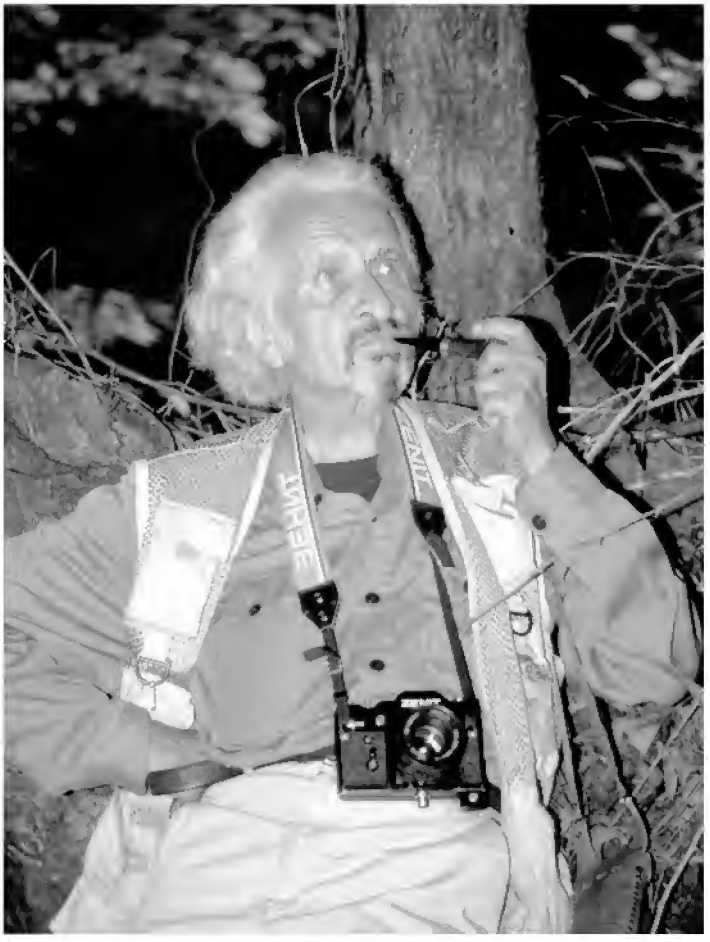
# BANISTERIA

A JOURNAL DEVOTED TO THE NATURAL HISTORY OF VIRGINIA



Roger H. de Rageot (1931-2006)

Roger H. de Rageot was a renaissance naturalist who worked for the former Norfolk Museum of Natural History from 1952 to 1967. This issue contains an obituary and the first half of his unpublished manuscript on the natural history of the Great Dismal Swamp and nearby areas.

Number 29 ISSN 1066-0712 2007

# B A N I S T E R I A

A JOURNAL DEVOTED TO THE NATURAL HISTORY OF VIRGINIA

ISSN 1066-0712

Published by the Virginia Natural History Society

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***Banisteria*** No. 28 was published on 23 March 2007.

*Cover*: Roger de Rageot contemplating in the Great Dismal Swamp (photograph by David Liebman).
*Back cover*: Canebrake Rattlesnake (*Crotalus horridus*), pen and ink drawing by Roger de Rageot.

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Number 29, 2007

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# A Flora of Fisherman Island, Virginia

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## ABSTRACT

Fisherman Island is a 750 ha barrier island located off the southern tip of the Delmarva Peninsula. It is managed by the U.S. Fish and Wildlife Service as Fisherman Island National Wildlife Refuge. A total of 256 plant species and subspecific taxa are reported for the island for the 2005 growing season. These include 14 new Northampton County, Virginia, records and five state-rare taxa. About 30% of the plant species observed are not native to the island, and a few of these are invasive species. The most serious invasive species and the only one that appears to be a current threat to the island's rare species is *Phragmites australis* var. *australis* (Common Reed).

*Key words*: barrier island, Fisherman Island, Fisherman Island National Wildlife Refuge, flora, invasive species, Northampton County, rare plants.

## INTRODUCTION

In 2004, the U.S. Fish and Wildlife Service (USFWS) contracted the Virginia Department of Conservation and Recreation's Division of Natural Heritage (DCR-DNH) to conduct a botanical inventory of Fisherman Island National Wildlife Refuge, Northampton County, Virginia. Specifically, the agreement required DCR-DNH to conduct a survey for rare plant species on Fisherman Island, develop a list of all vascular plant species encountered on the island while conducting rare plant surveys, and develop a list of invasive plant species found on the island. This paper reports on the results of this work.

## STUDY AREA

Fisherman Island National Wildlife Refuge (FINWR) is coterminous with Fisherman Island (FI), a barrier island located about 0.5 km south of the southern tip of the Delmarva Peninsula. Fisherman Island is of recent origin; documented evidence of an island in the area dates back only to 1815. Unlike other barrier islands in Virginia, FI is increasing in size. In 1852, the island consisted of about 10 ha, whereas today it comprises about 750 ha (U.S. Fish and Wildlife Service, 2005).

Fisherman Island has a long history of human use and occupation. Early residents used the island for hunting and fishing. In the 1890s, the island was acquired by the U.S. government and used as a quarantine station for European immigrants sailing up the Chesapeake Bay to Baltimore. The island was used as a defense station by the U.S. Army during both World Wars because of its strategic location at the entrance to the Chesapeake Bay, and remained a military installation until the 1960s. FINWR was established in 1969 and is managed by the Eastern Shore of Virginia National Wildlife Refuge, USFWS (U.S. Fish and Wildlife Service, 2005).

In 1964, the Chesapeake Bay Bridge-Tunnel (CBBT) opened; a second span was added in 1999. The CBBT connects Virginia's Eastern Shore with the cities of Norfolk and Virginia Beach via U.S. Route 13. Route 13 crosses the eastern end of the island for a length of about 2.75 km (1.70 mi). To the north, a high-level bridge across Fisherman Inlet connects FI with the Eastern Shore mainland. To the south-southwest, a series of low-level trestle bridges, high-level bridges, and underwater tunnels connect FI with Cape Henry, a distance of about 25 km (16 mi) by road (Chesapeake Bay Bridge and Tunnel Commission, 2006).

We identified the following natural community types (described in Fleming et al., 2006) on the island: Maritime Dune Grasslands, Maritime Dune Scrub, Maritime Dune Woodlands, Maritime Wet Grasslands, Maritime Shrub Swamps, Tidal Mesohaline and Polyhaline Marshes, Salt Flats, Salt Scrub, and Upper Beaches and Overwash Flats.

Ruderal habitats on the island include frequently mowed grassy strips along the edges of Route 13, a small paved parking area, partially shaded areas adjacent to bridge abutments, areas of riprap used to support elevated portions of Route 13, areas around military bunkers, and areas around the foundations of former buildings.

## METHODS

Before conducting fieldwork for this project, we gathered information on the study area's landscape. Aerial photographs and topographic maps were examined to delineate the distribution of plant habitats and to identify sites with high potential for rare species occurrences. Harvill et al. (1992) and the DCR-DNH rare species databases were utilized to develop a list of potential rare plants for FI based on rare plants known to occur elsewhere on Virginia's barrier islands and other maritime habitats. We used data compiled on the area's rare plants, along with information on the distribution of plant habitats, to formulate field plans and direct our field investigations.

Fieldwork for the project began 17 May 2005 and ended 13 October 2005. We spent 12 days in the field and focused our surveys on plant communities with a high potential for rare species. In order to develop the flora list, however, all known plant communities on the island were visited; we visited most of these communities at least twice during the growing season to capture species present at different times of the year. Beach and adjacent dune communities around the perimeter of the island could not be accessed until mid-summer due to the presence of nesting American Oystercatchers (*Haematopus palliatus*).

We maintained a list of all plant taxa encountered on FI and used Gleason & Cronquist (1991) to key out species whose identities were uncertain. A draft of a flora in progress, Weakley (2004), was consulted for more recent treatments. Harvill et al. (1992) was used to determine if each taxon had previously been collected in Northampton County. We collected voucher specimens of taxa new to the county and kept a separate list of invasive species encountered on the island.

Special emphasis was placed on searching for *Amaranthus pumilus* (Seabeach Amaranth), a potential species for the island that is listed as threatened under the federal Endangered Species Act of 1973, as amended. Seabeach Amaranth is found exclusively on barrier island beaches, where it usually occurs on stable upper beach shelves between the wrackline and foredune crest, on overwash flats, or on the accreting ends of islands. We searched all potential habitat on the island for this species during August and September. A previous search for the species on FI was conducted in 2000 (Belden, 2000). The only known extant population of this species in Virginia is on Assateague Island in Accomack County (Virginia Department of Conservation and Recreation, 2005).

## RESULTS

A total of 256 plant species and subspecific taxa was recorded for FI. These are listed in Table 1 and include 3 pteridophytes, 2 gymnosperms, 161 dicot angiosperms, and 90 monocot angiosperms. These 256 taxa represent 65 plant families and 174 genera. The Poaceae (grass family) has by far the largest number of taxa, containing 59 taxa (23.0% of the flora). The Asteraceae (aster family) has 40 taxa (16% of the flora), and the Cyperaceae (sedge family) has 17 taxa (7% of the flora). The 256 taxa compare with 139 taxa reported by Boulé (1979) for the island and 238 reported by Stalter & Lamont (2000).

Sixty-nine of the plant taxa documented during our study were new records for Fisherman Island (Table 1). Fourteen of these taxa also were new records for Northampton County based on Harvill et al. (1992). Voucher specimens for 13 of these taxa were deposited at the herbarium of the Virginia Polytechnic Institute and State University (VPI). A photograph of *Heliotropium curassavicum* was sent to VPI to voucher that species as a county record due to the small size of the population.

Five taxa documented from FI are considered rare in Virginia by DCR-DNH (Townsend, 2005). These are *Chamaesyce bombensis* (Southern Beach Spurge), *Heliotropium curassavicum* var. *curassavicum* (Seaside Heliotrope), *Hydrocotyle bonariensis* (Coastal Water-

pennywort), *Physalis walteri* (Dune Ground-cherry), and *Polygonum glaucum* (Sea-beach Knotweed). None of these species are listed under either the federal Endangered Species Act of 1973, as amended, or the Virginia Endangered Plant and Insect Species Act, as amended. Each of these species is discussed below. *Amaranthus pumilus* was not found on the island.

*Chamaesyce bombensis*

This prostrate annual herb in the Euphorbiaceae is found on dunes and other open, sandy habitats along or near the coast. Its range in the U.S. encompasses all of the Gulf States and southeastern coastal states, and it is also found in tropical America. Virginia is the northern limit of its range (Gleason & Cronquist, 1991). Most of the 11 extant Virginia occurrences are on barrier islands (Virginia Department of Conservation and Recreation, 2005).

We located many hundreds of individuals of *Chamaesyce bombensis* on FI in 2005. The species is widespread on the island and occurs in a variety of open, sandy habitats, including beaches, primary dunes, secondary dunes, and interior dunes. It appears to favor areas with minimal competition from other plant species. The largest known station for the plant is located on the south side of the island in a shallow, sparsely vegetated swale within a dune grassland community, where we observed an estimated 1,000 plants in a 170 x 10 m area.

*Heliotropium curassavicum* var. *curassavicum*

This somewhat fleshy, prostrate perennial herb is in the Boraginaceae. Plants in our area are var. *curassavicum*, a plant mostly of saline soil whose range extends north to Maine and south to the New World tropics. Populations north of Delaware are apparently not native, and some authors consider the species to be introduced and naturalized in other areas of the mid-Atlantic as well. Two other varieties are found in the West and Midwest (Gleason & Cronquist, 1991; Kartesz, 1999; McAvoy & Bennett, 2001; Weakley, 2004). The only other known extant population in Virginia is found on Assateague Island, where it was last seen in 1988 (Virginia Department of Conservation and Recreation, 2005).

We located one individual of Seaside Heliotrope on FI in 2005. This sprawling individual measured about 0.3 x 0.3 m and was partially buried in the sand, making it quite difficult to see. The plant was found on the south side of the island on an overwash flat and inland from a small lagoon that parallels the shore.

*Hydrocotyle bonariensis*

This perennial herb in the Apiaceae is found on dunes and moist, open sand. Its global distribution includes the coastal U.S. from Virginia to Texas, as well as tropical America (Kartesz, 1999; Weakley, 2004). Prior to our study, this species was known in Virginia only from the City of Virginia Beach and Southampton County, and only three exant Virginia populations were known (Harvill et al., 1992; Virginia Department of Conservation and Recreation, 2005). The FI occurrence represents the northernmost known location for the species (Harvill et al., 1992; Kartesz, 1999) and a new addition to the flora of the Delmarva Peninsula (W.A. McAvoy, The Delaware Natural Heritage Program, pers. comm.).

We found several hundred ramets of *Hydrocotyle bonariensis* within a 25 x 15 m area on the south side of FI. The population is located on the east side and near the toe of a sparsely vegetated low dune ridge and extends eastward into a moist swale dominated by *Morella cerifera* (Southern Bayberry). We observed about 150 ramets in fruit on 13 October 2005.

*Physalis walteri*

This rhizomatous perennial herb in the Solanaceae is found along the coast in sandy soil from Louisiana to Virginia, where it reaches its northern range limit (Gleason & Cronquist, 1991; Kartesz, 1999). Most of the 11 known extant populations in Virginia are found on barrier islands or on Cape Henry (Virginia Department of Conservation and Recreation, 2005).

We observed thousands of *Physalis walteri* plants on FI, comprising by far the largest known population in Virginia. This species is found in a wide variety of sandy, non-forested habitats, including beaches, dunes, moist swales, and overwash flats. It is a dominant species in many areas of the island and appears to compete quite well with other herbaceous species. It is tolerant of disturbance as evidenced by its prevalence along Route 13. We even found *P. walteri* growing in a stand of *Phragmites australis* var. *australis* (Common Reed).

*Polygonum glaucum*

This diffusely branched, prostrate annual herb in the Polygonaceae is found on beaches and in dune swales throughout its range (Gleason & Cronquist, 1991). It is known from the eastern seaboard states from Massachusetts south, but is either rare or extirpated in all states except Florida, South Carolina, and Massachusetts (Kartesz, 1999). Most of the nine extant populations in

Virginia occur on barrier islands or beaches along the Chesapeake Bay (Virginia Department of Conservation and Recreation, 2005). *Polygonum glaucum* is considered to be a globally rare species by NatureServe, an international organization focused on the compilation and management of biological data that operates in all 50 U.S. states, Canada, Latin America, and the Caribbean.

We found about 140 individuals of sea-beach knotweed on FI in five small colonies ranging in size from 2 $m^2$ to 2,250 $m^2$. The plant was in found on sand flats and dune swales that appear to receive occasional short duration inundation during storm events.

In addition to the five rare taxa discussed above, we recorded nine species on FI that are considered to be uncommon in Virginia by DCR-DNH (Townsend, 2005). These are *Aristida tuberculosa* (Seaside Three-awn), *Fimbristylis caroliniana* (Carolina Fimbry), *Galium hispidulum* (Coastal Bedstraw), *Ilex vomitoria* (Yaupon), *Lechea maritima* var. *virginica* (Beach Pinweed), *Leptochloa fusca* ssp. *fascicularis* (Bearded Sprangletop), *Polygonella articulata* (Coastal Jointweed), *Uniola paniculata* (Sea-oats), and *Zanthoxylum clava-herculis* (Hercules'-club).

Approximately 30% of the taxa that we recorded on FI are non-native plants that have become naturalized on the island. This compares with 29% reported by Stalter & Lamont (2000). The vast majority of these are roadside weeds found only in the frequently mowed grassy strips immediately adjacent to Route 13, but a few are invasive species. An invasive plant is a non-native species that has been intentionally or unintentionally introduced into an area by human activity and threatens to displace native species, alter natural communities, and change ecosystem processes (Heffernan, 1998). Invasive species found on FI include *Ailanthus altissima* (Tree-of-heaven), *Artemisia stelleriana* (Dusty Miller), *Artemisia vulgaris* (Common Wormwood), *Bromus tectorum* (Cheat Grass), *Carex extensa* (Long-bract Sedge), *Chondrilla juncea* (Hogbite), and *Lonicera japonica* (Japanese Honeysuckle). The most serious invasive species on FI and the only one that appears to be a current threat to the island's rare species is *Phragmites australis* var. *australis*. Major stands of Common Reed were aerial sprayed with an herbicide in September 2005 and 2006 (J. Scalf, The Nature Conservancy, pers. comm.).

## DISCUSSION

Two floras of Fisherman Island have been previously published (Boulé, 1979; Stalter & Lamont, 2000). Boulé (1979) reported 139 taxa for the island, including *Dichromena colorata* (L.) A.S. Hitchc. (White-topped Sedge). *Dichromena colorata* is a synonym for *Rhynchospora colorata* (L.) H. Pfeiffer, a rare species in Virginia (Townsend, 2005). Boulé (1979) reported that his specimens were deposited in the herbarium at the Virginia Institute of Marine Science (VIMS), which is part of The College of William and Mary. Conversations with Holly J. Grubbs, curator of The College of William and Mary herbarium, as well as with individuals on the VIMS staff, failed to locate Boulé's specimens. Stalter & Lamont (2000) also searched for *R. colorata* on the island without success. Thus, the presence of this species on FI could not be confirmed.

Stalter & Lamont (2000) reported 238 taxa for the island, including *Paspalum distichum* L. (Joint Paspalum), a rare species in Virginia (Townsend, 2005). They reported that this grass is rare on the island at the upland border of a brackish marsh and stated that a complete set of voucher specimens was deposited with the USFWS at Cape Charles, Virginia. We located voucher specimens for many, but not all, of the species reported in their paper. Among these was a collection labeled *Paspalum vaginatum* Sw. (Seashore Crown Grass). This species is closely related to *P. distichum* and, in the past, the latter name has been applied to the taxon now generally referred to as *P. vaginatum* (Gleason & Cronquist, 1991). This specimen appears to be the basis for the listing of *P. distichum* by Stalter & Lamont (2000), for they make no reference to *P. vaginatum*. After examination, the specimen does appear to be *P. vaginatum*, a species whose status in Virginia is unclear (J. F. Townsend, Virginia Department of Conservation and Recreation, pers. comm.). No specimen of true *P. distichum* L. was encountered in the collection.

## ACKNOWLEDGMENTS

This study was made possible through funding provided by the U.S. Fish and Wildlife Service (USFWS). Susan M. Rice, Refuge Manager, Eastern Shore of Virginia National Wildlife Refuge (ESVNWR), administered this funding for USFWS and provided logistical support for the project. Other members of the ESVNWR staff who assisted us with fieldwork logistics are Pamela P. Denmon, Robert J. Leffel, and Irene G. Morris. Assistance with the identification of plant specimens collected in conjunction with this project was provided by DCR-DNH Botanist John F. Townsend, DCR-DNH Vegetation Ecologist Gary P. Fleming, and Thomas F. Wieboldt, Assistant Curator, Herbarium, Virginia Polytechnic Institute and State University. We are grateful to Steven M. Roble and two anonymous reviewers for reviewing a draft copy of this paper.

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**Table 1. Flora of Fisherman Island, 2005.** The list is arranged taxonomically by Division: Equisetophyta (horsetails), Polypodiophyta (ferns), Pinophyta (gymnosperms), and Magnoliophyta (flowering plants). The Magnoliophyta are further divided into Class Magnoliopsida (dicotyledons) and Class Liliopsida (monocotyledons). Within each major group, families, genera, species, and subtaxa are arranged alphabetically. Scientific and common names follow Kartesz (1999) with the exception of three taxa, *Eupatorium linearifolium* Walter, *Melilotus albus* Medik., and *Setaria pumila* (Poir.) Roemer & J.A. Schultes ssp. *pumila*, which follow Weakley (2004). Synonyms are provided for some taxa where Kartesz (1999) departs sharply from other current sources. Non-native taxa, as determined from a consensus of the standard regional floras, are preceded by an asterisk (*). A few taxa whose status as native or non-native is uncertain are preceded by *?. Rare species, as determined by the Virginia Department of Conservation and Recreation (Townsend, 2006), are highlighted in bold. The third column shows taxa that were previously reported by Boulé (1979) (B) or Stalter & Lamont (2000) (S&L). Taxa not previously reported are indicated as "New." The last column shows the first author's collection number for specimens deposited at VPI to voucher new records from Northampton County.

| DIVISION/FAMILY/ SCIENTIFIC NAME | COMMON NAME | PREVIOUS REPORTS | COUNTY RECORD COLLECTION NO. |
|---|---|---|---|
| **EQUISETOPHYTA** | | | |
| EQUISETACEAE | | | |
| *Equisetum hyemale* L. var. *affine* (Engelm.) A.A. Eat. | Tall scouring-rush | New | 2110 |
| **POLYPODIOPHYTA** | | | |
| BLECHNACEAE | | | |
| *Woodwardia areolata* (L.) T. Moore | Netted chain fern | New | |
| OSMUNDACEAE | | | |
| *Osmunda regalis* L. var. *spectabilis* (Willd.) Gray | Royal fern | B, S&L | |
| **PINOPHYTA** | | | |
| CUPRESSACEAE | | | |
| *Juniperus virginiana* L. | Eastern red-cedar | B, S&L | |
| PINACEAE | | | |
| *Pinus taeda* L. | Loblolly pine | B, S&L | |
| **MAGNOLIOPHYTA: MAGNOLIOPSIDA** | | | |
| AIZOACEAE | | | |
| *Sesuvium maritimum* (Walt.) B.S.P. | Slender sea-purslane | B, S&L | |
| AMARANTHACEAE | | | |
| *Froelichia gracilis* (Hook.) Moq. | Slender snake-cotton | S&L | |
| ANACARDIACEAE | | | |
| *Rhus copallinum* L. | Winged sumac | B, S&L | 2123 |
| *Toxicodendron radicans* (L.) Kuntze | Eastern poison-ivy | B, S&L | 2102 |
| APIACEAE | | | |
| **Daucus carota* L. | Queen Anne's lace | B, S&L | |
| **Foeniculum vulgare* P. Mill. | Sweet fennel | S&L | |
| ***Hydrocotyle bonariensis* Comm. ex Lam.** | Coastal marsh-pennywort | New | 2108 |
| *Hydrocotyle* sp. (only sterile material was found; reported by S&L as *Hydrocotyle verticillata* Thunb.) | A marsh-pennywort | S&L | |
| *Ptilimnium capillaceum* (Michx.) Raf. | Herbwilliam | B | |

| DIVISION/FAMILY/ SCIENTIFIC NAME | COMMON NAME | PREVIOUS REPORTS | COUNTY RECORD COLLECTION NO. |
|---|---|---|---|
| AQUIFOLIACEAE | | | |
| *Ilex opaca* Ait. | American holly | B, S&L | |
| *Ilex vomitoria* Ait. | Yaupon | S&L | |
| ARALIACEAE | | | |
| **Hedera helix* L. | English-ivy | New | |
| ASTERACEAE | | | |
| **Achillea millefolium* L. | Common yarrow | B, S&L | |
| *Ambrosia artemisiifolia* L. | Annual ragweed | B, S&L | |
| **Artemisia stelleriana* Bess. | Dusty miller | New | |
| **Artemisia vulgaris* L. | Common wormwood | S&L | |
| *Baccharis halimifolia* L. | Groundseltree | B, S&L | |
| *Bidens bipinnata* L. | Spanish-needles | B, S&L | |
| *Bidens connata* Muhl. ex Willd. | Purple-stem beggarticks | S&L | 2111 |
| *Borrichia frutescens* (L.) DC. | Bushy seaside-tansy | B, S&L | |
| **Chondrilla juncea* L. | Hogbite | S&L | |
| **Cichorium intybus* L. | Chicory | New | |
| *Cirsium horridulum* Michx. | Yellow thistle | S&L | |
| **Cirsium vulgare* (Savi) Ten. | Bull thistle | New | |
| **Conyza bonariensis* (L.) Cronq. | Asthmaweed | New | |
| *Conyza canadensis* (L.) Cronq. var. *canadensis* = *Erigeron canadensis* L. var. *canadensis* | Canadian horseweed | B, S&L | |
| *Conyza canadensis* (L.) Cronq. var. *pusilla* = *Erigeron canadensis* L. var. *pusillus* (Nutt.) Boivin | Canadian horseweed | S&L | |
| *Erechtites hieraciifolia* (L.) Raf. ex DC. | American burnweed | S&L | |
| *Eupatorium capillifolium* (Lam.) Small | Dog-fennel | B, S&L | |
| *Eupatorium hyssopifolium* L. | Hyssop-leaf thoroughwort | B, S&L | |
| *Eupatorium* sp. (species has characteristics of *E. linearifolium* Walter, but is not a perfect fit) | | New | |
| *Eupatorium serotinum* Michx. | Late-flowering thoroughwort | New | |
| *Gamochaeta purpurea* (L.) Cabrera = *Gnaphalium purpureum* L. | Spoon-leaf purple everlasting | S&L | |
| **Helenium amarum* (Raf.) H. Rock | Yellowdicks | New | |
| *Heterotheca subaxillaris* (Lam.) Britt. & Rusby | Camphorweed | B, S&L | |
| **Hypochaeris radicata* L. | Hairy cat's-ear | B | |
| *Iva frutescens* L. | Jesuit's bark | B, S&L | |
| *Krigia virginica* (L.) Willd. | Virginia dwarf-dandelion | New | |
| *Lactuca canadensis* L. | Florida blue lettuce | S&L | |
| *Mikania scandens* (L.) Willd. | Climbing hempvine | B, S&L | |
| *Pityopsis graminifolia* (Michx.) Nutt. var. *latifolia* (Fern.) Semple & Bowers = *Chrysopsis graminifolia* (Michx.) Ell. var. *latifolia* Fern. | Narrow-leaf silk-grass | B, S&L | |
| *Pluchea odorata* (L.) Cass var. *odorata* | Sweetscent | S&L | |
| *Pseudognaphalium obtusifolium* (L.) Hilliard & Burtt = *Gnaphalium obtusifolium* L. | Blunt-leaf rabbit-tobacco | B, S&L | |
| *Pyrrhopappus carolinianus* (Walt.) DC. | Carolina desert-chicory | S&L | |
| **Senecio vulgaris* L. | Old-man-in-the-spring | New | |
| *Solidago canadensis* L. | Tall goldenrod | New | |
| *Solidago sempervirens* L. | Seaside goldenrod | B, S&L | |
| **Sonchus asper* (L.) Hill | Spiny-leaf sow-thistle | S&L | |

| DIVISION/FAMILY/ SCIENTIFIC NAME | COMMON NAME | PREVIOUS REPORTS | COUNTY RECORD COLLECTION NO. |
|---|---|---|---|
| ASTERACEAE (continued) | | | |
| *Symphyotrichum pilosum* (Willd.) Nesom var. *pringlei* (Gray) Nesom = *Aster pilosus* Willd. var. *pringlei* (Gray) Blake | White oldfield American-aster | S&L | |
| *Symphyotrichum subulatum* (Michx.) Nesom = *Aster subulatus* Michx. | Seaside American-aster | S&L | |
| *Symphyotrichum tenuifolium* (L.) Nesom = *Aster tenuifolius* L. | Perennial saltmarsh American-aster | B, S&L | |
| **Taraxacum officinale* G.H. Weber ex Wiggers | Common dandelion | S&L | |
| BIGNONIACEAE | | | |
| *Campsis radicans* (L.) Seem. ex Bureau | Trumpet-creeper | B, S&L | |
| BORAGINACEAE | | | |
| ***Heliotropium curassavicum* L. var. *curassavicum*** | Seaside heliotrope | New | Photographed |
| BRASSICACEAE | | | |
| **Arabidopsis thaliana* (L.) Heynh. | Thalecress | B, S&L | |
| *Cakile edentula* (Bigelow) Hook. | American searocket | B, S&L | |
| **Cardamine hirsuta* L. | Hairy bittercress | S&L | |
| *Lepidium virginicum* L. | Poorman's-pepperwort | B, S&L | |
| CACTACEAE | | | |
| *Opuntia humifusa* (Raf.) Raf. | Devil's-tongue | B, S&L | |
| CAPRIFOLIACEAE | | | |
| **Lonicera japonica* Thunb. | Japanese honeysuckle | B, S&L | |
| CARYOPHYLLACEAE | | | |
| *Sagina decumbens* (Ell.) Torr. & Gray | Trailing pearlwort | New | |
| **Scleranthus annuus* L. | Annual knawel | S&L | |
| *Spergularia salina* J.& K. Presl | Saltmarsh sandspurry | New | |
| **Stellaria media* (L.) Vill. | Common chickweed | S&L | |
| CHENOPODIACEAE | | | |
| *Atriplex cristata* Humb. & Bonpl. ex Willd. = *Atriplex arenaria* Nutt. | Crested saltbush | B, S&L | |
| *Atriplex prostrata* Bouchér ex DC. = *Atriplex patula* L. | Hastate orache | B, S&L | |
| *?*Chenopodium album* L. | Lamb's-quarters | B, S&L | |
| **Chenopodium ambrosioides* L. | Mexican-tea | B, S&L | |
| *Salicornia bigelovii* Torr. | Dwarf saltwort | B, S&L | |
| *Salicornia virginica* L. | Woody saltwort | B, S&L | |
| *?*Salsola kali* L. ssp. *kali* = *Salsola caroliniana* Walt. | Russian-thistle | B, S&L | |
| *Sarcocornia perennis* (P. Mill.) A.J. Scott = *Salicornia perennis* P. Mill. | Chickenclaws | B, S&L | |
| *Suaeda linearis* (Ell.) Moq. | Annual seepweed | B, S&L | |
| *?*Suaeda maritima* (L.) Dumort. | Herbaceous seepweed | New | |
| CISTACEAE | | | |
| *Hudsonia tomentosa* Nutt. | Sand golden-heather | B, S&L | |
| *Lechea maritima* Leggett ex B.S.P. var. *virginica* Hodgdon | Beach pinweed | S&L | |

