Arboretum news. Volume 14 1965

THE UNIVERSITY OF WISCONSIN

ARBORETUM NEWS

Vol. 14, No. 1 Madison, Wisconsin January, 1965

On a Winter Walk in The University of Wisconsin Arboretum— January 29, 1965

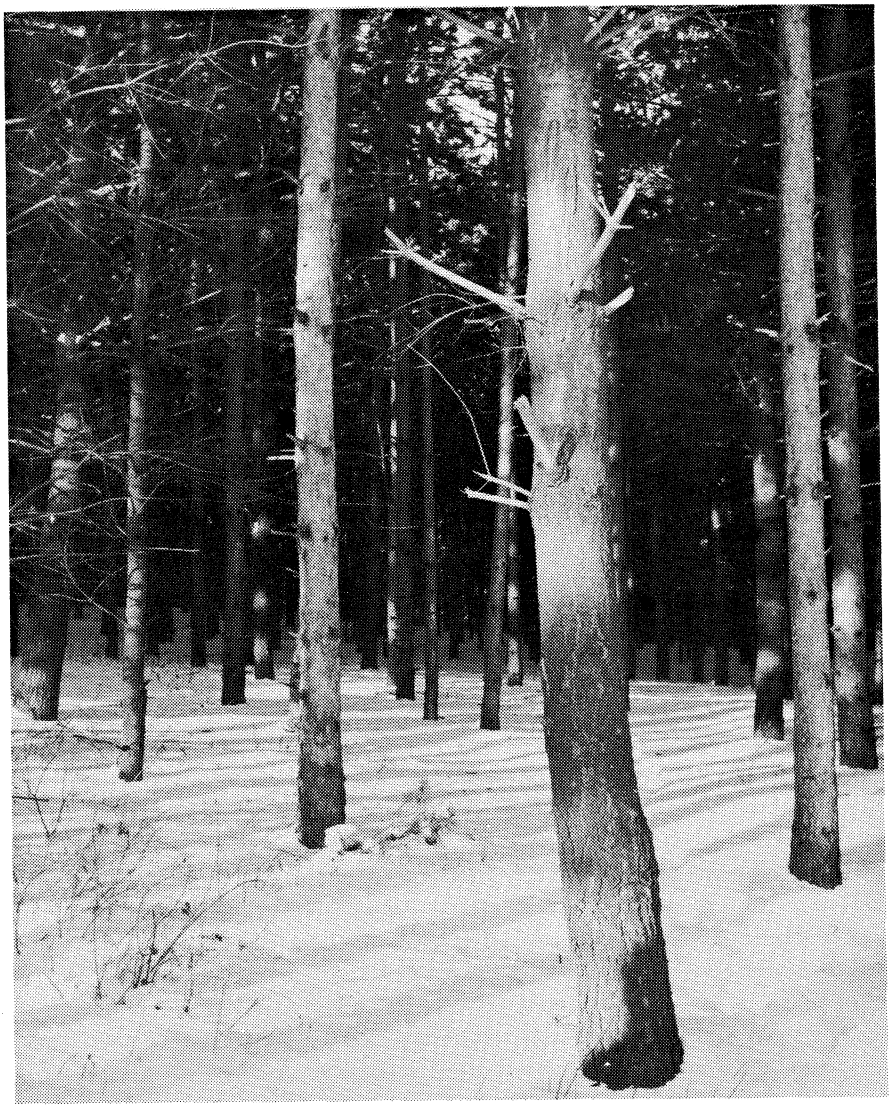
The film in my camera had a few frames still left unexposed. Since I was anxious to develop and examine it, I decided to "waste" the remainder in a useful way. The recent heavy winter storms had left the countryside around Madison blanketed with a thick mantle of the white fluffy ----, and this had been preserved by temperatures which can best be described as severe. Acting on the assumption that the snow, and any free-form artwork it had been molded into by the temperamental winds, would be least disturbed in The University of Wisconsin Arboretum, I took myself, cameras, and other paraphernalia there to use up my film.

My assumption that there would be some undisturbed snow scenes proved to be correct. Crossing the Curtis Prairie, being drawn to the pine forest on the far side, I passed dry, brittle, flowering stalks and stems of prairie grasses and forbs protruding from the mantling snow, now only faded reminders of their past late summer glory. Once beneath the canopy of the red pines, the scene changed from one of blasted starkness to one of awesome beauty. The biting cold here, as on the prairie, told me why no other had passed this way. The snow was undisturbed except for the regular lines of paw and tail prints which told of the comings and goings of small rodents. That blue-cold color that one often sees in a Kodachrome taken at dawn or dusk in winter seemed to emanate from the snow, dominating the scene. Yet as I shivered in the blue glow the scene gradually warmed. There was more to it than first met the eye. I noticed the ruddy glow the late afternoon sun gave to the flaky red pine trunks and the heavy, protecting, dark green canopy of pine needles that the trees spread above. Still more of the finer details became apparent as I took in the panorama. There were white punctuations of snow trapped by the whorls of branches and branch stubs up and down the tree trunks, and I noticed for the first time that the snowy mantle was not continuously ice-blue but was interrupted by dazzling sun flecks and sparkling ice crystals. I forgot my annoyance with myself for not having brought the tripod needed to make the time exposures necessary in the low light under the pines. Even the "snick-snick" of tire chains and the hum of traffic on

the busy Beltline Highway were forgotten. As I wandered on, the single track of a pair of skis crossed my path, but even these seemed part of the display which nature had arranged for me. It must have been at that point, however, that I wondered if another would view this vista in the same light as I had, and turning, as it were to ask an imaginary follower, was rudely jolted back into an awareness of the everyday world around me. A wandering, disorderly looking trail of a heavy footed individual led to the precise spot on which I was standing. No one would ever see the beauty of the scene the way I had.

Is it not often the case that in our excitement and enthusiasm over a particularly beautiful scene, be it a lookout from a rocky ledge over a mighty river or the more restricted view in a cool, richly flowered glen, that we do some damage just by being there? Man should look more often for the imaginary follower and consider very seriously how much his own passage over a scene makes it less beautiful for others and then consider ways to make his trail less obvious.

–John E. Purchase
Research Assistant–Botany



WINTER IN THE ARBORETUM PINES. JANUARY, 1965.

Horticultural Plants in the Arboretum

I. The Redbud

Pink flowers, heart-shaped leaves, a colorful history and relative absence in Wisconsin are all uniquely interesting characteristics of the Redbud or Judas tree.

Cercis canadensis, the scientific name of the Wisconsin species, derives its genus name from the Greek *kerkis.* This is the name used for a weaver's instrument that looks similar to the two-and-one-half to three-and-one-half-inch long brown seed pods of the genus.

About the time when Hopa crabapple and double flowering plum are in bloom, usually late April to early May, the Arboretum Redbuds display their exotic beauty. Twigs, larger branches, and sometimes even the trunk of the trees are covered with the rosy-purple, one-half-inch blooms that appear before the foliage. Trees located near the Duck Pond, the Horticultural Area, and along the southern edge of Gallistel Woods are worthy of a special trip when nature unfolds this flowering spectacle.

