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Tadpole of
Green Frog
(*Rana Clamitans*)



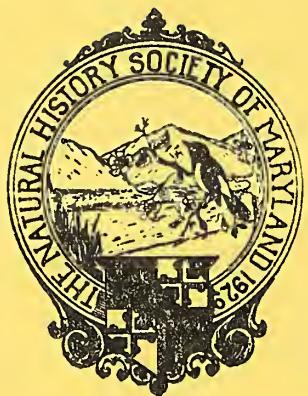
MARYLAND NATURALIST

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MARYLAND NATURALIST



Tadpole of Green Frog

The striking cover photograph by C. J. Stine and E. J. Eisenmeier shows a full grown tadpole of the green frog (*Rana clamitans*) taken from a pond in Massey, Kent County, Maryland, March, 1952.

The green frog is one of the most common of the seventeen species of frogs known to occur in Maryland, having been recorded from every county in the state. It, like the bullfrog, lives alone in ponds, pools, and water ditches throughout its range.

This frog is often mistaken for a young bullfrog but may be distinguished by its fold of tissue with a yellow stripe on it extending from the angle of the mouth two-thirds of the way back to the hind legs. The bullfrog lacks this dorsolateral fold.

In our area the green frog breeds from May to mid August. The call of the male resembles the twang of a rubber band across an open cigar box. The female lays from 1000 to 4000 eggs and the tadpoles transform the following year from April to September.



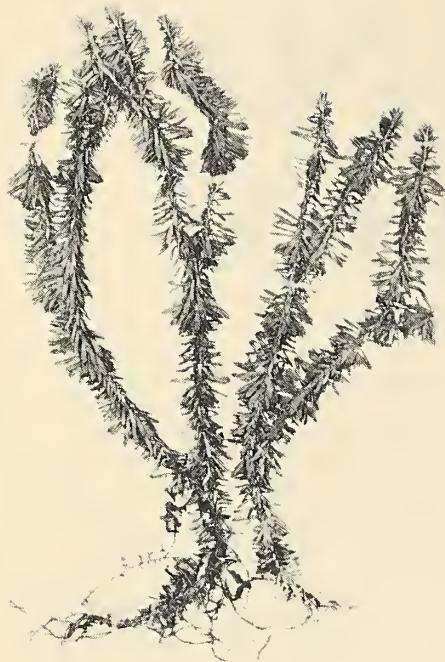
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Shining Clubmoss
Fig. 1



Slender Clubmoss
Fig. 2

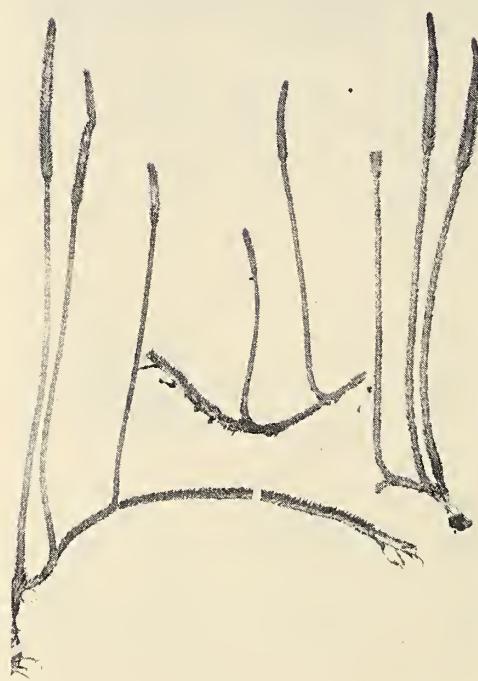


Fox-Tail Clubmoss
Fig. 3

FLORA OF THE PENINSULA OF
DELAWARE AND MARYLAND
DELAWARE: Sussex County
A. T. Mahew No. 5465 5 Aug. 1937
Lycopodium alpinumoides L.



Northern Bog Clubmoss
Fig. 4



Slender Southern
Bog Clubmoss
Fig. 5



Robust Southern
Bog Clubmoss
Fig. 6

Contributions to the Flora of Maryland, I.

THE LYCOPSIDA OF MARYLAND
(Clubmosses, Spikemosses and Quillworts)

by
Clyde F. Reed

The vascular cryptogams are classified into four classes: Psilopsida, Lycopsida, Sphenopsida and Pteropsida (in part). The first of these is mainly made up of fossil forms, with a few living survivors confined to the tropics and subtropics. The second includes the plants considered in this paper. The third includes the Horsetails or Scouring Rushes, which will be described in a later paper. The fourth includes the true ferns, along with the gymnosperms and angiosperms (the flowering plants). The various groups will be treated in various parts of this series of papers. In the Lycopsida are included the Clubmosses (*Lycopodium*), the Spikemosses (*Selaginella*) and the Quillworts (*Isoetes*).

Perhaps no other group of plants adds so much to the undercover of the woods as the Clubmosses. Most of them are evergreen and can be easily found in wintertime in our region. Various Clubmosses can be found throughout Maryland and Delaware, while others are very local in their distribution. The accompanying maps indicate the regions from which the author has collected or has seen specimens, each mark representing at least one collection. The specimens exist either in the Reed Herbarium or in one of the herbaria listed below. About 700 specimens are indicated on the maps.

Herbaria whose specimens are indicated on the maps.

1. Reed Herbarium, 10105 Harford Road, Baltimore 34, Maryland, including the Herbarium of the Johns Hopkins University, (in part) the Herbarium of the Maryland Academy of Sciences, The C. C. Plitt Collection, The Geo. L. Smith Collection, the Botanic Club of Baltimore Herbarium.
2. Herbarium of the University of Maryland, College Park.
3. Herbarium on the District Flora, United States National Herbarium.
4. Herbarium of the Department of Plant Industry, Beltsville.
5. Herbarium, Goucher College, Towson.
6. Gray Herbarium, Harvard University, Cambridge, Massachusetts.
7. Herbarium of the Academy of Natural Sciences of Philadelphia.
8. Herbarium of the Natural History Society of Delaware, including the Tatnall Collection, Wilmington.

LYCOPSIDA

A preliminary listing of the Lycopsida which occur in Maryland and Delaware appeared in 1943 by Reed (1).

1) Reed, Clyde F. County Distribution of the Ferns and Fern-allies in Maryland, Delaware and the District of Columbia. Bull. Nat. Hist. Soc. Maryland 13: 47-54. Map. 1943.

A more extensive account of these plants with detailed distribution indicated on maps was published in 1952 by Reed (2). Lately, a new Fern Flora of Maryland, Delaware and the District of Columbia has been published (1953) by the author (3).

Three very different types of plants are included in the Lycopsida; usually they are classified in three distinct families, separated from each other by several groups of fossil plants. When the coal fields were being formed during the Carboniferous Period, great forests of the Lycopsids existed throughout those regions where the coal fields are today. In our region these are confined mainly to the mountainous regions of Western Maryland. Each of the three types of plants is represented in our flora in Eastern North America by a single genus.

1. Plants usually terrestrial; leaves small but expanded, moss-like.
2. Sporophyte homosporous *Lycopodiaceae*.
3. Sporophyte heterosporous *Selaginellaceae*.
1. Plants usually aquatic in shallow water, infrequently semi-terrestrial; leaves quill-like *Isoetaceae*.

Lycopodiaceae

Lycopodium. This genus occurs throughout Maryland and the surrounding states; many of the species are widely distributed, while others either have a very limited distribution or just reach our region along the Susquehanna River or in the mountainous region of western Maryland. Various common names are given to the plants of this genus, as Running Pine, Christmas Green, Clubmosses and Trailing Evergreen. The spores in this genus are all alike, hence the plants are said to be homosporous. The spores germinate to form a prothallus which has both male and female sex organs on the same structure.

Key to the Lycopods of Maryland and Delaware

1. Sporangia borne in the axils of ordinary foliage leaves, which are not aggregated to form a cone; broad, flattened gemmae or reproductive buds often occurring in the upper axils.
2. Plant from 2 to 7 inches tall with a slender rooting base (up to 3 inches in length), the branches mostly simple above the base with all the leaves green 1. *L. porophilum*.
2. Plant from 4 to 9 inches tall with sprawling branches and an elongated rooting base (4 to 16 inches long), the branches nearly simple to loosely forking with the rooting base covered with brown leaves 2. *L. tucidulum*.

2) Reed, Clyde F. The Lycophens of Maryland, Delaware and the District of Columbia. *Castanea* 17: 128-136, 16 maps. 1952.

3) Reed, Clyde F. The Ferns and Fern-allies of Maryland, Delaware and the District of Columbia. 1953. Published by the author.



Bristly Clubmoss
Fig. 7



Running Clubmoss
Fig. 8



Ground Pine
Fig. 9



Trailing Evergreen
Fig. 10



Ground Cedar
Fig. 11

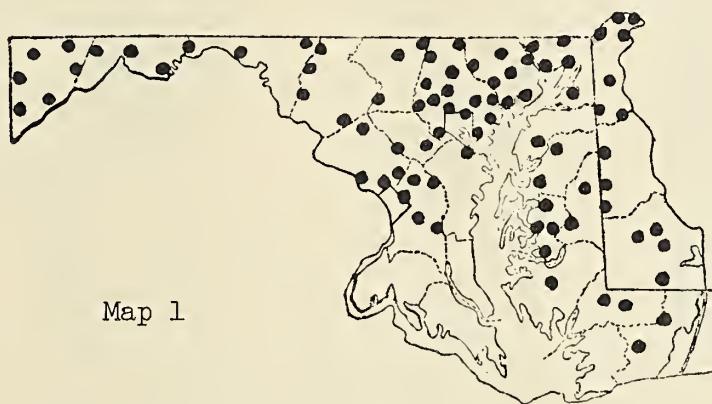
1. Sporangia borne in the axils of modified leaves, which are aggregated to form a cone; the reproductive buds lacking.
 2. Sterile branches creeping over the surface of sandy land; the cones with green, foliage-like leaves or, if the scale-like bracts are yellowish, the cone is solitary, terminating slender branches which arise directly from the creeping base.
 3. Bracts of the cone yellowish, the fertile branch slender, arising directly from the creeping base... 3. *L. carolinianum*.
 3. Bracts of the cones green, nearly like the leaves of the fertile branches.
 4. Sterile stem low-arching or procumbent, up to two feet long, rooting at the tip; fertile branches one to many, with green leafy cones up to 4 inches long.....4. *L. alopecuroides*.
 4. Sterile stem creeping, up to two feet long, but usually shorter, rooting at the tip; fertile branches few to ten, with green leafy cones up to 6 inches long, usually more slender than in the preceding species..5. *L. inundatum*.
 2. Sterile branches erect or strongly ascending from a creeping primary superficial or subterranean stem, usually of rich woods; the cones with yellowish scale-like bracts, borne on erect green leafy branches.
 3. Ascending branches simple or few-forked, creeping widely over the surface of the ground.
 4. Cone solitary, not stalked, imperceptibly passing into the ascending branches which are at first simple and later slightly forking6. *L. annotinum* var *acrifolium*.
 4. Cones 1 to 6, stalked, definitely separated from the ascending leafy branches which are at first simple and later dichotomous and becoming prolonged.. 7. *L. clavatum*.
 3. Ascending branches freely forked, bushy-branched or fan-like, arising from a creeping subterranean stem.
 4. Cones not stalked at the ends of the branches, the ascending branches erect, tree-like with numerous crowded ascending branchlets.....8. *L. obscurum*.
 4. Cones stalked, the ascending branches tufted, bushy or fan-like, spreading.
 5. Cones mostly solitary, the sterile branchlets nearly cylindrical; leaves in 4 or 5 rows, all alike.....9. *L. sabinaefolium*.
 5. Cones usually in groups, the sterile branchlets strongly to barely flattened; leaves in 4 rows, those of the undersurface smaller than or unlike the marginal ones, the latter forming wings along the sterile branches.
 6. Stems running on or near the surface of the ground; plants greenish.....10. *L. complanatum* var. *flabelliforme*.
 6. Stems creeping deep in the ground; plants bluish-green.11. *L. tristachyum*.

1. *Lycopodium porophilum* Lloyd & Underw. Map 7x. Lloyd's Clubmoss.

In general appearance Lloyd's Clubmoss is quite similar to that of the more common Shining Clubmoss, except that the branches are smaller in diameter and rarely branch above the level of the ground. The leaves are broadest at the base and are more pointed apically than those of the Shining Clubmoss. Practically all the leaves are green, with only a few brownish or yellowish one near the surface of the ground. Plants in our region are rarely over four inches tall.

In Maryland Lloyd's Clubmoss is rare, being found only on the wet faces of sandstone cliffs in the Muddy Creek Falls, near Swallow Falls State Park, Garrett County, Maryland (Reed 29470, July 6, 1952). This find extends the known distribution of this lycopod from West Virginia (according to the 8th edition of Gray's Manual, 1950) eastward to western Maryland.

2. *Lycopodium lucidulum* Michx. Fig. 1. Map 1. Shining Clubmoss.



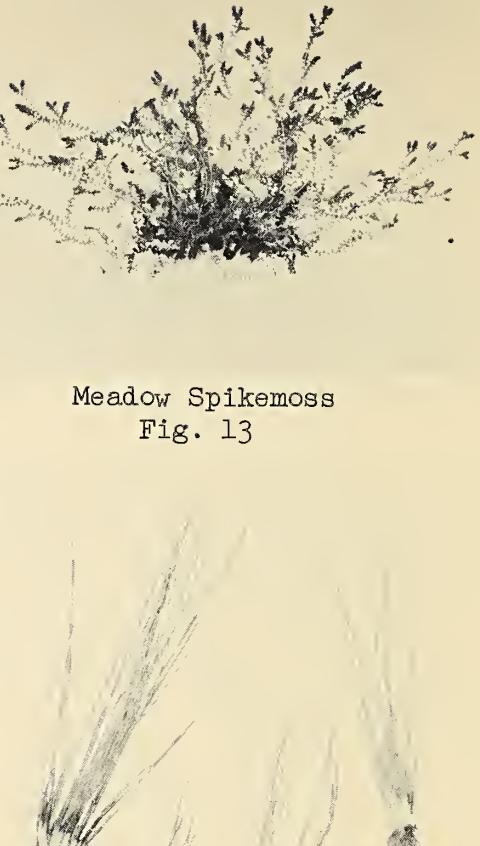
The Shining Clubmoss is frequently found on the Piedmont Plateau in wet ravines, often producing hugh mats of evergreen tufts-- a beautiful sight to see these after a light snow, poking their greenery above the white carpet. The erect green branches stand from three to six inches upward from a more horizontal stem which is clothed in brown leaves. Often a dozen or more branches can be traced to a single stem. By continuous dichotomous branches the ultimate erect branches are produced.

The reproductive portion of the branch of this and the preceding species is not well-distinguished from the vegetative parts of the branch. Usually the sporophylls (modified leaves that bear the spore-bearing sporangia) are yellowish and mixed in with otherwise normal green leaves. The sporophylls can usually be found about one centimeter from the apex of the aerial branch. A flip of the plant produces a cloud of yellowish powder — the spores.



Meadow Spikemoss
Fig. 13

Rock Spikemoss
Fig. 12



Coastal Quillwort
Fig. 15

Appalachian Quillwort
Fig. 14



- 64 -

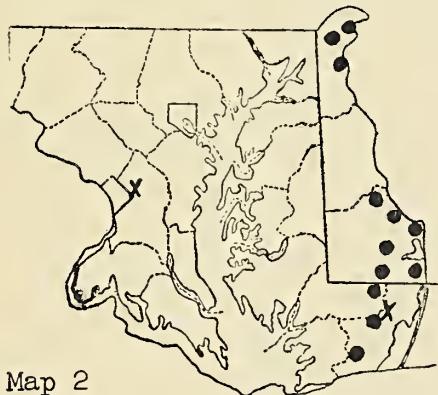
Chesapeake Quillwort
Fig. 16

Potomac Quillwort
Fig. 17

The Shining Clubmoss and the Lloyd's Clubmoss are distinguished from all the other species of Clubmosses in our region by the peculiar method of vegetative reproduction of having gemmae which are broad modified leaves found in the axils of some of the normal leaves. These fall off the plant and where they fall on the earth give rise to a new plant.

Besides on the Piedmont, the Shining Clubmoss occurs occasionally throughout the rest of Maryland, except on the lower Coastal Plain, where attempts to find this lycopod have been without success.

3. *Lycopodium carolinianum* L. Fig. 2. Map 2x. Slender Clubmoss.



The Slender Clubmoss and the next two species with their varieties are predominantly coastal in their distribution, being found in sphagnous meadows and in wet pinelands. Known localities of the Slender Clubmoss in Maryland are few, one being near Washington, D.C. (an old record) and the rest from Worcester County between the Pocomoke Swamp and the Atlantic Ocean.

The most characteristic features of this lycopod are the lack of leaves on the underside of the prostrate, creeping main stem and the leafless aerial branches

which terminate in an elongated erect cone.

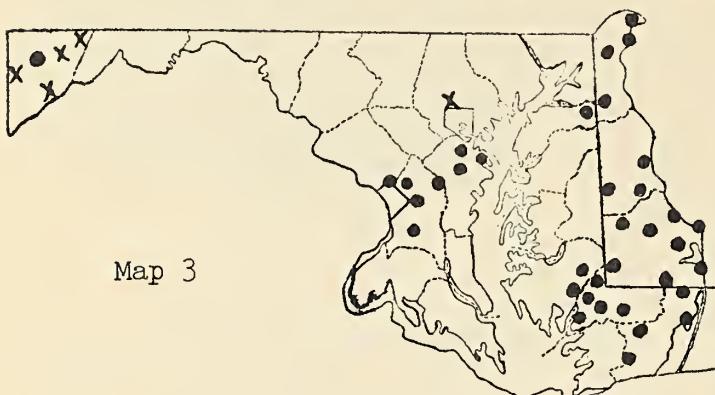
4. *Lycopodium alopecuroides* L. Fig. 3. Map 2. Fox-tail Clubmoss..

The Fox-tail Clubmoss live in bogs and swampy woods along the coastal regions of the Atlantic Ocean from Wilmington southward through Worcester County, Maryland. The main stems are definitely arching, bearing deciduous fertile branches which are stouter than those in the Bog Clubmosses, up to two and one-half feet in height.

The sterile leaves of the arching stems are narrowly lanceolate or linear-lanceolate and acuminate (6-8 mm. long). The cone-bearing branches are from eight to twelve inches tall, the sterile leaves of which are similar to those of the main stem, except that they are somewhat lax, narrower and ascending; the fertile leaves (sporophylls) are similar to the leaves of the peduncle, but are larger, broader, forming the stout, cylindrical cone.

The Fox-tail Clubmoss in our region is frequently confused with the robust form of the Bog Clubmoss and may be identical with it. The two lycopods are often found near each other in Delaware and Maryland.

5. *Lycopodium inundatum* L. Fig. 4-6. Map 3. Bog Clubmoss.



mountains. The other two varieties, known as the Southern Bog Clubmosses, are larger, sometimes up to twelve inches tall, but averaging about nine inches, and they are coastal in their distribution. The main stem lies close to the ground, is green and leafy, and sends up cone-bearing erect branches. Sometimes the main stem arches in var. *Bigelovii*. In our region these two varieties grade imperceptibly into each other, the slender plants being known as the Slender Southern Bog Clubmoss (Fig. 5) (*L. inundatum* var. *Bigelovii*), the more robust plants, as the Robust Southern Bog Clubmoss (fig. 6) *L. inundatum* var. *robustum*). As mentioned above the Robust variety is often confused with the Fox-tail Clubmoss from which it may not be separable. The spores mature in midsummer.

On the Coastal Plain of Maryland and Delaware the Southern Bog Clubmosses occupy two distinct regions of distribution, one just below the Fall Line, the other above the influence of the tidal saline rivers on the Delmarva Peninsula.

6. *Lycopodium annotinum* var. *acrifolium* Fernald. Fig. 7. Map 3x. Bristly Clubmoss.

The Bristly Clubmoss is confined to the mountainous uplands of Garrett County in western Maryland, being a more northern species from Newfoundland to Wisconsin, reaching its southern limit in Virginia.

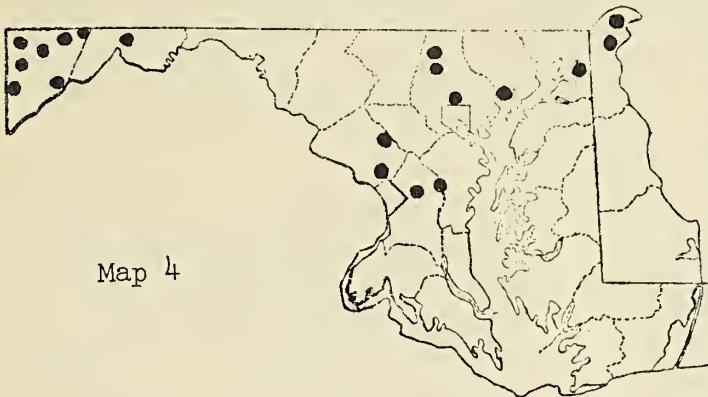
The stem is leafy and superficial, trailing on the ground. The branches are erect, simple or slightly forked, often terminating in a single, sessile cone. The leaves are entire and are spreading.

The Bristly Clubmoss had also been found in Maryland in deep ravines of the drainage of the Gunpowder Falls before the Loch Raven Dam Reservoir flooded many of the localities along its course.

The Bog Clubmosses are mostly confined to the Coastal Plain, being found in sphagnum meadows and in wet sandy wastes, as fields, ditches and pinelands. The plants in our region fall into three varieties.

The typical plants, known as the Northern Bog Clubmoss, (fig. 4), are about four inches tall and are confined to the upland swampy areas of Garrett County in the

7. *Lycopodium clavatum* L. Fig. 8 Map 4. Running Clubmoss.



The Running Clubmoss occupies two distinct regions in Maryland, one in the mountainous regions of Garrett and Alleghany Counties, the other in deep ravines and swampy places along the Piedmont and the very edge of the inner Coastal Plain.

The main stem is more or less prostrate, sometimes forking, sending down to the ground a sturdy root here and there. The erect branches arise more or less irregularly along this stem. Some of the branches terminate in a long-peduncled cone, sometimes in a cluster of from two to four cones. The leaves are flat and narrow, terminating in a long bristle. The spores mature by late summer.

irregularly along this stem. Some of the branches terminate in a long-peduncled cone, sometimes in a cluster of from two to four cones. The leaves are flat and narrow, terminating in a long bristle. The spores mature by late summer.