| DIVISION/FAMILY/ SCIENTIFIC NAME | COMMON NAME | PREVIOUS REPORTS | COUNTY RECORD COLLECTION NO. |
|---|---|---|---|
| CLUSIACEAE | | | |
| *Hypericum hypericoides* (L.) Crantz | St. Andrew's-cross | B, S&L | |
| CONVOLVULACEAE | | | |
| *Calystegia sepium* (L.) R. Br. | Hedge false bindweed | B | |
| *Dichondra carolinensis* Michx. | Carolina pony's-foot | New | |
| *?*Ipomoea hederacea* Jacq. | Ivy-leaf morning-glory | S&L | |
| *Ipomoea lacunosa* L. | Whitestar | S&L | |
| **Ipomoea purpurea* (L.) Roth | Common morning-glory | B | |
| CORNACEAE | | | |
| *Nyssa biflora* Walt. | Swamp tupelo | S&L | |
| CURCURBITACEAE | | | |
| *Melothria pendula* L. | Guadeloupe-cucumber | New | |
| EBENACEAE | | | |
| *Diospyros virginiana* L. | Common persimmon | New | |
| ELAEAGNACEAE | | | |
| **Elaeagnus umbellata* Thunb. var. *parvifolia* (Royle) Schneid. | Autumn-olive | S&L | |
| EUPHORBIACEAE | | | |
| ***Chamaesyce bombensis* (Jacq.) Dugand** = *Euphorbia ammannioides* Kunth | Southern beach spurge | New | |
| *Chamaesyce maculata* (L.) = *Euphorbia maculata* L. | Small spotted sandmat | S&L | |
| *Chamaesyce polygonifolia* (L.) = *Euphorbia polygonifolia* L. | Small seaside sandmat | B, S&L | |
| *Croton glandulosus* L. var. *septentrionalis* Muell.-Arg. | Vente-conmigo | New | |
| FABACEAE | | | |
| **Kummerowia striata* (Thunb.) Schindl. = *Lespedeza striata* (Thunb.) Hook. & Arn. | Japanese-clover | S&L | |
| **Lespedeza cuneata* (Dum.-Cours.) G. Don | Chinese bush-clover | S&L | |
| **Melilotus albus* Medik. [under *Melilotus officinalis* (L.) Lam. in Kartesz] | White sweet-clover | B, S&L | |
| *Robinia pseudoacacia* L. | Black locust | B, S&L | |
| *Strophostyles helvula* (L.) Ell. | Trailing fuzzy-bean | B, S&L | |
| *Strophostyles umbellata* (Muhl. ex Willd.) Britt. | Pink fuzzy-bean | B, S&L | |
| **Trifolium arvense* L. | Rabbit-foot clover | New | |
| **Trifolium campestre* Schreb. | Lesser hop clover | New | |
| **Trifolium dubium* Sibthorp | Suckling clover | New | |
| **Trifolium repens* L. | White clover | New | |
| **Vicia hirsuta* (L.) S.F. Gray | Tiny vetch | New | |
| **Vicia sativa* L. ssp. *nigra* (L.) Ehrh | Garden vetch | S&L | |
| **Vicia villosa* Roth | Winter vetch | New | |
| GENTIANACEAE | | | |
| *Sabatia stellaris* Pursh | Rose-of-Plymouth | B, S&L | |

| DIVISION/FAMILY/ SCIENTIFIC NAME | COMMON NAME | PREVIOUS REPORTS | COUNTY RECORD COLLECTION NO. |
|---|---|---|---|
| GERANIACEAE | | | |
| *Geranium carolinianum* L. | Carolina cranes's-bill | B, S&L | |
| LAMIACEAE | | | |
| *Monarda punctata* L. | Spotted beebalm | B, S&L | |
| *Teucrium canadense* L. | American germander | B, S&L | |
| LAURACEAE | | | |
| *Persea palustris* (Raf.) Sarg. | Swamp bay | S&L | |
| *Sassafras albidum* (Nutt.) Nees | Sassafras | B, S&L | |
| LINACEAE | | | |
| *Linum medium* (Planch.) Britt. var. *texanum* (Planch.) Fern. | Stiff yellow flax | New | |
| MALVACEAE | | | |
| *Hibiscus moscheutos* L. | Crimson-eyed rose-mallow | B, S&L | |
| MOLLUGINACEAE | | | |
| **Mollugo verticillata* L. | Green carpetweed | S&L | |
| MYRICACEAE | | | |
| *Morella cerifera* (L.) Small = *Myrica cerifera* L. | Southern bayberry | B, S&L | |
| *Morella pensylvanica* (Mirbel) Kartesz = *Myrica pensylvanica* Mirbel | Northern bayberry | B, S&L | |
| ONAGRACEAE | | | |
| *Ludwigia palustris* (L.) Ell. | Marsh primrose-willow | S&L | |
| *Oenothera humifusa* Nutt. | Seaside evening-primrose | S&L | |
| *Oenothera laciniata* Hill | Cut-leaf evening-primrose | B, S&L | |
| OXALIDACEAE | | | |
| *Oxalis corniculata* L. | Creeping yellow wood-sorrel | New | |
| PASSIFLORACEAE | | | |
| *Passiflora incarnata* L. | Purple passion-flower | New | |
| PHYTOLACCACEAE | | | |
| *Phytolacca americana* L. | American pokeweed | B, S&L | |
| PLANTAGINACEAE | | | |
| **Plantago aristata* Michx. | Large-bract plantain | B, S&L | |
| **Plantago lanceolata* L. | English plantain | B, S&L | |
| *Plantago virginica* L. | Pale-seed plantain | B, S&L | |
| PLUMBAGINACEAE | | | |
| *Limonium carolinianum* (Walt.) Britt. | Carolina sea-lavender | B, S&L | |
| POLYGONACEAE | | | |
| *Polygonella articulata* (L.) Meisn. | Coastal jointweed | B, S&L | |
| **Polygonum caespitosum* Blume var. *longisetum* (de Bruyn) A.N. Steward | Oriental lady's-thumb | New | |
| ***Polygonum glaucum* Nutt.** | Sea-beach knotweed | New | |

| DIVISION/FAMILY/ SCIENTIFIC NAME | COMMON NAME | PREVIOUS REPORTS | COUNTY RECORD COLLECTION NO. |
|---|---|---|---|
| POLYGONACEAE (continued) | | | |
| *Polygonum punctatum* Ell. | Dotted smartweed | B, S&L | |
| *Polygonum setaceum* Baldw. | Bog smartweed | New | |
| **Rumex acetosella* L. | Common sheep sorrel | B, S&L | |
| **Rumex crispus* L. | Curly dock | S&L | |
| RANUNCULACEAE | | | |
| **Ranunculus bulbosus* L. | St. Anthony's-turnip | New | |
| RHAMNACEAE | | | |
| *Berchemia scandens* (Hill) K. Koch | Alabama supplejack | S&L | |
| ROSACEAE | | | |
| *Prunus serotina* Ehrh. | Black cherry | B, S&L | |
| **Rosa multiflora* Thunb. ex Murr. | Multiflora rose | New | |
| *Rubus argutus* Link | Saw-tooth blackberry | S&L | |
| *Rubus cuneifolius* Pursh | Sand blackberry | New | |
| *Rubus flagellaris* Willd. | Whiplash dewberry | S&L | |
| RUBIACEAE | | | |
| *Diodia teres* Walt. | Poorjoe | B, S&L | |
| *Diodia virginiana* L. | Virginia buttonweed | S&L | |
| *Galium aparine* L. | Sticky-Willy | New | |
| *Galium hispidulum* Michx. | Coastal bedstraw | S&L | |
| *Galium tinctorium* (L.) Scop. | Stiff marsh bedstraw | New | |
| *Mitchella repens* L. | Partridge-berry | S&L | |
| RUTACEAE | | | |
| *Zanthoxylum clava-herculis* L. | Hercules'-club | B, S&L | |
| SALICACEAE | | | |
| *Populus deltoides* Bartr. ex Marsh. | Eastern cottonwood | B, S&L | |
| *Salix caroliniana* Michx. | Carolina willow | S&L | |
| SCROPHULARIACEAE | | | |
| *Agalinis purpurea* (L.) Pennell | Purple false foxglove | New | |
| *Nuttallanthus canadensis* (L.) D.A. Sutton<br>= *Linaria canadensis* (L.) Chaz. | Oldfield-toadflax | B, S&L | |
| **Veronica arvensis* L. | Corn speedwell | S&L | |
| SIMARUBACEAE | | | |
| **Ailanthus altissima* (P. Mill.) Swingle | Tree-of-heaven | S&L | |
| SOLANACEAE | | | |
| **Datura stramonium* L. | Jimsonweed | S&L | |
| ***Physalis walteri* Nutt.**<br>= *Physalis viscosa* L. var. *maritima* (M.A. Curtis) Rydb. | Dune ground-cherry | New | |
| *Solanum carolinense* L. | Carolina horse-nettle | B, S&L | |
| *Solanum ptychanthum* Dunal<br>= *Solanum americanum* auct. Non P. Mill.<br>= *Solanum nigrum* auct. Non L. | Eastern black nightshade | B, S&L | |

| DIVISION/FAMILY/ SCIENTIFIC NAME | COMMON NAME | PREVIOUS REPORTS | COUNTY RECORD COLLECTION NO. |
|---|---|---|---|
| TYPHACEAE | | | |
| *Typha angustifolia* L. | Narrow-leaf cat-tail | New | |
| ULMACEAE | | | |
| *Celtis occidentalis* L. | Common hackberry | B, S&L | |
| URTICACEAE | | | |
| *Boehmeria cylindrica* (L.) Sw. | Small-spike false nettle | New | |
| VALERIANACEAE | | | |
| **Valerianella locusta* (L.) Lat. | Lamb's-lettuce | New | |
| VERBENACEAE | | | |
| *Callicarpa americana* L. | American beauty-berry | S&L | |
| VITACEAE | | | |
| *Parthenocissus quinquefolia* (L.) Planch. | Virginia-creeper | B, S&L | |
| **MAGNOLIOPHYTA: LILIOPSIDA** | | | |
| AGAVACEAE | | | |
| *Yucca filamentosa* L. | Adam's-needle | B, S&L | |
| COMMELINACEAE | | | |
| **Commelina communis* L. | Asiatic dayflower | New | |
| CYPERACEAE | | | |
| *Carex albicans* Willd. ex Spreng. var. *albicans* | White-tinge sedge | New | 2101 |
| **Carex extensa* Goodenough | Long-bract sedge | New | 2113 |
| **Carex gravida* Bailey var. *lunelliana* (Mackenzie) F.J. Herm. | Heavy sedge | New | 2103 |
| *Carex hirsutella* Mackenzie = *Carex complanata* Torr. & Hook. var. *hirsuta* (Willd.) Gleason | Fuzzy-wuzzy sedge | New | |
| **Carex kobomugi* Ohwi | Asiatic sand sedge | B, S&L | 2106 |
| *Carex longii* Mackenzie | Long's sedge | S&L | |
| *Cyperus esculentus* L. | Chufa | S&L | |
| *Cyperus filicinus* Vahl | Fern flat sedge | B, S&L | |
| *Cyperus grayi* Torr. | Eastern Gray's flat sedge | B, S&L | |
| *Cyperus odoratus* L. | Rusty flat sedge | S&L | |
| *Cyperus retrorsus* Chapman | Pine-barren flat sedge | B, S&L | |
| *Eleocharis obtusa* (Willd.) J.A. Schultes = *Eleocharis ovata* (Roth) Roemer & J. A. Schultes var. *obtusa* (Willd.) Kükenth. | Blunt spike-rush | S&L | |
| *Fimbristylis caroliniana* (Lam.) Fern. | Carolina fimbry | S&L | |
| *Fimbristylis castanea* (Michx.) Vahl | Marsh fimbry | B?, S&L | |
| *Schoenoplectus americanus* (Pers.) Volk. ex Schinz & R. Keller = *Scirpus olneyi* Gray | Chairmaker's club-rush | New | |
| *Schoenoplectus pungens* (Vahl) Palla = *Scirpus americanus* auct. Non Pers. | Three-Square | B, S&L | |
| *Scirpus cyperinus* (L.) Kunth | Cottongrass bulrush | S&L | |

| DIVISION/FAMILY/ SCIENTIFIC NAME | COMMON NAME | PREVIOUS REPORTS | COUNTY RECORD COLLECTION NO. |
|---|---|---|---|
| JUNCACEAE | | | |
| *Juncus biflorus* Ell. | Bog rush | S&L | |
| = *Juncus marginatus* Rostk. var. *biflorus* Wood | | New | |
| *Juncus coriaceus* Mackenzie | Leathery rush | B, S&L | |
| *Juncus dichotomus* Ell. | Forked rush | S&L | |
| *Juncus effusus* L. | Lamp rush | S&L | |
| *Juncus gerardii* Loisel. | Saltmarsh rush | B, S&L | |
| *Juncus roemerianus* Scheele | Roemer's rush | B, S&L | |
| LILIACEAE | | | |
| **Allium vineale* L. | Crow garlic | S&L | |
| **Asparagus officinalis* L. | Asparagus | B, S&L | |
| POACEAE | | | |
| **Aira caryophyllea* L. | Common silver-hair grass | New | |
| *Ammophila breviligulata* Fern. | American beach grass | B, S&L | |
| *Andropogon glomeratus* (Walt.) B.S.P. | Bushy bluestem | S&L | |
| *Andropogon virginicus* L. | Broom-sedge | B, S&L | 2112 |
| **Anthoxanthum odoratum* L. | Large sweet vernal grass | New | |
| *Aristida tuberculosa* Nutt. | Seaside three-awn | B | |
| *Axonopus furcatus* (Flueggé) A.S. Hitchc. | Big carpet grass | New | |
| **Bromus hordeaceus* L. | Soft brome | New | |
| **Bromus racemosus* L. | Bald brome | S&L | |
| **Bromus tectorum* L. | Cheat grass | B, S&L | |
| *Cenchrus tribuloides* L. | Sand-dune sandburr | B, S&L | |
| *Chasmanthium laxum* (L.) Yates | Slender wood-oats | S&L | |
| **Cynodon dactylon* (L.) Pers | Bermuda grass | B, S&L | |
| **Dactylis glomerata* L. | Orchard grass | New | |
| *Dichanthelium meridionale* (Ashe) Freckmann | Matting rosette grass | S&L | |
| = *Panicum acuminatum* Sw. var. *unciphyllum* (Trin.) Lelong | | | |
| *Dichathelium ovale* (Ell.) Gould & C.A. Clark var. *addisonii* (Nash) Gould & C.A. Clark | Egg-leaf rosette grass | New | |
| = *Panicum addisonii* Nash | | | |
| *Dichanthelium scoparium* (Lam.) Gould | Broom rosette grass | B, S&L | |
| = *Panicum scoparium* Lam. | | | |
| *Dichanthelium sphaerocarpon* (Ell.) Gould var. *sphaerocarpon* | Round-seed rosette grass | New | |
| = *Panicum sphaerocarpon* Ell. | | | |
| *Digitaria ciliaris* (Retz.) Koel. | Southern crab grass | S&L | |
| = *Digitaria sanguinalis* (L.) Scop. var. *ciliaris* (Retz.) Parl. | | | |
| **Digitaria ischaemum* (Schreb.) Schreb. ex Muhl. | Smooth crab grass | S&L | |
| *Distichlis spicata* (L.) Greene | Coastal salt grass | B, S&L | |
| **Echinochloa crus-galli* (L.) Beauv. | Large barnyard grass | S&L | |
| *Echinochloa walteri* (Pursh) Heller | Long-awn cock's-spur grass | New | |
| **Eleusine indica* (L.) Gaertn. | Indian goose grass | S&L | |
| *Elymus virginicus* L. var. *halophilus* (Bickn.) Wieg. | Virginia wild rye | B, S&L | 2104 |
| **Eragrostis curvula* (Schrad.) Nees | Weeping love grass | S&L | |
| *Eragrostis hirsuta* (Michx.) Nees | Big-top love grass | New | |
| *Eragrostis spectabilis* (Pursh) Steud. | Petticoat-climber | B, S&L | |
| *Festuca rubra* L. | Red fescue | New | |

| DIVISION/FAMILY/ SCIENTIFIC NAME | COMMON NAME | PREVIOUS REPORTS | COUNTY RECORD COLLECTION NO. |
|---|---|---|---|
| POACEAE (continued) | | | |
| *Leptochloa fusca* (L.) Kunth ssp. *fascicularis* (Lam.) N. Snow = *Leptochloa fascicularis* (Lam.) Gray var. *maritima* (Bickn.) Gleason | Bearded sprangletop | S&L | 2109 |
| **Lolium arundinaceum* (Schreb.) S.J. Darbyshire = *Festuca arundinacea* Schreb. = *Festuca elatior* L. ssp. *arundinacea* (Schreb.) Hack. | Tall rye grass | S&L | |
| **Lolium perenne* L. ssp. *multiflorum* (Lam.) Husnot = *Lolium multiflorum* Lam. | Perennial rye grass | B, S&L | |
| **Microstegium vimineum* (Trin.) A. | Japanese stilt grass | New | |
| *Muhlenbergia capillaris* (Lam.) Trin. | Hair-awn muhly | B | |
| *Panicum amarum* Ell. var. *amarulum* (A.S. Hitchc. & Chase) P.G. Palmer | Bitter panic grass | B, S&L | |
| *Panicum amarum* Ell. var. *amarum* | Bitter panic grass | B, S&L | |
| *Panicum dichotomiflorum* Michx. | Fall panic grass | S&L | |
| *Panicum virgatum* L. | Wand panic grass | S&L | |
| **Paspalum dilatatum* Poir. | Golden crown grass | New | |
| *Paspalum floridanum* Michx. | Florida crown grass | S&L | |
| *Paspalum laeve* Michx. | Field crown grass | New | |
| *Paspalum setaceum* Michx. | Slender crown grass | S&L | |
| **Phragmites australis* (Cav.) Trin. ex Steud. var. *australis* | Common reed | B, S&L | |
| **Poa annua* L. | Annual blue grass | S&L | |
| **Poa pratensis* L. | Kentucky blue grass | S&L | |
| *Schizachyrium littorale* (Nash) Bickn. = *Andropogon scoparius* Michx. var. *littoralis* (Nash) A.S. Hitchc. | Dune false bluestem | B, S&L | |
| *Setaria magna* Griseb. | Giant bristle grass | New | |
| *Setaria parviflora* (Poir.) Kerguélen = *Setaria geniculata* auct. non (Wild.) Beauv. | Marsh bristle grass | New | |
| **Setaria pumila* (Poir.) Roemer & J.A. Schultes ssp. *pumila* = *Setaria glauca* (L.) Beauv. [under *Pennisetum glaucum* (L.) R. Br. in Kartesz] | Pearl-millet | S&L | |
| *Sorghastrum nutans* (L.) Nash | Yellow Indian grass | New | 2105 |
| **Sorghum halepense* (L.) Pers. | Johnson grass | S&L | |
| *Spartina alterniflora* Loisel. | Saltwater cord grass | B, S&L | |
| *Spartina patens* (Ait.) Muhl. | Salt-meadow cord grass | B, S&L | |
| **Sporobolus indicus* (L.) R. Br. | Smut grass | S&L | |
| *Tridens flavus* (L.) A.S. Hitchc. | Tall redtop | S&L | |
| *Triplasis purpurea* (Walt.) Chapman | Purple sand grass | B, S&L | |
| *Uniola paniculata* L. | Sea-oats | B, S&L | |
| *Vulpia elliotea* (Raf.) Fern. = *Festuca sciurea* Nutt. | Squirrel-tail six-weeks grass | B | |
| **Vulpia myuros* (L.) K.C. Gmel. = *Festuca myuros* L. | Rat-tail six-weeks grass | S&L | |
| SMILACACEAE | | | |
| *Smilax bona-nox* L. | Fringed greenbrier | S&L | |
| *Smilax glauca* Walt. | Sawbrier | S&L | |
| *Smilax pseudochina* L. | Bamboovine | New | |
| *Smilax rotundifolia* L. | Horsebrier | S&L | |

*Banisteria*, Number 29, pages 17-31


# A Survey of Macrolepidopteran Moths of Turkey Run and Great Falls National Parks, Fairfax County, Virginia

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## ABSTRACT

National park sites at Turkey Run Park and Great Falls Park, Fairfax County, Virginia, were surveyed intermittently from April 1999 through March 2007 for macrolepidopteran moths. A total of 480 taxa from 281 genera in 13 families was documented, including the first known record of *Abrostola urentis* Guenée (Noctuidae) from Virginia. Eleven of the taxa recorded are included on the watch list of rare animals in Virginia. Relationships of uncommon moths to their host plants are discussed. Extensions to the known physiographic ranges and periods of adult flight activity are noted for some species.

*Key words*: *Abrostola urentis*, biodiversity, Lepidoptera, moths, national parks, Potomac River Gorge, Virginia.

## INTRODUCTION

Although the Lepidoptera have long been esteemed among collectors of insects (Morrison, 1875; Packard, 1895; Holland, 1903), few systematic studies of the moths of Virginia have been published (Skinner, 1921; Stein, 1993; Ludwig, 2000, 2001, 2002; Butler et al., 2001). Thus, there has been little dissemination of information on the distribution of macro-moth species within the Commonwealth. This study sought to add to the distributional knowledge of the macro-moth fauna by compiling individual records documented with a voucher specimen from two national park sites in northern Virginia, ascertain the species richness of macro-moths found along the Potomac River Gorge, an area long heralded for its biodiversity and regionally rare species (Ward, 1881; Cohn, 2004), and determine whether any federally or state-listed rare, threatened or endangered macro-moths occur within the study sites.

## STUDY SITES

The study sites are located within the Virginia portions of Great Falls Park and in Turkey Run Park, Fairfax County, Virginia (Fig. 1). Both parks lie on the western rim of the Potomac River Gorge within the Piedmont physiographic province of the Central Appalachian region. Great Falls Park encompasses nearly 323 ha while the area studied in Turkey Run Park is approximately 100 ha. Turkey Run Park is 15 km northwest of the center of Washington, D.C. and Great Falls Park is 5 km farther upriver. The parks are

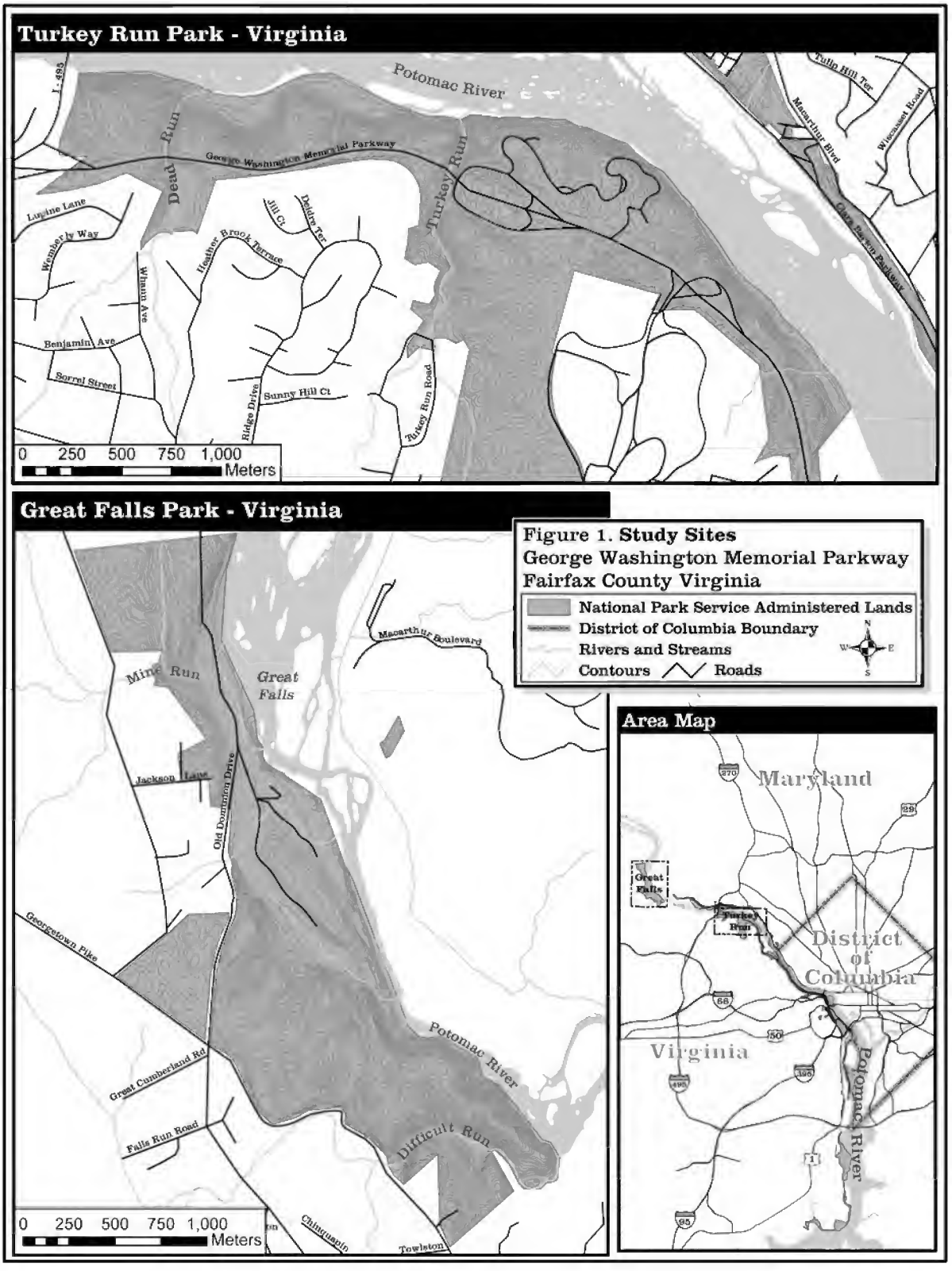


Fig. 1. Location and topographic features of Turkey Run and Great Falls national parks.

managed by the National Park Service as units of the George Washington Memorial Parkway.

Both parks are characterized by two-hundred foot palisades of metamorphic rock cut by steep streams draining into the Potomac River. The park's vegetation includes a complex of upland and floodplain forest communities, riverside bedrock terrace prairies, and frequently flooded river shores. Although disturbed, secondary forests are common in formerly cleared areas of the parks; much of the contemporary forest consists of maturing second-growth stands greater than 100 years old, with several *Quercus alba* L. (White Oak) more than 200 years old documented along the northern ridge of Great Falls Park (Abrams & Copenheaver, 1999). These deciduous and mixed deciduous/ coniferous stands support a thick shrub layer and lush herbaceous flora. The diversity and abundance of spring ephemeral wildflowers on the Turkey Run Park floodplain rival those found anywhere in Virginia. The largest wetland area found in the parks is a 6 ha swamp, the remnant of an ancient Potomac River oxbow, which lies near the center of Great Falls Park. The combined vascular flora of these two parks contains more than 925 extant species (George Washington Memorial Parkway Biological Database, 2007).

## MATERIALS AND METHODS

The Turkey Run Park inventories were conducted from April 1999 to October 2000 and cotemporally with Great Falls Park inventories from January 2004 through March 2007. Methods that we used to capture moths during this study included standard blacklight traps, ultraviolet light shown on a hung white sheet, fermented fruit and sugar baits painted on trees, collecting around incandescent lights on the outside of buildings, and general daylight searches for diurnal species. Blacklight traps consisted of a five-gallon plastic bucket fitted with a funnel, four-fold vane side extensions and a ceiling with a 15 watt blacklight in the center. Moths exiting the funnel are captured in the bottom of the bucket where they are killed by ethyl acetate or tetrachorethane. Power is provided by a 12 volt sealed lead-acid battery. We sampled various locations and habitats within the parks and retained voucher specimens for each taxon found. A total of 29 taxa were documented only with photographic vouchers, two taxa were recorded solely on the basis of sight observations, and the remainder were vouchered as pinned specimens. The sight records are of *Amphion floridensis* (all author citations are provided in the list of species) on 3 June 2004, and *Hemaris thysbe* on 31 July 2006, both in Great Falls Park. Voucher specimens are deposited in the collection at the George Washington Memorial Parkway (GWMP), Turkey Run Park Headquarters in McLean, Virginia. Photographic vouchers are labeled, saved on a compact disk, and curated with the pinned specimens.

## RESULTS AND DISCUSSION

A total of 480 macrolepidopteran moth taxa from 281 genera in 13 families was documented within Turkey Run and Great Falls Parks. The most species rich family was the Noctuidae with 269 taxa, followed by Geometridae (108), Notodontidae (26), Arctiidae (24), Sphingidae and Saturniidae (12 each), Nolidae (9), Lymantriidae (8), Lasiocampidae (6), Apatelodidae, Uraniidae, and Thyatiridae (2 each), and Mimallonidae with just a single species. The highest species richness in any genus was found in *Acronicta* (19 species), followed by *Catocala* (12 species), *Zale* (10 species), *Macaria* and *Hypena* (9 species each), and *Idia* (8 species). The total macro-moth fauna recorded from Great Falls Park was 425 taxa. A total of 222 taxa was documented in Turkey Run Park from 1999 and 2000 and an additional 86 taxa were added between 2004 and 2007, bringing the total known macro-moth fauna of the park to 308 taxa. Fifty-five taxa were documented only in Turkey Run Park, 172 taxa were unique to Great Falls Park, and 253 taxa are known from both parks. Ludwig (2000) reported that the known macro-moth fauna of Virginia is approximately 1,200 species. Following this baseline, Turkey Run and Great Falls Parks support at least 40 percent of the macro-moth fauna of Virginia.

Our collection of *Abrostola urentis* (Variegated Brindle Moth) in Turkey Run Park is the first record for Virginia based on reviews of collections held by the Virginia Department of Conservation and Recreation, Division of Natural Heritage (Steve Roble, pers. comm.), the United States National Museum (USNM) collection at the Smithsonian Institution (Michael Pogue, pers. comm.), and a five-year inventory of macrolepidopteran moths in Hanover County, Virginia (Ludwig, 2000, 2001, 2002). This moth was photographed in Turkey Run Park on 26 July 2004, 10 and 14 September 2004, and on 21 June 2005 (Fig. 2). A voucher was collected on 10 September 2004 and is deposited in the GWMP collection. *Abrostola urentis* is a widespread species known from Nova Scotia and New Brunswick, west to British Columbia, and south to North Carolina in the East, to Kansas and northeastern Colorado in the Great Plains, and to Oregon in the West (Lafontaine & Poole, 1991). The nearest known locality to Virginia for this species is based on two records contributed by Doug Ferguson to the USNM collection from Sycamore Landing, Montgomery County,

Fig. 2. *Abrostola urentis* photographed in Turkey Run Park, Fairfax County, Virginia, on 26 July 2004.

Maryland, dated 30 April and 24 July (no year given). The larvae of this species are reported to feed on Stinging Nettle (*Urtica dioica* L., Urticaceae) and possibly on other species of Urticaceae as well (Lafontaine & Poole, 1991). *Urtica dioica* is found in Turkey Run Park but is also known in 30 other Virginia counties (Harvill et al., 1992). Other taxa in the Urticaceae that occur in Turkey Run Park are *Boehmeria cylindrica* (L.) Swartz. (False Nettle), *Laportea canadensis* (L.) Wedd. (Wood-Nettle), and *Pilea pumila* (L.) A Gray (Clear Weed), all of which are more common statewide than *U. dioica* (Harvill et al., 1992). Thus, the apparent rarity of *Abrostola urentis* in Virginia is unlikely related to the rarity of its host plant.

Although no federally endangered or threatened species were documented, eleven of the macro-moth species that we found in Turkey Run or Great Falls Parks are included on the Virginia invertebrate watch list due to their possible vulnerability to extirpation statewide (Roble, 2006). Six of these eleven species were found only in Great Falls Park, one was found only in Turkey Run Park, and four were recorded in both parks. The six species found in Great Falls Park and their state natural heritage ranks are *Acronicta spinigera* (Nondescript Dagger Moth) S1S3, *Anticlea multiferata* (Many-lined Carpet) S1S3, *Balsa tristrigella* (Three-lined Balsa Moth) S1S3, *Bellura brehmei* (Narrow-leaved Cattail Borer Moth) S1S3, *Eutelia pulcherrima* (Beautiful Eutelia) S1S4, and *Euxoa violaris* (Violet Dart) S1S3. *Orthosia revicta* (Subdued Quaker Moth) S1S4 was found only in Turkey Run Park. *Acronicta radcliffei* (Radcliffe's Dagger Moth) S2S4, *Anticlea vasiliata* (Variable Carpet) S1S3, *Metarranthis indeclinata* (Pale Metarranthis) S2S4, and *Oligia crytora* (Mantled Brocade) S1S3, were recorded in both parks.

