

NATIVE PLANT SOCIETY OF NORTHEASTERN OHIO

Founding Chapter Of

THE OHIO NATIVE PLANT SOCIETY

6 Louise Drive
Chagrin Falls, Ohio 44022
(216) 338-6622

On the Fringe

THE JOURNAL OF THE OHIO NATIVE PLANT SOCIETY

Volume No. 5

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Number 6

PROGRAMS AND EVENTS:

November 1 (Sunday) Dayton Chapter - 1:30 p.m. - Cincinnati Zoo, Field trip to zoo horticultural gardens. Meet in parking lot near information center.

November 13 (Friday) Cleveland Chapter - 5:30 p.m. - Cleveland Museum of Natural History, Native Plant Society Annual Dinner. See write-up.

November 13 (Friday) Cincinnati Chapter - 8:00 p.m. - Avon Woods Outdoor Education Center, Dr. Vic Soukup will lecture on "Botanizing in Alaska."

November 14 (Saturday) Wilderness Center - Field trip to Tinkers Creek with Dr. Clinton Hobbs. Call for time and meeting place, **673-6949**.

November 16 (Monday) Columbus Chapter - 7:30 p.m. - Sharon Woods Metro Park, "Spring Wildflowers of Michigan's Upper Peninsula" by Alvin E. Staffan.

November 16 (Monday) Dayton Chapter - 6:30 p.m. - Dayton Cox Arboretum Annual Dinner. Charlie King, Executive Director of the Ohio Biological Survey, will speak on "Praires of the Darby Plains."

December 6 (Sunday) Cincinnati Chapter - 3:00 p.m. - Devon Park, Covington, Kentucky field trip; **6:00 p.m.** - Dinner, Northern Hills Fellowship Church, Cincinnati; **7:15 p.m.** - "Endangered Plants of the Nature Conservancy" by Jeff Knoop.

December 6 (Sunday) Dayton Chapter - 1:30 p.m. - Field trip to Glen Helen with Ralph Ramey. Meet in parking lot, phone contact: Marianne Stephan, **513-434-5791**.

December 12 (Saturday) Wilderness Center - 2:00 p.m. - Field trip to Secest Arboretum in Wooster. Phone contact: Mr. Schmitthenner - **419-264-7833**.

December 15 (Tuesday) Columbus Chapter - 6:00 p.m. - Sharon Woods Metro Park. Pot luck supper.

FRIDAY, NOVEMBER 13, 1987
NATIVE PLANT SOCIETY ANNUAL DINNER
CLEVELAND MUSEUM OF NATURAL HISTORY

Wine & Punch Hour	5:30 - 6:15 p.m.	Dinner Ticket (includes speaker)	\$10.00
Buffet Dinner	6:15 - 7:30 p.m.	Speaker Ticket Only	4.00
Meeting	7:30 - 8:00 p.m.		
Speaker	8:00 p.m.	<u>Special Diets Available</u>	

FAMILY & GUESTS WELCOME!!!

This is always one of the best evenings of the year, when we all get together and have a chance to converse with botanical friends we haven't seen for awhile, and with other members visiting from around the state. From the reception through the dinner, it is a time of congeniality and sharing of news and information. This year we have had to raise the price to cover the caterer's price rise and the increase in the Museum's ticket price. However, it is still the best bargain in town!

Dr. Warren H. Wagner, Jr., Professor of Botany and Natural Resources and Curator in the University Herbarium and Botanical Gardens, University of Michigan, will be our guest speaker. He will speak on "Rare and Unusual Ferns in the Western Great Lakes Region." Dr. Wagner writes: "The past thirty years have seen much new exploration in the western Great Lakes region. We have learned many new facts about the ferns and other fern-like plants, including new occurrence of species not reported before from this region as well as species new to science. An effort will be made to capture some of the excitement that field workers have encountered in these studies. The species will be illustrated by color photographs taken in the wild."

Dr. Wagner, internationally recognized, teaches Biology of Woody Plants, Field Botany, Systematic Botany, Plant Morphology, and Pteridology. He is President of the Michigan Botanical Club and Chairman of the Michigan Natural Areas Council. In addition, he serves as President of the American Fern Society, the Botanical Society of America, the Society for the Study of Evolution, and the American Society of Plant Taxonomists. He is the author of many books including the recent "Michigan Trees."

Dr. Wagner is known as a dynamic speaker and has been known to create magic on stage with ferns. Join us for a unique and fabulous evening!

RESERVATIONS, ACCOMPANIED BY CHECK IN FULL, MUCH BE SENT IN NO LATER THAN NOVEMBER 1ST, 1987. MAKE CHECK PAYABLE TO: NATIVE PLANT SOCIETY AND SEND IT TO: 6 LOUISE DRIVE, CHAGRIN FALLS, OHIO 44022.

Most people are attracted to our native plants because of our varied types of wild flowers. Some become fascinated with the many species of native shrubs and trees. If they have the space in their lawn many will try a wild flower garden and plant some of the unusual shrubs and/or trees around their home.

However, all of our wild flowers, shrubs, and trees (except for the few native conifers) belong to just one group of the vascular plants, the **angiosperms**.

The three groups of vascular plants are the **angiosperms**, flowering plants; the **gymnosperms**, cone bearing plants; and the **pteridophytes**. This third group which is commonly called the Ferns and their Allies contain, by most modern interpretation, four divisions. The term division is equal to the term phylum and represents a unit of a kingdom.

These four divisions are 1) **Psilotophyta**, the Whisk ferns, 2) **Arthrophyta**, the Horsetails and Scouring Rushes, 3) **Microphylophyta**, the Club Mosses, Groundpines, Spikemosses and Quillworts, 4) **Pteridophyta**, the ferns. The fourth division is broken down into six units (Crabbe, Jermy, Mickel-1975) which are a) **Eusporangiate**, b) **Filmy**, c) **Adiantoid Schizaeoid**, d) **Gleichenoid Polypodioid Grammitid**, e) **Cyathaceae Dennstaedtaceae Thelypterareae Aspleniaceae Blechnaceae** or **CyDennTAB** for short, f) **Water ferns**.

