



VOL. 40
NO. 1
1977

University of Washington
**ARBORETUM
BULLETIN**

Published by the Arboretum Foundation

The Arboretum: A Living Laboratory

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1977

"... The Arboretum must be viable ... the Arboretum must be dynamic, offering programs, new programs and repeat programs, to share the knowledge that we have accumulated ..." Francis Ching, Director, Los Angeles State and County Arboretum.¹

Have you ever noticed on a bright sunny day or a drizzly autumn afternoon a group of college age people huddled detective-like around a tree in the Arboretum? If so, this group probably belonged to one of several classes from the University of Washington which uses the Arboretum as its field laboratory. Indeed, it was just such a sight on an early spring day five years ago which convinced me — then a high-school senior — that the University of Washington was the only school for me. Little did I realize that within three years I myself would be leading similar groups around the Arboretum.

On weekday afternoons throughout autumn and spring, students and instructors spend three or four hours, sometimes walking all the way from Foster's Island to the Japanese Tea Garden to study the Arboretum collections. Although you will usually see small groups at a time, each quarter approximately 200 students spend at least one afternoon weekly in the Arboretum.

Arboretum Users from the University

Several departments at the University of Washington offer classes directly or indirectly involving Arboretum study. Probably the heaviest use

*Connie Millar will earn her undergraduate degree in the College of Forest Resources this summer. Since she has also been a teaching assistant for the class in Dendrology, which she describes in the accompanying article, she is well qualified to write from the points of view both of the student and the instructor.

¹Excerpt from: Proceedings of a Symposium: The Urban Arboretum in a Time of Crisis. 1972. University of Washington Arboretum Foundation.

comes from the College of Forest Resources in which two of its core-curriculum classes bring approximately 150 students nearly every week in autumn and spring to the Arboretum. One of these, the course in Dendrology (biology and identification of tree species), comes alive through use of Arboretum resources. The Dendrology professors, Drs. Linda Brubaker and Reinhard Stettler, are convinced that the three-hour weekly lab exercises in the Arboretum present unique opportunities for studying the tree species as live specimens. Because most of the descriptive taxonomy is covered during these lab exercises, more time is available in classroom lectures to deal with conceptual material on the systematics, ecology and genetics of forest trees.

The structure of the Arboretum exercises is straightforward. Prior to each visit, students study a list of 12 to 15 species of trees they will observe that week. Students meet on appointed lab days at the Arboretum administration buildings, where they separate into two groups, each group headed by the professor or by a teaching assistant, and they head for opposite ends of the study area. Since the species lists are arranged taxonomically by genera and families, the groups must often walk the entire span of the Arboretum — in and out of the woods — to cover the complete list. Because of the wide extent of the Arboretum's collections, a large sample of species from native families can be studied in detail during one term.

The philosophy of learning in the Arboretum is one of discovery by the students rather than instruction by the leader. Approaching each tree as an unknown specimen, students try to identify it themselves instead of passively observing. They use dichotomous keys, refer to descriptive texts or to notes which they have taken on previous specimens. Bit by bit they narrow down the iden-

tification to family, to genus and finally to the species level.

The Dendrology instructors have found that this approach — coined the "Aha! Approach" — leads to greater involvement on the part of the student, and increased learning from firsthand experience. In addition, there is something in human nature which makes discovery for oneself a special event, regardless of the fact that the same discovery has been made by countless other persons before. It is the same attractive force which accounts for much that is intriguing in scientific research.

It stands to reason, however, that this teaching method is viable only if students have sufficient prior knowledge and preparation to tackle the problem. The instructor's responsibility is to supplement and build upon students' knowledge so that they arrive at the point where this approach is beneficial as well as feasible.

After the students have identified (or nearly so) the species in question, the instructor takes five to ten minutes to summarize the important descriptive characteristics and to point out diagnostic "tricks" useful in distinguishing look-alike species. The discussion then turns to the broader aspects of the species — its range, ecology, adaptive features, and wood and foliar properties and uses.

The use of the Arboretum for lab classes in Dendrology has a long history at the College of

Forest Resources. Dr. David Thomas first started taking his students there in 1946. But this tradition of studying trees in lab exercises is not the only way in which the Arboretum is used by the Dendrology class. An important aspect of this course is a term project requiring the students to research particular aspects of a species or several species. In executing a mini-scientific research program they are able to learn a great deal more about a species than can be presented in lecture or laboratory exercises. Because of its proximity to the University and the unique conditions available in the Arboretum, many students choose Arboretum trees as the subjects for their reports.

