Imaging Practices and Priorities in the BRIT Herbarium

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Junction, TX | 8-10 April 2011
Specimen workflow

- Specimen is selected for digitization
- Specimen is prepared for imaging
- Specimen is imaged (scanner or camera)
- Post-image protocol
- Re-filing
Selection: Specimen prioritization @ BRIT

- **Research priority (Andes to Amazon Biodiv. Proj.)**
  - 40,300 images (live+sheet)
  - Types (1000 sheets)

- **By geography (county-by-county)**
  - Denton, Gillespie, Wise, Kendall, Montague Cos.
  - Soon: Van Zandt, Cooke, Collin, Williamson Cos.

- **By taxonomy (Ferns of Texas)**

- **Promotional priorities (e.g. 4H Plant ID contest)**
Specimen selection: considerations

- **Condition of sheet** (requires repair, oversized, etc.)
- **Intended use** (medicinal plant display)
- **Ownership/permission** (NP specimens, special colls, etc.)
- **Historical value** (Reverchon, Whitehouse)
- **Character identification** (fertile vs. sterile)
- **Status of annotation** (identified!)
- **Uniqueness** (unlikely to be duplicated elsewhere)
Specimen preparation

- Current accession stamp
- Previous accession stamps ("ex"-ed)
- Repairs
- Contents of fragment packet
- Multiple sheets
- Barcode
- Annotation/Identification
Preparation: Accession stamps

- Consider adding an “ex” to a previous accession stamp rather than obscuring it with a line or text.
Preparation: Fragment packet contents

- When material available in the fragment packet is not represented elsewhere on the sheet:
Preparation: Barcode

- Each sheet is assigned a barcode, placed along the bottom edge in a parallel position, as close to the center of the sheet as possible.

Code 39 Barcode (format)
1 5/8” x 5/8”
Alphanumeric, variable length, universally compatible, archival-quality, self-adhesive (~US$31 for 1000)

Currently used at BRIT
Preparation: Multiple sheet specimens

- Consider each sheet a separate object, assigned a unique barcode
- Sheets are identified as belonging to a multiple set with a handwritten note above the barcode
Specimen imaging

- Equipment
- Training and staffing
- Storage of archival, master and delivery files
- Production of derivative files
- Web interface and access
- Transition plan across technologies for preservation
Imaging: Equipment

- Capture device
  - Epson Expression 1640 XL
  - Epson Expression 10000XL-GA
  - Canon EOS 5D Mark II

- Physical support for device (copystand, herbscan)

- Computer (laptop or desktop)

- Scale bar

- Color bar / Grey scale

- Black photo mat to frame sheet

- Capture software (usu. included with capture device)

- USB Barcode scanner
Imaging: Color Management System (or lack thereof)

- The controlled conversion between the color representations of various devices (scanner, camera, monitor) and the object.
- We utilize color and grey scales that are captured at the same time as the object, for future adjustments.
- Replaced periodically (6 mos)

ColorChecker
(Gretag-Macbeth)
xritephoto.com (~US$70)

Kodak Q-13 Color Separation
(with grey scale)
adorama.com (~US$24)
Imaging: Depicting scale

Forensics scale (#6-3813)
Flat color, no-glare plastic, no advertising,
15 cm & 6 in.
redwop.com (~US$10 for 10)
Imaging: Capture device & frame (scanners)

Epson Expression 1640 XL on Herbscan (Kew RBG)

Epson Expression 10000XL-GA on S4 (J. Best, BRIT)
<table>
<thead>
<tr>
<th></th>
<th>1640XL</th>
<th>10000XL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>device cost</strong></td>
<td>discontinued</td>
<td>~ US$2500</td>
</tr>
<tr>
<td><strong>frame cost</strong></td>
<td>~ US$4100 (herbscan)</td>
<td>~ US$200 (S4)</td>
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<tr>
<td><strong>resolution</strong></td>
<td>≥ 1600dpi</td>
<td>≥ 2400dpi</td>
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<tr>
<td><strong>file format</strong></td>
<td>.TIF +</td>
<td>.TIF +</td>
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<tr>
<td><strong>file size</strong></td>
<td>~216 MB</td>
<td>~216 MB</td>
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<tr>
<td><strong>speed</strong></td>
<td>6 min</td>
<td>1-2 min</td>
</tr>
<tr>
<td><strong>3D</strong></td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td><strong>&gt;&gt;11” x 17”</strong></td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td><strong>transfer</strong></td>
<td>USB 2.0</td>
<td>USB 2.0, FireWire (IEEE 1394)</td>
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3-D specimens are difficult to image with scanner
# Imaging: Camera

