



RINHewS

The Newsletter of the Rhode Island Natural History Survey

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President's Corner

A Report Card for the Natural History Survey

by Peter V. August

My tour of duty is up, and the Rhode Island Natural History Survey has elected Dr. John Paul of the Environmental Protection Agency Narragansett Research Labs as the new President. I have known John for many years; he is an excellent scientist, a strong leader, and a creative thinker—the Survey is in good hands!

As a scientist and teacher in an academic environment, I am hardwired to assign grades at the end of a term. Let me take a moment to reflect on the successes and continued challenges of the Rhode Island Natural History Survey from its inception until now.

Enhancing communication among Rhode Island's naturalists is fundamental to the mission of the Survey. This has been the Survey's greatest success. The conferences, newsletter, lecture series, annual meetings, and even its web page (www.edc.uri.edu/rreapage/nathist) have provided a dependable and stimulating suite of venues for news, discussion, debate, and interaction. The survey gets an "A+" for its achievements here.

Our growing publication series has already gone far in advancing our knowledge of Rhode Island's flora and fauna. Martine Villalard-Bohnsack's excellent guide to seaweeds of the region has set a high standard for our scholarly publications. The forthcoming flora and fauna will be a significant contribution. For disseminating knowledge of RI's biota, we get a solid "A."

One of the early motivations to form the Rhode Island Natural History Survey was to develop and implement a plan for the systematic survey of Rhode Island's fauna and flora. At

the same time, the National Biological Survey (NBS) was being formed and we saw the NBS and RINHS as logical and productive partners in developing a plan for thorough ecological inventory of the state. With a few name changes and an institutional restructuring, the NBS has had a very difficult start-up period. This is unfortunate because the NBS remains a terrifically important initiative that deserves all the support it can get! Hopefully, the NBS will find its new home at the United States Geological Survey (USGS)—as the Biological Resources Division—to be a stable and supportive institutional base of operations. Now that the NBS has found a home, let's hope it will be able to provide a leadership role in working with Natural History Surveys, such as ours, to develop a standard database of the Nation's biota. On this category, the RINHS gets an "I" (incomplete); we need to give the NBS and the RINHS more time to develop a survey plan.

The Survey needs a stable financial base for operations. We have been very successful in obtaining grants to support special projects, but the day-to-day expenses of running the office have been difficult to fund. We were exceedingly lucky to have been awarded the generous Lamb Foundation grant to get our organization

(continued on p. 2)

Mission Statement of the Rhode Island Natural History Survey

- To advance scientific knowledge of Rhode Island's biota, ecological communities, and environmental resources;
- To facilitate and coordinate the gathering and dissemination of information on Rhode Island's biota and natural communities;
- To enhance communication among Rhode Island's environmental and life scientists.

up and running and a splendid Champlin Foundations Grant to buy office equipment. Nonetheless, one of the biggest challenges facing the Survey is financial planning and fund raising. So, for now, we get an "A" for effort, a "B" for funding special programs, and an "Incomplete" for developing an operating base.

The Survey has, from day one, recognized a need to develop a stable, professionally curated, central repository for systematic collections in the state. We have made little progress on this front and this remains high on the list of major challenges facing the Survey. We get a "D" for achievement on this issue.

The Survey has gotten off to a very strong start and can be proud of its first report card, but there are plenty of challenges ahead. I am confident that under the leadership of Dr. Paul, the continued excellent work of Executive Director Lisa Gould, the commitment of the Board of Directors, and the wisdom of the Advisory Board, nothing will stand in the way of success for the Rhode Island Natural History Survey.

Peter V. August is Chair of the Department of Natural Resources Science, University of Rhode Island, and the out-going President of the Rhode Island Natural History Survey.

Research Reports

The Rhode Island Cilioprotist Micrograzer Survey: A student-assisted multimedia archive for teaching, research, and environmental management

by Linda A. Hufnagel

An effort is under way in my laboratory at the University of Rhode Island's Department of Biochemistry, Microbiology and Molecular Genetics to create a computerized, multimedia archive documenting the diversity and distribution of a major group of microorganisms that play a central role in the ecology of Rhode Island. This archive, to be stored digitally and eventually made available through CD-ROM or the internet, will contain material that will be useful to teachers, researchers, and those interested in the Rhode Island environment or who wish to explore sources of new natural products.

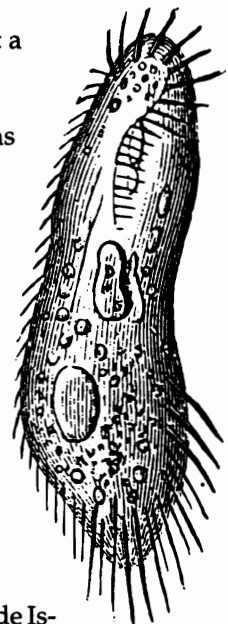
The group of organisms to be surveyed, the ciliated protists (Phylum Ciliophora), consists of a

large and varied array of species of microscopic, single-celled organisms (Corliss 1979; Lee *et al.* 1985), that live in aquatic and soil environments. These organisms are "micrograzers" because they feed on bacteria and other microbes; however, they are themselves food for small predatory invertebrates which in turn are a major source of food for many larger aquatic and soil animals, such as finfish, shellfish and worms. They are thus central to the food web supporting finfish and shellfish populations. They are also important to the general health of aquatic and soil environments (Fenchel 1987), because they play a part in decomposition processes (Fenchel and Harrison 1976), in controlling blooms of potentially deleterious bacteria and phytoplankton, and as biological indicators of water quality (Bick 1972).

The cilioprotists also represent a vast untapped resource of genetic information for various natural products, whose use to humans has not been explored. Unique proteins, toxins, enzymes, lipids and other compounds have been identified in cilioprotists, but only one marketed product has been developed (genetically engineered "ribozymes," catalytic RNAs that cleave other RNA molecules at specific sites). The cilioprotists of Rhode Island likely contain many useful natural products waiting to be discovered.

Many species and genera of cilioprotists may occur only in Rhode Island, including new, previously undiscovered species. Although at least 9,000 species have been identified worldwide, it is estimated that at least as many remain to be discovered. It is not uncommon for a cilioprotist species to be found at only one location worldwide. These are in danger of becoming extinct, as humans through urban sprawl quickly encroach on their habitats, such as a small pond, a swamp, a pine barrens, a beach or a bay.

The cilioprotists of Rhode Island have been investigated in only a few studies, limited to certain genera and locations in the state. One study has been narrowly focused on peritrich ciliates of marine ponds (cf. Langlois 1969); another addresses the taxonomy of marine tintinnids, including those of coastal Rhode Island (cf. Pierce and Turner 1993; Pierce, ms in preparation); a third has resulted in the identification and ultrastructural characterization of several different ciliates from the Pettaquamscutt River (Johnson, *et al.* 1995; Johnson, pers. comm.). In a different approach, providing few specific details



about identified species or genera, the seasonal abundance of ciliates in certain locations (cf. Hargraves 1981; Verity 1986, 1987) or in experimental mesocosms using components from Rhode Island has been reported (cf. Langlois 1993).

Although the cilioprotists are extremely important to the ecology of the rivers, lakes, ponds, salt ponds, marine waters and various soil environments of Rhode Island, it is difficult to locate the little information that is available in the literature about their occurrence, abundance and diversity in Rhode Island. For this reason, the effects of environmental disasters, such as the recent oil spill off Matunuck, or more subtle impacts of human activity on the environment, such as septic runoff and toxic wastes, on the cilioprotists and their food chains, cannot now be readily assessed.

To remedy this situation, the author has begun to make a thorough and systematic survey of the ciliate species inhabiting Rhode Island waters and soils, with the help of undergraduate student volunteers. Biogeographical, behavioral, trophic, morphological and environmental parameters are included in the profile of each species.