Close examination of the flowers will show the two-sided form of the blossoms that characterizes the Legume family to which the tree belongs. Later in the summer these pea-like blooms will develop into a flat seed pod the same color as the flowers. By fall, when the five- to seven-veined heart-shaped leaves turn a golden yellow, the seed pods will have turned brown. These pods stay on into the winter and add interesting design to the landscape. Most noticeable in the winter is the bright brownish-red bark divided into longitudinal plates and the branching habit resembling an apple tree.

The tree is not rare. It is found from New York south to Florida, west into Texas and north through eastern Kansas, Nebraska, and to southern Ontario. Take a spring trip through southwestern Arkansas, Oklahoma, and eastern Texas and you will see a magnificent display of flowers unequaled by any other tree species. The tree grows best in this area of the United States. Here the Redbuds generously cover the wooded ravines and river banks, growing as an understory beneath larger trees. At its best in loose sandy loam soils, the tree reaches a height of 40 or more feet. There is little wonder why the envious Northerners become keenly interested in this striking beauty.

In Wisconsin, Redbuds are near their northern limit of hardiness. Gardeners are willing to try Redbud at the risk of failure because of its beauty. If the parent tree is from a northern location the seedlings seem to grow well. The seed source for the Arboretum trees was primarily from northern-grown specimens.

One source of seed at the Arboretum is a specimen tree located near the northwest corner of Agricultural Hall on The University of Wisconsin campus. This tree, a profuse bloomer and spectacular specimen, came from a hardy selection at the University of Minnesota.

Another source of seed is Columbus, Wisconsin, a small town 30 miles northeast of Madison. Local residents trace the Redbud history back 80 years. The story is told of a local resident who met and married a young lady from the East. This young lady, recalling the native Redbuds of the East, became interested in growing the tree at Columbus. On one of her visits to northern Indiana, it is believed that she dug a seedling tree and brought it to Wisconsin. Surprisingly the

tree proved hardy and produced many seedlings in cultivated areas of the yard. Neighbors recognized the unique beauty of the tree, became interested, and transplanted the young seedlings.

Today, Redbuds are commonly found in many home landscapes of the small town. Although many trees are hardy enough to maintain themselves, other Columbus trees have succumbed to the cold Wisconsin winters.

A third source of trees at the Arboretum is the Willis Nursery, Ottawa, Kansas. This nursery has selected a variety called "Pink Bud," presently grown at the Morton Arboretum in Lisle, Illinois. This tree, found growing in the wild on an estate near Kansas City, Kansas, is interesting because of its bright cerise pink flowers.

Three other horticultural varieties of *Cercis canadensis* are "Flame," "Alba," and "Withers Pink Charm." "Flame" originated about 1905 as a seedling in the wild in Wilkinson County, Mississippi, near Fort Adams. This variety has large flowers—a flower with 20 petals is common. It is similar to the clone "Plena" which was grown in the Missouri Botanical Garden in the 1940's.

"Alba" is a pure white blossoming tree. This selection is hardy over the same northern range as the species. "Withers Pink Charm" is a clonal selection with flowers a decided pale pink. It was found in the mountains near Mount Solan, Virginia.

To use Redbud in home landscapes, plant small specimens, as older trees are somewhat difficult to transplant. In the North, plant trees that have wintered three to four years; this proves their hardiness. Encourage maximum flowering on trees by planting on bright sunny sites. Redbuds can withstand some shade if a sunny spot is not available, but they will not bloom as profusely.

Redbud has a unique Biblical legend. The legend concerns the tree, *Cercis siliquastrum,* a purplish-flowering relative of Wisconsin's *Cercis canadensis.* This tree grows in southern Europe, western Asia, and is regarded as a native of Palestine. According to the legend, Judas Iscariot hanged himself on this tree after his betrayal of Christ. Tradition claims that the purplish flowers indicate how the tree burned with shame that Judas selected it. Since that time all of the seven *Cercis* species are commonly called "Judas Tree."

–Darrel Apps
Teaching Assistant–Horticulture

Establishing the Listeman Arboretum, Neillsville, Wisconsin

Neillsville, county seat of Clark County in west-central Wisconsin, is fortunate in having an elderly gentleman named Kurt Listeman as one of its prominent and long-time residents. The city's chief benefactor grew up in Massachusetts, just a few miles from the famous Arnold Arboretum and spent many hours wandering through the grounds. It occurred to him that a similar institution would be of considerable value to the Neillsville area. Through the efforts of John Oncken, Clark County Agent, the project was brought to the attention of Professor Robert Ellarson and of Theodore Peterson, of the departments of Wildlife Management and of Forestry. They enlisted the aid of other members of the University faculty, and the result was an agreement to provide a plan for the development of the arboretum. Through a generous gift from Mr. Listeman to The University of Wisconsin to provide technical assistance in the form of a survey, the writer, a graduate student in plant ecology, is preparing a development and management master plan for the proposed arboretum. Throughout the remainder of this article, the proposed arboretum will be referred to as the Listeman Arboretum, so named by the Neillsville City Council in honor of Mr. Listeman's late wife, Marguerite.

We at Wisconsin are considerably conservation conscious. Therefore Professor Grant Cottam, other members of the faculty, and the writer, upon seeing the 32½-acre site with its variable topography, its interesting location adjacent to the Black River, and most important, its rich forest vegetation, were of the opinion that it would be wasteful to cut out extensive areas to make way for the type of arrangements found in formal arboreta. The writer is of the opinion that the best layout, both from a conservation viewpoint as well as purely utilitarian considerations, is of the type which he likes to refer to as a "communetum." Rather than being a formal collection of species arranged in beds according to some natural or unnatural classification, the "communetum" is simply a collection of plant communities. This arrangement, which is maintained in The University of Wisconsin Arboretum, takes advantage of pre-existing vegetation and site conditions and manipulates these according to ecological "rules" so that the plants on display are viewed against their natural background. Since plant communities are more or less self-managing, the emphasis in the planning of such an arboretum is on the establishment and stocking of the communities, their development and manipulation, and on the physical aspects, namely the planning of trails and other aids by which the communities may be seen and understood. This plan does not exclude altogether the possibility of perennial beds and shrub gardens. There will be former agricultural land available for this purpose and none of the wooded area need be destroyed. However, there probably will be strong emphasis placed on the use of native Wisconsin species in these latter areas rather than exotic species. Exotics not only need considerable care for their healthy maintenance but also pose a possible threat to the native plant communities should they escape, find a suitable ecological niche, and explode to the detriment of the other species in the community which they have invaded. Kudzu vine and Japanese honeysuckle are a problem in this respect in the southern United States and Tartarian honeysuckle gives some indication of becoming so in more northern woodland communities. For this reason all exotics should be eyed with suspicion until their biological significance and amplitudes are clearly understood.