The host plants of *Euxoa violaris* and *Oligia crytora* are not known (Covell, 1984; Lafontaine, 1987). The other nine Virginia watch list macro-moths recorded during this inventory all use larval host plants that are common statewide (Harvill et al., 1992). These include woody deciduous trees, shrubs or vines in the genera *Quercus* (oaks), *Prunus* (cherry), *Ulmus* (elms), *Toxicodendron* (Poison Ivy and Poison Sumac), *Diospyros* (persimmon), *Crataegus* (hawthorn), *Tilia* (basswood), and *Rubus* (blackberries), and the herbaceous plants, *Typha angustifolia* L. (Narrow-leaved Cat-tail) and *Epilobium* spp. (willow-herb) (Covell, 1984; Wagner et al., 1997, 2001; Robinson et al., 2002; Wagner, 2005). Thus, the apparent rarity of these moths in Virginia is not due to a paucity of their larval host plants.

In spite of the statewide abundance of *Typha angustifolia* and *Epilobium* spp., the only documented host plants of *Bellura brehmei* and *Anticlea multiferata*, respectively, neither of these two plants has ever been documented from Great Falls or Turkey Run Parks, despite recent vascular plant surveys in these parks documenting over 925 taxa. Thus, these two moth species must have immigrated some distance to the park where they were captured or they are using alternate, unknown host plants. The taxon most closely allied to *T. angustifolia* that is found in Great Falls Park is *Typha latifolia* L. (Broad-leaved Cat-tail), but it is very rare there. The Onagraceae (evening-primrose family), to which *Epilobium* belongs, contains four other genera that are common in Great Falls Park, including species of *Circaea* (enchanter's nightshade), *Gaura* (biennial gaura), *Ludwigia* (water-primrose), and *Oenothera* (evening-primrose) that may be serving as additional host plants of *Anticlea multiferata* in the area around Great Falls Park.

Our records of *Euxoa violaris* and *Diachrysia aeroides* (specimens confirmed by Michael Pogue) from the Piedmont of Virginia represent physiographic range extensions for these two species within the Commonwealth. Previously, *Euxoa violaris* was known only from the Coastal Plain and *Diachrysia aeroides* only from the mountains. *Euxoa violaris* inhabits areas of loose, shifting sand such as beach and dune areas along the Atlantic Coastal Plain from Massachusetts to North Carolina (Lafontaine, 1987). Based on reviews of collections at USNM and the Virginia Department of

Conservation and Recreation, Division of Natural Heritage, there are only two previously known Virginia records of *Diachrysia aeroides*, both from high elevation sites in western Virginia (Steve Roble, pers. comm.).

Our inventory extended the known periods of adult activity for four species. Adult activity in *Costaconvexa centrostrigaria* has been documented as occurring from March through October (Covell, 1984), but we recorded it on 9 December 2004 during this inventory. The flight period for *Galgula partita* is reported as March through October (Covell, 1984). We documented this species in Turkey Run Park on 13 December 2006. Adult activity in *Cerastis tenebrifera* has been noted in most areas from late March until early May and as early as February in the South (Lafontaine, 1998). It was found in Turkey Run Park on 16 January 2007, as was *Iridopsis defectaria*, for which Covell (1984) gives the known flight period as February through November.

## ACKNOWLEDGMENTS

National Park Service staff including Melissa Kangas, Ann Brazinski, and Dan Sealy assisted in the collection of field data from Turkey Run Park during the 1999-2000 study. Specimens collected during 1999-2000 were identified by staff of the Virginia Department of Conservation and Recreation, Division of Natural Heritage including Anne Chazal, Steve Roble, Kathy Derge, and Chris Ludwig; Dale Schweitzer verified most of these identifications. John W. Brown (USNM) provided macro-moth data for species collected from Great Falls and Turkey Run parks during the June 2006 Potomac Gorge Bioblitz. George Balogh determined specimens of *Macaria fissinotata* and *Hydriomena pluviata*. Steve Roble and two anonymous reviewers provided helpful comments on the manuscript. Special appreciation is extended to Sean Denniston, National Park Service, National Capital Region for providing the image in Fig. 1.

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## LIST OF SPECIES

Macro-moth taxa documented from Turkey Run and Great Falls parks are listed following the numerical sequence (except for placement of the family Nolidae) in Hodges et al. (1983). Taxa added subsequent to that checklist (or reassigned to other families or genera) are cited by the addition of a decimal to the number assigned to the most closely related known taxon. The periods of adult activity for Great Falls (GF) and Turkey Run (TR) parks are given based on dates when these taxa have been documented in the parks. Dates separated by a hyphen indicate that the taxon was documented on at least one day during each month within this continuum of months, whereas dates separated by a comma represent individual observation dates. The date of the earliest and latest observation is cited for each taxon. An "x" denotes that the taxon was found in the park indicated and a dash indicates that the species was not found in the park.

| Hodges # | Family/Species | GF | TR | Dates Observed |
|---|---|---|---|---|
| | **Thyatiridae** | | | |
| 6237 | *Pseudothyatira cymatophoroides* (Gn.) | x | x | 15 Jun - 12 Jul |
| 6240 | *Euthyatira pudens* (Gn.) | x | – | 19 Apr |
| | **Geometridae** | | | |
| 6258 | *Alsophila pometaria* (Harris) | – | x | 6 Dec -7 Feb |
| 6261 | *Heliomata cycladata* Grt. & Rob. | x | – | 3 Jun |
| 6273 | *Macaria pustularia* Gn. | x | x | 3 - 11 Jun |
| 6322 | *Mellilla xanthometata* Wlk. | x | – | 19 Aug |
| 6326 | *Macaria aemulataria* Wlk. | x | x | 23 Apr - 11 Jun, 30 Sep |
| 6331 | *Macaria promiscuata* Fgn. | x | x | 9 May - 13 Aug |
| 6340 | *Macaria minorata* (Pack.) | – | x | 30 Aug |
| 6341 | *Macaria bicolorata* F. | x | x | 16 May, 13 Aug |
| 6342 | *Macaria bisignata* Wlk. | x | x | 8 May, 19 Jul |
| 6348 | *Macaria fissinotata* (Wlk.) | x | – | 13 May |
| 6352 | *Macaria granitata* Gn. | x | x | 19 - 23 Apr |

| Hodges # | **Geometridae** (continued) | GF | TR | Dates Observed |
|---|---|---|---|---|
| 6353 | *Macaria multilineata* Pack. | x | x | 8 May - 3 Jun, 4 Aug |
| 6362 | *Digrammia continuata* (Wlk.) | x | x | 8 May, 19 Aug |
| 6386 | *Digrammia ocellinata* (Gn.) | x | x | 3 - 23 Jun |
| 6405 | *Digrammia gnophosaria* (Gn.) | x | – | 19 Aug |
| 6440 | *Hypomecis gnopharia* (Gn.) | – | x | 13 Aug |
| 6443 | *Glenoides texanaria* (Hulst) | x | – | 30 Oct |
| 6478 | *Exilis pyrolaria* Gn. | x | x | 4 - 8 Aug |
| 6582 | *Iridopsis vellivolata* Hulst. | x | – | 29 Jul |
| 6586 | *Iridopsis defectaria* (Gn.) | x | x | 16 Jan, 23 Apr, 10 Jun, 13 Aug |
| 6588 | *Iridopsis larvaria* (Gn.) | x | x | 18 May - 13 Aug |
| 6590 | *Anavitrinella pampinaria* (Gn.) | x | x | 13 - 19 Aug |
| 6594 | *Cleora sublunaria* (Gn.) | x | – | 3 May |
| 6597 | *Ectropis crepuscularia* (D. & S.) | x | x | 24 May - 29 Jun |
| 6598 | *Protoboarmia porcelaria* (Gn.) | x | – | 6 Apr |
| 6599 | *Epimecis hortaria* (F.) | x | x | 23 Apr - 13 Aug |
| 6620 | *Melanolophia canadaria* (Gn.) | x | x | 19 Apr, 11 Jun, 13 Aug |
| 6621 | *Melanolophia signataria* (Wlk.) | x | x | 3 Jun - 16 Jul |
| 6640 | *Biston betularia* L. | x | x | 8 May, 29 Jul |
| 6654 | *Hypagyrtis unipunctata* (Haw.) | x | x | 23 May - 13 Aug |
| 6655 | *Hypagyrtis esther* (Barnes) | x | x | 11 Jun, 15 Aug |
| 6658 | *Phigalia titea* (Cram.) | x | x | 13 Mar - 6 Apr |
| 6659 | *Phigalia denticulata* (Hulst) | – | x | 12 Dec - 7 Feb |
| 6660 | *Phigalia strigataria* (Minot) | x | x | 25 Mar - 6 Apr |
| 6662 | *Paleacrita vernata* (Peck) | – | x | 18 Dec - 30 Jan, 14 Mar |
| 6667 | *Lomographa vestaliata* (Gn.) | x | x | 8 - 9 May |
| 6711 | *Thysanopyga intractata* (Wlk.) | x | x | 9 May - 23 Jun, 13 Aug |
| 6720 | *Lytrosis unitaria* (H.-S.) | x | x | 10 - 15 Jun |
| 6726 | *Euchlaena obtusaria* (Hbn.) | x | – | 3 May |
| 6733 | *Euchlaena amoenaria* (Gn.) | x | x | 11 Jun, 19 Aug |
| 6739 | *Euchlaena irraria* (B. & McD.) | x | – | 3 Jun |
| 6740 | *Xanthotype urticaria* Swett. | x | – | 19 Aug |
| 6743 | *Xanthotype sospeta* (Dru.) | x | – | 3 Jun |
| 6754 | *Pero ancetaria* (Hbn.) | x | x | 23 Apr - 3 Jun |
| 6763 | *Phaeoura quernaria* (Sm.) | x | – | 9 May |
| 6796 | *Campaea perlata* (Gn.) | x | x | 8 - 11 Jun, 19 Aug |
| 6797 | *Ennomos magnaria* Gn. | x | x | 4 - 6 Oct |
| 6798 | *Ennomos subsignaria* (Hbn.) | x | x | 2 - 8 Jun |
| 6815 | *Gueneria similaria* (Wlk.) | x | – | 9 May |
| 6823 | *Metarranthis angularia* B.&McD. | x | x | 3 - 10 Jun |
| 6824 | *Metarranthis amyrisaria* (Wlk.) | x | – | 15 Jun |
| 6825 | *Metarranthis indeclinata* (Wlk.) | x | x | 26 May - 15 Jun |
| 6826 | *Metarranthis hypochraria* (H.-S.) | x | x | 3 - 11 Jun |
| 6828 | *Metarranthis honuraria* Grt. & Rob. | x | x | 8 May, 4 Aug |
| 6834 | *Cepphis decoloraria* (Hulst) | x | – | 15 Jun |
| 6837 | *Probole alienaria* (H.-S.) | x | x | 8 May, 11 Jun, 19 Aug |
| 6838 | *Probole amicaria* (H.-S.) | x | x | 9 May - 10 Jun, 13 Aug |
| 6844 | *Plagodis alcoolaria* (Gn.) | x | – | 29 Jul |
| 6884 | *Besma endropiaria* (Grt. & Rob.) | x | – | 3 Jun |
| 6885 | *Besma quercivoraria* (Gn.) | – | x | 8 May |
| 6892 | *Lambdina pellucidaria* (Grt. & Rob.) | x | x | 19 Apr - 5 May |
| 6894 | *Lambdina fervidaria athasaria* (Hbn.) | x | – | 19 Apr |
| 6941 | *Eusarca confusaria* Hbn. | x | x | 10 Jun, 19 Aug |
| 6963 | *Tetracis crocallata* Gn. | x | x | 11 Jul - 19 Aug |
| 6964 | *Tetracis cachexiata* Gn | x | – | 19 Aug |
| 6966 | *Eutrapela clemataria* (Sm.) | x | x | 23 Apr - 11 Jul |

| Hodges # | **Geometridae** (continued) | GF | TR | Dates Observed |
|---|---|---|---|---|
| 6974 | *Patalene olyzonaria puber* (Grt. & Rob.) | x | x | 23 Jun - 6 Oct |
| 6982 | *Prochoerodes lineola* (Dru.) | x | x | 14 Jun - 15 Aug |
| 7009 | *Nematocampa resistaria* (Haw.) | x | x | 11 Jun – 11 Jul |
| 7033 | *Nemoria lixaria* (Gn.) | x | x | 1 Sep - 4 Oct |
| 7046 | *Nemoria bistriaria* Hbn. | x | x | 6 Apr, 25 Jun |
| 7053 | *Dichorda iridaria* (Gn.) | x | – | 28 Aug |
| 7058 | *Synchlora aerata* (F.) | x | – | 3 Jun |
| 7071 | *Chlorochlamys chloroleucaria* (Gn.) | x | – | 9 May |
| 7084 | *Hethemia pistasciaria* (Gn.) | x | – | 9 May |
| 7114 | *Idaea demissaria* (Hbn.) | x | – | 19 Aug |
| 7115 | *Idaea eremiata* (Hulst) | x | – | 3 Jun |
| 7123 | *Idaea obfusaria* (Wlk.) | x | – | 29 Jul |
| 7132 | *Pleuroprucha insulsaria* (Gn.) | x | x | 13 Aug, 6 Oct |
| 7136 | *Cyclophora packardi* (Prout) | x | x | 23 Apr, 23 Jun, 19 Aug |
| 7139 | *Cyclophora pendulinaria* (Gn.) | x | x | 25 Jun - 16 Jul |
| 7146 | *Haematopis grataria* (F.) | x | x | 10 Jun - 8 Sep |
| 7147 | *Calothysanis amaturaria* (Wlk.) | – | x | 8 May |
| 7159 | *Scopula limboundata* (Haw.) | x | x | 3 Jun, 13 Aug |
| 7169 | *Scopula inductata* (Gn.) | x | – | 3 Jun |
| 7196 | *Eulithis diversilineata* (Hbn.) | x | x | 11 Jun - 16 Jul |
| 7197 | *Eulithis gracilineata* (Gn.) | x | x | 3 Jun, 6 Oct |
| 7237 | *Hydriomena transfigurata* Swett | x | – | 19 Apr |
| 7239 | *Hydriomena pluviata* (Gn.) | x | x | 6 - 12 Apr |
| 7290 | *Coryphista meadii* (Pack.) | – | x | 15 Aug |
| 7329 | *Anticlea vasiliata* Gn. | x | x | 23 Apr, 15 Jun |
| 7330 | *Anticlea multiferata* (Wlk.) | x | – | 9 May |
| 7333 | *Stamnodes gibbicostata* (Wlk.) | – | x | 6 Oct |
| 7388 | *Xanthorhoe ferrugata* Clerck | – | x | 1 Aug |
| 7399 | *Euphyia unangulata* (Haw.) | x | x | 23 Jun, 19 Aug |
| 7414 | *Orthonama obstipata* (F.) | x | x | 14 Mar - 23 Apr, 4 Aug - 30 Sep |
| 7416 | *Costaconvexa centrostrigaria* (Woll.) | x | x | 23 Apr - 21 Aug, 30 Nov, 9 Dec |
| 7430 | *Trichodezia albovittata* (Gn.) | – | x | 9 May |
| 7437 | *Operophtera bruceata* (Hulst) | – | x | 5 Dec |
| 7440 | *Enbaphe mendica* (Wlk.) | x | x | 11 Jun, 19 Aug |
| 7459 | *Eupithecia columbiata* (Dyar) | x | – | 6 Apr |
| 7474 | *Eupithecia miserulata* Grt. | x | – | 4 Oct |
| 7509.1 | *Eupithecia matheri* Rindge | x | – | 6 Apr |
| 7530 | *Eupithecia swetti* Grossb. | x | x | 25 Mar - 6 Apr |
| 7637 | *Cladara limitaria* (Wlk.) | x | – | 6 Apr |
| 7647 | *Heterophleps triguttaria* H.-S. | x | x | 2 Jun, 19 Aug |
| 7648 | *Dyspteris abortivaria* (H.-S.) | x | x | 10 Jun - 29 Jul |
| | **Uraniidae** | | | |
| 7650 | *Callizzia amorata* Pack. | – | x | 23 Jun |
| 7653 | *Calledapteryx dryopterata* Grt. | x | x | 15 Jun, 15 Aug |
| | **Mimallonidae** | | | |
| 7659 | *Lacosoma chiridota* Grt. | x | x | 11 - 23 Jun |
| | **Apatelodidae** | | | |
| 7663 | *Apatelodes torrefacta* (Sm.) | x | x | 11 - 15 Jun |
| 7665 | *Olceclostera angelica* (Grt.) | – | x | 23 Jun, 14 Aug |

| Hodges # | Family/Species | GF | TR | Dates Observed |
|---|---|---|---|---|
| | **Lasiocampidae** | | | |
| 7670 | *Tolype velleda* (Stoll) | x | x | 29 Sep - 30 Oct |
| 7674 | *Tolype notialis* (F.) | – | x | 16 Jul |
| 7683 | *Artace cribraria* (Ljungh) | x | x | 17 Jun, 30 Sep - 6 Oct |
| 7687 | *Phyllodesma americana* (Harr.) | x | – | 19 Apr |
| 7698 | *Malacosoma disstria* Hbn. | x | x | 3 - 11 Jun |
| 7701 | *Malacosoma americanum* (F.) | x | x | 4 - 15 Jun |
| | **Saturniidae** | | | |
| 7704 | *Eacles imperialis* (Dr.) | x | x | 16 Jul - 8 Aug |
| 7706 | *Citheronia regalis* (F.) | x | x | 3 Jun - 4 Aug |
| 7708 | *Citheronia sepulchralis* Grt. & Rob. | – | x | 13 Aug |
| 7715 | *Dryocampa rubicunda* (F.) | x | x | 12 May - 23 Jun, 13 Aug |
| 7716 | *Anisota stigma* (F.) | x | – | 12 Jul |
| 7723 | *Anisota senatoria* (J.E. Sm.) | x | – | 12 Jul |
| 7746 | *Automeris io* (F.) | x | x | 14 - 15 Jun |
| 7757 | *Antheraea polyphemus* (Cram.) | x | x | 11 May |
| 7758 | *Actias luna* (L.) | x | – | 3 Jun |
| 7764 | *Callosamia promethea* (Dr.) | – | x | 12 May |
| 7765 | *Callosamia angulifera* (Wlk.) | x | x | 18 May - 11 Jun |
| 7767 | *Hyalophora cecropia* (L.) | x | – | 9 Aug |
| | **Sphingidae** | | | |
| 7778 | *Manduca rustica* (F.) | x | – | 5 Sep |
| 7784 | *Dolba hyloeus* (Dr.) | x | x | 9 - 15 Jun |
| 7789 | *Ceratomia catalpae* (Bdv.) | x | x | 15 Jun, 27 Aug - Sep 27 |
| 7793 | *Paratrea plebeja* (F.) | x | – | 29 Jul |
| 7824 | *Paonias excaecatus* (Sm.) | x | – | 29 Jul |
| 7825 | *Paonias myops* (Sm.) | x | x | 8 May, 29 Jul |
| 7827 | *Laothoe juglandis* (Sm.) | x | x | 11 May - 23 Jun |
| 7853 | *Hemaris thysbe* (F.) | x | – | 31 Jul |
| 7871 | *Deidamia inscripta* (Harris) | – | x | 14 Apr |
| 7870 | *Sphecodina abbottii* Swainson | – | x | April 24 - 18 May |
| 7873 | *Amphion floridensis* Clark | x | – | 3 Jun |
| 7885 | *Darapsa myron* (Cram.) | x | x | 9 Jun - 25 Jul |
| | **Notodontidae** | | | |
| 7902 | *Datana ministra* (Drury) | x | x | 13 - 29 Aug |
| 7903 | *Datana angusii* Grt. & Rob. | x | x | 3 Jun - 13 Aug |
| 7904 | *Datana drexelii* Hy. Edw. | – | x | 10 Jun, 13 Aug |
| 7906 | *Datana contracta* Wlk. | – | x | 8 Jun - 11 Jul |
| 7907 | *Datana integerrima* Grt. & Rob. | x | x | 19 Jun - 13 Aug |
| 7915 | *Nadata gibbosa* (Sm.) | x | x | 8 May - 11 Jun, 13 Aug |
| 7920 | *Peridea angulosa* (Sm.) | x | – | 19 Aug |
| 7929 | *Nerice bidentata* Wlk. | x | x | 22 May - 11 Jun, 13 Aug |
| 7930 | *Ellida caniplaga* (Wlk.) | – | x | 23 Apr - 23 Jun, 13 Aug |
| 7931 | *Gluphisia septentrionis* Wlk. | x | x | 8 May, 3 Jun, 30 Aug |
| 7951 | *Symmerista albifrons* (Sm.) | x | x | 18 Apr - 13 Aug |
| 7957 | *Dasylophia anguina* (Sm.) | x | x | 10 Jun, 16 Aug - 5 Sep |
| 7974 | *Misogada unicolor* (Pack.) | x | – | 19 Aug |
| 7975 | *Macrurocampa marthesia* (Cram.) | x | x | 11 Jun |
| 7983 | *Heterocampa obliqua* Pack. | x | x | 3 Jun, 13 Aug |
| 7990 | *Heterocampa umbrata* Wlk. | x | – | 29 Jul |
| 7994 | *Heterocampa guttivitta* (Wlk.) | x | x | 19 Apr - 6 Sep |
| 7995 | *Heterocampa biundata* Wlk. | x | x | 8 May, 11 Jun, 15 Aug |

| Hodges # | **Notodontidae** (continued) | GF | TR | Dates Observed |
|---|---|---|---|---|
| 7998 | *Lochmaeus manteo* Doubleday | x | x | 4 - 19 Aug |
| 7999 | *Lochmaeus bilineata* (Pack.) | x | x | 23 May - 29 Jul, 27 Aug |
| 8005 | *Schizura ipomoeae* Doubleday | – | x | 23 Jun, 21 Aug |
| 8007 | *Schizura unicornis* (Sm.) | x | x | 3 May - 30 Jun |
| 8011 | *Schizura leptinoides* (Grt.) | x | – | 15 Jun |
| 8012 | *Oligocentria semirufescens* (Wlk.) | x | x | 29 Jul - 13 Aug |
| 8017 | *Oligocentria lignicolor* (Wlk.) | x | x | 8 May - 23 Jun, 13 Aug |
| 8022 | *Hyparpax aurora* (J.E. Sm.) | x | – | 23 Jun |
| | **Arctiidae** | | | |
| 8067 | *Cisthene plumbea* Stretch | x | x | 8 Jun, 26 Aug |
| 8087 | *Lycomorpha pholus* Dr. | x | – | 23 Jun |
| 8089 | *Hypoprepia miniata* (Kby.) | x | – | 29 Jul |
| 8090 | *Hypoprepia fucosa* Hbn. | – | x | 30 Jun - 13 Aug |
| 8098 | *Clemensia albata* Pack. | x | – | 3 Jun |
| 8107 | *Haploa clymene* (Brown) | x | x | 11 - 29 Jul |
| 8118 | *Holomelina opella* (Grt.) | x | – | 5 Sep |
| 8121 | *Holomelina aurantiaca* (Hbn.) | x | – | 19 Aug |
| 8129 | *Pyrrharctia isabella* (Sm.) | x | x | 11 May - 11 Jul |
| 8133 | *Spilosoma latipennis* Stretch | x | x | 3 - 11 Jun |
| 8134 | *Spilosoma congrua* Wlk. | x | x | 8 May - 10 Jun |
| 8137 | *Spilosoma virginica* (F.) | x | x | 8 May - 23 Jun, 4 Aug |
| 8140 | *Hyphantria cunea* Dr. | x | x | 8 May - 13 Aug |
| 8146 | *Hypercompe scribonia* Stoll | x | x | 4 Jun – 15 Jul |
| 8169 | *Apantesis phalerata* (Harr.) | x | – | 19 Aug |
| 8171 | *Apantesis nais* (Dru.) | x | x | 15 Jun - 19 Aug |
| 8171.1 | *Apantesis carlotta* Fgn. | x | x | 22 May - 13 Aug |
| 8176 | *Grammia anna* (Grt.) | x | – | 15 Jul |
| 8177 | *Grammia virgo* (L.) | x | – | 19 Aug |
| 8188 | *Grammia figurata* (Dru.) | – | x | 29 Jul - 13 Aug |
| 8203 | *Halysidota tessellaris* (Sm.) | x | x | 1 Jun - 13 Aug |
| 8230 | *Cycnia tenera* Hbn. | x | x | 8 May - 10 Jun, 13 Aug - 9 Sep |
| 8238 | *Euchaetes egle* (Dr.) | x | x | 11 Jun - 29 Jul |
| 8267 | *Cisseps fulvicollis* (Hbn.) | x | – | 30 Oct |
| | **Lymantriidae** | | | |
| 8292 | *Dasychira tephra* Hbn. | – | x | 23 Jun |
| 8293 | *Dasychira dorsipennata* (B. & McD.) | x | – | 16 Jul |
| 8296 | *Dasychira basiflava* (Pack.) | x | x | 10 Jun - 19 Aug |
| 8298 | *Dasychira meridionalis* (B. & McD.) | – | x | 13 Aug |
| 8302 | *Dasychira obliquata* (Grt. & Rob.) | x | – | 29 Jul |
| 8314 | *Orgyia definita* Pack. | x | x | 23 Jun, 4 Oct |
| 8316 | *Orgyia leucostigma* (J.E. Smith) | – | x | 12 Aug, 1 Nov |
| 8318 | *Lymantria dispar* (L.) | – | x | 17 Jun |
| | **Nolidae** | | | |
| 8970 | *Baileya ophthalmica* (Gn.) | x | x | 8 May - 11 Jun, 4 Aug |
| 8971 | *Baileya dormitans* (Gn.) | x | x | 3 - 23 Jun |
| 8972 | *Baileya levitans* (Sm.) | x | – | 29 Jul |
| 8973 | *Baileya australis* (Grt.) | x | x | 8 May, 19 Aug |
| 8983 | *Meganola minuscula* (Zell.) | x | x | 9 May, 14 Jul - 1 Aug |
| 8983.1 | *Meganola phylla* (Dyar) | x | – | 3 May |
| 8983.2 | *Meganola spodia* Franc. | x | – | 3 May |
| 8991 | *Nola cereella* (Bosc.) | x | – | 29 Jun |
| 8992 | *Nola triquetrana* (Fitch) | x | x | 23 Apr, 3 Jun |

| Hodges # | Family/Species | GF | TR | Dates Observed |
|---|---|---|---|---|
| | **Noctuidae** | | | |
| 8322 | *Idia americalis* (Gn.) | x | x | 8 May - 6 Oct |
| 8323 | *Idia aemula* (Hbn.) | x | x | 11 Jun - 13 Aug |
| 8326 | *Idia rotundalis* (Wlk.) | x | – | 3 Jun |
| 8328 | *Idia julia* (B. & McD.) | x | – | 3 Jun |
| 8329 | *Idia diminuendis* (B.&McD.) | x | – | 3 Jun |
| 8330 | *Idia scobialis* (Grt.) | x | – | 15 Jun |
| 8333 | *Idia denticulalis* (Harvey) | x | – | 15 Jun |
| 8334 | *Idia lubricalis* (Gey.) | x | x | 23 Jun - 11 Jul, 3 Sep |
| 8338 | *Phalaenophana pyramusalis* (Wlk.) | x | x | 22 May - 23 Jun |
| 8340 | *Zanclognatha lituralis* (Hbn.) | x | x | 8 May - 3 Jun, 4 Aug |
| 8345 | *Zanclognatha laevigata* (Grt.) | x | – | 15 Jun |
| 8347 | *Zanclognatha obscuripennis* (Grt.) | x | x | 13 Jun, 19 Aug |
| 8349 | *Zanclognatha protumnusalis* (Wlk.) | x | – | 27 Aug |
| 8351 | *Zanclognatha cruralis* (Gn.) | x | x | 10 Jun, 19 Aug |
| 8352 | *Zanclognatha jacchusalis* (Wlk.) | x | x | 11 Jun, 30 Aug |
| 8353 | *Zanclognatha ochreipennis* (Grt.) | x | x | 22 Jun - 4 Aug, 6 Oct |
| 8355 | *Chytolita morbidalis* (Gn.) | x | – | 3 Jun |
| 8356 | *Chytolita petrealis* Grt. | x | x | 29 Jul - 13 Aug |
| 8358 | *Macrochilo litophora* (Grt.) | x | x | 3 Jun, 4 Aug |
| 8360 | *Macrochilo orciferalis* Wlk. | x | – | 3 Jun |
| 8364 | *Phalaenostola larentoides* Grt. | x | x | 3 Aug - 10 Sep |
| 8368 | *Tetanolita floridana* (Sm.) | x | – | 4 Oct |
| 8370 | *Bleptina caradrinalis* Gn. | x | x | 3 Jun - 13 Aug |
| 8378 | *Renia salusalis* (Wlk.) | x | – | 29 Jul |
| 8380 | *Renia nemoralis* B. & McD. | x | – | 22 May |
| 8381 | *Renia discoloralis* Gn. | x | x | 11 Jul – 19 Aug |
| 8386 | *Renia adspergilus* (Bosc.) | x | x | 3 - 11 Jun |
| 8393 | *Lascoria ambigualis* Wlk. | x | x | 3 Jun - 27 Jul |
| 8397 | *Palthis angulalis* (Hbn.) | x | x | 8 May, 19 Aug |
| 8398 | *Palthis asopialis* (Gn,) | x | x | 8 May - 19 Aug, 6 Oct |
| 8401 | *Redectis vitrea* (Grt.) | x | – | 5 Sep |
| 8404 | *Rivula propinqualis* Gn. | x | x | 19 - 28 Aug |
| 8420 | *Hypenodes caducus* (Dyar) | x | – | 22 May |
| 8421 | *Hypenodes fractilinea* (Sm.) | x | – | 29 Jul |
| 8428 | *Dyspyralis nigella* (Stkr.) | x | – | 3 Jun |
| 8440 | *Nigetia formosalis* Wlk. | x | – | 22 Jun |
| 8441 | *Hypena manalis* (Wlk.) | x | – | 3 Jun |
| 8442 | *Hypena baltimoralis* (Gn.) | x | x | 8 May - 12 Sep |
| 8443 | *Hypena bijugalis* (Wlk.) | x | x | 9 May, 12 Aug |
| 8444 | *Hypena palparia* (Wlk.) | x | x | 22 May, 13 Aug |
| 8445 | *Hypena abalienalis* (Wlk.) | – | x | 11 Aug - 15 Sep |
| 8446 | *Hypena deceptalis* (Wlk.) | x | x | 8 May, 30 Jul |
| 8447 | *Hypena madefactalis* (Gn.) | x | x | 15 Jun - 10 Jul |
| 8461 | *Hypena humuli* Harris | – | x | 27 Jul |
| 8465 | *Hypena scabra* (F.) | x | x | 23 Apr - 30 Sep, 7 Nov - 19 Dec |
| 8479 | *Spargaloma sexpunctata* Grt. | x | x | 10 Jun, 19 Aug |
| 8490 | *Pangrapta decoralis* Hbn. | x | – | 3 Jun |
| 8491 | *Ledaea perditalis* (Wlk.) | x | – | 29 Aug |
| 8499 | *Metalectra discalis* (Grt.) | x | x | 23 Jun - 13 Aug |
| 8500 | *Metalectra quadrisignata* (Wlk.) | x | – | 4 Oct |
| 8505 | *Metalectra richardsi* Brower | x | – | 3 Jun |
| 8514 | *Scolecocampa liburna* (Gey.) | x | x | 11 Jun - 29 Jul |
| 8522 | *Gabara subnivosella* Wlk. | – | x | 11 Jun |
| 8525 | *Phyprosopus callitrichoides* Grt. | x | – | 3 Jun |

