
HALIFAX • FIELD • NATURALISTS

Objectives To encourage a greater appreciation and understanding of Nova Scotia's natural history, both within the membership of HFN and in the public at large. To represent the interests of naturalists by encouraging the conservation of Nova Scotia's natural resources.

Meetings On the first Thursday of every month at 8:00 pm in the auditorium of the Nova Scotia Museum of Natural History, 1747 Summer Street, Halifax. Meetings are open to the public.

Field Trips Are held at least once a month, **and it is appreciated if those travelling in someone else's car share the cost of the gas.** Everyone, member or not, is welcome to take part in field trips.

Membership Is open to anyone interested in the natural history of Nova Scotia. Memberships are available at any meeting of the society, or by writing to: Membership Secretary, Halifax Field Naturalists, c/o NS Museum of Natural History. New memberships starting from September 1 will be valid until the end of the following membership year. The regular membership year is from January 1 to December 31. Members receive the HFN Newsletter and notices of all meetings, field trips, and special programmes. The fees are as follows:

Individual \$12.00 per year
Family \$18.00 per year
Supporting \$20.00 per year
FNSN (opt.) \$5.00 per year

Executive 1995

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HFN is incorporated under the Nova Scotia Societies Act and is a member organisation of the Federation of Nova Scotia Naturalists and of the Canadian Nature Federation. It is registered for federal income tax purposes. Official receipts will be issued for individual and corporate gifts.

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This Issue (No. 79): P.4, 5, & 12-R. T. Peterson, *A Field Guide to the Birds East of the Rockies*, Fourth Edition; p.6 & 7-collection D. Butters; p.8-Marcel Cornect; p.15-tide table courtesy Dept. of Transport; back cover-Evelyn Hofer, *Perennials*, Time-Life Books, 1972



HFN NEWS AND ANNOUNCEMENTS

GOOD-BYE TO ROY JOHN

Roy John, our able and personable president, has left for Saskatoon to take up an exciting post in his field of study, nuclear chemistry. A very experienced naturalist, he had been active in all field clubs wherever he lived, and continued the tradition here in Halifax. No doubt he will find another one in Saskatchewan!

Having a solid, industrial background gives Roy a unique perspective for a naturalist. When he first joined HFN, he injected friendly enthusiasm and fresh ideas into the club's activities. He went on all HFN field trips, not limiting himself to his favourites (birds). He organised and took part in the Loon Watch, and also took part in other projects needing sustained observation. He became HFN's representative to FNSN, before becoming their Vice-President.

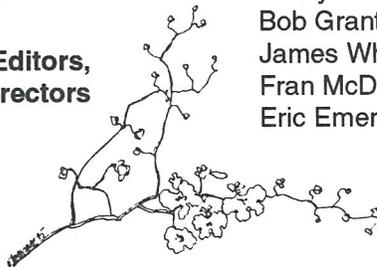
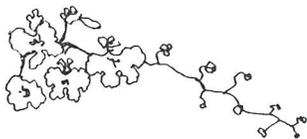
When Roy became HFN's President in 1994, he invited the Lieutenant Governor to become its sponsor and made the club more visible in other ways as well. The projects he successfully initiated were usually then delegated to others, thus increasing member participation.

Roy and Stephanie John will miss their beautiful home in Portugese Cove. In its natural setting and unmatched view over Halifax Harbour approaches, they spent hours observing whales, seals, and birds. It was a perfect place for Stephanie to pursue her avocations of weaving and rug-hooking, and for Roy to grow unusual vegetables and herbs.

The household includes their dog, Jenny, who is also an avid field-tripper; a cat; and a talking bird who enjoyed Executive meetings when held there.

Thank you Roy John.

— The Editors,
on behalf of the Board of Directors



HFN IS ON THE INTERNET!

Linda Payzant has set up a Home Page for HFN on the Chebucto Community Net. This is an Internet entry which describes the Club and its activities and lists our contact numbers. Its Internet address is:

<http://ccn.cs.dal.ca/Recreation/FieldNaturalists/fieldnat.html>

BICYCLE TRAILS

Clean Nova Scotia Foundation has produced a map of cycle trails in the Metro area. This can be obtained by mail from the Foundation (ph 902-420-3474) or picked up at most cycle and outdoor recreation shops.

THANKS

Thank you to everyone who has contributed to this newsletter, especially to Marcel Cornect for his article on Pitcher Plant inquilines, to Rhea Mahar for helping to prepare the article on Urban Naturalisation, and to Bob McDonald, Bernice Moores, and Cathy Fulton Strugnell.

CONSULTATION ON THE FUTURE OF MCNAB'S ISLAND

The fate of McNab's and Lawlor's Islands as a potential provincial park will be discussed at a public meeting later this summer.

The Board of Directors intends to present HFN's concept for this park at the meeting, but would like to hear our members' ideas first. We will be holding a 3-hour workshop to create a "naturalists' vision" of the islands. If you'd like your concerns included, please come.

Date: Wednesday, 5 July 1995

Time: 6.45 for 7 pm.

Place: To be announced, or contact Colin Stewart, Conservation Issues Director, 466-7168

WELCOME TO NEW AND RETURNING MEMBERS

Launa Lunn
Marilyn Glenn
Bob Grantham
James White
Fran McDonnell
Eric Emery

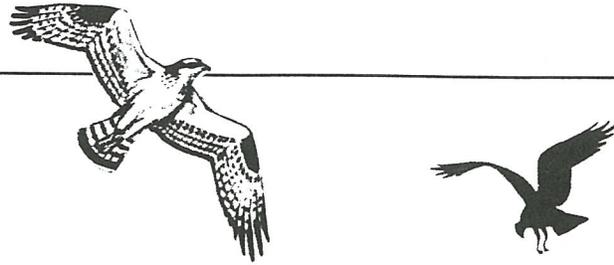
Maidenhair
Fern



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SPECIAL REPORTS



HFN AWARDS TO SCIENCE FAIR CONTESTANTS

For the past several years, the Halifax Field Naturalists have presented awards at the annual Halifax-Dartmouth-Bedford-Halifax County Regional Science Fair, and this tradition continued in 1995. The 19th Regional Science Fair was hosted by Halifax West High School on March 30 and 31. In all, 111 projects were entered by students from Junior High (Junior Division) and Senior High Schools (Senior Division). HFN offers awards for the best projects relating to natural history in each Division.

The Junior Award winners were Seela Amaratunga and Jennifer White from Sacred Heart School (Grade 7), for their project "Gel extraction from Seaweed." Seela and Jennifer were particularly interested in the development of low technology methods for the extraction of naturally-occurring, commercially-valuable gels which could be utilised by developing countries with only modest financial outlay. A neat project and a great idea!

The Senior Division Award winner was Michael Shaver from Prince Andrew High School for his project "Oleophilic Properties of Canadian Sphagnum and its application to Oil Spill Recovery Systems." Michael added a cationic surfactant to a peat-moss/water slurry and squeezed the mixture under 11 tonnes of pressure to extract the water; When dried, this produced a board which was capable of absorbing up to five times its own weight in oil. Could peat moss have saved us from the Exxon Valdez Disaster?

Both projects also received other awards: Seela and Jennifer won the Division A Award for excellence in science and service for the Public, donated by the International Development Research Centre. Michael won first prize overall in Division D (Grade 12) and will be representing the Region at the Canada-wide Science Fair to be held this year in Whitehorse, YT.

Judging and presentation of the HFN Awards was carried out by former HFN, Director Bob McDonald. The three students were each presented with an Award Certificate, a gift certificate for the Wild Bird Company Store, and an HFN brochure.

Well done, Seela, Jennifer, and Michael!

— **Bob McDonald**

A BRIEF 1991 TO 1994 HISTORY OF EFFORTS LEADING TO THE PROCLAMATION OF THE OSPREY AS THE PROVINCIAL BIRD OF NOVA SCOTIA

Autumn 1991 — Search for conference venue was begun.

March 1992 — HFN issues invitation to Canadian Nature Federation to hold 1994 Annual Conference in Halifax. CNF accepts invitation.

Autumn 1992 and Winter 1993 — Interested individuals meet to discuss organizational requirements for 1994 Canadian Nature Federation Conference.

