

# NATIVE PLANT SOCIETY OF NORTHEASTERN OHIO

Founding Chapter Of

THE OHIO NATIVE PLANT SOCIETY

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*On the Fringe*

THE JOURNAL OF THE OHIO NATIVE PLANT SOCIETY

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**ANNUAL DINNER**  
**SATURDAY, NOVEMBER 5, 1988**

## PROGRAMS AND EVENTS:

**July 9 (Saturday) 10:00 a.m.** - Rockbridge Stage Nature Preserve - Summer wildflowers abound along the trails of this geologically significant preserve.

**July 16 (Saturday) 10:30 a.m.** - **Dayton** - A guided tour of the beautiful Cincinnati Nature Center. Reservations needed.

**July 23 (Saturday) 10:00 a.m.** - Clifton Gorge State Nature Preserve - "The Travels and Tribulations of Thuja Occidentalis:" how a community of plants migrated to Clifton Gorge and why they stay.

**July 23 (Saturday) 10:30 a.m.** - Adams Lake Prairie and Chapparral Prairie State Nature Preserve - Meet at Adams Lake Prairie on US 41 two miles north of West Union. Peak flowering period including Rattlesnake Master and Prairie Dock.

**July 24 (Sunday) 1:00 p.m.** - Conkle's Hollow State Nature Preserve - This preserve hosts a number of tree species that dwarf visitors to the Gorge.

**July 30-31 (Friday & Saturday)** Aullwood Nature Center - Ohio Prairie Conference.

**August 6 (Saturday) 10:00 a.m.** - Clifton Gorge State Nature Preserve - Exploring the World of Plants, a look at some of the rarer plants of the preserve.

**August 13 (Saturday) Cincinnati Chapter** - A tour of Adams County prairie. Call for information.

**August 13 (Saturday) 10:00 a.m.** - Conkle's Hollow State Nature Preserve - Conkle's Hollow is home to a large number of vibrant fern species that grace its trails and hillsides.

**August 13 (Saturday) 1:00 p.m.** - Prairie Road Fen State Nature Preserve - This hike in a closed scientific preserve will explore the unusual plants of the fen and why they survive there.

**August 14 (Sunday) 10:00 a.m.** - **Dayton** - Tour Adams County prairies with Jeff Knopp of the Nature Conservancy. Call for details.

**August 20 (Saturday) 9:30 a.m.** - **Cleveland Chapter** - We will tour Jackson Bog and Triangle Lake State Nature Preserve with Emliss Ricks. Some very interesting plants will be in bloom. Meet at Jackson Bog at 9:30 a.m.

**August 20 (Saturday) 10:00 a.m.** - Desonier State Nature Preserve - This preserve represents typical Appalachian foothill vegetation and topography.

**August 22 (Monday) 7:00 p.m.** - **Dayton Chapter** - Tour of Dayton's Prehistoric Indian Village emphasizing native plants.

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### **NATIVE PLANT SOCIETY 1988 SEED EXCHANGE by Tom Yates, Chairman**

The NEO Native Plant Society is now offering seeds and spores of native plants collected in the Myrtle S. Holden Wildflower Garden, Lantern Court native gardens and native sites within Northeastern Ohio.

Seed will be wild collected or from first generation local native plants in garden situations. The Seed Exchange will be unconventional in that we will not offer a list. Rather, collection will be based on demand generated by your requests. This will eliminate some problems inherent in "stockpiling" quantities of seed. You may assume that the basic "workhorse" flowers of our gardens will be stockpiled but requests for less common species will be supplied when available — you may have to wait a year for seed. Your committee will attempt to fill all requests with fresh seed from any native plant found in our area.

We would like persons who are truly interested in propagation and culture of our natives to make use of this service.

Please order by botanical name. Each species will be 25¢ per packet. A packet may contain 100 seeds or 3 seeds, depending upon availability and demand. Requests will be processed frequently ensuring high viability. Seeds with fleshy pulp will be shipped with pulp intact to prevent drying. Process these immediately.

Please limit your order to 10 selections during this experimental year. Requests for scientific or commercial use will be considered on a case by case basis.

Please make checks payable to: Native Plant Society and send a self-addressed, stamped, business size envelope. Make requests to: NPS Seed Exchange, Lantern Court, 9203 Kirtland-Chardon Road, Mentor, Ohio 44060.

Tom Yates is the naturalist and horticulturist at Lantern Court, Holden Arboretum.

## OHIO ENDANGERED PLANT LIST: 1988 Version by Robert McCance, Jr.

The fifth version of Ohio's official list of endangered and threatened plants was filed as a proposed Ohio administrative rule on April 28 and revised on May 26, 1988. A public hearing was held June 2, and the list will be formally adopted in early July. This new list represents all information collected between March 1986 and May 1988 on Ohio endangered, threatened, potentially threatened and presumed extirpated vascular plants.

Major changes within rarity status occurred, but there was relatively little change in actual number of species in each category. Where the 1986 had 177 endangered plants, the 1988 list shows 178, but there were 39 additions and 38 deletions in the endangered category. The 1986 list had 173 threatened plants and now shows 174 species, but there were 44 additions and 43 deletions. The potentially threatened list dropped from 197 species to 154 species, mostly as a result of 38 species being dropped from the inventory because it was determined that they were not in any danger in Ohio. The presumed extirpated list increased from 100 in 1986 to 110 in 1988, largely as a result of fifteen endangered plants going to presumed extirpated because no post-1968 populations could be located. The cutoff date between historical and current records was shifted from 1960 on the 1986 list, to 1968 on the 1988 list. We intend to maintain a 20-year cycle on the data age—if a rare plant occurrence has not been located or updated in 20 years, it will automatically shift to the historical file. This change affected 15 endangered plants as they were moved to the "x" category. All 15 were searched for in the previous two years without success. The shift also moved some threatened plants to the endangered category and potentially threatened plants to the threatened category.