| Hodges # | **Noctuidae** (continued) | GF | TR | Dates Observed |
|---|---|---|---|---|
| 8528 | *Hypsoropha hormos* (Hbn.) | x | – | 9 May |
| 8534 | *Plusiodonta compressipalpus* Gn. | x | x | 13 Jul - 19 Aug |
| 8547 | *Anomis commoda* Butler | – | x | 6 Sep |
| 8555 | *Scoliopteryx libatrix* (L.) | x | x | 23 Apr, 29 Jul |
| 8574 | *Anticarsia gemmatalis* Hbn. | x | – | 4 Oct |
| 8587 | *Panopoda rufimargo* (Hbn.) | x | x | 8 May - 9 Jun, 13 Aug |
| 8588 | *Panopoda carneicosta* Gn. | x | x | 3 - 11 Jun |
| 8591 | *Phoberia atomaris* Hbn. | x | – | 6 Apr |
| 8592 | *Cissusa spadix* (Cram.) | x | x | 19 - 25 Apr |
| 8689 | *Zale lunata* (Dr.) | x | x | 16 Jun, 6 Oct |
| 8692 | *Zale galbanata* (Morr.) | x | x | 23 Apr - 11 Jun, 27 Aug |
| 8694 | *Zale aeruginosa* (Gn.) | x | x | 23 Apr - 9 May |
| 8695 | *Zale undularis* (Dr.) | x | – | 29 Jul |
| 8697 | *Zale minerea* (Gn.) | x | x | 8 May - 29 Jul |
| 8698 | *Zale phaeocapna* Franc. | – | x | 8 May |
| 8704 | *Zale helata* (Sm.) | x | x | 11 - 15 Jun |
| 8713 | *Zale lunifera* (Hbn.) | x | – | 6 Apr |
| 8716 | *Zale unilineata* (Grt.) | x | x | 19 Apr - 8 May |
| 8717 | *Zale horrida* Hbn. | x | x | 8 May - 22 Jul |
| 8719 | *Euparthenos nubilis* (Hbn.) | x | x | 9 May - 18 Jun |
| 8721 | *Allotria elonympha* (Hbn.) | x | x | 9 May - 13 Aug |
| 8727 | *Parallelia bistriaris* Hbn. | x | x | 19 May - 13 Aug |
| 8738 | *Caenurgina crassiuscula* (Haworth) | x | x | 10 Jun, 13 Aug, 4 Oct |
| 8739 | *Caenurgina erechtea* (Cram.) | x | x | 23 Apr, 10 Jun, 13 Aug, 4 Oct |
| 8745 | *Mocis texana* (Morr.) | x | – | 4 Oct |
| 8747 | *Celiptera frustulum* Gn. | x | x | 8 May, 11 Jul - 4 Oct |
| 8769 | *Spiloloma lunilinea* Grt. | x | x | 3 - 10 Jun |
| 8771 | *Catocala piatrix* Grt. | x | x | 23 Aug - 18 Oct |
| 8782 | *Catocala flebilis* Grt. | – | x | 13 Aug |
| 8788 | *Catocala retecta* Grt. | x | x | 13 - 19 Aug |
| 8792 | *Catocala vidua* (Sm.) | x | x | 13 Aug - 14 Sep |
| 8795 | *Catocala palaeogama* Gn. | x | x | 19 - 24 Aug |
| 8796 | *Catocala nebulosa* Edw. | x | – | 29 Jul |
| 8797 | *Catocala subnata* Grt. | x | – | 19 Aug |
| 8798 | *Catocala neogama* (Sm.) | x | x | 29 Jul, 6 Oct |
| 8801 | *Catocala ilia* (Cram.) | x | x | 29 Jun, 19 Aug |
| 8802 | *Catocala cerogama* Gn. | x | x | 29 Jul - 16 Aug |
| 8857 | *Catocala ultronia* (Hbn.) | x | x | 11 Jul - 19 Aug |
| 8878 | *Catocala amica* (Hbn.) | x | x | 4 Aug - 3 Sep |
| 8881 | *Abrostola urentis* Gn. | – | x | 21 Jun - 26 Jul, 14 Sep |
| 8889 | *Ctenoplusia oxygramma* (Gey.) | x | x | 3 Jun, 29 Sep |
| 8890 | *Pseudoplusia includens* (Wlk.) | – | x | 28 Sep |
| 8896 | *Diachrysia aeroides* (Grt.) | x | – | 14 Aug |
| 8898 | *Allagrapha aerea* (Hbn.) | x | x | 8 May - 19 Aug |
| 8908 | *Autographa precationis* (Gn.) | x | x | 23 Apr - 11 Jun, 13 Aug - 5 Sep |
| 8924 | *Anagrapha falcifera* (Kby.) | x | x | 23 Apr, 11 Jun, 4 Oct |
| 8955 | *Marathyssa inficita* (Wlk.) | x | – | 3 Jun |
| 8957 | *Paectes oculatrix* (Gn.) | x | x | 8 May - 29 Jul |
| 8962 | *Paectes abrostoloides* (Gn.) | x | – | 29 Jul |
| 8968 | *Eutelia pulcherrima* (Grt). | x | – | 22 May |
| 9025 | *Oruza albocostaliata* (Pack.) | x | – | 22 May |
| 9030 | *Ozarba aeria* (Grt.) | x | x | 3 May, 13 Aug |
| 9037 | *Hyperstrotia pervertens* (B. & McD.) | x | – | 3 Jun |
| 9040 | *Hyperstrotia secta* (Grt.) | x | – | 9 May |
| 9044 | *Thioptera nigrofimbria* (Gn.) | x | x | 16 Jul - 25 Sep |

| Hodges # | **Noctuidae** (continued) | GF | TR | Dates Observed |
|---|---|---|---|---|
| 9047 | *Lithacodia muscosula* (Gn.) | x | x | 3 Jun - 1 Aug |
| 9051 | *Lithacodia musta* (Grt. & Rob.) | x | – | 16 Jul |
| 9053 | *Pseudenstrotia carneola* (Gn.) | x | x | 3 Jun - 13 Aug |
| 9055.1 | *Maliattha synochitis* (Grt. & Rob.) | x | – | 29 Jul |
| 9057 | *Homophoberia apicosa* (Haw.) | – | x | 10 Jun |
| 9062 | *Cerma cerintha* (Tr.) | x | – | 29 Jul |
| 9065 | *Leuconycta diphteroides* (Gn.) | x | – | 3 Jun |
| 9127 | *Spragueia leo* (Gn.) | x | – | 23 Aug |
| 9182 | *Panthea furcilla* (Pack.) | x | – | 19 Aug |
| 9184 | *Colocasia flavicornis* (Sm.) | x | – | 19 Apr |
| 9185 | *Colocasia propinquilinea* (Grt.) | x | – | 9 May |
| 9189 | *Charadra deridens* (Gn.) | x | x | 29 Jul - 13 Aug |
| 9193 | *Raphia frater* Grt. | x | – | 29 Jul |
| 9199 | *Acronicta rubricoma* Gn. | x | – | 29 Jul |
| 9200 | *Acronicta americana* (Harr.) | x | x | 9 May - 18 Jun |
| 9208 | *Acronicta betulae* Riley | x | x | 8 May, 29 Jul |
| 9209 | *Acronicta radcliffei* (Harv.) | x | x | 17 Jun, 5 Sep |
| 9227 | *Acronicta laetifica* Sm. | x | x | 22 May - 4 Aug |
| 9229 | *Acronicta hasta* Gn. | x | x | 11 - 15 Jun |
| 9235 | *Acronicta spinigera* Gn. | x | – | 3 Jun |
| 9237 | *Acronicta interrupta* Gn. | x | x | 22 May, 9 Sep |
| 9238 | *Acronicta lobeliae* Gn. | x | x | 9 May - 17 Jun |
| 9242 | *Acronicta exilis* Grt. | x | – | 3 Jun |
| 9243 | *Acronicta ovata* Grt. | x | x | 3 Jun, 13 Aug |
| 9244 | *Acronicta modica* Wlk. | x | x | 8 May - 15 Jun |
| 9249 | *Acronicta increta* Morr. | x | – | 8 May - 11 Jun, 19 Aug |
| 9251 | *Acronicta retardata* (Wlk.) | x | x | 8 May - 3 Jun, 6 Aug |
| 9254 | *Acronicta afflicta* Grt. | x | – | 15 Jun |
| 9257 | *Acronicta impleta* Wlk. | x | x | 8 May, 14 Aug |
| 9259 | *Acronicta noctivaga* Grt. | x | – | 29 Jun |
| 9264 | *Acronicta longa* Gn. | x | – | 19 Aug |
| 9266 | *Acronicta lithospila* Grt. | – | x | 16 Jun |
| 9281 | *Agriopodes fallax* (H.-S.) | x | x | 3 Jun, 13 Aug |
| 9285 | *Polygrammate hebraeicum* Hbn. | x | x | 8 May - 23 Jun, 13 Aug |
| 9285.1 | *Comachara cadburyi* Franc. | x | – | 9 May |
| 9301 | *Eudryas grata* (F.) | x | x | 9 May - 10 Jun, 13 Aug |
| 9309 | *Psychomorpha epimenis* (Dr.) | x | x | 14 - 20 Apr |
| 9314 | *Alypia octomaculata* (F.) | – | x | 28 Apr |
| 9332 | *Apamea vulgaris* (Grt. & Rob.) | x | x | 3 - 10 Jun |
| 9404 | *Oligia modica* (Gn.) | – | x | 19 Aug |
| 9410 | *Oligia crytora* Franc. | x | x | 10 Jun - 29 Jul |
| 9419 | *Oligia mactata* (Gn.) | – | x | 30 Sep |
| 9449 | *Archanara oblonga* (Grt.) | x | – | 3 Jun |
| 9454 | *Amphipoea velata* (Wlk.) | x | x | 3 - 23 Jun |
| 9463 | *Parapamea buffaloensis* (Grt.) | x | – | 14 Sep |
| 9466 | *Papaipema cataphracta* (Grt.) | x | x | 4 - 6 Oct |
| 9471 | *Papaipema arctivorens* Hamp. | x | – | 12 Sep |
| 9479 | *Papaipema lysimachiae* (Wlk.) | x | – | 12 Sep |
| 9483 | *Papaipema inquaesita* (Grt. & Rob.) | x | – | 25 Sep |
| 9484 | *Papaipema rutila* (Gn.) | – | x | 30 Sep |
| 9486 | *Papaipema birdi* Dyar | – | x | 27 Sep |
| 9520 | *Achatodes zeae* (Harr.) | x | – | 10 Jun |
| 9522 | *Iodopepla u-album* (Gn.) | x | – | 29 Jul |
| 9524 | *Bellura brehmei* (B. & McD.) | x | – | 15 Jun |
| 9526 | *Bellura densa* (Wlk.) | x | – | 19 Aug |
| 9545 | *Euplexia benesimilis* (McD.) | x | x | 12 May, 13 Jul - 19 Aug |

| Hodges # | **Noctuidae** (continued) | GF | TR | Dates Observed |
|---|---|---|---|---|
| 9547 | *Phlogophora periculosa* Gn. | x | x | 19 Aug - 30 Sep |
| 9556 | *Chytonix palliatricula* (Gn.) | x | x | 8 May - 11 Jun, 19 Aug |
| 9582 | *Nedra ramosula* (Gn.) | x | x | 15 Sep - 4 Oct |
| 9618 | *Phosphila turbulenta* Hbn. | x | x | 8 May - 10 Jun |
| 9619 | *Phosphila miselioides* (Gn.) | x | x | 8 May - 3 Jun |
| 9631 | *Callopistria mollissima* (Gn.) | x | – | 19 Aug |
| 9638 | *Amphipyra pyramidoides* Gn. | x | x | 10 Jul - 6 Oct |
| 9647 | *Athetis miranda* (Grt.) | x | – | 8 Aug |
| 9650 | *Anorthodes tarda* (Gn.) | x | x | 8 May, 19 Aug |
| 9663 | *Balsa tristrigella* (Wlk.) | x | – | 29 Jul |
| 9664 | *Balsa labecula* (Grt.) | x | – | 3 Jun |
| 9666 | *Spodoptera frugiperda* (Sm.) | x | – | 5 Sep |
| 9669 | *Spodoptera ornithogalli* (Gn.) | x | x | 13 Aug, 30 Oct |
| 9678 | *Elaphria versicolor* (Grt.) | x | – | 3 Jun |
| 9679 | *Elaphria chalcedonia* (Hbn). | x | – | 31 Oct |
| 9681.1 | *Elaphria cornutinus* Sal.& Pogue | x | x | 8 May, 29 Jul - 13 Aug |
| 9684 | *Elaphria grata* Hbn. | x | x | 23 Apr, 13 Aug - 6 Oct |
| 9688 | *Galgula partita* Gn. | x | x | 21 Mar - 23 Apr, 10 Jun - 13 Dec |
| 9690 | *Condica videns* (Gn.) | x | – | 3 Jun |
| 9693 | *Condica mobilis* (Wlk.) | x | – | 3 Jun |
| 9696 | *Condica vecors* (Gn.) | x | x | 23 Apr, 14 Jul - 8 Sep |
| 9699 | *Condica sutor* (Gn.) | x | – | 5 Sep |
| 9720 | *Ogdoconta cinereola* (Gn.) | x | – | 9 Sep |
| 9725 | *Azenia obtusa* (H.-S.) | x | x | 3 Jun, 4 Aug |
| 9781 | *Basilodes pepita* (Gn.) | – | x | 23 Aug - 6 Sep |
| 9886 | *Lithophane patefacta* (Wlk.) | x | x | 23 Apr, 30 Oct |
| 9887 | *Lithophane bethunei* (Grt. & Rb.) | x | – | 22 Mar |
| 9895 | *Lithophane signosa* (Wlk.) | – | x | 18 Apr |
| 9910 | *Lithophane antennata* (Wlk.) | – | x | 12 Mar |
| 9915 | *Lithophane grotei* Riley | x | x | 7 Feb, 6 Apr, 8 Nov |
| 9916 | *Lithophane unimoda* (Lint.) | x | – | 6 Apr |
| 9929 | *Pyreferra hesperidago* (Gn.) | x | – | 6 Apr |
| 9932 | *Pyreferra pettiti* (Grt.) | x | x | 6 - 23 Apr |
| 9933 | *Eupsilia vinulenta* (Grt.) | x | – | 6 Apr |
| 9933.1 | *Enpsilia sidus* (Gn.) | x | – | 6 Apr |
| 9934 | *Eupsilia cirripalea* Franc. | x | – | 6 Apr |
| 9934.1 | *Eupsilia* sp. nov. | – | x | 23 Apr |
| 9936 | *Eupsilia morrisoni* (Grt.) | x | x | 7 Mar, 30 Oct - 13 Dec |
| 9941 | *Sericaglaea signata* French | x | x | 23 Apr, 31 Oct - 16 Nov |
| 9943 | *Metaxaglaea inulta* (Grt.) | x | x | 4 - 6 Oct |
| 9945.2 | *Metaxaglaea violacea* Schw. | x | – | 4 Oct |
| 9946 | *Epiglaea decliva* (Grt.) | x | – | 31 Oct |
| 9957 | *Agrochola bicolorago* (Gn.) | x | x | 6 Oct - 29 Dec |
| 10019 | *Psaphida resumens* Wlk. | x | x | 26 Mar - 15 Apr |
| 10021 | *Copivaleria grotei* (Morr.) | x | x | 20 Mar - 6 Apr |
| 10202 | *Cucullia convexipennis* Grt. & Rob. | – | x | 4 Aug |
| 10288 | *Polia detracta* (Wlk.) | x | x | 3 - 15 Jun |
| 10368 | *Lacinipolia meditata* (Grt.) | x | – | 5 Sep |
| 10397 | *Lacinipolia renigera* (Steph.) | x | x | 8 May - 11 Jun, 26 Aug - 15 Sep |
| 10413 | *Lacinipolia explicata* McD. | x | x | 8 May, 29 Aug - 5 Sep |
| 10414 | *Lacinipolia implicata* McD. | x | – | 5 Sep |
| 10431 | *Faronta diffusa* (Wlk.) | x | – | 30 Sep |
| 10438 | *Mythimna unipuncta* (Haw.) | x | x | 4 May, 9 Jul - 4 Aug, 4 Oct - 1 Nov |
| 10440 | *Leucania linita* Gn. | x | – | 3 Jun |
| 10445 | *Leucania linda* Franc. | x | x | 10 Jun, 19 Aug |

| Hodges # | **Noctuidae** (continued) | GF | TR | Dates Observed |
|---|---|---|---|---|
| 10455 | *Leucania scirpicola* Gn. | x | – | 5 Sep |
| 10456 | *Leucania adjuta* (Grt.) | x | x | 4 - 6 Oct |
| 10459 | *Leucania inermis* (Forbes) | x | x | 3 - 11 Jun |
| 10461 | *Leucania ursula* (Forbes) | x | x | 10 Jun, 14 Aug |
| 10487 | *Orthosia rubescens* (Wlk.) | x | x | 14 Mar - 23 Apr |
| 10490 | *Orthosia revicta* (Morr.) | – | x | 30 Mar |
| 10491 | *Orthosia alurina* Sm. | x | – | 6 Apr |
| 10495 | *Orthosia hibisci* (Gn.) | x | x | 6 - 23 Apr |
| 10502 | *Himella intractata* (Morr.) | x | x | 6 - 23 Apr |
| 10518 | *Achatia distincta* Hbn. | x | x | 6 - 25 Apr |
| 10520 | *Morrisonia evicta* (Grt.) | x | – | 19 Apr |
| 10521 | *Morrisonia confusa* (Hbn.) | x | x | 19 Apr - 8 May |
| 10521.1 | *Morrisonia latex* (Gn.) | – | x | 26 May |
| 10524 | *Nephelodes minians* Gn. | x | x | 5 - 30 Sep |
| 10532 | *Homorthodes furfurata* (Grt.) | x | – | 3 Jun |
| 10532.1 | *Homorthodes lindseyi* (Benj.) | x | x | 8 May, 19 Aug |
| 10563 | *Protorthodes oviduca* (Gn.) | x | – | 3 Jun |
| 10567 | *Ulolonche culea* (Gn.) | x | x | 8 May - 3 Jun |
| 10578 | *Pseudorthodes vecors* (Gn.) | x | x | 9 May, 15 Aug |
| 10585 | *Orthodes crenulata* (Btlr.) | x | x | 7 Jun - 13 Aug |
| 10587 | *Orthodes cynica* Gn. | x | x | 8 May - 11 Jun |
| 10648 | *Agrotis gladaria* Morr. | x | x | 30 Sep - 6 Oct |
| 10651 | *Agrotis venerabilis* Wlk. | x | – | 4 Oct |
| 10663 | *Agrotis ipsilon* (Hufn.) | x | x | 23 Apr, 3 Jun, 13 Aug |
| 10664 | *Feltia subterranea* (F.) | x | – | 5 Sep |
| 10670 | *Feltia jaculifera* (Gn.) | x | – | 4 Oct |
| 10674 | *Feltia subgothica* (Haw.) | x | – | 4 Oct |
| 10676 | *Feltia herilis* (Grt.) | x | – | 4 Oct |
| 10810 | *Euxoa violaris* (Grt. & Rob.) | x | – | 4 Oct |
| 10870 | *Dichagyris acclivis* (Morr.) | x | – | 19 Aug |
| 10891 | *Ochropleura implecta* Laf. | x | – | 14 Aug |
| 10903 | *Anicla illapsa* (Wlk.) | x | – | 29 Jul |
| 10911 | *Anicla infecta* (Ochs) | – | x | 24 Aug - 30 Sep |
| 10915 | *Peridroma saucia* (Hbn.) | x | x | 8 May, 13 Aug, 6 Oct |
| 10925.1 | *Noctua pronuba* L. | x | x | 15 Jun, 13 Aug |
| 10942.1 | *Xestia dolosa* Franc. | x | x | 8 May - 6 Oct |
| 10944 | *Xestia smithii* (Snell) | x | – | 5 Sep |
| 10955 | *Agnorisma badinodis* (Grt.) | x | x | 4 - 6 Oct |
| 10956 | *Agnorisma bollii* (Grt.) | – | x | 6 Oct |
| 10969 | *Xestia dilucida* (Morr.) | x | – | 8 Oct |
| 10994 | *Cerastis tenebrifera* (Wlk.) | x | x | 16 Jan, 14 Mar - 23 Apr |
| 10998 | *Choephora fungorum* Grt. & Rob. | x | x | 6 - 19 Oct |
| 11029 | *Abagrotis alternata* (Grt.) | x | x | 3 Jun - 6 Oct |
| 11068 | *Heliocoverpa zea* (Boddie) | x | x | 13 Aug - 6 Oct |
| 11071 | *Heliothis virescens* (F.) | – | x | 4 Oct |
| 11117 | *Schinia lynx* (Gn.) | x | – | 19 Aug |
| 11128 | *Schinia arcigera* (Gn.) | x | – | 19 Aug |

## SHORTER CONTRIBUTIONS

*Banisteria*, Number 29, pages 32-35


*MACROLOPHUS BREVICORNIS* ON *TRIOSTEUM PERFOLIATUM* IN VIRGINIA: STATE RECORD AND NEW HOST-PLANT RECORD FOR MIRIDAE (HEMIPTERA: HETEROPTERA) -- Many dicyphine plant bugs—mirids of the subfamily Bryocorinae, tribe Dicyphini, subtribe Dicyphina (*sensu* Schuh, 1995)—are omnivores on glandular-hairy ("sticky") plants. The bugs not only feed on their hosts but also prey on small arthropods and scavenge insects that alight on the plants and become entrapped in glandular exudations (Spomer, 1999; Wheeler, 2001). Several dicyphines native to Europe have been used in greenhouses to control pests such as aphids, thrips, and whiteflies. The Palearctic bugs used in biological control are prohibited from being introduced into North America; as omnivores, they could become plant pests (e.g., Alomar & Albajes, 1996; Wheeler, 2001; Sanchez et al., 2004). North American entomologists, therefore, have investigated native dicyphines as potential biocontrol agents (McGregor et al., 1999, 2000; Sanchez et al., 2003, 2004; McGregor & Gillespie, 2004).

Recently, the Nearctic dicyphine *Dicyphus vestitus* Uhler was recorded from heart-leaved skullcap, *Scutellaria ovata* J. Hill (Lamiaceae), in Virginia shale barrens. Virginia represented the southeasternmost record of this mirid in the eastern United States, and heart-leaved skullcap was the first host plant documented for this bug (Henry, 1999).

On 7 May 1993, I discovered another little-known dicyphine that proved to be a new record for Virginia when Thomas Rawinski took me to a dolomite glade ("Dixie Cliff") near Glenvar in Roanoke County. I was interested in the glade because of its colonies of moss phlox, *Phlox subulata* L., a mat-forming member of the Polemoniaceae that harbors a diverse insect fauna (Wheeler, 1995a, b). During the visit to Dixie Cliff, I found late instars of a dicyphine mirid in thin woods at the base of the glade's south-facing slope (37° 15.2' N, 80° 10.4' W). Nymphs were on horse-gentian (also known as feverwort or wild coffee), *Triosteum perfoliatum* L. (Caprifoliaceae). I was not aware of mirids known from this plant and wanted to determine the bug's identity.

Fifth instars were collected and held at 22-24°C in a small plastic box (ca. 8 x 2 cm) with excised horse-gentian shoots; the stems were wrapped with moist cotton. Adults appeared on 13 May. I returned to Dixie Cliff in late May to collect additional adults, which Thomas Henry identified as *Macrolophus brevicornis* Knight. Voucher specimens have been deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC.

*Macrolophus* Fieber is a Holarctic genus that includes five Nearctic species. The species in eastern North America, in addition to *M. brevicornis*, are *M. separatus* Uhler and *M. tenuicornis* Blatchley (Henry & Wheeler, 1988; Schuh, 1995; Maw et al., 2000). Knight (1926) provided a key to the three eastern species.

*Macrolophus brevicornis* was described by Knight (1926) from Iowa, Kansas, Maryland, Missouri, and New Jersey. Since the original description, only Illinois (Knight, 1941) and Kentucky (Henry et al., 2005) have been added to the distribution. Biological information on this seldom-collected mirid is limited to its collection from two plant species: a milkweed, *Asclepias* sp. (Asclepiadaceae), in Iowa (Knight, 1941), and a ground-cherry, *Physalis* sp. (Solanaceae), in Kentucky (Henry et al., 2005). Knight (1941) noted "breeding" on milkweed, implying that nymphs were observed. Certain true bugs, or heteropterans, such as lygaeine Lygaeidae (Price & Willson, 1979; Slater & Baranowski, 1990), specialize on asclepiads, but specialization by North American mirds on these cardenolide-rich plants is unknown (Knight, 1941, 1968; Schuh, 1995; Wheeler, 2001).

Additional observations are needed to determine if *M. brevicornis* actually develops on milkweeds; the bug apparently has not been recorded from *Asclepias* since Knight's (1941) report. *Macrolophus brevicornis*, however, has been collected consistently on glandular species of *Physalis* (A.G.W., unpubl. data). *Triosteum perfoliatum* apparently can be added to the bug's known host-plant range. I also found two adults on this plant in a Maryland shale barren (Washington Co., Sideling Hill Wildlife Management Area, near Little Orleans) in mid-June 1994.

The mirid's seasonal history on *T. perfoliatum* is incompletely known. Third through fifth instars were observed at Dixie Cliff in early May 1993; by 28 May, adults predominated (23 were collected) with fewer than 10 fifth instars found. No individuals of *M. brevicornis* were observed on 3 July. In 1994, fourth and fifth instars were found on 20 May, mostly on lower (abaxial) leaf surfaces. Whether more than one generation is produced is unknown. *Macrolophus tenuicornis*, the only eastern species of the genus that has been studied, is bivoltine in Pennsylvania (Wheeler et al., 1979).

Horse-gentian is a densely glandular-hairy herb (Gleason & Cronquist, 1991; Rhoads & Block, 2000), although its exudate appears not to entrap small

arthropods. Glandular trichomes presumably evolved as a defense against herbivory by small arthropods (Levin, 1973; Duffey, 1986; Gregory et al., 1986; Sugiura & Yamazaki, 2006) and provide greater protection than nonglandular trichomes (Duke, 1994; van Dam & Hare, 1998). Glandular trichomes are toxic to certain herbivores and can deter oviposition, impede movement, and alter feeding behavior, as well as the searching behavior of their natural enemies. Sticky plants tend to be "off limits" to most generalist herbivores, which cannot traverse the glandular surfaces. Benefits to plants from reduced herbivory can be offset by the adverse effects of glandular trichomes on herbivores' parasitoids and predators (van Dam & Hare, 1998; Gassmann & Hare, 2005). Plants might also benefit by digesting and absorbing proteins from trapped insects (protocarnivory) (Spomer, 1999) or obtaining supplemental nitrogen when trapped insects decay and the breakdown products leach into the soil (Eisner, 2003).

Omnivorous insects generally have broader host-plant ranges than strict herbivores (Eubanks et al., 2003). Dicyphine mirids, as well as many stilt bugs (Berytidae) (Wheeler & Schaefer, 1982; Henry, 1997; Henry & Froeschner, 1998), associated with glandular-pubescent plants tend to be omnivores and might be more polyphagous than members of their respective families that develop on nonglandular hosts. The berytid *Jalysus spinosus* (Say), for example, feeds on unrelated sticky dicots and monocots (Wheeler & Henry, 1981; Wheeler, 1986, 1994). Studies on omnivorous heteropterans that specialize on sticky plants, similar to the study of terrestrial heteropterans that are omnivores (Eubanks et al., 2003), likely would yield insights into the ecological significance of associations with glandular plants and the evolutionary consequences of such specialization.

## ACKNOWLEDGMENTS

I thank Thomas J. Rawinski (formerly with Division of Natural Heritage, Virginia Department of Conservation and Recreation, Richmond) for taking me to Dixie Cliff and identifying *Triosteum perfoliatum*, Thomas J. Henry (Systematic Entomology Laboratory, USDA, ARS, PSI, c/o National Museum of Natural History, Smithsonian Institution, Washington, DC) for identifying *Macrolophus brevicornis* and reviewing the manuscript, and Peter H. Adler (Department of Entomology, Soils, and Plant Sciences, Clemson University) for his review of an earlier draft of the manuscript.

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*Banisteria*, Number 29, pages 35-36


OBSERVATIONS ON A MALFORMED AMERICAN BULLFROG (*RANA CATESBEIANA*) FROM FAIRFAX COUNTY, VIRGINIA -- Globally, herpetologists are concerned about amphibian population declines, extinctions, infections, and numerous reports of malformations. Most amphibians have life histories that include terrestrial and aquatic forms at different developmental stages, making them bio-indicators of both land and water health. Although malformations are not uncommon in animals, documentation of these abnormal morphologies in the literature help us better track their distribution and prevalence and can warn of potential environment problems if found in high numbers or concentrated areas. Many malformations are natural errors that occur in early development but some malformations can be linked to chemical teratogens and parasitic infections (Gilbert, 1991, Sessions, 2003). In this report, we document an American Bullfrog (*Rana catesbeiana*) with multiple malformations in its head region.

On 5 June 2006, one of us (TB) captured a female American Bullfrog (SVL 74 mm; 29 g) sitting in duckweed (*Lemna* spp.) in a shallow (1 m deep), old fish pond. The pond is located in Fairfax County, Virginia, just north of the Tre Towers Court and Braddock Road (Rt. 620) intersection (38° 52' 49.28" N, 77° 28' 47.88" W [NAD 83]). Several malformations were evident upon close visual inspection. A morphologically normal bullfrog was observed next to the malformed frog. The captured frog has the following malformations: anophthalmia (missing left eye) and missing orbit, right external nare absent, reduced tympanic ridge length on left side, asymmetry of the position of the left and right tympanic membranes, and asymmetry of left and right premaxilla and nasal bones (Fig. 1). A pigment spot (diameter 2 mm) of the same coloration as the tympanic membrane exists where the eye would normally be located. These malformations do not appear to be the result of injury or parasitic infection but rather congenital in origin. The frog was able to capture crickets and did not exhibit atypical behavior while being observed in captivity. Gross and minor motor functions appeared intact and typical for the species.

Fig. 1. Frontal view of malformed American Bullfrog showing anophthalmia and missing right external nare.