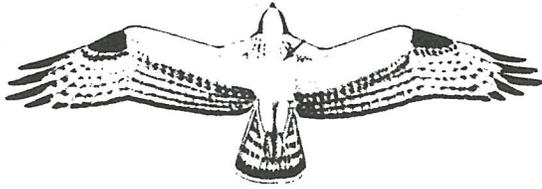
March 9, 1993 — First meeting of Conference Organising Committee.

Winter & Spring 1993 — The conference as a venue for the official proclamation of the Osprey as our provincial bird was discussed. It was hoped a three-fold benefit would result: 1) the province would finally have an avian symbol, 2) the conference would gain a little publicity, 3) The Nova Scotia Bird Society and the Nova Scotia Museum would receive recognition for their past efforts in this regard.

Spring & Summer 1993 — Conference committee members gather procedural information, as well as addresses, telephone and fax numbers for ministers who might be involved. Included are the ministers of Education, the Environment, and the Premier. During the Summer these are made available to committee members and the Executive of the Nova Scotia Bird Society, requesting letters be written for the Osprey designation.

September 7, 1993 — Premier responds to letters, including the August 25th letter of Carol MacNeill, President of the Nova Scotia Bird Society. HURRAH!

January 1994 — Premier's letter appears in 'Nova Scotia Birds'. HURRAH!



Some 12 months later!

Winter 1994 — Throughout the conference planning, 'The Osprey Pin', its design, and various quotations are discussed. The possibility of the museum producing and selling a pin is explored. However, it is suggested to Catherine MacDonald, Executive Assistant to the Minister of Natural Resources, that the Minister hand out pins at the Conference Ceremony (we had told her that John Cashore, B.C. Minister of Natural Resources, had done something similar at the 1993 CNF conference at Vernon).

Bob McDonald, Conference Chair, invites Premier to attend conference and to proclaim bird. Premier can't attend. Chair invites Don Downe (Natural Resources Minister), and Robbie Harrison (Environment Minister), to attend Conference.

At the suggestion of Joan Waldron (Conference Publicity), Bob Dickie, President of NSBS, sends a copy of the issue of 'Nova Scotia Birds' containing the Premier's letter to Gerry Clark, Chief of Staff at the Premier's office.

February and March 1994 — We now know that the Department of Natural Resources will be responsible for introduction of the legislation. **BUT NO NEWS OF ANY ACTIVITY IS FORTHCOMING!**

April 1994 — Spring session of the Legislature (the last opportunity to have legislation in place in time for the CNF conference) is in full swing. **STILL NO ACTIVITY ON 'THE BIRD'!**

However, we now are aware that the Department of Natural Resources (not the Department of Education) will be responsible. Conference committee again prepares a list of names and addresses of appropriate government officials for another round of letter writing and telephone calls. Conference organising committee makes copies of this list available to members of the Nova Scotia Bird Society at their April 28th meeting; to the Halifax Field Naturalists at their May 5th meeting; to field trip attendees of both groups; and to friends, relatives (some no longer residing in Nova Scotia), neighbours, etc., etc., etc.

Mid May, 1994 — Letters of response roll in from

the Premier and various Ministers. The conference committee had requested the Leader of the Opposition and the Leader of the NDP to support the legislation. Responses from them assure us of their support and offer procedural assistance as well.

May 19, 1994 — **LEGISLATION PROCLAIMING THE OSPREY THE OFFICIAL BIRD OF NOVA SCOTIA IS INTRODUCED IN THE HOUSE OF ASSEMBLY. HURRAH!**

13 Months later!

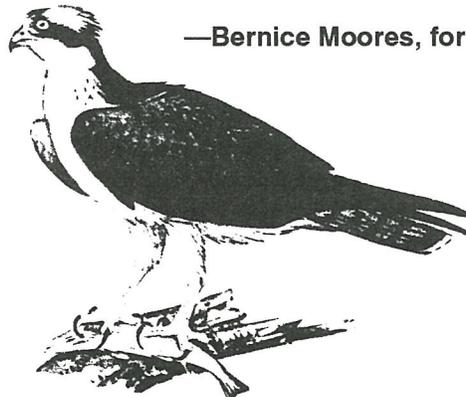
June 30, 1994 — **OSPREY PROCLAIMED THE OFFICIAL BIRD OF NOVA SCOTIA BY THE LIEUTENANT GOVERNOR. HURRAH!**

August 4, 1994 — The Minister of Natural Resources, Don Downe, announces the proclamation and unveils a plaque of a lapel pin featuring an Osprey, at 1:30 p.m. on the first day of the 23rd CNF national conference. The stuffed Osprey which the museum had had in waiting for at least two years is on display. Bob Dickie, President of the Nova Scotia Bird Society, was invited to organise and chair this segment of the conference. In addition to giving a brief and often humorous account of the Bird Society's long campaign to obtain a provincial bird, he had arranged for past presidents of the society to attend. As many as could be were there for the happy occasion.

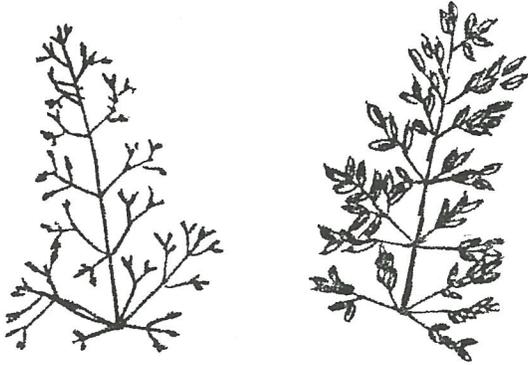
The Minister provides a supply of the specially-produced pins to the conference registrar for distribution to participants. He makes a bit of a production of pinning 'pin #1' to Bob Dickie's lapel, and 'pin #2' to his own.

The members of the organising committee of the 1994 CNF Conference are delighted at the outcome of the efforts of all who were involved. All of our objectives were met. The Nova Scotia Bird Society and The Halifax Field Naturalists (both affiliates of CNF), the 1994 Conference, and the Nova Scotia Museum all received recognition for their efforts. **AND, WE HAVE A VERY SUITABLE PROVINCIAL BIRD!** Maybe Canada Post will soon produce a series of 'provincial bird stamps'!

—Bernice Moores, for the CNF Conference,
hosted by HFN



SPECIAL ARTICLES



BREAKING UP THE ASPHALT

On June 1, Rhea Mahar talked to HFN about Urban Naturalisation of school grounds, and by extension, back yards and urban watersheds. This project is supported by The Evergreen Foundation in Canada, where it is under way in Ontario and Nova Scotia. England, Sweden, and New Zealand are ahead of us. The idea is to reverse the spread of asphalt in school yards, thereby providing pockets of native habitat in cities. At the meeting, the editors were asked to include a report in the summer Newsletter while there is still time to act on it, so this article has been prepared from Rhea's notes, and includes other material which was discussed that evening.

Our schools are already promoting Green activities, and learning how to 'Reduce, Re-use and Recycle'. Ten schools in the area have already started to return part of their playgrounds to a natural environment or to start gardening projects, usually in combination with some gardening project such as the sale of ladybugs (LeMarchant-St. Thomas School). The impetus starts with one or two enthusiastic teachers or parents and quickly spreads to other backyards and streetscapes. The planning includes composting organic material and reusing all sorts of throw-aways.

The first step is to assess the site and identify its habitat-type and surroundings, and its history. Barrens, woodland, acid bogs and lakes, alkaline ponds, and intervalles are the common habitats in Nova Scotia, modified by inland or coastal location, and south-west, north-east or other position. If there are islands of woodland or field adjacent to the site boundaries, new landscaping could be an extension of this, and corridors of woodland or field might be provided to join patches of wild habitat. For example: Bayers Lake Industrial Park has some designated wild spaces which are more valuable at present because of adjacent sites which are still

undeveloped — there is still time to plan for strips of woodland which would keep these areas joined.

Some sites have muddy patches which can be turned into healthy wetland — St. Stephen's School, Dartmouth, is turning its wet patch into a blueberry-cranberry bog. Some sites slope, and can be terraced. Some were once agricultural, and their new plantings reflect this: Old Orchard School, in Ontario, is planting clusters of fruit trees on the lawns. A school near Hamilton, Ontario, is planting an arboretum.

