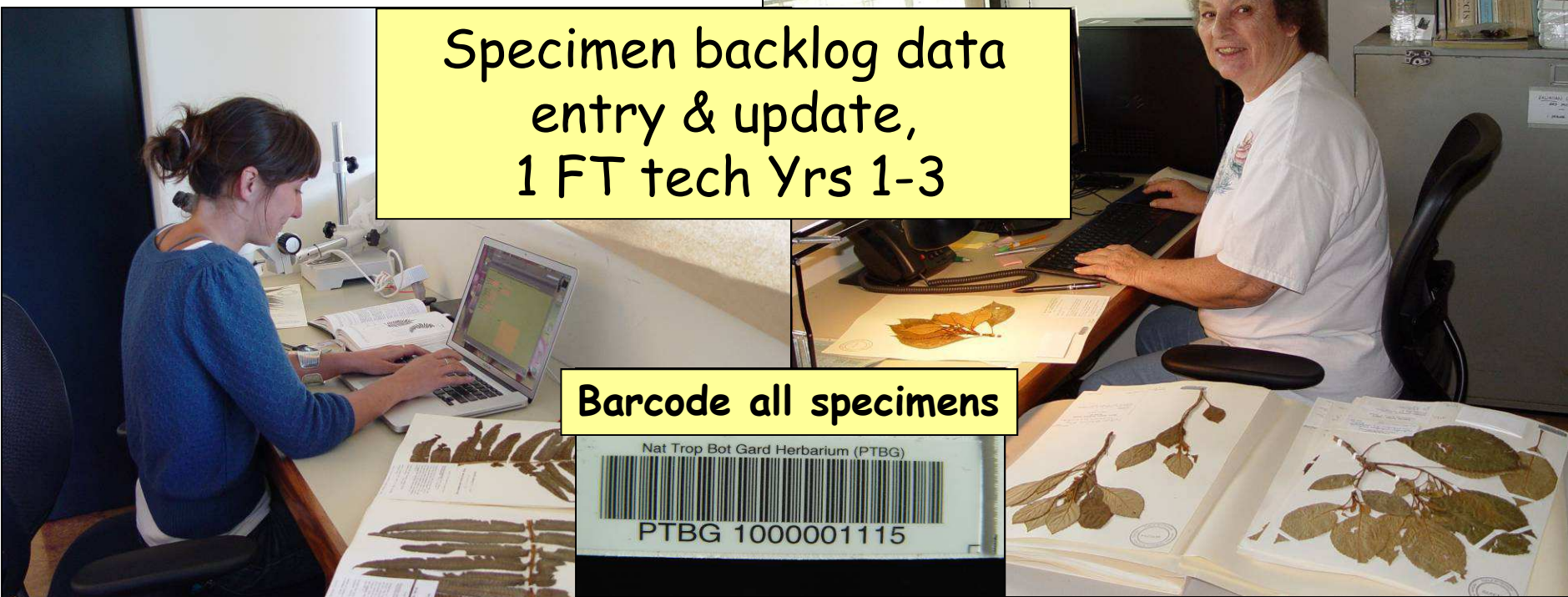


**Figure 3.** Proposed data capture and preservation at smaller CPH institutions. Label data can be databased either from the physical specimen or from the digital image for efficiency.