Now that we have a working hierarchy of the **pteridophytes** that will give us handles with which to place various native species, let's look at each in a bit more detail and explore their use in the home garden.

Psilotum and **Tmesipteris** are the two genera of Whisk fern. Only **Psilotum** is found in North America, and it is not native to Ohio. While not able to survive our winters, the plant is easily maintained as a house plant.

Equisetum is the only genus of Horsetails and Scouring rushes. They are quite common in the northern temperate area. There are seven species native to Ohio and most of the others would survive our winters. Only a few are desirable in the home garden - **E. sylvaticum** and **E. pratense** are the nicest, and **E. fluviatile** if you have a pond. **E. arvense** and **E. hyemale** should be avoided as they will become a serious weed in a year or two!

Lycopodium, **Selaginella**, and **Isoetes** are the genera in Microphylophyta. The first contains the clubmoss and groundpines which have eight species in Ohio. Extremely hard to transplant, the vast majority of gardeners should stick to the tropical species that can be grown in hanging baskets in your home greenhouse. If you want to try the native species, and have a cool woodland garden, **L. lucidulum** would be the one to start with.

Selaginella only has two species in Ohio but many in the humid tropics and subtropics. **S. apoda** will grow quite nicely in your lawn if you don't use chemicals. The tropical members can be very lovely as terrarium plants. In addition, the novelty plant, resurrection plant, is from this group.

The quillworts are in the genus *Isoetes*. Either aquatic or bog-like conditions are preferred by these plants and for most home gardeners they would be limited to those with ponds. In addition, tropical fish enthusiasts could use the aquatic members.

The ensporangiate ferns include three genera found in Ohio plus several tropical ones. *Botrychium* with eight species, *Ophioglossum* with two species, and *Osmunda* with three species are all native to the Buckeye State. Of the first two, only *B. virginianum* would be attractive enough for the home garden, but all three species of *Osmunda*; *O. regalis*, the Royal Fern; *O. claytoniana*, Interrupted Fern; *O. cinnamomea*, the Cinnamon Fern; would be very desirable for the home garden. They are big plants, up to 3 feet (1 meter), so they need room. In addition, the Japanese Royal Fern, *O. japonica*, is also hardy with a little help.

Although there are a few species of the filmy ferns native to southeast Ohio, for all practical purposes the home gardener should only consider this group for the home greenhouse or an elaborate terrarium setup as humidity is the prime environmental condition for the filmy ferns.

We have two native members of the **Adiatoid-Schizaeoid** group and these are the Maidenhair fern, *Adiantum pedatum* and the Climbing Fern, *Lygodium palmatum*.

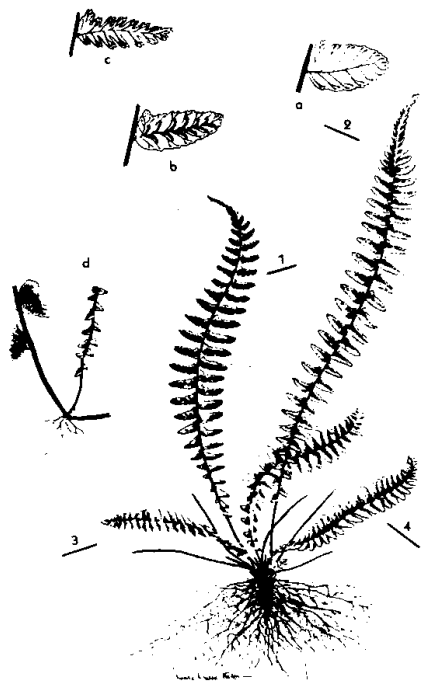
The first is easy to grow while the second is difficult. There are many subtropical species of *Adiantum* that are cultivated and a few will survive our winters with help such as mulching, etc. The Japanese Climbing fern, *L. japonicum*, has become naturalized in the southern states and can survive our winters if in a protected area.

The next group include *Polypodium virginianum*, the Rock Cap fern, which is native as well as *P. polypodioides*, the Southern Resurrection fern that is native to southern parts of Ohio and West Virginia. It might be able to survive in northeast Ohio in select locations, but the Rock Cap fern is very hardy and as it is evergreen is a good addition to the home garden.

The CyDennTAB's have many genera and even more species that are either native to Ohio or hardy here. First, let's examine the native ones that would be desirable in the home garden.

Asplenium platyneuron or **Ebony Spleenwort** is an evergreen, up to 1 ft. tall species that likes sun and good drainage. The other members of this genus do best on rock cliffs or walls with good drainage, but with frequent waterings. The Walking fern, *Camptosaurus rhizophyllus* is really a spleenwort and also likes rock walls but with a good covering of humus and moss.

The lady ferns, northern, southern, green and red stemmed are all varieties in the species *Athyrium filix-femina* and all are desirable. They are tolerant of a wide variety of conditions and easy to transplant. The **Silvery Spleenwort**



(this is a bad common name as it is not a spleenwort) **Athyrium thelypteroides** also known as **Diplazium thelypteroides** is readily grown in the woodland garden as is **A. pycnocarpon**. Also known as **D. pycnocarpon**, the Glade Fern, this very attractive species had problems with slugs in my garden.

Cystopteris protrusa is a nice member of this genus to try in a rich soil woodland garden, and **C. fragilis** will do well on rock walls.

For full sun with plenty of room the Hay-scented fern, **Dennstaedtia punctilobula** would be perfect. This plant spreads by underground rhizome and will rapidly cover a large area.

The Ostrich Fern is an old favorite that is large, over a yard (meter) tall, and spreads by rhizomes so give it room. **Matteuccia pensylvanica** produces brown reproductive fronds that are very nice for flower arrangements.