Next, we have to decide what people need in open spaces. Playing fields are necessary but can be overdone and a manicured lawn is required for croquet, lawn bowling, and so forth. Otherwise, Rhea suggests replacing lawns, which are hard to keep neat and use a lot of chemicals, with turf of local low-growing plants, or a prairie of endangered grasses (as on one Ontario site). We need food — some countries encourage the production of meat in gardens — goats, rabbits, chickens, pigeons — but Canada does not. Then we grow vegetables, herbs, and flowers; the last for their beauty and sometimes their fragrance. We should choose garden plants related to native species which will satisfy aesthetic needs and are likely to thrive.

What we do is regulated by bylaws, which may have to be reconsidered and perhaps changed; for example, those on keeping small livestock. There are regulations governing pools and fountains, especially around schools; for instance in one jurisdiction the basins may not be deeper than 17 inches. In fact, there have been no accidents with properly built and supervised ponds on English school grounds, where there are many of them.

Should teachers' training curricula be changed? The Teachers' Training College in Truro used to include gardening and natural history in its curriculum, and a very good Nova Scotia gardening text was available — sometimes still found in second-hand book stores.

The first step on the site is to divide the space into enclosures, with paths or trails around them to direct traffic; the trails can be marked simply with boughs pruned from city trees or with stone edging and gravel paths. Raised beds can also be formed. There ought to be water, even if only a reflecting birdbath. There should also be native plants forming an understory among trees which is usually missing in urban spaces; this will encourage mammals, birds, and butterflies.



It's a pity we cannot include some of Rhea's slides here! She showed a sidewalk hard pan turned into a raised garden bed with old telephone poles; Old Orchard School's new orchard; the arboretum at another school; garden ponds with high rims to keep toddlers out; two kids (the goat kind) in a lean-to shed against a wall. There was a school garden crammed with raised beds bounded by everything from planks to a wading pool with inflatable sides. In the middle, a bird bath, and everywhere, children tending, watering, and just looking. Incidentally, telephone poles, railroad ties and treated lumber are not recommended because they leach chemicals; the longest-lasting natural woods are cedar, redwood and larch.

The next step is to identify plants growing in similar, undisturbed land, and try to obtain them. Wild plants should not be moved unless they are threatened by immediate development or erosion; such transplants often fail anyway. Seeds from wild plants can be collected and sown, or raised as transplants. Some can be bought in nurseries, and this is where related cultivars can be found. Faculty members at the Agricultural College in Truro are looking for native plants that would do well in gardens, and are mass-producing cultivars by tissue culture. These will be offered to commercial growers for development. We must find out how this project is going — Carol Goodwin and a colleague talked to HFN about it quite recently.

This is a project right up HFN's alley, with lots of scope for research in natural history combined with gardening and some urban activism as well! Already Halifax City gardeners are interested, and so are some school boards. Anyone wanting to talk to Rhea Mahar can find her through the Nova Scotia Museum of Natural History at 424-3563 (until the end of June) or 424-7370.

Rhea suggested some plants that might be grown:

For barrens: A number of hardy plants grow over rocks and from cracks for example, three-toothed cinquefoil (*Potentilla tridentata*). To attract wildlife, nesting birds and various insects, specific animals and the plants needed to attract them will vary according to where one is located. We do not know what plants are needed by most Nova Scotian butterflies — here is a chance for research.

Pink-earth Lichen (*Baeomyces roseus*) from exposed ground, and native mosses from similar places might be introduced.

Wetland/pond: Water-lilies — there are many similar cultivars which can be used instead of the native *Nymphaea odorata*; the Yellow Water-lilies, (*Nuphar* spp.), are also good choices.

Bladderworts (*Utricularia* spp.) are common in coastal lakes and bogs; they are carnivorous.



Round the edges — Sweet Flag (*Acorus calamus*); Blue Flag (*Iris versicolor*); Sedges (*Eleocharis* and *Scirpus* spp.); grasses; rushes (*Juncus* spp.); Sweet Gale (*Myrica gale*); Spicebush (*Clethra* sp.), a rarity in Nova Scotia but cultivated in Europe so may be available commercially; Leatherleaf (*Chamaedaphne calyculata*), from cool peat bogs.

To be avoided — Cattails (*Typha* spp.), which quickly take over!

Native arboretum: Evergreens — White Pine (*Pinus strobus*), Spruces (*Picea* spp.), Fir (*Abies balsamica*), Larch (*Larix laricina*). Deciduous trees — Red or Swamp Maple (*Acer rubrum*), hardy everywhere; Poplars (*Populus* spp.); Wire Birch (*Betula populifolia*), Alders (*Alnus* spp.). Many other possibilities; check species in Trees of Nova Scotia, and look around the locality.

To conceal fences: The only native vine is Catbrier (*Smilax rotundifolia*), only hardy in the south-west; non-native options are Boston Ivy (*Parthenocissus tricuspidata*), English Ivy (*Hedera helix*), and Virginia Creeper (*Parthenocissus quinquefolia*).

For windbreaks: White Spruce (*Picea glauca*), Fir and poplars are fast growing and often used; a number of small shrubs are possibilities, for example, Sweet Fern (*Comptonia peregrina*), and Meadowsweet or Hardhack (*Spiraea latifolia*).

To attract birds: American Mountain Ash (*Sorbus americana*) is a small tree with attractive berries; there must be others — consult the N.S. Bird Society.

Berries for food: Pin Cherry (*Prunus pennsylvanica*); Choke Cherry (*P. virginiana*), Indian Pear (*Amelanchier* spp.)

Wild flowers for spaces: For open, grassy areas and fields — Goldenrod, (*Solidago*; many spp.); Aster (*Aster* spp.); Pearly Everlasting (*Anaphalis margaritacea*); Pussy-toes (*Antennaria* spp.); Three-toothed Cinquefoil (*Potentilla tridentata*).

Forest flowers are harder to grow and are best when obtained as cultivars.

References:

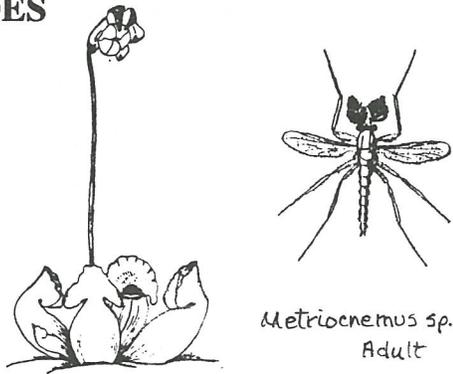
Saunders, Gary L., 1970: 'Trees of Nova Scotia — a Guide to the Native and Exotic Species'. Published by the NS Dept. of Lands and Forests

Merrilees, Bill, 1989: 'Attracting Backyard Wildlife — a guide for Nature Lovers'. Vancouver; Whitecap Books

The Xerces Society, with the Smithsonian Institution, 1990: 'Butterfly Gardening; Creating Summer Magic in Your Garden'. Vancouver, Whitecap Books

— Compilation by Ursula Grigg

PITCHER PLANT MIDGES AND MOSQUITOES



Part of the uniqueness of our local Pitcher Plant (*Sarracenia purpurea*) is owed to its well-known ability to trap insects in its fluid-filled, pitcher-like leaves. Trapped insects eventually drown and their remains serve as an important source of nutrients for the plant. What many people may not be aware of, however, is the surprising diversity of *living* organisms that occupy pitcher plant leaves. Their role in the life of the pitcher plant is equally important.

The living inhabitants of pitcher plant leaves, collectively described as inquilines, include bacteria, protozoa, mites, and insects. Two of the most conspicuous insect inquilines are the larval stages of a midge (*Metriocnemus knabi*) and a mosquito (*Wyeomyia smithii*). Depending on the location and time of year, pitcher plants contain about three mosquito larvae and sixteen midge larvae per pitcher.

The worm-like midge larva feeds on the carcasses of trapped insects that end up at the bottom of the pitcher. The mosquito larva, on the other hand, feeds by filtering microbes and small pieces of organic matter from the pitcher fluid. Over the spring and summer, larvae of both species pupate and then emerge as adults. After mating, they deposit their eggs in newly opened pitchers to continue the cycle. Pitcher plants commonly grow on bogs — places where soil nutrient levels are low. To compensate for this deficit, they take up nutrients released from the decaying insects trapped in their leaves. Enzymes secreted by the plant were thought to aid this process but no such enzymes have yet been found.