Mounting specimen backlog  
2 PT techs., Yrs 1 & 2

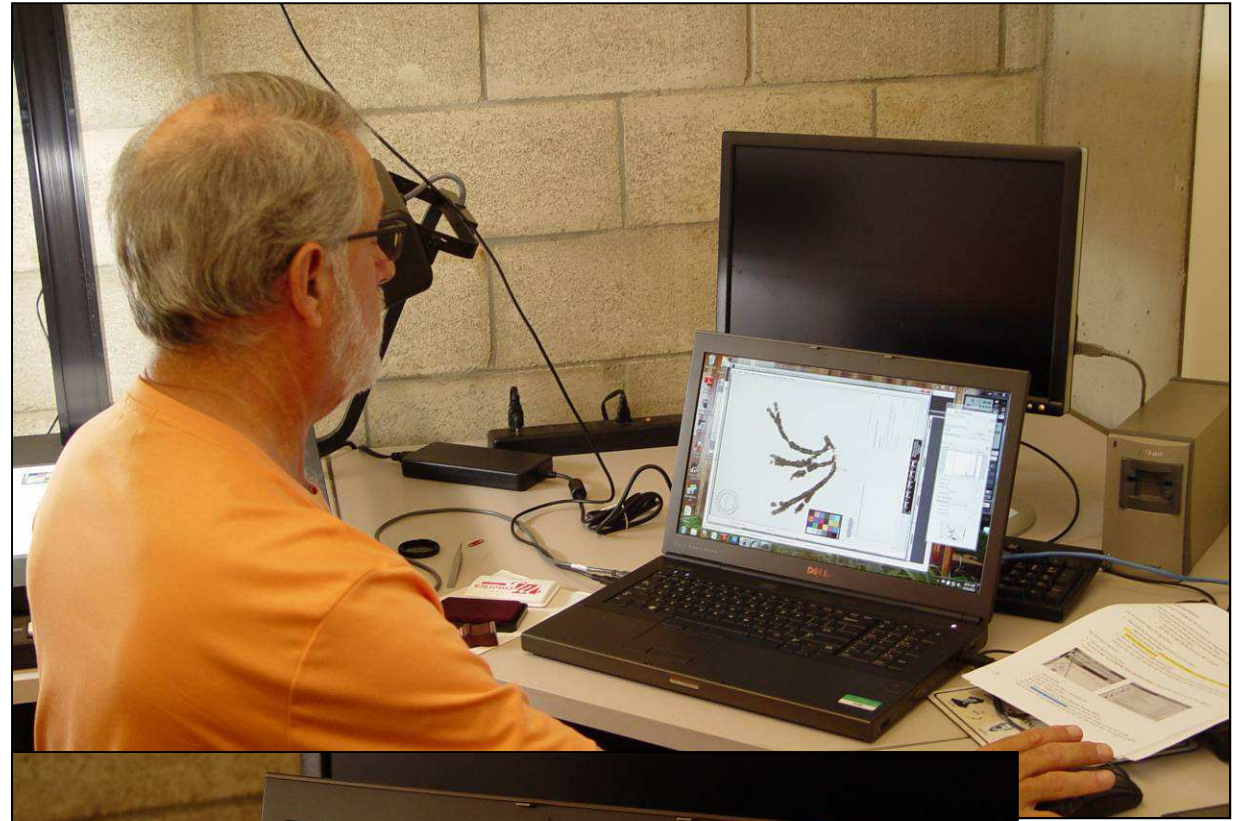
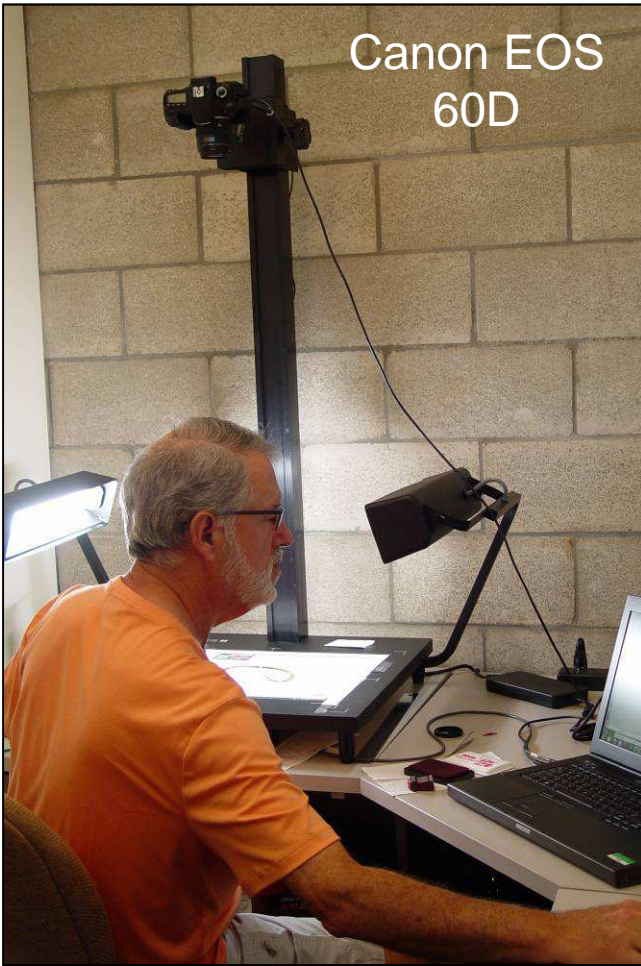