A unique aspect of this survey has been the use of videomicroscopy, to record aspects of the structure and behavior of the living organisms. Cilioprotists are highly motile organisms and have complex behaviors related to movement, feeding and reproduction. They swim using cilia as oars and can back up, turn and contract in response to external stimuli. They can be selective raptorial feeders or less selective filter feeders, usually ingesting other microorganisms. Their diverse motile and feeding behaviors are due to a wide range of morphological and physiological diversity. A record of their behavioral repertoires is therefore essential to each profile. Such records are simple to make using relatively inexpensive, high resolution video equipment. The resulting archive being developed in my laboratory contains video data on organismal behavior; morphology, development, reproduction, feeding, and remarkably detailed information on the fine structure and behavior of subcellular organelles, such as cilia, contractile vacuoles, food vacuoles, extrusive organelles, pigment granules and mitochondria. The result so far is a crudely assembled archive of videotaped and other types of data for about 60 different species of ciliates from Rhode Island (Hufnagel 1993; unpublished).

To be useful to scientists and teachers, the archive will be refined in several ways and then published. The refinements include the addition of more information about the species already discovered, as well as the condensation of the video and other data into a digital profile for each species, summarizing the most important information,

including descriptions, photomicrographs, diagrams and video clips. The profiles will eventually be cross-referenced by location and other criteria. Publication will include the more traditional monograph or book; however, to take advantage of the video data, publication in a multimedia format is also planned, combining video clips, photographs, diagrams and descriptive information in a digital publication via CD ROM, Jazz or Zip disks, videodisc or the Internet.

In conclusion, the RI Cilioprotist Micrograzer Survey will digitally document the cilioprotists of Rhode Island. A unique feature of the resulting archive will be the inclusion of video clips documenting the activities of the living organisms. The current activities of the project include: 1) a survey of the existing literature and search for unpublished information on Rhode Island cilioprotists; 2) collection of new data on cilioprotists from selected marine and freshwater ponds in Rhode Island; 3) development of methods for digitally archiving video and still images and descriptive information; and 4) creation of a prototype archive containing already collected information as well as new information on three selected cilioprotist species found in Rhode Island.

The author is especially interested in locating other individuals or groups willing to participate in or lend support to this unique and valuable project, which could be beneficial in the future to citizens of the State of Rhode Island.

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Ecology and Management of Mosquitoes and Eastern Equine Encephalitis

by Howard S. Ginsberg^{1,3},
Al Gettman^{2,3} and
Roger A. LeBrun³

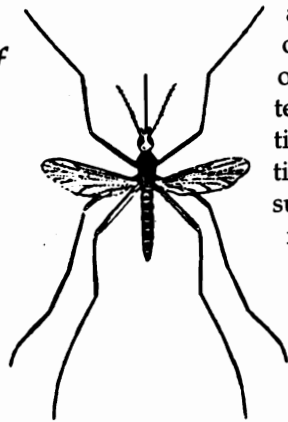
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Eastern Equine Encephalitis (EEE) is a very rare disease. On average, only about five human cases occur per year in the U.S. (Figure 1), mostly in the eastern states. However, it is the most virulent arthropod-borne virus (arbovirus) in North America with a mortality rate of about 50%, and patients who survive often suffer from permanent neurological deficits. Therefore, when surveillance programs show a serious risk that this disease might be transmitted to humans, the response is often vigorous.

The virus that causes EEE is an *Alphavirus*, in the family *Togaviridae*. It is primarily a bird virus that is maintained in a bird-mosquito cycle. The virus produces no symptoms in some bird species, but it causes severe disease in others (especially domesticated species such as turkeys, pheasants, emus and Pekin ducks) and in several mammals (such as horses, hence the name Eastern Equine Encephalitis). However, mammals are primarily dead-end hosts; they play little or no role in the transmission cycle because virus is generally not passed from infected mammals to uninfected mosquitoes. Therefore, the disease is often referred to simply as Eastern Encephalitis.



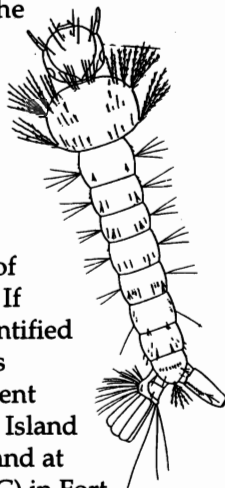
Many important details of the transmission cycle of EEE virus are poorly understood, partly because the disease is so rare. Nevertheless, the general outlines of transmission in nature are known. EEE virus must be present in an area for transmission to get started, but it is not known how the virus is introduced into an area. Some researchers speculate that the virus is always present in endemic areas (overwintering either in resident birds or in mosquitoes), while others think that it is introduced anew each year in migratory birds. The virus is transmitted among birds principally by *Culiseta melanura*, a mosquito species that feeds almost exclusively on birds. The habitat of this species is freshwater swamps and bogs (the larvae live in water around the roots of trees), and human cases of this disease typically occur in the vicinity of swamps. This mosquito species overwinters in the larval stage, and has several generations per year. Around midsummer, populations of *Culiseta melanura* are large enough to substantially increase the prevalence of virus in swamp-dwelling birds. Normally, viral transmission is limited to this enzootic cycle.

However, in years with large populations of *Culiseta melanura*, the prevalence of viral infection in birds can get so high that the virus can spill out to mammals via mosquitoes that serve as "bridge vectors." A vector is a species that transmits a pathogen from host to host. Bridge vectors for EEE are mosquitoes with broad feeding preferences that might bite a bird for one blood meal, and later (after digesting the blood meal and laying a batch of eggs) take another blood meal from a mammal. If the bird was infected with EEE virus, the mosquito might pick up the virus and later transmit it to a horse or human. In order to function as a bridge vector, a mosquito species must be "vector competent;" it must be physiologically capable of acquiring infection, maintaining the virus, and then transmitting virus to uninfected hosts. Mosquito species that have been implicated as bridge vectors include *Aedes vexans*, *Aedes sollicitans*, and *Coquillettidia perturbans*. In Rhode Island this year EEE virus has been isolated from pools of several species, with *Aedes vexans*, *Aedes canadensis*, and *Coquillettidia perturbans* of particular concern as potential bridge vectors.

Longevity of female mosquitoes plays a role in the risk of EEE, because the longer mosquitoes live, the more blood feeding/egg laying cycles they go through, and the higher is the probability that they will feed on an infected bird. This explains why EEE cases typically occur late in the season; it takes time for *Culiseta melanura* populations to increase, for prevalence of the virus to build up in bird popula-

tions to the point where it might be picked up by bridge vectors, and finally for infected *Aedes* or other bridge vectors to transmit the virus to mammals.

Surveillance for EEE virus typically involves mosquito trapping programs or use of sentinel animals (e.g., caged fowl). In Rhode Island, the Department of Environmental Management uses light traps baited with dry ice. The dry ice releases CO₂ gas as it sublimates, mimicking the breath of vertebrates and attracting bloodmeal-seeking female mosquitoes. Only female mosquitoes feed on blood (vertebrate blood contains proteins and sterols necessary for mosquito egg development), so relatively few males are attracted to the traps. The trap catches are kept cold (to keep any virus viable) and sorted to species. Mosquitoes from each trap are separated into "pools" of up to one hundred individuals, each pool including mosquitoes of a single species. The pools are analyzed for the presence of virus using a cell culture technique. If viruses grow in culture, they are identified using an immunological test, such as ELISA (enzyme-linked immunosorbent assay). The mosquitoes from Rhode Island have been tested at Yale University and at the Centers for Disease Control (CDC) in Fort Collins, CO.



A variety of techniques are available to manage mosquito populations. Methods directed at larval mosquitoes tend to be more efficient than methods directed at adults because the larvae live in definable habitats that can be relatively easily targeted, while adults are far more widely dispersed. On the other hand, EEE virus is not found in larval mosquitoes (remember, adult mosquitoes pick up the virus when feeding on birds), so it isn't known if a potential disease problem exists until adults are on the wing. Management decisions are further complicated by differences in the natural histories of different mosquito species. For example, *Coquillettidia perturbans* is a woodland species with one generation per year, whose larvae live in the muck at the bottom of ponds where they get air by piercing the roots of emergent vegetation. In contrast, *Aedes vexans* has several generations per year and sometimes migrates long distances. Larval *Aedes vexans* live in woodland pools, as well as in puddles and roadside ditches, and like most mosquito larvae they obtain air from the water surface. The exact design of a management program depends on which of these species is potentially a bridge vector. In 1996, both species were found infected with EEE in Rhode Island, so the intervention had to be designed for this circumstance. Of course, the most universally applicable

approach to prevent human infection with mosquito-borne disease is personal protection against mosquito bites. Prudence and common sense are, perhaps, our best weapons against EEE. Therefore, informing the public about potential risks is a central feature of most vector-borne disease management programs.

