Flowers of the Alps

Environmental Studies 105
Dr. George S. Ellmore
Tufts University European Center, Talloires France
Proposed for Summer 2019

Syllabus

**Purpose:** To inform about floral richness and diversity in alpine regions, leveraging the value of scientific binomials for identifying plants throughout the world.
- To evaluate morphological and genetic bases for assessing taxonomic relationships among flowering plants.
- To show biological features and human relevance of more than two dozen major plant families.
- To illuminate cultural differences between EU and US, that drive EU policies in agriculture and biodiversity.
- To provide experience with plants that survive in shallow soil, with little water yet exposed to extremes in wind, temperature, and harsh light; plants sought in the design of green roof systems.
- To develop appreciation of native plants in natural alpine areas (covering 25% of the world’s land surface) unique in showing vertical responses to climate change.

**Learning Objectives:** After completing this course, students should be able to:

Recognize up to 120 species of local plants by sight, and provide the correct Latin binomial (scientific name), common names (English and optional French) and Family name for each.
Work with professional dichotomous keys, internet and peer collaborations to identify plants species previously unseen by them.
Develop taxonomic and functional-group indicators of environmental conditions and change.
Contribute to meaningful plant-oriented activities in Talloires community (herbal cuisine, paper-making, etc)
Possess enough familiarity with major plant families to confidently recognize new members of important families throughout the world.
Predict response of vegetation to grazing, short growing season, low temperature, strong wind and high UV light, all features of plants at their alpine margins, vulnerable to climate change.


**Supplies:** Index cards (4x6 inches) and Scotch tape, for making "flash cards" of plants for review purposes. Be prepared to key out plants by dissecting flowers under magnification. A good quality **hand lens** (10X) is useful for detailed observation of wildflower structure, and may be borrowed from the Priory supply.

**Outdoor clothing** that allows you to be comfortable as we visit damp grassy meadows. We recommend long pants, shoes that tolerate water, and a cheerful disposition!

**Course structure:** Alpine communities cover more than 25% of the earth’s land surface, and have captured about
one-fourth of the world’s pool of soil carbon. Recently, alpine species have been favored for building extensive green roof systems on urban buildings. In this course we devote at least six hours per week studying the Talloires region's world-class display of montane and alpine floral diversity. Lectures (two per week, each 1.5 hrs) are devoted to plant structure and life history in enough detail to make use of professional dichotomous keys for identifying plants. Sessions highlight salient features of important plant families, outstanding representatives of those families, their relevance to human nutrition (human foraging of edible plants), floral ecology, and the design of dichotomous keys. Outdoor (field) sessions (4-5 h per week, including travel time) involve recognizing alpine species in their native environment, evaluating shifts in alpine vegetation, keying out new plants to the family level, and subsequent identification to genus and species. [minimum total contact hours = 42]

Week 1. Legacy of Systematics; Taxonomic Convention; Conifers and Keys
   Architecture and Life History of Flowering Plants
   Field session: Designing Dichotomous Keys; Ferns and Conifers
   [Talloires]

Week 2. Sources of Taxonomic Evidence; Evaluating Indicators of Forest Change
   Taxonomy vs functional groups. Amentiferae and Caryophyllaceae; Ranunculaceae and Brassicaceae
   Field session: Organography of plants; Trees and Vines
   Quiz (40 points)
   [Semnoz]

Week 3. Leaf Characters and Vestiture; Rosaceae and Fabaceae
   Hypericaceae, Violaceae, Apiaceae, and Ericaceae
   Field session: Alpine flowers -meadow species
   Quiz (40 points)
   [Tamié]

Week 4. Herbal Remedies; Flowers and Inflorescences; Primulaceae, Gentianaceae, and Boraginaceae; Lamiaceae, Orobanchaceae
   Field session: Alpine flowers -upland species
   Quiz (40 points)
   [Confins]

Week 5. Propagules: fruits and seeds: Chemical evidence and Bar Coding
   Asteraceae, Poaceae, and Orchidaceae
   Field session: Alpine flowers -tundra species near snowline
   Quiz (40 points)
   [Col des Aravis]

Week 6. Competitor exclusion hypothesis; Food security from native bees and wind
   Final Exam -comprehensive (80 points)

Grading: Letter grades (A, B, C, etc.) based on 4 cumulative field quizzes (66%), and a comprehensive final exam (33%) that stresses identification by sight, recognition of important plant families, and keying out of unknowns. Modifiers (+, flat, or -) based on lab performance.

References

Bergamo, P.J., F.J. Telles, S.E.J. Arnold, and V.L. Garcia de Brito. 2018. Flower colour within communities shifts from overdispersed to clustered along an alpine altitudinal gradient. Oecologia 188:


