Our first 50 years: the University of Wisconsin-Madison Arboretum 1934-1984. 1984

Madison, Wisconsin: University of Wisconsin-Madison Arboretum, 1984

Our First 50 Years

The University of Wisconsin Arboretum
1934-1984

(Cover) Civilian Conservation Corps crew breaking ground in the old Nelson pasture in the early stages of restoration of Curtis Prairie. This photograph was taken November 5, 1934, just a few months after CCC Company 2670 began working out of "Camp Madison" at the Arboretum.

UW Vice Chancellor and Political Science Professor Bernard C. Cohen presented a rededication of the Arboretum during the anniversary celebration on June 17.

A look back, and a rededication

The McKay Center

Sunday, June 17, 1984

The formal dedication of the UW Arboretum was held in a barn that stood on the present site of the McKay Center on the morning of Sunday, June 17, 1934. Among the speakers were UW President Glenn Frank; Landscape Architect John Nolen, who had proposed creation of an arboretum for the University a quarter of a century earlier; UW Horticulture Professor G. William Longenecker; and conservationist Aldo Leopold, whose speech is printed here for the first time, and was reread at the anniversary celebration by his daughter Nina Leopold Bradley.

Other speeches, reflecting on the progress that has been made toward the goals Leopold outlined, were also presented at the anniversary celebration, and texts of these presentations follow the text of Leopold's speech.

Michael Olbrich

Joseph W. Jackson

John Curtis

G. William Longenecker

Some of the people. Of the many who made the UW Arboretum possible, these were the leaders. A photo of Aldo Leopold appears on page 4.

What Is the University of Wisconsin Arboretum, Wild Life Refuge, and Forest Experiment Preserve?

An address by Aldo Leopold at the dedication of the University of Wisconsin Arboretum June 17, 1934

What Is an Arboretum? An arboretum is ordinarily a place where the serious-minded citizen can learn, by looking at them, the difference between a white and a black spruce, or see in person a Russian olive, a tamarisk, or an Arizona cypress. That is, it is a collection of trees.

Sometimes an arboretum also serves as an outdoor library of horticultural varieties, i.e., a place where one can compare all the apples, all the lilacs, all the roses.

Some advanced institutions arrange their tree-collection as natural associations, rather than as taxonomic groups. They present, for example, a sample of the Douglas fir forest of the Northwest, showing the hemlocks, larches, and balsams which grow in association with Douglas fir, and also the ferns, salmonberries, yews, and shrubs which grow under it, and if possible the mosses and herbs which grow under the shrubs. Such exhibits are called "ecological groupings" and represent "advanced thought" in arboretum management.

The Wisconsin Arboretum. We want to have all these things, but they by no means represent the main idea which we are trying to express here. It is something new and different. Perhaps we should not call the place an arboretum at all. Whether our idea is a worthy one, I will have to leave you to judge.

Our idea, in a nutshell, is to reconstruct, primarily for the use of

Two square miles of derelict farmland — the Arboretum land at the time of acquisition

An aerial view from the southwest, about 1932. Note the Nelson barn, center right, the farm fields and woodlots and the open wetland west of Lake Wingra. The large tree along the drive just below and to the right of the center of the photograph was later named the Joseph W. Jackson oak in honor of the man who led the drive for land acquisition.

the University, a sample of original Wisconsin — a sample of what Dane County looked like when our ancestors arrived here during the 1840s.

Obviously, it will take 50 years to do this thing. Obviously, too, it will be done for research rather than for amusement, and for use by the University, rather than for use by the town.

What I want to try and picture today is why it is important to the future welfare of our state to know what it was like before we took it away from the Indians.

Wingra Woods in 1942. "...the only natural thing about it was the trees."

Rebuilding the Wisconsin Landscape. First let me convince you that if you were set down, blindfolded, in Nakoma in 1840, you would not only fail to recognize the place, but you might fail to realize you were in Wisconsin at all.

This hill on which we stand was then an "oak-opening." Our grandparents describe, sometimes with rapture, the beauty of these open orchard-like stands of oaks, interspersed with copses of shrubs, and the profusion of prairie grasses, and flowers which grew between. But just what shrubs, grasses, and flowers were they? We don't know. Why did they remain open, instead of growing up to solid woods? Probably fire, but we're not sure. What oaks? Largely burr-oak, but we are not sure. We do know this, that the bluegrass which now covers half of our county was not present — it came with the white man — while the native grasses which then grew here are now rare or even possibly extinct. The pheasants and possibly even the quail which now inhabit Nakoma were absent; instead the oak-openings were populated with sharptailed grouse, then appropriately called "burr-oak grouse," and now found only a hundred miles to the north. The wild turkey apparently did not occur. The copses contained the ordinary partridge or ruffed grouse. There were elk and deer — elk horns have been pulled out of our local marshes, and of deer we have ample records.

The Wingra Marsh, which we boast of as largely "unspoiled," we would not have recognized in 1840. Those waving meadows of grass, rushes, and dogwood were then largely a tamarack forest, undergrown with sphagnum moss and orchids. We know this because tamarack logs were encountered in draining the golf course. The tamarack forest has been gradually converted into grassland by repeated burning, cutting, grazing, and mowing — a process still plainly visible in any of the tamarack relicts of the eastern half of the county.

The deep layers of peat which comprise this marsh are merely the closely packed remains of sphagnum plants which could not decay because of the acid water in which they were "pickled" through innumerable generations. Professor Fassett of the Botany Department takes his students there to exhume samples of this peat from various depths, and in these samples he finds embalmed the very pollen grains which fell or were blown into the marsh from the plants then growing in and around it. So perfectly are these pollens preserved that their shape and structure tells the kinds of plants which grew, while the relative abundance of the various kinds tells which plants were then most common. The bog is, in short, a vast historical library telling the story of the arboretum back to the Glacial Epoch, 10,000 years ago. Its volumes are still largely untranslated, but it is easy to see why they constitute a valuable educational and scientific asset.

Lake Wingra itself wears so different an aspect that the early settler would not know it now. Much of the shore was then a wild rice bed. The water level fluctuated more, but averaged higher. It was full of waterfowl, whereas now the ducks show almost an aversion to it.

Presumably the introduction of carp contributed heavily to these changes, but we do not know.

Why Study Original Wisconsin? Granted, then, that we have radically changed the aspect of land, what of it? It's still good to look at — why worry? Why try to discover the exact processes by which the Wisconsin of 1840 became the Wisconsin of 1930? Americans shall look forward, not backward, so why dig up these ecological graves?

Because we are just beginning to realize that along with the intentional and necessary changes in the soil and its flora and fauna, we have also induced unintentional and unnecessary changes which threaten to undermine the future capacity of the soil to support our civilization.

In some places these changes will merely reduce our standard of living — physical, in the sense of a healthy agriculture; spiritual, in the sense of needless spoliation of natural beauty. In other places, these changes threaten the actual physical existence of even the present social structure. In some cases, the damage is temporary, in others permanent.

For example, the erosion of topsoil which followed too much wheat and too many cattle is carrying the best parts of southwestern Wisconsin to the Gulf of Mexico. It will take time, geological time, to repair this loss.