Presumed extirpated plants that were rediscovered since the 1986 list was adopted include the following: *Aureolaria pedicularia* var. *pedicularia* (Woodland fern-leaf false foxglove, by Susan Munch), *Carex limosa* (Mud sedge, by Barb Andreas), *Carex disperma* (Two-seeded sedge, by Jim Bissell. This plant was not on the 1986 extirpated list but as a result of its discovery and subsequent research, an old herbarium record was located), *Euphorbia purpurea* (Glade spurge, by Jeff Knoop), *Fraxinus tomentosa* (Pumpkin ash, by Stanley Stine), *Heterantha reniformis* (Mud-plantain, by Allison Cusick and Marilyn Ortt), *Salix myricoides* (Blue-leaved willow, by Barb Andreas and Jeff Knoop) and Ohio's first federally endangered plant, *Trifolium stoloniferum* (Running Buffalo Clover, discovered independently by Duke Rankin and a group looking specifically for the plant—Allison Cusick, John Baird, Guy Denny, Susan Smith and Sabina Sulgrove). The discovery of Running Buffalo Clover in late May, 1988 resulted in the draft list being revised in order to add it to the state endangered list. Two populations are now known from Hamilton County and one from Clermont County as of June 1.

Plants newly discovered in Ohio and determined to be previously unknown elements of the native flora include *Podostemum ceratophyllum* (Riverweed, by Beverly Danielson), *Carex abscondita* (Southern leafy wood sedge, by Bill Carr), *Carex purpurifera* (Purple wood sedge, by Bill Carr and Allison Cusick), and *Poa*

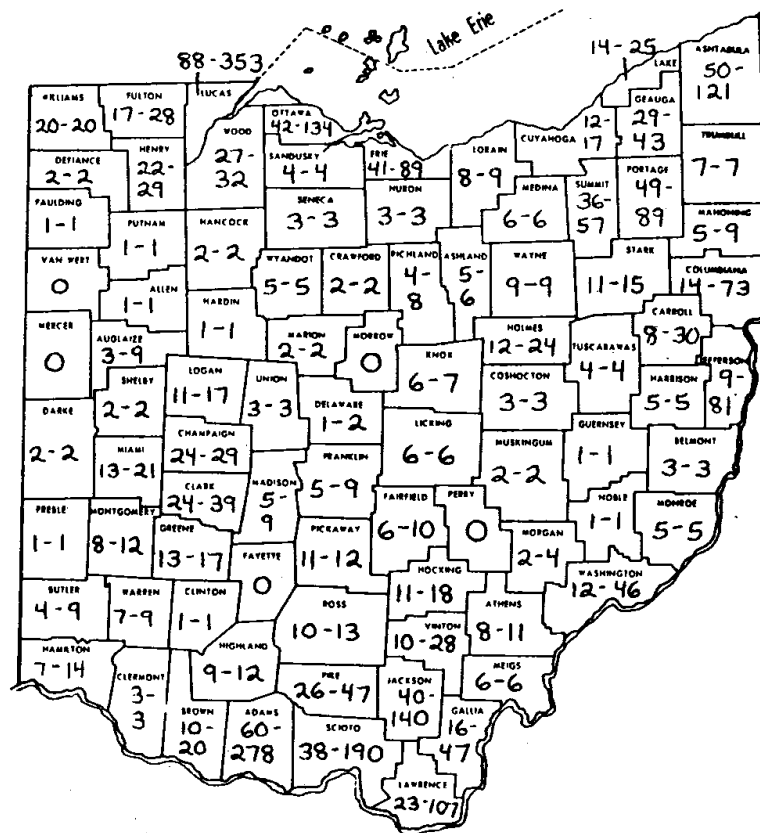
saltuensis (Pasture bluegrass, by Jim Bissell).

Copies of the new general distribution plant list should be available in late July and will be provided to everyone requesting a copy. Copies also will be distributed to Ohio Native Plant Society chapters for distribution to interested members.

Endangered and threatened plants are certainly not evenly distributed throughout Ohio. A total of 2,576 occurrences of the 352 endangered and threatened plants are on the 1988 list. There were 589 occurrences of the 178 endangered plants and 1987 occurrences of the 174 threatened plants. Lucas County leads with 353 occurrences of 88 species. Adams County has 278 occurrences of 60 species and Ashtabula County has 121 occurrences of 50 species. Five counties have no E & T plants—Fayette, Mercer, Morrow, Perry and Van Wert. Twenty-seven counties have no endangered plants and 22 counties have only one endangered plant. The map below shows the number of E & T species as the first number and the total number of occurrences of those species as the second number.

Bob McCance is the Administrator of the Ohio Natural Heritage Program, Division of Natural Areas and Preserves, ODNR.

## LOCATION OF COLLECTION AND SIGHT RECORDS



## RARE PLANT PROTECTION, CONSERVANCY STYLE by Larry E. Morse

"Find it, buy it, and put up a sign" could characterize The Nature Conservancy's earliest efforts at rare plant conservation. At first, our emphasis was on actual acquisition (by gift or purchase) of opportunistically selected acreage. Not until the state natural heritage inventory programs begin in 1974 did systematic identification of sites needing protection begin.

Today, heritage programs cover 47 states and form the National Natural Heritage Network, a repository of information on the status and location of the "elements of natural diversity" —the plant and animal species, communities of species, and other components of the biological landscape. Plant conservation at the Conservancy now starts with identifying and determining the preservation priority of these elements. Just as some chemical elements are abundant and others scarce, these biological units also can be categorized by their importance for conservation. The process involved, called "element ranking," has been developed jointly by the Conservancy and the natural heritage programs over the past several years.

Element ranking can be done at the global, national, and state levels. Basically, the method assigns a number on a one-to-five scale of priority, with 1 being the rarest and most imperiled, and 5 being the most abundant and secure. Global element ranks consider the species (or other element) over its entire global range, whether at a single site or on several continents. A given species, therefore, can have only a single global rank. Generally, a global rank is researched by a state heritage program or other parties familiar with the species in the wild. It is then reviewed by the scientific staff of the Conservancy's headquarters office and entered into the Conservancy's central scientific data bases. About 20,000 global ranks have been determined to date, primarily for vertebrates of the Western Hemisphere and for U.S. and Canadian vascular plants.

The "G1" global rank indicates the highest level of concern for a species. Typically, G1 species are those having five or fewer extant natural occurrences anywhere, or 1,000 or fewer mature individuals in their entire natural range. G1 species are so rare that they are seldom well-known to the general public. Examples include the Tiburon mariposa lily (***Calochortus tiburonensis***), known only from the Conservancy's Ring Mountain Preserve in California, and the Florida torreyia (***Torreya taxifolia***), known only from and near the Conservancy's Apalachicola Bluffs and Ravines Preserve in Florida.