Specimen backlog data  
entry & update,  
1 FT tech Yrs 1-3

Barcode all specimens



Canon EOS  
60D



Photographing &  
barcode-scanning  
specimens:  
mostly volunteers

Invited specialists  
program

Annotate specimens  
with correct names

Building human  
resources: staff training



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Herbarium Database

Herbarium Database Search > Search Results > Record Detail

Record Detail

Location | Data | Loans

**\*Zoomify\* images for viewing**

Specimen ID: T008832  
 Herbarium: PTBG  
 Full Name: *Cyanea kuhihewa* (CAMPANULACEAE)

Collection Location

Locality/Origin Info: Limahuli Valley; East side of ridge separating Limahuli and Hanakapiai valleys, above major waterfall, along main stream, and climbing above numerous small waterfalls.

Collection Data

Collected by: 0820 (K. R. Wood)  
 Otherherb: US,BISH,F  
 Determiners Name: Thomas G. Lammers (F) 25 Jun 1996  
 From Cultivated Plant: No

- [ntbg.org/herbarium/](http://ntbg.org/herbarium/)
- Images & data on NTBG herbarium website (updated weekly)
- Zoomified images stored on Amazon S3
- TIFF files stored on Amazon Glacier



NTBG herbarium database linked via CPH portal [pacificherbaria.org](http://pacificherbaria.org)



## Goals for 3 yrs

D-base 41,000

Mount 13,000

Image 65,000

## Results

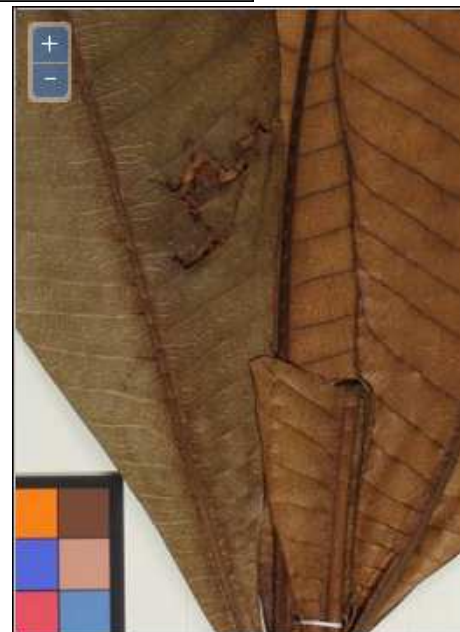
## Achieved in 3 yrs

43,500 d-based

10,000 mounted

32,500 imaged

(Volunteers will continue)



Federated States of Micronesia, Pohnpei, Kiti. Collected in the village Enipein Powe, up on the hillside.  
6°48'42"N, 158°12'56"E  
291 f.

Found in the forest on hillside slope in a shaded area, between *kaikes*, mango tree, and *sadak*.

Tree about 15 ft (4.6m) tall, leaf dark green above and lighter green below, with sticky white sap. Young leaves are small, old leaves are much bigger or larger. Sterile.

N.V. *Dobog* [Pohnpeian]

For yam planting. Used to make a trellis so the yam vine can grow on it.

**bark** Medicine to destroy marriage. To destroy marriages carve or peel the skin of the bark off, pound or crush, place into a piece of cloth, squeeze into a cup of water and drink all of it. Squeeze a small amount into the hand and apply all over the body starting from the head all the way down to the toes. Do this once a day for 4 or 8 days.

**tree** For making canoes.

21 Apr 2006

P. Emos Eperiam, Julie Cooper, Francisca Sohl, Relio Lengsi 82

# Conclusions

- Data entry lower than estimated 10/hr due to specimens with copious label data and/or data written in a foreign language, slowing transcription. Georeferencing dropped.
- Mounting rate lower than estimated 6/hr due to the additional time needed for mounting bulky or complex specimens.
- Imaging rate was lower than estimated 30/hr due to multiple images for large unmounted specimens (palms, pandans), opening packets, or second image if label overlaps specimen.
- Volunteers good but.....
- Should have budgeted an additional tech for Yr 3

# Acknowledgments



BISHOP MUSEUM



Matt Goodale





**Mahalo!**