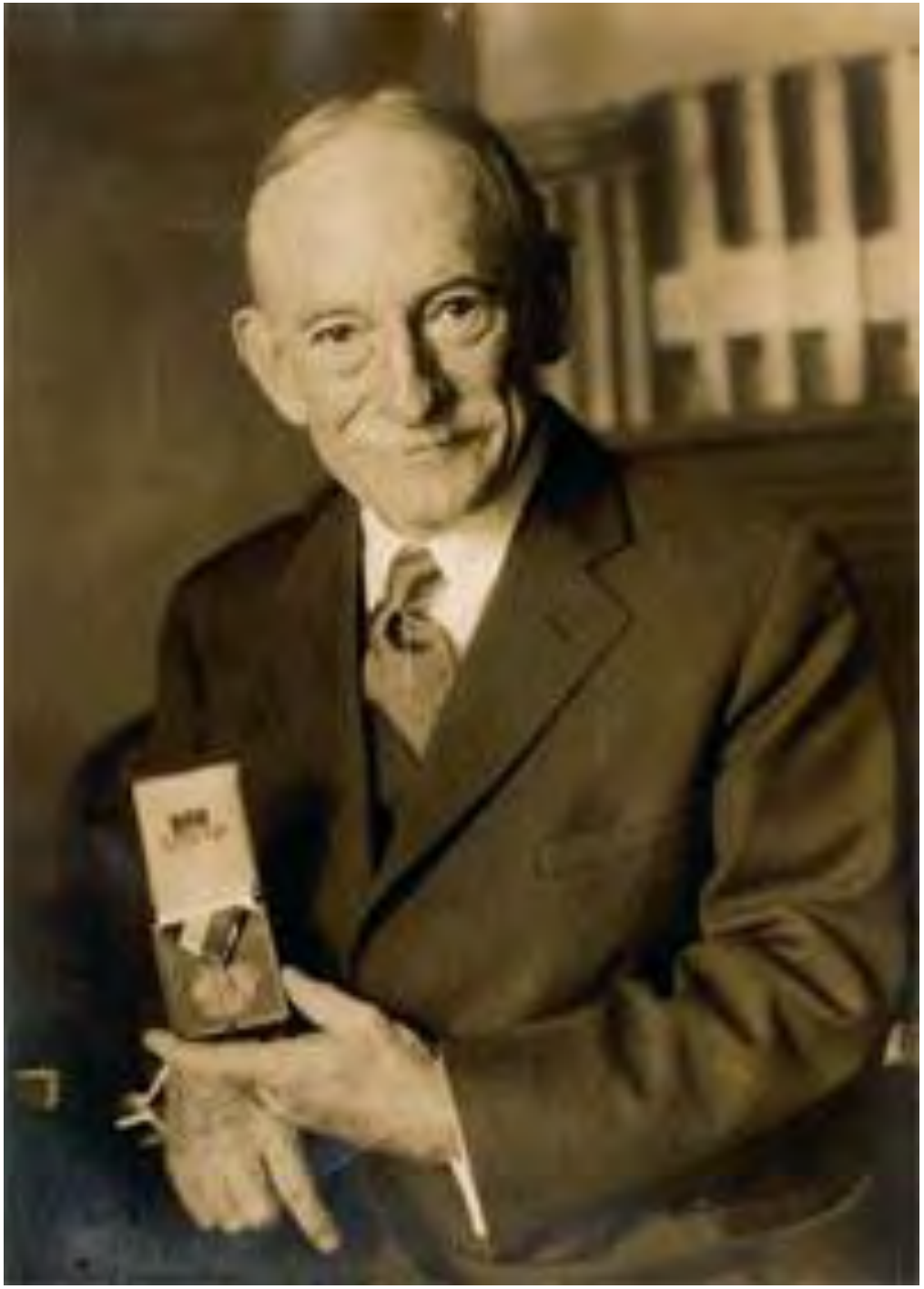
Taxonomically Challenging Plant Groups in the New Jersey Pinelands

Gerry Moore

plants.usda.gov



What is a taxonomically challenging plant group?

1. Nomenclature is challenging.

2. Identification is challenging.

3. Circumscription/classification is challenging.

History of Botanical Nomenclature

1736. Linnaeus. *Fundamenta botanica*

1737. Linnaeus. *Critica botanica*

1843. Strickland et al. Code (zoology)

1867. Alphonse de Candolle *Lois*

1906. Vienna *Rules*

1935. Cambridge *Code*

…..