It is very well for a person, even one very skilled at evaluating a plant community with the aid of long experience and familiarity, to proclaim a certain site rich or otherwise interesting and valuable. However, no matter how lucid his written description is, it cannot approach quantitative surveys for reproducibility. The quantitative survey is at once an inventory, since it provides a statistical estimate of the number and distribution of individuals over a given area. Additional quantitative information on the size of the individuals can be presented in tables, graphs, and maps which tell more about the community than any qualitative summary. However, there is value in both kinds of data so the survey of the Listeman Arboretum used some of each. For instance, species presence lists, collected plant specimens, photographs and verbal descriptions of the area are qualitative. The quantitative survey was more involved. An early plan was to define the boundaries of the existing plant communities in the field and to survey them separately. This proved awkward and repetitive because the communities graded into one another, making delimitation difficult. An alternative involved marking off the entire 32½ acres with a fifty-foot interval grid system of stakes. A standard Wisconsin quarter method survey was made using the stakes as survey points. In this manner information on the size and density of trees, saplings, and seedlings was acquired and the clearings were more accurately located. A vegetation map produced from the field information provided a basis for placing boundaries around the communities. As has been pointed out, these boundaries mean little in the field but make the description of the communities, which are in fact real, considerably more convenient. Some of the communities

defined by the vegetation map are: a low-lying seepage area near the south end of the property which supports yellow birch and black ash; an adjacent low-lying but better drained area on which American elm is dominant; and an upland portion which contains a large red oak community, a small bur oak community, a maple community and a white birch community. A large clearing towards the north end of the property supports many herbaceous species found in wet open areas; and not far from it, on a sandy bank of the Black River, there are a number of prairie species which could well act as the nucleus for a miniature prairie community.

THE FROZEN BLACK RIVER, LOOKING NORTH FROM THE LISTEMAN ARBORETUM, NEILLSVILLE, WISCONSIN. NOVEMBER, 1964.

In addition to the vegetation map of the Listeman Arboretum, two other maps were prepared. From a preliminary topographical map made by the writer, Professor Orie Loucks of the Botany Department prepared a field-corrected version. A soils map of the area of the Listeman Arboretum was also drawn up. Information for this came from a field map and soils survey conducted on the site by Professor Francis D. Hole of the Soils Department; with the assistance of F. Glenn Goff, former Wisconsin Arboretum botanist; Professors Cottam and Loucks, and the writer. The information which the maps and their supporting data contain will be most valuable in preparing the master plan.

The most difficult part of the project, from the point of view of the writer at least, is the synthesis of field data, historical records and land survey reports, maps, and photographs into the completed management master plan. This will be completed by the end of June, 1965. It will then be turned over to the Marguerite Listeman Foundation and the city of Neillsville for implementation. A few years

may be expected to pass before all nature trails, communities through which they lead, educational materials, service and maintenance facilities, and most important of all, public interest and moral support, are developed to the point where efficient use is being made of the establishment. When that time comes, however, Neillsville will be one of the few small American towns to possess an arboretum of this type right within its own city limits. It promises to be a facility which can serve local schools as an outdoor laboratory for the teaching of conservation and biological sciences; an area in which the casual or serious naturalist, artist or photographer may capture his favorite subjects according to his particular medium; and where anyone, regardless of his interests, may come to escape from the hectic pace of modern living for a few hours communion with Nature and her realm.

In an early newspaper article, Mr. Listeman suggested that the theme for the arboretum might be, "*A place to inspire the mind of man.*" If the Listeman Arboretum does nothing more than this for the Neillsville residents and visitors, its establishment will be well worth the trouble and expense.

–John E. Purchase
Research Assistant–Botany

Symposium on School Forest Development

The 5,000-acre Bong Air Force Base in Racine and Kenosha counties was abandoned in 1959. The availability of this site led to its utilization as the object of a plan for the development of an integrated urban, industrial, conservation area. Part of this plan called for the designation of school forests, and four separate sites of about 160 acres each were so designated. Administration of these areas is by four different local school systems. Representatives of these school systems visited the Arboretum last fall to obtain guidance on how their areas, mostly abandoned farm land, might best be developed.

Professor Ellarson, of the Department of Wildlife Management, and the writer then visited the Bong school forest sites to advise further. From visits to the sites and discussions with the school representatives charged with the responsibility of developing them, it was apparent that further discussions could be useful in placing the development of this land in the proper context. Hence the School Forest Development Symposium was held in The Wisconsin Center, February 12 and 13. The symposium was sponsored jointly by the Arboretum Committee and Wisconsin Cooperative Extension Services. Meeting with the school forest teachers and administrators were representatives from the University, Agricultural Extension, Conservation Department, and Madison School Forest.

Areas discussed during the symposium were: (1) the potential role a school forest might play in broadening an integrated school curriculum and aiding in developing a greater awareness of and appreciation for the natural environment; (2) why an environmental inventory and analysis is prerequisite to a meaningful long-range master plan; (3) specific development techniques; (4) school forest management and administration.

There followed a tour of the Arboretum, after which the symposium was concluded with a workshop on the particulars of each of the four school forests involved. Because of the success of this symposium, we hope it will be the first of a series of such symposia–symposia which contribute significantly to showing other schools around the state how to profit more from the use and development of their school forests, some 350 in all.

–D. Archbald

Picture Key to Wisconsin Trees

Wisconsin Trees, a Picture Key, developed as a teaching aid for elementary botany students as mentioned in the last issue of the *NEWS,* is now ready for distribution. Copies are available from the Arboretum Office, 329 Birge Hall, Madison, Wisconsin 53706, for twenty-five cents per copy if less than ten copies are ordered. Orders of ten or more copies are priced at ten cents each.

The tree identification guide is the product of the active and imaginative minds of F. Glenn Goff and Paul Zedler, former and present Arboretum Botanists. The guide was the outgrowth of a plan for the planting arrangement of species to be presented in the new Woody Taxonomic Garden now being developed on Carver Street at the Fish Hatchery Road. Printing costs were paid by the *Friends of the Arboretum.*

Arboretum Personnel

Chairman of the Arboretum Committee ..... Grant Cottam
Executive Director ..... G. Wm. Longenecker
Managing Director ..... D. Archbald
Botanist ..... Paul H. Zedler
Secretary, Arboretum Office ..... Jane Curtis Medler
329 Birge Hall

The University of Wisconsin Arboretum
Grant Cottam, Chairman
329 Birge Hall
The University of Wisconsin
Madison, Wisconsin 53706

THE UNIVERSITY OF WISCONSIN

ARBORETUM NEWS

Vol. 14, Nos. 2 & 3 Madison, Wisconsin April-July, 1965

Dr. James H. Zimmerman—Our Ranger-Naturalist

We were very pleased when the University Administration included in our current budget the position of ranger-naturalist. This position was established primarily to further our educational program. It will also provide a professional person to traverse the Arboretum with an eye toward potential trouble spots and possible changes which could be made to insure that the Arboretum continues its progress toward developing a system of plant and animal communities. While we felt that the need for this position was great, we were concerned that we would be able to find someone with the combination of qualities necessary to perform the duties involved. He would have to be an expert in nature education and would also require a strong background in a great many biological fields. Our budget was sufficient only to hire a person with a Bachelor's degree, and the combination of qualifications we wanted called for an expert with many years of training.

