Topic 01
Introduction to Plant Systematics

I. What is Systematics?

B. Important products
1. Species
2. Taxonomic monographs & floras (manuals, field guides)
3. Phylogenies & phylogenetic methods

Primary use of phylogenies in systematics: doing taxonomy

How to classify these 24 genera?
Phylogenies eliminate some possibilities and help identify plausible alternatives.

Broader impacts of phylogenies:

- From understanding the basis for unusual allergies...
Broader impacts of phylogenies:

To understanding our place in the evolutionary tree of life.
II. Herbaria

A. Herbarium specimens & important herbaria

1. What
II. Herbaria

A. Herbarium specimens & important herbaria

1. What

II. Herbaria

2. Important herbaria (after Index Herbariorum)

MVSC (ca. 15 thousand)
P (8 million)
NY (7.3 million)
K (7 million)
MO (5.9 million)
US (4.3 million)
II. Herbaria

3. Zoological analogs of herbaria

B. Use of specimens

1. Document patterns of morphological and geographical variation in plant diversity: past, present, and future
Floristic (biotic) diversity, past & present

- Accurate range estimates, e.g., maps from USDA PLANTS Database are based on herbarium specimens.
- Accurate range estimates, e.g., the composition of floras and manuals are based on specimen occurrence records.
II. Herbaria

B. Use of specimens

2. the basis for new species descriptions and other taxonomic studies.

Two new species of Gingers (Zingiberaceae)

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This is what the new species look like....

Descriptions. Medium herb to 85 to 130 cm in height; rhizomes compact, yellow internally, with numerous white tubers (yellow internally). Leaf sheaths loosely club-shaped, decussating during the dry season, 3 to 5-bracted, with basal sheaths green with red speckles, glabrous. 20–22 cm × 4.5 cm. Plane of dichotomy parallel to rhizome. Leaves 60–70 cm in length; glabrous and sometimes pubescent; 19–23 cm × 6–8 cm. Glabrous, green with small red speckles, deeply grooved in cross section, margin entire, smooth, ligulate midvein-cordate, 1.5–2.5 cm in length. Hairless, thin and translucent, pale yellow green, glabrous; blade 45–49 cm × 17–20 cm, narrowly obovate, midrib beneath green with sparse red speckles, glabrous, base cuneate, suboblong, adaxial surface dark green. Inflorescence terminal on relatively long, leafy shoots, 80–15 cm in length; peduncle 2–5 cm in length, glabrous, to 12 cm in length, red masor marcescent and silky short; inflorescence bracts 25–30 per inflorescence, 2.9–3.9 cm × 2.5–3.4 cm, with leafy and indurate, each joined to adjacent members by a leafy sheath. 90° in the angle, green to deep red marcescent distally in color. Cincinni one per branch, the lower 3–4 flowers, starting from base to apex of inflorescences; bracts not tabular, 13–15 × 4–6 mm, transversely.

This is how to tell the new species apart (a dichotomous key)...

Key to species of *Zingiberaceae*

1. Scape of Zingiberaceae
   1. Leaf sheaths lanceolate, rough, bactrid pendent, two or three flowers... "bump

2. Leaf sheaths ovate, rounded, erect, or distinctly elliptic
   2. Leaf sheaths ovate, rounded, erect, or distinctly elliptic
      1. Leaf sheaths rounded, or elliptic, leaflets 2–3 "bump

3. Leaf sheaths ovate, rounded, erect, or distinctly elliptic
   3. Leaf sheaths ovate, rounded, erect, or distinctly elliptic
      1. Leaf sheaths ovate, rounded, erect, or distinctly elliptic, leaflets 2–3 "bump

4. Leaf sheaths ovate, rounded, erect, or distinctly elliptic, leaflets 2–3 "bump

5. Leaf sheaths ovate, rounded, erect, or distinctly elliptic, leaflets 2–3 "bump

6. Leaf sheaths ovate, rounded, erect, or distinctly elliptic, leaflets 2–3 "bump
This is where they grow and where you'll find them.

II. Herbaria

B. Use of specimens

3. teaching aids.

4. reference specimens for applications requiring accurate species identification (e.g., forensics or taxonomic and floristic surveys)
II. Herbaria

B. Use of specimens

4. Reference specimens for applications requiring accurate species identification (e.g., forensics or taxonomic and floristic surveys)
5. archived voucher specimens to document the species identity of plants used for various other biological investigations.

II. Herbaria

C. How to make a specimen

1. Collecting
2. Pressing & Drying
3. Mounting

See Dirig (2005)