MARYLAND

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The Natural History Society of Maryland

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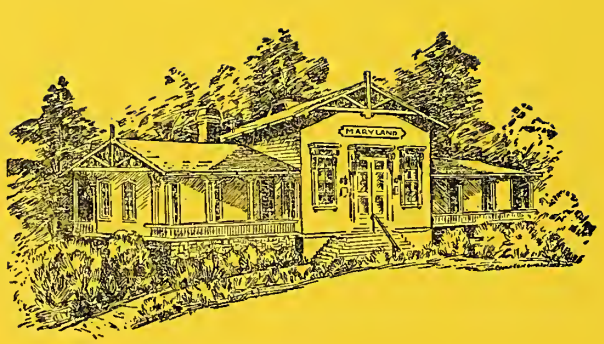

MUSEUM OF NATURAL HISTORY
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A JOURNAL OF NATURAL HISTORY

THE JOURNAL

Beginning with this issue the name of the Society's bulletin has been changed to "MARYLAND, A Journal of Natural History."

The Journal will be unique as most of the writing will be devoted to the fauna, flora, geology, topography and ecology of this State. Many of these articles will be the results of the research done in this institution and it is the purpose of this publication to aquaint the public of these findings as well as to give accounts of the natural phenomena of the State of Maryland.

The Journal has another important function in that it offers a medium of expression to those individuals who are working in the natural sciences and provides them with a means, hitherto unavailable, of reporting their varied researches.

We believe that this publication will fill an important gap in the periodical literature pertaining to the Natural History of Maryland.

Edmund B. Fladung
President

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JANUARY 1944
A DOLLAR A YEAR

CEDAR WAXWING

by

W. Wallace Coleman

FORAMINIFERA

by William Adrian Jenkins, Jr.

The Phyllum Protozoa is made up of the large group of animals characterized by having only one cell. Even though this group is very primitive as compared to the Metazoa, or many celled animals, the Protozoa carry on all of the essential life functions. When one speaks of fossil Protozoa, it is rather difficult to think of the naked forms we know as parasites (e.g. Amoebae causing dysentery) as leaving any record in the rocks throughout geological time. There are, however, types of these one-celled organisms which have a hard skeleton and which can be preserved in the rocks. It is with these forms that the geologist can trace the evolutionary trends of a very interesting phyllum throughout the greater part of the geological column where records of past life are found.

The Phyllum Protozoa is divided into four classes, only one of which contains fossil forms. These four classes are the Mastigophora, the Infusoria, the Sporozoa, and the Rhizopoda. The classes which do not occur as fossils are the Mastigophora, which move about by means of long whip-like appendages called flagella; the Infusoria, which move by means of very fine hair-like processes called cilia; and the entirely parasitic Sporozoa which may move about by amoeboid structures but always have a spore stage in their often complex life cycles. The Class Rhizopoda does have forms that have hard parts suitable for preservation as fossils. The method of locomotion in this group is by the use of pseudopodia (false feet) which are extensions of the protoplasm surrounding the nucleus of the cell. The Class Rhizopoda is made up of five orders: Foraminifera, Radiolaria, Mycetozoa, Helizoa, and Amoebina. Both the Foraminifera and Radiolaria are found fossil but it is with the Order Foraminifera that this paper is concerned.

Living Foraminifera

The Foraminifera we find living in our seas today are world-wide in distribution and number many thousands of species. Most of the forms are found in warm, shallow, marine waters. However there are also cold, deep, fresh, and brackish water types. The fresh water and brackish water forms may not secrete a shell or test at all. If they do, however, it is made of a much thinner material than the marine forms.

Some Foraminifera live only on the surface of the water, others only on the bottom. The greater number of species dwell on the bottom. The surface forms have much larger chambers making up their tests than the more compact bottom forms. The test (shell) of the surface forms is also much more porous, allowing a greater extension of the pseudopodia in all directions. Distribution of the surface types is largely dependent on ocean currents; while depth, temperature, and character of the bottom are the controlling factors of distribution of those which live on the bottom.

There are two general groups of Foraminifera based on the character of the material which makes up the test. One type cements foreign particles together to make up the test; the other secretes the test. The composition of the former is greatly dependent on the kind of material which is at hand. In many cases this material may be fine sand grains. Again, it may be sponge spicules, coarse sand grains, mica plates, or even other foraminiferal tests. There are some Foraminifera

which have very definite tastes as to what they use for their test, for example, the genus *Psammosphaera.* This genus builds its test from coarse sand grains around a long thin sponge spicule so that a very nondescript ball of sand seems to be pierced by a very delicate sponge spicule. The forms which secrete their tests will be taken up in detail later.

Foraminifera vary in size from the microscopic to as much as 3 inches in some of the fossil forms. Most of them are quite small, however, and can best be seen with a low power microscope or binocularscope. For example, the Foraminifera found in the Tertiary sediments of Maryland are usually no larger than a half a millimeter across.

Although a great deal of study has not been devoted to the habits of living Foraminifera, some very interesting facts are known about them. The movement of the living forms is on the order of a few millimeters an hour. Their food consists of diatoms, algae, vegetable matter, and other Protozoa. The tests of living forms are at times beautifully colored, the colors grading from very delicate shades of pink to a deeper red or brown. Some tropical forms are a very brilliant white combined with a very delicate structure. Against a dark background these forms are very beautiful.

The Test

It must be observed from the start that the test or shell of the Foraminifer is not an external skeleton such as the shell of a snail, but is internal. The protoplasm surrounding the nucleus of the cell is on the inside of the test and on the outside as well. The nucleus of the Foraminifer, however, is inside and occupies the middle chamber numerically of the test. The pseudopodia used for locomotion and obtaining food are able to extend beyond the test a great distance, that is, many times the diameter of the test. Living forms have even been known to abandon their tests for a short time.

Since none of the soft parts of Foraminifera are preserved as fossils, the classification of these animals is based on the structural characteristics of the test. We shall see how the structure and composition of the walls, arrangement of the chambers, number of chambers, character and position of the aperture, and ornamentation of the test bring together similar forms under a logical classification.

Structure and Composition of the Walls of the Test

One of the most persistent characteristics found among large groups of Foraminifera (e.g. families) is the structure and composition of the walls of the test. The wall may be simply one layer of calcareous material or it may be made up of more than one layer alternating in composition. It has already been mentioned that some types use foreign material to make up their tests. These foreign particles are cemented together by material secreted by the animal. The composition of the cement can be chitinous, calcareous, or made of iron oxide. Instead of using foreign material to make up the test, the Foraminifer may secrete the entire test. In most cases this secreted test is of a calcareous material, however, in a few rare cases the composition of the test may be of amorphous silicon. The walls of the test may assume a number of forms--gelatinous, chitinous, granular, hyaline, fibrous, alveolar, or porcellanous. Many of the forms under high magnification are full of tiny holes through the walls. Thus the word Foraminifera derives its meaning from the Latin roots *foramen* (a small opening) and *ferre* (to bear).