The fires which followed lumbering have probably cut by half, for at least a generation or two, the capacity of northern Wisconsin to support a self-sustaining population. Everybody knows this, but few know that the same fires have burned up many of the peat beds in our drained marshes, and thus threaten to turn land once too wet into a future sand-dune. Three marshes in Dane County have been burning all summer. When some old rattletrap of a building catches fire we all rush to the rescue, but when the compound interest of 10,000 years of plants catches fire, our officials sit by with folded hands while the average citizen's depth of understanding is reflected by the observation that he dislikes the smell of peat smoke.

The new insects which modern transportation continuously imports from the four corners of the earth are a standing threat to future agriculture. Our white pine — the very backbone of our original economic structure — now threatens to go down before the

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While a number of speeches were made at the dedication of the UW Arboretum on June 17, 1934, the one delivered by Aldo Leopold retains a special interest because it so clearly defines the special mission of the Arboretum and describes so much of the development that has taken place here since.

Leopold had been a member of the UW faculty for just over a year at the time of the dedication, and he had been thinking about the Arboretum project even longer. His interest in the Arboretum and his involvement in it were to continue until the time of his death in 1948, and so spanned one of the most productive periods of his life.

The text printed here as Leopold's dedication address is a version of the speech to which Leopold attached a note reading, "Dear Colonel (Jackson): This is a popularized version of the speech I gave at the dedication.... It will be some time before I can get the other one out in printable form."

A printed version, which appeared in "Parks & Recreation" magazine (Vol. 28, 1934), is quite different — shorter and much less detailed in its references to the Arboretum. This being the case, and also because this version has apparently never been printed anywhere, we chose it for our anniversary publication.

Aldo Leopold

blister rust, an imported disease. In the offing stands the threat of June-beetles (white grubs) making it imperative to cut down all the white oaks in our pastures. Granted we could shade our cows under tin roofs — who would want to live in a Wisconsin of oakless pastures?

Now this is not a tirade against careless farming, lumbering, or transportation. It is rather an admission that the tools wherewith we are building our civilization are so powerful, and their use has such complex and unexpected consequences, that we are tearing down about as fast as we are building up. It is an admission that science does not yet know enough, or is not yet sufficiently listened to, to anticipate and prevent this process of wreckage which attends our supposedly advancing footsteps.

Research. The business of a University has heretofore been conceived to be the preparation of citizens to cope with their environment. The University must now take on the additional function of preserving an environment fit to support citizens. This task is of a complexity far beyond what I can here take time to explain. I will ask you to accept my word for the fact that it is a long and difficult job. To perform it, a University must have, for the daily use of its faculty and students, a living exhibit of what Wisconsin was, what it is, and what it expects to become. Examples of what it is lie on every hand. What it expects to become may be exemplified on public forests, refuges, farms, and parks. What it was is to be exemplified on the Arboretum, and I hope on numerous areas created for the purpose.

This, in a nutshell, is the function of the Arboretum: a reconstructed sample of old Wisconsin, to serve as a bench mark, a starting point, in the long and laborious job of building a permanent and mutually beneficial relationship between civilized men and a civilized landscape. ■

Nina Leopold Bradley

Leopold's daughter, Nina Leopold Bradley, was too young to participate in the Arboretum dedication in 1934, but she remembers her father's interest in the Arboretum well, and comments that it was of enormous importance to him and probably in many ways a starting point for much he did afterward, including the experiences at the derelict Sauk County farm that provided the basis for his classic A Sand County Almanac. *One of her special memories is a Christmas walk with her father in 1947, when the two Leopolds first discovered pine seedlings sprouting in the restored pine forest, then about fourteen years old, and since named in Professor Leopold's honor.*

Since her youth in Madison Ms. Bradley has herself carried on the Leopold tradition of research in natural history and wildlife ecology, and has studied Hawaiian geese in Hawaii and the behavior of the water buck in Africa. For the last seven years she and her husband, Charles, have operated an ecological study program at the Leopold Memorial Reserve at the site of the Leopolds' sand county farm.

Keynote Address

The University of Wisconsin Arboretum from a Distance

by Peter Shaw Ashton

I have accepted your invitation to speak at this celebration as perhaps the greatest single honor I have received since arriving in the United States five years ago. First, I have admired Aldo Leopold since I was a child. His gentle wisdom has greatly influenced my career as a scientist, as well as my broader quest for a deeper understanding of man's relationship with the natural world. The Arboretum now stands as testimony to Leopold's vision, here embodied in a down-to-earth, yet subtle and uncompromisingly perfectionist approach to the restoration of damaged landscapes.

As Leopold predicted, it has taken fifty years to heal the land, and there is still much to do. You have been extraordinarily lucky in attracting the best people to do the job — people not only rigorous in their science but broad in their knowledge and attitude toward the task. If it was Leopold's ideas that influenced those who founded the Arboretum, it was John T. Curtis and Henry C. Greene who implemented these ideas, and in so doing, secured a place for the Arboretum in the history of plant ecology. A tradition of excellence has been set, and is extended into our own time through the work of Grant Cottam, through the limnological research carried out as part of the International Biological Program, and through the multitude of projects that continue in the Arboretum today.

The key to the remarkable level of success achieved has been the holistic approach that has been adopted. This is notably exemplified by the restoration of the prairies. That project itself is of great interest to me, for these communities, with their immense number of species and intricate spatial and temporal patterns, bear interesting analogy with tropical rain forests, whose community structure I have been studying now for more than twenty-five years. The work at Madison has done

Development

Digging plants near the Wisconsin River. Supervisor Ted Sperry, right

much to explain the subtle interactions, often at the species level, which determine the composition of a community and its persistence in time. This has been done by the method, novel at the time, of rebuilding communities from scratch, on the basis of meticulous historical research and many years of empirical experience. As a consequence of these celebrated experiments, solutions have been found to the problems that are encountered in attempts to establish a sustainable community in an alien habitat, and on soils irreversibly altered through injudicious farming practices. By the same token, we now have more understanding of why it is that exotic species so infrequently (though there are exceptions) succeed in invading natural vegetation.

The importance of an understanding of limiting factors in community management, and specifically the use of fire in the maintenance of prairies, was not itself a new discovery. The plains Indians had, of course, developed the technique from empirical experience over centuries prior to the arrival of settlers. As far as I am aware though, the first person to use fire as a management tool in the western scientific tradition was H. Slade, a forester in Burma in the 1890s who learned through experiment that fire was essential in the maintenance of tak stands. He in turn was fired for his heresy, and it took fifty years before his discovery became generally accepted in forest management and became recognized as far afield as the loblolly forests of Georgia. Nor was the value of careful monitoring of individual plants within communities over prolonged periods, important though this is, first demonstrated at Madison. My own former instructor in plant ecology, A.S. Watt, established permanent plots and enclosures in acid grassland in eastern England more than fifty years ago, and has followed patterns of change within them ever since.

Rather, then, the prairie experiments here at Wisconsin have shown the importance of integrating pure and applied science, and careful studies at varying scales of space and time, as a means to design and implement management systems aimed at sustaining particular communities. This work has provided incontrovertible proof of the necessity for active management of natural areas, a concept which remains inadequately recognized and is still deemed treasonous among some whose experience of the natural world does not extend to practical management levels.

Above all, the research associated with the restoration of natural communities in this Arboretum has provided a compelling case for long-term studies in biology, and for the value of sites where permanent control, and thus consistent management, can be assumed for research.