8. *Lycopodium obscurum* L. Fig. 9 Map. 5. Ground Pine.



The Ground Pine is one of the most common clubmosses in Maryland and Delaware, being found in abundance in nearly all wet or damp woods.

The stems are mainly underground, sending up an erect stem which branches considerably, forming small tree-like plants. Some of the branches terminate in a sessile cone, or there are several cones to a single upright plant hidden among the leafy branches or raised above them. The spores mature by late summer.

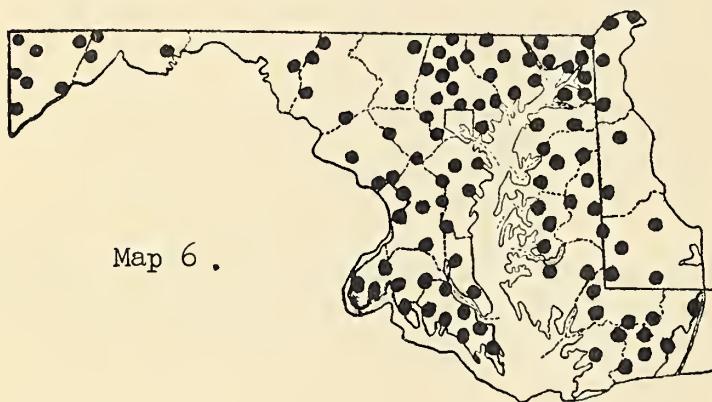
The two varieties which seem to be distinguished from each other in more northern regions, as the Flat-branch Ground Pine (*L. obscurum* var. *genuinum*) and the Round-branch Ground Pine (*L. obscurum* var. *dendroideum*), intergrade in our region, with the majority of the plants being more like the typical variety. In the first variety the leaves on the sterile branches are shorter and more appressed on the upper and lower surfaces than on the lateral ones, giving a flattish aspect to the branches, while in the second variety all the leaves are alike and give a roundish aspect to the branch.

9. *Lycopodium sabinaefolium* Willd. Map 8x. Ground Fir.

The Ground Fir is rare in Maryland, being reported for the first time in this state in 1952 by Reed, from Garrett County, thus extending its known distribution from the Poconos in northeastern Pennsylvania to western Maryland.

The slender stem creeps below the surface of the ground. The erect branches are tufted and rather crowded; the leaves are all alike. The cones are solitary or few (2 or 3), slenderly cylindric and are distinguished by their long peduncles (up to four inches long).

10. *Lycopodium complanatum* var. *flabelliforme* Fernald. Fig. 10, Map. 6.
Trailing Evergreen, Running Pine.



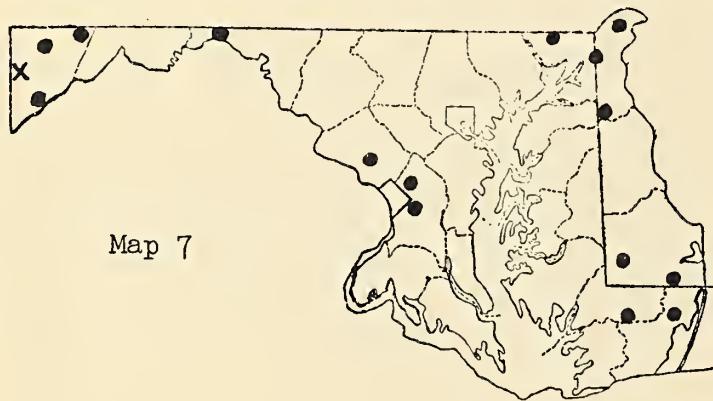
Map 6.

ware Bay and the Atlantic Ocean.

The stem and its branches are wide-creeping over the surface of the ground, giving rise to erect irregularly forked branches which are broadly flattened and fan-shaped. The fertile branches are greenish, simple or twice dichotomous, with a sparsely leafy peduncle, topped by slender, cylindrical cones. The spores mature by late summer.

An interesting variation of the Running Pine is a form in which the aerial branches and their divisions are recurved (*forma recurvatum* Reed). Plants like this have been found in Garrett County and in Baltimore County (type locality).

11. *Lycopodium tristachyum* Pursh. Fig. 11. Map 7. Ground Cedar.



Map 7

Another of the lycopods commonly found and widely distributed in Maryland and Delaware is the Running Pine. It grows in damp and dry forests, in thickets and on open moist slopes, sometimes forming large patches in pinewoods on and above the Piedmont. It seems to be absent from the Frederick and Hagerstown limestone soils, as well as from the halophytic habitats along the Chesapeake Bay, the Delaware Bay and the Atlantic Ocean.

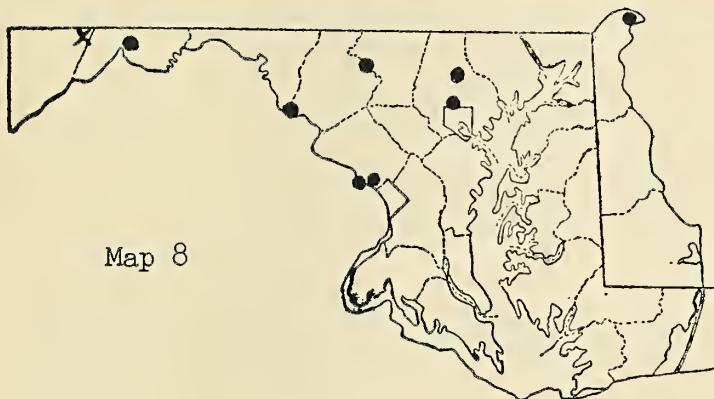
The Ground Cedar is similar to the Running Pine, except that the aerial branches are bluish-green in color and the leaves are much more appressed to the stems giving a stiff look to the plant. In our region this lycopod grows in dry open woods, in upland meadows and on rocky slopes. It is very scattered in its distribution, mainly on acid soils.

The main stem is underground, sometimes four inches deep, with many erect stems arising from it. The aerial stems are branched, closely covered by glaucous green leaves which are nearly all alike and equal, making the outline of the branchlets circular. The fertile branches are tipped with two to four cones. The spores mature by late summer.

Selaginellaceae

Selaginella. In our region *Selaginella* is represented by two very different species, one being found on exposed rocky bluffs, the other growing in lawns and in meadows and like habitats. Both reproduce heterosporously; that is, two types of spores are produced, each giving rise upon germination to a prothallus which produces either male or female sex organs.

1. *Selaginella rupestris* (L.) Spreng. Fig. 12. Map 8. Rock Spikemoss.



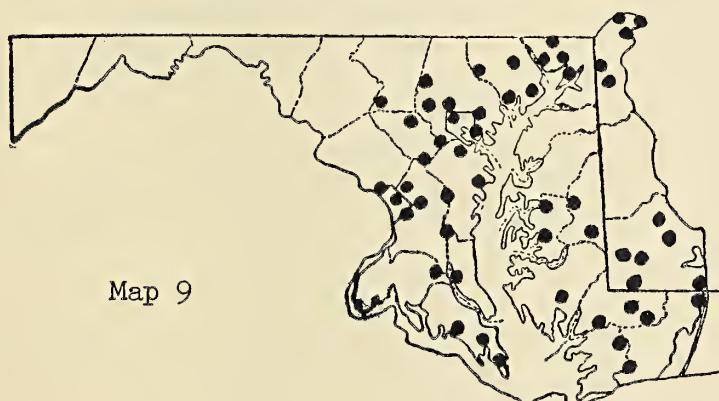
Map 8

The Rock Spikemoss is scattered in its distribution in Maryland, being confined to acid rock formations on and above the Piedmont.