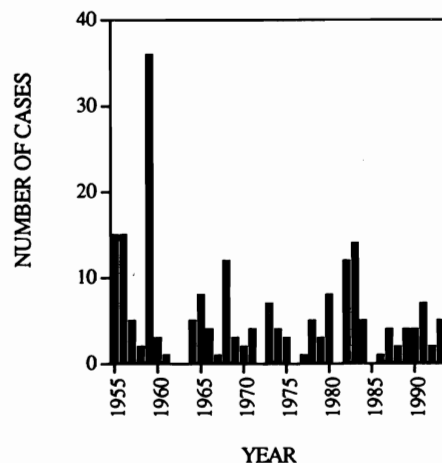
The ecology of EEE is complex and fascinating. We can only hope that the knowledge we have gained on the biology of these mosquitoes and the transmission cycle of the virus will allow us to implement surveillance and management protocols that prevent human cases of the disease, while minimizing any adverse environmental effects from the interventions.

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- Also, see the University of Rhode Island EEE web page: <http://www.edc.uri.edu/eee/>

Figure 1. HUMAN EEE CASES IN THE UNITED STATES

(compiled from Tsai & Monath 1987, CDC 1995)



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Status of the Rhode Island Butterfly Survey

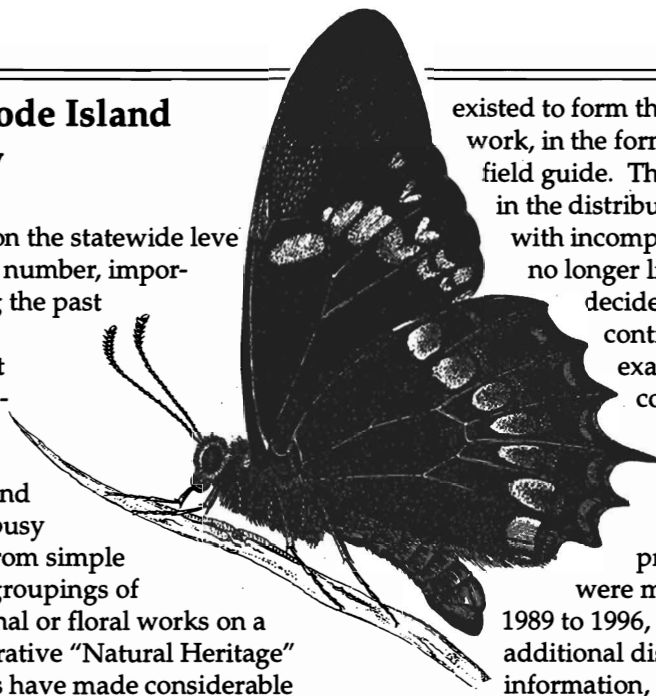
by Harry Pavulaan

Biological surveys on the statewide level have been increasing in number, importance, and scope during the past decade, in response to increasing development pressure on the environment. Governmental agencies, institutions, private organizations, and individuals have been busy compiling everything from simple county lists of specific groupings of organisms to entire faunal or floral works on a statewide level. Cooperative "Natural Heritage" programs in most states have made considerable headway in this field, especially with the use of Geographical Information (GIS) technology.

Due to a virtual lack of published information on the state's butterfly fauna, and no prior survey, the Rhode Island Butterfly Survey was conceived in the spring of 1983. A single paper had been published previously (Small 1962), treating only a few of the state's butterflies. In this light, a survey was necessary to establish a baseline on which future work could be based. First concentrating on the "true" butterflies, I conducted daily and weekly counts at several study areas in the state, where species diversity was richest and number were highest. Most field work was conducted in Kent and Washington counties. Great Swamp and Arcadia Management Areas were the most productive of the state's natural areas, while urban West Warwick remarkably proved to be nearly as productive. Most of the survey's voucher specimens came from West Warwick. Thorough spot surveys were conducted virtually anywhere I went in my travels throughout Rhode Island. A journal report (Pavulaan 1985) on the true butterflies was published, to establish literature records from the 1983 survey findings.

In 1984, the survey was expanded to include the "Skipper" butterflies, and extended to cover most of Rhode Island. Extensive breeding and rearing was also done, to identify host plant utilization. As a result, a second article (Pavulaan 1990) documented all Skipper records established by the survey. Several private and public collections were examined that year as well, to determine which additional species had been found previously in the state; this work added a considerable amount of data.

Due to a job transfer out-of-state, my field work was halted for several years. In 1989, I realized that with the amount of information accumulated during the two original years of the survey, enough material



existed to form the basis of a more formal work, in the form of a butterfly handbook or field guide. There were some glaring gaps in the distributional record, however, along with incomplete biological data. While I no longer lived in Rhode Island, I decided that it would be possible to continue the survey by further examining public and private collections, searching for published records in literature, and conducting field work in the state at opportune times during the appropriate seasons. Several trips were made to Rhode Island from 1989 to 1996, with the goals of recording additional distributional and biological information, and seeking species previ-

ously unrecorded in the state. In 1990 I was contacted by the Rhode Island Natural Heritage Program, resulting in a mutually beneficial relationship. Additional records were solicited by contacting members of entomological societies, and other naturalists, several of whom now regularly contribute valuable data and observations.

For an area as small as Rhode Island, there is now an impressive amount of information available. Species diversity, totalling 118 (including two unnamed "sibling-species"), rivals that of any neighboring state. Unfortunately, I am behind in the electronic information "revolution," and all information has been kept on paper, now comprising several files. This makes data retrieval cumbersome and time-consuming. I am now, however, in the process of setting up a database program to store and organize all data. A goal is to have this database compatible with the Rhode Island Natural History Survey database. Information should be readily available to Rhode Island naturalists by late 1997. Preliminary (hand-drafted) distributional maps, a checklist, and brood chart are currently available and updated yearly.

The state butterfly guide is currently in manuscript compilation stage, and is projected for completion by 1998. Biological information will include brood-flight periods, early and late record dates, nectar and host records, individual and seasonal variation, distribution, and conservation comments. In addition to the maps, a series of black-and-white specimen photographs will be utilized to highlight individual and seasonal variation not adequately covered in available field guides. Several habitat photos will also be included. The guide will be cross-referenced to several popular field guides.

After publication of the butterfly guide, the survey will likely continue in some form. Sponsor-

ship of the survey's on-going field work, and custody of the working database, will likely be transferred to a Rhode Island-based organization, probably the Rhode Island Natural History Survey, Natural Heritage Program, Butterfly Society, or similar cooperative arrangement.

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Harry Pavulaan is a cartographer with the National Oceanographic and Atmospheric Administration, and a member of RINHS. His work, A Checklist of Rhode Island Butterflies, is available from the RINHS Publications Listing.

The Butterfly Society of Rhode Island: the state's newest natural history organization

by Arthur Plitt

The Butterfly Society of Rhode Island began its metamorphosis in the spring of 1996, following the Rhode Island Spring Flower & Garden Show success of the "Butterfly Bit of Eden" display by the Roger Williams Park Zoo.

The Society's members range from gardening enthusiasts to environmentalists. Some are zoo-associated staff, volunteer gardeners, or docents. They include some collectors and some photographers of butterflies; others are simply entranced by the beautiful creatures.

The Society's mission is to spread the word to the public and interested parties, to enjoy and understand butterfly culture and gardens, and to help others understand the effects of habitat loss and degradation on butterfly populations. Future plans include a teaching program with the Roger Williams Park Zoo and Museum of Natural History, to enable children to learn about the environment and science through the excitement of butterflies and moths. The Society also plans to enhance the butterfly garden at the zoo.