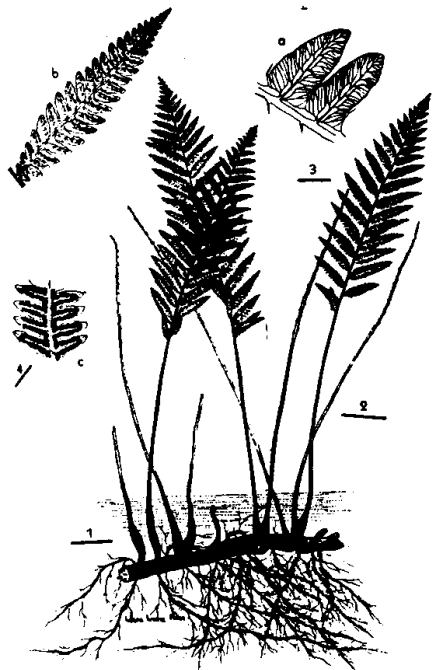
The Sensitive Fern, **Onoclea sensibilis**, also does this but it is not the best looking fern. It is the easiest to transplant and will survive in those wet areas where most other things will not.

Everyone should have the Christmas fern in their garden. **Polystichum acrostioides** is an evergreen that has been used for holiday decorations since colonial times.

Phegopteris connectalis and **P. hexagonrotera** both would do well in the woodland garden and are small enough for those with limited space.

On the other hand, only those with very large areas should try the bracken, **Pteridium aquilinum**. This large fern tolerates sun or shade and reaches heights of a yard (meter) and is almost as wide. As it spreads by underground rhizome don't expect it to stay in one spot!

Thelypteris noveboracensis is the New York fern which is a delicate colony forming fern of shades areas - very nice in many situations. Also, **T. palustris** would do nicely in sunny, damp areas.



For those with wet areas **Woodwardia virginiana** is a large, spreading by rhizomes, fern that is hard to beat. Fern Lake in Geauga County, which some of you have been to, is surrounded by this species.

For the home garden, all the species of Wood or Shield Ferns have to be considered. **Dryopteris marginalis**, **D. spinulosa**, **D. intermedia**, **D. cristata**, and **D. goldiana** all of which are native to Ohio as well as **D. clintoniana**, **D. dilatata** and all the hybrids that are produced by all the preceding species should be tried. Be sure not to overlook the European **D. filix-mas** and all its many cultivated forms.

Lorinseria areolata or **Woodwardia areolata**, the Net-veined Chain Fern, while very rare in Ohio is common in the new England states and should be included in the home garden. There are many other species in the CyDennTAB for the advanced home garden but the preceeding will give more than enough for the beginner.

Certainly not to be overlooked, even if they are not hardy or native, are the various species of Water Ferns. The Mosquito Fern, **Azolla** spp. and the Penny Fern, **Salvinia** spp. are both very nice free floating ferns for the pond. At the edge of the pond or in a wet bog area the species of Water-Clover Ferns, **Marsilea** spp. are very desirable and these with a little help can survive our winters. I have also had **Regnellidium diphyllum** from South America survive our winters in a shallow farm pond with no special help. And as any tropical fish enthusiast can tell you, the Water Fern, **Ceratopteris thalictroides** and **C. pteridoides** are very nice and can quickly fill the pond, or aquarium.

Now that you are more aware of the more common native species of the pteridophytes, you might want to do some reading on them and plan on both looking for them and perhaps adding them to your own native plants garden. I would recommend for the beginner the following:

The Fern Guide - Edgar T. Wherry (identification and tips on cultivation).

How to Know the Ferns and Fern Allies - John T. Mickel (covers U.S., Canada, and Mexico).

The Gardener's Fern Book - E. Gordon Foster (both outdoor and indoor information).

A Field Guide to the Ferns - Boughton Cobb (part of the Peterson Series).

The Home Gardener's Book of Ferns - John T. Mickel (world wide coverage).

All of these and many more would be available at your local library. Also, don't forget to check out the 1984 edition of **Ohio Endangered and Threatened Vascular Plants** which lists fourteen species of pteridophytes that need our help.

GOOD FERNING!

Dr. Carl Chuey is Professor of Biological Sciences at Youngstown State University and former president of the Ohio Fern Society.

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Athens	-	Dr. Scott M. Moody	-	614/593-2360	Days
Cleveland	-	Tom Sampliner	-	216/932-3720	Eve.
Cincinnati	-	Jim Innis	-	513/385-0670	Eve.
Columbus	-	Jim Stahl	-	614/882-5084	Eve.
Dayton	-	Ellen Fox	-	513/897-8039	Eve.
Toledo Organizer	-	Denise Gehring	-	419/535-3058	Eve.
Wilderness Center	-	Glenna Sheaffer	-	419/289-6137	Eve.

RIPPING UP ALASKAN FOREST by Michael Zimmerman

Third World countries are destroying tropical rain forests at an alarming rate. Unfortunately, the habitat destruction of rain forests is not restricted to the tropics, nor is it being carried out exclusively by underdeveloped countries. The U.S. government is paying for the destruction of the largest remaining rain forest outside of the tropics: Tongass National Forest.

Tongass National Forest is on southeastern Alaska's panhandle. Originally designated national forest by Congress in 1907, the area is home to huge 800-year old trees as well as populations of Sitka blacktail deer, black and grizzly bears, pine martens, lynx, fox, wolverines, flying squirrels and land otters. More bald eagles live here than in any other location on Earth. The lush, misty forest is presided over by towering western hemlock and Sitka spruce. The ground is carpeted by mosses and ferns.

This unique habitat and its inhabitants have been under severe pressure for the past seven years because Congress required that the U.S. Forest Service spend approximately \$40 million per year to encourage private companies to log the area. The Forest Service has been spending the money, and this great rain forest is being torn apart.

This sad situation stems from federal legislation passed in 1980. The Alaska National Interest Lands Conservation Act established millions of acres of parks and wildlife refuges throughout Alaska. To win approval for the package, environmentalists had to make two unpleasant concessions. First, 11.5 million acres of the 16.9 million total acres in Tongass National Forest had to remain available to the logging industry.

(Most of the remaining 5.4 million acres set aside as wilderness is not forested but includes marshes, bogs and meadows.)