Projects range from construction of audio-visual programs which convey the descriptive, ecological and unique properties of a species, to quantitative, comparative studies of form and function in the different foliar and crown geometries of species; from springtime pollination ecology studies where the adaptive structures of inflorescences are observed in relation to insect pollinators, to autumnal herbaria of fruit and leaves. In pursuing their research, students often spend weekend days in the Arboretum — photographing, measuring, patiently (or impatiently!) awaiting pollination visitors or climbing around the trees, ruler and notebook in hand.

Dendrology is not the only course in the College of Forest Resources which utilizes the Arboretum.

Dr. Brubaker discussing a species of pine with her Dendrology class.

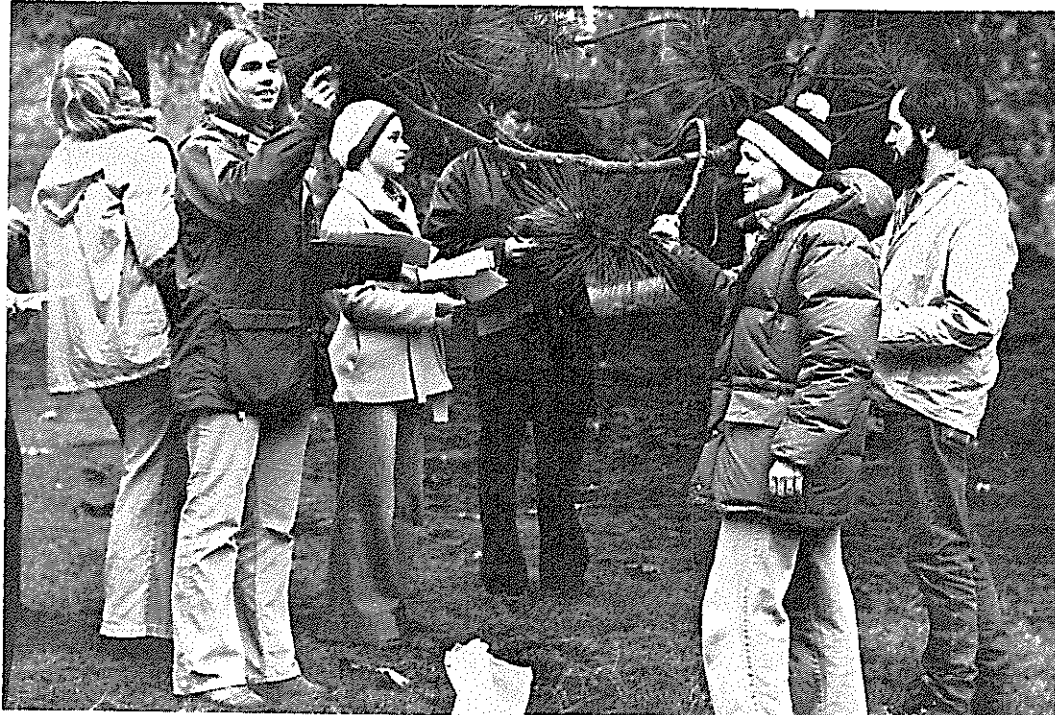


Photo: Joseph W. Marshall

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A student examines a branch of incense cedar — touching, feeling and smelling to identify it exactly.

The Forest Surveying class relies heavily on the Arboretum as the setting for its four-hour weekly field exercises. A skills class by nature, learning the techniques of forest surveying necessitates practicing with instruments in a woody environment. Although formerly field exercises were conducted primarily at Woodland Park, current professor, Dr. Peter Schiess, enthusiastically prefers the Arboretum because of its diversity of terrain and its hilly, naturally wooded areas which more nearly simulate forest conditions than Woodland Park. The broad, flat expanses are best for novice tape and compass work, whereas the uncultivated hills in other parts of the Arboretum serve as sites for practicing the more difficult techniques required for slope measurement and contour map construction. Because of these advantages, and the proximity of the Arboretum, Dr. Schiess now uses the Arboretum exclusively.

Besides the College of Forest Resources, the University's Botany Department also offers classes in which the Arboretum is an essential ingredient. The Ornamental Plants class, taught every spring and summer by Dr. Arthur Kruckeberg, is a required course for all Landscape Architecture students as well as being a popular course in the Botany Department itself. Whereas the forestry classes pay special attention to roles which tree species play in wild environments, the ornamental botany class studies trees and shrubs which have proven (or potentially may be) aesthetically and physically suited for horticultural use.