On 10-11 June 2006, the pond was revisited and searched by three people for a total of 4 h. Survey techniques included hand capture, visual encounter, terrestrial searches around the perimeter of the pond, and intensive dipnetting of the entire pond. All adult animals and tadpoles captured were examined for any anomalies and released. The following species were captured and all individuals appeared to be normal: *Terrapene carolina* (Box Turtle; n = 1), *Eumeces fasciatus* (Five-lined Skink; n = 2), *Rana catesbeiana* (n = 2), *Rana clamitans* (Green Frog; n = 1), *Acris crepitans* (Northern Cricket Frog; n = 1), *Hyla chrysoscelis* (Cope's Gray Treefrog; n = 1) and 150-200 *Rana catesbeiana*, *Rana clamitans*, and other unidentified tadpoles.

The North American Reporting Center for Amphibian Malformation (http://frogweb.nbii.gov/narcam/index.html) reports 182 American Bullfrogs with various abnormalities from the United States and Canada. Nine of these reports are for missing eyes but the causes are not described. There are no reports of bullfrogs with missing eyes from Virginia, although anophthalmia has been recorded for Virginia for other species of frogs (Mitchell, 2004). There are no reports of any amphibians with missing nostrils. Meteyer (2000) does not list this malformation for frogs and toads in her field guide to malformations of anurans, suggesting that this must be a rare or underreported malformation.

## ACKNOWLEDGEMENTS

We thank Dr. Joe Mitchell, Dr. Steve Roble, and several anonymous reviewers for comments on the manuscript.

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*Banisteria*, Number 29, pages 36-38


MESSAGE FROM A PEAT BANK: FIRST RECORD FOR THE EASTERN MUD TURTLE (*KINOSTERNON SUBRUBRUM SUBRUBRUM*) FROM COBB ISLAND, VIRGINIA -- Conant et al. (1990) summarized all known amphibian and reptile species of the Virginia barrier islands based on historical, museum, and personal records. Brannon et al. (2001) added observations on four species of reptiles from Myrtle and Ship Shoal islands and Roble (2001) added the Leatherback Sea Turtle to the list for Hog Island. These islands are geologically dynamic and well known to shift geographic position over time (Dolan et al., 1979; Mitchell & Anderson, 1994). Fresh water occurred on some of the islands historically but only a

few support freshwater ponds today. Islands that had fresh water or water in ponds with low salinity often change over time due to over-wash during storms or development of connections to brackish marshes due to island migration. A case in point is the loss of the freshwater ponds on Hog Island observed by Mathew Brady (1925), possibly as a result of the "Great New England" category 3 hurricane of September 1938 that tracked up the eastern coastline with a storm surge of at least 5.2 m (17 ft) (The Weather Channel, 2006). The Fowler's Toad (*Bufo fowleri*) population became extirpated on Hog Island, followed shortly thereafter by the Eastern Hog-nosed Snake (*Heterodon platirhinos*) population (Conant et al., 1990). Thus, the number of documented species for each of the Virginia barrier islands (e.g., Conant et al., 1990), is dynamic.

Cobb Island, Northampton County, Virginia, is a xeric dune with dense *Spartina patens* (Salt Hay Grass) brackish marshes on its landward side (McCaffrey & Dueser, 1990). It lies 12.1 km (7.5 mi) east of mainland Eastern Shore. The island is migrating landward at a rate of about 13 cm per year from erosion of the seaward margin and sand movement across the island to the brackish marshes on the western side (Dueser, 1990). The entire island is dynamic with brackish marshes forming and subsequently being lost as the island migrates. Peat layers form beneath the Salt Hay Grass and travel below the island's surface as sand rolls over it to eventually emerge on the seaward side and subsequently become exposed as old peat banks on the beach (B. Truitt, TNC Virginia Coast Reserve, pers. comm.).

On 18 October 2006, Barry Truitt and Chris Littlefield discovered the intact shell of an Eastern Mud Turtle (*Kinosternon subrubrum subrubrum*) packed with sand and organic debris protruding out of a peat bank on the middle beach on the seaward side of Cobb Island. It is an adult with a 78 mm carapace and 57 mm plastron (Fig. 1; see Mitchell, 1994, for minimum sizes for adults). The presence of a section of old telegraph wire in the same peat bank (B. Truitt, pers. comm.) suggests that the peat layer in which the turtle was found was present early in the 20th century when humans still lived there (Badger & Kellam, 1989; Barnes & Truitt, 1999). This observation places the estimated age of the deposited shell at about 75+ years, given the estimated rate of island migration (B. Truitt, pers. comm.). The turtle may have died and later became entombed in the peat or it was caught in the muck and died there.

Fig. 1. *Kinosternon subrubrum* shell discovered in a peat bank on the beach at Cobb Island, Virginia. Anterior is to the right.

Conant et al. (1990) did not list *Kinosternon subrubrum* for Cobb Island. Loss of the freshwater pools and ponds on this island may have occurred during the same hurricane that destroyed the ponds on Hog Island. Thus, the occurrence of human archaeological evidence, island movement rate, and apparent timing of the loss of fresh water on Cobb Island suggests that Eastern Mud Turtles occurred on the island into the 20th century. Neither fresh water nor *K. subrubrum* were observed on Cobb Island in the 1940s or during later herpetological investigations (Conant et al., 1990). The discovery of the shell in the peat layer on the beach is the first evidence that a population of *K. subrubrum* occurred historically on Cobb Island. This record brings the number of reptiles known for this barrier island to six species. *Kinosternon subrubrum* is now known to have occurred on at least seven of the 16 Virginia barrier islands (Conant et al., 1990; Mitchell, 1994).

## ACKNOWLEDGMENTS

I thank Barry Truitt for bringing the turtle to my attention and for valuable information on island processes.

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# MISCELLANEA

## Obituary

### Roger Henry de Rageot (1931-2006)

An article on Roger Henry (or Henri) de Rageot in the *Virginian Pilot* after his death noted that he never lived a normal life. That was an understatement. Roger was well known for his Spartan life in the Norfolk, Virginia, area where he lived most of his life after emigrating from Europe, and for his propensity to eat road kills and snakes. He was one of the old-time naturalists who was equally at home in the arts. Indeed, many of his writings were as much artistic flair as they were scientific papers. He has been called a naturalist, explorer, museum curator, photographer, painter, author, and eccentric. In fact, he was all of these things.

Roger Rageot (Fig. 1) was born in France on 22 June 1931, and grew up in the Charolais cattle region. He endured the German occupation there during World War II and caught wild game for food. Roger and his sister emigrated and arrived in the United States by ship in 1947 to settle in Maryland. He finished high school at the Sacred Hearts High School in La Plata, Maryland, where he learned English. He took some zoology courses at Washington University during 1949-1952 and at the College of William and Mary in 1952-1956, but did not attain a college degree. He worked with the Smithsonian Institution mammal collection before moving to Virginia. He got the curator job at the Norfolk Museum of Natural History in 1951 and worked there until 1967. Roger attended Old Dominion College (now University) part-time between 1952 and 1956. He spent 1957-1958 in France where he obtained a degree in "License of Natural Science."

Fig. 1. Roger Rageot in the 1950s at the Norfolk Museum of Natural History with the characteristic scarf around his neck. Photographer unknown.

Roger was initially paid as a night watchman at the museum but worked on natural history exhibits during the day. He did his own taxidermy, collected his own specimens, built the dioramas, and educated the public through lectures to school groups and public speaking. He was an invited member of the American Association of Museums in 1954. Roger's home was a Norfolk apartment in Gent where he kept several animals, including an adult Gila Monster (*Heloderma suspectum*) given to him by Howard K. Gloyd.

Funding was tight at the museum and Roger supplemented his income by collecting specimens of all sorts for profit by selling them to researchers and museums. Numerous specimen labels on snails, insects, millipedes, birds, bats, other mammals, fish, and of course amphibians and reptiles remain extant in several museums. He also sent specimens free to researchers like Howard K. Gloyd who was studying copperheads and cottonmouths and Roger Conant who was studying watersnakes. And, of course, he supplemented his diet with road kills and the occasional Snapping Turtle (*Chelydra serpentina*, Fig. 2). Roger applied to other museums throughout the country in 1956 and 1962 to apparently gain better wages and even received an offer or two, turning them down to stay in Tidewater.

Roger created watercolor paintings that ultimately sold for hundreds of dollars. Some of his pen-and-ink illustrations appeared on the cover and in the Art Feature of the Philadelphia Herpetological Society (PHS) Bulletin in 1963 and in Virginia Wildlife in 1964. The PHS Bulletin cover illustration of a Green Treefrog (*Hyla cinerea*) is reprinted as Fig. 3, and a Diamond-backed Terrapin (*Malaclemys terrapin*) drawing as Fig. 4. Photos of a Canada Warbler (*Wilsonia canadensis*), Whitetail Deer fawn (*Odocoileus virginianus*), Copperhead (*Agkistrodon contortrix*), and thorn bugs were published recently in *The Nature Handbook* by E. H. Williams, Jr. (Oxford University Press, 2005).

Unfortunately, in 1967 the museum's board did away with the natural history section and made it into an exclusively art museum. There was a big public outcry but the natural history museum and Roger were history. Roger then took whatever inheritance he had, bought a Toyota Land Cruiser and lots of supplies, and

Fig. 2. Roger Rageot in the 1950s on his scooter with a Snapping Turtle (*Chelydra serpentina*) headed home for dinner. Photographer unknown.

wandered throughout much of Central and South America for two years. He traveled, usually alone, through most of the countries in Central America, being robbed in British Honduras along the way. His first destination was French Guiana for which he carried a letter of introduction from the Secretary of the Smithsonian, S. Dillon Ripley. The Smithsonian Institution provided collecting supplies so that Roger could collect specimens in remote places. He was back in the United States in 1971 seeking funding for another tropical expedition.

His 1973 Peace Corps year was spent in Chile where he taught and worked on seeking ways to control Vampire Bat predation on cattle. He and a colleague ingeniously mixed a poison with petroleum jelly to apply to the bats' backs. They would fly back to their roosts and groom each other, infecting as many as 50 others. It was very effective. Roger remained in South America until 1980. He apparently contracted Hodgkin's disease later that year and came back to the United States to be treated successfully. He was not considered in remission until 1984 when he returned to Norfolk for semi-retirement. Roger remained active in local natural history excursions and occasionally spent time in Ecuador until he was too frail and weak to travel again. His cancer apparently came back in 2006 and he died from that and respiratory disease on 7 October 2006.

Roger Rageot was a co-founder of the Virginia Herpetological Society and its third president (1963-64). He contributed several articles, especially one on the amphibians and reptiles of Surry County (Rageot, 1965). He worked as the naturalist and director for several summers at the Pipsico Boy Scout Reservation and reported valuable natural history observations on the county's herpetofauna. He later (Rageot, 1969) reported on three rare species from Surry County – Oak Toad (*Bufo quercicus*), Barking Treefrog (*Hyla gratiosa*), and Eastern Spadefoot (*Scaphiopus holbrookii*). Roger also provided confirmation, a shell, of the state endangered Chicken Turtle (*Deirochelys reticularia*) in Virginia at Seashore State Park (now First Landing State Park) (Rageot, 1968).

Roger's first love in Virginia was the Great Dismal Swamp. During his 16-yr period with the Norfolk Museum, he spent many, many nights in the swamp with only a few blankets, sandwiches, and a few tins of food. He took notes on everything, not just amphibians and reptiles. His collections of animals ended up as stuffed display specimens in the museum's dioramas, scientific specimens in herpetological collections such as the Smithsonian Institution and other museums, and live animals in exhibits. His fieldwork in the Swamp was supported by small grants from the Virginia Academy of Science in 1953 and 1957.

Around 1960 Roger wrote a large manuscript based on his excursions and natural history observations in the Great Dismal Swamp in Virginia and North Carolina. He tried to get it published by as many as 10 book publishers but was apparently unable to make it happen. It was accompanied by 85 pen and ink drawings. Some

Fig. 3. An example of Roger Rageot's pen-and-ink drawings. This one of a Green Treefrog (*Hyla cinerea*) was on the cover of the Philadelphia Herpetological Society Bulletin in 1963.

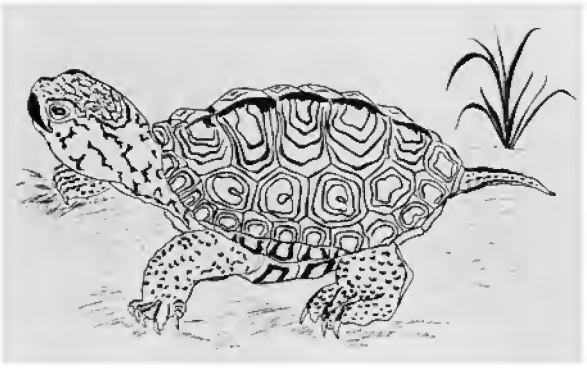

Fig. 4. A second example of Roger Rageot's pen-and-ink drawings. This one of a Diamond-backed Terrapin (*Malaclemys terrapin*) was in the art section of the Philadelphia Herpetological Society Bulletin in 1963.

of these drawings cannot now be located but some of those available are published in the following manuscript. Roger loved the Dismal Swamp. His attraction to it was not only scientific but also spiritual and literary. He gained his inner strength just being there and being one with the swamp ecosystem.

Roger also wrote several very different articles and papers, from magazine articles on the supernatural to scientific papers on natural history. Although he had some training as a scientist, his approach to life and natural history was artistic. He saw and felt art in nature and some of his writing reflected this inner connection. All of the papers known to us are listed in the bibliography. It is not an extensive list, but it is quite varied and broad in scope. "The Apparition," a story in a 1963 issue of Fate Magazine (but not located by us), devoted to tales of the supernatural and unexplained, was part of a series of stories that Roger grouped into a collection called "Rageot's Horrors." We have unfortunately been unable to find this collection.

During his tenure in Norfolk while at the museum and in later years after returning from the tropics, Roger (Fig. 5) appeared in numerous newspaper articles throughout the Tidewater area. He became something of a noted naturalist and was sought after for identification on many types of animals, fossils, and even some invertebrates. His eccentricities, like eating road kills and spending long periods of time in the Dismal Swamp by himself, were extolled in complimentary fashion by at least two reporters late in life. And the announcement of his death was covered by one of them with a sort of reverence for his gifts to Tidewater natural history, education, and his unusual life style.

The late Joseph Campbell, noted philosopher and professor of comparative mythology, extolled the virtues and value of making one's way in life. "Follow your bliss" is his most well-known phrase. Roger Rageot followed his bliss. He did what was right for him. And he did not care what other people thought about him. In the process, he gave far more than he received and he gave it with grace, humility, and dignity. He was fond of saying that he was a French count by heredity, a distinction disputed by his sister. But even if he was not really of royal descent, he surely acted that way. Virginia's natural history, especially herpetology, benefited from his service in the defunct Norfolk Museum of Natural History, public education, and his portrayal and love of the Great Dismal Swamp.

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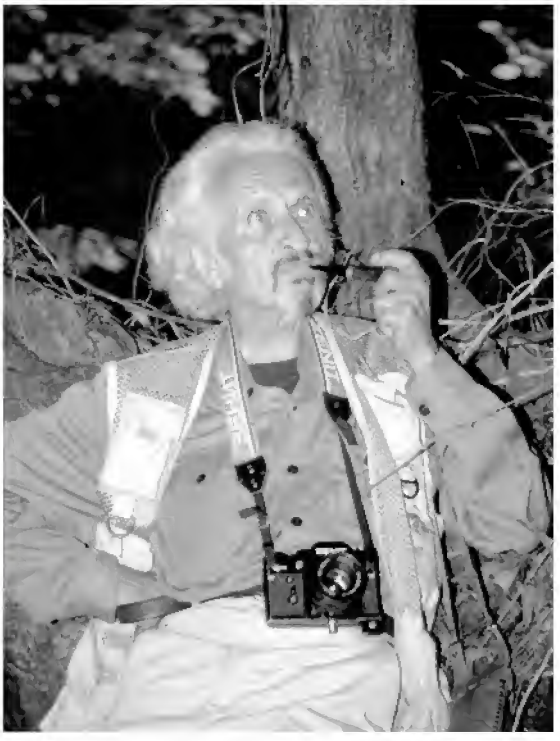

Fig. 5. Roger Rageot at Jericho Ditch, Great Dismal Swamp National Wildlife Refuge, Virginia in September 2002. Photograph by David Liebman.

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**My Favorite Story About Roger Rageot**

The scene is the south bank of the James River in Surry County, Virginia in the early 1960s. Around 200 teen-age Boy Scouts and their counselors have arrived in their summer camp on a bluff overlooking the James River. This was once "Plantation Country." Not far away is the site of the first permanent English settlement in America.

After evening chow the campers returned to their tents to ready themselves for that event's great campfire; the first of the season. There they would be introduced to the camp's key staff.

At dusk the scouts file into the council ring where the first campfire of that season is lit. Each adult leader is introduced by name and title of his camp job. The adult leaders are greeted with respect; ... one of them ... with awe!

Upon introduction the nature director stepped into the glow of the campfire and nodded to the assemblage. Night-time shadows were moving in rapidly on the gathering. The camp naturalist was in the spotlight. Then, he gave two short high-pitched whistles. From the halo of tree-boughs above the council-ring a great bird flew to the small figure below and lit on his shoulder!

It was a large bird with dark wings and a light-colored front. The bird's long tail had white circles evenly-spaced on its feathers. It balanced itself with that tail as it perched on the naturalist's shoulder! A gasp of disbelief escaped from the gathering. Nothing further needed to be said: This was a pre-eminent camp naturalist!

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To understand how such a thing could happen requires one to step back in time to see what went on during the preceding week before the camp opened. A nestling Yellow-billed Cuckoo had fallen from its perch on a tree-limb. It was picked up by a sympathetic naturalist. He fed the young bird until it was ready to fledge properly. Rageot combined several ingredients to provide the bird with a balanced diet. Fruit, insects, chopped nuts, a dash of bone-meal went into the mix. The young bird flourished on the mash gulping it down when offered. In the process a great bond formed between the bird and its friend! Knowing that doesn't wash away the magic ... it enhances it!

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Editors' note: Mr. Tobey and Mr. Rageot were among the six cofounders of the Virginia Herpetological Society in 1958.

# LAND UNVANQUISHED

Roger H. de Rageot

## PREFACE

The story about to unfold here tells us of a land subdued in light and shadow, a land extending along the Atlantic Coast from the southeastern part of Virginia to the tip of South Carolina. It is mostly a trackless wilderness, as yet untamed by the rapid advances of civilization; it is also a land of great natural beauty.

As the author of this paper, I attempted within these pages to paint a word picture for the reader of the various moods and colors of this truly unique area of our country, thus giving him or her a feeling of its atmosphere, therefore, in a way, part of this article should be evaluated as one might evaluate an oil painting. At the same time, in order to give a deeper understanding of its often-unique flora and fauna, I attempted here, using mere words, to bring to the reader a clearer picture of this interesting and colorful region.

In the form of various short stories and sketches, I endeavored to explain to the reader (who, I hope, will become as I am, a true lover of Natural History) the swampland as seen through the eyes of its often-timid and certainly secretive creatures of darkness. While these stories and sketches may appear to be fictitious, they are all solidly based on facts; and as Thomas Wolfe, one of our really great novelists, once said in a preface of his own: "Fiction is fact selected and understood, fiction is fact arranged and charged with purpose."

There are descriptive passages in this book whose main purpose is to give the reader a closer personal viewpoint of Nature herself; it is through such passages that I, as the author, attempted to give a brief introduction to that wonderful science of ecology by describing herein an animal, or an animal group, and its immediate relationship to its current environment and its often clever adaptation to it. I also attempted here to give the reader at least a general idea of the natural history of this remarkable region whose unique biota certainly places it right among the world's wonders.

"To him who, in the love of Nature, holds communion with her visible forms, she speaks a various language," so wrote William C. Bryant, a great poet, in his famous poem, Thanatopsis. How often have I taken these words to my own heart, and with my bed roll on my back, disappeared for days at a time into the Big Woods, there to dwell upon Nature's logical order; in this terrible world of international insanity, frustrations and tensions, with their exaggerated emphasis on material wealth, what other choice did I have? It is to persuade other people, especially our confused youth of today, to follow my simple choice that I have written this article.

rhr, Norfolk, VA, 4/15/61

## PART I.
## THE SWAMP

Nothing is more disturbing, mysterious or frightening than a swamp. The profound silence that envelopes it during the calm nights, the odd fogs which drag over the canes in the early morning hours, or the imperceptible sounds muffled by its density, render a swamp similar to a land of dreams, a formidable land, hiding a secret unknown and dangerous. The swamp is a world apart with a life of its own, where unknown creatures palpitate.

I am sitting at its edge watching the Black Vultures. They circle endlessly between the azure sky and the green world below and they wait; they are always

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## EDITORS' NOTES

Roger H. de Rageot was a naturalist who worked for the Norfolk Museum of Natural History from 1952 to 1967. He was a renaissance naturalist with little formal training as a scientist, although he took several courses at George Washington University. His writings show that he was torn between science and literature, the arts, and creative writing. Roger loved the Great Dismal Swamp and spent many days by himself with little more than a blanket, a few tins of food, and a notebook. The manuscript published in this (and the following) issue of *Banisteria*, Land Unvanquished, was written in 1961 before the wholesale loss of natural habitat by urban sprawl in southeastern Virginia and North Carolina, Roger's prime areas of focus. Many of his observations included in this manuscript were made in the Dismal Swamp. He appreciated the formal protection of some of this area when it was made into a national wildlife refuge in the mid-1970s. However, he lamented the loss of habitat and the changes brought about by urban sprawl.

Land Unvanquished is printed here with few changes except for spellings, grammar, and edits for clarity. In an appendix, we provide modern scientific names for the common names used in the article. Roger tried to publish Land Unvanquished as a book and approached several publishers, but he was never able to see that dream completed. We publish it here to honor his contributions to Virginia natural history. We thank Kathy Paine, University of Richmond, for typing the manuscript into electronic form from the original manuscript.

waiting for the death of an unfortunate creature; they make their living out of death. They glide on inert wings, following air currents. They are graceful.

Below me rises a wall of extensive canebrake beyond which I cannot see because the rows of cane stalks grow close together. A bird ejects three limpid notes; what is that bird? I have often heard it! Why, of course, it's a Carolina Wren!

Canebrake and briers extend for mile after mile, and from behind this impenetrable barrier there is that vague network of pulsating sounds of the hidden life: the grazing of insects' wings, the hardly audible murmur of the long cane leaves as they shudder from interval to interval with the sorrowful notes of a Mourning Dove; nothing could be so melancholy as the sad notes of this bird; he calls, the canes shudder.

A faint crackling of leaves and I know that it is a tiny, brown lizard; another rustling of dry leaves, more pronounced and more rapid, mark the passing of a larger reptile. The five emphatic notes of a Prothonotary Warbler come from a nearby bush, and all of these sounds are the voices of the forest that form a complex language; by long association with this language, I have learned to place each creature by its proper sound. This I do instinctively and it comes as a natural thing, which out of a long training has become a part of me. A soft, grating noise and I ponder over it; it persists; this time it is only a dry leaf holding to a twig by one thread; it spindles around, agitated by the wind; soon it will break off, and with a few spirals, fall to the ground where it will add to the accumulation of dead humus.

Into the tangled gloom, the vines climb and crawl, forming a green tapestry along the ground; and falling from the trees in long drapery, make archways toward tunnels in which everything is dimmed; an observer is affected by a rather profound atmosphere of conundrum. Though one sees nothing in this maze, one feels palpitating life close at hand. In such places, the Golden Mice, hidden in the gloom, await nightfall to come out of their nests to make their way among the tangled vines; also in these same shadows, the Banded Rattlesnake likewise waits to prey on these same Golden Mice. Then one sees little pathways and neat piles of grass that mark the activities of the Bog Lemmings.

Within a small area are the shattered remains of five Redwing Blackbirds; black and scarlet feathers lie mixed together on the brown leaves beneath the curling ferns; what sharp teeth, what needlelike claws, were the cause of this tragedy? The thick foliage of a great White Oak shivers; if trees could only speak instead of carrying that incomprehensible shiver, they would tell much!

Once I saw a group of blackbirds dash madly through the branches with frightened calls, and out of nowhere, a gray bird materialized! The blackbirds flew in all directions to confuse the hawk; this Cooper's Hawk for a very brief instant stood undecided, suspended in mid-air, wings beating fast; then suddenly, whirling around a tree, came face-to-face with the flying blackbirds. The hawk plunged; its talons struck; the feathers flew; there were pitiful screams, and the Cooper's Hawk then carried the agonizing bird to the lower branch of a maple; one set of claws firmly held to its perch, while the other set fastened onto the victim's flesh; the hooked beak began to tear open the yet screaming bird.

But the tragedies of this great wood are seldom witnessed. It is by piecing together the evidences left by these dark struggles that they must be reconstructed: a bug's elytra, a set of moth's wings, indicate the passing of a shrew; a bird's carcass, the work of a fox, or perhaps of a weasel. Here, at the foot of that pine, are three owl's pellets, containing the regurgitated, undigested parts of some small mammals, bones, hairs and five complete skulls: the skull of a Swamp Shrew, of two Field Mice, of one Bog Lemming (distinguished by its two grooved, upper incisors) and the smaller skull of a Harvest Mouse; perhaps these are the answer to those muffled squeals I thought I heard last night.

Among the briers, canes, and climbing vines, hidden life continues its vague network of sounds. In the gloom, snakes coil and uncoil. Delicate orchids, Pink Pogonias and Lady Slippers set forth their fresh colors. Every place appears identical. A broken tree stump covered with moss and the moss sporophytes erecting their matchlike stalks; on top of each one are capsules containing innumerable, microscopic spores, the seeds of a new generation.

From among the canes, seep the motionless, black pools; the illuminated sphagnum of their shores blaze like green fire. Above the golden canes, tree trunks stand in lines of drab gray. The evanescent odor of fungi, together with the acrid smell of methane gases, plus that of decayed logs, mix to form that alien atmosphere of the deep woods.

Suddenly, there is a faint murmur of rushing wings; this murmur increases to a roar, and the blackbirds pass low over the reeds and canes. A huge, living cloud, they swarm myriad: by the hundreds, by the thousands! The whole forest echoes with their insane chirps and chatters, until finally, the interminable column passes, leaving only the unechoing forest.

Over this brooding wilderness, an all-enveloping mist rises; visible now is only the outlines of tall trees, until they, too, merge into the gray mist; and the day dissolves into night.

There is a breaking of limbs, not loud, and two live, amber coals peer from the darkness; the Black Bear looks on, while I try to discern through the density the exact shape of this animal. The twin, amber coals vanish; and I see (or perhaps imagine I see) the form of a bear moving silently through the brush.

The sky has a sulfuric cast. A sigh, a frolicking wing, and the bizarre calls of a Night Bird. Such is the Swamp night, unfathomable, dense, and enigmatical. The "Pluck-plukety-pluck" of the Green Frogs sounds like someone plucking on the strings of a banjo, and the croaking of many Leopard Frogs, like the gurgling of a distant stream.

Suddenly, I feel something behind me, and turning, I see a round moon slowly rising, gradually slowing as it comes over the horizon; its light pierces the thick foliage, casting pallid reflections upon both water and trees. In the gloomy alleys, glow the frolicsome fires of phosphorescent fungi.

"H-o-O, h-o-0, h-o-o," the lugubrious call of the owl crosses the night. And as the swamp softly whispers, a rattlesnake swiftly glides through the canes.

## PART II.
## BENEATH AMBER WATERS

Because the winter rains were still falling, the ditch was deep, it had grown to four times its original size and was now like a torrent instead of that somnolent thing one usually saw.

Ten little Cave Fish moved across its bottom, staying closely packed together. At first, they had numbered more than twenty; but the voracious, diving beetles and their larvae had attacked them; after that, they were cut to but ten.

At the beginning of April, crayfish had played havoc with the remaining ten; death bore down upon these miserable and inexperienced little creatures. The ditch itself was not full of crayfish. There were females who carried a great number of eggs attached to their swimmerets, while others went about with little ones clustered on their backs.

One day, a pair of playful Otters came from the big lake where the Bald Eagles nested and fished year after year; after their arrival, there remained only a few crayfish.

Regarding the particular brood of Cave Fish previously mentioned, there now remained but one: this small creature had been born apart from the others. A peculiar turn of destiny had caused the egg that contained him as a germ to roll between two sticks where it became anchored. With a vigorous push, he had burst out of his prison; but his prison rolled itself like a ball and stayed attached to his abdomen. At first, he found this cumbersome ball to be almost intolerable, but later on learned to appreciate it, for it contained the substance of his life. Each day the ball decreased in size, until one day it was completely absorbed. Then he knew his first emotion, anger. It was also his first moment of anxiety. He opened his mouth and water filled it; his anger was somewhat appeased by the microscopic plankton.

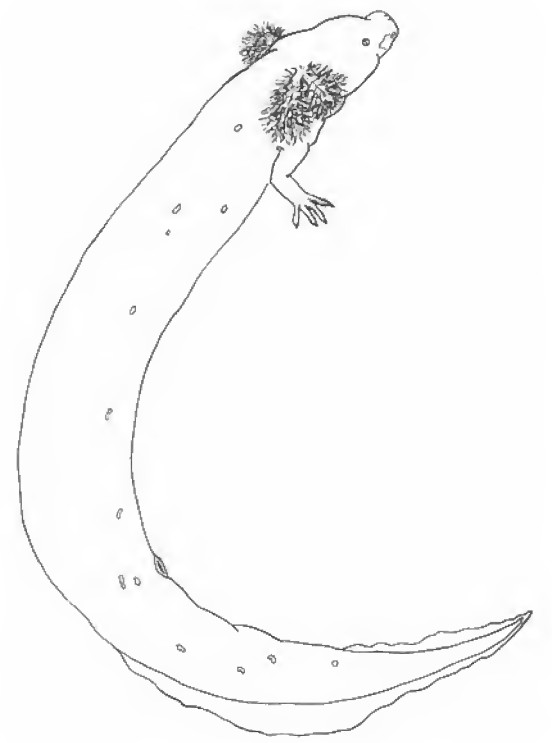
For some time, he lived in obscurity under the bank where swarmed and multiplied a multitude of aquatic organisms both vegetable and animal; so he escaped the rudeness of light and came to mix with this swarming multitude. He often fell into a state of pleasant torpor; one night, after he had fallen into one of these states, he almost died: for that night, the whole bank was packed with living things; gills and plants were taking away his precious oxygen and exhaling death; the venomous water surrounded him, and he already felt death slowly absorbing him.

That imperious necessity for darkness brought him back once more under the bank; by this time, it was quite safe, and he continued to live there with the other beasts that also preferred the recesses of obscurity.

He could see large, somber masses gliding upon the ditch bottom; these were the Sirens and Amphiuma, salamanders who looked and lived more like eels than amphibians. The Sirens fed almost entirely on small mollusks, while the Amphiuma fed on small animals of the ditch bottom. The Sirens were very peculiar because they had two perfect front legs but no hind legs; the Amphiumas were also strange creatures that had four under-developed buds where their legs should have been.