Second, Congress mandated that the area should produce timber harvests of 4.5 billion board feet each decade and authorized the Forest Service to spend whatever was necessary to reach this goal. The purpose was to stabilize Alaska's ailing logging industry.

Although hundreds of millions of dollars have been spent, there is no evidence that even the logging industry has benefited. A Wilderness Society report indicates that, in the last decade, the Forest Service has lost more than \$360 million on timber sales from the area. The report also suggests that the government subsidy has failed to improve the economy of the panhandle.

In fact, much of the government's money has been spent to build roads through the rain forest to make even more logging possible. Conservation groups claim that those roads and the subsequent associated logging are causing severe silting of salmon streams while drastically reducing the population sizes of many native species of plants and animals.

Critics further claim that the forest is being managed in a shortsighted fashion. Bart Koeller, executive director of the Southeast Alaska Conservation Council, said last year, "The rapid permanent removal of old-growth trees currently being practiced by the Forest Service is timber mining, not renewable forest management." Tim

Mahoney of the Sierra Club testified before a congressional committee that, "The Tongass is not only our largest and wildest national forest, but it is also our most mismanaged and abused national forest."

Economic conditions outside of the region have been largely responsible for the poor state of the logging industry. High interest rates, a weak housing market and foreign competition have all cut into profits. Even with massive governmental subsidies in Tongass and elsewhere (in fiscal year 1987, for example, Congress earmarked \$253 million for logging road construction alone), the logging industry has remained unhealthy. The panhandle's economy is thus still in poor shape while the great rain forest is disappearing.

Kenneth Dixon and Thomas Juelson of the Washington Department of Game have proposed an interesting solution that might very well be applied to the Tongass region. They suggest an alternative to the trickle-down subsidies currently in place. Instead of spending vast sums on logging roads, hoping that logging companies will hire more workers, Dixon and Juelson recommend that the government shift its subsidy from the industry to the workers themselves. Direct income subsidies as well as job training for unemployed workers would replace logging roads. In this way individuals can be directly aided without sacrificing an irreplaceable natural resource. The cost of such a program would be much less than that currently being spent to destroy the rain forest.

The Forest Service, acting along these lines, recently made a small grant of this nature to the town of Dubois, Wyo., in an attempt to diversify its economy.

Conservation groups are petitioning Congress to change the terms of the Alaska National Interest Lands Conservation Act and remove the requirement that the Forest Service spend tens of millions annually to deforest the Tongass. Congress, however, is moving at a glacial pace. Even though a House subcommittee held hearings last year, no action was taken.

It is a disgrace to destroy such a unique and wonderful environment in a failing attempt to save one particular industry. More pressure from the public is needed. We cannot let this magnificent lichen-draped forest and its wealth of animals be lost without a fight.

Michael Zimmerman is Professor of Biology at Oberlin College.

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NEW PRESERVE BOOK ISSUED:

The Division of Natural Areas and Preserves has just published a Directory of Ohio's Natural Areas and Preserves. This book describes 73 of 79 Preserves in detail. For the Preserves that are open to the public, a map and directions are given. The book sells for \$4.50 including tax. It will be available at the Annual Dinner or can be ordered from the Society office, or by writing the Division of Natural Areas and Preserves, ODNR, Bldg. F., Fountain Square, Columbus, Ohio 43224, add \$1.00 for mailing.

BIRD SEED REPORT:

The Audubonists among us will laugh at the simplicity of this report, but maybe some of you will find my recent discoveries about feeding the birds of interest.

The mixed bird seed sold in bags of 10, 25, or 50 pounds is **NOT** a good buy. These mixes contain milo, wheat, oats, and other cheap grains that have little or no value as nutrition for birds. In particular, milo is a common filler and is distinguished by its reddish color.

Sunflower seeds are the seed of choice for chickadees, evening grosbeaks, titmice, jays, goldfinches, purple finches and cardinals. Sunflower seeds have higher proportions of fat and protein and thus are extremely important. **Black OIL Sunflower** is cheaper and much better than the grey striped sunflower seed. Note that in the mixed bags the striped sunflower is used predominately or totally. **Sunflower hearts** are caviar to the birds, particularly the smallest ones.

WHITE proso millet is the favorite of many ground feeding birds, especially sparrows. The red proso millet is not nearly as attractive to most species.

Cracked corn is eaten by white-throated sparrows, cardinals and doves, but it is also desirable to squirrels and should be fed separately, away from bird feeders. It deteriorates quickly in wet weather and can cause disease in birds. In fact, any feed left to rot on wet ground can spread a deadly respiratory disease.

For the finches, Niger (thistle) seed mixed with **finely chopped sunflower hearts** is the best food. While it is expensive, it is well worthwhile as it provides the best nutrition and will guarantee the presence at your feeder of these colorful birds. Thistle does require a special kind of feeder with small holes.

Buy your own seed and mix it yourself in recipes to attract your favorite birds. In the long run it will be more economical as there will be less waste of seeds that are left to rot on the ground.

I have done a personal survey of prices at stores on the East side of Cleveland and found that cheapest prices are at the Chagrin Pet and Garden Supply on Solon Road in Chagrin Falls. They are wholesalers who supply the seed for Holden and Shaker Lakes seed sales. Because they buy in such enormous quantities, their regular prices are normally lower than other dealers. In addition, starting **November 1** they will have a 20% off sale on all seed and feeders. If you buy from them, mention the **Native Plant Society**.

Sources: The Audubon Society Guide to Attracting Birds. Ortho Books: How to Attract Birds.

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AWARDS TO MEMBERS:

Our own **Dr. Barbara Andreas** won the President's National Stewardship Award at the recent national meeting of The Nature Conservancy in Utah. Given for her devoted care of preserves in Ohio, this award is one of the most prestigious the Conservancy confers. Dr. Andreas' book on the flora of the unglaciated northeast

of Ohio is at the printers and is due out late next year. We will keep you advised of its arrival as all of us will want a copy.