In fact, totally novel ideas are exceptionally rare. Rather, science progresses through the serendipitous convergence of advances in different fields, and through the ingenious transfer of established techniques from one field of endeavor into another. As a personal example, you may be surprised to hear that, were it not for J.T. Curtis and the so-called Madison school of plant ecology, it is unlikely that I would be standing before you this afternoon. As an ambitious, but chronically ingenuous, young graduate student in the distant isolation of the Sultanate of Brunei in Borneo, I undertook a

A CCC prairie watering detail did battle with the hottest summer on record — 1936

gargantuan plot survey aimed at establishing interrelationships between soil and species composition in a tropical rain forest. Thirty thousand trees were counted and mapped, and identified as belonging to nearly eight hundred species. I returned to England elated but tremulous, for I had not the first idea how I was to bring order out of this mountain of undisciplined data. Fortunately, providence came to my aid. Within weeks of my return a paper was published which was to become a classic: J.R. Bray and J.T. Curtis' "Ordination of Upland Forest Communities in Southern Wisconsin." I read that paper with the excitement of a discoverer of buried treasure, and immediately set to work cranking a manual calculator eighteen hours a day for three weeks. The result was the first demonstration of a method that could analyze floristic variation within the most complex plant communities on earth, and a spectacular vindication of the first method of multidimensional ordination, a method which still remains among the most robust that has been devised.

I am fascinated to read the history of attempts to drain the wetlands surrounding Lake Wingra, and the consequent, and largely unpredicted, effects these attempts have had on hydrology and vegetation. Here, too, the Arboretum provided the opportunity to carefully monitor change, and to experiment with restorative methods over prolonged periods. The general and widespread detrimental effects of draining wetlands is by now well known, but here again there is still much to be learned. An area of particular concern to me, as director of an urban arboretum, is the effect of housing development and the accompanying diversion or confinement of streams in culverts on the hydrology of the adjacent landscape. We are seeing indirect, long-term effects on soil water, humification and surface compaction, to the detriment of our urban parks and woodlands. You at Madison have the resource, the intellectual leadership, and the experience with large scale experimental manipulation of the landscape and its vegetation cover to carry out rigorous studies aimed at resolving these important practical problems.

I cite these examples to emphasize the universality of so many of the processes within plant communities, and hence the general value of local research.

The forests and forest biologists of Wisconsin have helped us, for

CCC enrollee with root of prairie dock, 1939. A dream of a thousand acres of silphiums

example, to manage the forests of darkest Borneo. I am wondering if Borneo can bring light to Wisconsin. Specifically, I am intrigued by descriptions I have read concerning the stand structure and distribution of your oak, and maple-beech-basswood forests. The former occur on drier, the latter on moister valley sites. In Borneo, just as in your Arboretum, the bottomlands and other well-watered sites support a magnificent — in the case of Borneo, a primeval — forest of giant trees whose dense crowns shelter a spacious, open subcanopy, but preclude the regeneration of all but their own shade-tolerant seedlings. In Borneo, our twenty-year studies of mapped and tagged trees, emulating the Wisconsin example, have shown the valley forests to have a lower production rate than the thrifty forests on drier less fertile sites. This was not anticipated, but is, I now suspect, a general phenomenon in climax forest communities. Is this your experience too? The implication, that forest succession on the best sites eventually leads to a substantial decline in potential productivity, is clearly important for those who wish to manage for timber as well as for wildlife conservation.

I also mention these examples as an indication of future potential. The work you have undertaken here at the University of Wisconsin Arboretum can provide an example for others to follow worldwide. Graduates of this university are obtaining a training, based on accumulated recorded experience of the plant communities within your Arboretum, which is gaining in value every year. Because this work has worldwide applicability, your students must be encouraged to think big, for their developing skills are at a premium in a world where man is so often in disequilibrium with nature.

Early prairie burning experiments, Aldo Leopold second from left — mid-1940s

It is particularly refreshing, too, to see a university institution that is planning for the future by supporting a dynamic program for children. We have been through a period when the importance of that discipline which comes from careful observation in natural history has been undervalued. This discipline must come through love, and you have here an extraordinary resource for kindling the love of nature in the young. Children see nature in ways both different from, and refreshing to, their parents. When I lived with my family in Borneo, my wife and I often used to take walks with our three young children in a rain forest near our home. I would always be staring up at the branches overhead, in search of flowers or fruits, or watching the behaviour of pollinators and frugivores. Constantly, though, the children would tug me away to observe bizarre fungi, a giant millipede, or the delicate filigree of a fallen leaf reduced to its vascular skeleton. These astute observations of detail lead on, through the sharpening of curiosity, to that enthusiasm and relentless need for the right answer that make a good scientist — and a fearless defender of our way of life.

To me, horticultural plantings such as the Longenecker Gardens act as a stimulant to such curiosity for the adult public as well as the young. More particularly, they provide a familiar introduction to nature for the city dweller, who may at first be comfortable only with tamed nature. The gardens also provide a facility for evaluating and improving through breeding new plants for our gardens, city streets and parks. The nursery industry, captive to popular demand, has over the decades excelled in the breeding of lurid monsters, scentless as plastic tulips, to jar the eyes with their clashing "riot of color." It is shocking that we allow our young to view such obscenity! Here, in a more independent setting, you can instead concentrate on ameliorating the ever-present problems of disease resistance. As important, though still underemphasized by horticulturists, you can breed plants to encourage wildlife in our cities: butterflies and moths require scented flowers, and birds need mellow fruitfulness.

It is our responsibility to bring to our children, as a right, a sense of wonder at the beauty of the natural world, and an intolerance for the shabbiness and ugliness of much of the world that we are creating.

These childhood experiences are indelible. This contribution may in the end be the most lasting that you will make. ■

Peter Shaw Ashton is the director of Harvard University's Arnold Arboretum.

CCC camp — the barracks during one of the long winters of the 1930s

Progress Reports

The Plant Communities

by Grant Cottam

You have heard the words Aldo Leopold spoke at the dedication of the Arboretum fifty years ago. His plan was to turn these acres into an example of what Dane County looked like before the coming of European civilization. It was a grand plan, a stroke of genius. But Leopold showed remarkable insight in describing the difficulties of this endeavor, though even he underestimated its complexities. Even the most astute biologist could not foresee all the problems, and the Arboretum Committee was well supplied with astute biologists, notably Leopold, Norman Fassett and, later, John T. Curtis. These men were giants in their fields. They enjoyed excellent reputations at the time they were working, and even now, a quarter of a century after the last of them died, they are still viewed with reverence and awe. The science of ecology was still in its infancy in 1934, and, while it was relatively easy to decide what communities should be represented, it was impossible to say exactly what plants and animals these communities should include. The classic studies of Wisconsin's vegetation carried out by Curtis and his students were, therefore, a critical first step in development of the Arboretum. And as data from these studies accumulated, Curtis used this information in establishing the Arboretum. Yet today that job is

The lilac beds shortly after planting began in 1935

Tree planting by muscle power — late 1930s

still far from complete. Leopold estimated that it would take fifty years to accomplish the task, and here we are — fifty years later. In this case, Leopold, astute though he was, was off on his timing. Far closer to the truth, so far as the time it takes to establish a prairie, was the man who actually directed the work, Dr. Theodore Sperry. His guess was, "roughly... a thousand years."