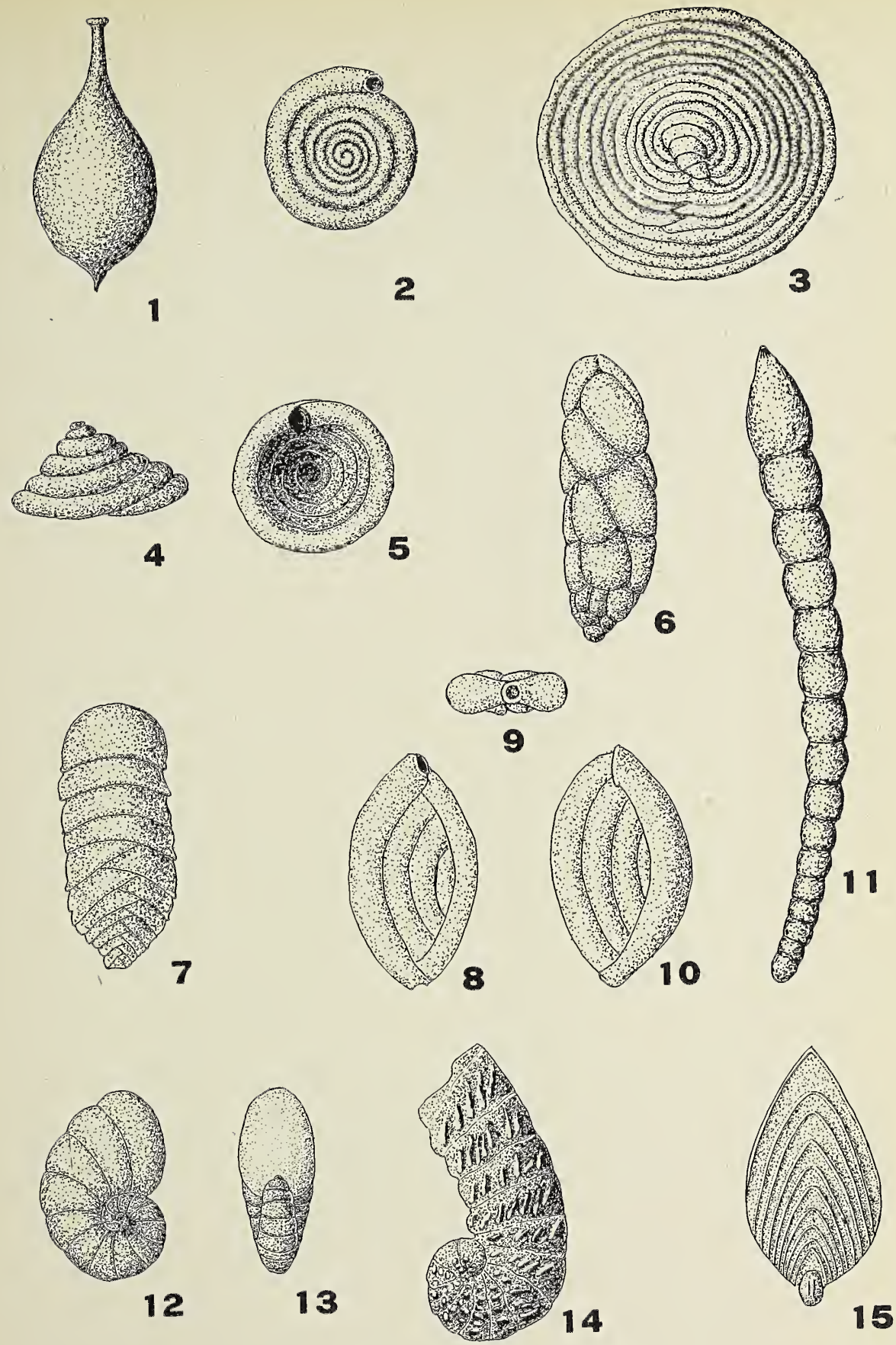

PLATE I. SHELL ARCHITECTURE

Arrangement of the Chambers and Form of the Test

The arrangement of the chambers and the form of the test may be the distinguishing characteristics of families of Foraminifera, but in general, these characteristics are used to distinguish the various genera.

The arrangement of the chambers of the test can assume a variety of forms as can be seen by Plate I which shows some of the types of shell architecture. However, all Foraminifera have in common a spherical initial or primordial chamber called the proloculum. As the animal grows, more chambers are added to the proloculum in a way characteristic to that particular form.

Probably the simplest type of test has only one chamber (Plate I, Fig. 1). The test may consist of a long tube coiled in one plane (Plate I, Fig. 2), or instead of being coiled in a single plane, the chambers may be added around the proloculum in concentric rings similar to growth rings of a tree. This type of arrangement is called annular (Plate I, Fig. 3). Only a slight modification of the coiled tube is necessary to produce the trocoid form (Plate I, Figs. 4 and 5). Here the coil is not in one plane but in an ascending spire. Figure 4 gives a side view of this form and Figure 5 is a ventral view. The chambers of the test can be in an elongate spiral as shown in Plate I, Figures 6. From an examination of Plate I, Figure 7, another type of architecture is evident. The early part of the Foraminifer is begun by the addition of chambers alternating on each side of the proloculum, or a biserial arrangement. In the last chambers, the biserial arrangement is changed to uniserial. Plate I, Figure 11 represents a form which is entirely uniserial. This type is called nodosarian from the generic name *Nodosaria*. Another way in which chambers may be added is a little more difficult to visualize. Each succeeding chamber is added around an elongate axis, the later chambers embracing a part of the chambers preceding it. This arrangement is called milioline and an example is shown on Plate I, Figures 8, 9, and 10. Figures 8 and 10 are opposite views and Figure 9 is an apertural view of this specimen. A very common type of shell architecture is the planospiral arrangement (Plate I, Fig. 12, side view, and Fig. 13, apertural view). A modification of the planospiral type is shown by Plate I, Figure 14. Here the early chambers are planospiral while the last chambers tend to become uncoiled. The frondicularian type is shown on Plate I, Figure 15. The proloculum is at the base and each chamber after this surrounds all of its predecessors.

There are many more arrangements of the chambers, but the above are some of the more common types found.

Number of Chambers

The number of chambers may be another persistent feature of families of Foraminifera as are the wall structure and composition. The term "number of chambers" is taken in its broader sense rather than in any specific number. For example, one family may be made up largely of one-chambered forms, while another family will be composed of many-chambered forms.

Character and Position of the Aperture

Most of the marine Foraminifera have a single large opening in the test which is called the aperture. This aperture, in most cases, is not a constant feature for large groups, such as families, but it is a very distinguishing characteristic of the genera and species. As can be seen from Plate II, the aperture may assume a number of shapes and positions.

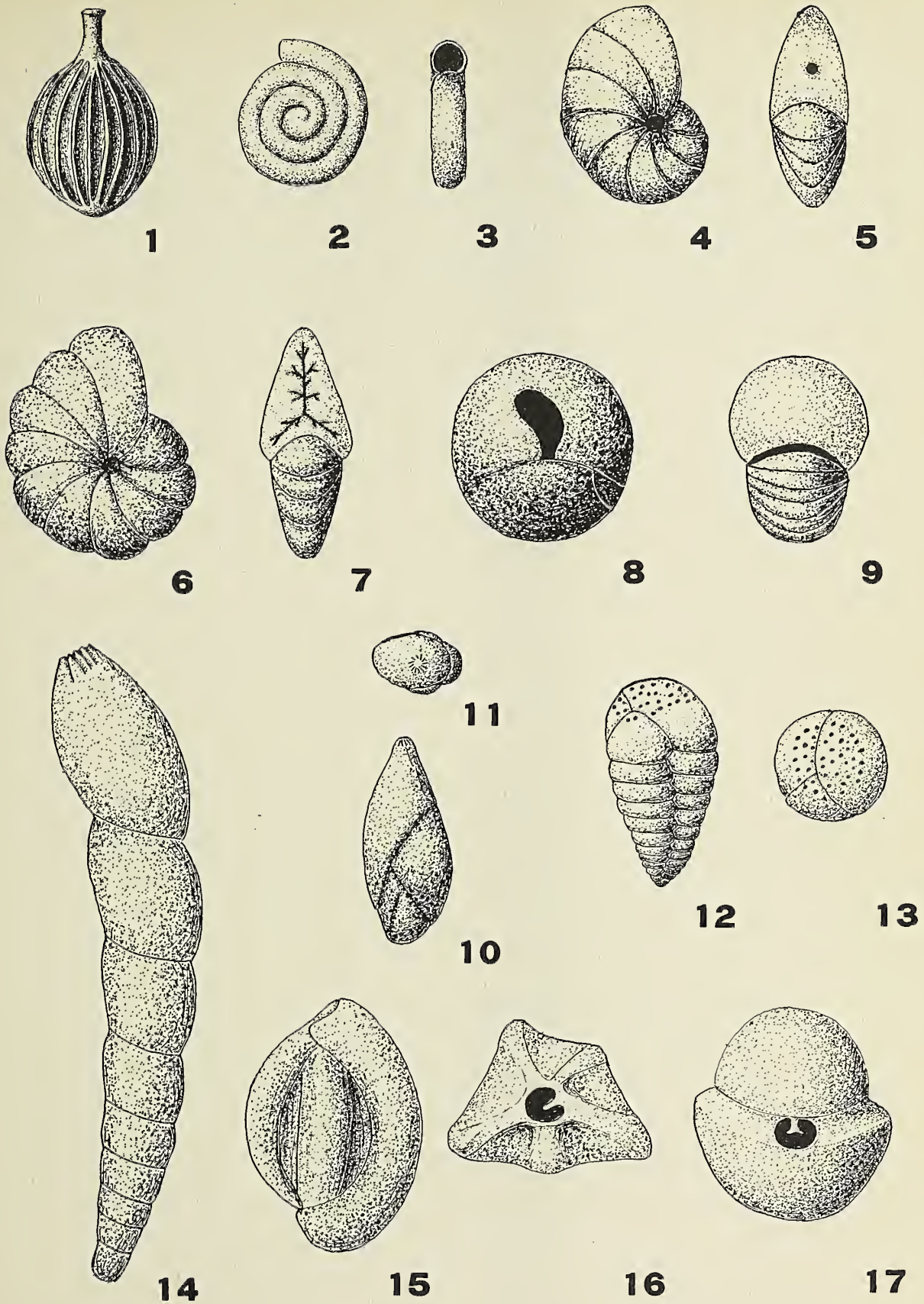

PLATE II. TYPES OF APERTURES

Probably the simplest shape of the aperture is a round opening. This round opening may be on the end of a neck with a lip, (Plate II, Fig. 1), or it may be in the center of the apertural face (Plate II, Fig. 4, side view, and Fig. 5, apertural view). The aperture can also be the open end of a coiled tube (Plate II, Fig. 2, side view, and Fig. 3, apertural view). Another interesting type of aperture is shown on Plate II, Figure 6, side view, and Figure 7, apertural view. This kind of aperture is called dendritic. The shape of the aperture may be "comma-shaped" or a slit at the base of the apertural face (Plate II, Fig. 8 and 9 respectively). Instead of a round opening, the aperture can be radiate as in Plate II, Figure 10, side view, 11, apertural view, and Figure 14. The aperture can also be a series of openings on the apertural face (Plate II, Fig. 12 side view, Fig. 13 apertural view). This type of aperture is called cribate. Still more complex types of apertures contain teeth. A simple tooth is shown in Plate II, Figure 15 side view, and Figure 16 apertural view. Figure 17 shows an aperture with a bifid tooth.

Ornamentation

Still more specific characteristics of species or varieties of species are the ornamentations of the test. These may take the form of ridges, knobs, spines or any number of special features.

Maryland Forms

Plates III and IV are typical examples of Maryland Tertiary Foraminifera.

Life History

The life history of Foraminifera consists of an alternation of generations such as is found in many other groups of animals. In other words, there is both a sexual and an asexual generation, giving rise to the two forms of each species--the microspheric and the megalospheric. The names of these two generations are derived from the size of the initial chamber, or proloculum, of the Foraminifer, the microspheric proloculum being very small compared to the proloculum of the megalospheric form.

The microspheric Foraminifer has a number of nuclei, although it is still one-celled. When the microspheric cell reaches maturity, it gathers the greater part of the protoplasm and the nuclei around the outside of the test, and finally, each individual nucleus takes a mass of protoplasm and secretes the proloculum of a new megalosperic test. Thus the asexual stage of the life history is completed.

The megalospheric Foraminifer, on the other hand, is made up of only one nucleus. As soon as this form reaches maturity, the nucleus breaks down into small flagellated zoospores that leave the adult. These zoospores then conjugate and give rise to the microspheric form. With this sexual generation, the life cycle is completed.

By far the most common type of reproduction among Foraminifera is asexual, as evidenced by the fact that the microspheric form is rare while the megalospheric form is common.

The microspheric form is a very important factor in indicating the evolution

of some groups. It has been found that the microspheric in its early chambers tends to repeat the evolution of the form while the megalospheric is less conservative and skips over any previous evolution or only shows it in part. In most cases, the only way the two forms can be distinguished is by grinding sections through the early chambers of the species.

Collecting and Preparing Material

Recent Foraminifera are world wide in distribution and can be found in most all marine bodies of water. The tests may be washed up on the beaches and can be collected from the beach sands. It is also possible to collect Foraminifera by taking a bottom sample off shore. This can be done by a simple dredge made from a bucket, or even better, one may use a sampling device which brings up a small sample of the bottom. This device is a container which closes on contact with the bottom and brings up a handful of the material. The method of preparing the sample for study is the same as used for fossil Foraminifera, and will be explained in detail later.

In Maryland, the Tertiary sediments contain large numbers of fossil Foraminifera. While the author has not collected from a great number of localities as yet, the collections that have been made very interesting. For the most part, the Tertiary beds in Maryland consist of unconsolidated sandy, glauconitic, or marly sediments typical of the Atlantic Coastal Plain. The Miocene section, particularly along the Calvert Cliffs on the Chesapeake Bay, contain an abundance of Foraminifera. The material from this section is readily accessible.

Unless one is accustomed to looking for these tiny fossils, it is very hard to observe them in the field. If the sediments contain large numbers of Foraminifera, however, one can see them with a hand lens of moderate magnification. Usually a small bag of the loose material in a fossil bed will yield quite a few "forams."

A clean sample is absolutely necessary for the study of Foraminifera. There are a number of ways one can wash away the fine material in a sample, all of which are good. The method used usually depends on that which is most convenient. One way of cleaning the sample is to place it on the first of a series of nested sieves with decreasing sized openings, and spraying a fine stream of water over the sample. The finer silts will be washed through, leaving the fossils and coarser material on the sieves.

Another method very often used is decanting of the fine material. The sample is placed in a container which is then filled with water and agitated. After a moment's settling of the coarse material, the finer material is poured off. This procedure is repeated until the water becomes clear. This method is very good as the tests are not subjected to any treatment which might break the more delicate forms.

Another modified method of the decenting process is the use of a long glass tube for floating off the finer material. The author has found that the large fluorescent tubes used for lighting, work quite well The size of these tubes is about an inch and a half in diameter and four feet long. However, even larger tubes will work equally well. Water is fed into the bottom of the tube and allowed to circulate up through the sample to the top of the tube where some kind of a drain is used to carry away the fine material held in suspension. The input of water is adjusted so that the coarser material is kept agitated but only the very fine sediment is carried off through the drain. When the water above the material becomes clear, the washing process is finished. After the sample has been cleaned by any of the above processes, it can be dried and is then ready for study.

Plate III. Eocene Foraminifera from Maryland

Fig. 1. *Nodosaria bacillum* Defrance (after Bagg)
3 miles west of Leeland. X 10½.

Fig. 2. *Nodosaria consorbina* var. *emaciata* (Reuss) (after Bagg)
Upper Marlboro. X 11.

Fig. 3. *Nodosaria communis* (d'Orbigny) (after Bagg)
1 mile northeast of Piscataway. X 25½.

Fig. 4. *Cristellaria radiata* (Bornemann) (after Bagg)
Woodstock. X 26.

Fig. 5. *Cristellaria rotatula* (Lamarck) (after Bagg)
1 mile southeast of Mason Springs. X 7½.

Fig. 6. *Polymorphina compressa* d'Orbigny (after Bagg)
Woodstock. X 40½.

Fig. 7. *Textularia sagittula* Defrance (after Bagg)
Upper Marlboro. X 69½.

Fig. 8. *Polymorphina lactea* (Walker and Jacob) (after Bagg)
Upper Marlboro. X 71½.

Fig. 9. *Spiroplecta clarki* Bagg (after Bagg)
Type Specimen. Woodstock. X 51½.

Fig. 10. *Polymorphina praelonga* Terquem (after Bagg)
Woodstock. X 49½.

Fig. 11. *Descorbina turbo* (d'Orbigny) (after Bagg)
Upper Marlboro. X 84½.

Fig. 12. *Truncatulina lobatula* (Walker and Jacob) (after Bagg)
Upper Marlboro. X 87.

Fig. 13. *Pulvinulina exigna* var. *obtusa* Burrows (after Bagg)
1 mile northeast of Piscataway. X 92½.

PLATE III. EOCENE FORAMINIFERA FROM MARYLAND

Plate IV. Miocene Foraminifera from Maryland

Fig. 1. *Globogerina bulloides* d'Orbigny (after Bagg)
Chesapeake Beach. X 60.

Fig. 2. *Cristellaria cultrata* (Montfort) (after Bagg)
Crisfield well. (776 feet). X 30.

Fig. 3. *Truncatulina varibilis* d'Orbigny (after Bagg)
Jones Wharf. X 58.

Fig. 4, 5. *Polystomella striatopunctata* (Fichtel and Moll)
(after Clarke). This is a Pleistocene specimen from
Wailes Bluff. X 35. (Also found in the miocene)

Fig. 6. *Bolivina beyrichii* var. *alata* Sequenza (after Bagg)
Chesapeake Beach. X 47.

Fig. 7, 8. *Textularia articulata* d'Orbigny (after Bagg)
7. Specimen from Plum Point. X 48½.
8. End view of the same.

Fig. 9, 10. *Textularia sagittula* Defrance (after Bagg)
9. Specimen from Plum Point. X 40.
10. End view of the same.

Fig. 11. *Textularia agglutinans* d'Orbigny (after Bagg)
Governor Run. X 40½.

Fig. 12. *Polymorphina compressa* var. *striata* Bagg (after Bagg)
Type specimen. Jones Wharf. X 29½.

Fig. 13. *Sagrina spinosa* Bagg (after Bagg)
Type specimen. Jones Wharf. X 35½.

Fig. 14. *Polymorphina regina* Brady, Parker and Jones (after Bagg)
Chesapeake Beach. X 37.

Fig. 15. *Uvigerina pygmaea* d'Orbigny (after Bagg)
Norfolk well (645 feet). X 26.

Fig. 16, 17. *Polymorphina lactea* (Walker and Jacob) (after Bagg)
16. Specimen from Jones Wharf. X 38½.
17. Another view of the same.

Fig. 18. *Discorbina orbicularis* (Terquem) (after Bagg)
Jones Wharf. X 67½.

Fig. 19, 20. *Nonionina scapha* (Fichtel and Moll) (after Bagg)
19. Specimen from Chesapeake Beach. X 50½.
20. Another view of the same.

PLATE IV. MIOCENE FORAMINIFERA FROM MARYLAND

The best way to study Foraminifera is by the use of a wide field binocular-scope equipped with objectives and eye pieces to give a range of magnification from ten to thirty times. The binocularscope has the advantage of wide field and depth of field without reversal of the image. It is also possible to work much more easily with the sample, as the objective is far enough away from the "forams." A microscope, or even a magnifying glass may be used, however.