Member Dr. Charlie King was given the National Oak Leaf Award for his long and distinguished contributions to TNC in Ohio and the nation. Charlie is Director of the Ohio Biological Survey.

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LAKESIDE DAISY:

The United States Department of the Interior, Fish and Wildlife Service, has proposed **Hymenoxys acaulis** var. **glabra** (Lakeside Daisy) as a threatened species under the Endangered Species Act of 1973. Lakeside Daisy is found only at the Marblehead Peninsula in Ottawa County in Ohio, and at several locations on the Bruce Peninsula and Manitoulin Island.

The Division of Natural Areas and Preserves, ODNR, has been trying for some time to buy a preserve at Marblehead to protect the Lakeside Daisy, but Standard Slag Company refuses to sell any land, even though they have finished quarrying the site in question. Ruth Fiscus, 321-2584, long a student of the Daisy, is spearheading a petition drive to get Standard Slag to reconsider. If you want to help, please contact her.

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NEW ORCHID BOOK AVAILABLE:

Recently we were guests of Fred Case at the presentation of his new book at Cranbrook Institute in Detroit. We have brought a case of books back with us and it is available to our members at \$24.60. This is a 15% saving over the retail price of \$28.95 and also saves more than \$2 in sales tax. First come first served.

ORCHIDS OF THE WESTERN GREAT LAKES REGION by Frederick W. Case, Jr., has recently been revised and is now available. This field guide to the wild orchids of the western Great Lakes area is designed particularly for the amateur botanist, although professionals will find it useful as well. It details 67 orchids species which occur in Michigan and Wisconsin, the border counties of Minn, Ill., Ind., and Ohio and the adjacent areas of the province of Ontario. Each species is illustrated with a color photo taken or selected by the author. The excellent genus and species descriptions and discussions include range maps as well as information on habit, season, distribution and habitat.

Mr. Case has also provided an introductory section on orchid biology, orchid ecology, distribution patterns of Great Lakes orchids, and growing native orchids. A glossary, bibliography and index complete this important treatment of a fascinating segment of the flora of the Great Lakes region. Three new species are introduced in this revision of the original book.

The orchid book will be available at the Annual Dinner or can be ordered by mail. However, if the book is to be delivered by mail, postage will be charged.

RESCUING NATIVE FERNS by Frank Kershaw

While plant collecting is contrary to the conservation of our native plants and the Code of Ethics of the Canadian Wildflower Society, occasions may arise where their rescue from pending destruction is acceptable. This is frequently the case at construction sites. These sites may contain vestiges of former fern gardens or naturalized areas where native ferns and wildflowers abound. This article emphasizes factors to be taken into account when transplanting ferns from such sites to the garden.

Preferably, ferns should be moved in the fall or early spring (before crocuses uncoil). Fall transplantation is ideal as the soil is sufficiently warm to encourage new feeder roots to develop and harden-off before winter. It is possible to move ferns in the summer, albeit more risky. Make sure you take extra soil/root mass and dedicate yourself to frequent watering.

Since ferns often grow in large groups rescue operations may be expedited. Unfortunately, some fern species are difficult to dig and move. Examples include cinnamon **Osmunda cinnamomea**, interrupted **Osmunda claytonia**, and royal ferns **Osmunda regalis** which are strongly rooted and with age develop hard woody rhizomes. Removing selected specimens may require a sharp spade or hatchet to sever interconnected plants. Better still, concentrate on younger plants which are easier to move. Because these same ferns prefer damp heavy soil, use strong plastic bags or hampers in moving them. Another species I have found difficult to move is bracken fern **Pteridium aquilinum**. This species while too large and invasive for small gardens has its place on larger properties with bare sunny banks. Successful transplanting requires considerable digging to retain a good percent of its spreading roots.

Other species that pose difficulties for transplanting are grape fern species **Botrychium** which have a nutritive relationship with soil fungus as well as walking ferns **Camptosorus rhizophyllus** and hart's-tongue fern **Phyllitis scolopendrium** which demand cool, moist limestone habitat.

While some species as noted above are difficult to move, others can be quite easy. For example, shallow rooted smaller species such as common polypody **Polypodium vulgare**, bulblet fern **Cystopteris bulbifera**, fragile fern **Cystopteris fragilis**, and spleenwort species (**Asplenium** species) can be eased from rocky ledges aided by a mason's trowel, knife or other pointed object. Transport them in a 6 inch deep flat lined with moist newspaper or damp peat moss to prevent their slender roots from drying out.



Be careful in moving fancy ferns, spleenworts and maidenhair fern **Adiantum pedatum** which have slender, brittle stalks as these can be easily broken. Clump forming species such as the beautiful evergreen Christmas fern **Polystichum acrostioides** can easily be moved by digging around and under the plant making sure to retain a majority of its radiating roots. Avoid wrenching or prying such species out of the ground to minimize root loss. Be careful not to injure the crown (growth point) when digging this and other ferns. If in doubt where the crown is, fold back the fronds and look for the center of the plant.

As noted earlier it is preferable to undertake a fern rescue in the fall or early spring. If the rescue has to occur in the summer trim back the fronds by 50 percent. This will reduce their surface area for moisture evaporation and thereby compensating for any lost roots. Damaged fronds should also be removed at this time. A summer rescue has the advantage of being able to assess the full size of the plants making it easier to ascertain where they might be positioned in the garden.

After having dug up the selected ferns transport them quickly to their new home. To reduce moisture loss at this stage cover them with a tarp or moist newspaper. The majority of rescued ferns can be planted immediately, albeit some of the smaller rock ledge species such as cliff brakes **Pellaea** species, maidenhair spleenwort and **Woodsia** species may better be transplanted into 4 to 6 inch diameter pots to develop new roots before moving into the garden 6 to 8 months later.