2012 *International Code of Nomenclature for algae, fungi and plants*

Major Developments

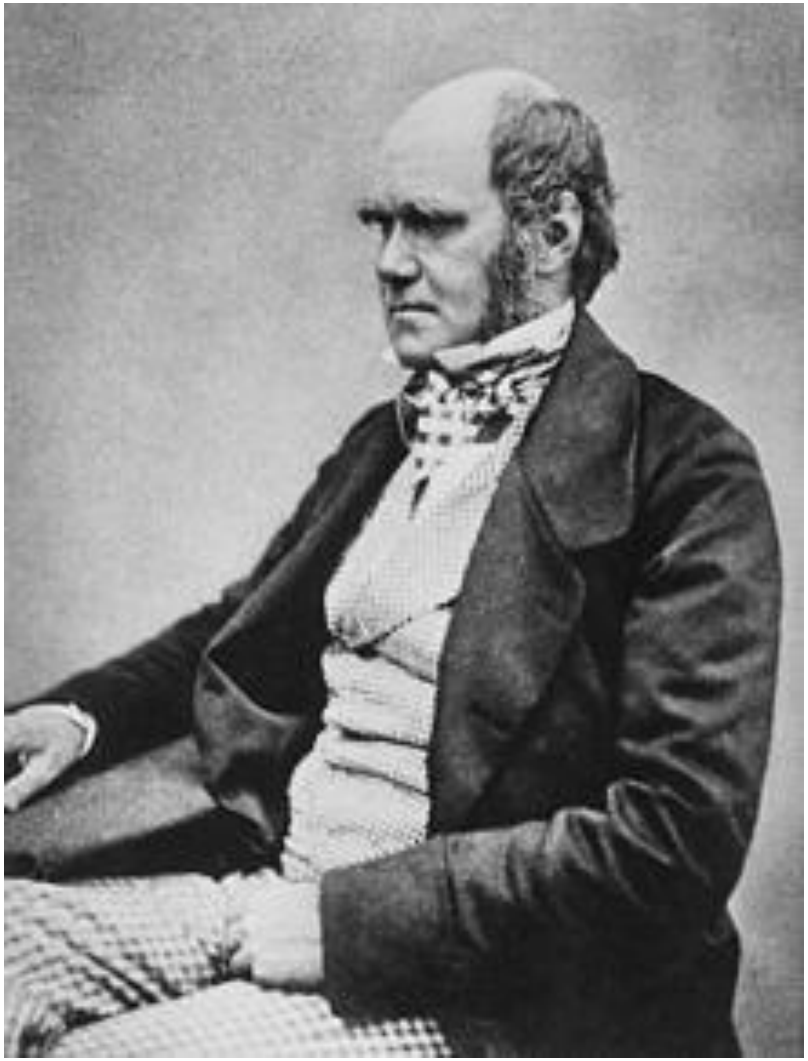
1. Botanical nomenclature separate from zoology
2. Starting points
3. Formal set of ranks
4. Uninominal, binominal
5. Applications determined by types
6. Priority
7. Effective publication standards
8. Latin requirement for diagnoses or descriptions (abandoned in 2012)

Primary Goal of Nomenclature

1843 Evil: "…when naturalists *are* agreed as to the characters and limits of an individual group or species, they still disagree in the appellations by which they distinguish it." (Strickland et al., 1843).

"Each taxonomic group with a particular circumscription, position, and rank can bear only one correct name…" (Code, 2012)

Priority



Priority

Darwin to Strickland

"I find it very difficult to obey…if I were to follow the strict rule of priority, more harm would be done than good…I have almost made up my mind to reject priority in this case…I cannot do it, my pen won't write it, it is *impossible.*"

Priority

Darwin to Strickland

"I feel sure as long as species-mongers have their vanity tickled by seeing their own names appended to a species, because they have miserably described it in two or three lines, we shall have the same *vast* amount of bad work…"

Priority

Darwin to Strickland

“I have come to the fixed opinion that the plan of the first describer’s name being appended for perpetuity to a species, has been the greatest curse to Natural History.”