So we are not yet finished. In fact, there are some communities where we have barely begun. But this year is a milestone, and it is time to evaluate our progress. There have been some outstanding successes, some partial successes, and some near failures. Even the communities already present in the Arboretum at the time of its establishment have had to adjust to the various pressures generated by increasing urbanization of surrounding areas, and not all of these are in as good condition as they were forty years ago. What follows is an assessment of the success we have enjoyed. It is a subjective evaluation. Other people would make a different assessment.

The Arboretum's most outstanding success in community establishment has been its prairies. When we have a good summer the big bluestem grass is 10 feet high, the baptisia tremendous, and dozens of other species delight the eye. Unfortunately, there are problems. Some of the weeds are doing wonderfully, too — especially the sweet clovers. This last unhappy fact points up the

The outdoor laboratory

Wingra Woods in the 1950s

most serious management problem still existing on our prairies: Curtis Prairie was a pasture before it was established; Greene Prairie was a cornfield. Both contained a rich endowment of agricultural weeds, and it has been much more difficult to get rid of the weeds than it has been to establish the prairie species. The result has been that these prairies are richer in species than almost any other area in Wisconsin. Most of the appropriate prairie plants are there. But most of the weeds are also still there, and the most widely distributed plant on the prairies is still Kentucky bluegrass. This nonnative appears to be perfectly at home in the prairies, not only in the Arboretum prairies, but in prairies all over the country — and there appears to be little hope of eradicating it.

There seems to be more hope of reducing the importance of sweet clover. Being a biennial, sweet clover lives only two years, producing seed the second year, and, since germination of its seeds is stimulated by fire, our practice of burning our prairies every other year may well have encouraged its propagation. Arboretum Ecologist Virginia Kline's experiment to determine the effect of several burning and mowing schedules on the success of the sweet clover and the vigor of prairie species has produced encouraging signs that some of the treatments are going to work. Wild parsnip and leafy spurge are two other serious weeds in our prairies, and no easy way of controlling them has yet been found. But in spite of these problems, the prairies are magnificent.

Wingra Woods — especially its northern part, facing Lake Wingra — has presented different problems. Since this was originally a natural forest growing in its proper climate, one might think it would have required no management. But at the time of its acquisition, this woods was pastured and consisted of the great red oaks and an understory of Kentucky bluegrass. It had been burned every spring to "green up" the grass for the cows, and the only natural thing about it was the trees. After the grazing and the fires stopped, there was rapid development of the understory. A great variety of shrubs — including a hybrid honeysuckle (*Lonicera X bella*) — appeared. The Arboretum Committee decided, since there were practically no tree seedlings and saplings in this woods, to give Mother Nature a boost and provide them. They decided to develop the north slope into a maple-beech-yellow birch-hemlock forest, which is a northern Wisconsin type.

The hemlocks have presented us with an interesting puzzle. They were planted as foot-tall seedlings, enclosed in wire cages to keep rabbits away, and all seemed to be well. Only they didn't grow. For ten years they just sat there. We seemed to have developed a natural bonsai hemlock. Then, about the middle of the 1960s, they took off, and now some of them are 20 feet tall and doing very well indeed. Overall, the planted trees, some of which are now fairly large, have completely changed the shrub layer in Wingra Woods. Their dense shade has killed the honeysuckles and most of the native shrubs as well. The herbaceous plants are mostly mesic forest species, and when the red oaks finally die, it looks as though we are going to have exactly the kind of forest the Arboretum Committee originally intended to create.

The Leopold Pine Forest has been considered one of the more successful Arboretum endeavors, but its resemblance to a northern pine forest is due almost entirely to the success of the pine trees. This forest was started in 1933 to represent the drier forests of northern Wisconsin, and there is no doubt that some of the pines succeeded. But attempts to develop an understory appropriate to a pine forest have met with little success. Numerous trips to the north were made, and truckloads of herbs and shrubs were brought in, but few of them became well established in the pines. There are a few exceptions. In areas where the overstory was removed and fences were erected for protection from animals, the understory plants did fairly well. And there are a few places outside these exclosures where a semblance of a normal understory exists. Former Arboretum Director Roger Anderson studied one of the plants typical of the pine forest understory, the starflower (*Trientalis borealis*), and concluded that moisture supply during the summer was probably the most important factor limiting its spread in the pines.

The original plan had been to plant the pines in an irregular pattern so that some of them would eventually shade out the smaller, more crowded ones, accomplishing a natural thinning. The pines were actually planted fairly regularly, however, and little natural thinning occurred as they grew. As a result, some of the

trees became severely overcrowded and unhealthy. The drought of 1976 resulted in very high mortality in many parts of the forest. Dr. Kline, with the help of the DNR forester, has marked over half of the existing trees for removal, and this thinning has been accomplished on about six acres of the fifty acres planted in the Leopold Pines and the Grady Tract. The thinning was very successful and completion of this task is imperative.

The northern lowland forests have not received the attention the upland forests have received, and success in establishing these communities has not been very great. The tamarack plantings have been most successful. These trees seem to transplant easily, and some fairly large ones were brought in and have grown well. Black spruce and white cedar have also been planted and are surviving. But no ecologist would claim that we have anything resembling real northern lowland forest communities in the Arboretum. The white cedar community looks like a deer yard, but probably the biggest disaster has been around Teal Pond, where a taxonomic error resulted in the planting of European alder (*Alnus glutinosa*) instead of the native species (*A. rugosa*). European alder grows very rapidly and gets much larger than the native alder. It also sprouts prolifically when cut, so that attempts to eradicate it have only resulted in a large increase in the number of stems. The fact that our most noxious woody weeds, the hybrid honeysuckle and buckthorn, thrive on moist sites adds to the problem, and large areas of the Arboretum have an almost impenetrable thicket of honeysuckle or buckthorn.

The juniper knoll just south of Gallistel Woods has also presented difficulties. Before the junipers were planted, a large amount of sand was deposited on this site in an attempt to provide the dry, nutrient-poor environment characteristic of juniper knolls. This has not been entirely successful, however, with the result that, while the junipers are doing well, many other plants are too, and the knoll has been overrun by unwanted species. Several Friends work parties have materially improved this situation. Fire management here would be difficult because of the flammability of the junipers.

Two probably overambitious attempts were made to establish in the Arboretum plant communities not native to Wisconsin. The first of these is the Ohio Valley hardwood planting in the southern part of Gallistel Woods. This was intended to represent the wet-mesic forests that grow farther south, and plantings of magnolia, sassafras, tulip tree, and a number of small trees and shrubs, including flowering dogwood and redbud, were made there. So far, the results have been disappointing. Many of the species have managed to survive, but have so far failed to establish an authentic sample of the Ohio Valley hardwood forest. It has been suggested that these nonnative species might do better if the oaks that tower over them were judiciously thinned. But the idea of destroying good native species in order to encourage a nonnative community is not an altogether attractive one.

The other nonnative community is even farther away from home here. This is the Rocky Mountain forest complex on the Grady Tract. Plans exist for developing a series of communities ranging from the very dry pinyon-juniper to the fairly mesic spruce-fir and lodgepole pine communities. The most successful of these plantings has been the ponderosa pines, and there are those who say it has been too successful because the pines are starting to block a very nice view of the city of Madison. The Douglas fir forest has been less successful, and many of the components of this forest complex have never been planted. In view of our notable lack of success in establishing an understory in the Leopold Pines, it would appear that it would be easier to move the Arboretum to Colorado than to establish a Rocky Mountain forest in Wisconsin.