The majority of woodland fern species do quite well in a soil with a pH of 5.9 to 6.5 comprised of almost equal parts leaf mold and friable topsoil, 10 to 12 inches deep. If fertilizer amendment is necessary work into the soil 4 to 6 ounces of bone-meal per square yard of soil mix. Avoid raw compost as its decomposition robs the soil of needed nitrogen. Unfavourable soils quickly reveal themselves in stunted fronds and premature frond die-back. For those species which require moist conditions include peat moss in the soil mix equivalent to that of leaf mold and topsoil. Mix the peat moss thoroughly with the soil as compacted peat moss robs the surrounding soil of moisture. Ensure that fern roots are in close contact with the soil by gently pressing the soil around the roots and water repeatedly. Rhizome spreading fern species such as ostrich **Matteuccia struthiopteris**, hay scented **Dennstaedtia punctilobula**, New York **Thelypteris noveboracensis** and bracken ferns are generally planted with roots no deeper than 1 inch below the soil surface. Do not cover the crown with soil as this will encourage crown rot and inhibit crosier development. Cobbles, stonegrit, limestone chips and limestone rocks will help calceophilic (lime loving) ferns gain root anchorage and provide cool root runs. Gritty material also discourages rodent activity.

Frequent watering is a must for newly transplanted ferns. Early morning watering and frond misting is preferred. Evening watering is prone to encourage slugs and disease. A mulch of cocoa beans or woodchips will help to conserve moisture and safeguard ferns from desiccation.

These comments should assist those undertaking a fern rescue. The sharing of information and experiences bring us one step closer to a better understanding

of our native plants.

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FUNGUS GARDENING by Norris Denman

I could start this like a Damon Runyon story: "I am sitting in my rotten deck chair which is on my rotten deck and I am looking at my rotten railing and I am wondering when I will be falling through when all of a sudden two professor types are coming up to me and making me an offer that I cannot refuse." In fact it happened just that way.

My wife Luise and I have a cottage on Lake Memphramagog in Quebec's eastern townships. The deck juts over the lake and the deck, railing and chairs are all over twenty years old and made of untreated wood. While the deck is sunny and warm in the morning, it is cool and shaded the rest of the day and perhaps just a little bit damp. The deck is beginning to creak and crackle, the chairs are missing slats—we lean one chair against the wall so nobody will fall out backwards—and the railing has large and important parts missing. Even our idiot flying squirrel has stopped using the railing. (We think he is an idiot from his habit of mistaking a leg for a tree trunk and his idiocy is probably caused by his habit of launching himself off the peak of the roof at midnight and slamming head first into trees.)

So professors Judy and Jack Kornblatt of Concordia University arrived one sunny spring morning, picked their ways daintily across the deck, avoiding touching the railing, and manoeuvred themselves into deck chairs. Then Jack turned to me and asked, "How would you like to work on rotten wood?" All I needed was this joke in bad taste!

But Jack was serious. He wanted to study the enzymes that breakdown lignin, an important component of wood. It is known that a crust fungus which grows on rotting wood produces an enzyme that breaks down lignin. For a variety of technical

reasons this enzyme is hard to study. However it belongs to a family of enzymes known as cytochrome peroxidases, enzymes in which Jack has substantial expertise. He wanted to find other enzymes that might be easier to study. What did he want me to do? "Collect fungi from rotting wood," he said waving at my rotting deck, railing and chairs, "and grow them in pure cultures so we can look for enzymes."

As we talked I realized once again how little we know about the fundamental processes in nature. Half the biomass of the world is the cellulose in woody tissues of plants. Closely associated with this cellulose is lignin, the second most abundant organic substance on earth, and making up one-eighth of the world's biomass. It has been estimated that a staggering four billion tons of carbon are incorporated into lignin each year. This tremendous tonnage is almost in balance—the annual accumulation through plant biosynthesis is nearly matched by the annual degradation by microorganisms. A small amount is lost to sediments to become the world's future oil and coal.

And yet we have little understanding of the role of lignin in nature. We know very little about how it is made by plants or why living trees need so much of it. We know a little more about how it is broken down, but not very much. Chemists are not even agreed upon the structure of the lignin molecule.

I decided to learn how to grow fungi—particularly the big bracket fungi growing on trees—reasoning that, since bracket fungi attack dying and recently dead trees, they might be able to degrade both the cellulose and lignin components of wood. Here I hit a snag. The scientific literature does not give much information on cultivating bracket fungi. Perhaps this is understandable. The commercial applications of a good lignin degrading enzyme are very interesting: pollutionless pulping, anti-enzymes to preserve wood and ultimately the production of very large quantities of high quality distillates that could supplement petroleum. I suspect that investigators are playing some cards close to the chest.

Professor Paul Widden of Concordia is a mycologist, a specialist in fungi. I brought my problem to him. He came up with a growing method that turned out to be successful. The fertilizer we chose would look quite odd to the average gardener. As one would expect there was nitrogen and phosphorus and potassium. Calcium however is a trace element of fungi, so there was very little present. We had boron, cobalt, molybdenum, manganese and quite an array of other metals. When we had finished planning the growing medium Paul handed me over to Kathy Svatek, a graduate student, for a crash course in making growing medium, pouring it into petri dishes (small sterile covered dishes used to grow bacteria and fungi) and sterile techniques. This last consisted of throwing everything in sight into alcohol and setting it on fire. Several hours later, loaded with equipment, hands badly burned (Paul: "Quit whining, every mycologist sterilizes his hands occasionally.") I headed back to my cottage to start growing fungi.

The bracket on the tree is the fruiting body of the fungus. The vegetative body is a mass of microscopic threads called *hyphae* spreading through the tissue of the tree and often far beyond into the surrounding soil. Mushrooms are often

the fruiting bodies of fungi which live in a symbiotic relation with tree roots. One cannot really get at the vegetative body, particularly since there is no way of telling which hypha is associated with which bracket. Cultivating a fungus from its fruiting body is a little like propagating a garden plant from a flower petal cutting because one cannot get at the rest of the plant. It takes a considerable amount of persuasion. And after persuading the fungus to return to the vegetative state, it must be separated from its contaminants--what I have come to call its 'little friends.' These are the many species of fungus gnats--who can find a fresh fungus much faster than I can--mites, and many unrelated species of fungi growing happily in, on and with the bracket. We have developed a few tricks to help at this stage but it requires much patience, waiting, sub-culturing, sub-sub-culturing and to the n-th power culturing until the cultures are clean. Many contaminated cultures showed up at each stage. Some were accidentally contaminated by me, in others the original contaminants seem to have been carried along without revealing themselves until much later. (Paul insisted that I give him all contaminated cultures for sterilization before disposal.)