Instead, research over the past few years has shown that inquilines are the key to understanding how nutrients are transferred from trapped insect to plant. Inquilines play a major role in the breakdown of trapped insects. As they feed, the byproducts of their metabolism are released into the surrounding pitcher fluid to be taken up by the plant. Nitrogen

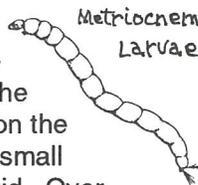
and carbon dioxide are two such by-products critical for pitcher plant growth.

Insect inquilines like the midge and mosquito play a special role. Because of their size they can 'process' trapped insects more quickly than their smaller counterparts. This increases the availability of nutrients to the plant over a relatively short period of time.

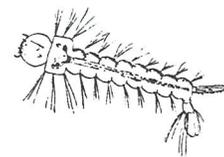
At first glance, it seems that the plant is at a disadvantage in having part of its nutrient source consumed. The apparent disadvantage, however, is outweighed by the advantage of having carbon dioxide and nitrogen made available at a faster rate.

Just how important are insect inquilines to the pitcher plant? It has been suggested that their presence significantly enhances the plant's ability to sustain photosynthesis, especially during the summer months (Bradshaw and Creelman 1984). It is during this time that higher light levels and temperatures promote higher rates of photosynthesis within the plant, thus increasing the demand for carbon dioxide. Fortunately, these conditions also promote higher metabolic rates among inquilines, increasing their output of the needed chemical.

Pitcher plant leaves are miniature ecosystems fuelled by drowned insects. As with any ecosystem, the living things making it up are interdependent. For example, the relationship between pitcher plants and their inquilines is clearly mutualistic, since both sides benefit.



Among living inhabitants of pitcher plant leaves, other kinds of relationships exist. Research has shown that mosquito growth, for example, is enhanced by the presence of the midge, but not vice versa. This is because of the feeding methods employed by each species. As midges feed, they also break up the carcasses of trapped insects into smaller pieces. Small pieces not consumed by midges promote microbial growth, and so provide food for mosquitoes.



Weyomyia smithii Larvae

Weyomyia smithii ♀ Adult

Head (1994), who conducted research on pitcher plant midges and mosquitoes in Gros Morne National Park, called this kind of relationship 'processing chain commensalism.' In effect, midges are food processors for mosquitoes, and while the mosquito benefits, the midge is not harmed.

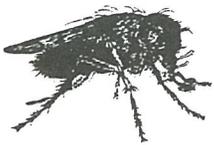
By occupying the leaves of pitcher plants, insects and other inquilines have taken advantage of a reliable food supply. Pitcher plants in turn can flourish in habitats that otherwise would not be suitable for them.

References

Bradshaw W.E. and A. Creelman, 1984: Mutualism between the Carnivorous Purple Pitcher Plant and its Inhabitants. *Am. Midl. Nat.* 112(2): 294-303

Head S.B., 1994: Pitcher-Plant Midges and Mosquitoes: A Processing Chain Commensalism. *Ecology* 75(6): 1647-1660

— Marcel Corneet



THE HOUSEFLY

The housefly, *Musca domestica*, is one of the most agile flying beings in the animal kingdom, even if it was next to last in evolving this skill, following the beetles (300 million years Before Present), pterosaurs (150 m.y. B.P.), and birds (130 m.y. B.P.), and preceding only the bat (an *arriviste* 15 m.y. B.P.). It carries on-board gyroscopes, has spring-release clasps to unhinge its wings, a catapulting undercarriage, and can even generate its own high-octane fuel! What makes it even more impressive is that this creature does not look out of its swollen giant eyes at any world we would recognise.

For the fly sitting there on the kitchen table, reflexively stroking its front legs to clean them, and regurgitating some of the nice liquified dog excrement it has lapped up earlier outside, the fluorescent fixture in the kitchen is doing some very odd things. The bulb shines over the kitchen for a while as bulbs are supposed to, but then it suddenly cuts out, leaving the kitchen and everything in it in total darkness for a long interval until it just as suddenly lights back up again.

To the human occupant of the kitchen, no such stroboscopic flashes take place. The reason is that we can only tell two events apart if there's more than

1/20th second between them. That's why movies are called movies, even though they are just a series of still shots projected a bit faster than that key 1/20th second interval. A fly in a movie theatre would suffer no such delusion; its nervous system operates so fast that it can detect distinct events happening only 1/200th second apart. That would make a projection of Indiana Jones and his derring-do appear to be a tedious travelogue slide show, with long intervals of dark while the frames were advanced. To the fly under our 60 cycle per second lighting it would be like our impressions in a disco with flashing strobe lights freezing us in momentary poses.

The fly would be content to stand on the table for ages, stroking and dribbling and watching this surreal slow motion show. But when the chef spots the fly on the table, when he decides to take out all his aggrieved feelings and obliterate the accursed fly, then everything changes. Then the fly has to depart. It doesn't do this immediately however, for the fly's vision, though channelled through 4,000 crystalline eyes, is not really good enough to make out fine details over a distance. It's only when the human has stalked quietly to the table, raised his hand and started bringing it down in a furious, murderous sweep that the fly gets a clear impression that its presence is no longer recommended. It can usually get away with its low vision because it's fast. But can a fly get away when a first degree fist has already started on its way?

A human hand swinging down at top speed will take at least 1/60th second to cover the last three inches - the measured speed of a jab by Sugar Ray Leonard in his prime - and more likely 1/30th second or even more. This the fly clearly sees coming, flashed into bright light by the slowly churning overhead fluorescent bulb, and without due haste sets about preparing for takeoff.

A fighter pilot scrambling his jet has nothing on the simple housefly, its technique evolved over 80 million years. First its brain works out the trigonometry of the descending hand so it can tell in which direction survival lies. Then starter muscles on the outside of its chest get their first signals to pull in the hard sheet of fibreglass-like material that forms the point of attachment for the wings. Those wing-fasteners click inward and the wings are ready to be moved. That requires fuel of course, and so the fly — still in the interval while the furious hand is crashing the last two inches tableward — neatly opens its fuel valves. Not gasoline but high-octane sugar streams into the wing muscles joined by blasts of oxygen pumped in through silvery air hoses. Only when the air and fuel are properly under way does the fly send a stronger hit to its starter muscles. The wings are pulled all the way down like a propeller

plane still on its chocks getting its first engine-sputtering rev.

There is no time for a running start so the fly just tightens its thigh muscles, crouches slightly, pushes straight up, thus catapulting itself into the air. The ungainly bug-eyed creature floats at first, like a helicopter hovering above an aircraft carrier deck until its wings pick up enough speed to carry the weight. Then it turns sideways, retracts its landing-carriage legs to reduce air resistance, and accelerates fast, upward and away. The descending hand smashes on to the table, and a strange cry of Anglo-Saxon origin sweeps out of the human mouth.

If a fly could travel upside-down, landing on the ceiling would be easy. It would just have to put its

feet out. But flies, like most airplanes, lose their lift when they go through the air bottom side up. Proceeding just under the ceiling, the fly puts its two front legs up over its head and in front of it. It is the position Superman takes when exiting phone booths, and it is ideal for what's to come. As soon as those two front legs contact the ceiling the fly will aerobatically tuck up the rest of its body and let momentum rotate it to the ceiling. The manoeuvre leaves the fly's body suspended upside down, without it ever having to do a full roll (*this solves the old riddle of how does a fly land on the ceiling.*)

— Rewritten by C. Shupe, co-editor for the Catherine Trail Naturalists' Club Newsletter, #88, May 1994, from 'The Secret House,' by David Bodanis, available in the Beaconsfield Library



FIELD TRIPS



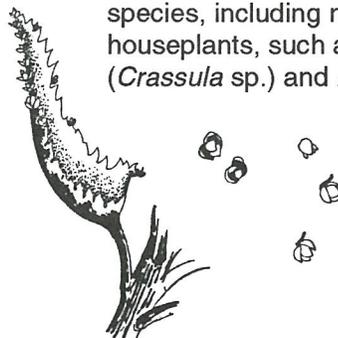
DALHOUSIE BIOLOGY DEPARTMENT GREENHOUSE

DATE: Saturday, 25 February 1995
PLACE: Dalhousie University, Life Sciences Centre
WEATHER: -8, overcast, snow flurries, windy;
later, bright sun
LEADER: Pierre Taschereau
ATTENDANCE: 18 adults

It was a treat to enter the warmth and light of the Dalhousie Greenhouse after a wintry walk over slippery sidewalks. The penthouse location on the eighth floor of the Life Sciences Centre affords a spectacular view over the south end of Halifax, with views across the Northwest Arm and Point Pleasant Park. The Greenhouse provides a home for a great variety of plants, both foreign and native. Different rooms emulate a diversity of climates. These plants are not grown for ornamental or commercial purposes, but form a study and research collection for Biology students. Several examples of each species may be kept, but they are not propagated in any great number, unless there are germination studies underway. Several trays of plants were set aside with notes warning that experiments were in progress and the plants were not to be disturbed.