Dues are only \$10 per year to cover mailings and miscellaneous expenses. Plans are underway to celebrate the first anniversary with Harry Pavulaan (who is preparing a book on Rhode Island butterflies), at a big June 1997 annual meeting. Regular meetings are held on the second Tuesday of the month (generally at the zoo's education center), at 6:00 p.m. to approximately 7:30. Contact President

Arthur Plitt at (401) 455-8638, or mail your suggestions, questions, and dues to: BSRI, Box 6585, Providence, RI 02940-6585.



Museum Marks 100th Anniversary

The Museum of Natural History, Roger Williams Park, officially marked its centennial year on June 6, 1996. For more than a century the Museum has served as Rhode Island's premier center for informal science education and interpretation in all areas from astronomy to zoology.

With its state-of-the-art Cormack Planetarium reopened in 1995, renovated, climate-controlled collection storage areas, and a revitalized program of educational offerings, the Museum is well prepared for the next century. Furthering its mission as "The People's University," to be accessible and welcoming to all will be the installation of an elevator for which construction is currently underway. Also, as of this fall, the Museum's auditorium has been redefined as a multi-purpose educational activity space for school groups or teacher-training workshops as well as serve its traditional use as a 120-capacity auditorium when needed.

The City of Providence founded the Museum in 1896 to house a donated collection of preserved mammals and birds. Over the past century, the collections have grown to encompass not only natural history including geology and paleontology, but cultural materials as well. In that the Museum is Rhode Island's only natural history museum, it has served as a statewide repository for donated collections of preserved plants, animals, rocks, minerals, fossils, as well as ethnographic and archeological artifacts and archival materials, representing unique historical documents. Such collections are irreplaceable scientific, educational, and historical resources.

The Museum currently exhibits striking artifacts from its Native American collection in "All Things Connected," installed in 1995. The exhibit also has an award-winning companion catalogue of the same title, and includes an interpretive component of Native Americans' relationship with the natural world. Other exhibits include "Natural Selections," whose focus is the passion for collecting that characterized the Victorian period, and "Narragansett Bay Worlds" which depicts the Bay's natural, geological, and cultural history.

For more information about the Museum and its collections, exhibits, or educational programs, call (401) 785-9457; http://ids.net/'cormack_pl/museum.html

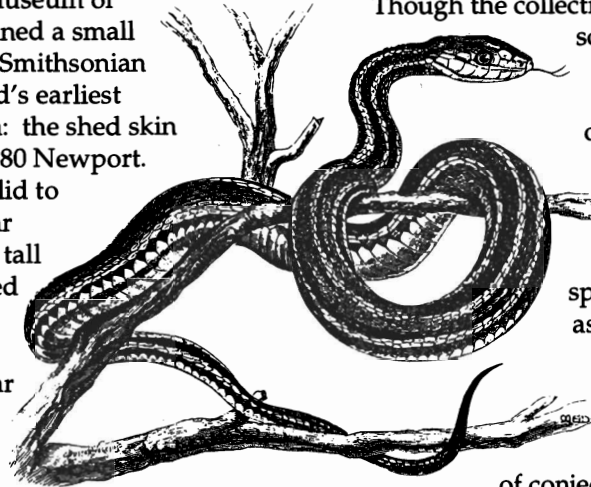
Rhode Island Collections

The Rhode Island Herpetological Record

by Christopher J. Raithel

By the faint light of the cavernous collections room of the American Museum of Natural History, I examined a small cardboard box from the Smithsonian which held Rhode Island's earliest herpetological specimen: the shed skin of a Black Racer from 1880 Newport. I carefully removed the lid to expose the brittle tubular fragments of skin as the tall museum cabinets seemed to lean in and peer over my shoulder. The head section was intact. So far so good. Dorsal scales unkeeled, facial scalation OK. It was a racer alright. In the bottom of the box was a small card. Penned by quill in the obvious hand of the period, it read, "skin of Gopher Snake, Newport, RI. Aug. 1880-snake sent from Smithsonian." Oops, problem! The skin was clearly not a Gopher Snake, but if the "snake" was sent from the Smithsonian as the label indicated, then must Newport unequivocally be its origin? Were racers once on Aquidneck Island and then extirpated? I'd love to know. Unfortunately, one of Rhode Island's most interesting specimens is also problematic.

Future generations will have no difficulty interpreting the herpetofauna of Rhode Island as it exists today. Since 1980 I have spent many hours, driven more than ten thousand miles, and searched hundreds of ponds throughout Rhode Island in relentless pursuit of these animals. This work has produced several thousand specimens and volumes of field notes, all archived at the American Museum of Natural History in New York City. For abundant species I tried to get voucher specimens for every township and island. Uncommon species were documented at each locality unless they were obviously demographically sensitive, such as some turtles and large snakes. Many of these specimens were salvaged from road kills or brought to me by a network of cooperators. Eventually, with the specimens serving as the backbone of information, the data will be published as the "Herps of Rhode Island," and entered into the GIS mapping system, where it will be a valuable tool for resource managers.



Herpetology is a rigorous discipline. Observations and even literature reports are notoriously unreliable and are never accepted as primary information. Even alleged specimens, as we have seen, should be meticulously examined. These lessons, imparted to me by my museum mentors, seemed harsh to someone trained primarily in bird identification, where sight observations are considered data. Though the collection record earlier in this century is scanty, each specimen represents a valuable snapshot in time. My surveys delineate a clear pattern of species loss over broad areas of Rhode Island. I believe this trauma attributable to habitat loss and fragmentation. By documenting the status of all species today, we should be able to assess changes over time and effectively predict the future. Without the specimen record, we'll continue to wallow in the comfortable but unreliable world of conjecture.

Chris Raithel is a Senior Wildlife Biologist at Rhode Island Department of Environmental Management's Division of Fish and Wildlife, and serves on the RINHS Advisory Board.

Rhode Island Bird Collections Touted at International Museum Conference

by Marilyn Massaro

The eleventh annual meeting of the Society for the Preservation of Natural History Collections (SPNHC) was held this year on June 12-15 at the Academy of Natural Science at Philadelphia. This organization has as its international membership curators, collection managers, conservators, and other persons responsible for the stewardship of natural history collections. The theme of this year's meeting was historic collections. This focus presented an opportunity to announce to the professional museum community the wealth of resources available in Rhode Island for researchers, educators, and scholars of antiquarian bird collections. In a slide-illustrated presentation, "Tidal Wave of Conservation Sweeps Ocean State's Historic Bird Collections," Marilyn Massaro, Curator of Collections at the Museum of Natural History, Roger Williams Park, Providence reviewed some of these resources.

The talk was enthusiastically received with many people expressing interest in the remarkable diversity of antiquarian bird collections found in Rhode Island and the enlightened stewardship their home repositories have demonstrated of late. A version of this

(continued on p. 11)

Focus On

RINHS Institutional Members: The Narragansett Bay National Estuarine Research Reserve

by Allan D. Beck

The Narragansett Bay National Estuarine Research Reserve (NBNERR) is one of 22 sites located in U. S. coastal areas. Together they comprise the National Estuarine Research Reserve System (NERRS) preserving over 440,000 acres of representative estuarine habitats. The NERRS is a state-federal partnership of state owned and managed coastal properties designated and supported by the National Oceanic and Atmospheric Agency (NOAA). These natural, protected sites are set aside for long-term scientific, educational and stewardship programs that provide information essential to the public and coastal management decision-makers. The System is authorized by Section 315 of the Coastal Zone Management Act as amended (CZMA).

The NBNERR was designated in 1982 and is located in the geographical center of Narragansett Bay. The Reserve presently encompasses approximately 2300 acres of land and 1600 acres of adjoining bay waters. The land area includes 2000 acres on Prudence Island, 204 acres on Patience Island, and all 94 acres on Hope Island. The major activities of the past several years have been to develop facilities and the support structure for visiting scientists and educators.