Our solution to this dilemma was indeed fortunate. We got our expert. He is Dr. James H. Zimmerman, a graduate of this university with a Ph.D. in plant taxonomy. Jim has had a lifelong interest in the Arboretum. He has maintained a list of phenological events here since he was an undergraduate and has had an equal interest in the birds, the insects, and the plants. He is the only man in Wisconsin who really knows the genus *Carex*, grass-like plants which are very common but very difficult to identify.

Jim's background in nature education is strong. He has been associated with the Madison School Forest since its beginning and has contributed much to the remarkable educational program carried on there. He has also conducted a number of evening classes for the Madison Vocational School on the subject of reading the landscape. An indication of the regard in which he is held by his students is the fact that many of them have taken the course more than once, and each time they add new depths to their understanding of nature.

Jim is with us on a part-time basis because of budgetary limitations and because he wishes to have some free time to pursue other aspects of conservation and nature education as the spirit moves him. We feel that any activities that further an appreciation of nature, whether conducted on the Arboretum or not, benefit the Arboretum because they create an awareness of its value. So we are

very pleased to welcome "Jim Zim" to our staff, and feel that we are getting a real bargain. Jim has already started his nature education program with a mimeographed trail guide for the Curtis Prairie. This guide is distributed to those who attend public tours of the prairie for their use on return visits. During July and August, about 470 persons came out for the two-hour guided tours given on several weekends. These field trips, open to the public, will be repeated through the fall. Information on dates and times, published in the local papers, may also be obtained through the Arboretum office.

—Grant Cottam, Chairman
Arboretum Committee

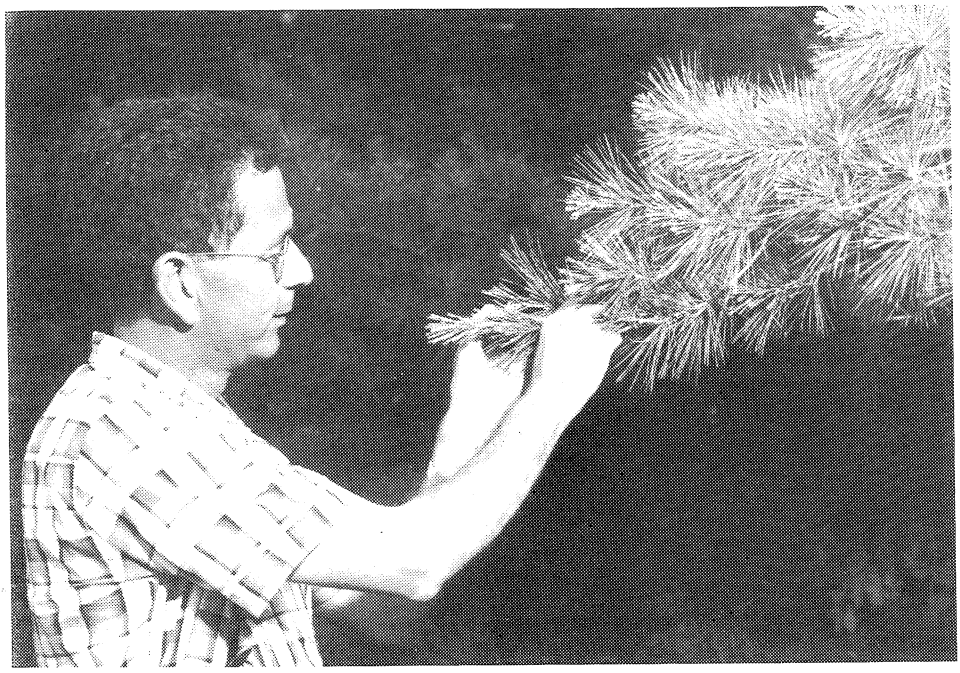
Investigation of Pine Understory—Leopold Pines

One of the goals of The University of Wisconsin Arboretum is to establish as many of the native Wisconsin plant communities as possible. Within the Arboretum are examples of plant communities which are distributed over the whole state. Anyone who has participated in one of the numerous Arboretum tours can attest to the educational value of the area. The Arboretum also provides opportunities for research and aesthetic appreciation of natural beauty. The bringing together of these many diverse communities with different ecological requirements in a single location requires a considerable amount of planning, management, and maintenance. This is especially true of those which do not normally occur in the Madison area. An example of such a community is the northern pine forest.

Native pine communities are generally distributed in an area north of the tension zone. Except in the case of a few scattered communities which occur in suitable micro-habitats, the meso-climate of the prairie-forest border region does not seem to be conducive to the establishment of natural pine communities. However, it is generally agreed the trees in Arboretum Leopold Pines are able to exist in the area. They show a fantastic yearly growth rate which can be determined by noting the distance between successive whorls of branches on the red and white pine trunks. This growth rate actually exceeds that of many natural stands.

On warm summer days, the odor of drying, resinous pine needles and the faint breezes whispering through the Leopold Pines gives one the feeling of being in northern Wisconsin. However, the obvious lack of the usual green carpet of understory plants weakens the illusion. Stimulated by a desire to remedy this situation, studies were initiated in the summer of 1964 to determine how the understory conditions in the Arboretum differed from those in natural pine communities. The fact that differences exist was not disputed since past attempts to artificially establish an understory assemblage have met with only limited success.

Study areas were selected in both northern and southern Wisconsin as being representative of conditions under which pine forest ground flora develops naturally. Three northern stands were located in Oneida and Vilas Counties. Two of these were dense, even-aged forests, being comparable in age to the Leopold Pines. The third was the Arboretum's Finnerud Forest, a stand of majestic, 125-year-old red pines near Minocqua, Wisconsin. An old-growth pine community in Juneau County was selected to represent the meso-climatic conditions of southern Wisconsin which were presumed to be similar to those of the Arboretum. The study of these stands was directed towards determining: (a) the factors which are conducive to the success of the understory in natural pine communities; and (b) how these relate to the unsuccessful understory establishment in the Leopold Pines.



Arboretum Naturalist James H. Zimmerman examining one of the Leopold pines.

Several environmental factors were found to be related to the success of the understory. However, none can be considered to be "the factor" responsible for limiting the understory in a pine forest, for many enter into the scheme of plant success. The community dominants, the trees, modify the environment of the herbaceous ground flora in many ways. Two easily observed effects of the trees are their influence in reducing both the light and the precipitation which reaches the forest floor. Light and moisture are essential for plant growth. Removal or reduction of either can result in decreased vigor or death of an understory plant. Analysis of environmental data showed that as the canopy became less dense there was an increase in throughfall precipitation and light reaching the forest floor.

Areas beneath deciduous trees in dense pine stands supported a more luxuriant ground flora. This can be observed in the Leopold Pines under black cherry trees. The increase in vegetation is apparently due to an increase in soil moisture from greater throughfall precipitation due to the broadleaf canopy.