We entered the Fern Room first, where we admired Common Polypody (*Polypodium virginianum*), a lovely arching fern which is widespread in Nova Scotian woods, and many dainty Maidenhair (*Adiantum* spp.) ferns, as well as the Green Cliff Brake (*Pteris* sp.), which has a striking spore pattern on the underside of its leaves. We also examined Flamingo Flower (*Anthurium scherzerianum*), native Pitcher Plants (*Sarracenia* sp.), and various epiphytes — plants which can grow without soil — such as the Squirrel's Foot Fern (*Davallia* sp.) from Malaya, named for its furry rhizomes, and the Hart's Horn Fern (*Platycterium bifurcatum*) from Australia. We were all intrigued by *Nepenthes petiolata*, a carnivorous vine rather like a Pitcher Plant, which had flowers in bloom and sacs of water to entrap its prey. We also looked at Spikemoss (*Selaginella kraussia*), a small creeping evergreen plant which resembled some of our native Clubmosses (*Lycopodium* spp.).

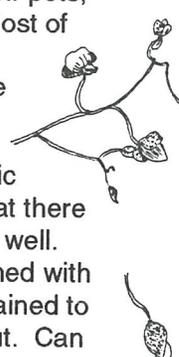
The Cactus Room, which is kept cool in the winter, housed a number of succulents and cactus species, including many which are familiar as houseplants, such as the fleshy-leaved Jade Plant (*Crassula* sp.) and *Kalanchoe* spp. from



Kalanchoe spp., Mexican Hat

Madagascar. One of the latter is known as Panda Plant; another is the Mexican Hat Plant which carries hundreds of tiny plantlets around the brim of its 'hat'. Pierre let us collect some of these to try to grow at home. The pots of cactus were set out on long tables, over which some of the larger plants sprawled, such as the Rat-tail Cactus (*Aponecactus flagelliformis*) with its exotic red blooms. The dry, grey-green of the cacti provided quite a contrast to such brilliant flowers. The day had turned sunny, and hot sun streamed in through the glass roof over our heads, although we could hear the wind howling outside, rattling the fittings of the window-blinds.

A number of colourful exotics awaited us outside the Orchid room, including Spanish Moss in flower, a lovely Kaffir Lily (*Clivia miniata*) from southern Africa, and the oddly-scented Pineapple Flower (*Eucomis pallidiflora*), whose flower emerges looking like a yellow-green pineapple with a tuft of leaves on top. There were also several different species of Wandering Jew (*Tradescantia*) in bloom, and Glory Bower (*Clerodendrum thomsoniae*), which has curious white blooms with red tips. The flower clusters look like bright birds settling on the foliage. In the Orchid room itself were a number of brilliant flowers, many hanging over the edges of their pots, which were suspended above our heads. Most of the Orchids we saw do not belong to the Greenhouse collection, but are housed there temporarily.

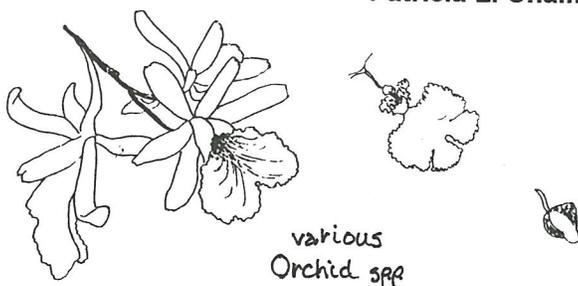


While the Greenhouse exists for scientific purposes, there are touches that suggest that there is an aesthetic enjoyment of these plants as well. Outside the Cactus room the corridor was lined with chicken wire, on which Jasmine has been trained to grow. Some blossom stalks were coming out. Can you imagine walking down a hall, releasing the scent of Jasmine as you brush against the plants?

We all enjoyed this chance to see lush growing things in the dead of winter, and left longing for Spring to arrive. Thank you, Pierre!

Individuals can arrange to visit the Greenhouse during the week: call the Biology Department at Dalhousie University and ask for the Greenhouse Manager, Carmen Mills.

— Patricia L. Chalmers



various
Orchid spp

A FIELD TRIP TO THE STARS

DATE: Tuesday, 7 March 1995
INTERPRETER: Mary Lou Whitehorn
PARTICIPANTS: 8

In 1945 a strange-looking machine was built — a very popular, and at that time extensively produced, planetarium projector. It reminds me of those old WWII sea mines, with appendages sticking out all over — but underwater is as far away from the use of this old contraption as you can get!

This odd ball takes you to the stars! (Well, sort of...)

In the 1950s, the first public planetarium in Canada was installed in the old Nova Scotia Museum on Spring Garden Road. In 1970, when the Museum moved to its new building on Summer Street, the planetarium was disassembled and sent to languish for 15 years in the Mt. Uniacke House garage. In 1980 it was reassembled in the Sir James Dunne building at Dalhousie University. For 35 years, the public has been able to tour the galaxy and see our celestial neighbours.

Recently, HFN members took such a field trip. Disappointingly, only eight people attended, but, on the bright side, we had a very personal look at our sky.

Mary Lou Whitehorn, who is one of Canada's leading amateur astronomers and an active member of the Royal Astronomical Society of Canada, gave a fascinating presentation, showing us how our sky looks in March. The equipment she used is designed to project constellations on a domed ceiling. We became familiar with Leo, Gemini, Cassiopeia, Ursa Major and Ursa Minor, and dozens of other pictures of the night sky that can be seen with the naked eye on a clear, dark night. Mary Lou explained that there are innumerable stars in the universe, always moving, our sun being one of them. Our solar system is a byproduct of solar or star formation. Lucky, huh?!

The planetarium, still owned by the Nova Scotia Museum, is operated by volunteers. Being so old, it is now very fragile, and is held together by a prayer and a kind word. To replace the projector would cost about \$100,000; an ultra-modern outfit would run to ten times that!!

Weekly tours are presented for the public — you may visit the planetarium any Thursday evening, at 7 p.m. Or perhaps you'll be fortunate enough to accompany a booked tour group, with a school or community party, on another day. (They appreciate

donations too, for planetarium upkeep, or for the Food Bank.)

A special sound track has been produced for the star show, and ethereal strains carry you through twilight and out into the earthly night. It is a show well worth attending! In fact, it's out of this world!

— Catherine Fulton Strugnell

CONRAD'S BEACH PROVINCIAL PARK

DATE: Saturday 22 April 1995

PLACE: Conrad's Beach

WEATHER: +8, overcast, a cool wind, occasional bright sun

LEADER: Glen Gibson

PARTICIPANTS: 18 adults



This Earth Day outing was the first of four visits to Conrad's Beach planned in the next twelve months. We will observe its changing landscape and wildlife as the seasons progress. This first outing was to have been led by Etta Parker, who was unfortunately unable to be with us. As several of us discovered to our cost, Conrad's Beach is not marked on the provincial map: to get to it, drive out of Dartmouth via Highway 107, and take either Route 328 (Ross Road) or the Minesville Road to reach Route 207; drive along the shore until you see the Conrad's Road sign, then turn right and follow the road to the end.

Glen began by telling us about the human history of the area: there were Micmac settlements here long ago; followed by the Acadians, who made many dykes in the area; Germans and Loyalists in the eighteenth century; and later, Scots. The landforms and the water levels have been altered many times over the years, both by human intervention and by the action of the sea. During World War II the area was quarried for rock and sand, and remains of old fishing wharves are still visible on Fox Island. The beach is now part of the Coastal Heritage Park System.