The plants are grayish green. The stems and branches are erect or ascending and tufted, looking much like a stiff moss. All the rigid sterile leaves are alike, each tipped by a long white bristle, making the sterile bran-

ches nearly round. The spores mature in late summer.

2. *Selaginella apoda* (L.) Fernald. Fig. 13. Map 9. Meadow Spikemoss.



Map 9

The Meadow Spikemoss is quite delicate and moss-like. It grows in lawns, in mud, in meadows and in similar habitats. This spikemoss is probably more widely distributed than is indicated on the map since it is easily overlooked as a true moss.

The plants are bright green, moss-like, with wide-creeping stems. The leaves spread in two planes, thus giving a flattened aspect to the plant. The fertile spikes are 4-angled. The spores mature in the summer.

Isoetaceae

Isoetes. The Quillworts are predominantly aquatics, but may be amphibious along the edge of shores of streams, rivers and lakes. Only two species reach into Maryland and Delaware, one with three variations. Two types of spores are produced, sometimes on separate plants. Microspores produce a prothallus having the male sex organs; macrospores (megaspores), one having female sex organs. The leaves in this genus are quill-like and arise from a crown which is at or just below the surface of the soil in the water.

Key to the Quillworts of Maryland and Delaware.

1. Peripheral bast-bundles present; velum narrow; leaves 6 to 15 inches long; 25 to 100 leaves to the crown 1. *I. Engelmannii*.
1. Peripheral bast-bundles absent; velum partial; leaves 2 to 7 inches long; 5 to 30 leaves to the crown.
 2. Macrospores with low, rather thread-like reticulations, otherwise smooth; microspores smooth; leaves 6 to 22 in the crown..... 4. *I. riparia* var. *reticulata*.
 2. Macrospores with crests; microspores finely granular to tuberculate; leaves 8 to 30 in the crown.
 3. Macrospores distinctly granular, with crowded prominences forming short crests near the commissural ridges; microspores nearly smooth to finely granular..... 3. *I. riparia* var. *Palmeri* forma *saccharata*.
 3. Macrospores with rather jagged crests, forming irregular discontinuous ridges and occasional partial reticulations; microspores tuberculate..... 2. *I. riparia* var. *typica*.

1. Isoetes Engelmannii Braun. Fig. 14. Map 10. Appalachian Quillwort.



The Appalachian Quillwort grows in sluggish fresh-water streams, in ponds and in lakes, in either shallow or deep water. It varies from aquatic to amphibious in habitat. Although more frequently occurring along the Fall Line, it is infrequently found throughout both Maryland and Delaware.

The leaves vary from six to fifteen inches in length, with from 25 to 100 leaves to the crown. The spore-bearing structures occur at the base of the leaves; the macrospores are honey-combed reticulate; the microspores are smooth.

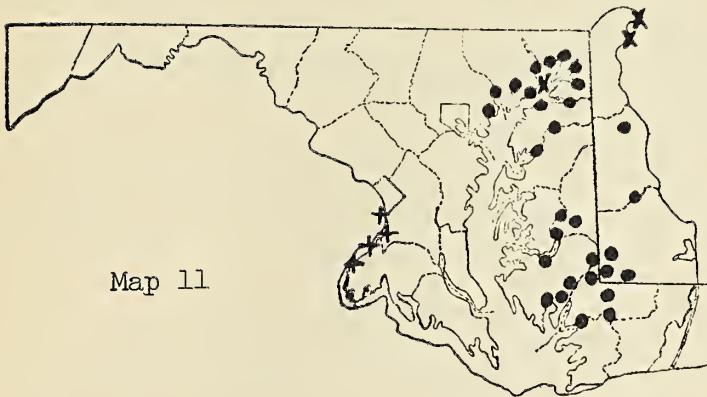
2. Isoetes riparia Engelm. ex A.Br. (typical). Fig. 15. Map 11x. Coastal Quillwort

The Coastal Quillwort is found in tidal saline situations at the mouth of the Susquehanna River at the Chesapeake Bay. Localities known along the

Delaware River at Wilmington are probably extinct there at the present time according to Tatnall and Proctor — due to civilization.

The macrospores have rather jagged crests forming irregular discontinuous ridges and occasional partial reticulations. The microspores are tuberculate. The leaves vary from 10 to 30 to the crown, range from 3 to 10 inches in length and are usually straight and rather rigid.

3. *Isoetes riparia* var. *Palmeri* forma *saccharata* (Engelm.) Proctor. Fig. 16
Map 11. Chesapeake Quillwort.



The Chesapeake Quillwort is the more common quillwort found in the estuaries of the Chesapeake and Delaware Bays drainages, in very dilute saline to fresh-water tidal situations along the Delmarva Peninsula.

The macrospores are distinctly granular as if sprinkled with sugar, occasionally with short crests near the commissural ridges.

The leaves vary from 8 to 30 to the crown, range from 2 to 6 inches in length and are often recurved, though sometimes straight.

4. *Isoetes riparia* var. *reticulata* (A.A.Eaton) Proctor. Fig. 17. Map 11
Potomac Quillwort.

The Potomac Quillwort is one of the two southernmost variations of the more northern Coastal Quillwort. It is confined to the estuaries of the Potomac River below the Fall Line near Washington, D.C. and to the lower western Chesapeake Bay.

The macrospores have low, rather tread-like reticulations, but are otherwise smooth. The microspores are smooth. The leaves vary from 6 to 22 in the crown, range from 3 to 7 inches in length and are spreading or slightly recurved.

THE VARYING HARE, OR SNOWSHOE RABBIT, IN MARYLAND

By Romeo Mansueti
Chesapeake Biological Laboratory

The varying hare, *Lepus americanus virginianus* Harlan, more popularly known as the snowshoe rabbit, is regarded as an enigmatic species in Maryland.

Some outdoorsmen doubt whether it has ever occurred in the State, yet there are several authentic references to its occurrence.

Meshach Browning (1865. Forty-four years of the life of a hunter; being reminiscences of ... a Maryland hunter, roughly written down by himself. J. B. Lippincott & Co., Phila., p. 242) recorded it as follows: "On Monday morning, I took my gun and set out for the Little Crossings. (Garrett County). When I got into the hunting-ground, I perceived something as white as snow lying at the foot of a tree, which, as I came nearer, I saw was a large rabbit. As I did not wish to fire my gun at him, I took a club, and went around the tree, thinking to kill him by striking at him from behind it. But I missed him, and out he flew, like a streak of lightning, with the dog after him, yelping at every jump. The dog was soon left so far behind that he got ashamed, and gave up the chase.. * * *" He made no further mention of it.

Merriam (1900. The life zones and areas of Allegany County. Md. Geol. Surv., Allegany Co., p. 291-293) pointed out that E. A. Preble trapped this rabbit at Finzel, Garrett County, six miles north of Frostburg. The specimen is preserved in the United States National Museum, in Washington, D. C.

The late Mr. Dan Dorsey, former manager of the Castleman Hotel in Grantsville, related to me in December, 1950, that during the winter about 1900, and for years before, varying or snowshoe hares were frequently observed in the spruce forest at Wolfe Swamp, between Meadow Mountain and Red Ridge, just southeast of the town. Shortly after much of this timber was cleared, the hares disappeared. During his youth, Mr. Dorsey pointed out, the hares seemed to be restricted to areas immediately associated with spruce, and they were never seen elsewhere. Curran (1902. The forest of Garrett County. In Md. Geol. Surv., Garrett County, p. 31⁴) wrote that "The winter of 1902 will probably see the last large stand of Spruce in the county removed. It is at the head of Cherry Creek, between Negro and Meadow mountains. * * *" Apparently, this date also marks the beginning of the real decline in the abundance of hares. A resident near Sang Run stated that over 50 years before (about 1902) varying hares were occasionally observed escaping into the Cranesville swamp on the Maryland-West Virginia border, where spruce still stands in small numbers.