At the end of the scale is the G5 rank, indicating a species that is abundant and secure over its total range, even if it is rare, disjunct, declining, or extirpated in some areas. Many familiar U.S. plants are ranked G5, such as white oak (***Quercus alba***), ponderosa pine (***Pinus ponderosa***), sagebrush (***Artemisia tridentata***), and prairie rose (***Rosa setigera***).

In the middle of this rather logarithmic scale is the G3, which might be termed "medium rare." These plants that have between 21 and 100 occurrences in their worldwide distribution or about 3,000 to 10,000 individuals, whichever is the more limiting factor. Some of our scarcer wildflowers are ranked G3, including the dwarf trillium (***Trillium pusillum***) and the California lady's-slipper (***Cypripedium californicum***).

Between the G1 and the G3 is the G2, for plants having from about six to 20 occurrences or between 1,000 and 3,000 individuals. G4 species are less imperiled than G3, yet of some long-term concern, usually because of a restricted geographical range or because of a low population density despite a broader distribution.

The national and state ranks operate on the same scale and definitions as the global ranks, with the exception that national ("N") ranks refer to the status of the species in a particular nation, and state ("S") ranks refer to the status in a given state. For example, the tulip tree (*Liriodendron tulipifera*) is abundant in the eastern and central United States, but barely ranges northward into Canada. Its global rank is G5, and its national rank for the U.S. is N5. However, its Canadian national rank is N3, reflecting its rarity there. Similar patterns can apply to state ranks: a plant ranked as S1 or S2 in Minnesota might be abundant (S5) in Montana.

The global and state ranks can be combined to present the state status of a species in a global context. A Species rare everywhere, perhaps G1 or G2, obviously cannot be abundant and secure in some portion of its range. Thus, a state rank can never be lower than the global rank. Patterns such as G2/S2 or G2/S1, and even G5/S1, are regularly encountered, while a G2/S5 would be logically impossible.

The G3/S3 pattern presents an interesting and generally unexpected consequence of the Conservancy's system of combined global and state ranks. These are plants that are somewhat common, at least locally, in a particular state, yet quite rare globally, perhaps occurring nowhere else. For example, dozens of plant species of such habitats as the New Jersey pine barrens, the Appalachian shale barrens, and the Great Lakes shorelines are ranked G3/S3, making them moderately high protection priorities in those states where they are doing their best.

By ranking elements on the basis of their rarity, globally and state-by-state, the Conservancy creates lists of species in order of their need for protection. Such lists become a powerful conservation agenda, indicating which species require the most attention. However, without specific information on the sites where these plants actually occur, none of the Conservancy's protection tools can be applied to the species in jeopardy. The state natural heritage inventories are the usual source of data on the occurrence of such species and on the knowledge of what grows where. These places are then correlated with actual land ownerships.

Next, what the Conservancy calls "natural diversity scorecards" are developed for each state and revised annually to set the overall protection agenda for each Conservancy field office. The scorecards present the elements (plants, animals, and natural communities) in priority sequence by their global and state ranks and lists the significant sites known in the state for each element as well as the status of the



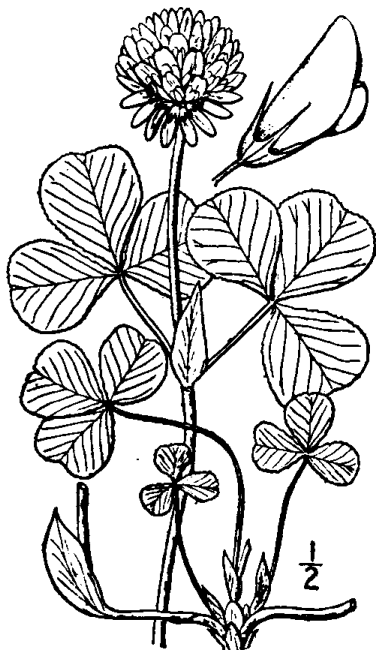
1. *Aconitum noveboracense* Gray. New York Monkshood.

elements' occurrences at each of those areas. For every priority conservation site, the field office then itemizes the actual tracts of land to which protection might be directed. In effect, scorecards enable the Conservancy to select the best sites for protecting the most important species.

These lists of priority species also are used in planning further fieldwork. Most interesting, of course, are species for which no current sites are known. For example, the running buffalo clover (*Trifolium stoloniferum*), which once ranged from West Virginia to Kansas, hadn't been seen anywhere since 1940 until Rodney Bartgis of West Virginia located two tiny stands of the plant in 1983. Reranked G1, this species was still eagerly sought elsewhere. Success came recently to Marc Evans of the Kentucky Heritage Program and to Jim Aldrich and Mike Homoya of the Indiana Heritage Program when they found America's rarest native clover in their respective states in June, 1987. Protection of these newly found occurrences is already being negotiated, and samples for agricultural experimentation were also cautiously obtained.

In creating its first preserves, the Conservancy gave little attention to the question of a long-term preserve design, which considers not only the tract of land with the rare plants actually on it but also surrounding tracts that are important to the species' continued survival. Nor was attention given to whether or not the property supported the plant's entire population, a portion of it, or (in a few cases) none. These questions are now routinely addressed when selecting and designing preserves and are considered fundamental to the Conservancy's protection process.

For rare plants in particular, the acreages involved in habitat protection are often small. Many plant populations lie within a single owner's land, and negotiations are straightforward. However, when multiple tracts exist, protection usually proceeds in stages, with acquisition of key (usually central) tracts an early priority. In many cases, it takes a decade or more before all tracts at a site can be fully protected.



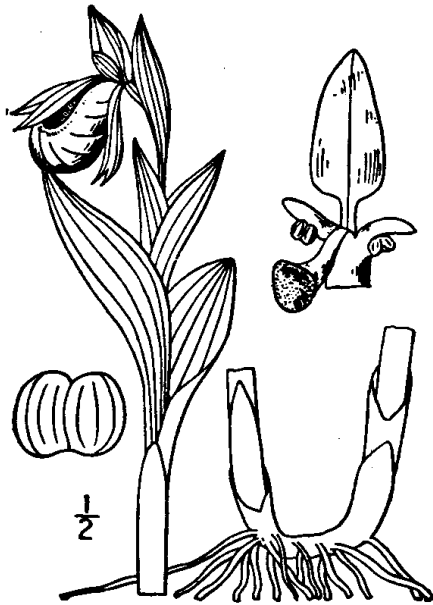
11. *Trifolium stoloniferum* Muhl. Running Buffalo Clover.