The Arboretum is one of several places which the students of ornamentals visit; the others are the Government Locks, the University of Wash-

ington campus and selected private gardens. Such variety is important, stresses Dr. Kruckeberg, in order for students to understand the many ways that planting can be used around human habitation. The main emphasis during field trips is on the taxonomy and systematics of selected species and their horticultural uses and requirements. Like the Dendrology class, students prepare a term project, the completion of which often requires research and study of particular species or specimens in the Arboretum.

These three classes represent the primary University users of the Arboretum. Many other classes also use it regularly but in lesser frequency. Classes in introductory Biology, Plant Taxonomy, Photography, introductory Forest Biology and Environmental Sciences are among those whose course outlines have included at least one visit per term to the Arboretum. To each class, the Arboretum's diverse resources have offered unique opportunities for study.

Benefits of the Arboretum — What Do the Students Say?

It should be clear by now that the Arboretum has traditionally been used by generations of University students through new and repeated programs. What are the factors that have made the Arboretum so popular as an outdoor laboratory?

The many native and landscaped sites, complete with such a large number of native and exotic species, offer variety for those who wish to study plants. The fact that many species are represented by more than one specimen helps the students to understand the tremendous morphological variation which exists in nature.

Although set in the middle of urban Seattle, the Arboretum is large enough that one feels distant from the surrounding city even though a short drive away from the University. Probably most

Students from the Forest Surveying class squint through a transit, watching for the flagman on Azalea Way. Photo: Connie Millar



important is the fact that the Arboretum presents a unique total environment. In addition its proximity offers an escape from the conventional lab classroom. Away from long-conditioned tensions associated with a campus environment, students feel more relaxed and more in touch with the forest setting. Away from bells and distractions, students seem less time-conscious and more pre-disposed to the program of study.

Arboretum use establishes a physical contact between classroom studies and the forest environment. For many who have struggled for two years through lower division non-Forestry or non-Botany related requirements, the Arboretum-centered courses represent the first tangible step toward the discipline which they wish to study.

In the less formal atmosphere of Arboretum classes, students and instructors have a chance to become well acquainted — a change from the anonymity which haunts large universities. Because students come from such diverse backgrounds, they often have had varied experiences in and with plants. During Arboretum exercises, there is an opportunity to share with one another the knowledge they have accumulated. Frequently, anecdotes bring up new and fascinating bits of information from which everyone gains. Such verbalization of personal experiences serves to involve many students in the learning process in a manner which is nearly impossible in a classroom situation.

Many students have expressed pleasure in the weekly routine of visiting the Arboretum. Despite the cold and the rain, they derive a sense of serenity in experiencing its phenological changes. He who marks time by observing intimately the slow and stately march of winter or the vibrant blossoming of spring surely participates more intensely in the changing seasons than one who is classroom-bound. Weekly visits provide the opportunity to watch changes that other, infrequent visitors may not see — the blazing and lingering red of the *Nyssa sylvatica* off lower

Azalea Way, the long retention of leaves on the red alders by the lagoon, the manner in which the wind and rain whip the last leaves from the Pacific dogwood. These experiences are non-trivial, for they foster a keener sense of observation requisite to all biological inquiry.

If it seems obvious to state these benefits of the Arboretum to University students, then you, as I have taken the existence of the Arboretum for granted. In a survey I conducted recently of other forestry schools, I discovered that often dendrology and plant classification courses are taught without using an arboretum laboratory. Actually, many top-ranking forestry schools either have no arboretum available or lack one of useful size and breadth. For the most part, at these schools students learn to identify trees through the use of herbarium sheets, Reiker mounts, photographic slides or living boughs and fruits brought indoors to the classroom. The only exposure they have to live trees comes during one or two field trips per term to distant forests.²

Of course, it is difficult or impossible to evaluate the superiority of either program in the long run, but in my opinion — and in that of many students here — an arboretum offers the most balanced and varied environment for a diversity of field botany pursuits, and is best suited for the type of interests to which the University caters.

Nevertheless, you need not take my word as truth. Come out and join us in the Arboretum as we prepare for another lab outdoors. Be ready to investigate, to discover, to get cold fingers and wet feet, and most of all be ready to share what you know. But be careful! You too could end up like a University student, notebook and pencil in hand.

Acknowledgement

I should like to thank Linda Brubaker for her patient help with the original manuscript.

²Notwithstanding the innovative programs at some schools: Bever, Dale. 1974. 'Dendro,' an Unstructured Approach. Journal of Forestry 72:6-12.

**The Arboretum serves people in many ways.
Work and Fun Day — April 14
is your opportunity to serve the Arboretum.**