Sometimes a beautiful snake, colored like the rainbow, and another very colorful snake, orange and black, came to capture Sirens and Amphiumas, their main prey. During such times, he could feel a great turmoil going on; and he could see indistinct forms twisting and writhing. The two colorful snakes were the Rainbow and the Mud Snake; they both possessed a pointed spur at the end of their tails which was very useful to them, since they spent a great deal of their time burrowing.

Once, one of these snakes, without even intending to do so, lightly struck our poor little Cave Fish with his tail; this had been his first real wound.



In June, the Pickerelweeds put forth their spikes of blue flowers; and a long, blue line spread on either side of the ditch, which was again somnolent. During this time, our small Cave Fish was under a leaf with only his pectoral fins moving back and forth; he felt very secure under this shady leaf. The harshness of light, which was to him most unpleasant, hurt his sensitive touch, benumbing him.

Through evolution, he had become an individual of a species adapted to a life of darkness; he did not see much of the world except vague and somber forms dissolved into an opaque grayness. Rather, he felt the world of living things through vibrations, each of which was received by the sensory cells, which were distributed over his skin and fins; these sensory cells were the receptors which transmitted the different values of the world of vibrations to the nerve ends, which, in turn, transmitted them to his muscles, which responded accordingly.

One day, a small fresh water crustacean came close to the leaf where our little Cave Fish lay; at once he knew it was a small crustacean just by the type of vibration it created in the water; he darted after it. Then he heard the rasping of the saw-toothed tongue of the *Planorbis* (small spiral snails) as they filed away at the soft tissues of the green algae; this sound he could distinguish from among the others because he knew it so well, since he had so often fed upon the *Planorbis*.

A nearby worm began to pound upon the bottom and he went after it; this sudden motion created a small, blurred cloud over the silty bottom. A Redfin Pickerel, which was marauding deeper than usual, saw this small cloud of silt; and with a burst of lightening speed, dashed upon the Cave Fish, who naturally felt the imminence of grave danger. An impulse beat through him in simultaneous waves, the implications of which were to flee, to flee deeper into the darkness and to hide; but in his blind fear, he found himself turning in spirals, and he knew not how it was he so suddenly found himself in the dazzling light; that light which had so bewildered his poor senses, and because it was so intense, destroyed them. He kept on spiraling, feeling that dreadful nearness of the terrible Redfin Pickerel closing in on him, its powerful jaws snapping in rage and frustration.

Then, suddenly, he found himself once more under his favorite shadowy bank; once more in the welcome darkness, he plunged among the stems of the *Myriophyllum*. Also around this time, a rather large school of Mudminnows swam by; and the bad Redfin Pickerel, seeing an easier prey, went after them.

Other Cave Fish of his own species were also among the *Myriophyllum* stems. He was now quite safe but also very exhausted: his gills were beating fast; gradually, however, the beat of his gills lessened and a drowsiness spread over him. The small, fresh water beasts weaved about him a subtle network of sounds and he slept.

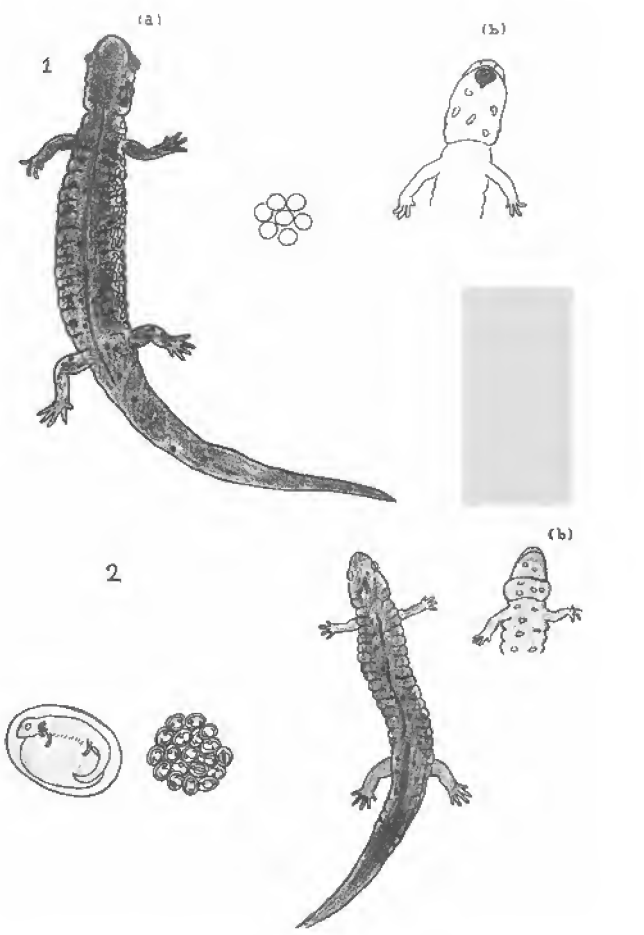
Who, however, can tell what is reserved in the hard Hand of Destiny? A biologist was, on this very day, collecting fish in the Big Swamp; he had been dipping his net for hours, finding nothing of interest; so he was naturally disgusted. It was by pure chance that just when he was about to leave, he dipped his net along the edge of the ditch where our little Cave Fish slept; there was a most violent turmoil in the water like that of a cyclone, and the net went up again; a gleam of pure satisfaction crossed the biologist's face as he saw a little fish about an inch long flapping miserably at the bottom of his net. Immediately, he realized he had something unusual; then he placed the little fish in a jar, and with that sort of ecstatic happiness which comes to a biologist when he finds a truly wonderful specimen, he stood there holding the jar at eye level, just looking at the poor little Cave Fish: he saw his pinkish belly, that greenish gray back, those black lines adorning each side of him, and the tactile barbels of its lips, which were kept in constant motion as the little fish sought for a way out of his glass jar prison.

The biologist, looking at this little, odd creature which was a part of the mystery of the Great Swamp, seemed lost in reflection. Being wise in the ways of Natural Science, he knew that similar species of fish, Blind Cave Fish, live deep in mountain caves; and, at the same time, he also realized that the Big Swamp's black waters were parallel in habitat to that of the mountain caves: thus, the first Swamp Cave Fish had been discovered!

## PART III.
## SWAMPLAND SPRINGTIME

The rain fell endlessly and the woods became wet and soggy, wetter and soggier than they had been for two years. The shifting wind blew through the leafless trees which stood silhouetted against the gray sky; from time to time, squadrons of black, croaking crows passed across this gray horizon. The wilderness echoed with beating rain. The rain formed rivulets whose flowing waters were like a song and which were also clear as a crystal. It was in fact as if the intermittent rain had become a perpetual thing forever associated with the great swampland. The rivulets overflowed their banks until they joined together, causing the tree trunks to stand in three feet of water; so that now, there was the sky, gray and grave, the trees becoming silhouettes; and the dark, brooding water mirroring both sky and trees.

A glittering drop of rain rolled down a bark crevice and passed through an interstice beneath the bark, another drop followed, then another; and a little light,




fawn-colored batrachian with a cross mark on its back, whose body was delicate and translucent, awakened from its long slumber, leaving its bark home while it did so. The notes of the first, solitary Peeper came into earshot.

In the last days of February, the sleighbell notes of Spring Peepers were scattered throughout the swampland; at first, these notes were intermittent and timid, but as more peepers awakened from their long winter slumbers, they increased in both number and intensity until they reached voluminous peaks of a great rhythmic chorus.

Waves of spring advanced steadily and the Spotted Salamanders began to lay their eggs in masses of jelly which they attached to submerged leaves and sticks. The males came to the ponds first and deposited hundreds of sperms in tiny sacs, which the females now pushed into their cloacae with their hind legs, causing fertilization to take place. From these eggs, in two or three weeks, would emerge half-inch-long, greenish, gill-breathing larvae; in the fall, they would transform into black and yellow-spotted adults who

would then leave their native ponds.

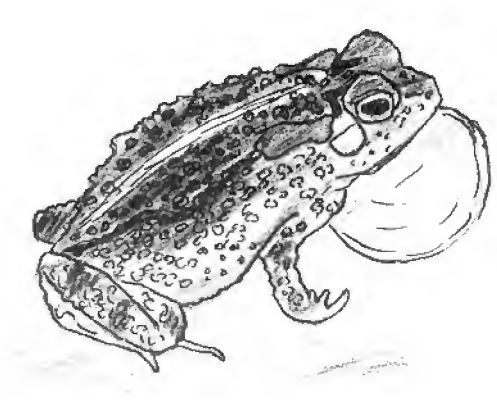
At night, Chorus Frogs, who had left their burrows as soon as the ice had departed from the ponds, called by the thousands; and their shrill calls arose to an infernal din.

On the fifteenth of March, the interminable rain abated and the fine droplets of March rain fell gently and rhythmically upon the Great Swamp, ricocheting off leaves which shot from their buds and grew rapidly. The forest was not growing greener, as was expected; instead, there was a mixture of soft yellow and green, which began to cover the trees and was reflected in the amber water; as a result, the Great Swamp was taking on a color which was strangely yellow, finely mottled with green.

Early one afternoon, the rain stopped, the clouds dissipated, and the sun shone radiantly and warmly, giving to the scenery the aspect of a fantastically abstract painting; thus did April paint the land.

The Redwings and the Blackbirds did not band together anymore as they had done during the winter, coming in thundering clouds of fluttering wings to their favorite roosting places; instead, they paired and dispersed, losing their conspicuousness from among other creatures of the forest. Winter turned into spring. As the frogs and toads left their hibernating spots and invaded the ponds to breed, the woods resounded with a chorus made by multitudes of varied voices; at night, this chorus intensified itself into deafening proportions as the frogs and toads, so inconspicuous during most of the year, turned loose in mass excitement. The "Shirp-shirp-shirp" of the male Cricket Frogs went on relentlessly, night and day, while the female deposited her eggs singly, attaching each one to the stem of an aquatic plant.

One night, a large, red moon lingered above the trees and the sweet, musical trills of American Toads sounded on the still, night air; their soft tremolos echoed and re-echoed along the edges of the silent water. It was during this time that the frogs' eggs hatched, and swarms of black tadpoles popped from them; in no time at all, the water was filled with them, and they started their amazing metamorphosis: the long, watch spring intestine of the algae-eating tadpoles shortened, changing into the shorter intestine of the carnivorous, adult forms; meanwhile, the hind legs appeared, then the front legs; the tiny mouth expanded into a cavernous gape which extended from ear to ear, and the tail was gradually absorbed.



Their fish-like existence was over; their gills disappeared and the newly transformed frogs were equipped with lungs; thus did an important change in respiration occur. The ground frogs went ashore on foraging excursions, some of them with the nubbins of tails still trailing behind. The Musk and Mud turtles, expert foragers of muddy bottoms, took their toll of young tadpoles; a group of Night Herons migrated from the salt marshes and dined for several weeks on them, but despite their many enemies, these tadpoles did not seem to diminish in number; swarms of tiny frogs continued to invade the land.

The tree leaves widened and became a darker green. The Wild Irises, which had erected their green bayonets, now cast up their blue flags. May came, bringing with it longer twilights and the blossoms of the Coral Honeysuckle.

Frogs hastened to complete their life cycles: the female Fowler's Toad responded to the weird drone of their mates and hurriedly laid their eggs in tangled tubes of jelly. Most frogs breed and transform quite rapidly; their breeding spots are temporary ponds that vanish when the rain stops. Tadpoles of Green Frogs take a year for their transformations, those of Bullfrogs, two years; so that these two batrachians, unlike the others, can only complete their cycle of metamorphosis in the larger, more permanent ponds.

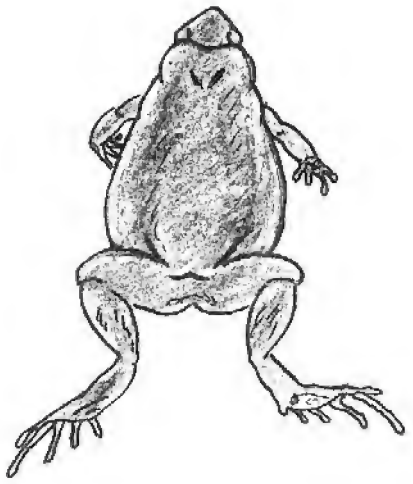
Up in the trees were the treefrogs, invisible, since they become green like the leaf to which they must cling with their suction discs; or gray as lichen, taking on any color which matches the object to which they happen to be clinging at the time. Treefrogs, numbering twenty-two species, counting the Peeper, which is the smallest, leave their trees and bushes in the springtime and go forth into dark water to breed, returning later on to their former habitats to continue their loud noises, remaining invisible for the rest of the year.

By the ponds among the lilies were those frogs which all of us know the best because they never leave the ponds: they are the Bull, the Green and the Leopard

frogs; the last one having rectangular, black spots all over its back. Most amazing of all are the Swamp Chorus Frogs, the smallest of which hardly ever grows bigger than half an inch, and the largest, never over an inch-and-a-half in length. These Swamp Chorus Frogs are burrowers who, once during timeless evolution, were treefrogs who left the trees for a humbler subterranean existence, where they hunted small bugs and worms; their toe pads, once effective suction discs, are now degenerated. There was a time, far back, when all frogs lived in the water where they originated; then they specialized in several directions: some became tree frogs and acquired suction pads, some became burrowers, while others took to the land and developed a skin more or less dry-resistant and became toads. The Green, the Bull, and the Leopard frogs never left the ponds. The Swamp Chorus Frogs, once tree frogs before they became burrowers, therefore underwent two evolutions, a thing most astonishing because what they underwent was actually a regressive evolution; and evolution rarely regresses.

Among the frogs, there is an odd little batrachian that resembles neither a frog nor a toad, the Narrow-mouthed Toad, who feeds almost exclusively on ants and does not fear their stings, because from its skin a fluid is secreted which is poison to ants; a troglodyte, the Narrow-mouthed Toad never leaves its hole except after a heavy rain.

One day, after a big rainstorm, I encountered the Narrow-mouthed Toad: dusk was rapidly creeping over the earth from the east, and in a flooded pasture that bordered on the Dismal Swamp, came a most curious sound; it was a sound that could have been part of the breathing dusk which I knew must have come from somewhere in particular, yet seemed to come from nowhere: a soft bleat, an evanescent wail. All I could tell was that it came from the grass, and plunging into the black of night, flashlight in hand, I tried to follow it to its source. I entered the flooded pasture, walking in ankle-deep water; soon other voices responded to the first one. Suddenly, at my rapid approach, all voices became very still; so I stood there waiting in that silent darkness. It was a long time before I heard anything else. For two long hours I waited there while those voices remained silent as the grave; to me, it seemed an interminable time on earth, until finally, the progenitor of that very strange, new voice grew accustomed to me and to my flashlight. I was now able to approach much closer without disturbing this new creature, so close, in fact, that sometimes I was less than ten inches from it, my eyes just above the tuft of grass from which it was calling. I was trying hard to see between the blades, yet



seeing nothing; it was as if mythical, nighttime beings had invaded the grass. The long hours of night accumulated and passed on. From time to time there was a splash and a piercing scream as some Water Snake captured himself a frog. A large Cottonmouth Moccasin passed into the beam of my flashlight, and that evanescent wail continued there in the utter darkness. Then, around three o'clock in the morning, there in the middle of a tuft of grass with only its pointed head above water, I saw a Narrow-mouthed Toad; and as I held my flashlight beam upon it, it kept calling!

After this incident, I captured more Narrow-mouthed Toads, but they were very hard to find because they always stayed under cover of grass, were shy, and would dive under water at the slightest warning.

Soon, a new day came, bringing with it the whistle of the Yellow-Breasted Chat. I was totally happy because I had solved the puzzle concerning the source of another of those mysterious, nighttime voices.

At the great stagnant pool where the Water Lilies expanded their leathery, green pads and the misty vapors of the morning hung low over the Cattails, the incessant calling of the Leopard Frogs subsided and the banjo-like notes of the Green Frogs continued, with the trill of the Swamp Sparrow in the background, sort of thrown in for good measure. The woods fairly clamored and rang out with countless amphibian voices as spring advanced at a more rapid pace. The flowers burst forth: the pinkish blooms of the Bog Laurel were very white against the gloom. The fragrant, Wild Azaleas, the White Violets, the climbing Yellow Jasmine, and the dogwood, each of these was an early Spring flower. Later on, there would also be the sweet-scented

Magnolia, whose leaves were just now beginning to grow; and the Zebra Swallowtails already fluttered among the Dogwood.

## PART IV.
## CANEBRAKE INHABITANTS

Warmer weather came; its waves swept on, invading the canebrake, causing the Golden Mice to team with much activity: they built new nests and repaired older ones which had suffered from the ravages of an intemperate winter. The nests of the Golden Mice, graceful constructions about the size of a large grapefruit, were placed at the top of the tall canes. During the construction of a nest, endless trips were made by each little inhabitant of the canebrake: first, long cane leaves were brought and interwoven to make the outer cover of the nest; then bark and parts of cane stalks were shredded into fine thread to make a soft, inner-lining; sometimes, even a few birds' feathers were collected and added, as a finishing touch to this inner lining.

A young male of the Golden Mouse tribe sat on the top of a cypress knee, gnawing on an acorn held in his delicate, front paws. He certainly was a delightful little creature with his large, black eyes and big ears; and he just sat there, munching on that acorn; his long, abundant whiskers vibrated constantly as he kept nervously chewing on it.

The mating season among Golden Mice was, by now, well advanced; and this young male, for the first time in his life, felt the need of a mate. This great call of nature had come about quite suddenly without any warning: a mounting tension was gradually building up within him; he could feel, pounding through his blood and brain, the sharpness of the mating instinct which blotted out everything else. He was the slave of a new, violent and ruthless need; and he would know no peace until this need was satisfied. A great gust of wind rushed through the tall canes, and in the stillness, they rustled. He moved restlessly, climbing among the vines with great agility.

When he came to the shore of the big, stagnant pond, he met a female of the species who was busily laying the foundations of her nest. She paid no heed to him at first, as he advanced upon her; then she caught his male scent: her pink nose went up, and in the catching of it, felt something quite alien within herself. He came slowly toward her. For a moment, the two little beasts stood face to face, their noses touching, their long whiskers moving to and fro with rising excitement. But the female was not to be so easily conquered by the male; an old instinct prevented simplicity in such things, and like most females, she felt the sadistic compulsion to tease her mate; such teasing is believed to be a firm necessity in all courtships so as to prevent them from growing too dull. She, following the true course of the eternal female, dashed madly amid the canes with the male in hot pursuit; now they both raced through the canes, climbing around the narrow stalks. They accomplished incredible acrobatic feats, aided by their semi-prehensile tails. A Great Horned Owl came out of the night; its weird form passed above the canes and was soon swallowed up in blackness. This owl could have very easily made the mice his special prey; fortunately, however, his piercing eyes failed to spot them in time.

The young male, after a most violent pursuit, overtook the female; with the courtship formalities behind her, she was now far more willing to respond to his advances. Naturally, there followed many more mad chases through the canes during the course of which they often, in their wild enthusiasm for each other, vibrated their tails against the canes talks, making soft, rasping sounds. Thus was their wonderful courtship accomplished in the pale moonlight. Two successive nights were spent in nest building; then, throughout the day, they rested.

During the early morning hours of the fifteenth of May, three tiny, helpless pink babies were born in that same nest which rocked at the top of a tall cane. At midday, these young Golden Mice, twisting and whining, had their first meal. On the sixth day after their births, short, dark hairs appeared on their backs and hips. From this time forward, their growth was truly amazing: they doubled and tripled in size; the short, dark hairs grew longer, turning grayish in color, gradually covering the entire body. Whenever the female Golden Mouse went out on foraging excursions, the young often accompanied her, hanging onto her belly; it was not long until they, too, became more sure-footed and were able to follow her freely about.

After the birth, the male declined to visit the nest anymore; and no doubt if he had, the female would have chased him off, for since the birth, she was now bitter toward him.

Fifteen days had elapsed in recorded time since these new Golden Mice had entered the world, and they had, by now, become expert climbers, engaging in all kinds of pranks. In another week, they were able to shift for themselves. They then drifted apart and went out searching on their own for wild forest seeds.

One day, as the Cotton Mice went furtively about their night errands, a terrible restlessness swept the

canebrake. The Cotton Mice were the largest mice of the Great Swamp; first cousin of the Golden Mice, they differed from them both in size and in habits because most of their life was spent on the ground. This vague restlessness was due to the fact that every canebrake inhabitant knew all about the Old Rattler who lurked nearby. Even the Bog Lemmings didn't dare to leave their underground tunnels. A little Harvest Mouse who lived in a nest of grass near an old stump, just peeked out once and went back inside her nest, remaining there.

That morning, the Big Rattler rested himself in the warm sunshine at the foot of a tree. A White-Tail Deer inadvertently came too close to him; in marked irritation at this intruder, the rattlesnake shook his rattles menacingly, and the buck fled terror-stricken, his antlers crashing through the branches. The dry sound of those fateful rattles announced to all the rattlesnake's ominous presence, and every little canebrake inhabitant stood frozen, sort of transfixed in a momentarily arrested state of motion!

About nightfall, the female Golden Mouse decided to get a drink at the stagnant pond; obviously, she didn't see the Big Rattler there on the shore, for the simple reason that his color patterns rendered him invisible against the dead leaves. The rattlesnake struck: the poor Golden Mouse could feel his long, twin fangs piercing her frail body like two steel prongs; immediately, she lost all consciousness; and from this great loss, drifted into death itself, right there amid the Great Swamp with all of its hidden life and its countless struggles for survival.

## PART V.
## THE SALAMANDERS AND EVOLUTION

In old clearings, unchanged and timeless, the vague murmurs of the woods fuse into a melting, rainy-gray dawn. Timorous amphibians, the salamanders, crawl among fallen timbers whose masses heap together, forming a huge jungle of decay. Salamanders, first appearing in the later Devonian period, some three hundred million years ago, have remained unchanged despite the march of time and still live much as they did during that period.

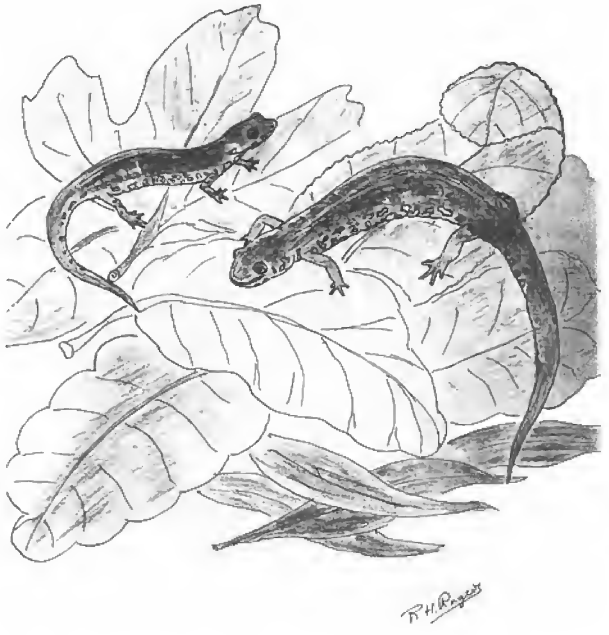
In late February, the female Margined Salamander, while lying on her back, lays her eggs amid the roots of an aquatic moss called "Fontinalis." The salamander and the Fontinalis are not to be thought of as two separate things because the amphibian lays her eggs in the roots of this same plant every year. True, one is a plant and the other is an amphibian, yet they are inseparable as an ecological principle and as such, are closely knit in the web of life. The salamander depends upon this plant for breeding, and the plant upon sunshine and rain for its growth; so that if rain is late, the plant is late in growing and the salamander late in breeding.

Since the larvae of the Margined Salamanders are gill-breathing, that is they can only breathe under water, it is important that they metamorphose into an adult before the ponds begin drying up all over the Big Swamp; because when the ponds dry up, the Margined Salamanders will disappear.

On a late afternoon during the month of June, a Slimy Salamander deposited her eggs into the cavity of a rotten log; they adhered together and hung from the top of the cavity like a small bunch of grapes. Mother salamander lay curled at the bottom of this cavity, guarding her brood and seldom leaving them.

Under favorable conditions, the individual cells within each egg soon developed, then divided and multiplied, until the indistinct outline of each embryo became apparent; the cells continued to divide and multiply, and each organ composing the future embryo took shape, until at last, the embryo was complete; thus did they become individual organisms in their entirety, yet still an entity in the overall, intricate pattern of nature itself.

As the time came for them to pierce the egg-envelope, the young salamanders began to twist around in their embryonic fluid; minute-by-minute, as their excitement grew, they looked like black dots



moving on a merry-go-round inside a transparent globe. The first young one popped out, then the second one, and a third one, until now the rotten log was alive with tiny, crawling salamanders, glistening black, with silver spots. They sensed at once the job of living and of breathing the moist atmosphere of decay; it would be very erroneous to state here that they breathed with their lungs because Slimy Salamanders are lungless creatures, breathing through the pores of their moist skins and through the thin membranes of their throats. Like a few young salamanders of the land-breeding species, they have no gills, these having been absorbed prior to their emergence from the egg. In a word, they are the perfect replicas of the adult and need no metamorphosis to be able to breath outside of water. These young salamanders feel not only the need, but the actual necessity, to immediately hide themselves beneath the leaves.

August came and the Duskies, small, brown salamanders, commenced to breed in the cypress swamp under the bizarre phantasmagoria where the cypress knees erect their odd forms. By then, most of the water had evaporated, leaving bare the dark, stick mud; the Duskies deposited their eggs on this sticky mud beneath debris and in the few remaining stagnant pools, where the fertilized eggs began their development. When the young Duskies hatched out in late September and October, they would then possess delicate, feathery gills and would begin an entirely new aquatic existence until their metamorphosis into adults; not until then would they be able to live long away from water. Those young Duskies remaining back in the ponds were fortunate; while the others, those emerging from the eggs laid on the bare mud, would perhaps have to undertake a dangerous journey in search of a stream. But hatching out was still far away, and by then, the winter rains would fall once more and the woods would become wet and soggy.

So today, the salamanders recapitulate through their life history, the great drama of the emergence of animals from water to land, which took place some three hundred million years ago. The Margined Salamander, whose eggs are too fragile to be deposited on land and whose larvae spend the first part of their lives as fishlike creatures and another part of their adult stage on land, point out to us how the first step toward their dry land existence truly began; and simply by the ability to lay its eggs on land as well as in the water, the Dusky Salamander demonstrates to us still another step; finally, the Slimy Salamander, by both the ability to deposit her eggs on dry land and the complete development of her young before hatching, the last step of this important emergence.

With these timeless amphibians, the pageant of the conquest of dry land continues, since it is an instinct strongly implanted. One can still see alive now that great Devonian drama, which is forever a part of the ageless, Great Swamp.

But let's go back in time and see for ourselves how the oldest land vertebrate came about: the Silurian period came and passed on, and the earth entered a new era, the Devonian; this was approximately three hundred million years ago. There was still much land below the water. Probably where our swamps are now, was the ocean with its huge sharks and strange sea animals swimming about. But the land was steadily increasing its hold; the first land snails appeared; it was also the age of fishes and many kinds, both fresh water and marine, had become well-established. For the first time since life began, land plants were becoming more conspicuous; and true forest vegetation was much in evidence. Ferns reached their peak: they were the most abundant plant of this epoch; large and tree like, they were beautiful, with big, complex, spreading leaves.

The other plant orders were the club mosses and the horsetails. *Lepidodendron*, a giant club moss with uplifted, hairy arms that terminated in scaly cones fifty-to-sixty feet high; while *Sigillaria*, another club moss, towered to the height of one hundred sixty feet, with only a few of its large, top branches clothed in glasslike leaves.

The horsetails also grew in these forests of giant ferns and club mosses; their straight, hollow-and-pointed stems forty feet high, ended in a compact cone.

Then, long before man, in the Upper Devonian period, a group of fish, the Crossopterygians struggled out onto dry land and became the first land vertebrates, the amphibians; the amphibians became the masters of this newly conquered element, the earth; some of them attained great size: the Labyrinthodonts dragged their heavy bodies through the giant club mosses and horsetails in the swamps of the Upper Devonian period, and left their large footprints in the soft mud.

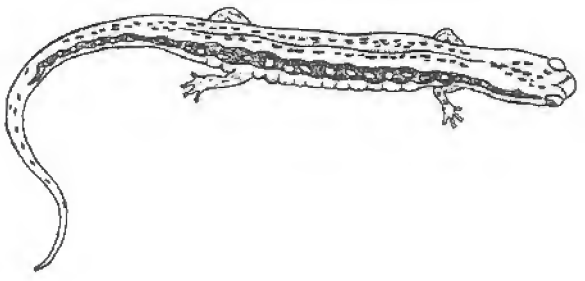
The reptiles came and they were far better equipped for a dry land existence than were the amphibians. Amphibian eggs, very simple in structure, had to be deposited in water, where they hatched as fish like larvae; while the reptiles produced shell-protected eggs, and the excess of yoke in them enabled their young ones inside to reach an advanced stage of development before starting to hatch. Thus reptiles, the descendants of amphibious stock, in being able to breed entirely on land, accomplished yet one more step in terrestrial evolution. They became free of water, bound to it no

more; they had, at last, achieved what the amphibians had failed to achieve, and they spread over all the earth. They multiplied rapidly, and the amphibians could only find safety in a submission to them.

Their reign over, the huge Labyrinthodonts passed away, along with other members of the amphibian tribe; today, all that is left of this once great group of animals, which bridged the gap from aquatic to land life, are the frogs, the salamanders and the obscure, tropical caecilians. The timid and secretive salamanders, whose entire existence is spent in the shadows of the woodlands, are seldom encountered because of the seclusion of their habitat. By being incredibly colorful, they quite often astound those who discover them: there is the Two-Lined Salamander, yellow, with two distinct, wide, black lines on either side of his body; the Marbled Salamander, a chubby little fellow, is slate-black and marked with irregular, gray bars on its back; and the Red Salamander, who looks like a live piece of red coral.

Only at nightfall do the salamanders really start to dart about; they search for the earthworm, the small snails, the slugs, the spiders and the tiny crustaceans in the ponds. They crawl in utter darkness, silent, mysterious, secretive; and as they crawl, the trees, rocked by a gentle wind, make a long and continuous murmur like a forest song, a song transmitted from generation to generation, speaking eloquently of the past, of a time when the first amphibians peopled the earth, and of the arrival of the reptiles and the great struggle between them and the amphibians for earthly dominance; this song also tells of the great dinosaurs, about the first birds and other warm-blooded animals; and finally, about the arrival upon the scene of man himself.

The salamanders crawl and squirm in total darkness; at the bottom of a stream, a Two-Lined Salamander chases small, aquatic crustaceans. It is the time of day when the horizon is gray, and the trees



gradually transform into fantastic, indistinct nighttime shapes. A Bittern glides through the dry grass, stops, seeming to disappear like some ghost as the coloration of its plumage becomes one with the surrounding grass; then its rapid, throaty notes shatter the silence. In the gray dusk, the magnolias are beautiful.

