

Botany 940: Stebbin's Variation and Evolution in Plants
Chapter 2: Examples of Variation Patterns within Species and Genera

Brief overview of the chapter by

- Classifications
- Examples
- Questions

How have concepts changed or are the same today?

Patterns of Variations

Classifications:

Biotypes, ecotypes, clines, subspecies, polytypic species, ecospecies, cenospecies, and comparium

Species and genera-specific examples

-> distinction between two classifications?

Ecotype Concept

“Product arising from as a result of the genotypical response of an ecospecies or species to a particular habitat.” (Turesson, 1922)

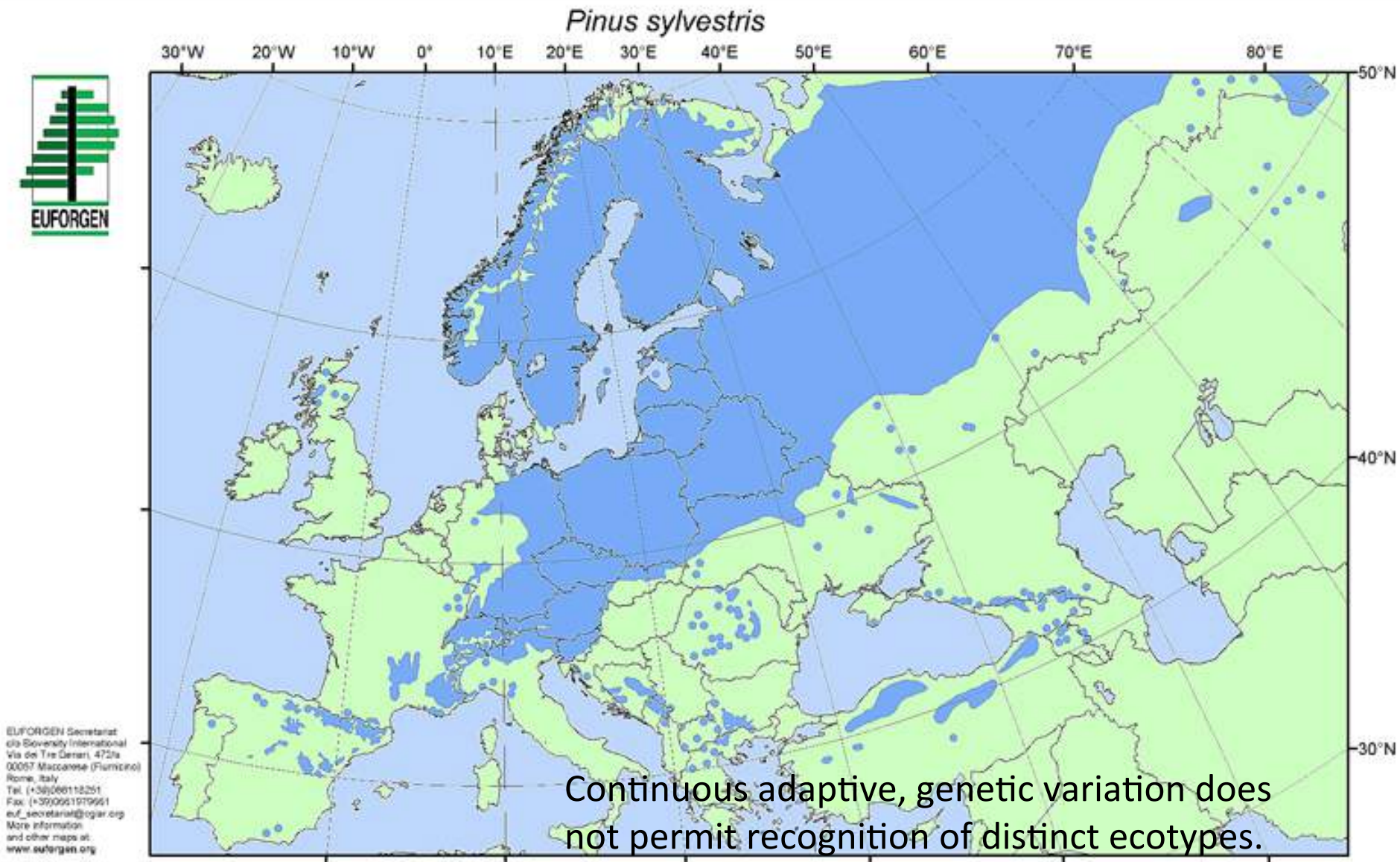
Suggested that differentiation into ecotypes are more likely in common, widespread species than rare or local species

Attempted to emphasize distinctness of ecotypes

Ecotype Concept

1. To what extent are different biotypes of a species grouped into partially discontinuous aggregates which may be recognized as distinct ecotypes and to what extent do they form a continuous series?
2. What is the relationship between ecotype and polytypic species (as developed by zoologists)?