The native communities that existed here when the Arboretum was established have also had their share of problems. The wooded areas have suffered the invasion of some weedy species, notably the ubiquitous honeysuckle and buckthorn (*Rhamnus cathartica*). Noe Woods is in the best shape, but its maintenance has required a lot of effort spent eradicating the honeysuckle and some Norway maples that managed to get established there. The sandy slopes above the Greene Prairie formerly supported an oak opening. This opening is now much smaller because the numerous young oaks there quickly became small trees after grazing stopped following acquisition of the land, and also because of a 1954 fire, which destroyed many of the large trees but apparently stimulated the

young ones. At present, most of the savanna oaks have died of oak wilt, and the center of the woods is a tangle of honeysuckle, blackberry, and thirty-year-old oaks. The most successful management tool in this kind of community is fire, but managing a forest with fire when the forest is adjacent to a residential development will require meticulous preparation. Another partial solution is the use of biological control. The oak wilt fungus that killed the large trees doesn't normally infect the small ones, but it will kill them if the young trees are properly and deliberately inoculated. Dr. Kline has used this technique on the Grady knoll, and has exterminated 10,000 oaks. The process is

Curtis Prairie about 1955

expensive in time and money, and by itself will not restore the savanna. Our experience in the Grady Tract oaks makes an important point: in the maintenance of plant communities, protection from disturbance alone is not enough. All communities have to be actively managed if they are to be maintained.

The marsh areas also are changing. Most important is Wingra Fen, a small area west of Wingra Woods. Fens are relatively rare communities, and this one was very nice, containing hundreds of small white ladyslippers (*Cypripedium candidum*). The problem here has been invasion by shrubs. For decades, mowing of the fen kept it open. But when the Arboretum acquired this property and the mowing stopped, the fen rapidly began to develop a shrubby cover and the orchids practically disappeared. Various combinations of burning and mowing have been tried to keep the fen open. One of the problems is that the old horse-drawn mowers could negotiate this wet area a lot better than our modern equipment can. A new buckthorn species, *Rhamnus frangula,* is also adding to our woes.

The general conclusion one must draw from a review of the successes and failures of the management efforts in our natural communities is that nothing comes easy. Biotic communities change from year to year, even from day to day in response to the weather, the interactions of the plants and animals they contain, and the disturbances imposed by too many people sometimes doing the wrong things. If there is such a thing as a perfect balance, it has not been achieved in the Arboretum. No one can expect these communities to stand still forever. Change is inevitable. The challenge now is to manage them with tender loving care as well as with a thorough knowledge of what they are and what they can become. ■

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Boreal forest

Animal Research

by Robert McCabe

Today we are indulging a retrospective look at the University Arboretum. As a benchmark we start with Aldo Leopold's ideas expressed in the summer of 1934 at the dedication of this outstanding appendage of our campus. I wonder whether we would be focusing on that presentation if *A Sand County Almanac* had not appeared to arouse the dormant environmentalists of the 1950s.

My assignment is to deal with the animal aspect of Arboretum activity. The earliest designation for the piece of geography on which we now stand was *University of Wisconsin Arboretum and Wildlife Refuge.* This was later, but not officially, reduced to *University Arboretum,* then to *Arboretum,* and finally in the vernacular to *The Arb.*

The wildlife program began during the CCC days when rabbits, woodcocks, waterfowl and songbirds were studied by an elite group among the camp corps guided by a staff biologist. I suspect it is easy to be an elitist in natural history when stone hauling and pond digging may be the major alternatives.

Unfortunately, many of the data gathered by the CCC boys never reached print. Most died in files marked "field study." I saw this crew in action only once, in 1939, but I was impressed with the skill and comprehension of these young men soon to become soldiers.

One cannot speak of Arboretum research, be it on plants or animals, without doffing one's hat to Charles Bunn, Professor of Law. He understood in the early 1940s that funds for research in natural resources were difficult to obtain from government in the face of the impending holocaust. He privately and without fanfare created a fund that made possible studies on plants and animals that were supported in no other way.

Among these early studies on animals was a fifteen-year investigation of the Arboretum pheasant population. Indeed there were two distinct populations in the early days of the Arboretum, one in the east marsh and one in the west marsh. The farmlands surrounding the Arboretum at that time helped to support these aggregations. The research showed that about 70 percent of the young born in any one year are lost by the second winter, that the average life span of a cock pheasant in an unhunted area is 1.5 years, and that the hens average 2.5 years.

A woodcock breeding population has been counted each spring for the past thirty-five years, both as a teaching and a research exercise. The average number of breeding birds per year is about eighteen. The areas used as display sites for male woodcocks change slowly, but are predominantly fen areas with scattered brush that tend to be invaded by undesirable exotic plants such as Tatarian honeysuckle and buckthorn.

For 16 years (1948-1963) the rabbits of the Arboretum were controlled and research data obtained by a hunting group that removed animals weekly during the winter months. The age ratio among the shot sample was roughly 75-80 percent young each year, indicating rapid population turnover. The number of animals taken was a function of population numbers and not of differential hunting pressure.

Deer have been recorded for the Arboretum for at least sixty years, but it was not until the 1960s that the number of deer became burdensome to the plant communities within the Arboretum. After experimenting with several removal schemes to reduce the herd, the current program of shooting and live capture has been effective in controlling deer numbers without eliminating all deer. Unless a protective fence discourages deer from entering the Arboretum, particularly from the southern border, the control program will continue to be necessary to protect desirable vegetation.

An outstanding single species monograph was based on research in the HoNeeUm Pond area. The American robin was the species involved. Several of the more interesting research findings were that there is apparently no relationship between nest success and nest density; the annual production of one pair is five or six young, and those young suffer 75 percent mortality before migrating.

Along McCaffrey Drive in the area where the road skirts Lake Wingra, there is a small cattail marsh. It is here that several projects on red-wing blackbirds have been undertaken.

In the Gardner Marsh area small mammal habitats were partitioned by metal barriers and the number of animals in the various compartments was regulated to examine the effects of population pressures. Similar populations of mice were studied in mechanically partitioned habitats in one of the old CCC barracks. In each case, in the field

as well as in the laboratory, excess numbers interfered with reproduction and survival.

Various songbirds have been subjects of long term investigation. These have included house wrens, tree swallows, willow flycatchers, and catbirds. In the latter case the pair relationships among individually marked birds showed that pair bonds often remained intact for long periods. In one case, for example, a female was mated with a male for six years. Also those pairs that returned to the Arboretum came to the same half of a 14-acre study site in the headquarters area. Some returned to the same bush used in the previous year or years.

During the early 1940s the Arboretum, in cooperation with the Illinois Natural Survey, conducted an experiment to bring back a breeding population of wood ducks to the Lake Wingra watershed. These ducks had not bred in the area for more than twenty years. The ducks transplanted were raised as ducklings at the Arboretum. The effort was successful, and today wood ducks are regular breeders in the Madison area. The first observation of a banded duck that was released at the Gorham Spring (Stevens Ponds) was in the center of the Arboretum. A banded female was later captured in the Forest Hill Cemetery.

As an ornithological base for bird study, an account of the *Avifauna of the Arboretum* was compiled in 1936 and is now used to assess changes in numbers and species of birds using the Arboretum.