In order to examine the sample thoroughly, a small amount of the material is sprinkled evenly on the bottom of a shallow black box which has been marked off in squares of some convenient size. (The author uses squares of one-half inch). The amount of material should be such that the individual forms stand out readily; too much material crowded together makes it difficult to see the Foraminifera. The size of the box used is a matter of preference, a box 4 by 6 inches serving very well. By moving the box from square to square, the entire box of material can be viewed in a short time.

Individual forms may be separated out by the use of a needle, the eye end of which has been inserted into some type of holder. A small bit of wax on the point of the needle will allow any single form to be readily picked up and transferred. Another way to pick out individual forms is to use a dampened brush of the smallest size available (Series 00). After a little practice, one becomes quite adept at separating individual forms for mounting.

It is possible to get a concentrate of Foraminifera from a cleaned sample by "floating" them off with carbon tetrachloride. A sample containing "forams" is placed in a container and the carbon tetrachloride is poured over it. The hollow tests will rise to the surface and can be caught by pouring off the liquid through filter paper. This method gives a very beautiful concentrate of "forams" with only very little foreign material.

Another way of concentrating the Foraminifera is by placing a small bit of sample in a large watch glass and spinning the material. The tests which are lighter will collect around the outside rim of the watch glass, while the heavier material will remain in the center. This method is similar to that used in panning gold.

Mounting

After the material has been looked over and the different species have been picked out, the next problem is that of mounting the forms in some convenient way for labeling and preserving them against loss and crushing. Several cardboard slides are on the market made for this particular purpose.

There are two kinds of slides generally used, the choice of which depends on whether an individual specimen or a complete fauna from a particular locality is to be mounted. The slide for a single specimen is made from two layers of cardboard with the top layer punched with a circular opening. A piece of black paper is placed in between the two cardboards and the layers are glued together. Labeling of the specimen can be done on the margin of the slide. In order to protect the specimen from breakage, a very small cover glass can be cemented over the opening in the cardboard.

The faunal slide is made in much the same way except that the opening is rectangular and the black background is divided into numbered squares. In this way, the specimens may be cataloged very easily. There are also on the market metal sheaths for these slides which allow the rectangular opening to be covered

with a glass slide. Thus it is very easy to slip the slide out if a specimen needs to be moved or turned over.

The Foraminifera are fastened to the slides with gum tragacanth or gum arabic. These powdered gums are available at any drug store and can be dissolved in warm water until the desired consistency is reached. For small "forams", a much thinner consistency is needed. If the space where the specimens are to be mounted is first painted with the gum solution and allowed to dry, it is only necessary to moisten the place slightly before securing the specimen. If at a later time it is desirable to move the specimen, all that needs to be done to loosen it is to moisten again. Other glues on drying will tend to crack the "foram", and if they are not water soluble, the specimen is permanently fixed.

Other types of slides, such as hollowed glass, are available but they are usually expensive and not as suitable for all types of work.

Evolutionary Trends

The Family Miliolidae is a good example of the evolutionary development found in Foraminifera. Examples from this family show very clearly the development of the test along certain well defined lines. Keeping in mind that there are two forms to each species the microspheric and megalospheric form, it is possible to make cross sections of genera in this family and see clearly how the history of the family is repeated in the development of the test. The microspheric form with its small proloculum will reflect in the early chambers the development of the family while the megalospheric form either will omit or will show only partially this development.

Quinqueloculina (Figure 1) derives its name from the fact that the chambers are added about an imaginary elongated axis in such a manner that the chambers in the adult form are 72 degrees apart. Five chambers are visible in the adult from the outside. Each new chamber is added to a shifting plane around this axis. See Page 16.

From the proloculum, chamber number 2 is added as shown in Figure 1. This second chamber is a short coil about the proloculum and represents a characteristic of an ancestor which was coiled in one plane about the proloculum.

In a longitudinal section, the proloculum (1P) and second chamber (2) may look like Figure 2a. If a median section through the proloculum is examined such as in Figure 2b or along the dotted line AB in Figure 2a, if the coil is long enough, the second chamber may appear on opposite sides of the proloculum.

Chamber 3 is added next in plane A, 144 degrees from chamber 2 (Fig. 1). Chamber 4 is added in plane B 144 degrees from A. This method of addition is continued with each chamber partially embracing the preceding chambers. After chamber 7 has been added, the Foraminifer has reached the form of the adult, that is, a chamber in planes A, B, C, D, and E each 72 degrees from each other.

The only difference between the microspheric and megalospheric forms in *Quinqueloculina* is the size of the proloculum. In the megalospheric form, the proloculum is much larger than in the microspheric form. If we take *Quinqueloculi* as the basic form for one of the trends of development in the Family Miliolidae, can observe other forms in this family which retain the basic arrangement of *Quinqueloculina,* at least in their early chambers of the microspheric form. In later chambers, the other forms may tend to decrease the number of chambers visibl from the outside, for example, *Triloculina* to three, *Biloculina* to two, and *Idali* to one.

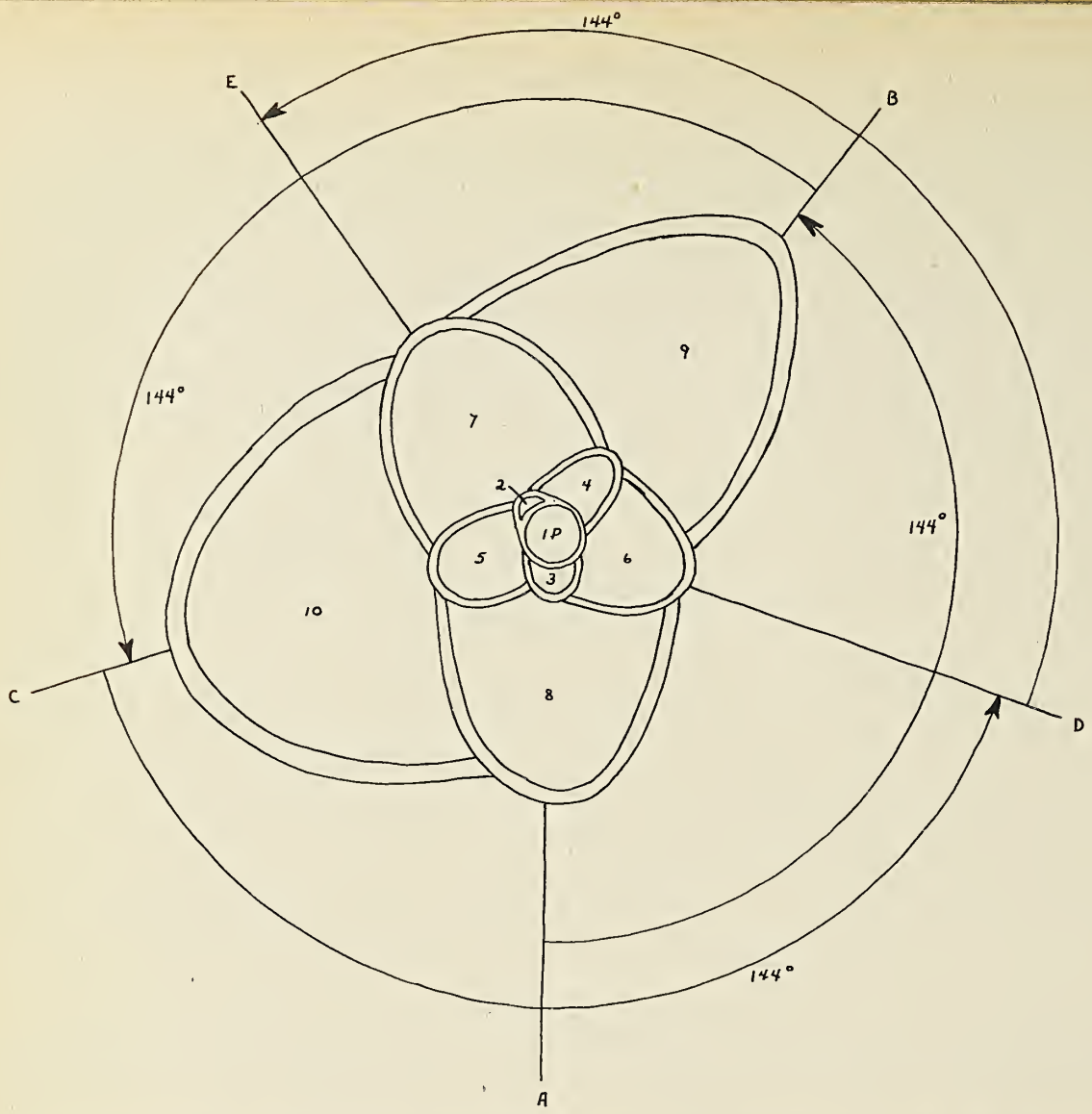

Fig. 1. Diagrammatic median section of *Quinqueloculina* showing how the chambers are added around an imaginary axis every 144 degrees. A-E are the planes in which the chambers are added. Chamber 1P is the proloculum and the rest of the chambers are numbered as new ones are added.