Registrations and other landowner-contact programs are becoming an increasingly important protection tool for The Nature Conservancy. Through these techniques, landowners learn of the Conservancy's interest in their properties and receive management recommendations from Conservancy field staff. In many instances, the Conservancy concludes that continued management by a present owner is satisfactory protection, and there is no need to pursue acquisition or other more expensive techniques. Registration, a formal but nonbinding acknowledgement of a site's significance, is sufficient for safeguarding the majority of rare plant sites. Furthermore, a landholder considering the sale of a registered tract is aware of the Conservancy's interest in the land and thus is likely to contact the Conservancy about the sale.

Registrations are especially powerful for protecting aquatic plants. Occurring in tidewater, or in a lake or riverbed, the plants themselves technically may be publicly owned but nonetheless are threatened by inappropriate development of privately held adjacent shorelines or riverbanks. Conservancy-secured registrations on such lands are protecting nationally rare aquatic species like the Maryland bur-marigold (*Bidens bidentoides*, G3/S3) on upper Chesapeake Bay shorelines in Maryland, the harperella (*Ptilimnium nodosum*, G2/S2) in a West Virginia creek, and the mat-forming waterhyssop (*Bacopa stragula*, G1/S1) along freshwater tidal shores of the Pamunkey, Mattaponi, and Chickahominy Rivers in southern Virginia.

A surprising proportion of the globally significant rare plants in the U.S. exist on publicly owned lands. State-owned areas also are important strongholds of rare flora in most parts of the country. Conservancy purchase of such lands as national parks is hardly likely, even when endemic plants are involved, yet we want to see that these plants receive appropriate habitat protection and management.

Merely growing on publicly owned land does not assure a rare plant's long-term survival. First, habitat changes, diseases, or other ecological factors may necessitate specific management to mitigate. Second, the plant may depend on a water supply or other resources outside the area's boundary, requiring management cooperation with an adjacent landowner. Third, some rare plants (such as cacti or orchids) are collected in large quantities, even in national parks, requiring law enforcement to protect them. Finally, the development and improvement of roads, trails, parking areas, and other visitor facilities can pose conflicts when the exact localities and importance of plant populations are not known to the land manager. For example, a stand of a G2-ranked orchid, the lesser whorled pogonia (*Isotria medeoloides*), was nearly destroyed in Georgia's Chattahoochee National Forest because its discoverer had kept the locality secret but was unaware of prospective development in the area until the Conservancy convinced the discoverer to let the Forest Service check its plans against the actual locations of the plants.



4. *Cyprispedium candidum* Willd. Small White Ladies'-slipper.

Special designations are used by some public land managers to indicate areas of ecological significance that need particular kinds of management. For instance, many of the U.S. Forest Service's Research Natural Areas (RNAs) protect rare plant habitats, as do a number of RNAs and Areas of Critical Environmental Concern (ACECs) designated by the Bureau of Land Management (BLM). In cooperation with the state heritage programs, The Nature Conservancy is working to bring sites that qualify as RNAs or ACECs to the attention of public land managers. Through this effort, hundreds of sites nationwide have been recommended to the U.S. Forest Service for specific designation as conservation areas. As an example, the Conservancy assisted the BLM with the designation of a 9,300-acre ACEC in Oregon that harbors four G1 plant species.



Related to public land protection is the frequent involvement of the heritage programs in environmental review, in which environmental impacts are assessed for proposed developments, improvements, and other activities requiring state or federal permits. For instance, minor adjustments to power line and highway alignments have protected many rare plant sites that might otherwise have been inadvertently lost.

The easiest short-term stewardship of a piece of land is simply to leave it alone. Nonetheless, to protect a specific rare plant, intervention may be desirable or even essential. This process of planning management activities species by species, community by community, is now standard practice at the Conservancy, with the adequacy or appropriateness of a stewardship action being determined by its effect on the long-term maintenance of the most important species, communities, and other natural features for which the preserve is maintained.

Ecological succession at a protected site can lead to loss of the particular opening, prairie, or other niche essential to a rare plant. Although windstorms, fires, and natural herbivores can create new openings that a rare plant may eventually exploit, most of our preserves are far too small to depend on natural processes alone to maintain the habitat mosaic in which rare plants occur. Therefore, many of the Conservancy's stewardship practices focus, in effect, on retarding succession through deliberate burning, mowing, or grazing of the vegetation competing with the site's priority plants.

Another unnatural factor in most Conservancy preserves (as well as in most of the American landscape generally) is the presence of "exotic" or non-native species. Many of these introduced plants and animals lack the pests, predators, diseases, and other factors that stabilized them in their native lands and behave here as aggressive invaders that are difficult to control and nearly impossible to eradicate from a preserve. Nevertheless, their small-scale local removal may be essential to the survival of a particular rare plant.

On a few occasions, direct intervention in stabilizing or restoring a depleted local plant population is necessary. The species biology and life history of most rare plants are little known, so cautious experimentation is usually needed before techniques are adopted on a large scale. The Conservancy cooperates with professional horticulturists in these cases, especially those at botanical gardens and arboreta affiliated with the Center for Plant Conservation. Results, here, can be measured only in decades if not centuries.

Legal listing of species as endangered or threatened under state or federal law can help in stewardship, particularly for plants that are directly exploited and for those that depend on wetlands, groundwater seeps, or other delicate habitats that cannot be strongly protected in their entirety. The Conservancy and the heritage programs work closely with the state and federal officials who determine species for these official lists.

The Nature Conservancy, in cooperation with the state natural heritage inventories, has become the acknowledged leader in the identification, protection, and stewardship of rare plants in the United States. All told, the Conservancy has protected about 500 U.S. sites including a total of more than 1,000 occurrences of globally rare plants (G3 and higher). With the addition of registry programs and public

lands protection planning to the Conservancy's continuing land acquisitions, the number of rare plant species protected with Conservancy help is growing rapidly.