<table>
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<th>Feature</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Device Cost</td>
<td>~ US$2900*</td>
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<tr>
<td>Frame Cost</td>
<td>~ US$950</td>
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<tr>
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<tr>
<td>File Format</td>
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<tr>
<td>File Size</td>
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<tr>
<td>Speed</td>
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<tr>
<td>3D</td>
<td>Yes</td>
</tr>
<tr>
<td>&gt;&gt;11” x 17”</td>
<td>Yes</td>
</tr>
<tr>
<td>Transfer</td>
<td>USB</td>
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</tbody>
</table>

*Camera cost includes body, 50mm macro, 16GB card, AC adapter*
Imaging: Camera

- Depth-of-field, or height of focus area is significantly larger when using a camera.

- Speed of capture (0.25 s)
- Cost
- Servicing
- Ease of transport
- Flexibility (for various situations)
- Less damaging to specimen
- Smaller archival file sizes

- More time spent adjusting camera settings (but less on specimen)
- Capture format requires processing (but allows more flexibility)
- Smaller archival file sizes
Imaging: Camera cost

- Canon EOS 5D Mark II (US$2500)
- Canon EF 50 mm f/2.5 macro (US$300)
- Canon ACK-E6 ac adapter (US$130)
- 16 GB CompactFlash card (US$50)
- Remote release RS-80N3 (US$20)

TOTAL: US$ 3970
Image capture & processing

- Scanners:
  - Capture in .TIF (~216 MB) @ 600 dpi
  - Archive in .TIF

- Camera:

<table>
<thead>
<tr>
<th>Capture</th>
<th>Converted</th>
<th>Extracted</th>
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</thead>
<tbody>
<tr>
<td>RAW (.CR2)</td>
<td>.JPG</td>
<td>.DNG</td>
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<tr>
<td>25 MB</td>
<td>7 MB</td>
<td>25+ MB</td>
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Improvement required during image capture
Image workflow: capture

- Utilize an identifier that will allow for ease of searching without resorting to an external file or dbase.
- Include ownership
- If including numerical values from barcode, consider entry via a USB barcode scanner to avoid errors.
- Legacy images: use OCR to scan for barcode to rename images.

**e.g.**
BRIT02345.TIF

![Epson scan software (screen capture)](image)
Post-imaging protocol: specimen

- BRIT considers a sheet ‘digitized’ if it has been:
  1. Imaged
  2. Databased

- To denote what stage a sheet is at, they are stamped:
  1. IMAGED (imaged) 9 Apr 2011
  2. “Recorded in Atrium” (databased)
Date is handwritten in pencil, and changed to indicate that new annotations affixed to the sheet have been databased.

APIACEAE
Cicuta maculata L.
A. K. Neill (BRIT) 9 April 2011

Plants of Texas USA
Gillespie County

Recorded in Atrium
9 Apr 2011

Apiaceae
Cicuta maculata
Water Hemlock Lethally Poisonous

Gillespie County
Fredericksburg Baron Creek
N30° 16' 06'', W098° 52' 07'' Elev. 502 meters

Habitat: Along margin of Baron Creek near downtown Fredericksburg in moist sand. Large colony of about 30 plants to 2.5 meters tall.

IMAGED
17 JUN 2010

RESEARCH INSTITUTE OF TEXAS

ROBERT J. O'KENNON 9221
10 July 1991
Image workflow

Capture device ➔ Computer ➔ Image Processing server ➔ Image server

- Linux image processing server
- Djakota image server
- Linux storage server