A field station has been constructed at South Prudence with a grant from NOAA. The 2500-square feet provide a nature center, research laboratory and office and support facilities. Our trust is that, "If we build it, they will come." Overnight facilities for up to 12 people are available for visiting scientists, naturalists, and educators. A plethora of protected habitats, on-site logistical support, long-term data sets for water quality, and meteorology coupled with a GIS mapping capability provide an attractive situation for outside investigators and educators.

The NBNERR is engaged in three main program areas:

Research: Rather than developing an extensive in-house research program at the reserve, we have chosen to encourage on-site extramural projects. Given the limited personnel resources, we believe that this is a more cost-effective strategy to develop scientific data for educating the public and provide the underpinning for coastal zone management decisions. This approach has been successful, resulting in over 30 research and monitoring projects conducted over the past five years. More than half of these projects are long-term and continuing. The research ranges from "Process and Pattern in Western

Atlantic Salt Marsh Plant Communities: A Biogeographical Perspective," conducted by Dr. Mark Bertness of Brown University, to "Etiology of Tick-Borne Diseases," a study by the Harvard School of Public Health. A list of research and monitoring projects is available on request.

The national network of Reserves provides an ideal opportunity for long-term monitoring on a local to national scale. The scientific literature is replete with pleas for inter-decadal environmental data sets. The NBNERR is addressing the need for natural resource status and trends information. We are participating in the NERRS national monitoring program and electronically measure standard water quality parameters at two sites at 15-minute intervals. A citizens' water quality monitoring program taking weekly measurements has been operating since 1991. We now have five years of precipitation data at our Potter Cove meteorological station, and continuous monitoring of atmospheric parameters at 15-minute intervals, beginning in May 1996. Too often we collect reams of physical and chemical parameter data without coupling this to a relevant biological monitoring program. Our intent is to expand this to relevant biological monitoring projects. What should we monitor? Can we operate as a partner in a larger statewide program? Can RINHS assist in this? Who else can we collaborate with? Is there funding?

Stewardship: We are identified as an estuarine reserve, yet almost two-thirds of our 2300 acres are uplands. Stewardship is a new initiative and our goal is to manage our holding in understanding of and in harmony with nature. We look to many of you reading this newsletter to help us in natural resource surveys, developing management plans for specific habitat protection, forestry management, fire ecology, control of invasive species, and the whole realm of activities to preserve our holdings in perpetuity.

Education: Part of our mission is educating both the public and coastal zone managers to foster an understanding and appreciation for our estuarine resources. We will be operating a modest nature center at the field station designed and staffed by the Audubon Society of Rhode Island (ASRI) under a cooperative agreement with the Reserve. An on-site and off-site education program will be developed by ASRI. More about this later.

If you are a scientist, educator, or steward of the environment, consider focusing all or part of your project at the NBNERR, and call Al Beck at (401) 683-5061 to discuss what opportunities await you at this relatively undiscovered oasis of hospitality and opportunity in the middle of Narragansett Bay.

The 1997 Notable Trees of Rhode Island Calendar

by Guy Lefebvre

The Rhode Island Urban and Community Forest Council is proud to be releasing its second Notable Trees of Rhode Island Calendar. The 1997 calendar is slightly larger than the 1996 edition, and the four color photographic images are very sharp, showing excellent branch and leaf detail.

January features a large double-trunked American Sycamore (*Platanus occidentalis*) located in Lincoln. Sycamores were the first American shade trees whose seeds were taken to the moon and back to earth to be planted. The U. S. Forest Service refers to these trees as "Moon Sycamores." The fine specimen in the calendar is only an "Earth Sycamore," but is highly accessible to the public, being easily visible from River Road midway between St. Jude's Church and the Lincoln Town Hall.

February features an impressive Red Oak (*Quercus rubra*) found on the RISD campus, and nominated by RISD President Roger Mandle. March features a 102-foot tall American Linden (*Tilia americana*) located in the Adamsville village of Little Compton. This linden is the remaining tree of a grove of lindens once used to mark due north by sea captains navigating the narrow straits of the Westport River.

A set of in-bloom Saucer Magnolias (*Magnolia x soulangiana*) located in the village of Wickford grace both the month of April and the cover. This variety developed in 1820 by French botanist M. Soulange-Bodin in his Parisian gardens has especially showy flowers. May's notable tree is a Weeping Higan Cherry (*Prunus subhirtella pendula*) located in Providence's Swan Point Cemetery. The cherry tree is often considered the hardiest, most persistent member of the distinguished genus *Prunus*, which includes trees both lovely and useful such as almonds, peaches, pears, apples, and plums.

Summer arrives in June with a late-blooming Tuliptree (*Liriodendron tulipifera*) located in Cranston. In colonial times, tuliptrees were often referred to as canoewood, this soft-grained light yellow wood being popular with Native Americans and European settlers alike to build canoes.

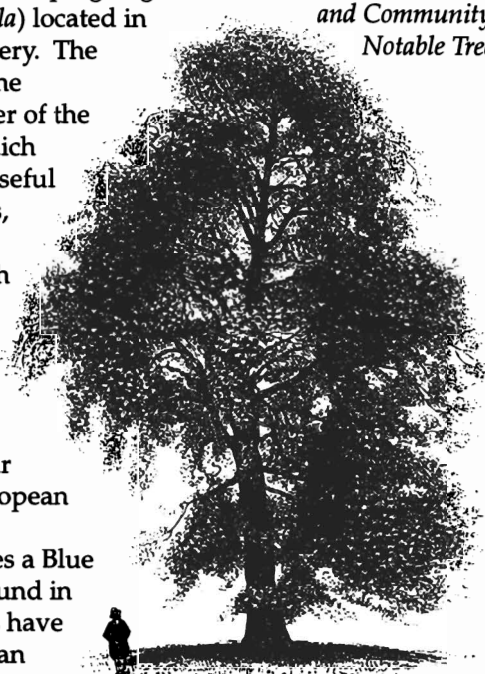
The month of July showcases a Blue Atlas Cedar (*Cedrus atlantica*) found in Middletown. Blue Atlas Cedars have deep fibrous root systems that can

withstand windy, exposed sites which often prove intolerable to other evergreens. August takes the viewer to a stunning American Elm (*Ulmus americana*) located in the middle of Central Falls. This survivor creates the favorite shady spot on the street for all the neighborhood children.

September features a Japanese Red Maple (*Acer palmatum*) planted at the Rhodes School in Cranston fifty years ago to the month to commemorate the premature death of eight-year old Cranstonian George Hearth. October brings the viewer to the surrounds of Jamestown and an 80-foot tall Eastern Black Walnut (*Juglans nigra*) with an 85-foot crown spread. Walnuts are, of course, culturally notable for their ability to flavor ice cream. The stark month of November presents a leafless Red Mulberry (*Morus rubra*) located in isolation from other trees by a stone wall in Little Compton. The year comes to conclusion in December with a 400- to 500-year old mighty White Oak (*Quercus alba*) located on the Bridgham Farm Conservation Land managed by the East Providence Conservation Trust.

Each notable tree photograph is accompanied by descriptive text, measurements, street address, and the name of the nominator. The calendar also contains sunrise and sunset times for the fifteenth day of each month as well as the average precipitation and temperature for each month. The 1997 Notable Trees of Rhode Island Calendar is available from the Rhode Island Urban and Community Forest Council, 1037 Hartford Pike, North Scituate RI 02857; (401) 647-3367. The price is \$10 plus \$2 for sales tax and shipping. First, buy one for yourself, and then upon inspection, buy a bunch for holiday giving!

Guy Lefebvre is Vice-Chair of the Rhode Island Urban and Community Forest Council, and Chair of its Notable Tree Program.



***It's time to
RENEW!***

All RINHS memberships are due October 1.

Please remember to send in your renewal soon. And if you've already renewed, thanks for the prompt response!



Rhode Island Bird Collections (continued from p. 7) paper is currently being prepared for publication in the *Collection Forum*, SPNHC's biannual journal, at the request of the journal's editor.