To the north the Conservancy is cooperating with the Nature Conservancy of Canada with the intent of establishing heritage-style inventories in the provinces. For plants, the first cycle of ranking is well under way as a joint project with the National Museum of Natural Sciences in Ottawa. To the south, in Latin America and the Caribbean, Conservation Data Centers drawing on the heritage methodology are helping set conservation objectives in several nations.

Inventory and protection, like stewardship, are ongoing activities. If significant new stands of a rare plant are discovered, protection opportunities increase. If many more are found, its priority will drop. On the other hand, if sites are lost or destroyed, the priority of a species will increase, focusing greater attention on its remaining stands. The continual revision of these inventory, protection, and stewardship priorities is one of the major values of the Conservancy/heritage partnership.

**Dr. Larry E. Morse** serves as The Nature Conservancy's chief botanist and as director of scientific data bases. He will be the Annual Dinner speaker in Nov. 1989.

This article is a reprint from **The Nature Conservancy Magazine**, November/December 1987.

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### LIST OF GLOBALLY AND FEDERALLY ENDANGERED SPECIES IN OHIO

G-3	<i>Aconitum noveboracense</i>	Northern Monkshood
G-3	<i>Asplenium bradleyi</i>	Bradley's Spleenwort
G-2/C-2	<i>Agalinus auriculata</i>	Ear-leaved Foxglove
G-3	<i>Besseya bullii</i>	Kitten Tail's
G-3/C-2	<i>Cirsium hillii</i>	Hill's Pasture Thistle
G-2 or G-3	<i>Collinsonia verticillata</i>	Early Stoneroot
G-3/C-3	<i>Cypripedium candidum</i>	White Lady's-Slipper
G-3	<i>Delphinium exaltatum</i>	Tall Larkspur
G-2/C-2	<i>Euphorbea purpurea</i>	Glade Spurge
G-3	<i>Heuchera parviflora</i>	Small-flowered Alumroot
G-3	<i>Napaea dioica</i>	Glade Mallow
G-2/C-2	<i>Pachistima canbyi</i>	Canby's Mountain Lover
G-3/C-2	<i>Plantago cordata</i>	Heart-leaved Plantain
G-2/C-2	<i>Plantanthera leucophaea</i>	Prairie White-fringed Orchid
G-1/C-2	<i>Poa paludigena</i>	Bog Blue Grass
G-3/C-3	<i>Potamogeton hillii</i>	Hill's Pondweed
G-3	<i>Potamogeton tennesseensis</i>	Tennessee Pondweed
G-3/C-3	<i>Sida hermaphrodita</i>	Virginia Mallow
G-3/C-2	<i>Silene regia</i>	Royal Catchfly
G-3	<i>Synandra hispidula</i>	Synandra
G-1	<i>Trifolium stoloniferum</i>	Running Buffalo Clover

The explanation for the categories can be found in Morse's article except read N (national) for C.

## WATCH OUT FOR THE TICK ATTACK

In the summer and fall of 1975, a group of children living in Lyme, Conn., developed painful symptoms of arthritis. Alarmed parents reported the cases to the Connecticut State Health Dept., which asked Dr. Allen Steere of Yale University Medical School to investigate.

Steere and his co-workers made a striking finding. Thirty-nine children in Lyme and two nearby towns had been diagnosed as having juvenile rheumatoid arthritis—more than 100 times the normal incidence for the size of the population. Twelve adults had also recently developed a form of inflammatory arthritis. The cases were curiously bunched, with most victims living in heavily wooded areas.

In 1976, Steere announced the discovery of a new disease, which he dubbed "Lyme arthritis." He and his team then showed that the disease was transmitted by the deer tick, **Ixodes dammini**. Not until 1982 did researchers discover that the infectious agent was a spirochete, a corkscrew-shaped microbe.

What began as a local curiosity has grown into a national and worldwide problem. Lyme disease has now been reported in 32 states and on five different continents. In 1984, it surpassed Rocky Mountain, spotted fever as this country's most common tick-borne disease.

### The Trail of Infection

In the Northeast, where most Lyme-disease cases occur, an unlikely trio is responsible: the deer tick, the white-footed mouse, and the whitetailed deer. Adult ticks feed and mate on the deer, then drop off to lay eggs. The eggs hatch into tiny deer-tick larvae, which contract the infection by feeding on the mouse, the primary carrier of the Lyme-disease spirochete. The larvae eventually molt into infected "nymphs," an adolescent stage that poses the chief threat to humans.

Nymphs are active in late spring and summer, when people tend to be outdoors more. They're also much smaller than adult ticks (see the illustration) and thus harder to spot on clothing or skin. From 70 to 90 percent of people who contract Lyme disease have been bitten by nymphs. Nymphs readily latch onto ground-feeding birds as well—which is thought to be how the disease spreads to distant areas.

White-tailed deer also help to spread infected ticks to new areas. Some experts trace the appearance of Lyme disease to the nation's resurgent deer population—from about half a million at the turn of the century to 15 million today. Deer thrive where the lawns of suburbia intersect woodlands or open fields. The fields provide grazing area, the woods provide shelter—and homeowners provide tasty ornamental plants. It's an environment conducive to Lyme disease.

"People are creating a habitat that essentially pulls deer, mice, and ticks into their backyards," said one Lyme-disease expert. Those most at risk are people who can see deer from their houses.

Killing the deer has been suggested as a way to attack Lyme disease. But

experts say such action is premature and could be dangerous. Deprived of their usual hosts, infected adult ticks become a more immediate nuisance, as happened when deer on an island off Massachusetts were virtually exterminated. Wandering ticks threatened the populace as they searched for new hosts. Displaced ticks may also settle on dogs and horses, both of which can become lame from Lyme disease as well as bring ticks closer to home.

### **Lyme-disease Hot Spots**

Lyme disease doesn't threaten everyone, however. Despite its increasing prevalence in the U.S., 90 percent of cases have occurred in just eight states: California, Connecticut, Massachusetts, Minnesota, New Jersey, New York, Rhode Island, and Wisconsin.

Within these states glow several Lyme-disease hot spots, areas where the disease is firmly established. Among the main ones; southeast and coastal Connecticut; Cape Cod and the nearby islands of Nantucket, Martha's Vineyard, and Block Island; New York's Long Island (especially Fire Island, Shelter Island, and the rest of Suffolk County), and the counties of Westchester and Putnam; central and southern New Jersey; west-central and northwest Wisconsin; east-central Minnesota; and the coastal counties of California north of San Francisco. Such areas are said to be "endemic" for the disease. Lyme disease is clearly a summer disease, with about 90 percent of all cases occurring from early June through September.