A study of mink was conducted to learn something of mink numbers and mink behavior in the wild. Animals were live-trapped, marked and released. In the process a new nontag-nonmutilation method of marking was discovered. The stable, white pattern on the ventral pelage of this animal provided an individual marker. Drawings of these patterns served as absolute identification markings for mink that were recaptured. Male mink were found to have a winter range larger than habitat within the Arboretum, while the female had a range only about a tenth as large as the male's.

Some of the pioneer work on the censusing of songbirds was conducted at the Arboretum. These techniques have been incorporated in census methods now used throughout the United States.

In addition to bird and mammal studies, the ponds in Gardner Marsh were used as sites for fish research. Insect investigations have also taken place from time to time in the Arboretum.

The initial purpose of the Arboretum as I know it was to serve as a wildlife refuge as well as an arboretum. The arboretum concept was not to be a collection of exotic or cultivated plants, but an area in which examples of the native vegetation were to be restored and preserved in ecological units for research and education. A secondary hope was

Gardner Marsh

that these synthetic plant communities would also attract ecologically appropriate species of birds and mammals. This has not occurred extensively, largely because the communities are too small. I have, for example, a record of an upland plover (sandpiper) using the prairie briefly in one year only. In at least two years a clay-colored sparrow bred in the jackpine area, but no resident population resulted. In many cases there has been a decline in certain species as a result of our efforts to maintain the Arboretum. Bluebirds, tree swallows, willow flycatchers and catbirds are examples of birds that have declined. The Franklin's ground squirrel population that once thrived in the area of the McKay Center has disappeared. Only white-tailed deer have increased.

Human use and the take-over by exotic vegetation have regulated the animal use of the Arboretum far more than did the deliberate development of plant communities.

Expectation encourages prediction. The aggregate wisdom of the early Arboretum organizers predicted that we could learn still uncovered truths by having a land laboratory as part of our university facility. To some extent the expectation exceeded the results, but not totally. We did learn many things about plants and animals that made a contribution to science and to learning. If we can prevent deterioration of the laboriously created plant communities that are in fact the Arboretum, our children can be as proud fifty years from now as we are today. ■

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Longenecker Gardens

The Longenecker Horticultural Gardens

by Edward R. Hasselkus

The first lilac was planted on Good Friday 1935. This marked the beginning of the Arboretum's horticultural plantings for the display and testing of trees and shrubs for Wisconsin and midwestern conditions. Executive Director and Professor G. William Longenecker, landscape architect and horticulturist, designed and executed these plantings with special emphasis on lilacs. Funds for planting stock were generously supplied by the Madison Garden Club. During the '30s, the Civilian Conservation Corps constructed maintenance buildings, roads, stone walls and fences, and provided the labor for planting and maintaining the new plantings.

A flowering crabapple collection was begun in 1942 with the financial assistance of Madison's Westside Garden Club. Their support continues to the present.

Highlights of the '50s included the development of the viburnum collection along Manitou Way and the Shrub Display Garden. A master plan of the remainder of the horticultural gardens was prepared by Longenecker in 1957. He skillfully created pleasing vistas and a series of enclosed spaces intended to lure the visitor from one area into another. About the same time a young man named Eugene Moran began his career here at the Arboretum. He and his crews have worked diligently through the years to ensure the success of this venture. William G. McKay's bequests to the Arboretum and the Department of Horticulture not only provided a vital facility, but provides continuing support for the evaluation of landscape plants. Since 1954 we have participated in a USDA Regional Plant Introduction project in which more than 475 taxa of landscape plants have been cooperatively evaluated in twelve north-central states.

During the '60s the Tree Display area was developed. Among the first plantings was a collection of North American oaks received from the Michaux Quercetum of the Morris Arboretum in Philadelphia. The Autumn Purple white ash was introduced into the nursery industry by Longenecker. In June 1967, the horticultural plantings were dedicated as the G. William Longenecker Horticultural Gardens in honor of their creator.

Progress during the '70s included the development of the Pinetum and the construction of the McKay Center. Printed guides to the lilac, crabapple and viburnum collections were prepared by Ken Wood. All of the plants in the Longenecker Gardens were labelled with permanent record labels for the first time. An explosion of the Arboretum's deer population resulted in massive damage to valuable plants from browse and antler rubbing. John C. Van Camp, of Rockford, Illinois, made a significant contribution of trees and funds for the development of the Tree Display area. The Royal Botanical Garden, Hamilton, Ontario, helped update the "geriatric" lilac collection by providing rooted cuttings from their world famous collection. Students began to discover the Longenecker Gardens in larger numbers as enrollment soared in dendrology and landscape plants courses.

So far in the decade of the '80s, evaluations of the ground cover junipers and the potentillas have been published. Whitespire Japanese birch and Wisconsin creeping juniper have been introduced to the nursery industry as new cultivars.

As I look back over the past five decades, I feel we have reached or exceeded the visions of our founders. The Longenecker Horticultural Gardens has joined the ranks of the respected horticultural arboreta of North America. Longenecker's master plan assured that the plant collections provided all visitors with an esthetic experience, while at the same time providing the serious student or researcher with an educational opportunity.

In forty-nine years, the lilac plantings have grown to a total of more than 300 taxa — certainly one of the top lilac collections in North America. Though not the largest, the flowering crabapple collection is among the most up-to-date and the most studied in the United States. In the early years, planting stock was acquired from any convenient nursery source, with little or no knowledge

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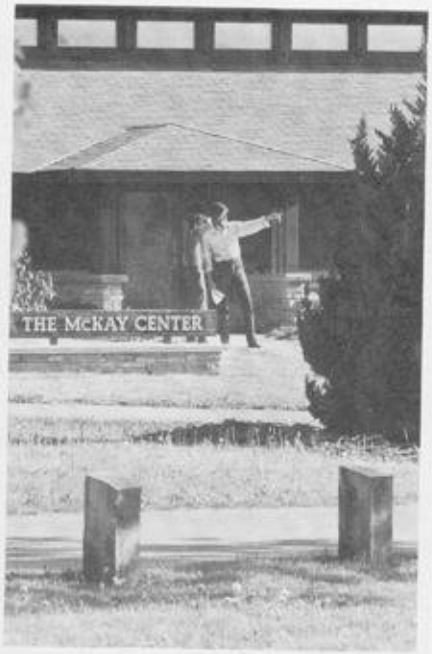
of its seed origin. More recently the Longenecker Gardens has been the beneficiary of plant explorations, both domestic and foreign, sponsored by the USDA and other arboreta and botanical gardens. The high priority placed on the accession of plants of documented origin will ensure that the collections of the Longenecker Horticultural Gardens are of scientific value to researchers both now and for the next fifty years. ■

McKay Center



A Perspective
The Arboretum at 50

by William R. Jordan III

I first read Professor Leopold's dedication address in 1977, shortly after beginning work here at the Arboretum, when I came across a copy in the UW Archives, and I have been thinking about it ever since. It seems to me that it is much more than a historic curiosity. It is a prophetic statement and a charter for the development of a new kind of enterprise — not just a new kind of arboretum, but a new way of thinking about and dealing with nature. I think it has major implications, not only for the Arboretum itself or the University of Wisconsin, but for technological societies everywhere. Yet recognition of this has been surprisingly slow in coming. Even today, it seems to me, its full import has not been fully grasped by scientists generally, by many environmentalists, or by the general public. For evidence of this you have only to consider that in all that has been written about Leopold during the last thirty-five years, no one has identified his participation in the development of the UW Arboretum and the ideas behind it as one of his most novel and far-reaching contributions to the modern conservation movement of which he was both prophet and pioneer.