Recent conservation and inventory projects have been undertaken for the E. Dickens Collection at the Block Island School (1993), the E. Sturtevant Collection of the Norman Bird Sanctuary and Museum (1994-1995), and the Museum of Natural History, Roger Williams Park. The latter is in its completion phase with funds provided this year by the Nuttall Ornithological Club, America's oldest and most prestigious bird club. The Moses Brown School in Providence has just begun the task of inventorying specimens mounted in their full-wall tableau, which appears to be the oldest bird collection in Rhode Island (and one of the oldest in the country with a pre-Civil War installation date).

SPNHC and its journal, newsletter, and other publications have been instrumental in heightening awareness of the tremendous environmental chronicle antiquarian natural history collections provide. If you are interested in joining or learning more about SPNHC, contact Marilyn Massaro at the Museum of Natural History, (401) 785-9457 x 248.

RINHS 1996-1997 Lectures on Rhode Island's Biota, Geology & Ecosystems

Ninety people enjoyed University of Rhode Island Department of Geology's D. E. Fastovsky's lecture *In Search of Dinosaurs in the Gobi Desert, Mongolia*, which kicked off the 1996-1997 RINHS Lecture Series on October 1.

On November 12, Virginia Carpenter, Director of Science and Stewardship at the R. I. Field Office of The Nature Conservancy, will give a slide lecture on *Dragonflies and Damselflies of Rhode Island*, to be held at the Audubon Society of Rhode Island's headquarters in Smithfield, RI.

Could Verrazano See His Toes? will be the subject of Scott Nixon's talk on February 11, 1997 at Roger Williams University, Bristol, RI. Professor Nixon directs the Rhode Island Sea Grant Program and teaches at the University of Rhode Island's Graduate School of Oceanography.

The finale of the season's lectures will be presented on April 8 by Professor Douglass Morse of Brown University's Department of Ecology and Evolutionary Biology; Dr. Morse will speak on *Spiders at the Shoreline*. This lecture will be held at the Roger Williams Park Museum of Natural History in Providence, RI.

All the lectures begin at 7:30 p.m., with refreshments preceding the talks. These are great opportunities to mingle with the state's naturalists and environmental scientists; they are free and open to the public. Join us!

RINHS Institutional Members: Special News & Events

The Narragansett Bay National Estuarine Research Reserve (NBNERR) located on the South End of Prudence Island recently contracted with an education coordinator and an exhibit coordinator, through a cooperative agreement between the Audubon Society of RI and RIDEM.

Amy Costa, as education coordinator, is planning an education program which will include both on-site and off-site opportunities targeted to both children and adults. Mil Kinsella-Sullivan is currently planning a permanent exhibit at the new education facility at the South End. This exhibit will recreate the island's habitat and pictorially chronologue the history of the reserve.

A nature walk on the island, to include discussion of Prudence Island habitats and history, is scheduled for November 23rd. For information call the Audubon Society of RI at (401) 949-5454.

The Rhode Island Wild Plant Society offers a variety of interesting fall and winter events, including Amateur Naturalist Workshops at ASRI's Caratunk Wildlife Refuge on January 25 ("Keeping Field Notes and Journals") and February 1 ("Gear and Garb"); a Groundhog Day Walk at Sachuest Point NWR in Middletown, RI on February 2; a Late Winter Walk at the Eppley Wildlife Refuge in West Kingston, RI on March 1; and a session, "Soils and Sites" at the ASRI Headquarters in Smithfield, RI on March 3. For information contact RIWPS at (401) 949-0195.

Resources of Interest

Status of the World Ocean and Its Biodiversity is a 72-page report published by Ocean Voice International. Copies can be ordered from OVI, Box 20060, 3332 McCarthy Road, Ottawa, ON K1V 0W0, Canada; send \$10 US; email cx240@freenet.carleton.ca

We All Live Downstream documents nonpoint source pollution, considered the greatest threat to America's drinking water supplies. This video was produced by the Oregon State University Extension Service and may be ordered from: Publications Orders, Extension and Experiment Station Communications, Oregon State University, 422 Kerr Administrative Services Building, Corvallis OR 97331. Cost: \$30 (including shipping).

Global Biodiversity Assessment (Cambridge University Press, \$44.95; ISBN 0-5215-6403-4), released by the United Nation's Environment Program, is described by the U.N. as the first comprehensive, peer-reviewed report to examine earth's biodiversity.

Nearctic Avian Migrants in the Neotropics, 2nd. Ed., 1995, by Rappole, Morton, Lovejoy, and Ruos. Order from: Conservation & Research Center, 1500 Remount Rd., Front Royal VA 22630; make checks [\$12 + \$2 s/h] payable to "Smithsonian Institution."

Upcoming Conferences & Seminars

November 6 *The Art of Doing Science Under Sail: A Research Opportunity for College Students*, a lecture by Audrey Meyer (Woods Hole Oceanographic Institute), 4:30 p.m., Dept. of Science & Mathematics, Roger Williams University, Bristol, RI; (401) 254-3108.

November 9 *Nature Film Spectacular: Zooming in on the Inside Story*, 7:30 p.m., a lecture by Paul Gasek, documentary filmmaker (National Geographic Society), at Mystic Marinelife Aquarium, Mystic CT. For reservations call (860) 572-5955 x 520; \$8/adult; \$5/child age 3 and older.

November 12 *Economic Systems, Values, and the Quality of the Coastal Environment*, 3:30 p.m., a lecture by James Wilen (U. CA-Davis) with a panel discussion following lecture. Auditorium, White Hall, URI, Kingston, RI. Sponsored by URI Partnership for Coastal Environment.

November 12 *Dragonflies and Damselflies of Rhode Island*, 7:30 p.m., an RINHS lecture by Virginia Carpenter (The Nature Conservancy), at the ASRI Headquarters, 12 Sanderson Rd., Smithfield, RI. Cosponsored by the Audubon Society of RI. Free. Contact RINHS at 874-5800.

November 16 *What's Old & What's New in Environmental Education*, Fall Conference of the R.I. Environmental Education Association, an all-day program at Davies Technical High School, Lincoln, RI. \$25; contact (401) 277-1415 to register.

November 19 *Economic & Environmental Aspects of Aquaculture*, 3:30 p.m., a lecture by David Bengston (URI), with a panel discussion following. Auditorium, White Hall, URI, Kingston, RI. Sponsored by URI Partnership for Coastal Environment.

December 2 *Adaptive response of an herbivore to changing levels of predation*, 4:00 p.m., a lecture by Kristina Rothley (Yale U.), at the Biological Sciences Center, URI, Kingston, RI. Free. Sponsored by the URI Department of Biological Sciences.

December 3 *Global Perspectives on Aquaculture*, a lecture by Harald Rosenthal (Kiel U., Germany) with a panel discussion following. Auditorium, White Hall, URI, Kingston, RI. Sponsored by URI Partnership for Coastal Environment.

January 11, 1997 *Restoring Grasslands at Ninigret NWR*, 1:00 p.m., a lecture by Ronald Flores (U.S. Fish & Wildlife Service), at the Cross Mills Library, Charlestown, RI. Sponsored by the R.I. Wild Plant Society. Free. Contact (401) 949-0195.

January 25 *Habitat Restoration Conference*, to present Save the Bay's assessment of the state of Rhode Island's estuaries, salt marshes, and eelgrass beds,

and to develop a resolution to protect and restore them. Sponsored by Save the Bay; (401) 272-2540.

February 10-14 *Aquatic Sciences Meeting*, American Society of Limnology & Oceanography, Santa Fe, NM. Contact J. Cole at (914) 677-5343; email: 76067.3033@compuserve.com

February 12 *Could Verrazano See His Toes?*, 7:30 p.m., an RINHS lecture by Scott W. Nixon (R.I. Sea Grant) at Rm. 124, Science & Math Building, Roger Williams University, Bristol, RI. Cosponsored by Roger Williams University. Free. (401) 874-5800.

March 8 *Rhode Island's Flora: An Historical Perspective and a Look to the Future*, 1:00 p.m., a lecture by Lisa L. Gould (R.I. Natural History Survey), with location TBA. Annual Meeting & 10th Anniversary celebration of the R.I. Wild Plant Society. Contact RIWPS at (401) 949-0195.