A number of creatures are found here; it is an important migration stop, and its mudflats are used by shorebirds, while its ponds and marshes are a favourite refuge for waterfowl. Sand dunes are visited by Snow Buntings and Horned Larks in the winter, and the dense thickets of conifers shelter songbirds in summer. Most importantly, the rocky edge of the white sand beach, near the grassy dunes, provides nesting areas for the endangered Piping Plover. While the bird life is the most readily

apparent, there are also many mammals in the vicinity, including Foxes, Coyotes, Mink, and Otter. Skunks have moved in recently, and last winter a Bear was seen.

We walked out on the boardwalk, turned left to cross the grass, and enter the conifer grove. Here we heard a Downy Woodpecker, Song Sparrows, and a Yellow-rumped Warbler. *Usnea* lichens were thick on the spruce trees, and Bayberry, Foxberry, and cranberries grew along the edge of the path. There are different routes through the trees, and when we all emerged, a horse and its rider were cantering on the mudflats near Lawrencetown River. We gathered to look over at Fox Island, which is accessible at low tide, and saw a seal on the shore. There were White-tailed Deer tracks in the sand.

Towards the rocky end of the beach, our stedisturbed a great number of spiders, beach hoppers, and insects living in the stranded kelp, Sea Colander, Irish moss, and Rockweed which we kicked up as we walked. We found the half-buried hull of an old wooden schooner in the sand, and speculated about its age and size. Ahead of us, some of our group were standing riveted to the ground, binoculars raised. The Piping plovers had been spotted! Disregarding the dozen pairs of field glasses trained on him, the male began his courtship dance, and mated with the female while we watched. This pair is one of only fifty or so that nest in Nova Scotia. Unfortunately their inconspicuous nests are often victims to careless humans and their dogs; the chicks are preyed upon by Merlins, Foxes, Mink, and Coyotes.

Although the sun was warm, the wind was cool, and we sheltered in the rocks by the bridge as we ate lunch. Herring, Ring-billed, and Black-headed Gulls wheeled overhead, and a Great Blue Heron flew into the marsh. A Song Sparrow sang from a tangle of rosebushes, and a Belted Kingfisher sat on a post overlooking the water.

Thanks to Glen for this introduction to Conrad's Beach.

—Patricia Chalmers



SONG SPARROW

ALMANAC



This almanac is for the dates of events which are not found in our programme: for field trips or lectures which members might like to attend, or natural happenings to watch for, such as eclipses, comets, average migration dates, expected blooming seasons, etc. Please suggest other suitable items.

- MAY** Silent explosions of frothy white: Indian Pear and Mountain-ash.
JUNE Rose-purple blush on barrens and bogs: Wild Rhododendron; cool blue in damp meadows: Blue-Flag Iris.
JULY Magenta flush across acres of wasteland: Fireweed or Large Willow-Herb; spangle of gold in dry ditches: Hawkweed, Ragwort, Black-eyed Susan.
AUGUST Silver-green of Pearly Everlasting...; first golds of goldenrod... and so on.

— from “Weedwatch” in Alder Music by Gary Saunders (1988)

NATURAL EVENTS

- June-early July** Snapping, Wood and Painted Turtles lay eggs
4-11 June Environment Week
8 June Oceans Day
21 June Summer Solstice at 5:35 p.m. ADT: Summer begins
late June Lambkill (Sheep's Laurel) blooms
late June-July Eastern Garter Snakes born alive
July and August Young Spring Peepers migrate from ponds to woodlands
2nd week July Chanterelle mushroom harvest begins
14-15 July Bear River Cherry Carnival
mid-July Shorebirds begin to reappear, after nesting in their northern breeding grounds — migration continues for several months
15 July Parks Day — Look for events at Provincial Parks
3rd week July Lindens (a.k.a. Limes) bloom along Halifax streets
late July Cicadas start their buzzing trills
late July-early Aug. Plymouth Gentian blooms
August-Sept. Tadpoles of American Toads metamorphose, and the toads leave ponds looking for terrestrial homes
early Aug.-mid Sept. Blueberry season in Nova Scotia — look for festivals such as:
19 August Tatamagouche
21 August Parrsboro
29 Aug.2 Sept. Oxford
9 September Maplewood
mid-August migration of shorebirds peaks
11-13 August Atlantic Waterfowl Celebration in Sackville, N.B.
12-13 August Perseid meteor shower peaks: rate 50 per hour — but the almost full moon will interfere with viewing
17-20 August Rockhound Roundup in Parrsboro
late Aug.-early Oct. most species of warblers leaving — waves of migrants may be seen
late August-Sept. Snapping, Wood, and Painted Turtles' eggs hatch
September the busiest month for most fall migrating birds
23 September Autumnal Equinox at 9:15 a.m. ADT: Fall begins



Sources — Blomidon Naturalists Society, A Natural History of King's County, 1992;
Colombo's Canadian Global Almanac, 1995;
Gibson's Summer Nature Notes for Nova Scotians, 1982;
Royal Astronomical Society of Canada's Observer's Handbook, 1995; Tourism Nova Scotia;
Tufts' Birds of Nova Scotia, 1986;
the personal observations of Gordon Yeadon and the compiler



ORGANIZATIONAL EVENTS

Blomidon Field Naturalists — Meets third Monday of the month at the Beveridge Arts Centre, Acadia University, 7:30 p.m. No meetings in July or August.

8 July "Dragonflies" with Tom Herman and Paul Brunelle — Meet at the Robie Tufts Nature Centre at 10:00 a.m.

12 August "Shore Birds of the Minas Basin" with Judy Tufts — Meet at the R. Tufts Nature Centre at 11:00 a.m. or at the Tourist Bureau at Windsor at 11:30.

Friends of McNab's Island — For more information phone 434-2254 or 422-1045.

23 July Annual Picnic

24 September Fall Beach Sweep — Depart from the Cable Wharf at 10:00 a.m.

Halifax-Westmoor Garden Club — For more information phone 453-6801.

8 July 41st Provincial Rose Show at Spring Garden Place

18-19 August Halifax Flower Show at the Halifax Shopping Centre



Nova Scotia Bird Society — Meets fourth Thursday of the month at the Nova Scotia Museum of Natural History, 8 p.m. No meetings in June, July or August.

Phone the N.S.B.S. Bird Information Line at 852-CHAT (2428) to hear news of what birds are around province-wide, and any other Society news of note such as field trips, meetings, etc. This line is usually updated at least twice a week. There are too many field trips this summer, in various parts of the province, to be listed here, so phone for details.

28 September "Birding in Pictou County" with Ken McKenna

Nova Scotia Wild Flora Society — Meets fourth Monday of the month at the N.S. Museum of Natural History, 7:30 p.m. No meetings in July or August. For more information phone 423-7032.

25 June Exploring the Pockwock area with Heather Drope. Look for plants in a new area that looks promising. Meet at the N.S. Museum at 9 a.m.

26 June Shubie Park — Flora with Carl Munden. Meet at the Fairbanks Centre in Dartmouth at 7:00 p.m. This replaces the usual indoor meeting.

5 August Martinique Beach Provincial Park — Flora with Deannie Sullivan-Fraser. Meet at the Park at 10 a.m.

Orchid Society of Nova Scotia — Meets second Sunday of the month at the Nova Scotia Museum of Natural History, 7:30 p.m. For more information phone 422-7223.

24-25 June Spring Orchid Show, City Centre Atlantic

10 September Sergio Englert of 'Ricsel Orchids' in Brazil will speak on the Cattleya Orchids of Brazil. N. S. Museum of Natural History at 7:30 p.m.

Shubenacadie Canal Commission — For more information phone 462-1826.

8 July "Canoe to the Sea" Canoe Race

Uniacke Estate Museum Park — For more information phone 866-2560.

18 June "Estate Walk" with Alex Wilson — several long, moderate-to-difficult walks through the natural parts of this huge estate.

Look for the Department of Natural Resources' **Parks are for People Programme**, an annual listing of many events held at various parks, from May to November. Pick up a programme at your local library, or phone Susan Hruszowy at DNR, 424-4321, for other locations.