As far as is known there are no reliable reports in recent years of varying hares from Maryland that can be absolutely identified with native stock. Mr. John Hamlet, formerly with the U. S. Fish and Wildlife Service, at the Patuxent Research Refuge, reported that in 1945 he observed a female in Garrett County, but the exact locality was not designated. This record could have been based on hares that have been introduced. Mr. Talbot Denmead has remarked that a few specimens have been stocked in the past at the Woodmont Rod and Gun Club. In addition, several hundred hares have been stocked at various points in western Maryland, particularly during 1949. Results of these introductions have not been studied or evaluated. During 1950 and 1951 the Maryland Department of Research and Education distributed about 100 questionnaires to selected sportsmen, hunters, and naturalists who have been active in Garrett County outdoors. Although a section of the questionnaire was devoted to the varying or snowshoe hare, only one return contained any information concerning the occurrence of this species; namely, the record cited for Mr. Hamlet.

The varying hare is more or less restricted to areas of spruce in Maryland, where it has been observed in open woods and thickets. Spruce forest is part of the Canadian Life Zone. In Maryland, the Canadian Life Zone areas are very small, limited to scattered districts upon the Alleghany Plateau in Garrett County in the upland swamps and glades and upon the tops of some of the higher mountains. The varying hare seems to be more or less restricted by conditions that characterize this zone. Its present geographic range is as follows: Extreme southern Ontario, Canada and northeastern United States from north central Maine south to the Allegheny Mountains of Virginia and West Virginia, and possibly as far south as the Great Smoky Mountains of North Carolina and Tennessee (Handley and Patton, 1947. The wild mammals of Virginia, Va. Comm. Game and Inland Fish., Richmond, p. 186).

In Virginia this species has been recorded from Highland County, about 50 miles south of Garrett County. Handley and Patton have suggested that this fine game animal be re-established in suitable places in Virginia, such as Whitetop, Mount Rogers, and Mountain Lake. Grimm and Roberts (1950. Mammal survey of southwestern Pennsylvania. Pa. Game Comm., p. 82-83) state that this species is now of rather rare and local occurrence in Cambria and Somerset counties, where it has been successfully introduced. Somerset County is directly north of Garrett County, and according to some reports the hare is prospering at this time in Paint, Ogle and Shade Townships. Rhoads (1903. The mammals of Pennsylvania and New Jersey. Phila., p. 119) stated that it was formerly common about Crumb, Somerset County, not far from the Maryland border. Grimm and Roberts remarked that "By the turn of the century the varying hare had disappeared from most of its original range." Except for the extreme northeastern corner of Somerset County, the restocking of this species in Fayette County, just northwest of Garrett, has apparently not been successful. In West Virginia, Kellogg (1937. Annotated list of West Virginia mammals. Proc. U. S. Nat. Mus., 84(3022): 471-472) stated that varying hares were observed in Tucker and Randolph Counties in 1911, immediately southwest of Garrett, and also that in 1936 several were trapped about 75 miles south of Garrett County.

The varying hare definitely occurred in western Maryland in primeval times, for Gilmore (1946. Mammals in archeological collections from southwestern Pennsylvania. Jour. Mammalogy. 27(3): 227-234) found remains at the Fort Hill Indian Village site, in extreme southern Somerset County, and at the Martin site on the Youghiogheny River near the Maryland border. Even in prehistoric times the present day varying hare, or its prototype, was found within the borders of the State. Gidley and Gazin (1938. The Pleistocene vertebrate fauna from Cumberland Cave, Maryland. U. S. Nat. Mus., Bull. 171: 69) discovered at least 10 skull portions and 19 lower jaws in the famous cave in Allegany County. They stated, "No persistent characters of importance were noted distinguishing the fossil from the living hare, *L. americanus*." These remains may be more than 20,000 years old.

In conclusion, the varying hare seems destined to be permanently extirpated in Maryland. It is a species with specialized habitat requirements and one of limited distribution. Its environment is being encroached upon by civilization gradually in some and swiftly in other places. Restocking of this species in western Maryland would seem to be folly since the amount of suitable habitat for a successful introduction is negligible. The optimum habitat is

VARYING OR SNOWSHOE HARE

Lepus americanus virginianus Harlan



Records of the varying hare in western Maryland

forest of the high intermountain Alleghany Plateau which has at least a moderate understory of small trees and shrubs to provide food and cover. These areas are gradually being destroyed by an increasing deer herd as well as human expansion in Garrett County. In short, the varying or snowshoe hare and man and his management methods are incompatible.

MARYLAND SALAMANDERS OF THE GENUS AMBYSTOMA (Part I) Distribution

By; C. J. Stine

Photographs by the Author



The four species of Ambystoma found in Maryland

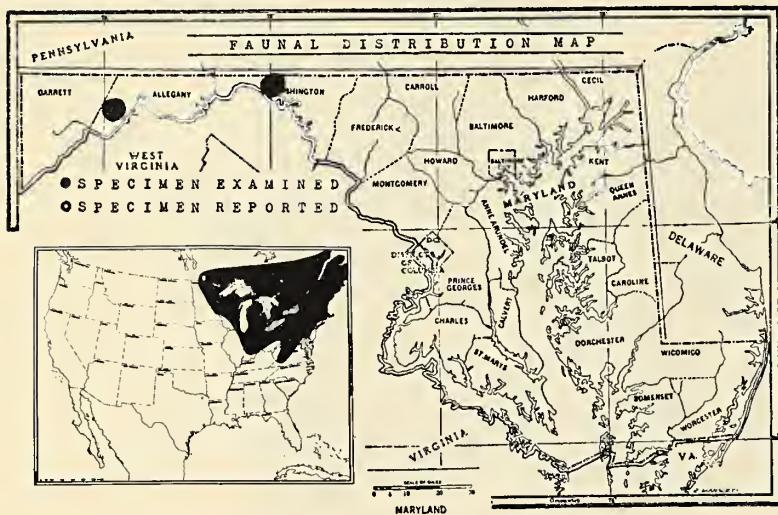
Salamanders belong to the class Amphibia, of the subphylum Vertebrata, of the phylum Chordata, of the animal kingdom. Like other amphibians they have a thin, somewhat moist, highly glandular skin devoid of scales, scutes, (except caecilians - a tropical order of salamanders that have minute scutes imbedded in the skin) feathers and hair which characterize the fish, reptiles, birds and mammals respectively.

Because of this thin naked skin salamanders are subject to rapid dessication and death, hence are invariably found in places of high humidity.

Of the eighteen species (kinds) of salamanders known to occur in Maryland, those belonging to the genus *Ambystoma* are particularly interesting in coloration, habits and distribution. The four members of this group of stout, lung breathing, essentially terrestrial salamanders represented in our state are the Jefferson's salamander (*Ambystoma jeffersonianum*), the spotted salamander (*Ambystoma maculatum*), the marbled salamander (*Ambystoma opacum*) and the eastern tiger salamander (*Ambystoma t. tigrinum*.)

The purposes of this paper are: 1 - to point out easily discernable field characters by which the adults of these four species may be distinguished one from the other and 2 - to review their distribution in Maryland.