March 16-19 *12th Annual Symposium, U.S. Regional Association of International Association for Landscape Ecology*, Durham, NC. Contact Dean Urban at (919) 613-8076; email: iale97@pinus.env.duke.edu

April 8 *Spiders at the Shoreline*, 7:30 p.m., an RINHS lecture by Douglass H. Morse (Brown University), at the Roger Williams Park Museum of Natural History, Providence, RI. Cosponsored by the RWP Museum of Natural History. Free. Contact RINHS at (401) 874-5800.

April 8 *2nd Annual International Wildlife Law Conference*, Washington, DC. Contact GreenLife Society at (510) 558-0620; pcis@igc.apc.org

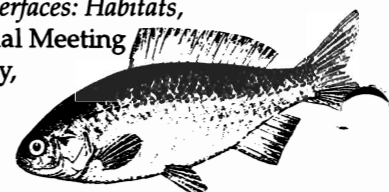
April 28-May 2 *2nd International Symposium on Environmental Software Systems*, Whistler, British Columbia. Contact website: <http://cfc.crle.uoguelph.ca/isess97/>

May 15-16 *Ecosystems Restoration and Creation*, 24th Annual Conference, Tampa, FL. Contact F. Webb, (813) 757-2104; webb@mail.hcc.cc.fl.us

June 6-9 *Symposium on Marine Conservation Biology, at Annual Meeting of Marine Conservation Biology Institute, Society for Conservation*, Redmond WA. Contact E. Norse at (206) 883-8914; enorse@u.washington.edu

August 11-14 *Changing Ecosystems: Natural and Human Influences*, 82nd Annual Meeting of the Ecological Society of America, Albuquerque NM. Contact F. Wagner, (801) 797-2555; ecol@cc.usu.edu

August 24-28 *Fisheries at the Interfaces: Habitats, Disciplines, Cultures*, 127th Annual Meeting of the American Fisheries Society, Monterey, CA. Write AFS, 5410 Grosvenor Lane, Bethesda MD 20814.



Opportunities for Volunteers & Students

Audubon Society of Rhode Island, 12 Sanderson Road, Smithfield RI 02917, welcomes volunteers to help with property surveys and inventories, checking property bounds, doing trail maintenance, and serving as trail wardens. Contact Properties Manager Dave Rodrigues at (401) 949-5454.

Common Fence Point Improvement Association, 74 Narragansett Blvd., Portsmouth RI 02871. Volunteers and students are needed for a saltmarsh restoration project, to monitor the progress of revegetation and other features. The project is 5.14 acres in size, located on the northernmost tip of Portsmouth. Contact project coordinator Mil Kinsella-Sullivan at (401) 683-4549.

Johnson & Wales University, 8 Abbott Park Place, Providence, RI 02903. More than 60 Johnson & Wales students have taken part in environmental community service activities this fall. Work has ranged from one-day cleanups to ten-week projects. The community service program is expanding and looking for new project sites around northern Rhode Island. Interested hosts may contact Dr. Matthew McConeghy at (401) 598-1766.

Lloyd Center for Environmental Studies, P. O. Box 87037, S. Dartmouth, MA 02748; (508) 990-0505. Spring & Summer Internships: Must have completed sophomore year of college; positions available with housing & stipend of \$75/week. Send cover letter, resume, & 2 letters of reference.

- (1) 4 Education Interns to work with school children, youth groups, and adults in programs teaching about the coastal zone.
- (2) 1 Research Intern for field survey of Lepidoptera in pine barrens and coastal bogs.
- (3) 1 Administrative Intern to assist in membership development and publicity.

Mystic Marineline Aquarium, 55 Coogan Blvd., Mystic, CT 06355 has volunteer opportunities in administration, visitor and member services, marketing and public relations, special events, exhibits, interpretation, development, education and programs, maintenance and grounds-keeping, husbandry, and research and veterinary services. Both adults and young people ages 15-17 are welcome to participate.

The MMA also offers an Intern Program for college students to gain practical experience in a museum setting. Working from 12-35 hours per week, students may gain experience working with marine mammals and birds, fish and invertebrates, or work in research, education, marketing, public relations, graphics, merchandising, development, human resources, and engineering and maintenance.

College credit is available for these internships.

For more information contact the MMA at the above address or call (860) 572-5955.

The Narragansett Bay National Estuarine Research Reserve, P.O. Box 151, Prudence Island, RI 02872 is pleased to announce the availability of Graduate Research Fellowships from the National Estuarine Research Reserve System of NOAA. An on-site research lab, computer room, overnight facilities, and on-site transportation are available to fellowship recipients. Also available are long-term data sets on NBNERR meteorology and water quality data. Contact Allan Beck at (401) 683-5061.

The Newport Aquarium, 18 Market Square, Newport, RI 02840 needs enthusiastic summer interns to teach visitors about marine animals, assist with school groups, help care for marine animals, and conduct beach tours. Students with a background or interest in natural sciences and education are encouraged to apply. Contact George Klein, (401) 849-1340.

Rhode Island's National Wildlife Refuges: Ninigret, Trustum Pond, Pettaquamscutt Cove, Sachuest Point, and Block Island refuges need your help counting wildlife, banding birds, constructing nesting boxes, maintaining trails, leading nature walks, and assisting refuge visitors. The program offers you several areas of opportunity; these include biological, visitor interpretation, education and orientation, maintenance, and miscellaneous skills. For more information contact Ron Flores at (401) 364-9124.

Rhode Island Natural History Survey, C.E. Education Center, E. Alumni Avenue, URI, Kingston, RI 02881, seeks a volunteer to help with the newsletter and other Survey projects. Computer skills (especially PageMaker and database experience) are particularly welcome. Contact Lisa Gould at (401) 874-5800.

Roger Williams Park Museum of Natural History, Elmwood Avenue, Providence, RI 02905 has a number of collection-related projects for (unpaid) student internships; projects include curatorial upgrading, nomenclatural updating, inventory and conservation of the museum's 10,000 specimen herbarium.

Opportunities to work with other natural and physical science collections exist as well. Independent research that earns college or graduate credit toward degree completion is encouraged and welcomed. For information contact: Marilyn Massaro, Curator, (401) 785-9457 ext. 248.

Roger Williams Park Zoo in Providence, RI has an intern program designed for people considering a career in the zoo world. It provides initial zoo experience and exposure to different zoo careers. Interns spend a minimum of 4 consecutive days/

Opportunities, continued from p. 9

week for 10 weeks in the program. Admission to the program is based on an application and interview.

Docents (must be at least 18 years old) are recruited every November and December for classes offered every Tuesday and Saturday beginning in January, for 13 weeks. Docents are asked to dedicate at least 72 hours per year to the Zoo. Docents also run and help out with special Zoo events, and make trips to other areas of interest.

For information about the above opportunities, as well as "Dino Guides," ZooGardeners" and "Meeters and Greeters," contact Pamela Rowe, Director of Volunteer Services, Roger Williams Park Zoo, Elmwood Ave., Providence, RI 02905; (401) 785-3510 x 356.

Rose Island Lighthouse Foundation, P. O. Box 1419, Newport, RI 02840 needs volunteers and interns for spring and summer work to help develop school curriculum for grades K-5, and to guide at the lighthouse in the summer. Interest in education, lighthouses, history, birds, native plants and/or marine biology is helpful. Enthusiasm and reliability are required. For information contact: Charlotte Johnson, Executive Director, at (401) 847-4242.