The Arboretum, it seems, represented an idea that was far — perhaps too far — ahead of its time in 1934. Where did this idea come from? What did it mean to Leopold and his audience? And what does it mean to us as we look back over our first half century and look forward to our second?

It seems to me that some of the major influences that shaped the Arboretum's early course are obvious. The first was the great local interest early in this century in creating parks for the rapidly growing City of Madison. The first efforts to set the Arboretum land aside as open space were in fact aimed at creation of a park. While that effort failed, and the Arboretum is explicitly not a park today, this influence lives on in public use and appreciation of the Arboretum — and even more significantly in the powerful esthetic and historical motives that underlay the novel development plan for the Arboretum, so clearly evident in Professor Leopold's dedication address.

Nevertheless, the park movement is part of the prehistory of the Arboretum, not its history. The history began with the successful drive for the first acquisition of land in the early 1930s, the decade of dust and depression, and it seems clear in retrospect, if it was not clear then, that the Arboretum is a product of that time in several specific ways.

First, it was the low prices of the Depression era that made it possible to acquire land on the scale conceived by Michael Olbrich and Joseph Jackson, the early leaders of the project — largely with money provided by a few public-spirited benefactors such as Louis Gardner. Indeed, the acquisition of land for the Arboretum coincided almost exactly with the period of economic depression. It began in the very depths of the Depression in 1932, and was 95 percent complete by 1941. Far from being paradoxical, this reflected a national pattern, as farms failed due to economic hard times and

private land passed into public ownership.

So the land itself was a gift of the Depression. And so was the labor needed to develop it. Looking back it is clear that, despite their great energy and enthusiasm, the early leaders of the Arboretum project could not have realized their ambitious plans without the help of the Civilian Conservation Corps. The boys of CCC Company 2670 provided a labor force 200 strong from 1935 through 1941, and that made it possible to act on an idea that was ahead of its time and otherwise might have waited another fifty years for realization. This was the second gift of the Depression to the Arboretum. And these two circumstances — cheap land and free labor — make it clear why the Arboretum happened when it did, and why nothing quite like it has been carried out since on so large a scale.

Remarkable as this story is, however, it was neither the acquisition of land nor its physical development that distinguished the UW Arboretum from similar institutions elsewhere. What set this Arboretum apart was the idea behind it — the idea Professor Leopold outlined in his dedication address. And this too was in many ways clearly a reflection of the times, in this case not so much the economic hardship of the Depression as the related ecological disasters of the Dust Bowl and deforestation.

To the few environmentalists of the time, the droughts and catastrophic dust storms of the 1930s were unmistakable evidence that something had gone dramatically awry in the relationship between man and the environment in the heartland of the North American continent. While the epicenter of the dusted-out country was farther south and west in Kansas and Oklahoma, drought conditions prevailed in Wisconsin as well, and in fact one of the largest storms of the period swept across the upper Midwest in early May 1934, just five weeks before the dedication of the Arboretum.

At the same time a century of logging was coming to an end in the forested regions of the upper Great Lakes states, leaving much of northern Wisconsin an ecological wasteland, denuded of trees, economically depressed and visited by frequently catastrophic fires that burned through the slash left by the loggers.

Madison stood on an ecologically privileged isthmus between these two disaster areas, but it is clear that the novel plan for the Arboretum's development was at least in part an imaginative response to these conditions. Certainly the idea Leopold described in 1934 reflected the general thinking and preoccupations of the time. Indeed, the nation responded to the Dust Bowl and widespread deforestation with the creation of a variety of New Deal programs such as the Soil Conservation Service, the WPA, and the CCC. An underlying theme of all these early conservation programs was revegetation and the healing of degraded land. But it was apparently only here at the UW Arboretum that those committed to revegetation took on — in fact dreamed up for themselves — the added task of the actual restoration of authentic replicas of whole native *communities*.

And so, in a single bold and imaginative leap, inspired, we gather from Leopold's speech, by a complex mixture of scientific, environmental, historical, and esthetic considerations, we have the first systematic plan anywhere to put nature back together again — *whole*.

This was a new idea at the time, one that had been explored by only a few isolated people, like Elzeard Bouffier, of France. While it borrowed from a variety of pursuits ranging from horticulture and forestry to natural area management and landscape architecture, it was novel in its acceptance of the natural community as a model or objective, combined with a commitment to reach that objective by a deliberate, active, manipulative process borrowed essentially from agriculture.

Consider what this means. Shortly after Leopold gave his address a few UW students began the first experiments that led to restoration of tallgrass prairie on

Leopold pines

the old pasture south of the administration area. The process was unprepossessing, but remarkable in its implications nevertheless. For the first time since the dawn of agriculture 10,000 years ago, human beings were practicing a new kind of agriculture — an agriculture committed not to taking nature apart and simplifying it, but to putting it back together bit by bit and plant by plant. The result, Curtis Prairie, is spectacular to look at. But it is historically significant as the world's oldest scientifically restored ecological community — the result of one of the earliest attempts anywhere to replant precisely and systematically in imitation of nature.

This, I think, is a tremendous thing. Why has it not been more widely recognized?

It seems to me there are several reasons for this. One is simply that restoration is by nature inconspicuous. By design, the products of the restorationist's efforts resemble and blend into nature. They are easily overlooked or mistaken for natural communities. Then, too, there is a sense, only partly correct, that restoration is a nontechnology, and that what the restorationist does would be done anyway by nature alone — more slowly perhaps, but probably better.

At the same time, restoration has been slow to capture the imagination of environmentalists. Necessarily preoccupied with the need to preserve the natural landscape, they have tended to stress the fragility and irreplaceability of ecological communities, and to resist the suggestion that, with effort and skill, it is possible to restore some communities under certain conditions.

Finally, with some notable exceptions, ecologists have tended to prefer natural communities to restored ones as objects of research, though recently a number of eminent scientists have pointed to the great value of studying disturbed communities, and to the lessons that may be learned from the process of restoration itself. Fortunately, there are now signs of growing interest among ecologists in restoration as both a challenge and a research opportunity.

Whatever the reasons, this idea of the imitation of nature has been an inconspicuous one up to now, and it is only during the past couple of decades that it has begun to influence events off-campus, as it were, in industry, environmental planning and management, and so forth.

Now at last the implications of the ideas outlined by Professor Leopold in 1934 are beginning to be widely recognized, though few people recognize the Arboretum as the place of their origin and their earliest proving ground.

I think of these implications in several categories — practical, scientific or conceptual, and psychological or even religious.

Of these, the practical implications are the most obvious. The idea here — and Leopold himself made extensive use of the metaphor — is that restoration is the ecologist's version of healing — it is medicine practiced at the level of the community or the ecosystem rather than the organism. Obviously this is a matter of immense importance, and becomes even more so as the scars resulting from development and the exploitation of nature widen. The conspicuous example is mine reclamation. British Ecologist Anthony Bradshaw estimates that during the decade between 1965 and 1974 more than a million acres were newly disrupted by surface and strip mining in the United States alone. Ultimately, this will have to be reclaimed. And the development of practical, ecologically sophisticated restoration techniques is going to play a critical role in ensuring that at least some of this reclamation takes the form of high quality community restoration, exactly like that pioneered at the Arboretum during the past fifty years.