I started my fungus garden in mid July, 1986, and by the end of October I had six bracket fungi and the fly agaric, a mushroom, growing vegetatively, each in its own petri dish. I did most of my collecting on a twenty-five acre tract of woodland right behind our cottage. Part of this tract was logged in 1950, part was probably cleared in the 1840's and part is still virgin forest. The very big trees are sugar maple, beech and hemlock but where the blowdowns have let in the light are white birch, yellow birch, ironwood, striped maple, mountain maple, red maple and choke cherry. A rill has cut a miniature gorge through the soft bedrock and is a home to two-lined salamanders and dusky salamanders. I spend a lot of time in the woods just sitting and listening. Each year some old trees blow down. This supplies my firewood but I always leave plenty for the redbacked salamanders to use for nests. And there are a lot of dying and rotten trees for the bracket fungi--I don't know how many different kinds of fungi since I have only begun to count them. Judy found the magnificent wine-red hemlock varnish shelf **Ganoderm tsugae**, growing like stairs up the side of a big leaning hemlock. The birch polypore **Piptoporus betulinus**, is everywhere on dead birches. This fungus was a favourite tinder source in the days of flint-and-steel firelighting. I found two different species of **Phellinus**, one on a big blown down beech and one on a big blown down sugar maple. The beech was four feet in diameter and the maple three feet and I mourn them both--the beech goes back to before the days of settlement. I tripped over the turkey tail **Trametes** polypore. **Heterobasidion annosum**, isn't there. I finally found it on a black spruce growing by a lake on the northern branch of the TransCanada in Ontario. The lake was full of loons and the forest was full of black flies. The fly agaric **Amanita muscaria**, was rescued from a red squirrel or maybe the red squirrel was rescued from this very poisonous mushroom!

Gardeners work in the hot sun fighting weeds, bugs, the neighbours' cats and dogs, bulb eating squirrels and the big feet of hydro men tramping down the line. Most of my work was done in the long summer dusk on the kitchen table at our cottage with the windows thrown open to the night winds, watching the moonrise over the

lake and listening to the crickets singing—and the goofy flying squirrel crashing into trees. Or the warm summer rain on the roof and in the leaves. Wintertime and I have cleared some book shelves in my den and cultivate my garden in comfort, not worrying about sunlight—the fungi don't need it—or dry air, since each is snug in its own sealed dish.

Sitting in the woods, listening to the bird song and silence, question after question came to mind. Why does the birch polypore grow only on birch? Is it because the birch supplies an essential nutrient that this fungus needs and that other trees do not, or does the birch have a fungicide that discourages other fungi but that this species has adapted to. The same question could be asked of other specializing fungi such as the hemlock varnish shelf. Would I be wasting my time trying to grow these species in pure culture? Would their enzymes be so specialized as to be unusable? And after the bracket fungi finished with a tree, what other kind of fungi (or bacteria) take over and complete the task?

And there are deeper questions that affect the whole living systems of the world. Is the tree a passive victim of fungus attack? Perhaps not. Perhaps the tree encourages and guides the fungi. Nutrients are always in short supply in forests because the heavy rainfall of forested areas washes them away. And what nutrients are left are locked up in the tissues of the trees themselves. It would be in the tree's best 'interest' to control the rate of rotting of its leaves, dead branches and heartwood so that nutrients would be released at a controlled rate, quickly enough for root uptake but not so quickly that they would be washed away before being used again.

Trees and fungi have been together from deep time—a third of a billion years. Surely most species are now living in harmony.

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NOTICE ON NEWSLETTER SUBSCRIPTIONS FOR STATE MEMBERS

If you wish a subscription to "On The Fringe" they are available at the rate of \$7.50 per year. Send your check made payable to: Native Plant Society, 6 Louise Drive, Chagrin Falls, Ohio 44022.

EDITOR'S NOTE:

The following is reprinted from the "The Ohio Lepidoptirest," Volume 9, No. 2 dated June, 1987. While it refers to butterflies, the argument is the same for plant species. We include the article because it reflects one opinion in the ongoing dispute about what constitutes a native plant and why that is important.

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THE ETHICS OF INTRODUCING SPECIES by John A. Shuey

Over the past few years, I have heard a lot of discussion about introducing various butterflies and moths to Ohio. These discussions usually revolve around species which are presumed to be extinct in Ohio, or species that have not been reported from here, but for which "proper" habitats seem to exist. I find myself arguing often and strongly against introducing species for several reasons.

In cases where the species is presumed to be extinct in Ohio, I often hear that reintroducing the species to Ohio is simply an act of replacing a missing entity. But is it? In the case of Ohio's two most famous "extinct" butterflies, **Lycaeides melissa samuelis** and **Neonyumpha mitchellii**, the populations in Ohio were probably genetically distinct from most other populations around Ohio. There is ample evidence that Ohio populations of both these species were cut off from those of adjacent states nearly 5,000 years ago, and during that period of time probably developed unique genetic adaptations. Thus, importing **mitchellii** from southern Michigan is the equivalent of introducing Andean Condors to southern California.

One can argue that there is no real evidence that these species are really extinct in Ohio. The only known Ohio populations of **samuelis** probably became extinct last year, but that means very little considering that most people thought it was gone from Ohio over 10 year ago. The point is, there are several hundred square miles of potential habitat available in northwestern Ohio that needs to be closely looked at before final pronouncements are made. The same situation exists in northeastern Ohio for **mitchellii**. There are scores of small wetlands that have never been searched for this species, yet most people have written this species off in Ohio.