The natural pine community was found to differ from the Leopold Pines in several ways. For example, the soils under the Leopold Pines are not yet fully developed. One striking difference occurs in the litter, that mat of needles and other organic remains that lies on top of the mineral soil. In native communities, the litter generally has three layers, with the bottom layer, called humus, consisting of almost totally decomposed organic material. This layer is rich in nutrients when compared to the mineral layer immediately beneath it and is also usually quite moist in native pine stands. Humus is absent from the soil in the Leopold Pines. In northern Wisconsin, the understory herbs were found to have their roots and rhizomes concentrated in the humus layer. In the Leopold Pines the same species have their subterranean organs below the organic layer, in the upper mineral soil. The writer has observed that during July and August the litter in the Leopold Pines can become thoroughly dry. This may explain why the subterranean organs of the herbs are not found there, since plants rooting in the litter would be subjected to severe moisture stress. The presence of a completely developed litter would tend to retard drying and allow the plants to survive with their roots in the nutrient-rich humus.

Several hypotheses have been developed about the changes that should be made in the Leopold Pines to promote successful understory establishment. Changes which would increase the moisture available to the understory, such as opening the forest canopy, may promote a more vigorous understory. Light may in some cases be limiting, as may also be the presence of a fairly high rabbit population that uses the pines for cover and eats the herbaceous plants. Several experiments are in progress to determine which management techniques will best promote understory development. Within the Leopold Pines there are several fenced areas which exclude rabbits. These areas have a luxuriant growth of understory herbs and shrubs. However, they not only suffer less rabbit damage but also receive more precipitation throughfall and light due to their location in fairly open areas. This year an experiment was set up to determine the effect of additional moisture on the understory. Two areas 50 ft. by 10 ft. are being watered at the rate of one-half inch per week in those weeks during which no rain falls. These areas are being compared with two adjacent areas which are receiving no additional precipitation. It is hoped that by comparing the mortality rates of the understory plants present in the areas some conclusions can be drawn concerning the effect of additional soil moisture.

Obviously, the problem of establishing the proper understory in the Leopold Pines is a long way from being solved. But further investigation, plus the modification of the environment with the passage of time, should eventually result in the establishment of conditions necessary for the development of a truly natural-appearing community.

—Roger C. Anderson
Research Assistant—Botany

Horticultural Plants in the Arboretum

2. The Japanese Tree Lilac

The University of Wisconsin Arboretum has many examples of fine unusual trees that would make ideal specimen selections for the home yard. If you are considering an addition to your landscape, or just want to see some uncommon flowering trees, a visit to the Arboretum would be worthwhile.

One of the most attractive flowering trees is *Syringa amurensis japonica,* commonly called the Japanese Tree Lilac. It is the best known of the tree lilacs and is valuable for its large pyramidal heads of small creamy white flowers which are the last of the lilacs to bloom. The large leaves make it conspicuous in the summer and its rather open habit of growth with rounded top presents an attractive winter silhouette.

All of the tree lilacs are native to northeastern Asia. *Syringa amurensis japonica* is found commonly in central Japan where it grows in the forests and moist woods. It is even more abundant northward and is found extensively in Hokkaido. Mr. William S. Clark became interested in the tree in the latter part of the nineteenth century and sent seeds to the Arnold Arboretum in 1876, thus introducing the tree to the United States.

The deciduous Japanese Tree Lilac is the tallest growing of all the lilacs. It can be trimmed to grow on a single trunk in a pyramidal rather open habit and will reach a height of up to thirty feet at maturity. Or, it may be grown as a tall shrub.

The broad, ovate and entire leaves are opposite and often five inches long. They are slightly heart-shaped and are larger and coarser than those of the com-

mon lilac. The flowers, differing from the true lilac by having short corolla tubes and protruding stamens, are small and creamy white. The large, loose panicles, sometimes six inches high, normally come into bloom in late June or about a month after the common lilacs have finished flowering. The fruit that then forms in these clusters is warty and about three-quarters of an inch long. The trunk and older branches resemble those of the cherry with large lenticels and smooth, dark, reddish bark.

The Japanese Tree Lilac is extremely hardy. Some specimens are known to be thriving in Dropmore, Manitoba, Canada. Until it reaches full height, it is a rapid grower in any good soil, and then lives for many years, flourishing with little care. The tree is susceptible to borers and scale infestations, but today these can be readily kept in check.

The six Japanese Tree Lilacs in the Arboretum along the drive to the Administration Building were bought in the spring of 1935 from the McKay Nursery and planted in their present locations. Besides these in the Arboretum, there are many others to be found growing around Wisconsin. A lovely specimen, the largest in Wisconsin, is located on Henry Mall on the College of Agriculture campus. *Syringa amurensis japonica* is available for purchase this year at several local nurseries.

So, whether you are looking for an exceptional specimen tree for home landscaping or enjoy the spectacle of beautifully blooming trees, do look for the Japanese Tree Lilacs on your next drive through the Arboretum.

–Nancy W. Knight
Graduate Student–Horticulture

Syringa amurensis japonica in winter silhouette.

Arboretum Publications

A new publication on plant identification has recently been printed by the *Friends of the Arboretum*. *Wildflower Families and How To Know Them* was written by James H. Zimmerman and Booth Courtenay. It utilizes a new system originated by Dr. Zimmerman and Mrs. Courtenay which greatly simplifies identification of any flower at hand. Its charts of plant families provide a short-cut method of locating an unknown plant by group (family or subfamily). Family groups are characterized by concise descriptions and diagrammatic illustrations. Then, if one desires to determine genus and species, he can do this readily with the help of suggested texts—both popular and technical—given in the new booklet. A section on plant ecology is included to provide further aids in plant identification.

The booklet is available from the Arboretum Office, 329 Birge Hall, Madison, Wisconsin 53706, for $1.00 per copy. Orders of 25 or more copies are priced at 75 cents each. The authors have dedicated all proceeds from sale of the identification guide to the *Friends of the Arboretum* to further the work being done by this organization.

Wisconsin Trees, A Picture Key, by Goff and Zedler, announced in the last issue of the *News,* is now sold out and no longer available from the Arboretum Office. A revised and improved edition can be obtained from College Printing and Typing Company, 453 West Gilman Street, Madison, Wisconsin 53703, at a cost of 30 cents if sold over the counter. Mail orders are $1.00 each. Orders of 25 or more copies, purchased either in person or by mail, are priced at 25 cents each.

The Arboretum Birdwatcher

One Sunday morning in early July I arose with the birdwatchers. I would have said birds, but I'm sure that the "binocular set" awakens much earlier. After all, they have to get up, wash and dress in order to get out into the field. Presumably all that the birds have to do is to get up. I wouldn't labor the point so much except that it is a rare morning in July, or any other month for that matter, when I arise before seven thirty. This particular morning, the sun had not yet appeared over the horizon when I arrived at the Arboretum.