## PART VI.
## AN EXCURSION INTO THE DISMAL SWAMP

The natural life of a great swamp is always rich and varied. This is so because a swamp is not a single, general habitat; a swamp is the sum total of many, small habitats; and each habitat contains a fauna of its own, which is composed of an animal community existing in close correlation with its immediate surroundings. Each moss-covered log is a universe of life: you turn over a log and you see some white grubs, and you wonder what kind of beetles the grubs will become; you see a caterpillar, and you wonder again what type of butterfly the caterpillar will become. Then, on the mossy side of a log, you notice a tiny, amber snail; you notice how intricate are the markings of its shell; you are amazed; you look closely at the snail; you see its extended small, yellow body crawling; you find it hard to believe that there is life in such a tiny shell. You turn over a log, then another; and you find more land snails and your attention becomes focused upon them. None is very large but they differ in size. All are marked with an interesting design on their shells. Quite a few have teeth inside of the shell aperture. Maybe you know something about snails, and you are aware that these teeth were developed as a protection against beetles and other creatures that prey upon snails. You also notice that these teeth in their numbers and shapes, differ from one species to another.

Many of the land snails are extremely small, but there are several hardly as big as a pinhead; and they live between the leaves and the fungi that grow on them; they feed on fungi. By gathering the fungi on the

leaves, you collect some of them. They are very fragile, which makes them hard to collect.

There, under a log, is a flat, whitish shell a little less than an inch in diameter: this is the shell of the Cannibal Snail, *Haplotrema*. Practically all other land snails are vegetarians, but *Haplotrema* is carnivorous, feeding upon worms and other snails. Once I found a *Haplotrema* in the act of eating another snail: the shell of its victim had been partly eaten away by the sharp teeth of the file-like tongue of the *Haplotrema*.

Now we are in the middle of the Dismal Swamp, in the Nansemond County area. Because of the thickness of the underbrush, we can advance only with extreme difficulty. Trees, mostly Black Gums and scattered Cypresses tower toward the sky. In the Canes below, it is too thick for the wind to penetrate; and the air is humid, hot and uncomfortable.

My friend, Bob, who wasn't too interested in biology, but wanted to have a look at the swamp, accompanied me. "How far do you figure on going into this God-forsaken hole," asked Bob. "It gives me the creeps. I think we've seen enough for one; let's turn back."

"Why, what do you mean," I answered, "We've hardly started yet."

"Are you trying to be funny?" shouted Bob.

"No," I retorted, trying to be cheerful instead.

"Okay," answered Bob, "this is your show; but I hope you understand what you're doing because I'd hate to get lost in this place."

Suddenly, I saw the small, shiny body of a Little Brown Skink on a brown leaf; and I made a quick dash for it, missing it by inches. "Funny," I then remarked to Bob, "I never miss a skink once I start out after one."

"Well, just you let me try the next one," said my friend, Bob, "I bet I can get it." So Bob, a moment later, tried a Little Brown Skink himself; and as I had anticipated, missed it.

The place was now swarming with Little Brown Skinks; we could see them scurrying among the leaves. Next time, I saw one immobile beside a limb; I made a dash for it and this time, I got it. Afterward, I explained to Bob my pet theory on the capture of Little Brown Skinks; but Bob was somewhat skeptical, refusing to believe that my success was not due to good luck.

As we moved through the canes, Bob exclaimed, "Keep that bag away from me!" I then recalled that the white bag, which dangled from my right hand, and contained a Copperhead, was unreasonably close to him.

"Are you sure that snake can't get out of there?" demanded the luckless Bob.

"Of course," I replied rather politely.

"Just what makes you so sure?"

"Well, for one thing, although the fangs of a snake certainly are useful as a piercing object, they are perfectly useless in gnawing holes through bags. Snakes aren't rodents; they have no gnawing teeth."

That morning, Bob got the scare of his life. It happened as we were entering the canebrake that we found it: I didn't see it, as I was then occupied with some beetles under a log. Bob pointed out to me an object on the leaves, which he thought to be a coiled snake. At first, I couldn't make out the snake because the pattern of its body camouflaged it well with the dry leaves where it was. I broke off a strong limb and proceeded toward the snake. It was then that I heard Bob running away. I then placed the limb on the neck of the snake, behind its head, and grabbed it by its neck, just behind the head. Its body thrashed madly about, and I had a time putting it in the bag without being bitten.

"All right," I called to Bob, "you can come on back now; have no fear, everything is under control."

I heard Bob's timid voice coming from the canebrake somewhere: "Are you all right?"

"Sure I am," I replied.

As we advanced westward, the canes gradually thinned out and more timber was in evidence, until we began to walk through an area of large timber where the underbrush was scant. The forest floor was abundantly covered with Sphagnum, which extended in a soft, emerald green carpet. In water pools there is a species of sphagnum that floats beneath the surface of the water and looks like green stars; this pretty sphagnum is known as "Cuspidatum."

Sphagnum is said to give acidity to the soil, and few creatures are able to withstand acidity in soils; indeed, we noticed that life under the logs and on top of the soil of the forest in general had diminished considerably since we entered this sphagnum bog. For some time, all we were able to find was Margined Salamanders who didn't seem to mind the acidity of the bogs; we even found several nests of eggs of these creatures under logs in sphagnum pools.

I also found a peculiar little slug: I don't know what it was, but I am sure I never saw it before; unfortunately, it proved to be very fragile, so I couldn't successfully preserve it.

I heard a very light movement of tiny, scraping feet just behind me, and I turned around in time to see a bright blue tail disappear on the side of the tree trunk opposite me. In a second, I ascended this tree with my hands and knees; ten feet above me was a four-inch-

long lizard, black, with parallel white lines on its back; its tail was a metallic blue, and it looked at me with its lively, little black eyes. I was almost upon it. I never miss a lizard on a tree trunk, and I knew when my hand fell upon it, it would be the end for him. I hesitated: "Poor little, harmless creature," I thought. "Yet I need a series of Blue-Tailed Skinks for my collection." "Zoom!" went my hand and I caught it!

As we continued onward, Bob said to me, "Don't you ever get tired of walking?"

"I'm just warming up," I answered.

"What do you say we stop here?" said Bob.

"Wait awhile," I told Bob, "it's only a few more miles to Lake Drummond; and besides, there's nothing like a good walk in the outdoors for your health."

"Do you really mean to say," continued Bob in a somewhat sarcastic tone, "you're enjoying all of this?"

"Certainly," I answered him.

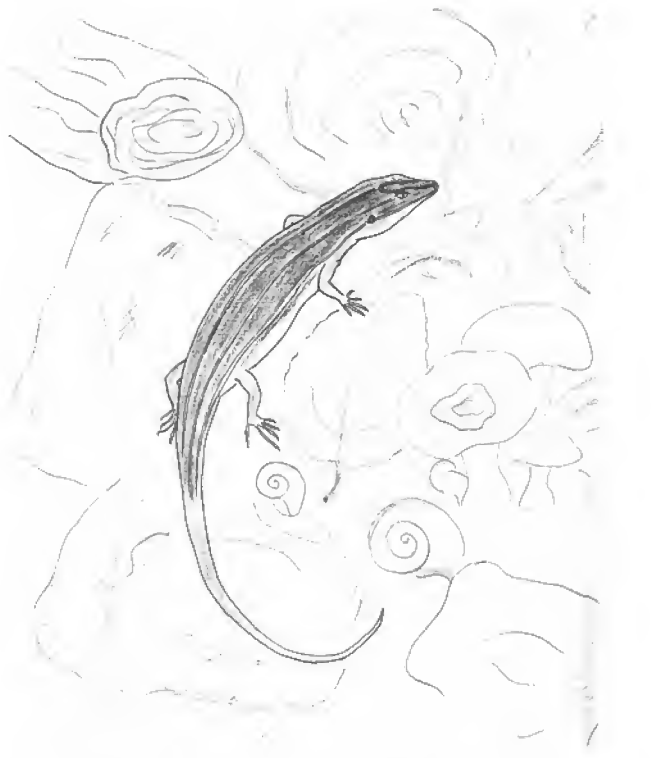
We walked about two more miles, then we saw a big opening in the trees; soon we could see the lake through this opening. The crimson sun was just setting, and the surface of the great lake was cast in a crimson afterglow. In a moment, the sun, which appeared as a great ball of fire, disappeared; and the sky was still brilliant over the spot where it had died.

The trees, Cypresses, Black Gums and Cedars, drew a somber line under the light sky. A pair of Yellow-Crowned Night Herons passed overhead, and their hoarse cries penetrated the dusk. They headed north toward the tidal marsh where they had their rookery. We followed with our own eyes the regularity of their wing beats until they disappeared into the dusk; long after their disappearance, their hoarse cries were still audible.

Soon, a red moon rose just above the forest. We stopped to make camp; I selected a dry spot at the foot of a great White Oak because there was a large hole in its trunk in which I could store things. Since we had both developed a ravenous appetite, we started to eat without even bothering to build a fire.

"What was that last lizard with the blue tail you caught up in the tree?" asked Bob.

"I suppose," I replied, "you mean '*Eumeces fasciatus*,' the Blue-Tailed Skink? The one we caught a while ago is a young individual. As the Blue-Tailed Skink gets older, they gradually lose the blue in their tails. The male of this particular species even loses the white stripes of his body, which I'm sure you noticed on our specimen, and takes on an olive-cream color, with a bright orange head. It is then called a 'Scorpion' by many and erroneously believed to be poisonous. The female of the Blue-Tailed Skink retains her white



stripes, and with the exception of the loss of the blue on her tail, bears the pattern of the juvenile."

"Tell me," asked Bob once more, "are there any poisonous lizards in this swamp?"

"No, you can rest assured that all of the lizards we'll meet in this swamp are absolutely harmless. There are, for that matter, only two lizards believed to be poisonous in the entire world: the Gila monster and the Beaded lizard, which lives in Southwestern North America."

The flickering flame of our kerosene lamp threw a white circle in the surrounding darkness, and I found myself off again on the subject of lizards: "Lizards are not swamp creatures; unlike their relatives, the amphibians, they are more suited to the drier, more arid climates. With the possible exception of the Anolis, or American Chameleon, and the Giant Skink, which occurs in places farther south into North Carolina, I know of only four lizards in the Dismal Swamp: they are the Six-Lined Racerunner, the Fence Lizard, the Little Brown Skink and the Blue-Tailed Skink. Of these, only the Little Brown Skink and the Blue-Tailed wander far into the swamp and do not seem to mind moist situations; the other two remain close to its edges. The Fence Lizard is an arboreal species very seldom seen far from trees; its claws and toes are somewhat longer than those of other lizards, and its brown coloration is an excellent camouflage for its natural

surroundings. The Six-Lined Racerunner is restricted to the forest edges and more open paths bordering the swamp, where it is abundant; its introduction into the Dismal Swamp seems to be a result of man's advancement, as it is ill suited to an existence in damp surroundings. Its name 'Racerunner' isn't a misnomer, for it can run with a speed far surpassing its size; indeed, when one walks along the railroad tracks or in the open fields, he sees only a slight blur just before the animal disappears into the bushes."

"What do these lizards feed on?"

"Well, they are insectivorous, which, of course, means they feed on insects. The Fence lizard for example, and I have dissected the stomachs of a few, shows a marked preference for spiders."

"Do they bite?" Bob wanted to know at once.

"They can and will bite if handled roughly, however, their sharp teeth, effective in crushing beetle shells, find human skin hard to pierce; their bites generally amount to nothing more than a pinch."

"How do they reproduce?"

I answered this question to the best of my ability. I told Bob how small, female lizards deposited their oval, white eggs with their soft, leathery shells under decaying logs where the heat of decomposition hatched them. Bob was somewhat amazed when I told him that the female generally abandons her eggs as soon as they are laid, never to return; I also told him that this is a general characteristic of reptiles. Blue-Tailed Skinks and a scattering of other reptiles tend their eggs until hatching.

Then, somehow, I managed to continue my impromptu lecture to the luckless Bob: "Evolution itself can be reconstructed in so many different groups of animals. If you carefully observe a Little Brown Skink, you will notice that its legs are very small and degenerate, and that this little reptile does as much crawling as it does walking; in many skinks, legs are somewhat degenerate organs. This group of little lizards is a group, which actually, in classification, seems to stand between the lizards and the snakes. Then, if you have observed the Glass Lizard, a legless lizard, you'll probably note that this species looks more like a snake than a lizard. One sees exhibited in this species the degeneration and gradual loss of legs, which eventually led to snakes, which are, in reality, through high specialization, a reptile group built strictly for crawling. There are several groups of legless lizards throughout the world; the python and other primitive snakes have attached to their skeletons the remnants of hind leg appendages; this suggests the method by which snakes may have evolved from lizard-like ancestors. Of course, the Little Brown Skink and the Glass Lizard aren't presently in the process of transforming into snakes. At first, when a species evolves, there are many failures; and through such failures come many creatures that arrive at a dead end somewhere in the line of evolution until after some new natural experiment achieves its end; it's while nature herself is finding such a final result that many species and groups arrive on the scene; and it is also through such trial and error methods that the path of evolution is so often recapitulated. I have found very few Glass Lizards in the Dismal Swamp, however, they are abundant in the vicinity of the sand dunes near the Tidewater seashore. The Glass Lizard, a legless lizard, has always been something of great interest to the lover of nature's wonders: this is because of its ability to shake off its tail, or pieces of it, which is as long as its body. Let a mammal or a bird pursue a Glass Lizard and off comes its tail! And while the predator is thus occupied with this wiggling tail, the tricky Glass Lizard scurries to safety! Many lizards possess this unique ability, which is a real nuisance to the reptile collectors because this tail appendage comes off so easily, one has to be very careful in capturing them. Each segment of the Glass Lizard's tail has a weak spot and a valve that closes off the blood vessels; in due time, a new tail is regenerated. Many instances of the regeneration of organs may be cited in reptiles; and in amphibians, it is very frequent. In the lower animal kingdom, it is a thing of everyday life; however, as we move upward in the scale of evolution, tissues become more complex and take on more individuality, until regeneration becomes less and less possible."

"This is much too deep for me," said Bob. "I hate to say so, but I didn't get half of it!"

"Well, I didn't expect you to, but I'm sure some of it must have sunk in."

"Of course, it's all very interesting, but I'd like to talk about something else for a change. I just got out of school yesterday afternoon, and here I am sitting in the middle of a lousy swamp with the mosquitoes eating me up, and you still talking about lizards!"

"Why, what's a few mosquitoes, you ought to see them later on in the summer, Bob."

"Please don't talk about 'em; I don't want to know anything about mosquitoes of the Dismal Swamp!"

"Hey," shouted Bob, "look up there at that big bat on our lamp!"

I saw a large Polyphemus Moth which had been attracted to our light. "Pass me the carbon tetrachloride," I said. "No, not that, that's a jar of formaldehyde!"

"I don't know the difference," screamed the luckless Bob.

"Look here, Bob, in that can under the knapsack; yes, that's the right one!" I held the can under the moth and all at once, with a gentle touch, I knocked it into the can and closed the can on him; I heard its wings frantically beating against the sides of the can; I was worried about this because the specimen could so quickly damage itself, for the wing scales can come off so easily. Soon, however, the carbon tetrachloride took effect and the moth grew still. I was happy to obtain this specimen because I was much interested in large, nocturnal moths.

"Let's turn in," I told Bob. Bob was soon fast asleep, his snoring resounded in the still night, getting on my nerves because it destroyed the purity and harmony of the usual forest sounds; I had to move because I just couldn't stand it any longer. I selected a spot ten feet away from him, only to discover that his snoring was still audible. It was not until I had moved a full twenty feet away from Bob that I could, at last, enjoy the pure harmony of the night, which now came to my ears like a symphony of strange voices.

## PART VII.
## DISMAL SWAMP INSECTS

The first, faint light of dawn tinted the horizon, and the hitherto obscure forest forms became more distinct. The sun began its gradual ascent, and the "Rat-tat-tat" of the Pileated Woodpecker pierced the bright morning atmosphere. I saw this large woodpecker working away at the wood of a dead Elm, getting at the boring larvae of a species of Longhorn Beetle. Its crest was red as fire under the morning sun; its body was black, with white on the neck, tail and wings. A handsome bird, the Pileated Woodpecker is common in the Lake Drummond area.

A Red Bat still hung on a twig; in such a position, I saw how easily it could be mistaken for a dead leaf.

A large, black scarab with much difficulty struggled up a mound of dirt with a round ball of dung which it pushed from a backward position with its hind legs. Although the ball rolled back down each time the scarab reached the summit of the mound, it persistently tried again; finally, luck was with the scarab and he made it.

The early Egyptians once held the scarab to be sacred because they saw in the ball that the scarab rolls about, something similar to the work of planets. In reality, when the scarab rolls its ball, it is searching for a suitable place to bury it; once such a place is found, the scarab then digs a hole and pushes the ball inside of it and lays an egg on top of it; a small, white grub emerges from this egg, which then feeds on the ball of dung and metamorphoses into an adult scarab beetle.

At noon, two Red-Shouldered Hawks soared up high into the azure sky, their calls, long, harsh whistles, came in close repetitions.

Along the shores of an irrigation canal, the Six-Spotted Tiger Beetles move in small armies. Their carapaces are a brilliant blue, and they have the appearance of small sapphires in motion. They move on long, slender legs at amazing speeds for their size; they seem to be moving constantly in an aimless manner, but their course is not aimless, for they are searching for the smaller insects that comprise their diet. The voracious Tiger Beetles are to the insect world what sharks are to the sea and falcons are to the air.

Irrigation ditches in Nansemond County are fairly numerous, and their water runs through the swamp like long, black ribbons; on the narrow strips of sandy soil forming their shores, live hosts of creatures who shun the shady forest; these strips of open ground are the world of an infinite variety of beautiful butterflies: the three most striking butterflies to be found there are the Palamedes and the Tiger and Zebra swallowtails. Sometimes Tiger Swallowtails will gather by the hundreds around a waterhole and whenever one approaches, take off in a cloud of yellow-and-black fluttering winds. The Zebra Swallowtail is not the only sociable drinker; there is also a small butterfly with pale blue wings that likes to come en masse to a moist spot on the ground. This small butterfly species is the attractive "Silver Blue," so called because of the silver coloration of its under wings.

Perhaps there is no other object in nature which attracts as much attention as do butterflies; their beauty and brilliant colors place them high among nature's favorites. It is hard to believe that these gems of living creation spend most of their existence as a caterpillar, a form of grub; but truth is stranger than fiction. Most butterflies have a favorite plant or tree upon which they feed, and there on a twig or a leaf, the female deposits her eggs. From these eggs a tiny grub emerges which then grows into an adult butterfly.

Caterpillars are often odd-looking things with horns and projections, or hairs, covering their bodies; sometimes these horns or hairs are a means of protection, but more often they are just ornamental. The caterpillar of the Royal Moth, one of the largest moths, is a huge, green grub about four inches in total length, green with black-and-white designs, and with four or five aggressive, orange horns striped with black

near its head; it looks like something from outer space. After a period of time which varies from species to species, the caterpillar spins a cocoon, goes into the chrysalis stage, which means that it builds a sort of case around itself; once in the chrysalis stage, the caterpillar undergoes a complete change and emerges a butterfly. Most butterflies live only a few months, some even less. Some of our largest moths have no feeding apparatus and live only long enough to breed.

Once, as I walked through one of the Dismal Swamp's gloomy alleys, my attention was arrested by a large, green moth standing motionless at the base of a tree trunk; it had large wings which terminated in a long tail; the wings were delicate and finely veinated; so pale green were these wings, they were almost transparent. As I approached closer, I noticed that the moth had a conspicuous pair of feathered antennae and that its body was quivering: then I saw that it was laying eggs; I counted twenty-five already-laid eggs attached to the bark and more were being laid as the moth's body continued quivering. This was the Luna Moth. I knew that the adult of the species does not feed and lives, at the most, but a few weeks; I found this hard to believe; why would such a lovely thing spend most of its life as a grub, only to die when it reaches the most perfect stage of its life? This question is partly answered by the fact that the winged adult makes easier the propagation of the species.

While we are on the subject of moths and butterflies, I should also mention here the *Catocala cara*, an attractive and interesting moth. One day, I saw this moth, commonly called "Underwing," with its vermilion wings bordered in black, fly from a tree limb; the moth flew several feet and landed in a nearby tree. I went to the tree, hoping to capture it before it could fly away again. Though I was certain of the place where it had landed, I couldn't locate it. Suddenly, I saw a flash of vermilion wings almost under my nose, as the moth flew off: I followed its aerial course with my eyes; as soon as I saw it light, I went to the spot; I searched this spot carefully, but I found no moth. I was beginning to wonder whether or not my eyes had played tricks on me, when all at once I began to distinguish a faint outline of a moth against the bark; the top wings, which were folded over the very colorful under wings, were a dull brown, the color of bark itself; and the motionless moth stood quite invisible in this protective coloration. "Why those brilliant under wings which flashed like fire when the moth took off?" I asked myself.

When I reached home that night, I read up on moths: I found out that this particular species has dull upper wings and brilliant underwings; the reason for this, I read, is to puzzle an enemy; it is a means of protection. Whenever an enemy threatens, the *Catocala cara* suddenly flashes its brilliant colors out of nowhere, and before the enemy can recover from the shock, the moth escapes; in a world of many varied beings, where the survival of the fittest is always the ruling factor, some of the most bizarre means of protection evolve.

A horde of small, brown butterflies were continually zigzagging from flower to flower; they have massive abdomens and their wings are proportionally small; these are called "Skippers." A large, absurd-looking fly comes with great speed, and in its powerful, long, grasping legs, seizes a Skipper without stopping in its flight and is off again; I have just seen the Robber Fly!

The shores of irrigation ditches are places of struggle, and one never knows what form the predator will assume; perhaps it is an Ambush Bug hidden within the corolla of a comely flower waiting for the insect that comes to feed on the nectar; or perhaps it takes the form of a Red-Headed Lizard on a sunny log waiting for flies and spiders to come within its reach before attempting capture.

I should not mention the shores of irrigation ditches without first mentioning the wasp's world: three miles from Suffolk, Jericho Ditch flows silent and bleak under the green archway of trees toward Lake Drummond, ten miles away. It was late in the afternoon, and I still had many hours before me, as it was early summer and night was yet far off; so I deposited my sleeping bag by the shore of the Jericho Ditch, thus ridding myself of some of my collecting equipment and strolled along its banks. I observed the endless variety of dragonflies hovering above the water, doing all sorts of aerial arabesques: they came through the air at vertiginous speeds, then halted in mid-air, diving down like rockets, then gyrating, were up and off again in a mad buzz of wings. From time to time, a dragonfly would dip the tip of its abdomen in the dark water, and without stopping in flight, would deposit eggs on the stem of an aquatic plant. I cannot name all of the varieties of dragonflies, for they are not one of my specialties; but I am safe in assuming that at least fifteen different varieties of these graceful creatures can be found along the Jericho Ditch.

I don't know when I first noticed it, but I was suddenly aware that the sandy soil of the Jericho Ditch bank was riddled with small holes; it was as if the bank had been riddled with many bullet holes. A number of *Bembix* wasps were digging furiously; I lay down to observe the busy insects. After a while, I saw one of the

wasps emerge from a burrow, scratching a temporary sand cover over it, she then carefully scattered any telltale piles of sand and was off. In the meantime, others of the *Bembix* wasp colony had followed her example and also went off. Not too long afterward, one of the *Bembix* wasps appeared fly-laden, and without hesitation, came in a vertical descent and alighted on her unmarked, closed tunnel; I was somewhat amazed at this creature's ability to alight upon the unmarked burrow with such uncanny accuracy. A second and a third *Bembix* wasp also returned fly-laden, and after opening the tunnel entrance, disappeared within it. The growing larvae were in constant need of a fresh supply of flies, so the wasps came and went; and as they did so, their burrows were opened and closed carefully, following each operation.

A number of bee flies flew around the colony, and some of the *Bembix* spent a good deal of their time chasing them off; the Bee Fly is one of the chief enemies of the *Bembix* wasp larvae.

I continued my rambling along the Jericho Ditch, and I observed many thin-bodied, long-legged, solitary wasps; their colors made a blue, metallic sheen often annulated by bright yellow. The solitary wasps are the spider-hunters; some only prey on a certain species of arachnid. To this group of wasps belong the mud daubers; they build mud cells that they fill with spiders they have paralyzed with their powerful stings; these dead spiders are then stored as food for future larvae. Though solitary wasps are noted as spider-hunters, I know of two species that have branched out in another way of specialization: one is *Chlorion*, readily set apart by its orange abdomen, which preys exclusively upon grasshoppers; the other is the Cicada-killer, over an inch in total length, a giant among wasps.

Though wasps are insects deserving a high place among nature's most attractive beasts, I have always had an awesome fear of them: I have been stung on more than one occasion, and it happened so fast I didn't even see the wasp in action; all I knew was that suddenly I felt an intense burning sensation where the dart had pierced my exposed flesh. Sometimes, when a wasp has a mind to, it will sting several times before it is fully pleased. Wasps have a bad temper and you never know when one will strike. Unlike bees, its dart may be employed repeatedly without injury to the wasp; so whenever I see the big, ominous-looking, yellow-and-black Cicada-killer flying close by, I hasten to make room; I can appreciate the damage that a wasp of this size can do with its dart.

One July afternoon of torrid heat, the noise of the cicada was relentless and nerve-racking; all other creatures, even the snakes and turtles, had taken refuge in their nooks and crannies; only the cicadas continued their incessant noise. Then amid their number, one of the cicadas began all at once to make strange noises. Before long, after a wild flight, it fell to the ground, making several wild somersaults and was immobile.

High up in the tress, a big wasp had come stealthily upon its victim and had delivered its paralyzing sting. The big wasp, after what seemed to be deliberate consideration, began to drag away the heavy, body of its prey. The Cicada-killer was big but his prey was bigger; the Cicada-killer went to the nearest tree and began lifting the prey up the tree. When it had gone about five feet, it then grasped the prey tightly in its legs and flew off; it flew around ten feet before the prey dragged it back to the ground, and once again it repeated this stratagem which I knew it would repeat over and over again, until it had reached its burrow into which the dead cicada would be taken; tenacity is one great trait of insect life, a trait to which they undoubtedly owe much of their success.

The banks of irrigation ditches provide an interesting habitat. Besides the wasps already mentioned here, four species of parasitic wasps, the velvet ants, also find in these strips of land the means for their existence. Most conspicuous of the velvet ants is the bright red-and-black Cow-killer, which I'm told can deliver a painful sting. Female velvet ants, all of whom can sting, are always wingless; while the less familiar winged male does not sting; in many instances throughout the animal kingdom, the female is the mean one. The wonderfully colored velvet ants are parasites of bees and other wasps, especially of the solitary species. When a female velvet ant meets the burrow of a wasp, she crawls down into it and kills the owner with a powerful sting; she then lays her egg upon the owner's larvae, which her own larvae devour. I could go on with the amazing ways of wasps, but I had come to the Jericho Ditch with a special mission in mind; I shall speak of this mission.

There is a strange creature inhabiting the Jericho Ditch area; it is the *Megarhyssa*, belonging to the Ichneumon flies, a group of insects closely related to the wasps, all of whom parasitize other insects. Usually parasites themselves, Ichneumon flies are small and unlikely to attract attention, except of course, that of the insect specialist; but *Megarhyssa* is a species of fair size, a fact which immediately renders this insect very conspicuous. The body of *Megarhyssa* is black, and its ovipositor trails behind the animal in the form of several, thin threads of considerable length, especially when compared to the size of the animal itself. Despite

their delicate appearance, these ovipositors are able to pierce through solid wood for a considerable distance in order to reach the burrows of wood-boring beetles within a tree trunk so that an egg may be deposited; the egg is not necessarily deposited near the larvae of the wood-boring beetle, but the burrow must be reached. How the female *Megarhyssa* decides where to bore, is unknown.

My mission was to get photographs of this odd ichneumonoid in the act of boring. I knew an old tree trunk where they liked to gather, and after I had arrived, I prepared my camera for action: three *Megarhyssa* were on the tree trunk; they held their transparent wings in a vertical position to their bodies; their abdomens were arched and their ovipositors, which rose above the abdomen, formed a loop, then came down vertically toward the wood into which they bored. I looked at the long, thin, black bodies glimmering there under the late afternoon sun; these creatures appeared too fantastic to be something a part of our living world. Though I knew them to be harmless, I could not help thinking of them as some monsters out of science fiction. Since my pictures had to be taken at very close range, I was afraid that these creatures might fly off at my approach; I assure you that after I had heard my camera's click, I was greatly relieved to find them still there; but, as I later discovered, all my fears proved unfounded: the insects' ovipositors were deeply buried in the wood, and even had they so desired, they could not have escaped. I took several more pictures, and I was glad that my mission had been accomplished; my hopes now rested upon the development of these photographs.

I returned to the place where I had left my sleeping bag. On the way back, I stopped and looked at the flowers of a Tulip Tree; I thought they were wonderful flowers; especially when the dying sun gave intensity to their otherwise pale tints. I also noticed that many Cardinal Flowers grew at the edge of the woods and that their velvety petals were arranged in a manner very different from those of most other flowers.

At last, I had reached the end of my trip. I built a fire and warmed up a few cans of food. In the meantime, the light of day had recessed imperceptibly with each passing minute. Under the archway made by the trees overhanging the Jericho Ditch, it was already dark, very dark. I heard an animal plunge into the water and come to the surface to breathe, then plunge again; then I heard the stroke of its feet as it swam; then I heard a wild scream. I held my flashlight where I had heard the animal swim. It was a Mink. I sat down on a log in the darkness, smoking my pipe and listening to the night birds: I heard the nasal piping of a Wilson's Snipe, the hooting of the Barred Owl; then from very far away into the swamp, the "Hoo-hoo" of a Great-Horned Owl.

A cool wind arose at night and the insects remained silent; the trees creaked under the blowing wind. Ten feet away from me a form moved; beside it was a smaller form. The doe and her fawn had not seen me sitting there in the darkness because the wind blew in an opposite direction from them. As long as I remained motionless, the doe continued browsing on twigs and the fawn stood by her side; but the time came when I could remain still no longer, and both the doe and the fawn quickly disappeared.

I heard a chorus of Green Frogs; since I was in need of a series of these frogs upon which I was writing a scientific paper, I spent an hour collecting them. After that, the air had gotten very chilly and the frogs stopped calling. I unrolled my sleeping bag; in a moment, I lay comfortably inside it, listening to the Barred Owl, the sound of the wind through the high branches and the creaking of the trees; with this, I fell peacefully asleep.

I didn't awaken until dawn; I looked at my watch and saw that it was five o'clock in the morning. Over the eastern horizon, the sky was pale and delicately pink, so I went back to sleep, and it was ten o'clock before I awakened again. On a branch high above my head, a Gray Squirrel was inquisitively chirping. I was all ready to lie there in comfortable contemplation, when not two feet from me, I noticed a coiled snake; it was black with nice, white rings, a King Snake. Without getting out of my sleeping bag, I plunged upon the snake and caught it; I placed the wriggling reptile in my collecting bag and began to roll up my sleeping bag. It was then that I saw a spider web which had been built between one of the corners of the bag and a small twig; on the web was a Black Widow; I had slept all night with this unwelcome guest. The bite of this spider is not generally fatal but can be, and is considered dangerous. In the Dismal Swamp, one can live dangerously without knowing it. The presence of the Black Widow can be explained by the fact that I was not far from the edge of the swamp; farther in, this highly venomous spider is seldom found. I did not possess any photographs of the much-dreaded Black Widow, and I thought this was an excellent time to get one, so I took my picture and started planning another trip.