The Yale investigators turned up an important fact while interviewing their Lyme patients. Few were aware of a tick bite. But many recalled that an unusual red skin rash had preceded their arthritis. About two-thirds of Lyme patients notice such a rash—the earliest clue to infection. That clue is important, because early treatment of Lyme disease with antibiotics such as tetracycline or penicillin can make a vast difference in the severity of its effects.

The rash appears at the bite location from two days to a few weeks after the bite. It usually starts as a small red spot that expands as the spirochetes spread beyond the bite. Most commonly, the rash develops into a reddish circle or oval about two to three inches in diameter. It fades with or without treatment after a few weeks.

Much larger rashes—anywhere from 6 to 20 inches in diameter—may also occur, especially on the back. Despite their size, large rashes may be easy to miss because they're often very faint.

Other variants include a rash with a red perimeter and a clear center and the so-called bull's-eye rash, which consists of several concentric red rings. Rashes may vary in shape, depending on where they occur on the body. Frequent sites are the thigh, groin, and armpits. People often develop a rash in more than one place.

Early symptoms may also include profound fatigue, a stiff neck, and flu-like symptoms such as headache, chills, fever, and muscle aches. Since tick bites don't always produce a rash, those symptoms alone may warrant a medical check for

possible Lyme infection—especially if they occur in summer and you live in an area that is endemic for Lyme disease.

Without treatment, the spirochetes usually multiply and the disease progressively worsens. The second stage, occurring within weeks to months of the bite, may affect the heart and nervous system. Third is the chronic arthritic stage, which begins up to a year or more after the bite.

Some 20 percent of untreated people develop acute neurological or cardiac symptoms. A common second-stage symptom is similar to Bell's palsy—a paralysis of the muscles on one or both sides of the face. Others include severe headache, encephalitis, or meningitis.

Cardiac problems arise mainly from blockage of electrical pathways within the heart, which may affect the heartbeat. Symptoms include palpitations, light-headedness, and shortness of breath. Cardiac symptoms generally last only a week or two but may sometimes be prolonged. Some people require a temporary pacemaker during that time.

In the third stage, about half of untreated patients develop arthritis, most commonly in the knees. Episodes usually are cyclical: They last for several weeks or months, then diminish, and then recur. In about 10 percent of these cases, the arthritis becomes chronic, leading to erosion of cartilage and bone.

Recently, experts have found that late-stage Lyme disease may also involve neurological problems that don't occur until many months or years after the initial infection. The symptoms include overpowering fatigue, intermittent burning or numbness in the limbs, and problems with short-term memory.

Antibiotics help against all stages of Lyme disease but are most effective when used early. Treatment of the later stages may require approximately two weeks of intravenous antibiotics. Symptoms persist in 50 to 70 percent of people not treated until the later stages.

### **Problems of Diagnosis**

Lyme disease is sometimes difficult to diagnose because its pattern can vary. In some people, the distinctive rash never forms. Others experience neither the rash nor neurological problems and have arthritis as their first symptom. Still others may have neurological problems alone. Also, the symptoms can resemble those of other illnesses, leading doctors to mistake Lyme disease for something else.

The disease can be identified through a blood test, however, which detects antibodies that are formed against the spirochetes. The reliability of the test is low until about six weeks after the bite, as antibody levels increase.

### **Other Tick-borne Diseases**

While ticks transmit several other diseases, most of those occur only in specific areas and far less frequently than Lyme disease (which totaled more than

1400 cases in 1986). Babesiosis, for example, which produces headache, fever, and chills, tends to affect about a dozen people each year, mainly in the Cape Cod area and the eastern end of Long Island. Colorado tick fever, which affects an estimated 50 to 150 people annually, is similarly regional and occurs only among those who live or work at altitudes above 4000 feet.

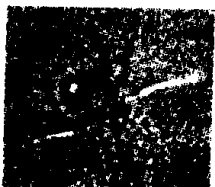
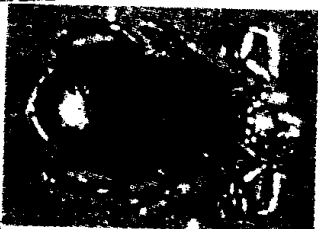
An exception to the localized pattern is Rocky Mountain spotted fever, which was reported in 40 states in 1986. These days, the disease might well be renamed Carolina spotted fever. Of 775 cases reported in 1986, nearly half occurred in the Southeast, especially the Carolinas. Oklahoma was also hard hit, with 104 cases.

Rocky Mountain spotted fever can sometimes be fatal. It killed 23 people in the U.S. in 1986. The infecting agent, a microbe from a group called rickettsia, is transmitted by the Rocky Mountain wood tick in the West and the American dog tick in the East.

Nearly all cases occur in the spring and summer, generally several days after exposure to infected ticks. The onset of illness is abrupt, often with high fever, headache, chills, and severe weakness. By about the fourth day of fever, victims develop a spotted pink rash, which usually starts on the hands and feet and gradually extends to most of the body.

As with Lyme disease, early detection and treatment significantly reduces the severity of illness. The disease responds to antibiotic therapy with tetracycline or chloramphenicol.

### New Products for Tick Control



*From the upper left, the female, male, and a tiny deer-tick larva;*

Ticks are notorious for thwarting attempts to destroy them. Traditional tactics such as spraying an area with pesticides are usually impractical. But two new products could prove useful, including one that enlists mice as unwitting allies.

**Damminix** is a cardboard tube stuffed with cotton balls impregnated with insecticide. A box of **Damminix** contains 50 tubes that you space 10 yards apart in a grid pattern on your property. Then it's up to the local mice to filch the treated cotton for their underground nests. After their usual nocturnal forays, the mice return to their nests burdened with ticks. The ticks drop off into the cotton and die. The mice survive to repeat the process nightly.