In the event that I have my reader confused at the outset, may I be allowed to provide something by way of background explanation. It seems that when I submitted an article to the *Arboretum News* a few months ago, I promised to have another ready for use during the summer. Being reminded of this obligation, I decided that early morning would be a good time to go to the Arboretum for some inspiration.

In order not to attract too much attention to my early morning field trip through the Arboretum woods, I decided to go disguised as an ornithologist. I can't recall ever having seen one of these dressed and equipped for a day's work, but I assumed that he would wear brown or khaki field clothes, boots, hat, and would carry a pair of binoculars, camera, light meter and a clipboard. In any event, that's what I took.

Noe Woods was full of birds when I got there. At first I could see none of them because the sun had not come up far enough above the trees for the woods to be very well lighted. Songs and calls filled the air however, and I thought that I recognized a couple of voices—a robin and a mourning dove. After sitting on a log for a short time, I managed to sort out another. As the reader has perhaps guessed, I know very little about birds so that when I say I think it was a pewee,

it may not have been. When I spotted the little fellow who was making the sound in question, he certainly had the right shape. He looked like a flycatcher. Unfortunately I could not find a "Peterson" to bring into the field with me so no silhouette comparison was possible. He said "Chee-er-ee," if anyone wants to verify my identification.

Perhaps it was too early, or the location was wrong, or possibly I was wearing the wrong kind of hat (it was an old brown wool beret). For whatever the reasons, I was not having much success as a birdwatcher, so I stood up and started to move along the trail. Suddenly I stopped. I had the feeling that I was being watched. A faint rustling of leaves came from the woods on the west side of the trail but there was no sign of whatever it was that was responsible. It could have been a chipmunk. Once more I was about to move off when the litter crackled again and there was a flash of reddish brown. "Stray dog in the Arboretum," I thought, waiting to get a better look at it. "Not a dog—a deer! I didn't think they came into this woods."

The rustler was a doe. She was a delicate-looking little creature, rather smaller than one usually imagines a deer to be. Obviously aware of my presence but apparently confused by my failure to move and perhaps also by my drab clothing, she circled, watching me constantly, at a distance of thirty to fifty feet. Thinking perhaps to elicit a reaction on my part, the doe raised her flag and took a few quick, short bounds which carried her to the east side of the trail. "Nice try, little gal. I'm wise to your game. I'll bet that you have a fawn hidden out here somewhere."

Not having succeeded in getting me to move, the doe stopped, took a few cautious steps, then tried another short bound—still no luck. Finally she walked behind a thicket of honeysuckle bushes where I could hear but not see her. Remaining motionless for a moment or so more, I then started along the trail again. No sooner had I lifted my foot from the ground than there was an explosive crash and a swishing of leaves as the deer broke from cover and bounded downhill and away towards the opening on the eastern side of the woods, snorting, rather jubilantly I thought, believing that her ruse had worked. Not wanting to disappoint her by stopping to look for her fawn, I continued out of the woods. After all, I had gotten something to write about now. The birds could wait for another time when I might be better equipped and perhaps more appropriately attired in a good birdwatching hat.

—John E. Purchase
Research Assistant—Botany

Arboretum Personnel

Chairman of the Arboretum Committee ..... Grant Cottam
Managing Director ..... D. Archbald
Ranger-Naturalist ..... James H. Zimmerman
Botanist ..... Paul H. Zedler
Secretary, Arboretum Office ..... Jane Curtis Medler
329 Birge Hall

The University of Wisconsin Arboretum
Grant Cottam, Chairman
329 Birge Hall
The University of Wisconsin
Madison, Wisconsin 53706

THE UNIVERSITY OF WISCONSIN

ARBORETUM NEWS

Vol. 14, No. 4 Madison, Wisconsin October, 1965

A HISTORY OF NOE WOODS

Interpreted from the Structural Organization of the Trees and Shrubs

The 30 years of land acquisition and development in the Arboretum have produced a complex but interesting historical record. It is no more remarkable, however, than the historical record of forest development made available by intensive study of the wooded communities. Several aspects of the history of Noe Woods emerged as part of a study carried out by Mr. Goff during his term as Arboretum botanist.

There are several steps in the analysis of a forest such as Noe Woods for its historical record. First, one recognizes that many of the past disturbances were patchy, but large enough to create imprints. These provide a continuing record of events right up to the present, and are to be expected in small irregular "pockets," a mosaic of microstands which collectively make up the woods. When aerial photographs of Noe Woods are viewed stereoscopically, the vegetation forms such a mosaic. The pattern is equally apparent to an observer on the ground.

To examine the historical record from these disturbance imprints, the second step requires stand delineation at a size consistent with the smallest units in the mosaic. Careful mapping from the aerial photos and on the ground resulted in 45 mosaic units ranging from one-half to two acres in extent within Noe Woods. Twenty of these were sampled in detail for the material presented in this report, while an additional eight stands were established in the adjacent Grady Woods south of the Beltline.

The data collected were similar to that obtained in most of the other studies carried out by the Plant Ecology Laboratory at The University of Wisconsin. Five concentric-circular sample plots were placed within each stand. In this study, emphasis was placed upon the number of stems representing different size classes of trees. A detailed record was made of the saplings and seedlings, also by size classes, and of the numbers and sizes of the shrubs.

One of the most obvious results is that the 20 stands in Noe Woods form a gradient in species composition from stands dominated by black oak (Compositional Index about 800) to stands dominated by elm and butternut (C. I. about

1450). The latter example is somewhat extreme, for the major part of the gradient runs from stands of black oak to stands that are mostly white oak. Only a few are dominated by the more mesic species that appear to be replacing the oak. In the middle of the gradient is the usual mixture of white oak and black oak that we think of as being Noe Woods.

Thus there is represented on a small scale in Noe Woods a significant segment of the compositional gradient that we see in the southern Wisconsin landscape. The question, as in the southern Wisconsin landscape, is now: How much of the variation along the gradient is attributable to disturbance and is therefore likely to disappear within the life cycle of the oaks, and how much is attributable to physical environmental differences?

Some of the evidence needed to answer this question actually is available from the changes in composition that are represented within the Noe Woods samples themselves. It is possible to calculate a compositional index, first for the overstory trees, second for the stratum slightly younger and lower in the canopy, and so forth, continuing to the calculation of a compositional index among the smaller saplings. Instead of measuring the height of every stem to determine its canopy position, a similar result can be obtained by using diameter size classes of the trees. In this study, eight size-class strata based on stem cross-sectional area were used, four in the tree stratum and four among the saplings. A chart showing the Compositional Index for each of the eight strata in sequence can be thought of as a compositional profile of the stand. While such a profile actually depicts changing composition with size, it is closely related to changes in time, and hence is representative of the vegetational history.