Save the Bay, 434 Smith Street, Providence, RI 02908. Save the Bay's Habitat Restoration Project seeks volunteer hydrologists, wetland biologists, and civil engineers to assist Save the Bay and community groups in salt marsh restoration projects in Narragansett Bay's coastal communities. For information contact Andy Lipsky at (401) 272-3540 or email at savebay@savethebay.org

Websites, continued from p. 15

Tree of Life (TOL) website will ultimately include information on all living organisms, including life histories, photographs, and genetic and evolutionary relationships [see article in *Science* 273: 2 August 1996, pp. 568-570]. Contact: <http://phylogeny.arizona.edu/tree/phylogeny.html>

U. S. Department of Agriculture National Agricultural Statistics Service website: <http://www.usda.gov/nass/> or email at: NASS@ag.gov For USDA's Economic Research Service, contact: <http://www.econ.ag.gov/> or email: service@econ.ag.gov

Wildlife Ecology Digest, a weekly digest for discussion, ideas, etc. concerning wildlife ecology. Email David Doyle: kingfshr@northcoast.com

World Wildlife Fund Alert Networks can be accessed at: <http://www.panda.org/action/mailist.htm> You may also email for information at: majordomo@panda.org

Rhode Island Natural History Survey, Inc.
c/o Cooperative Extension Education Center
E. Alumni Ave., URI, Kingston, RI 02881
Telephone: (401) 874-5800; Fax 401-874-2259
RINHS@URIACC.URI.EDU

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Allan D. Beck, Narragansett Bay National Estuarine Research Reserve

David Blockstein, Committee for the National Institute for the Environment

J. Allan Cain, Rhode Island State Geologist
Virginia A. Carpenter, The Nature Conservancy
Joseph Dowhan, U. S. Fish and Wildlife Service
Richard W. Enser, RIDEM Natural Heritage Program
Howard S. Ginsberg, USGS-Biological Resources Division
Mark D. Gould, Roger Williams University College of Arts & Sciences

Thomas P. Husband, URI Department of Natural Resources Science
Marjorie Jensen, URI Department of Community Planning
Keith T. Killingbeck, URI Department of Biological Sciences
Margaret Leinen, URI Graduate School of Oceanography
Christopher H. Little, Christopher H. Little & Associates
Peter T. Lockwood, RI Association of Wetland Scientists
Marilyn Massaro, Roger Williams Park Museum of Natural History

Leslie Merhoff, CT Geological & Natural History Survey
Joanne Michaud, Rhode Island Wild Plant Society
Douglass H. Morse, Brown University Department of Ecology & Evolutionary Biology

Jack Mulvena, Rhode Island Zoological Society
Lorin I. Neuling, Illinois Natural History Survey
Scott W. Nixon, Rhode Island Sea Grant
John F. Paul, U. S. Environmental Protection Agency
J. Christopher Powell, RIDEM Division of Fish & Wildlife
Christopher J. Raithel, RIDEM Division of Fish & Wildlife
David S. Reis, Coastal Resources Management Council
Lee C. Schisler, Jr., Audubon Society of Rhode Island
Linda A. Steere, Applied Bio-Systems, Inc.
Everett Stuart, USDA Natural Resources Conservation Service

Stephen K. Swallow, URI Department of Environmental and Natural Resource Economics
Lawrence Taft, Norman Bird Sanctuary
Saran Twombly, URI Department of Biological Sciences
Anthony Vecchio, Roger Williams Park Zoo

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Keith T. Killingbeck, Secretary
Virginia A. Carpenter, Treasurer
Lisa L. Gould, Executive Director

Annual Membership Fees:

\$25 Individual
\$40 Family
\$10 Student/Ltd Income
\$100 Institution



Weaving the Web: Electronic Resources

Amphibian and Reptile Conservation site on reptilian conservation breeding is available at: <ftp://ggg.iserver.com/pub/doc>
Or email Craig Hassapakis at ARC@yvx.byu.edu

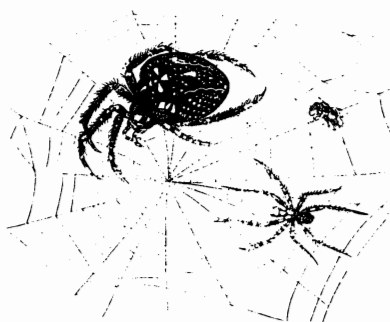
Center for International Forestry Research offers searches of the TROPIS index, an index of permanent plots maintained by CIFOR to help forest researchers and others interested in tree growth data. Email: J.Vanclay@cgnet.com Website at: <http://www.cgiar.org/cifor> Email: cnie@cnie.org

Committee for the National Institute for the Environment website: <http://www.cnie.org>
CNIE is also developing a prototype National Library for the Environment, an on-line source of environmental information; the site includes U.S. Congressional Research Service reports on environmental issues. Contact: <http://www.cnie.org/nle>

Ecological Society of America's Sustainable Biosphere Initiative is working with NASA to document the use of advanced technologies on ecological science. For more information about the Advanced Technologies in Ecological Science Project, or to get instructions on subscribing to the bulletin board, email: keith@esa.org

Essig Museum of Entomology, University of California website on California's endangered insects: <http://www.mip.berkeley.edu/essig/endins/endins/htm> You may also email at histerid@nature.berkeley.edu

Fish and Fisheries Research is an on-line, world-wide, peer-reviewed journal devoted to current investigations on the biology and ecology of fresh



water and marine fish and fisheries.
Website: <http://www.LSOFT.COM/FFResearch/>

GreenLife Society website: <http://EE:LINK.umich.edu/greenlife.index.html>

Institute of Marine Biology has an on-line bibliography of over 4,800 references relating to the interactions of aquaculture and the environment.

Contact the website at: <http://www.imbc.gr/cgi-bin/searchdb3/bibliography>

Johnson & Wales University, Science Department website has a broad compendium of information (and a growing array of maps and photos) on the Woonasquatucket Watershed: <http://www.jwu.edu/artnsi/science/science.html>

Rhode Island Natural History Survey website: www.edc.uri.edu/rreapage/nathist

Roger Williams Park Museum of Natural History website: http://ids.net/cormack_pl/museum.html

Smithsonian Institution's National Museum of Natural History gopher: nmnhgoph.si.edu
The Smithsonian's Conservation Center web site: <http://Institution,FrontRoyal,VA22630,USA/www.si.edu/>

Society for Ecological Restoration website: <http://nabalu.flas.ufl.edu/ser/SERhome.html>
Email: ser@mac.wisc.edu

U. S. Environmental Protection Agency homepage: <http://www.epa.gov/ecosystems>

TreeBASE is a website for a database on the morphological and genetic data of phylogenetic trees.
Contact: <http://phylogeny.harvard.edu/treebase>

(continued on p. 14)



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Thanks!

The Rhode Island Natural History Survey continues to be grateful to our members who donate books and reprints for our growing reference library. Carl Sawyer and Bob Wakefield of the University of Rhode Island donated several books and materials on weeds and grasses in the United States, and from Peter Lockwood has come *The Vascular Flora of Southeastern Connecticut: An Annotated Checklist*. Charlotte Sornborger gave RINHS the journal of her grandfather, Harold Nelson Gibbs, containing his observations (and beautiful illustrations) of plankton in and around Narragansett Bay (this book has been placed in the Special Collections Room at the URI Library). Everett Stuart donated a copy of the Natural Resource Conservation Service's *Northeast Wetland Flora: Field Office Guide to Wetland Species*, and Martine Villalard-Bohnsack gave a copy of Wendy Zomlefer's beautiful and informative *A Guide to Flowering Plant Families*. Thanks also go to Harry Pavulaan for copies of eight articles about the Lepidoptera of Rhode Island.

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We continue to give thanks as well to the Champlin Foundations, for their generous grant last December. With those funds we are purchasing new office furniture, a more powerful computer system to help us work on the flora and fauna databases and publishing, and more reference material for the library. Additions to the library--thanks to the Champlin grant--include the National Geographic Society's *Field Guide to the Birds of North America*, *Peterson's Field Guide to Eastern Birds*, *Peterson's Field Guide to Birds' Nests*, *National Audubon Society Field Guide to North American Rocks and Minerals*, *National Audubon Society Field Guide to North American Butterflies*, *Introductory Mycology*, *A Manual of Aquatic Plants*, *Mammal Species of the World: a taxonomic and geographic reference*, *Ecology and Classification of North American Freshwater Invertebrates*, *Index Herbarium*, *Seymour's Flora of New England*, *Handbook of Turtles*, *Handbook of Salamanders*, *Turtles of the United States and Canada*, *Marine Animals of Southern New England and New York*, and the 18-volume set *The Birds of North America*, published by the American Ornithologists' Union and the Academy of Natural Sciences.



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