Jefferson's salamander (*A. jeffersonianum*) - bottom left on plate - is uniform dark brown in color on the sides and dorsal surface and the legs and sides have blue fleckings. The ventral surface is lighter than the back and blue marks are also present there. This salamander is second smallest of the four species being slightly longer and more slender than the marbled salamander. The average length is about 6-1/4 inches. The field characters that identify this species are the *uniform dark brown color, blue flecklings and long toes* (longer than the other species.)



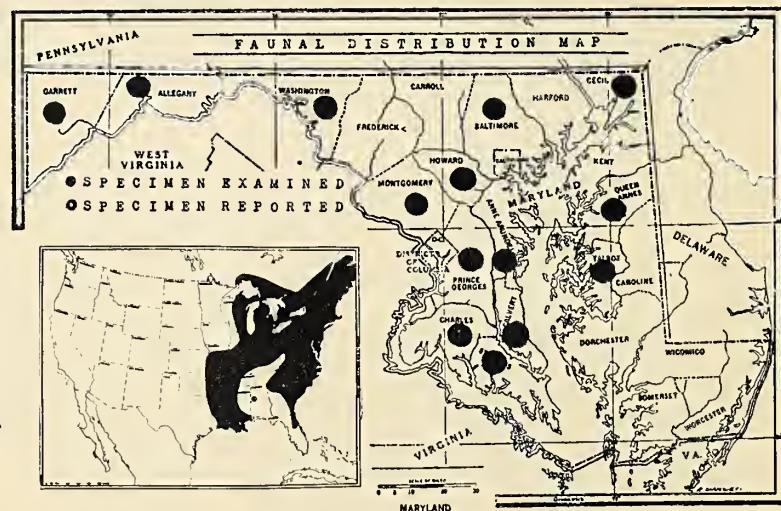
Distribution of Jefferson's salamander (*A. jeffersonianum*) in Maryland. Insert indicates general range of species in U.S.

The spotted salamander (*A. maculatum*) - middle of plate - is intermediate in size between Jefferson's and the tiger salamander, the average size being a little less than seven inches. The doral color is chocolate brown with *two lateral rows of yellow to orange spots from head to tail*. The underside is pale slate gray.

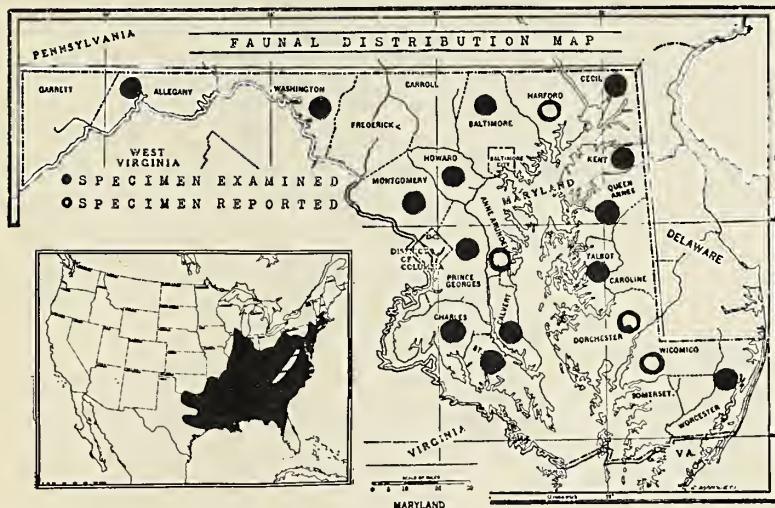
The spotted salamander is presumably state wide in its distribution and is found in all major physiographic divisions. Although more commonly seen than the marbled salamander this species has been recorded in less counties than *A. opacum*.

- - - - -
Distribution of the spotted salamander (*A. maculatum*) in Maryland. Insert indicates general range of species in U.S.

Jefferson's salamander is an upland species throughout its range and in Maryland is known only from the province of the Valleys and Ridges (Near Indian Springs, Washington Co.) and the Allegheny Plateau, (Carlos, Washington Co.) divisions of the Appalachian Highlands. Adequate collecting may reveal its presence in the Cumberland Valley, Blue Ridge and Piedmont provinces. Although common in certain localities this is the least known of the Maryland Ambystomids.



The marbled salamander (*A. opacum*) - top of plate - is the smallest of the four species, the average length being about four inches. This salamander may be identified at once by its *striking dorsal color pattern of bright white to dull gray on a lustrous black ground color*. The light markings are variable in size, shape and distribution. The belly is uniform bluish or brownish black with white fleckings.



Distribution of the marbled salamander (*A. opacum*) in Maryland. Insert indicates general range of species in the U.S.

The juvenile of this species is most likely to be confused with the adult spotted salamander on the Maryland Coastal Plain, but as shown on the plate the spots of the juvenile eastern tiger salamander are *irregular in distribution and extend well down onto the sides of the species*. In the adults these lateral spots coalesce to form bars.

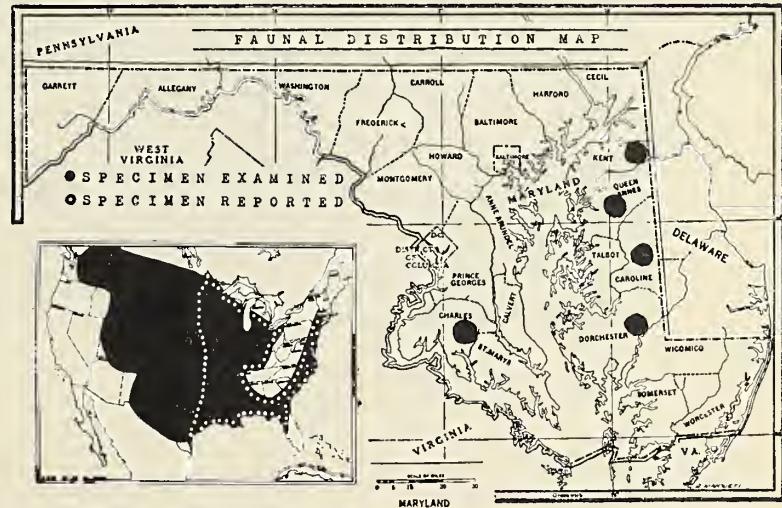
The eastern tiger salamander is known only from the Coastal Plain in Maryland and has been recorded in but five counties. This subspecies should be found, with assiduous collecting, however to occupy a more continuous range east of the fall line.

Subsequent parts of this series will deal with the habitat and habits of these species and the differentiation of their eggs and larvae.

In the Maryland maps for *A. maculatum*, *A. opacum* and *A. t. tigrinum* not every locality of occurrence in every

The marbled salamander is an ubiquitous form occurring in the major physiographic divisions, but has not been recorded to date from the minor provinces of the Allegheny Plateau and Blue Ridge. Presumably state wide.

The eastern tiger salamander (*A. t. tigrinum*) - lower right in plate - is the largest of Maryland's ambystomids. The average length being 8-1/2 inches. The ground color is deep brown dorsally and is marked with numerous pale yellow blotches. The ventral is olive yellow.



Distribution of the eastern tiger salamander (*A. t. tigrinum*) in Maryland. Area within dots on insert indicates range of this sub species in U.S.

county has been indicated. Single symbols have been used in order to avoid over crowding. Since faunal distribution maps are rapidly outdated, any information concerning new or previously uncovered county records will be deeply appreciated.