Where changes are taking place, an index close to 1400 is typical of the sapling strata, substantially higher than the C. I. of the overstory. On the other hand, stands in which there is no evidence of major compositional change are characterized by having approximately the same Compositional Index all the way down through the canopy into the reproduction layer. The data from this study show that a few of the stands in Noe Woods have little evidence of change taking place, while others appear to be changing very rapidly indeed. Some of the understory saplings now present may not survive to form a future stand, but on the basis of the overall differences in composition between overstory and understory, one must conclude that change is taking place. The essential feature of the change is from a relatively uniform dominance by one or another oak species, to a mixed pattern of oaks, elms and butternut, depending on the topography and soil drainage.

However, the most interesting results of this study show that not all of Noe Woods originated at one time. Several parts of it are dominated by white oaks of large diameter and wide-branched low crowns that probably date from a time when prairie fires raced through the thin grass between the trees. Other parts of the woods appear to have been clear-cut for fuel wood about the turn of the century. This is most apparent in the north half of the woods, adjacent to McCaffrey Drive, where the overstory stems are nearly all small in diameter. In addition, the stems frequently originate in groups, indicating the survival of several sprouts. At the base of some of these clumps, one can find the remains of a cleanly sawn stump.

The cutover stands were particularly obvious in the analysis of data and prompted the separation of several groups of stands within the woods. The two most important groups have been called "cut" and "uncut." The uncut stands are characterized by the presence of trees of very large size, specifically having the basal area of the two larger tree-size classes substantially greater than the basal area in the two smaller tree-size classes. The reverse holds for the stands that were cut. Designation of these groups as simply "cut" and "uncut" is an

oversimplification, however, for there is some evidence of light selective cutting throughout Noe Woods, and probably no part of it is literally "uncut." An occasional larger tree can be found within the so-called "cut" stands. Nonetheless, this early disturbance of the woods has left a strong, recognizable imprint today, and is a major influence on the present trends toward change.

One of the important changes in the present vegetation that can be attributed partially to the cutting is taking place within the understory shrub cover. It is very difficult to describe shrubs quantitatively because of their diverse growth forms and irregular stocking. In this study, an index of shrub importance was developed to include measures of shrub density as well as basal diameter and height. Taking all the shrub species together, the index shows an initial rise in the importance of shrubs from stands of low C. I. (primarily in the Grady samples), reaching a peak near C. I. 700, and declining in the more mesic stands.

There are also significant differences in shrub development between the cut and the uncut groups of stands. In both groups there is a general trend for a decreased importance of shrubs where there is a high overstory tree basal area. This is a strong relationship in the uncut group of stands, with few samples having abnormally high shrub cover. In the stands that were cut, however, there is slight relationship between overstory basal area and the shrub importance, and the overall importance of shrubs is very much greater. The mean shrub value in the uncut stands is 93, while that of the cutover stands is 133, indicating effectively 50 percent larger and more numerous shrubs persisting in the disturbed portions of the woods.

Noe Woods can be examined as a matrix of small stands of diverse origins, some of which include these large white oaks that obviously were once open-grown.

Portions of Noe Woods still show the evidences of a heavy cutting about 1900. The stump sprouts and small stems shown here illustrate some of the variations in stand history that are found in the woods.

Finally, there are stands in which very little oak remains, designated the "non-oak" group. There is no direct evidence that the oak was removed either by cutting or by an early attack of oak wilt disease, but the stands are the youngest and the sites are more mesic than the remainder of Noe Woods. Disease may have invaded more rapidly or there may have been a somewhat different composition in these stands from early times. Right now the largest trees are no more than 40 to 45 years old. The overstory composition is varied, but two important species are butternut and elm, with box elder as the leading sapling species. The understory shrub composition is also very different from the remainder of the woods, with elderberry, gooseberry and nannyberry as the most prominent species.

At the other extreme in the age gradient of stands in Noe Woods is the area of open-grown white oak and bur oak that forms an oak-opening grove in the hollow on the east side of the woods. This stand has only recently been weeded of a complete cover by Tartarian honeysuckle so did not qualify for sampling. The shrub cover may have prevented any previous growth of understory saplings, but the result now is that the grove has all the characteristics of the earliest stages in the development of Noe Woods, except for the absence of prairie grasses in the understory. With special care, it may be possible to maintain this remnant of oak-opening in Noe Woods so that as changes proceed elsewhere in the woods, we can continue to have the complete spectrum of dry-mesic oak forests within a short distance along one of the Arboretum trails.

O. L. Loucks—Dept. of Botany
F. Glenn Goff—NSF Fellow, Botany

GOLDENROD GALLS IN THE ARBORETUM

In late summer and early fall, the goldenrods in the Arboretum have reached maturity, and the extensive vistas of the golden-yellow blossoms on the prairies give a pleasant character to the landscape. If a viewer examines the individual plants closely, it is revealed that the goldenrods support a variety of interesting insect galls. There are three common types of goldenrod galls in the Arboretum: *Figure 1,* a ball gall, a spherical stem swelling about an inch in diameter; *Figure 2,* an elliptical gall, an elongate, spindle-shaped stem swelling; and *Figure 3,* a bunch gall, composed of numerous compact leaves in an apical rosette that replaces the flower head.

The ball gall is caused by the immature stage of a fly, *Eurosta solidaginis* Fitch. The female fly lays her eggs upon the surface of goldenrod stems during early summer. A newly hatched larva, called a maggot, bores into the stem and causes the formation of the pithy gall. By fall, the galls are about the size of a hickory nut, round, and of similar texture to the stems themselves. Cut open the gall and a single maggot will be found in a smooth-walled chamber in the center of the gall. The maggots remain in the galls during the winter, after first cutting a tunnel to the surface of the gall, which serves as an escape hatch for the adult fly following its pupation in the spring. The fly itself may be easily reared in the spring if the galls are gathered and placed in a container, such as a glass jar covered with tissue paper or netting. The fly is a pretty insect with brown-banded wings, and is a member of the fruit fly family, *Tephritidae.*

Ball galls may occur on most of the stems in a good-sized patch of goldenrod. Occasionally two or more galls may be found on the same stem. Most of the galls are at about the same height. They are readily seen in winter and gathered then by fishermen who use the maggot for bait. Birds and mice also open the galls to obtain the maggot inside.

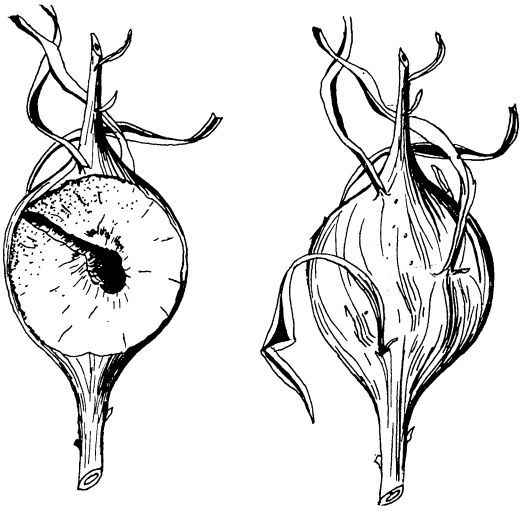


Figure 1. Ball gall.