The maker, EcoHealth Inc. of Boston, claims that **Damminix** can virtually purge your yard of deer-tick nymphs and larvae, thus reducing the risk of Lyme-disease infection. Some Lyme-disease experts view **Damminix** as an ingenious approach to tick control and one that just might work, but they'd like to see more evidence. Only one study supporting the efficacy of **Damminix** has been published. Its authors, researchers at Harvard University School of Public Health, are also part-owners of EcoHealth. Their results require confirmation by independent studies now in progress.

Meanwhile, **Damminix** does have some drawbacks. For one, it's expensive. At \$4.00 a tube, two applications annually as recommended by the maker cost from \$200 to \$400 per acre. Moreover, neither ticks nor mice recognize property lines. So you may have to convince your neighbors to use **Damminix**, too.

Fewer reservations surround **Permanone**, a new tick repellent. **Permanone** is an aerosol spray for use on clothing. Its active ingredient, permethrin, kills ticks on contact. Most insect repellents, such as **Off!** and **Cutter**, contain deet — the nickname for N,N-diethyl-meta-toluamide. Deet repels ticks but doesn't kill them. Three separate field studies have shown permethrin to be a more effective tick repellent than deet.

The U.S. Environmental Protection Agency sanctions permethrin's use in a variety of pesticide products. But the agency is awaiting data from a study in progress before approving the chemical's use in repellents. Nevertheless, **Permanone** can be bought in 24 states. A provision in Federal law allows states with a "special need" to market pesticide products not yet approved by the EPA. **Permanone** is available in some hardware stores and gardening centers in Alabama, Arkansas, Colorado, Connecticut, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, Nebraska, New Jersey, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. Its distributor, Coulston International Corp. of Easton, Pa., has also applied to make it available in New York, Pennsylvania, and Wisconsin.

For now, though, the only repellents sold in many areas are likely to contain deet, which can be applied to skin or clothing. Products with high concentrations of deet should be used sparingly, if at all, on the skin. Deet is safer, lasts longer, and works better against ticks when used on clothing. Be sure to apply any repellent to the shoe tops, socks, and pants cuffs, the areas most accessible to ticks.

### **The Mythology of Tick Removal**

Few rituals are more steeped in folklore than tick removal. You name it and someone has tried it—or heard that it works. Gasoline, kerosene, and glowing matches all vie for honors, along with rubbing alcohol, fingernail polish, butter, and others.

To settle the matter, CU questioned three Lyme-disease researchers who spend much of their time collecting ticks in the wild. They had accumulated a total of nearly 300 tick bites, but none had contracted Lyme disease—a tribute either to their luck or their tick-removing ability.

A good removal technique, they all agreed, should work fast. The idea is to get the tick off before it's had time to inject spirochetes into you. (The mouth parts that penetrate the skin don't harbor spirochetes.) Research suggests that you have a grace period of at least a few hours from the time of the bite. But the sooner you remove the tick, the better.

That's why one hallowed technique—suffocating them with vaseline, butter, or the like—gets a failing grade. Ticks would be likelier to die of old age first. Gasoline, kerosene, and hot matches also work slowly if at all. Moreover, they all irritate the tick and may actually provoke it to spew spirochetes into the skin.

The experts said there's only one good way to remove a tick, and that's to pull it out with tweezers or small forceps. The idea is to grasp the tick as close as possible to its mouth—the part sticking into the skin. Then, without jerking, pull it upward steadily. Don't worry about pulling out a little skin in the process.

The best tool for the job is a thin, curved forceps, available from surgical-supply stores and pharmacies. It's ideal for gripping the tick close to the skin and avoiding its bloated abdomen, which can act like a syringe if you squeeze it. The superiority of forceps was affirmed in a study published in 1985 in the journal *Pediatrics*. The author attempted to remove 100 ticks from the skin of sheep. He used forceps and four other methods: vaseline, fingernail polish, rubbing alcohol, and a hot kitchen match. Forceps worked every time, while the other techniques failed to dislodge any.

After removing the tick, disinfect the bite with rubbing alcohol or povidone iodine (**Betadine**). Don't handle the tick; spirochetes could enter the body through breaks in the skin. Dispose of it in alcohol or flush it down the drain. And check the bite occasionally for at least two weeks to see if a rash forms. If it does, you've been infected and should seek treatment promptly.

This article has been reprinted from **Consumer Reports**, June 1988 edition.

#### **EDITOR'S NOTE:**

This article is being reprinted because Ohio has become a hot spot for Lyme disease ticks, particularly in south-western Ohio. Those of you travelling to see the prairies, or to Presque Isle, Pa., will be exposed. There is no need to cancel plans to visit areas of infestation; preventive spraying prior to exposure, and careful checking afterwards will keep you safe. When you travel this summer, inside Ohio, or to other states, keep this article in mind.

**Bug B Gone**, 100% Deet, is recommended by a doctor at the Cleveland Clinic and is available at Valley Pharmacy in Chagrin Falls.



## THE FINE ART OF SEED COLLECTING by Margaret Williams

Collecting seeds and growing your own plants can add another dimension to the joy of gardening. Even if you only continue to watch the plants after they finish blooming, and then search for seed you will be amazed at the diversity of seed pods and seed. The drawings in this article by F.H. Hillman, taken from the Nevada State University Agricultural Experiment Station Bull. No. 38, 1897, show examples of some seeds of Nevada plants. The seeds are shown both natural size and enlarged — no scale is given.

It is frustrating and disappointing to go on a seed collecting hunt only to find that the flowers dried up without making seed or that the seed pods are empty. But it is even more disappointing, and infuriating, to have someone give you seed heads containing only chaff or immature seed. Those of you who are experienced seed collectors know whereof I write, and need read no further. The purpose of this article is to help the others of you avoid the pitfalls. It is easy if the seed shakes out of a pod neatly like columbine or shooting star seed. But usually the dried flowers (including pods or seed coverings) must be crumbled to release the seed, and it will be mixed up with chaff. Blow the chaff away carefully. Usually if the seed is large, you will be able to feel it and see it. Hopefully with a hand lens you will be able to recognize smaller seed — in a dry year, the seed may simply shrivel up and not mature.