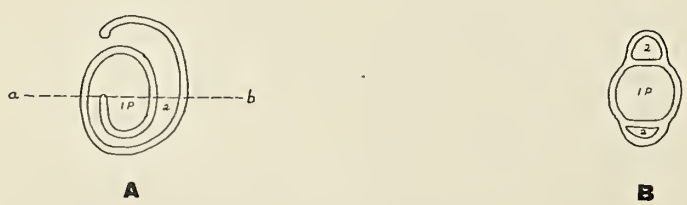

Fig. 2. Sections of the proloculum and second coiled chamber. a. Diagrammatic longitudinal section parallel to the elongate axis showing the proloculum (1P) and the second coiled chamber. (2). b. Diagrammatic median section at right angles to the elongate axis showing the proloculum (1P) and coiled second chamber (2) on opposite sides of the proloculum.

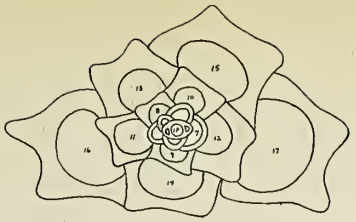

Fig. 3. *Quinqueloculina regosa* d'Orbigny (from Cushman adapted from Schlumberger), X 220. This form shows smooth early chambers with progressively more angular chambers of the adult.

Triloculina, whose outside chambers are 120 degrees apart, has an inner arrangement in the microspheric form like *Quinqueloculina* (chambers 144 degrees apart). A median section of the microspheric form of *Triloculina schreiberiana* d'Orbigny is shown in Figure 4a. Beginning with the proloculum (1P), the first seven chambers are added in planes 144 degrees away from each other, just as the development of *Quinqueloculina*. With the addition of chambers 8, 9, and 10, however, a new character of arrangement is assumed with the chambers being added every 120 degrees.

A B

Fig. 4. *Triloculina schreiberiana* d'Orbigny (from Cushman adapted from Schlumberger). a. Microspheric form, X 48½. b. Early chambers of the megalospheric form, X 98.

The megalospheric form, as stated before, is more progressive and only shows a part of the quinqueloculine stage. The early chambers of the megalospheric form of *Triloculina schreiberiana* d'Orbigny are shown in Figure 4b. The proloculum 1P is followed by the spiral chamber 2. Chambers 3-5 are irregularly placed but they are nearly 144 degrees apart as in *Quinqueloculina*. The complete quinqueloculine stage is not present, however, because in chambers 6-9 the chambers are added 120 degrees apart. Thus the megalospheric form reaches the stage of *Triloculina* much sooner (chambers 6-9) than the microspheric form (chambers 11-16).

The next stage in further reduction of the final number of chambers is demonstrated by the median sections of *Biloculina ringens*, Figure 5. In the microspheric form, Figure 5a, the proloculum (1P) is followed by the characteristic coil of chamber 2. In this case, the second chamber is only one-half a coil in length. Therefore, it is cut only once by the median section. Chambers 3-8 represent the quinqueloculine stage with chambers added every 144 degrees. With the addition of chamber 9, the triloculine stage begins and the chambers from 9 to 14 are added 120 degrees apart. The last development in this form starts with chamber 15 which brings about a new arrangement. This forms the biloculine stage which has chambers added every 180 degrees. Continuing from chamber 15, the rest of the chambers are added 180 degrees apart. The microspheric form of *Biloculina*, then, repeats the coiled chamber (chamber 2), the quinqueloculine stage (chambers 3-8) and the triloculine stage (9-14) before it reaches the adult stage of *Biloculina* (14, 15, etc.).

Fig. 5. *Biloculina ringens* (from Cushman adapted from Schlumberger). a. Early chambers of microspheric form, X 74. b. Megalospheric form, X 120.

The megalospheric form of *Biloculina ringens* is quite different from the microspheric in that the progression to the adult biloculine arrangement is shorter. In Figure 5b, the megalospheric form of *Biloculine ringens* is illustrated. First we have the proloculum (1P) followed by the coiled chamber 2. Chamber 3 initiates immediately the triloculine stage skipping entirely the quinqueloculine arrangement found in the microspheric form. This triloculine stage is continued through chamber 10. The change from *Triloculina* to *Biloculina* is begun with chamber 10, which is approximately 150 degrees from chamber 9. Likewise the angle is the same between chamber 10 and 11. The biloculine plan, however, is begun definitely with chamber 12 which is 180 degrees from chamber 11. Thus we have an accelerated growth in the megalospheric form which leaves out the quinqueloculine stage and reaches the biloculine stage with the addition of chamber 12 whereas the biloculine stage in the microspheric form is reached only after the addition of chamber 15.

Figure 6 shows a median section of *Biloculina murrhyna.* This megalospheric form begins the biloculine stage immediately after the addition of the coiled chamber 2. The quinqueloculine and triloculine stages are completely omitted. It is interesting to note the very large size of the proloculum (1P) and relatively small size of the coiled second chamber (2).

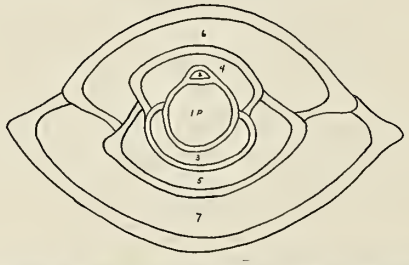

Fig. 6. *Biloculina murrhyna* (from Cushman after Schlumberger). Megalospheric form showing how the quinqueloculine and triloculine stages are omitted. X 298.

A higher development than Biloculina is found in the genus *Idalina* which goes one step further than adding chambers 180 degrees from each other. In this form the final stage is a single chamber added around the biloculine stage. In the microspheric form, there is a repetition of the quinqueloculine, triloculine and biloculine stages before the final single chamber or chambers are added. In the megalospheric form, the development may either be accelerated such as found in *Biloculina ringens* (Fig. 5b), or the chambers may immediately be added at 180 degrees from the proloculum.

The highest development reached by this group of the Miliolidae is represented by the uniloculine stage in which the microspheric form reflects the development of the quinqueloculine, triloculine, and biloculine arrangement.

The order of arrangement in this group is always the same, the microspheric form showing all the stages, the megalospheric showing them partially or skipping over some stages. Thus we have in the Family Miliolidae a very good example of the development of a form along very definite lines. The fundamental arrangement is quinqueloculine, progressing to the simpler triloculine, then to the biloculine, and finally evolving to the simplest form, the uniloculine. Foraminifera as a whole contain many such examples, some of which are not quite as striking as in the Miliolidae, but nevertheless show similar trends of development.

Economic Importance

Foraminifera are interesting as a purely scientific study in which one learns of their habitat, their intricate unicellular structure, their means of reproduction through alternation of generations, and their place in the evolutionary scale of life; but Foraminifera have an aconomic importance as well. These minute fossils have a place in our highly mechanized life that can mean a savings of millions of dollars in one of our most important industries--petroleum.

One of the great factors onf chance in the location and drilling of oil wells is eliminated if stratigraphic correlations in an oil bearing region can be made on the basis of Foraminifera. Coupled with a structural knowledge of a petroliferous region, Foraminifera can be depended upon as accurate signposts or markers of incalculable value to the oil engineer.

Contrary to the views of early workers in the field of micropaleontology, most species of Foraminifera live for only a very short geologic period of time. Therefore, layers of sediment of differing ages can be distinguished by the species of Foraminifera found within them. Likewise, large beds of one age may be further subdivided into zones of only a few feet in thickness by the species which occur. It must be understood that zoning of geologic beds is not altogether based on Foraminifera as some sediments do not even have these fossils present. However, in oil geology, Foraminifera are much more convenient than other fossils for identifying geologic beds as we shall see presently.

One of the important jobs of a petroleum geologist working in sub-surface geology is the making up of a stratigraphic chart of a region and, if possible, the zoning of the various formations. If Foraminifera are present throughout the entire geologic section, these charts are constructed so that by correlating with the chart, the species found while drilling, the sub-surface geology of the well can be quickly and easily determined. For example, let us say that a particular oil bearing horizon contains a distinctive species of Foraminifera. If the sequence of beds overlying the oil reservoir for the region is known and has been zoned, then the depth of a new well in the same region can be determined from the constant comparison of the zones found with the chart.

To the petroleum geologist, the actual species names of forms is not as important as a quick means of identification. Much time could be wasted in actually looking up the specific name of a Foraminifer. Usually a sufficient identification of a form will be the generic name with some abbreviation following it to indicate the age relationship and a number to identify the species. For example, *Nodosaria* Ea - 1 would indicate a species of *Nodosaria* from the Eocene, Aquia formation; or *Quinqueloculina* Mc - 2 would indicate a species of *Quinqueloculina* from the Miocene, Calvert formation. After the paleontology of an oil region has been worked out, sections showing the characteristic Foraminifera can be made up and the beds zoned. These sections or charts are then used to govern the drilling of each new well in the region.