Continuous variations

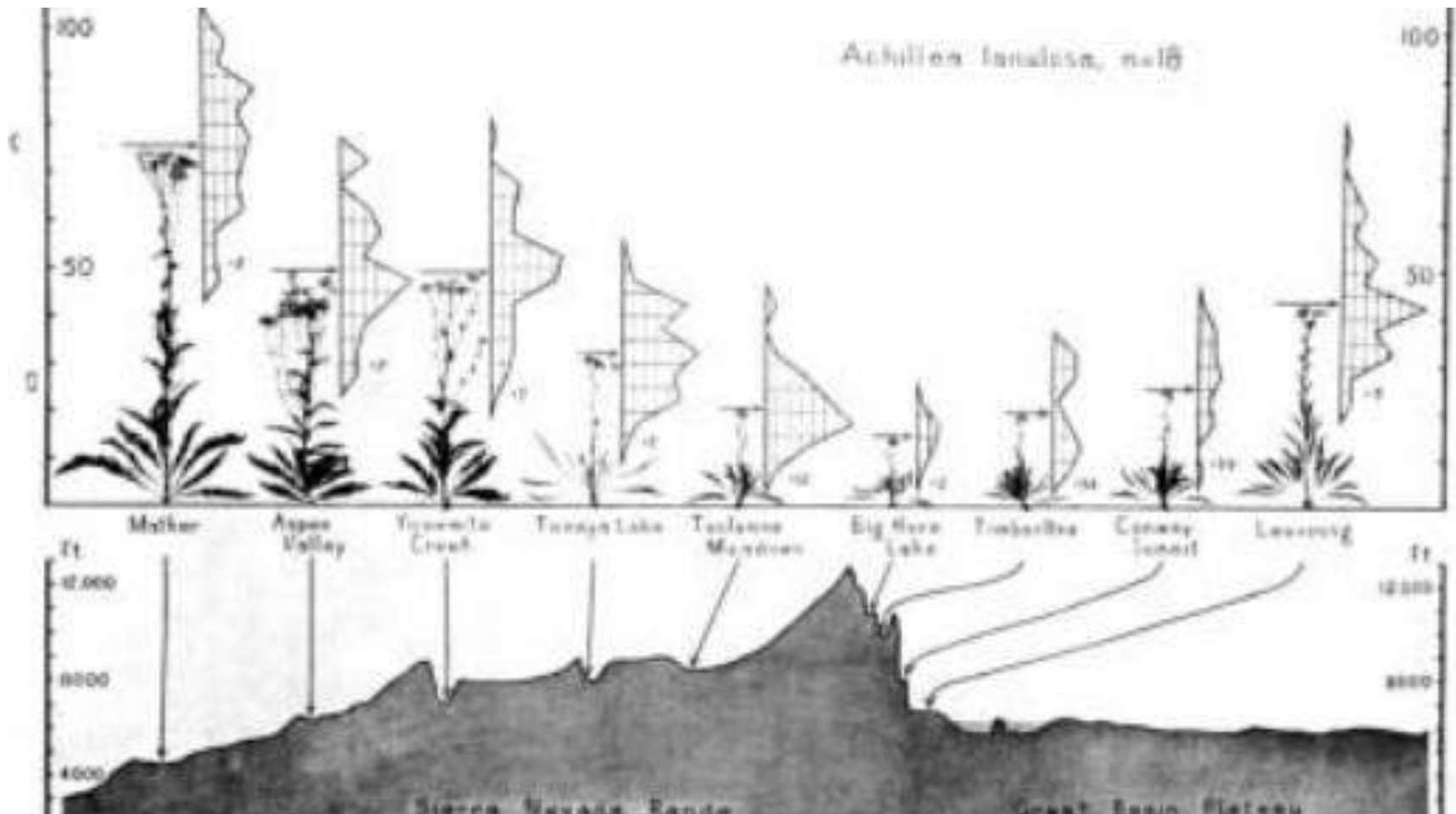


Clinal variation- character gradients

- “Auxiliary taxonomic principle” (Huxley, 1938 & 1939)
- Stebbins suggests character gradients (or clines) are common but methods of systematics don't address them because of the focus on combination of characters, correlations or exclusions for taxonomy

How do modern methods of systematics address this concept?

Clines- character gradients



Clausen Keck Heisey, 1948

Clines- character gradients

Advantages

- Quantify continuous variation
- Analyze individual characters and combinations

Disadvantage

- Clines can only be recognized after extensive sampling across wide range

When does discontinuous characters warrant subspecies designations?

Ecotypes vs. Subspecies

Ecotype – ecological and adaptive; their reaction to the environment which may or may not be morphological

Subspecies– morphological, geographical, and historical

Clausen, Keck, and Hiesey suggest that morphologically distinguishable ecotypes serve as the basis for a subspecies designation...

Subspecies

Pinus contorta

- Subspecies classified based on genetic and adaptive differences
- Dicotomous key states trees at boundaries show intermediate traits



Types of variation patterns: gene flow



Delphinium – polytypic replacing each other geographically, some subspecies that were crossed, others sympatric species show no hybridization and others



Aquilegia – genetic barriers are weak



Quercus – many species with designated subspecies

Approaches to Species Delimitation

- Have we refined species concepts?
- Did we or do we currently still have “artificial” proposals for declaring new species?
- How has this changed with modern DNA technologies?
- Stebbins suggested that since variations due to environment are much less common in animals than plants, zoologists only need to consider systematics rather than genetic-environmental terms.