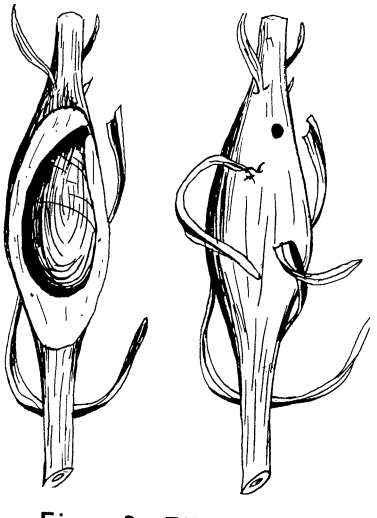


Figure 2. Elliptical gall.

Figure 3. Bunch gall.

Sketches by Wayne Westphal, Conservation Aid, Arboretum.

The elliptical gall is caused by the immature stage of a moth, *Gnorimoschema gallaesolidaginis* Riley, a member of the family *Gelechiidae*. In the fall the adult female moth lays eggs on the old plants. The eggs hatch in the spring. The young larva, called a caterpillar, crawls to a new shoot and boring into the stem causes the growth of the gall. The caterpillar becomes full grown about the middle of July. Before changing to a pupa, the caterpillar eats a passageway through the walls of the gall at its upper end, and closes the opening with a plug of silk. This plug is pushed out by the adult moth when it emerges from its brown cocoon in the late summer. The feeding of the caterpillar keeps the interior walls of its shelter smooth and neat, and its castings are packed at the bottom of the cavity.

The bunch gall is produced by a fly in the *Cecidomyiidae,* a family of the smallest midge-like flies. Many species of cecidomyiid midges are responsible for flower, bud and leaf galls. The midge species *Rhopalomyia solidaginis* (Loew) has been reared from bunch galls in the Arboretum (Det. R. Gagne, U. S. National Museum).

The midge lays eggs in the summer that hatch into tiny maggots. These attack the growing tip of the main stem, producing a cluster of deformed leaflets at the apex, instead of leaves being distributed normally along the length of stem. An old bunch gall may have lateral branches produced as a result of the deformity of the terminal bud. One, two or three cells in the center of the globose leafy gall may shelter a stout whitish maggot. The larva of a gall midge may be recognized by the presence of a "breastbone" or chitinized process lying within the thorax and terminating behind the head. The midge completes its development and transforms into a pupa in the fall. This pupa actively moves and leaves the gall from a tiny opening between the tips of the interior leaflets. It emerges as an adult outside the gall. The insect probably overwinters as an adult, as the bunch galls do not contain midges in the late fall.

The physiology of gall formation is not completely understood, but appears to be closely related to the growth of the insect larva. Ordinarily a gall does not grow until the egg is hatched—if the egg is removed the gall does not appear. The gall grows along with the insect larva. It appears that the larva exudes some fluid that acts upon certain meristematic cells, such as the cambium and other cells capable of further growth and multiplication, in such a way as to stimulate their increase in size and number. Why the galls of different species of insects have a distinctive, or specific form, is not yet completely known.

The gall is important to its insect maker as a source of special food and as a shelter niche. Empty goldenrod galls also serve as shelter or nesting niches for guest insects or inquilines and transients. For example, the eumerid wasp, *Ancistrocerus tigris* (Saussure), which builds clay-partioned cells and provisions them with caterpillars, was reared from a goldenrod gall in the Arboretum by J. R. Dogger in 1946. Both gall-makers and inquilines are attacked by parasites and predators.

The overall incidence of insect galls on goldenrod is low, and the galls are not of economic importance on the plants except that elliptical and bunch galls usually prevent normal flowering. However, goldenrod galls provide an interesting example of the evolution of a plant-insect relationship. The botanist can find interest in the effect of the insect secretions on abnormal plant growth and anatomy. The entomologist can be concerned with the life histories of the different gall insects and the ecological relations in the gall between parasites, predators, inquilines and transients.

Many other examples of gall insects can be found on *Solidago* throughout its range of occurrence. For example, E. P. Felt (1940, *Plant Galls and Gall-Makers,*

364 pp. Comstock Publ. Co., Ithaca, N. Y.) listed the following insects associated with goldenrod galls:

Flower galls
2 genera, 5 species of midges
Bud galls
5 genera, 8 species of midges
Apical rosette galls
5 genera, 10 species of midges (incl. 2 inquilines, 1 predator)
Leaf galls
7 genera, 9 species of midges (incl. 3 prob. inquilines)
Blisterlike leaf galls
2 genera, 10 species of midges (incl. 1 predator)
Stem and root galls
6 genera, 21 species of midges
3 genera, 7 species of flies
2 genera, 5 species of caterpillars
1 genus, 1 species of gall wasp

The above summary shows that *Solidago* supports 76 species of gall-making insects, of which 63 are the tiny gall midges.

In the Arboretum, the ball and elliptical galls are found on *Solidago altissima* L. The bunch gall is found principally on *S. altissima,* and also on *S. graminifolia* (L.) Salisb. The midge species responsible for the bunch gall on the latter plant was not reared or identified.

—J. T. Medler
Dept. of Entomology

RESOLUTION OF RESPECT FOR ALFRED W. PETERSON

Presented at the Annual Meeting of the Friends of the Arboretum, November 18, 1965

Alfred W. Peterson, first president of the Friends of the Arboretum, died on October 23, 1965. His contribution to the Friends is but one of many activities on behalf of the Arboretum. As Vice President of the University he was in charge of our financial affairs. All of our property transactions were handled by him. Our trust fund and other gifts were also under his supervision. In his discharge of these responsibilities toward the Arboretum he went far beyond what was required of him. He was ever conscious of our problems and needs, anticipating opportunities and troubles we might encounter and acting, or encouraging others to act, in our behalf. As president of this organization, he guided us through our precarious first year, always gracious and understanding, giving freely of his time and wise counsel to assure our success. Over the years, he has been our friend in court, our bridge between the Arboretum and the Regents.

Such were his material contributions. Of equal importance are the intangibles. Alfred Peterson's knowledge of "the right thing to do" smoothed our path immeasurably. He knew how to work with people, and his way was not through craft or cunning, but through absolute honesty. Those who worked with him relied on this ability, and whenever there was a question about which course of action was best for the Arboretum, he was consulted. Our experience has been that he was never wrong.

There is little in our official documents about Alfred Peterson. This is because he wrote most of the official documents himself, and he was a quiet, self-effacing man. No one can say how we would have fared without him, but there is no doubt that behind many of our achievements there is the guidance and counsel of Alfred W. Peterson.

—Grant Cottam, Chairman
Arboretum Committee

Arboretum Personnel

Chairman of the Arboretum Committee ..... Grant Cottam
Managing Director ..... D. Archbald
Ranger-Naturalist ..... James H. Zimmerman
Botanist ..... Paul H. Zedler
Secretary, Arboretum Office ..... Jane Curtis Medler
329 Birge Hall

The University of Wisconsin Arboretum
Grant Cottam, Chairman
329 Birge Hall
The University of Wisconsin
Madison, Wisconsin 53706