Table I shows a hypothetical example of the occurrence of Foraminifera in a

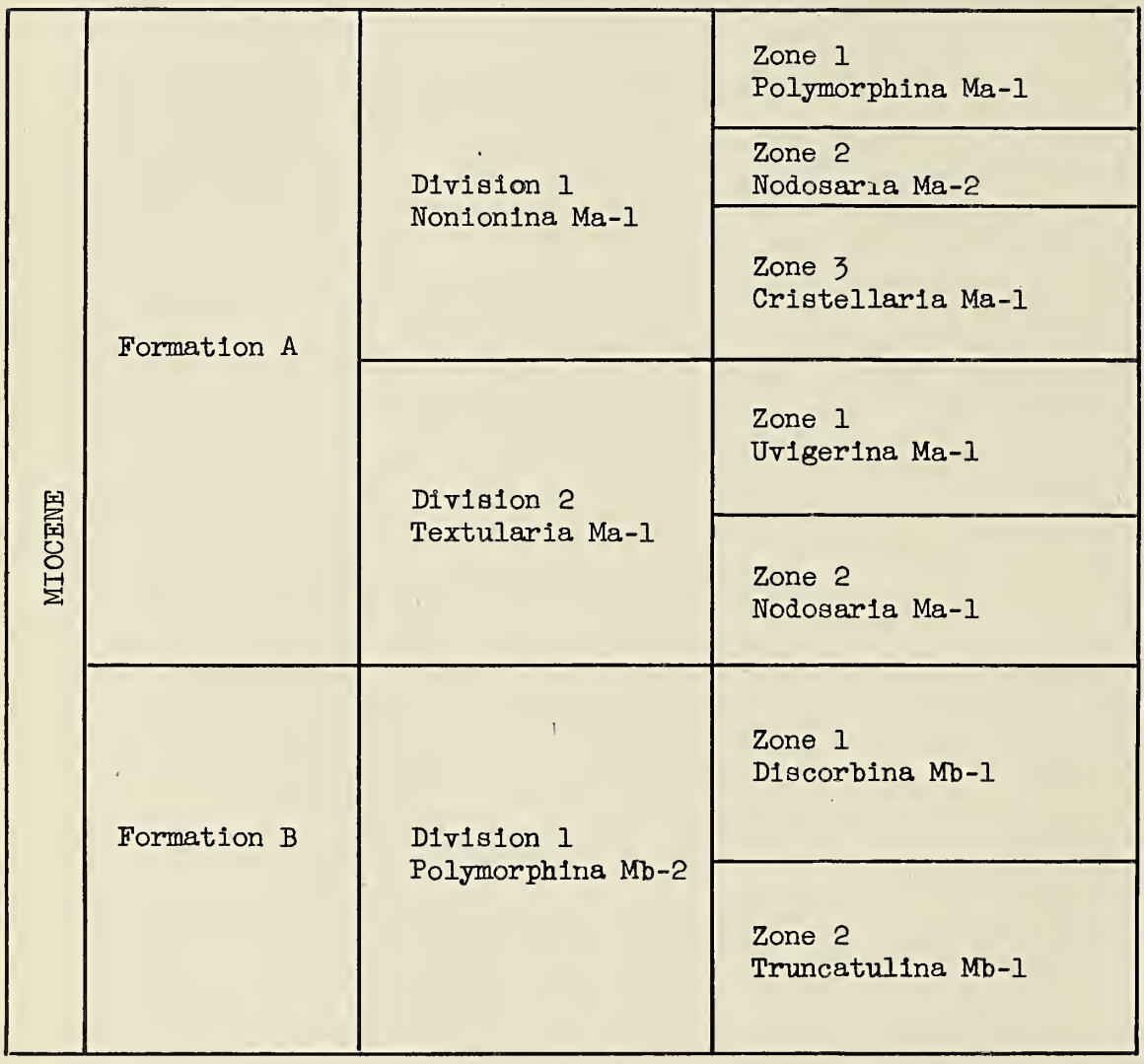

Fig. 7. Portion of hypothetical stratigraphic chart showing how Foraminifera are used for zoning. Chart made from the data of Table 1.

Formation	Feet from top of the Formation	Mb-1 Anomalina	Ma-1 Nodosaria	Ma-1 Nonionina	Ma-1 Globogerina	Mb-2 Polymorphina	Ma-1 Miliolina	Ma-1 Polymorphina	Mb-1 Truncatulina	Ma-1 Textularia	Mb-1 Rotalia	Ma-1 Spiroloculina	Mb-1 Discorbina	Ma-2 Nodosaria	Ma-1 Bolivina	Ma-1 Cristellaria	Ma-1 Uvigerina
A	10 feet			C	C			C							C		
	20			C	F			C									
	30			C	F			F									
	40			F	C									C			
	50			F			R							C	C		
	60			F	R											F	
	70			C	C							R				C	
	80			F	F											C	
	90			C	F					R						C	
	100									C							C
	110				F					F							C
	120				C		R			C							F
	130				C		C			F							F
	140		F		C					F							
	150		C		F					C		R			F		
	160		F		C		R			C							
	170		C		C		R			C					R		
B	10 feet				C	C					C		C		R		
	20				R	F							F				
	30	R				F					R		F				
	40					R							C				
	50					C			R				C				
	60					C			C		R						
	70					F			C								
	80	R				F			F								
	90					F			F								
	100					C			C		C						

C - Common F - Frequent R - Rare

Table 1. Portion of hypothetical well core showing the distribution of Foraminifera.

core taken from an oil well. From the data contained in Table I, a stratigraphic chart may be set up as in Figure 7. The forms found in Formations A and B of Table I were zoned by utilizing certain Foraminifera. The forms selected for the zoning have very short vertical ranges, for example, *Polymorphina* Ma - 1 is found only in the upper 30 feet of Formation A and would indicate a usuable zone to the geologist as would *Nodosaria* Ma - 2 which is found only from 40 to 50 feet from the top of Formation A. The stratigraphic chart is, then, set up from the Foraminifera which clearly indicate particular zones.

Foraminifera are particularly adapted for use in the petroleum industry for a number of reasons. In the first place, the tests of these animals are so small that they will not be broken or destroyed by the drills used in the industry. In the case of large fossils, there is very little chance of obtaining complete specimens from a well that is being drilled as the drills themselves do not cover a sufficiently large surface area. In the case of Foraminifera, it is not necessary to get a big sample from the bottom of the well in order to find a great number of Foraminifera as they are usually quite abundant.

In order to see how samples can be taken from oil wells (which sometimes reach great depths), it is necessary to know something about the drilling methods used. There are two methods, the percussion and rotary drill, the choice of which depends upon expense, type of rocks to be drilled through, and depth of the final well.

In the percussion method, the well is dug by breaking up the rock by pounding and then removing the broken material with water. The bit of the power driven tool used is usually about 5 feet long with a larger weight above it attached to the suspending cable. When the bit becomes dull, the cable and tool is hoisted out of the well and replaced. A bailer is then attached to the cable and let down in the well to bail out all tne loose material that has accumulated. This bailer consist of a long tube (usually 25 to 30 feet long) with a valve in the bottom which allows the mud and water to be taken back to the surface. It is from this bailer that the sample of Foraminifera is taken.

A rotary drill consists of a round cutting tool which is lubricated in the well by mud. This type of drilling produces a core which can be examined for microfossils.

Both methods or drilling are very expensive. Even a moderately deep well may cost $50,000, so if the Foraminifera found indicate a "dry" well, much needless expense will be avoided. It is thus apparent that an intensive study of one-celled fossils which lived millions of years ago can mean dollars in our pockets and gas in our cars today. Foraminifera are signposts from the past toward the future.

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Preliminary Notes on the Phalangida (Harvestmen) of Maryland

by Martin H. Muma

A systematic study of the arachnids found in Maryland was started in October, 1940. Since that time spiders, scorpions, false scorpions, harvestmen, ticks, and mites have been collected, preserved, and catalogued pending their indentification. The first group, the spiders, have been given the most attention as they are represented by a large number of species and as literature and equipment facilitating their study was more easily obtained. As only two scorpions were found the problem of identifying and recording them was simple (See Bull. Nat. Hist. Soc. of Md., September-October 1942, Vol XIII, No. 1, page 12). The false scorpions were turned over to Mr. Irving P. Schloss for study (See Bull. Nat. Hist. Soc. of Md., September-October 1942, Vol XIII, No. 1, page 12). It is hoped that this paper will serve both the purpose of introducing the harvestmen, and of listing the species thus far recorded.

The order Phalangida comprises a group of animals often seen by naturalists but seldom studied. These interesting arthropods are known variously as daddy-long-legs, harvestmen, harvest-spiders, and shepherd-spiders. They are characterized by a short, more or less oval-shaped body composed of two regions, a cephalothorax and an abdomen, and extremely long slender legs. Less distinctive characteristics are the presence of nine abdominal segments, two eyes situated on a tubercle near the center of the cephalothorax and a pair of scent glands located near the fore legs. Of their habits and biology little is known other than the facts that they walk with the body hung low near the middle of the legs rather than high, the eggs are laid in the ground, under stones, or in cracks in wood, and the adults hide during the day. They are often found congregating in great numbers, on the sides of trees, barns and houses, and in caves. There is some difference of opinion as to what the harvestmen eat; some workers state that they eat living insects while others record them as feeding on dead insects and soft vegetables and fruit.