Priority

“The oldest fool is always right”

Details, details, details

Orthography

pennsilvanica, pennsilvanicum, pennsilvanicus, pennsylvanica, pennsylvanicum,

pennsylvanicus, pensilvanica, pensilvanicum, pensilvanicus, pensylvanica, pensylvanicum, pensylvanicus,

1981 Sydney: Special Committee for Orthography

1993. Yokohama: Special Committee for Orthography

1999 St. Louis: 37 proposals

2005 Vienna: 147 proposals

Summary of nomenclature proposals

- 2011 Melbourne:338+
- 2005 Vienna : 312+
- 1999 St. Louis: 218+
- 1993 Yokohama: 321+
- 1987 Berlin: 336+
- 1981 Sydney: 215+
- 1975 Leningrad: 152+
- 1969 Seattle: 284+
- 1964 Edinburgh: 278+
- 1959 Montreal: 317+
- 1954 Paris: 387
- 1950 Stockholm: 540+

(last Congress was 1935)

Spirited Debates at Meetings

Candolle (1869): “provoked a kind of polemic and antipathy that rarely contributes to progress in science.”

Briquet (1906): “every point was argued with considerable heat.”

Nicolson (1999): “we ought not act like bloodthirsty enemies.”

Marcus Jones's "tribute" to E. L. Greene

"Greene, the pest of systematic botany, has gone and relieved us of his botanical drivel. They say the good that men do lives after them but that the evil is interred with their bones. I suspect that his grave must have been a big one to hold it all…[It] makes one half inclined to believe in Hell, for no other place would be suitable for him."

***Contr. Western Bot.* 15:225-229. 1912.**

Details, details, details

Types

Holotypes (Isotypes)

Lectotypes (Isolectotypes)

Neotypes (Isoneotypes)

Epitypes (Isoepitypes)

Syntypes (Isosyntypes)

Paratypes

Q. montana Willd.
Q. prinus L.

Names originally described & typified from N.J. Pinelands

Agalinis racemulosa
Andropogon littoralis
Corema conradii
Eleocharis olivacea
Lobelia canbyi
Panicum addisonii
Panicum clutei
Panicum longifolium
Rhexia aristosa
Rhynchopsora microcephala
Rhynchopsora torreyana
Rhynchospora cephalantha
Rhynchospora gracilenta
Rhynchospora kniekernii
Schizea pusilla
Scirpus longii
Scirpus subterminalis
Utricularia striata

Biodiversity v. Name Diversity

The Plant List (2010, K, MO)

1,250,000 names (1,040,000 species names)

- **300,000 (29%) accepted**
- **480,000 (46%) synonyms**
- **260,000 (25%) unresolved**

Identification is difficult

In these cases, like the ones involving nomenclatural challenges, the taxonomic treatments are largely stable but identification of individuals can be challenging due to numerous factors, including:

a. limited hybridization

b. limited populations exhibiting ancestral polymorphisms

c. difficult character interpretation



Quercus

Oaks *(Quercus)*

1. *Quercus alba*
2. *Quercus bicolor*
3. *Quercus coccinea*
4. *Quercus falcata*
5. *Quercus ilicifolia*
6. *Quercus imbricaria*
7. *Quercus lyrata*
8. *Quercus marilandica*
9. *Quercus michauxii*
10. *Quercus montana (prinus)*
11. *Quercus nigra*
12. *Quercus palustris*
13. *Quercus phellos*
14. *Quercus prinoides*
15. *Quercus rubra*
16. *Quercus stellata*
17. *Quercus velutina*