Although it may seem early, actually now is the time to begin to think about which seeds you would like to collect, either to grow yourself or to pass on to a seed exchange. The first step is locating the plants from which you would like to collect seed. If the plants are in your garden, it is relatively easy — all you have to do is watch the plant as it matures and periodically check on the ripening of the seed. Collecting seed from plants in the wild is more difficult and if you do not locate the plants when they are flowering, unless you have had a great deal of experience, the plants are much harder to find and to identify after the blossoms are gone. Find a source where the plants are abundant. Timing is crucial — seeds collected when immature often have low viability and vigor, and seeds of many native plant species takes about six weeks for the seed of most plants to ripen. But there are many exceptions to the rule: the seed of the first flowers on a lewisia plant usually ripens before the last flowers bloom; the same is true of the seed of composites (remember dandelions); phlox plants have to be watched



Dandelion  
Taraxacum officinale

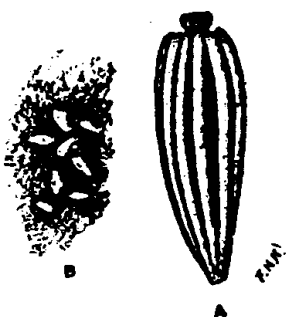
closely, almost daily as the flowers are drying up, the pods can burst open and the seed flies into oblivion overnight; the lower pods on lupine stems can burst and expel their seed while the upper flowers are still in bloom; etc. Finding ripe seed is not an art, it is a challenge, and often it is a matter of repeated trips to your seed source. Some pods remain upright and hold in the seed even when the stems are dry and the seed is mature — penstemon, calochortus, paintbrush, and others are like this — have your paper bag right at hand, and do not tip the pods over until the bag is underneath. Just be sure to scatter some seeds for next year.

James and Cheryl Young in their book discuss the sequence of seed development:

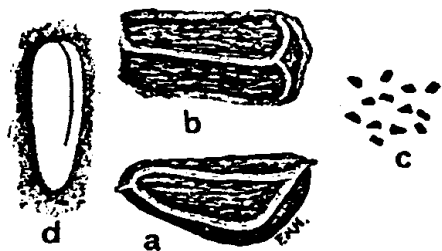
a. Soft dough stage: if the seed is pinched between the thumb and forefinger, the inside of the seed will be squeezed out (if the seed is large); very small seed will simply be squashed.

b. Hard dough stage: bite the seed, once the soft dough stage is completed; fully mature seed is generally very hard to bite. Usually ripe seed is no longer green in color, but is tan or brown or black. Seed collection should begin with the transition from soft to hard dough stage. The chance of obtaining plump, fully matured seeds can be increased by cutting stems with seed pods, rather than stripping the pods from the plant. In some species, this method will allow seed maturation to continue. Care must be taken to spread out the plant material so that it dries uniformly and the seed does not mold. If the seed is immature, it may continue to ripen if the flower stems are put in water. (Some say that adding a little sugar to the water helps.)

c. Maturity: obviously the ideal stage to collect seeds. Unfortunately, maturity and seed pods breaking open may occur at the same time. The seed of many plants is violently ejected when the pods break open and the seed is dispersed widely.



Ox-eye Daisy  
Chrysanthemum  
leucanthemum



Yellow Evening-primrose  
Oenothera elata

For instance, it is almost impossible to find phlox seeds after the pods have broken open. To make sure of getting some viable seeds, repeated collections may be necessary. These collections should extend from the latter part of the soft dough stage until all seed is mature. The period of optimum seed collection can be extended by starting the seed collection at low elevations and following the plants upslope as they mature. If the seed pods on a south-facing slope have already shattered, it may be possible to find the same kind of plants on a north or eastfacing slope with collectible seed.

Areas burned by wild fires are excellent

for seed collection for several seasons after the burning. This is due to natural plant succession, the response of many species to a reduction in competition, and nutrient changes brought on by the fire.

Keeping records of your collections is extremely important. If you are collecting several species in different bags at the same time, take care not to mix up the seeds. Collect seed only from healthy plants with desirable attributes, i.e., vigorous growth under adverse conditions such as drought or salinity, dense vegetative growth, or high seed production.

Plastic bags or wax-coated paper containers should never be used to store seed. The moisture content of freshly collected material is often quite high, and nonporous bags can trap this moisture causing the seed to mold or rot. Sometimes it is expedient to collect seed in plastic bags, but transfer it to large paper bags as soon as possible. It is best to clean the seed as soon as it is dry; sometimes insects are inadvertently collected with the seed (or eggs hatch as in legumes) and the seed will be damaged. A simple method to clean seed is to rub the collected materials over a coarse screen. A more efficient method is to rub the materials between two wooden paddles covered with rough rubber matting. Either method loosens the seed from the chaff. Care must be taken not to crush the seed. The chaff can be removed by winnowing or by sifting through a series of screens (strainers) with different sizes of mesh. Thoroughly dried seed can be stored in closed paper bags or dry glass jars in a cool place, add some moth balls if insects are suspected.

This brief article cannot answer all your questions, for more information consult the book: Collecting, Processing, and Germinating Seeds of Wildland Plants. 236 p. by James and Cheryl Young. Copies can be obtained from them: (phone 702/747-3037) 600 Akard Circle, Reno, NV 89503. Reprinted from Northern Nevada Native Plant Society Newsletter, June 1988.

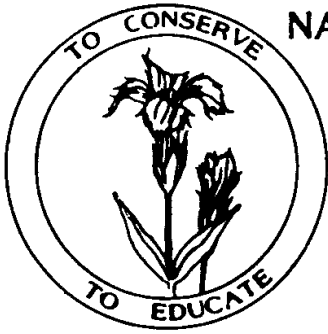
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Toledo	-	Denise Gehring	-	419/535-3058	Eve
Wilderness Center	-	Marvin Smith	-	419/869-7575	Eve

\* \* \* \* \*

The Native Plant Garden at the Garden Center of Greater Cleveland is looking like a million dollars, thanks to Kate Harrington who oversees the entire garden, and to Marian Larson who has led the NPSNEO in their development of the Ohio Native Plant Society plot. **Volunteers are needed!!** Come enjoy the summer in this lovely place; give a couple hours or a couple days each month.



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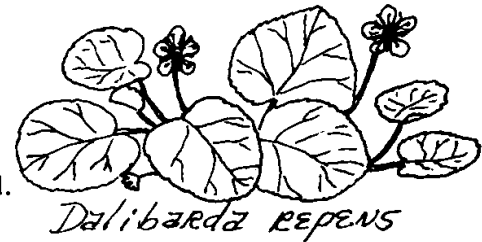
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