In a similar way, the Arboretum presents a model and a proving ground for environmental activities as diverse as landscape architecture, forestry, park and natural area management, and even some forms of agriculture. In all these areas the benefits of restoration in conservation of habitat, in preservation of rare species, and in savings of water and materials, and of energy in the form of labor, fuel, fertilizer and pesticides, are incalculable.

All this suggests the significance of what must have seemed a half century ago like an academic pastime, or a federal make-work project with little practical importance in the "real" world. In fact, the Arboretum idea was eminently practical from the beginning. Inspired partly by alarm at the consequences of environmental abuse, it was the response of Leopold and his colleagues to a real national emergency. For Leopold in particular, it was the other side — the more active and management-

oriented side — of the ideas he developed in *A Sand County Almanac,* written during the same years he was playing a leadership role in the development of the Arboretum. If in the *Almanac* Leopold would mourn the passing of the prairies, at the Arboretum he would participate in a pioneering attempt to bring back a bit of the prairie.

And what was truly practical and responsive then is, if anything, even more pertinent and practical today. The Dust Bowl, remember, is not over. The conditions that produced it still exist. The world's deserts are expanding. Deforestation has not ended, it has simply been exported from Wisconsin to Alaska and the great tropical rain forests. The need for environmental healing, urgent in 1934, has become even more so since. Furthermore, the conservation — even the preservation — of native communities requires active management based on ecological understanding. This must be the single greatest lesson of the Arboretum experiment so far. And it suggests an exciting future for our restoration and management research efforts.

To some extent, of course, the leadership in the development of restoration as an environmental technology has passed from the Arboretum to other organizations, notably the reclamation industry, during recent decades. Where we retain a position of preeminence, however, is in the development and refinement of techniques for the restoration and management of native communities of the highest ecological quality, and even more distinctively, in the development of restoration as a research technique, a task that challenges fundamental ideas about ecological communities and ecosystems, raising basic questions and providing opportunities for testing fundamental hypotheses about them.

This is an idea that was hinted at by both Leopold and John Curtis, and that in fact underlay much of Curtis' own work at the Arboretum during the 1940s and '50s. Recently it has taken the form of the idea of restoration ecology, which will be developed in detail at a symposium the Arboretum will sponsor this fall. The key idea here is that restoration is conceptually related to methods traditionally used in the laboratory to study the structure and dynamics of communities experimentally — even synthetically — by assembling them bit by bit. To the extent this linking of research traditions proves fruitful, this discussion will represent a step toward the development of restoration as both a science and an art of ecological healing.

Finally, it seems to me that restoration has psychological — even religious — implications that may well be its most significant and its profoundest contribution to the developing relationship between human beings and their environment. Environmental thinking has recently reflected a degree of polarization between two ways of thinking about and dealing with the environment. The first draws from a tradition of responsible stewardship of the land typified by Benedictine ideals of land management. The other emphasizes a more passive relationship, stressing awareness, appreciation, and letting things be, and has at times been identified as an attitude more in the Franciscan tradition.

The reason I find restoration, as pioneered at the Arboretum, so appealing, so healthy, and so promising a development in our relationship with nature is that it brings these two attitudes or sides of human nature into harmony. Like more traditional forms of agriculture, ecological restoration deals with nature by manipulating it, and is in this sense active and even aggressive in its relationship with nature. Unlike traditional agriculture, however, restoration does not manipulate arbitrarily, seeking to remodel nature in a fashion that prefigures machine production. Instead it accepts nature itself as a model and proceeds by attempting to imitate nature in the most meticulous and fullest sense.

This, it seems to me, places the restorationist in an extremely attractive position — active as a shaper of the landscape, and yet attentive to nature and receptive to its subtlest secrets and most intricate relationships.

The restorationist is in this sense, like an artist *and* a scientist, impelled to look closer, drawn into lively curiosity, drawn to test ideas by his or her commitment to the imitation of nature.

All this, it seems to me, is something momentous in the sometimes troubled history of our relationship with nature. All of it is there in this remarkable piece of writing by Aldo Leopold. The idea he outlined in 1934 has provided the basis for fifty exciting years at the Arboretum. And I think that it is becoming clear that it is good for another fifty years at the very least. ■

Some Key Events in the History of the Arboretum

1853 Scientist Increase Lapham calls for creation of an arboretum for the University of Wisconsin.

1911 Landscape Architect John Nolen proposes expansion of Vilas Park to the southern shore of Lake Wingra and development of a UW arboretum around University Bay.

1922 The Lake Forest Company declares bankruptcy, ending a decade-long attempt to develop the wetlands east of Lake Wingra.

1927 Attorney and UW Regent Michael Olbrich secures the Regents' approval for a plan to begin arboretum development around Lake Wingra.

1929 Olbrich dies, leaving the arboretum project to languish through the first two years of the Depression.

1931 Arboretum idea revived by Colonel Joseph W. Jackson.

1932 Acquisition of the first Arboretum land, the 245-acre Nelson farm in the area now occupied by the Longenecker Gardens, the administration area, and part of Curtis Prairie.

1933 Planting of Leopold Pines begun.
Aldo Leopold joins UW faculty as country's first professor of game management.

1934 Formal dedication in Nelson barn, Sunday, June 17.
Establishment of Wisconsin Emergency Relief Administration transient camp; construction of camp buildings begun near present-day administration area.

1935 First contingent of CCC workers arrives at Camp Madison.
Prairie restoration experiments begun on site of Curtis Prairie.
First lilacs planted in horticultural gardens.

1936 Acquisition of the east marsh made possible by funds provided by Louis Gardner.

1940-2 Land acquisitions, including purchase of the 200-acre Grady Tract, bring the Arboretum to 1100 acres, establishing nearly its present outline and size of 1280 acres.

1941 CCC camp closes in November, just weeks before Pearl Harbor.

1945-51 Botanist Henry Greene carries out early stages in restoration of Greene Prairie. Forest restoration work continues under supervision of John Curtis, with maple forest species underplanted in Wingra and Gallistel Woods.

1948 Publication of John Curtis and Max Partch's paper on the effects of fire on prairie vegetation, based on pioneering experiments on Curtis Prairie.
Aldo Leopold dies fighting a brush fire near his sand county farm.

1953 Walt Disney crew films burning of Curtis Prairie for documentary "The Vanishing Prairie."

1959 Publication of John Curtis' classic *Vegetation of Wisconsin,* based in part on work at the Arboretum.

1962 Friends of the Arboretum formed, carrying out an idea proposed by Curtis just before his death in 1961.

1966 Friends establish first formal tour program for the Arboretum.

1977 Opening of McKay Center marks Arboretum's growing awareness of its mission to the public.

1981 Arboretum launches *Restoration & Management Notes,* the first publication to deal exclusively with the restoration of high quality ecological communities.

Our First 50 Years

The University of Wisconsin-Madison Arboretum 1934-1984

A commemorative booklet

Publication of this booklet has been made possible by a gift in memory of Booth Lenore Courtenay.

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William R. Jordan III, Editor

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