1 cm

Hickories (*Carya)*

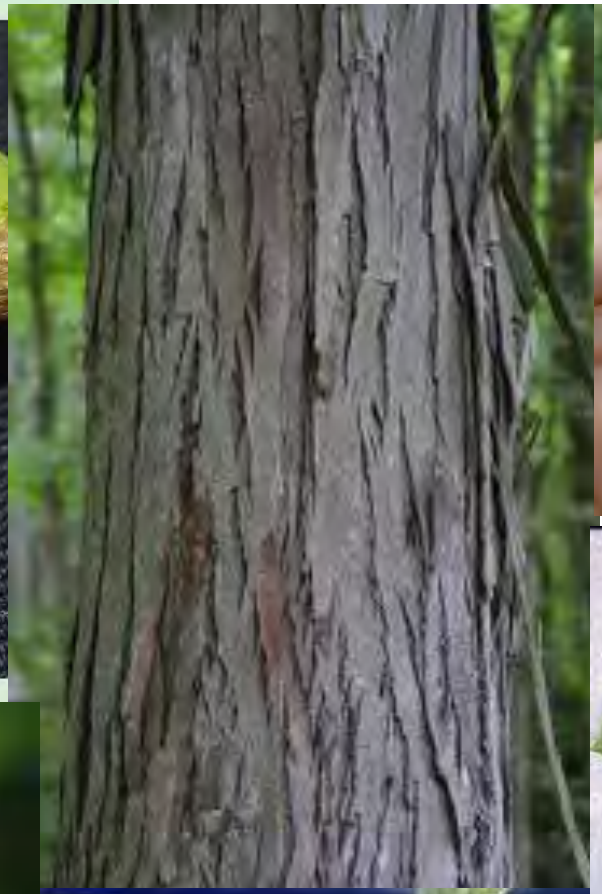
***Carya cordiformis* (1787)**

***Carya glabra* (1768)**

***Carya ovata* (1785)**

***Carya pallida* (1897)**

***Carya tomentosa* (1798)**



Classification is difficult

ABOVE SPECIES LEVEL

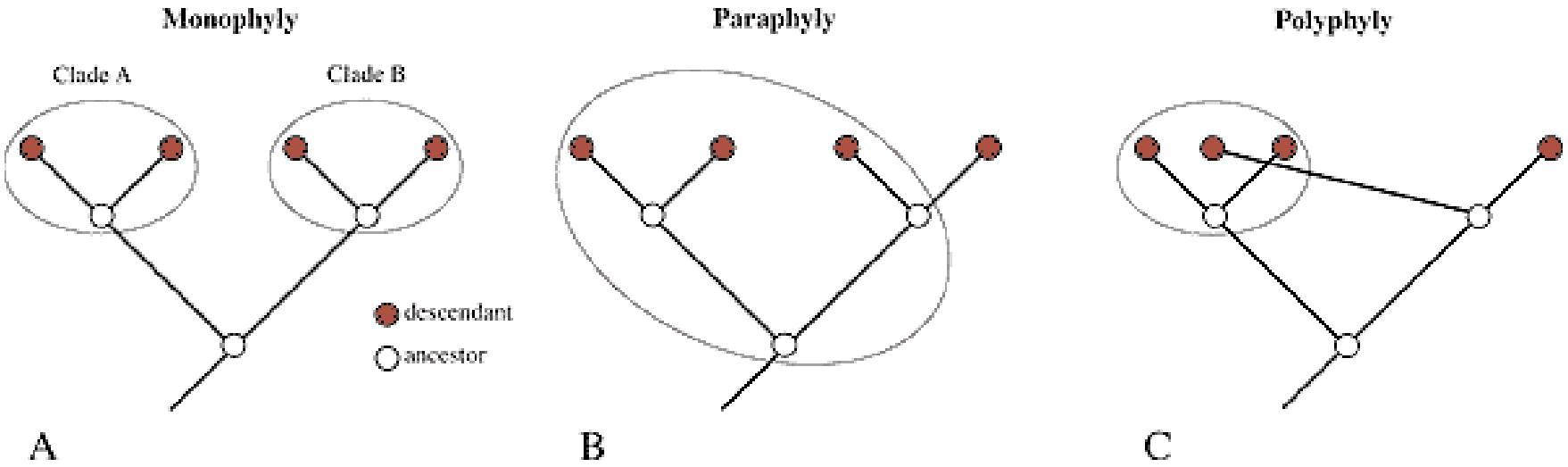
1. **Even with well resolved phylogenies and philosophies, the situation is still quite arbitrary as there are many different ways to carve up the tree of life.**
2. **Situations in *Aster* for example can be accommodated by making the genus larger or splitting it up into many smaller genera.**

Classification is difficult

ABOVE SPECIES LEVEL

1. **Monophyletic:** includes all the descendants of a common ancestor, i.e. all its members share a common ancestor.
2. **Paraphyletic:** is formed when one or more descendants of a common ancestor are excluded from the group
3. **Polyphyletic:** is formed when a common ancestor is not included in a group

Classification is difficult



Classification is difficult

BOTTOM LINE

1. Readily distinct clades are the most stable taxonomically.

Examples: Poaceae, Cyperaceae, Asteraceae, Apiaceae, Brassicaceae, monocots.

2. Other groups (distinct grades, indistinct clades) less so.

Examples: Scrophulariaceae, Araceae, Liliaceae, dicots.