Once a species is introduced to Ohio, it casts doubt on the authenticity of any "newly" discovered populations. This has two implications. First, butterfly distributions are supposed to have biological meaning. For example, **samuelis** has never been reported in Ohio outside of the Oak Openings of Lucas County. This is an easily understood distributrion which is based on its lupine host plant which occurs only on very sandy soils. Old sand dune complexes such as the Oak Openings are rare in Ohio, and lupine is known from just a few counties. Thus the distribution of **samuelis** is a reflection of several factors: soil type, lupine distribution, and **samuelis'** ability to colonize otherwise suitable habitats. All butterfly distributions, no matter how common the species, are controlled by similar factors, even if they are not so apparent. One of the most fascinating areas of biology involves analyzing distribution patterns to discover patterns controlling them. By artificially moving

species around, biogeographers' jobs become more difficult, and butterflies less important. Certain introductions are easy to spot and ignore (e.g. introductions from California) but introductions of species from adjacent states are more plausible. It would be great biological news if **Speyeria diana** recolonized Ohio on its own, but it is irrelevant and misleading if someone secretly introduces it.

The second implication is more disturbing. Many butterflies are rare because their habitats are also rare. In the case of **samuelis** and **mitchellii**, the discovery of native populations would be of enough significance that the state or some other conservation organization would probably purchase the habitat to preserve it forever. However, these organizations have no interest in preserving introduced species. How could we convince these organizations that a given population is native to Ohio, if a nearby population is known to be introduced? After all, butterflies can fly. My greatest fear is that native populations of one of these two species will be lost to a housing development because we cannot prove it is part of Ohio's fauna.

Finally, in many cases it is simply against the law to introduce insects to certain areas. It is against the law to introduce any species to a State Nature Preserve. The introduction of species from outside Ohio undermines the credibility of lepidopterists with state agencies, and could make it difficult for all of us to obtain collecting permits and enjoy the good rapport we have worked so hard to build.

When are introductions justified? Only in cases where they serve to increase the chances of survival of critically endangered species or population segregates. For example, while there are no known populations of **samuelis** in Ohio, part of the Oak Openings ecosystem extends in extreme southern Michigan and the butterflies survive in at least one locality there. This population is part of the series of populations that once occurred in Ohio, and should be genetically identical. In order to help preserve the Oak Openings populations, these Michigan populations could and should be used as a source for new populations.

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CHERISH PLANTS! by David B. Owens

A simple statement of fact is basic: without plants, we should all die.

First of all, the oxygen we breathe is supplied by plants. In the earliest years of our planet, there was no oxygen to breathe; it came only with the evolving of plants. On Mars, where there is no evident plant life, there is no oxygen in the atmosphere.

Our basic diet rests squarely on plants. The juicy steak many enjoy is possible only because there are grasses and grains to feed cattle. Although many of the clothes we wear are made of synthetics—which are principally made from coal which in turn can be traced back to plant life—the best warm weather clothing is still cotton and our warmest winter clothing is wool from sheep that grazed on plants.

How would you like to face the morning without a bracing cup of coffee or tea? No plants, no fruits or salads; no plants, no toast or roll or bagel or muffin or croissant. The diet of the entire world rests squarely on three cereal grains: corn,

wheat, and rice.

All tropical areas of the world were virtually closed to exploration and development until we learned from the Incas of the power of cinchona bark to fight malaria. A vital step toward the defeat of leukemia was not discovered until this century—the rosy periwinkle of Madagascar, from which two powerful drugs were developed. The outlook of many heart patients would be grim indeed without the discovery of digitalis from garden foxgloves, now synthesized as lanoxin.

The tragic fact is that between now and the year 2000, an estimated 25,000 plant species will be extirpated before only about ten percent of them will have been studied as potential sources of medicines and new foods for a hungry world.

The motto of every reasonable and informed person should be, "Cherish plants!"

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MILKWEED: A PLANT OF MANY USES

In spring, tender shoots of milkweed can be boiled and eaten like asparagus. In autumn, roots are collected and marketed in small amounts for the medicinal drugs they contain — remedies for long trouble and rheumatism.

The Indians made twine from the coarse, strong fibers in the bark of the stalk. They produced sugar by shaking the honeydew from milkweed blooms in early morning and drying it.

Dead stalks with picturesque empty pods are favorites for making winter bouquets and art objects.

Common milkweed bears clusters of dull purple flowers with a heavy odor which is attractive to bees and butterflies. Each flower of the cluster has an elaborate trap to catch the legs of these insects and remove any pollen they may carry.

Sometimes the insect cannot escape and pays with its life for the nectar it came to drink.

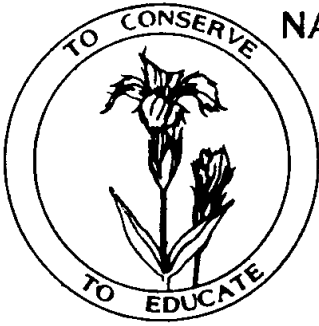
Each cluster of blossoms is followed by one or two large warty pods with a seam along one side. The seam pops open when the pod becomes ripe and dry.

Inside is a closely packed roll of several hundred flat brown seeds arranged like scales on a fish, each with a folded "parachute" of fine, silky fibers. Gradually, these parachutes open, releasing seeds to the fall winds.

During wartime, hundreds of tons of milkweed pods were gathered by school children and the silky fluff inside was processed as a substitute for kapok, used to pad life jackets and aviator suits.

Butterfly weed, also called pleurisy root, has bright orange flowers and is considered the most beautiful of the milkweeds. Unlike the others, it lacks the milky juice.

Indians used roots of butterfly weed for medicine and cooked the green pods with their buffalo meat, much as we used green peppers.



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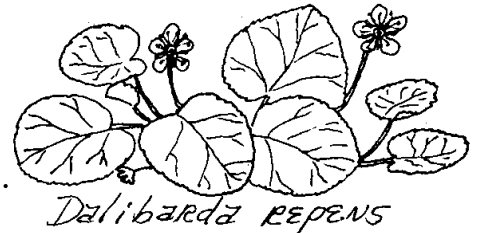
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