Taxonomically the order in the United States is divided into three suborders: the Cyphophthalmi, the Mecostethi, and the Plagiostethi. The suborder Cyphophthalmi contains three western species comprising a single genus. In the Mecostethi thirteen species representing three families and nine genera are found. There are four families, twenty-two genera, and forty-two species in the suborder Plagiostethi. The largest family of harvestmen is the Phalangiidae which contains fifteen genera, one of which, the genus Leiobunum, is represented by sixteen species. Altogether our fauna comprises thirty-two known genera and fifty-six known species.

The phalangid material collected in Maryland was sent to Dr. Clarence J. Goodnight of the University of Illinois for identification. Of the thirty vials of material sent to Dr. Goodnight all but twelve contained immature specimens most of which were Leiobunums. The species identified are listed below followed by locality records. Unless otherwise noted collection was made by the author.

Family-Phalangodidae

Genus-Phalangodes

Phalangodes acanthina (Crosby and Bishop)

Records-Six specimens collected in leaf mold at College Park.

Family-Phalangiidae

Genus-Hadrobunus

Hadrobunus grandis (Say)

Records-One specimen collected on tree trunk near Deep Creek Lake.

Hadrobonus maculosus (Wood)

Records-Two specimens collected at Berwyn by Dr. Walter F. Jeffers. One specimen collected at College Park, by Mr. E. Gerald Meyer.

Genus-Leiobunum

Leiobunum bicolor (Wood)

Records-Three subadults from the zone of partial darkness in John Friend's Cave near McHenry.

Leiobunum calcar (Wood)

Records-One specimen collected on tree trunk near Deep Creek Lake.

Leiobunum verrucosum (Wood)

Records-Three specimens collected at Berwyn by Dr. Walter F. Jeffers. One specimen collected under bark at College Park.

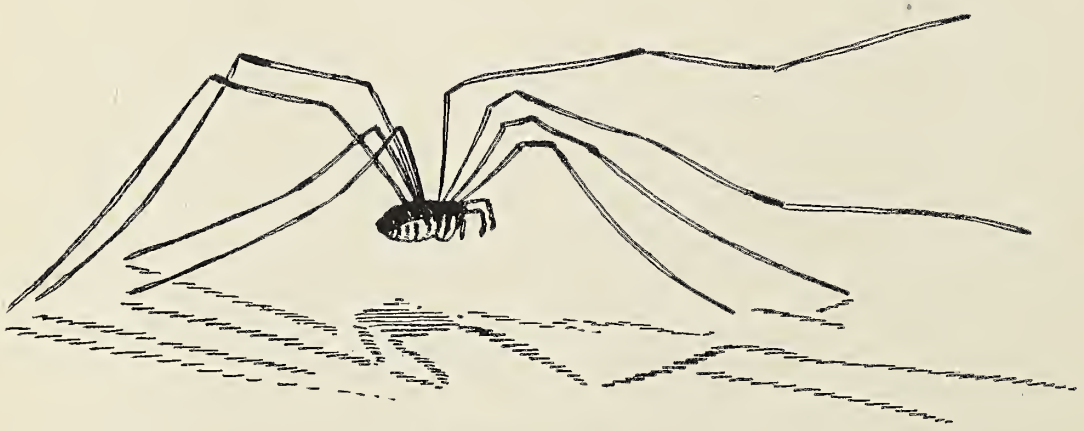
Leiobunum vittatum (Say)

Records-One specimen collected at Berwyn by Dr. Walter F. Jeffers.

Genus-Odiellus

Odiellus sp.

Records-One specimen of a species of this genus which according to Dr. Goodnight "appears somewhat unusual" was collected near Deep Creek Lake.



A Harvestman

MARYLAND FORESTS

by Karl E. Pfeiffer, Assistant State Forester

In the matter of tree growth, Maryland is a border state, as it was politically in the Civil War. Part of it is sympathetic to the South and part to the North, and part is betwixt and between.

Woodlands in the State can be roughly divided into three classes that correspond with the physiographic provinces, namely, the Coastal Plain, comprising the Eastern and Western Shores as far as the fall line which is roughly the Baltimore and Ohio main line from Deleware to the District of Columbia; the Piedmont Plateau, from the fall line to the Catoctin Mountains in Frederick County; and the Appalachian Plateau, from the Catoctin Mountains to the Western boundary along the West Virginia line in Garrett County.

In the Coastal Plain can be found trees that are of the South, such as cypress, loblolly pine, red gum, swamp cottonwood, southern white cedar, along with various other species.

In the Appalachian Plateau are found trees native to the north, such as white pine, spruce, hemlock, larch, sugar maple, yellow birch, basswood, cucumber, and many other varieties.

Between these are found a mixture of trees common to both the others and to the general Eastern section of the country, such as various oaks, Virginia pine, chestnut, and others.

Several species are found in all the counties of the state, among them tulip poplar, white oak, pitch pine, red maple and black gum.

Altogether there are some 157 varieties in this State, of which some 70 are of commercial value. The others are more of local value for fire wood and the like.

The forested area of the state now comprises some 2,223,000 acres or about 35% of the land area. Most of this woodland is in farm woodlots.

The early history of the state shows that extensive clearings were made in the woodlands, for when the settlers came they found vast areas of forests as well as open land.

"On the plains and in the open fields there is a great abundance of grass, but the country is, for the most part, thickly wooded. There are a great many Hickory trees and Oaks so straight and tall that beams, sixty feet long and $2\frac{1}{2}$ feet wide, can be made of them. The Cypress trees also grow to a height of 80 feet, before they have any branches and three men with arms extended can barely reach around their trunks." (As quoted from a letter sent back to England by one of the early immigrants). This clearing went on until about 1900, when the United States Census shows that the improved farmlands had reached a peak, and it has been declining since then. This has been due to the wearing out of some of the submarginal land and the abandonment of these farmlands.

The Coastal Plain has more woodland than any of the other physiographic provinces, with Appalachian Plateau next and the Piedmont least. This can be accounted for by the fact that the Coastal Plain is greater in area, and that the Piedmont Plateau has a greater number of farms and better farmland, while

the Appalachian Plateau is mountainous. The County with the greatest percent of woodland is Garrett, with 63% of the area in forest, while Carroll has the least, only 13%. Approximately 56% of Maryland's forest area is in the following eight counties arranged in their order percent wooded.

Garrett	63%	Worcester	47%
Allegany	62%	Wicomico	46%
Charles	59%	Calvert	45%
St. Mary's	51%	Prince George's	41%

The following eight have more than 100,000 acres arranged in order.

Garrett	274,483 acres	Dorchester	138,291 acres
Charles	171,547 "	Prince George's	127,200 "
Allegany	163,832 "	St. Mary's	119,080 "
Worcester	148,182 "	Wicomico	111,608 "

At present the State owns 109,972 acres of land as State Forests and Parks as follows:

STATE FORESTS

Allegany County	Green Ridge	25,141 acres
Cecil County	Elk Neck	3,762 "
Charles County	Doncaster	1,464 "
Garrett County	Potomac	12,107 "
	Savage River	41,473 "
	Swallow Falls	7,133 "
Talbot County	Seth Demonstration	125 "
Prince George and Charles Counties	Cedarville	3,510 "
Worcester County	Pocomoke	11,453 "
	TOTAL	106,168 "