Species Concepts

1. Typological: a group of individuals that share a common phenotype.

2. Biological: a group of actually or potentially interbreeding organisms.

3. Phylogenetic: a group of organisms bound by a unique ancestry.

4. Ecological: a group of organisms that share a distinct ecological niche.

Species Concepts

1. None of the species concepts works all of the time.

2. The more species concepts a group of populations adheres to the more stable it is as a species from a recognition and circumscriptional standpoint.

Species Concepts

1. Typological: Collections of individuals that share a common phenotype.

2. Biological: This concept identifies a species as a set of actually or potentially interbreeding organisms.

3. Phylogenetic: a group of organisms bound by a unique ancestry.

4. Ecological: a group of organisms that share a distinct ecological niche.

Rhexia

Stone: *R. aristosa, R. mariana, R. virginica*

Snyder (1986): *R. aristosa, R. mariana, R. ventricosa, R. virginica, R. ×brevibracteata*

Nesom (2012): Infrageneric classification of *Rhexia.* (All Pinelands species in *R.* sect. *Rhexia*)

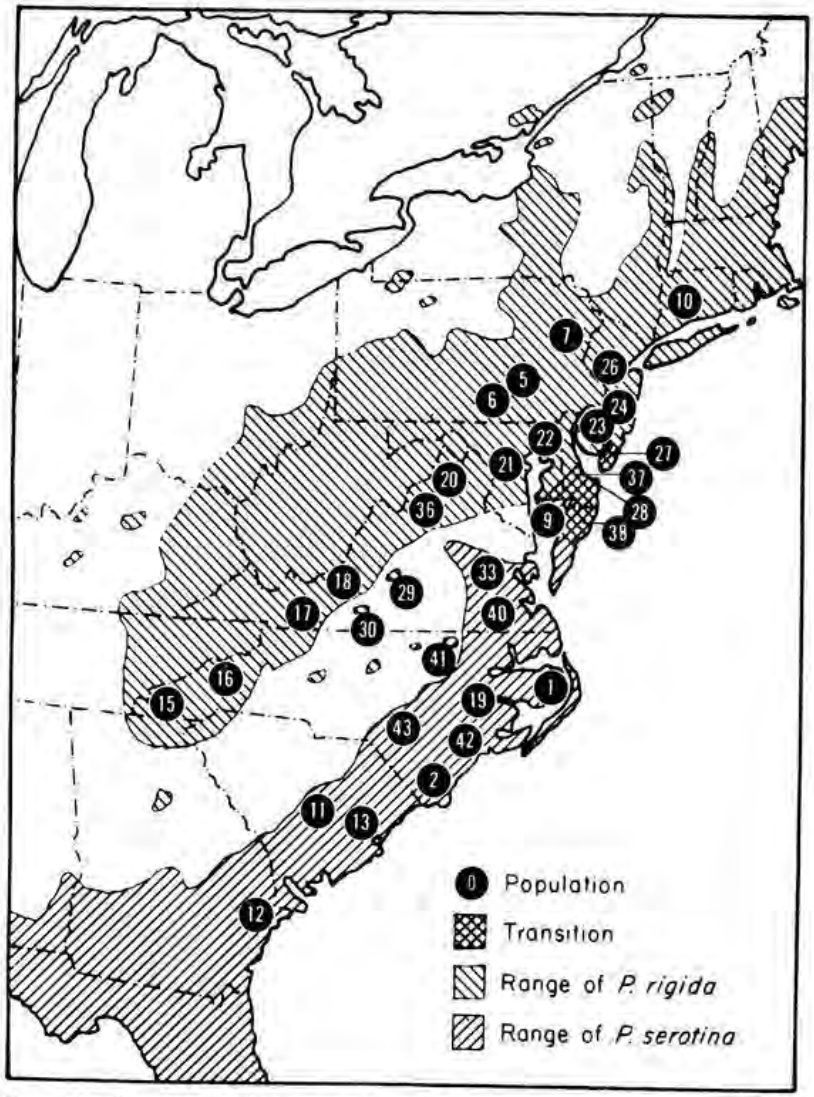


FIGURE 1. Range map of *Pinus rigida* and *P. serotina*, showing locations of sample populations.

ANALYSIS AND RESULTS

Statistical Strategy: To achieve all three objectives with any precision it was

Sagittaria

copyright reserved
US
The Academy of Natural Sciences of Philadelphia
Panicum hirstii Swallen TYPE
Rhodora 63: 236. 1961.
A. E. Schuyler 1994
00147882