## PART VIII.
## FOREST DENIZENS

The immitigable forest looms and muses before us, the forest eternal, the forest green; a land of shadows and of subshadows, a land of light and of subdued light.

A Black Widow oscillating on spindly legs, passes from light-to-shadow, and black as the shadow itself, becomes a part of it; so that the Black Widow and the shadow are now one: within this shadow, the Black Widow waits, invisible and deadly.

In dark crevices and fungied holes, the centipedes swarm, brown, green, red and yellow; all iridescently beautiful, yet giving one a creepy feeling while they move their numerous segments and legs, not quite insects, since they didn't advance that far in their evolutionary development.

White spikes of the Lizard Tail undulate. Uncounted insects crawl, a horde of queer, six-legged creatures with vibrating antennae: the Unicorn Beetle, marked with black and with a tremendous beak much like a lobster's claw; the Ox Beetle with its three gigantic horns, and the single-horned Rhinoceros Beetle. These three, standing apart in the tribe of creeping insects because of their gigantic size, eat their way through decomposing wood, subsisting on the decayed wood fibers.

The Rhinoceros Beetle is very remarkable among insects because both male and female provide for the future welfare of their young.

And then there is the big Click Beetle, able with the aid of a spring-like mechanism located on the under part of its thorax, to jump at least ten inches off the ground; also on the upper part of its thorax are two designs resembling the two eyes of a reptile: whenever the Click Beetle remains motionless, all one can see are these cold, reptilian eyes peering into space.

The Bombardier Beetle, with its orange-and-slate-blue carapace, discharges with a distinct pop a defensive fluid from a gland at the end of its abdomen whenever it becomes excited; this fluid is either volatile, or is shot out in a fine spray so that it looks like smoke. The ground beetles, among which are the caterpillar-hunters, are beetles that can squirt a fluid with a strong, nauseous odor for some distance into the faces of their enemies.

From the grass, a small, brown head with two black beads for eyes, looks upon the scene; so the Mink begins his inquisitive search.

On a plant stem, a lively, scarlet jumping spider, who was hopping along unconcernedly, was suddenly attached by a bronzed Wheel Bug posted there in ambush behind a leaf; the Wheel Bug jabbed its thin, pointed beak into the unlucky spider's thorax and sucked out the life juices.

Beetles scurry among the mosses, leaves and ferns. Among that vast array of scarabs feeding upon dissolution and decay, is the male scarab, displaying all sorts of fantastic horns. The carabs, similar in their name-sound to the scarabs, are carnivorous, preying on other insects, including their own kind. *Pasimachus*, the largest, more than an inch long, possesses tremendous mandibles employed mainly for cutting apart the soft bodies of caterpillars. *Bembidion*, one of the smallest carabs, hardly bigger than a pinhead, preys on the almost microscopic bugs.

Above the star-shaped leaves of the Gum Tree, a dilapidated tree crumbling away amid the forest, its broken top rises skyward, containing a group of fungi about the size and shape of a dinner plate. And as one looks below these star-shaped leaves of the gums, he can plainly see the white cover of the Smooth Azalea's blooms; still farther below that, the black water in which swims the blind Swamp Fish and other creatures of the depths who must feel their way along the bottom.

A school of Mudminnows swims near the surface of the water, enjoying the few rays of sunshine; as they swim, turning on their sides, they cast into the thick shade a bright glitter of silver sheen; a Kingfisher, attracted by the spots of gleaming silver, executes a perfect high-speed dive on the minnow school, emitting all the time a series of high-pitched rattles that peal like the laughter of a lunatic across the entire wilderness.

I stand enveloped by gloom and silence. It seems as though I'm hearing the mandibles of countless insects chewing through wood fiber and tissue, eating away the matrix of the unconquerable forest, as though I can hear squeaking segments, the scraping of larvae in their tunnels, the breathing of chrysalides in their cocoons, and the soft pounding of female spiders against their webs, calling their mates.

Two slugs crawl side by side, leaving a trail of glistening slime, marking their progress; one of these slugs is a *Limax*, the other a *Phylomacum*. These two are, in fact, separate genera, distinguished from one another only because in the case of the *Phylomacum*, there is a mantle covering the entire foot of this animal, while in the case of the *Limax*, the mantle is a sort of small cape covering only a little of the foot. Both are snails without shells. There is an infinite variety to be found among these obscure creatures; there is also infinite beauty in their delicate, glass-like textures.

The Spanish Moss trembles and the forest, which

was asleep, breathes deeply again. A Green Snake vanishes into the weeds.

Somewhere beneath inky-black waters, life stirs profusely: fingernail clams crawl slowly; their movements are so slow that their progression along the bottom is not even noticeable; it takes a fingernail clam many minutes to cover even an inch, and almost an eternity to traverse as much as a whole yard! Time, it appears, has no bearing upon their molluscan existence. The gill pouches of many clams are filled with young; as time goes by, they are expelled, streaming out of these gill pouches like grains of sand.

Microscopic, single-celled, green plants, desmids and diatoms, are swept along by the flow current; these and the larger, multicelled algae, form a freshwater pasture in which grazes a truly amazing variety of little freshwater beings, the most abundant of which are the water fleas; all of these small crustaceans resemble white specks jerking up and down throughout the water. The female of some of these small creatures, known as copepoda, carries at her tail-base two sacs full of eggs. Each female copepoda carries within her body enough sperms to fertilize several generations of eggs.

The *Vorticella* colonies are located on the long filaments of green algae; these curious, one-celled, bell-shaped animals are mounted on a long stalk that continually springs up and down, so that these *Vorticella* appear to be engaged in some sort of bizarre ritual dance.

Amphipods are engaged in all sorts of antics, climbing, jumping and swimming among submerged plants; these amphipods are about half-an-inch long and have the appearance of large fleas; they are also very prolific, each female being capable of producing one dozen-and-a-half eggs fifteen times in a hundred fifty-two days.

There is yet another group of freshwater crustaceans, the isopods, or Sow Bugs. There are many species of isopods; some of them have never been described by the scientists, and as such, are new to science. One outstanding isopod can change from male-to-female, or from female-to-male at different periods. Isopods are scavengers who feed on the refuse of pools; with their heavily armored, broad backs, they resemble miniature Armadillos.

So this black water world of tiny beings teams with energy. A few, vagrant fingers of sunlight filter through the trees, illuminating this resplendent, green algae pasture where one of nature's odd dramas recurs at regular intervals. Delicate, vine-like plants float beneath the surface; these plants are the Bladderworts' with their slender, stem-bearing, finely-branched leaves arranged alternately, they seem to be very innocent-looking indeed: on the branches of each leaf, however, are small, bladder-like traps; each bladder is a slightly compressed sac, having a slit-shaped, valve-guarded aperture; whenever little organisms like crustaceans enter the outer chamber, which is armed with teeth, their movements stimulate this valve to open; the opening of the valve starts a suction, pulling both water and animal into the all-consuming bladder.

Even some creatures who never leave the murkiness of the somber bottom, often come close to the surface to bathe for an instant in the few fingers of sunlight falling through the thick branches. A huge Snapping Turtle with its algae-covered back, stops amid aquatic vegetation and is invisible; all one can now see is the white inside of its wide-open mouth, which is prepared to snap shut on the unwary fish it is built to attract. The Snapping Turtle is on the ditch bank during the hot afternoon; it has a monstrous head and jaws that could easily slice off a man's finger without any trouble. With its spiny carapace and horny tail, it looks like some prehistoric monster. It simply lies there basking in the hot sun. The old snapper seems timeless with age, yet alert and ready to vanish into the abysmal depths at the slightest sound.

At the water's edge, under pieces of bark, are very thin worms, a foot or more long, coral-red in color, with an opalescent sheen to them. The individual worms are usually tangled together like masses of squirming, red thread; these masses appearing to be made by a single worm. These curious worms are a species of rather rare Bristleworms.

The purple shadows grow and deepen over the immitigable forest.

(Parts IX-XVI to be published in the next *Banisteria*)

**Appendix. Scientific names of plants and animals mentioned in the text of Land Unvanquished (compiled by Steve Roble and Joe Mitchell).**

**Plants**

| | |
|---|---|
| Sphagnum; Cuspidatum | *Sphagnum* spp.; *S. cuspidatum* |
| (Bald) Cypress | *Taxodium distichum* |
| (Atlantic White) Cedar | *Chamaecyparis thyoides* |
| Cattail; reeds | *Typha angustifolia* and/or *T. latifolia* |
| Cane (and canebrake) | *Arundinaria gigantea* |
| Spanish Moss | *Tillandsia usneoides* |
| Pickerelweed | *Pontederia cordata* |
| Brier (= Greenbrier) | *Smilax* spp. |
| Wild Iris | *Iris virginica* |
| Lady Slipper | *Cypripedium* spp. |
| Pink (=Rose) Pogonia | *Pogonia ophioglossoides* |

| | |
|---|---|
| Lizard Tail | *Saururus cernuus* |
| Great White Oak | *Quercus alba* |
| Water lily | *Nymphaea odorata* |
| Tulip Tree | *Liriodendron tulipifera* |
| Magnolia | *Magnolia grandiflora* |
| Gum Tree (= Sweet Gum) | *Liquidambar styraciflua* |
| White Violet | *Viola* sp. (probably *V. lanceolata*) |
| Black Gum | *Nyssa sylvatica* |
| (Flowering) Dogwood | *Cornus florida* |
| Smooth/Wild Azalea | *Rhododendron* sp. (probably *R. atlanticum* or *R. viscosum*) |
| Bog (= Sheep) Laurel | *Kalmia angustifolia* |
| Yellow Jasmine | *Gelsemium sempervirens* |
| Bladderwort | *Utricularia* spp. |
| Coral Honeysuckle | *Lonicera sempervirens* |
| Cardinal Flower | *Lobelia cardinalis* |

**Invertebrates**

| | |
|---|---|
| Black Widow | *Latrodectus mactans* |
| Wheel Bug | *Arilus cristatus* |
| Six-spotted Tiger Beetle | *Cicindela sexguttata* |
| Bombardier Beetle | *Brachinus* spp. |
| Rhinocerus Beetle | *Xyloryctes jamaicensis* |
| Ox Beetle | *Strategus antaeus* |
| Unicorn Beetle (= Hercules Beetle) | *Dynastes tityus* |
| (Eyed) Click Beetle | *Alaus oculatus* |
| Luna Moth | *Actias luna* |
| Royal Moth | *Citheronia regalis* |
| Polyphemus Moth | *Antheraea polyphemus* |
| Tiger Swallowtail | *Papilio glaucus* |
| Palamedes Swallowtail | *Papilio palamedes* |
| Zebra Swallowtail | *Eurytides marcellus* |
| Silver Blue (= Eastern Tailed-Blue or Spring Azure) | *Everes comyntas* or *Celastrina ladon* |
| Cicada-killer | *Sphecius speciosus* |
| Cow-killer | *Dasymutilla occidentalis* |

**Fish**

| | |
|---|---|
| Mud Minnow; mudminnow | *Umbra pygmaea* |
| Redfin Pickerel | *Esox americanus* |
| Swamp Fish; Cave Fish | *Chologaster cornuta* |
| Blind Cave Fish | (subterranean species of Amblyopsidae, 4 genera) |

**Amphibians**

| | |
|---|---|
| Amphiuma | *Amphiuma means* |
| Sirens | *Siren lacertina* or *S. intermedia* |
| Spotted Salamander | *Ambystoma maculatum* |
| Marbled Salamander | *Ambystoma opacum* |
| Dusky Salamander | *Desmognathus auriculatus* |
| Slimy Salamander | *Plethodon chlorobryonis* |
| Margined Salamander | *Stereochilus marginatus* |
| Red Salamander | *Pseudotriton ruber* |
| Two-lined Salamander | *Eurycea cirrigera* |
| American Toad | *Bufo americanus* |
| Fowler's Toad | *Bufo fowleri* |
| Cricket Frog | *Acris gryllus* |
| Tree Frog | *Hyla* spp. |
| Spring Peeper; peeper | *Pseudacris crucifer* |
| Swamp Chorus Frog | *Pseudacris brimleyi*, *P. feriarum* or *P. nigrita* |
| Narrow-mouthed Toad | *Gastrophryne carolinensis* |
| Bullfrog | *Rana catesbeiana* |
| Green Frog | *Rana clamitans* |
| Leopard Frog | *Rana sphenocephala* |

**Reptiles**

| | |
|---|---|
| Snapping Turtle | *Chelydra serpentina* |
| Musk Turtle | *Sternotherus odoratus* |
| Mud Turtle | *Kinosternon subrubrum* |
| American Chameleon, Anolis | *Anolis carolinensis* |
| Fence Lizard | *Sceloporus undulatus* |
| Six-lined Racerunner | *Aspidoscelis sexlineata* |
| Little Brown Skink | *Scincella lateralis* |
| Blue-tailed Skink | *Eumeces fasciatus* or *E. inexpectatus* |
| Red-headed Lizard | *Eumeces* spp. |
| Giant Skink | *Eumeces laticeps* |
| Glass Lizard | *Ophisaurus attenuatus* |
| Mud Snake | *Farancia abacura* |
| Rainbow Snake | *Farancia erytrogramma* |
| King Snake | *Lampropeltis getula* |
| Water Snake | *Nerodia sipedon* |
| Green Snake | *Opheodrys aestivus* |
| Copperhead | *Agkistrodon contortrix* |
| Cottonmouth Moccasin | *Agkistrodon piscivorus* |
| Banded Rattlesnake | *Crotalus horridus* |

**Birds**

| | |
|---|---|
| Bittern (=American Bittern) | *Botaurus lentiginosus* |
| Yellow-crowned Night heron | *Nyctanassa violacea* |
| Black Vulture | *Coragyps atratus* |
| Bald Eagle | *Haliaeetus leucocephalus* |
| Cooper's Hawk | *Accipiter cooperii* |
| Red-shouldered Hawk | *Buteo lineatus* |
| Wilson's Snipe | *Gallinago delicata* |
| Mourning Dove | *Zenaida macroura* |
| Barred Owl | *Strix varia* |
| Great Horned Owl | *Bubo virginianus* |
| Kingfisher (= Belted Kingfisher) | *Ceryle alcyon* |
| Pileated Woodpecker | *Dryocopus pileatus* |
| Carolina Wren | *Thryothorus ludovicianus* |
| Prothonotary Warbler | *Protonotaria citrea* |
| Yellow-breasted Chat; "Night Bird" | *Icteria virens* |
| Swamp Sparrow | *Melospiza georgiana* |
| Red-wing Blackbird; "redwings" | *Agelaius phoeniceus* |
| Blackbird (= Common Grackle) | *Quiscalus quiscula* |

**Mammals**

| | |
|---|---|
| Armadillo | *Dasypus novemcinctus* |
| Swamp Shrew | *Sorex longirostris fisheri* |
| Red Bat | *Lasiurus borealis* |
| Golden Mouse | *Ochrotomys nuttalli* |
| Cotton Mouse | *Peromyscus gossypinus* |
| Harvest Mouse | *Reithrodontomys humulis* |
| Field Mouse | *Microtus pennsylvanicus* |
| Bog Lemming | *Synaptomys cooperi* |
| Gray Squirrel | *Sciurus carolinensis* |
| Otter | *Lontra canadensis* |
| Mink | *Mustela vison* |
| Black Bear | *Ursus americanus* |
| White-Tail Deer | *Odocoileus virginianus* |

## Reviews

*Birds of Shenandoah National Park, Blue Ridge Parkway, and Great Smoky Mountains National Park. A Field Guide.* 2006. Ernest P. Edwards. McDonald and Woodward Publishing Company, Blacksburg, VA. 141 pp. $19.95.

Many people will remember Dr. Edward's Mexican bird guides, and his long tenure as Professor of Biology at Sweet Briar College. While there, he studied birds of the Blue Ridge and other mountainous regions for many years, including two National Parks,

Covering some 600 miles of parks and parkways, this book focuses on bird life in these biologically rich mountain realms, from Front Royal, Virginia in the north to the Tennessee-North Carolina border to the south. In that naturalists' haven, this book is designed for the active bird-watcher to identify birds in appropriate habitats along the parkways and in adjacent National Parks. Because of the dominant upland habitats along the way, only a few aquatic birds are included in the text and illustrations. Of the 336 species known for the region, Dr. Edwards has produced a field guide for many of the more common ones.

Several aspects of the pocket-sized book are quite useful. Each species account includes prominent distinctive features of both sexes, voice, relative abundance, and principal habitat choices. Colorful illustrations, on facing pages, usually portray adults of both sexes, as well as seasonal differences, and immatures.

My one critique of the book concerns the illustrations. Some are obviously too dark, whereas others lack the correct color intensity when compared with the bird in the wild: red (tanagers), yellow-green (*Empidonax* flycatchers). A few (Cerulean and Orange-crowned warblers, Swamp Sparrow) should be completely recast for future revisions of the book.

Despite these limitations, the understandable text and other positive aspects of the book will be attractive to any birder visiting these regions.

David W. Johnston
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## Reports

1. President's Report

As incoming president I would like to thank our past president Judith E. Wilson for her dedication to the Virginia Natural History Society during her tenure these past two years. I also thank Mike Donahue for his service as a councilor. I want to welcome Barry Knisley who is our new Vice President. Dr. Knisley of the Department of Biology, Randolph-Macon College, previously served as both Vice President and President of VNHS. I also welcome Michael Lachance, who serves as an extension agent in Nelson County, as our new councilor.

An exciting celebration will be held on September 21-22, 2007, in Martinsville to honor the career and 80th birthday of Richard Hoffman. Dr. Hoffman is one of Virginia's preeminent naturalists. Please plan to attend. More information can be found below in the Announcements Section.

The Virginia Natural History Society has much of which we can be proud. It is now in its 15th year. Twenty-eight issues of *Banisteria* have been published that contain over 200 valuable articles on the natural and human history of Virginia. Our website, thanks to the work of our webmaster John White, has been greatly improved and contains the table of contents for every issue of *Banisteria* and now has PDF files of many of the articles. If you haven't visited lately please take a look at our website at: www.va-nhs.org.

However, membership has not grown over the past several years and hovers at about 125 members. In the next two years I hope to increase the number of members. I ask for the help of all of our members in spreading the news about *Banisteria*. In future issues of *Banisteria* we will be sending out a flyer with information about *Banisteria* and how to join. Please distribute these to fellow naturalists, libraries, natural area offices, natural history societies, schools etc. If you have any ideas about how to increase membership or to improve the Virginia Natural History Society or *Banisteria*, please email me at tmcavoy@vt.edu.

*Banisteria* is also in need of manuscripts for publication. Consider sending your own or encourage a fellow naturalist to submit a manuscript for publication.

There are no printing charges for members. Many of us have old notebooks with valuable information on the natural history of Virginia. Publishing these data will ensure that this information is not lost and forgotten but instead will be persevered and may possibly help to protect a natural area or species. Four hundred years have now passed since the founding of Virginia and every year that passes our natural resources continue to decline. Now more than ever it is critical to continue to support and publish the work done by researchers in the field of natural history. Your membership in the Virginia Natural History Society ensures the publication of *Banisteria* where that knowledge is preserved and can be used to protect and increase our understanding of our natural resources.

Respectfully submitted,
Tom McAvoy, VNHS President

2. Secretary/Treasurer's Report

We have 119 members of record for 2007. Our treasury presently holds $7,472.33, as of July 1.

As always, we encourage our present and active members to recruit members for the Society. A membership form is included with this mailing. Please pass it on to a friend or colleague interested in the natural history of our state. This is really important.

We continue to be grateful to Hampden-Sydney College for support with the paperwork/computer work concerning our treasury, membership records, and mailings.

Please submit all enquiries about membership in the Society or about past issues of *Banisteria* to: Dr. Anne Lund, Virginia Natural History Society, Box 62, Hampden-Sydney, Virginia 23943, or email, alund@hsc.edu.

Respectfully submitted,
Anne Lund, Secretary/Treasurer

3. Webmaster's Report

Approximately 20 more articles from past issues of *Banisteria* as well as the abstracts and several papers from the most recent issues were posted on the society's website (va-nhs.org) as downloadable PDF documents. Send any comments to me at vhs.webmaster@verizon.net.

Respectfully submitted,
John White, VNHS Webmaster

4. Coeditors' Report

This is a special edition of *Banisteria* because it highlights a renaissance naturalist who was an educational icon in the Virginia Beach area for many years. The cover illustrations are of him and by him. The obituary serves to tell his story and the first half of a lengthy essay on the Dismal Swamp shows how his interests varied and how much he loved the Swamp.

We, as always, seek manuscripts, large and small on Virginia's natural history. Our pages have been filled with a broad range of articles and contributions to Virginia's natural history. Please join the distinguished list of authors who have made contributions.

The table of contents for each issue of *Banisteria* can be viewed on the society's website at va-nhs.org. We have prepared PDF versions of more articles and shorter contributions for posting on the website. A printable order form for back issues is also available on the website.

Respectfully submitted,
Joe Mitchell and Steve Roble, Coeditors

**Announcements**

1. Election results

Michael Lachance was elected to succeed Mike Donahue as councilor for a four-year term. Barry Knisley, who previously served as Vice President (1992-94) and then as the second President of VNHS (1995-96) was elected as Vice President and will automatically become President again in January 2009.

2. Symposium in honor of Richard Hoffman

The Virginia Museum of Natural History (VMNH) and the Virginia Natural History Society (VNHS) are cosponsoring a special symposium on September 22, 2007, to honor the career and 80$^{th}$ birthday of Richard Hoffman. Richard is a native Virginian who has devoted most of his life to the study and documentation of the natural history of Virginia and the southern Appalachians, while also earning an international reputation as a leading scholar of the world's milliped fauna. The first of his many hundred papers and books, published in 1944 while he was still a teenager, documented his discovery of a lizard species new to Virginia. Richard and Joe Mitchell conceived the idea of *Banisteria* in the early 1990s and served as coeditors of the journal from 1992-1999. Richard is currently an

associate editor of the journal, an honorary councilor of VNHS, and the only life member of the society. The symposium, entitled "A Lifetime of Contributions to Myriapodology and the Natural History of Virginia: A Symposium in Honor of Richard L. Hoffman's 80th Birthday" will be held at the VMNH's new facility in Martinsville. Current plans include a social reception on Friday night and a banquet on Saturday night, with formal and informal presentations throughout the day on Saturday. Separate fees (approximately $25 each) will be assessed to attend the symposium and the banquet. **Preregistration is required by September 10.** Coorganizers of the event are Steve Roble (steve.roble@dcr.virginia.gov) and Joe Mitchell (dr.joe.mitchell@gmail.com) of VNHS and Nick Fraser (nick.fraser@vmnh.virginia.gov) of VMNH. Consult the society's website (va-nhs.org) for periodic updates or contact one of the coorganizers. The museum will publish the proceedings of the symposium and other invited papers as a contribution to its *Memoirs* series.

3. Longtime VNHS member recognized by special symposium at national meeting

Dr. John Holsinger, Professor of Biology at Old Dominion University and a longtime VNHS member, was honored by a special symposium held on July 25, 2007, during the annual meeting of the National Speleological Society in Marengo, Indiana. More than 1,000 scientists, spelunkers, and other cave enthusiasts attended the meeting. Dr. Holsinger was honored for his many contributions to the study of caves and cave life throughout the world. The symposium included an introductory lecture by Dr. Holsinger, followed by formal presentations by six colleagues. Dr. Holsinger, who has served several terms on the Virginia Cave Board, including the role of Chairman, has been a leading proponent for the conservation of caves and their unique biota in Virginia for many decades.

4. New insect field guide prepared by VNHS councilor

VNHS councilor Art Evans is the author of a new field guide to North American insects and spiders. The book, entitled "National Wildlife Federation Field Guide to Insects and Spiders of North America," was published this spring by Sterling Publishing Co., Inc. (Chanticleer Press) and includes 1,600 color photographs of more than 900 species. Look for it at your local bookstore.

5. Virginia Herpetological Society publications available on-line

The Virginia Herpetological Society has recently prepared a digital library of all 90 issues of the *Virginia Herpetological Society Bulletin* (1958-1979) and the first 25 volumes of *Catesbeiana* (1981-2005), as well as most of the society's semiannual newsletters published since 1995. The files can be downloaded as PDF documents from the society's website (vaherpsociety.com). Indexes to titles and species included in the *Catesbeiana* volumes will be available soon to coincide with the society's 50th anniversary in 2008.

6. Sound and video clips available on-line

The Cornell Laboratory of Ornithology has recently made more than 65,000 sound clips and 18,000 video clips of birds and other animals from the lab's Macaulay Library of Natural Sounds available for free viewing/listening at the following website: www.animalbehaviorarchive.org. Most of the recordings are of North American species, but the collection includes samples obtained from around the world.

## Virginia Natural History Society
## Website: va-nhs.org

### General Information

The Virginia Natural History Society (VNHS) was formed in 1992 to bring together persons interested in the natural history of the Commonwealth of Virginia. The VNHS defines natural history in a broad sense, from the study of plants, animals, and other organisms to the geology and ecology of the state, to the natural history of the native people who inhabit it. The goals of the VNHS are to promote research on the natural history of Virginia, educate the citizens of the Commonwealth on natural history topics, and to encourage the conservation of natural resources. Dissemination of natural history information occurs through publication of the journal *Banisteria*, named for John Banister (1650-1692) who was the first university-trained naturalist to work in Virginia. The first issue was published in 1992, and the journal is published twice per year in spring and fall. Articles cover a wide array of subjects, and prospective authors are encouraged to submit manuscripts on any aspect of natural history in Virginia; book reviews and biographies of relevance to natural history in Virginia are also welcomed. The editors of *Banisteria* will also consider manuscripts on any aspect of natural history from neighboring states if the information concerns a species native to Virginia or the topic is directly related to regional archeology, anthropology, botany, ecology, zoology, paleontology, geology, geography, or climatology. Manuscripts are peer-reviewed for suitability and edited for inclusion in the journal. Page charges ($15/page) are waived for VNHS members. The society's website contains instructions for authors, the titles (and abstracts beginning in 2004) of all *Banisteria* papers, and downloadable versions (pdf format) of selected articles from past years.

### Memberships

The VNHS is open to anyone with an interest in natural history and welcomes participation by all members in society activities and efforts to promote education and conservation. Membership includes a subscription to *Banisteria* and invitation to the annual Virginia BioBlitz. Annual dues for members are $20 (per calendar year); library subscriptions are $40 per year. Checks should be sent to the Secretary/Treasurer, who also has back issues of *Banisteria* available at $10.00 each (except Nos. 1-6 are $5.00 each and No. 13 is $18.00). The VNHS is a tax-exempt, nonprofit, society under Section 501(C)3 of the IRS. We welcome donations to support our mission in Virginia.

### The Virginia Natural History Society
### Application for Membership

Name _____

Address _____

_____

_____

Zip Code _____

Phone _____

Email _____

Area(s) of Interest _____

**ANNUAL DUES AND SUBSCRIPTIONS TO *BANISTERIA***

(memberships and subscriptions are by calendar year; subscribers/members outside the United States should add $3.00 for additional postage)

- ☐ $500.00 Life (not annual)
- ☐ $300.00 Benefactor
- ☐ $100.00 Patron
- ☐ $50.00 Supporting
- ☐ $40.00 Institutional
- ☐ $25.00 Family
- ☐ $20.00 Regular
- ☐ $5.00 Student (see below)

☐ I have added a contribution of $_____ to my membership dues.

The special student rate is applicable only when accompanied by the following certification signed by a faculty advisor.

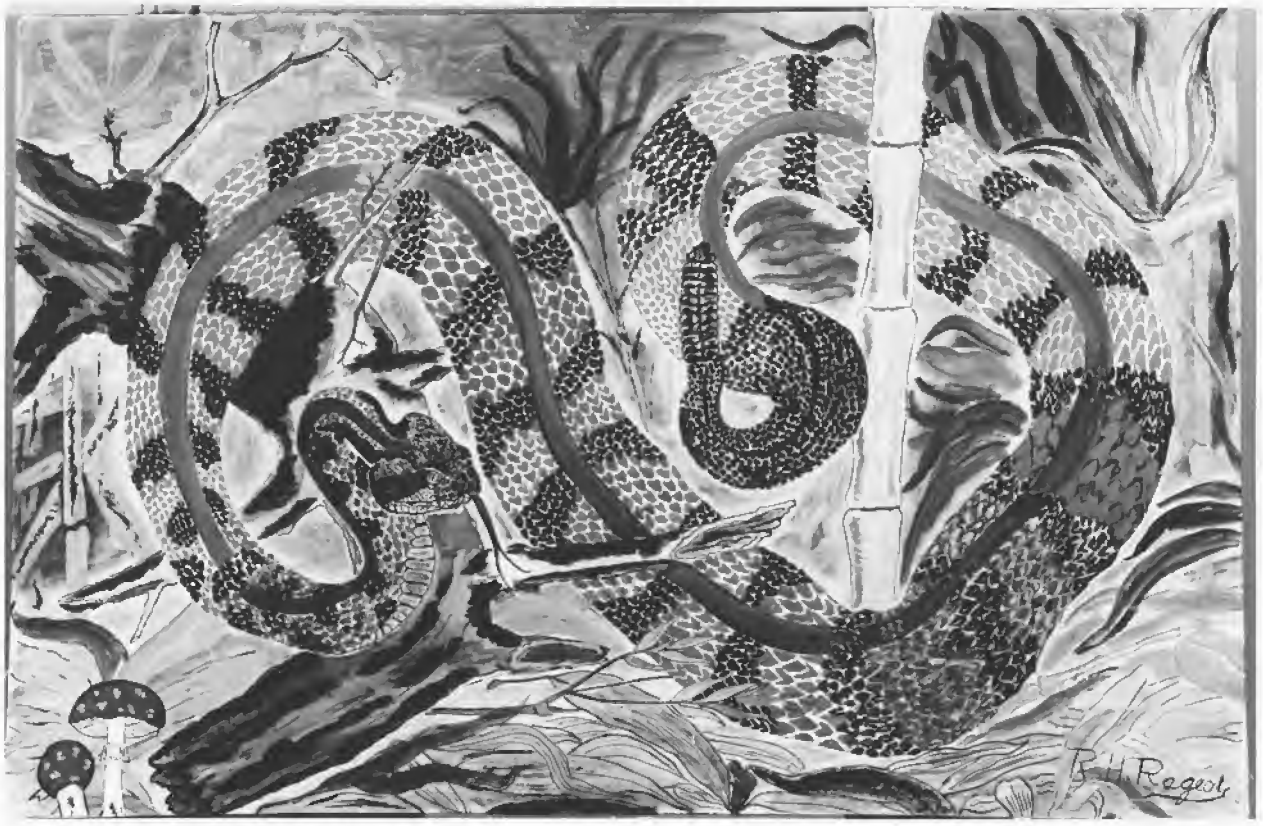
Institution _____

Advisor _____

Date _____

**Make checks or money orders payable to**:
Virginia Natural History Society

**Send membership form and dues to:**
Dr. Anne Lund, Secretary-Treasurer
Virginia Natural History Society
Box 62
Hampden-Sydney, Virginia 23943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