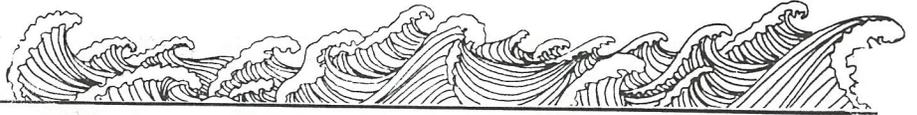
SUNRISE AND SUNSET ON SUMMER AND EARLY FALL SATURDAYS

3 June	5:31	20:54	5 August	6:05	20:35
10 June	5:29	20:59	12 August	6:13	20:25
17 June	5:28	21:02	19 August	6:21	20:14
24 June	5:30	21:04	26 August	6:29	20:02
1 July	5:33	21:04	2 Sept.	6:37	19:50
8 July	5:37	21:01	9 Sept.	6:46	19:37
15 July	5:43	20:57	16 Sept.	6:54	19:24
22 July	5:49	20:52	23 Sept.	7:02	19:11
29 July	5:57	20:44	30 Sept.	7:10	18:58



— courtesy of David Lane, Burke-Gaffney Observatory, St. Mary's University
— compiled by Patricia L. Chalmers

TIDE TABLE

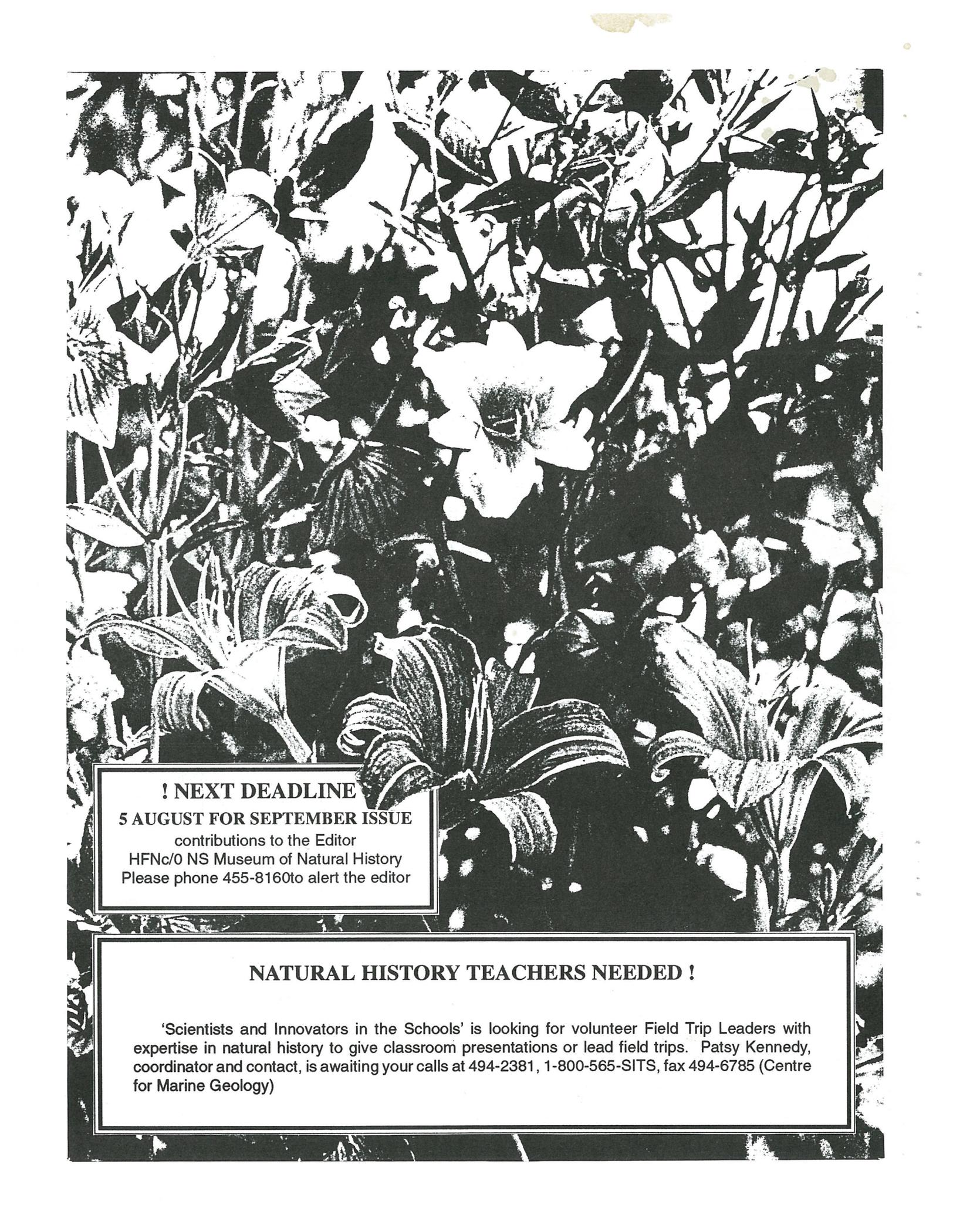


July-juillet

August-août

September-septembre

July-juillet				August-août				September-septembre															
Day	Time	Ht./ft.	Ht./m	Jour	Heure	H./pi	H./m	Day	Time	Ht./ft.	Ht./m	Jour	Heure	H./pi	H./m	Day	Time	Ht./ft.	Ht./m	Jour	Heure	H./pi	H./m
1	0400	0.8	0.2	16	0515	0.1	0.0	1	0450	0.9	0.3	16	0620	1.1	0.3	1	0620	1.4	0.4	16	0035	4.9	1.5
SA	1015	5.5	1.7	SU	1100	6.1	1.9	TU	1100	5.8	1.8	WE	1155	5.7	1.7	FR	1205	5.7	1.7	SA	0715	2.0	0.6
SA	1615	1.6	0.5	DI	1750	0.9	0.3	MA	1730	1.4	0.4	ME	1900	1.1	0.3	VE	1920	1.2	0.4	SA	1245	5.0	1.5
SA	2220	5.4	1.6		2315	5.9	1.8	ME	2310	5.3	1.6					SA	1955	1.5	0.5	SA	1955	1.5	0.5
2	0435	0.9	0.3	17	0610	0.5	0.2	2	0540	1.1	0.3	17	0020	5.1	1.6	2	0035	5.0	1.5	17	0125	4.6	1.4
SU	1050	5.5	1.7	MO	1145	5.9	1.8	WE	1140	5.7	1.7	TH	0710	1.5	0.5	SA	0730	1.6	0.5	SU	0810	2.2	0.7
DI	1700	1.6	0.5	LU	1845	1.0	0.3	ME	1830	1.4	0.4	JE	1240	5.3	1.6	SA	1255	5.5	1.7	SU	1340	4.9	1.5
	2255	5.3	1.6					ME	2355	5.1	1.6	JE	1950	1.2	0.4	SA	2025	1.1	0.3	DI	2045	1.5	0.5
3	0520	1.0	0.3	18	0000	5.5	1.7	3	0635	1.2	0.4	18	0110	4.8	1.5	3	0140	4.8	1.5	18	0230	4.5	1.4
MO	1125	5.5	1.7	TH	0700	0.8	0.2	TH	1225	5.6	1.7	FR	0800	1.8	0.5	SU	0840	1.7	0.5	SU	0900	2.2	0.7
LU	1755	1.7	0.5	TU	1230	5.7	1.7	TH	1930	1.3	0.4	FR	1325	5.1	1.6	SU	1400	5.4	1.6	MO	1445	4.8	1.5
	2335	5.2	1.6	MA	1940	1.1	0.3	JE			VE	2040	1.3	0.4	DI	2125	1.0	0.3	LU	2135	1.5	0.5	
4	0610	1.1	0.3	19	0055	5.1	1.6	4	0050	4.9	1.5	19	0210	4.5	1.4	4	0255	4.7	1.4	19	0340	4.6	1.4
TU	1205	5.5	1.7	WE	0750	1.2	0.4	FR	0735	1.4	0.4	SA	0850	2.0	0.6	MO	0945	1.7	0.5	TU	0955	2.2	0.7
MA	1855	1.6	0.5	ME	1320	5.4	1.6	VE	1315	5.5	1.7	SA	1425	4.9	1.5	LU	1515	5.4	1.6	TU	1550	4.8	1.5
				ME	2030	1.2	0.4	VE	2035	1.2	0.4	SA	2130	1.4	0.4	LU	2230	0.8	0.2	MA	2225	1.5	0.5
5	0020	5.0	1.5	20	0150	4.8	1.5	5	0150	4.7	1.4	20	0315	4.4	1.3	5	0420	5.0	1.5	20	0440	4.8	1.5
WE	0700	1.2	0.4	TH	0840	1.5	0.5	SA	0840	1.5	0.5	SA	0940	2.0	0.6	TU	1050	1.5	0.5	MA	1045	2.0	0.6
ME	1250	5.5	1.7	TH	1410	5.2	1.6	SA	1420	5.5	1.7	SU	1525	4.9	1.5	MA	1630	5.6	1.7	WE	1650	5.0	1.5
ME	1950	1.5	0.5	JE	2120	1.2	0.4	SA	2140	1.0	0.3	DI	2220	1.3	0.4	MA	2330	0.5	0.2	ME	2310	1.3	0.4
6	0110	4.9	1.5	21	0250	4.6	1.4	6	0305	4.7	1.4	21	0420	4.5	1.4	6	0530	5.4	1.6	21	0530	5.1	1.6
TH	0755	1.3	0.4	FR	0930	1.7	0.5	SU	0950	1.6	0.5	MO	1035	2.0	0.6	WE	1150	1.3	0.4	TH	1130	1.8	0.5
JE	1345	5.5	1.7	VE	1510	5.1	1.6	DI	1530	5.5	1.7	MO	1630	5.0	1.5	ME	1735	5.9	1.8	TH	1740	5.3	1.6
	2050	1.4	0.4	VE	2215	1.2	0.4	DI	2240	0.8	0.2	LU	2310	1.2	0.4	ME				JE	2355	1.2	0.4