AN ABNORMALLY COLORED MOLE FROM MARYLAND

by

John E. Cooper

On November 10, 1948, through the efforts of Mr. George R. Debnam, Jr., of Woodstock, Baltimore County, the writer secured an abnormally colored individual of *Scalopus a. aquaticus*, collected on Mr. Debnam's property on Bellona Avenue west of Charles Street. The specimen was found by accident on November 9, 1948, at approximately 4:00 o'clock P.M. by Mr. Charles Bell who, while raking leaves on the front lawn, noticed its burrow rising and stepped on the tunnel, killing its occupant. Until dug from the ground it was thought to be an ordinary mole, since they are very abundant in the region.

The specimen, a 152 mm. (total) male, is creamy-white dorsally and on the sides, and this color extends onto the ventral surface. The under-surface is silver-gray anteriorally, gradually becoming white toward the tail. The hind foot measures 21.5 mm., the fore foot is 23 mm., and the tail 24 mm.

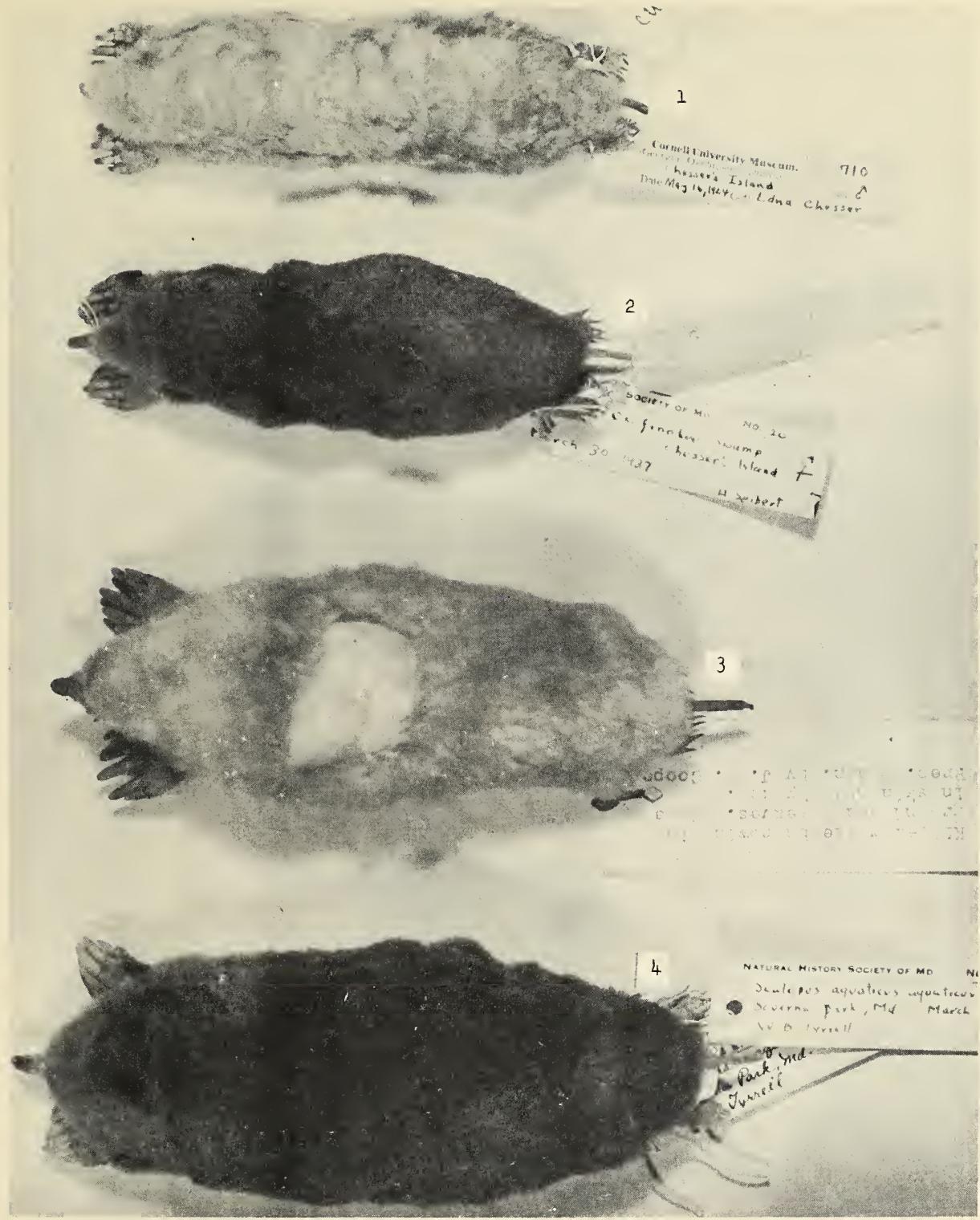
Partial albinism has been noted in Maryland short-tailed shrews. *Blarina brevicauda*, by Gentile (1948); but, no previous record for this occurrence in Maryland moles is known. Apparently, this condition has been noted in a few instances in various sub-species of *aquaticus* from other localities. Also, it occurs frequently in *Scapanus* and *Parascalops*.

Jackson (1915) writes, "The common type of chromatic variation in *Scalopus* and *Scapanus* is the occurrence of white, cream, orange, or ochraceous spots or blotches, appearing usually either on the face or on the ventral parts."

Cockrum and Meinkoth (1942) record a specimen of *S. a. machrinus* from Illinois having white ventral pelage with yellow-orange tones. Hargitt (1889) and Harper (1927) record other instances of this peculiarity. Through the kindness of Dr. W. J. Hamilton, Jr., Professor of Zoology, Cornell University, the writer obtained a cream-colored *S. a. australis* (shown in photographs) from the Okefenokee Swamp, Georgia.

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- (1) Cream-colored specimen *Scalopus a. australis*
 Okefenokee Swamp, Georgia
- (2) Normal specimen *Scalopus a. australis*
 Okefenokee Swamp, Georgia
- (3) Cream colored specimen *Scalopus a. aquatilis*
 Baltimore County, Md. (Hole in skin made
 by dog)
- (4) Normal specimen *Scalopus a. aquatilis*
 Severna Park, Maryland

NOTES FROM FIELD AND LABORATORY



MIGRATION OF GREY SQUIRRELS

Mr. Frank L. Bentz, former Public Relations Director of the Game and Inland Fish Commission, and now retired, relates an interesting observation regarding a migration of squirrels in Maryland.

"While crossing over on the ferry in 1947, I overheard some hunters relating experiences. One told of witnessing a migration of squirrels in one of the lower counties a few years ago. That reminded me of one about 1922. While returning from Cumberland, I was stopped by cars ahead and after waiting a considerable length of time, I went forward to find out the cause of the delay. There was a migration of grey squirrels crossing the highway. This migration lasted at least thirty minutes. Attempts were made to interrupt their trek, but they continued until the last one."

Mr. Bentz adds that the general opinion is that the cause of the migration was a shortage of food in the particular area. He also says that Mr. Ernest A. Vaughn, now director of the Maryland Game and Inland Fish Commission, has heard of similar migrations.

The Natural History Society would welcome information from its readers regarding migrations of animals in Maryland.



COMMON SKUNK HAS MEAL OF YELLOW JACKETS

On August 17, 1952, I collected a dead male skunk (*Mephitis mephitis*), an almost completely black individual, from the main road that passes through the U. S. Department of Agriculture Experimental Station at Beltsville, Maryland near the Swine Center. The animal lay near the center of the road and had a crushed skull, indicating that it had probably been killed by a passing vehicle.

An examination of the stomach contents revealed that the animal had feasted on yellow jackets (*Vespa sp.*), the stomach bulging with these insects. The quantity of these bees present in the stomach would suggest that the skunk had raided a nest of yellow jackets.

Donald Lamore
Greenbelt, Md.

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