7	0215	4.7	1.4	22	0355	4.6	1.4	7	0425	4.9	1.5	22	0520	4.7	1.4	7	0025	0.3	0.1	22	0615	5.4	1.6
FR	0850	1.4	0.4	SA	1025	1.9	0.6	MO	1055	1.4	0.4	TU	1125	1.9	0.6	TH	0625	5.8	1.8	22	1220	1.5	0.5
VE	1450	5.5	1.7	SA	1610	5.0	1.5	LU	1640	5.7	1.7	MA	1725	5.1	1.6	JE	1250	1.0	0.3	FR	1825	5.5	1.7
	2150	1.2	0.4	SA	2305	1.1	0.3	LU	2345	0.4	0.1	MA	2355	1.1	0.3	JE	1830	6.1	1.9	VE			
8	0325	4.8	1.5	23	0500	4.6	1.4	8	0535	5.2	1.6	23	0610	4.9	1.5	8	0115	0.1	0.0	23	0035	1.0	0.3
SA	0955	1.4	0.4	SU	1115	1.9	0.6	TU	1200	1.2	0.4	WE	1210	1.7	0.5	FR	0710	6.1	1.9	SA	0650	5.7	1.7
SA	1555	5.7	1.7	DI	1705	5.1	1.6	MA	1745	6.0	1.8	WE	1810	5.3	1.6	VE	1340	0.8	0.2	SA	1300	1.2	0.4
SA	2255	0.8	0.2	DI	2355	1.0	0.3	MA			ME			VE	1920	6.3	1.9	SA	1905	5.7	1.7		
9	0440	4.9	1.5	24	0550	4.8	1.5	9	0040	0.1	0.0	24	0035	1.0	0.3	9	0200	0.1	0.0	24	0120	0.8	0.2
SU	1105	1.3	0.4	MO	1205	1.8	0.5	WE	0635	5.6	1.7	TH	0650	5.2	1.6	SA	0755	6.4	2.0	SA	0730	6.0	1.8
DI	1700	5.9	1.8	LU	1755	5.3	1.6	ME	1300	1.0	0.3	TH	1250	1.5	0.5	SA	1425	0.6	0.2	SU	1345	1.0	0.3
10	0000	0.5	0.2	25	0035	0.9	0.3	ME	1845	6.2	1.9	TH	1855	5.5	1.7	SA	2010	6.3	1.9	DI	1945	5.8	1.8
MO	0545	5.2	1.6	TU	0635	4.9	1.5	10	0130	-0.1	0.0	25	0115	0.8	0.2	9	0245	0.1	0.0	25	0200	0.7	0.2
LU	1210	1.1	0.3	MA	1245	1.6	0.5	TH	0730	6.0	1.8	FR	0725	5.5	1.7	SA	0835	6.4	2.0	SU	0805	6.2	1.9
	1800	6.1	1.9	MA	1840	5.4	1.6	JE	1350	0.8	0.2	VE	1330	1.3	0.4	DI	1515	0.6	0.2	MO	1430	0.8	0.2
11	0055	0.1	0.0	26	0115	0.8	0.2	11	0220	-0.2	-0.1	26	0150	0.7	0.2	10	2055	6.2	1.9	LU	2025	5.8	1.8
TU	0645	5.6	1.7	WE	0720	5.1	1.6	FR	0815	6.2	1.9	26	0805	5.7	1.7	11	0330	0.4	0.1	26	0240	0.7	0.2
MA	1310	0.9	0.3	ME	1320	1.5	0.5	SA	1445	0.7	0.2	SA	1410	1.2	0.4	MO	0920	6.4	2.0	TU	0845	6.3	1.9
	1855	6.3	1.9	ME	1920	5.5	1.7	VE	2030	6.4	2.0	SA	2010	5.7	1.7	LU	1555	0.7	0.2	TU	1510	0.7	0.2
12	0150	-0.2	-0.1	27	0150	0.7	0.2	12	0310	-0.2	-0.1	27	0225	0.6	0.2	11	2140	6.0	1.8	MA	2105	5.8	1.8
WE	0740	5.9	1.8	TH	0755	5.3	1.6	SA	0905	6.3	1.9	27	0240	0.6	0.2	12	0410	0.7	0.2	27	0325	0.8	0.2
ME	1405	0.7	0.2	JE	1355	1.4	0.4	SA	1535	0.6	0.2	SU	0840	5.9	1.8	TU	1000	6.2	1.9	WE	0925	6.3	1.9
	1950	6.5	2.0	JE	2000	5.6	1.7	SA	2115	6.3	1.9	DI	1450	1.1	0.3	MA	1640	0.8	0.2	WE	1600	0.7	0.2
13	0240	-0.3	-0.1	28	0220	0.6	0.2	13	0355	0.0	0.0	28	0305	0.6	0.2	12	2220	5.8	1.8	ME	2150	5.7	1.7
TH	0835	6.1	1.9	FR	0835	5.5	1.7	SU	0945	6.3	1.9	28	0915	6.0	1.8	13	0455	1.1	0.3	28	0410	1.0	0.3
JE	1500	0.7	0.2	VE	1430	1.3	0.4	DI	1625	0.7	0.2	MO	1530	1.0	0.3	WE	1040	5.9	1.8	TH	1010	6.2	1.9
	2045	6.5	2.0	VE	2040	5.6	1.7	DI	2205	6.1	1.9	LU	2130	5.7	1.7	ME	1725	1.0	0.3	JE	1655	0.8	0.2
14	0330	-0.3	-0.1	29	0255	0.6	0.2	14	0445	0.3	0.1	29	0345	0.7	0.2	13	2305	5.5	1.7	29	0410	1.0	0.3
FR	0925	6.2	1.9	SA	0910	5.6	1.7	MO	1030	6.2	1.9	29	0955	6.0	1.8	14	0535	1.5	0.5	29	1010	6.2	1.9
VE	1555	0.7	0.2	SA	1510	1.3	0.4	LU	1715	0.8	0.2	TU	1620	1.1	0.3	TH	1120	5.6	1.7	FR	1655	0.8	0.2
	2135	6.4	2.0	SA	2115	5.6	1.7	LU	2250	5.8	1.8	MA	2210	5.6	1.7	JE	1815	1.2	0.4	VE	2240	5.6	1.7
15	0420																						



! NEXT DEADLINE

5 AUGUST FOR SEPTEMBER ISSUE

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