STATE PARKS

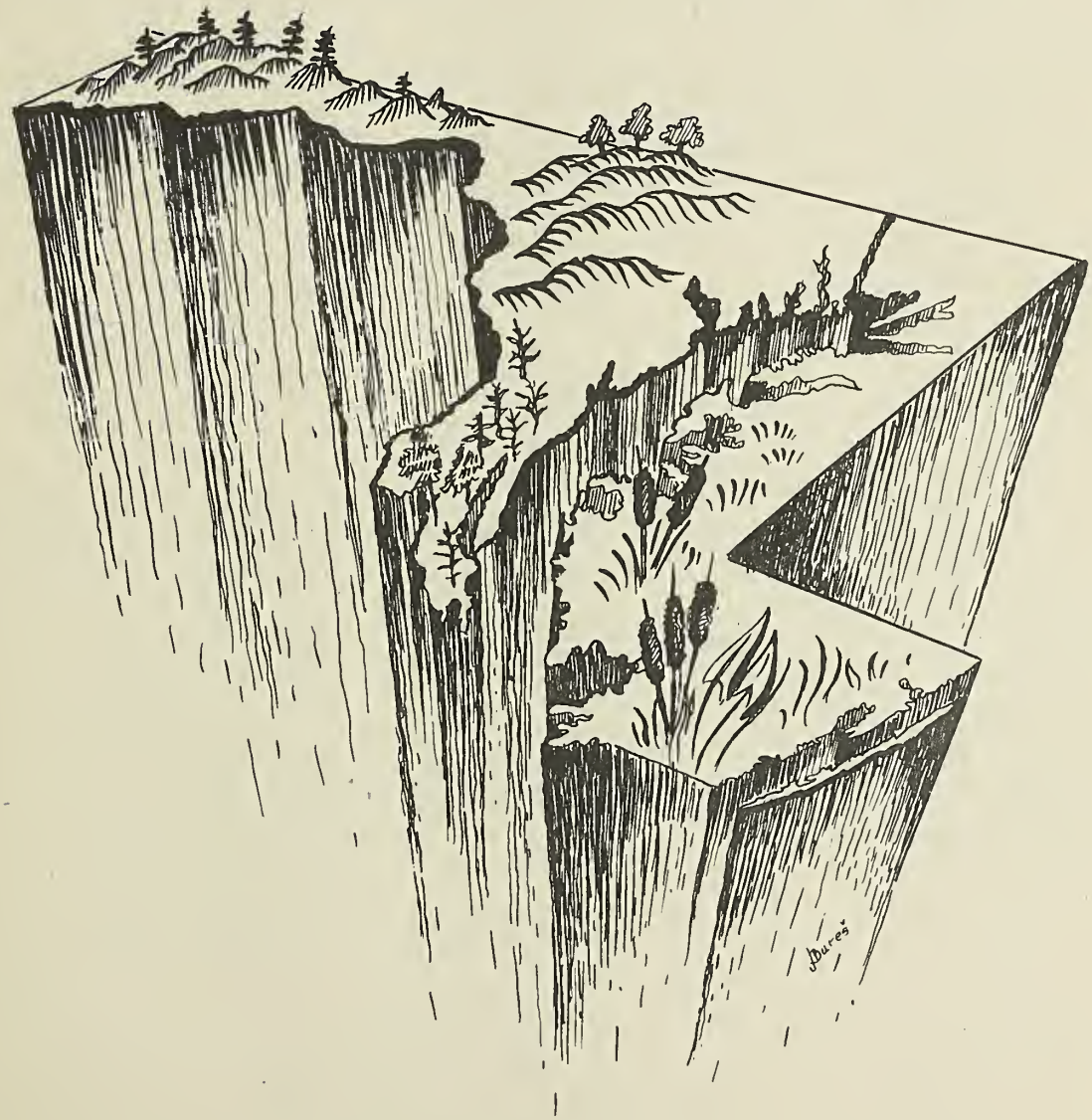
Baltimore and Howard Counties	Patapsco	1,563 acres
Frederick County	Gambrill	1,088 "
Washington County	Fort Frederick	279 "
	Washington Monument	45 "
	Fort Tonaloway	20 "
Cecil County	Elk Neck	808 "
Talbot County	Wye Oak	1 "
	TOTAL	3,804 "

It is hoped to increase this area so as to take in at least 200,000 acres of State Forests and Parks. The State Forests serve as sources of timber supply, experiment areas, and proving grounds. On these areas various methods of harvesting and growing trees are tried, and with the information and lessons drawn from the operations the private woodland owner will benefit. Besides timber growing,

recreational facilities are created and offered to the public. These State Forests, with the exception of small game plots, also are public hunting grounds and will always be maintained as such. The State Parks are primarily for recreation and are maintained as such. No hunting is allowed on these areas.

The State also offers woodland owners help in handling their tracts to the best advantage for themselves and the State as a whole. Advice is given in planting, if necessary, and when trees are ripe and ready for harvest, assistance is given in selecting the trees to cut, estimating them and valuing them so that the owner may get full return.

The greatest enemy of the trees is fire, which at all times should be kept out of the woods, so that nature in her bounteous way will go on supplying us with the wood we need now and will need in the future.



Lectures at the Society During SEPTEMBER, OCTOBER, NOVEMBER AND DECEMBER, 1943.

September 14--Lecture by Dr. Clyde Reed "Making of Lantern Slides".
21--Lecture by Richard E. Stearns "Sea Life".
October 12--Lecture by Gilbert C. Klingel "The Potomac River".
19--Lecture by Irving E. Hampe "Ornithological Research for Amateurs".
26--Lecture by Herbert C. Moore "Some Court Records Related to Natural History".
November 2--Lecture by John Lynn "The Geology of the Iron Regions of Minnesota".
9--Lecture by William A. Jenkins "The Forminifera of Maryland".
16--Lecture by Joseph F. Kaylor "Forestry as Related to Conservation".
23--Motion Picture "The Battle for Oil".
30--Lecture by Gilbert C. Klingel "The Patuxent River".
December 7--Motion Picture "Electronics at Work".

LECTURES TO OUTSIDE ORGANIZATIONS

September 5--Lecture to Church of the Redeemer Young People's Club, by George Maugans "Reptiles of Maryland".
22--Lecture to the Hydro-Electric Club, by George Maugans, "Herpetology".
November 2--Lecture to Sportsman's Luncheon Club, by George Maugans, "Snakes of Maryland".

JUNIOR DIVISION MEETINGS

September 4--Laboratory night.
11--Talk by James Hill "Hypnosis".
18--Lecture by Richard E. Stearns "Sea Life".
25--Talk by Franklin Atwell "The Spitting Cobra".
October 2--Laboratory night.
9--Discussion of Recent Junior Field Trip.
16--Lecture by Robert Buxbaum "Gwynns Falls-Scenic and Herpetological".
23--Lecture by Dr. Clyde Reed "The Taking of Natural History Notes".
30--Talk by James Hill "The Balance of Nature".
November 6--Motion Picture "The Flying Fisherman".
13--Quiz "Information Please".
20--Laboratory Night.
27--Talk by David Hardy "Poisonous Reptiles".
December 4--Lecture by Irving E. Hampe "Mammalia".
11--Demonstration by Joseph Bures on Dissecting.
18--Christmas Assembly.

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MARYLAND

A JOURNAL OF NATURAL HISTORY

BROAD-HEADED SKINK
Photographed by
August Selckmann

The Natural History Society of Maryland

APRIL 1944 VOLUME XIV No. 2

MUSEUM OF NATURAL HISTORY
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MARYLAND

A JOURNAL OF NATURAL HISTORY

FIFTEEN YEARS

Seven men with a common interest in the natural sciences and in natural phenomena banded together fifteen years ago and formed the Natural History Society of Maryland.

The Society started in one small room; the seven members had no equipment, no furniture and very little funds. The founding of the Society, however, fulfilled an urgent need in the life of the State of Maryland. It provided a meeting place where men and women concerned with the natural sciences could exchange and receive ideas and where they could achieve that mental companionship which is the stimulation for scientific work in general.

Today, fifteen years later, the Society has transmitted the enthusiasm of the original seven to a membership of nearly three hundred. The single small room is replaced by a museum and two three story buildings with lecture halls, laboratories, library and meeting rooms. Much research in Natural History has already been accomplished and much more is projected. Innumerable reports have been printed and the publications of the Society embrace many fields in natural science.

The Society has established its place firmly among the institutions of this state and looks to the future with optimism.

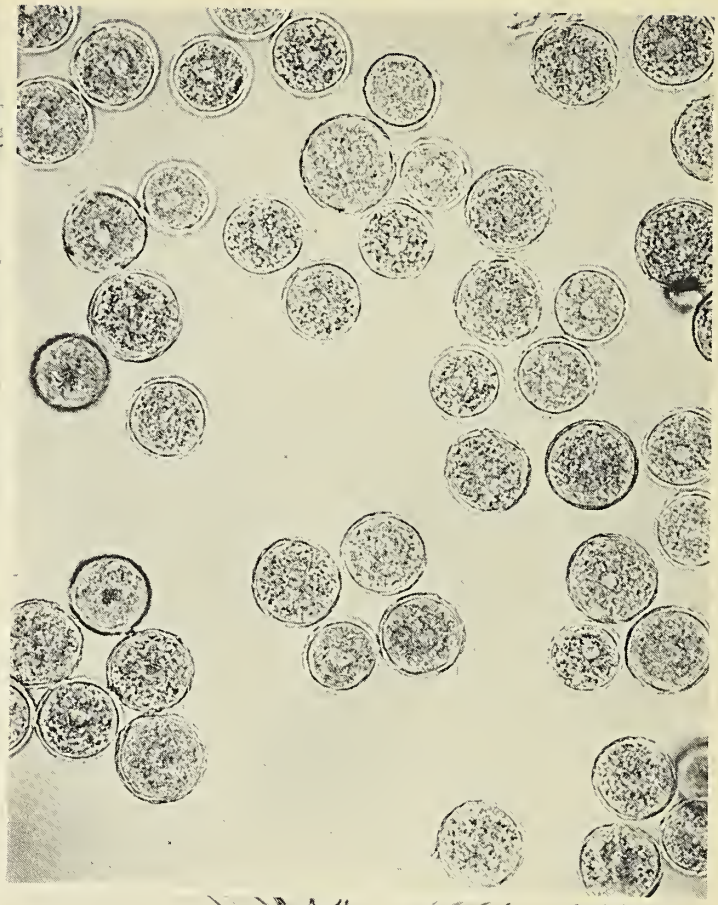
Gilbert G. Klingel
Trustee.

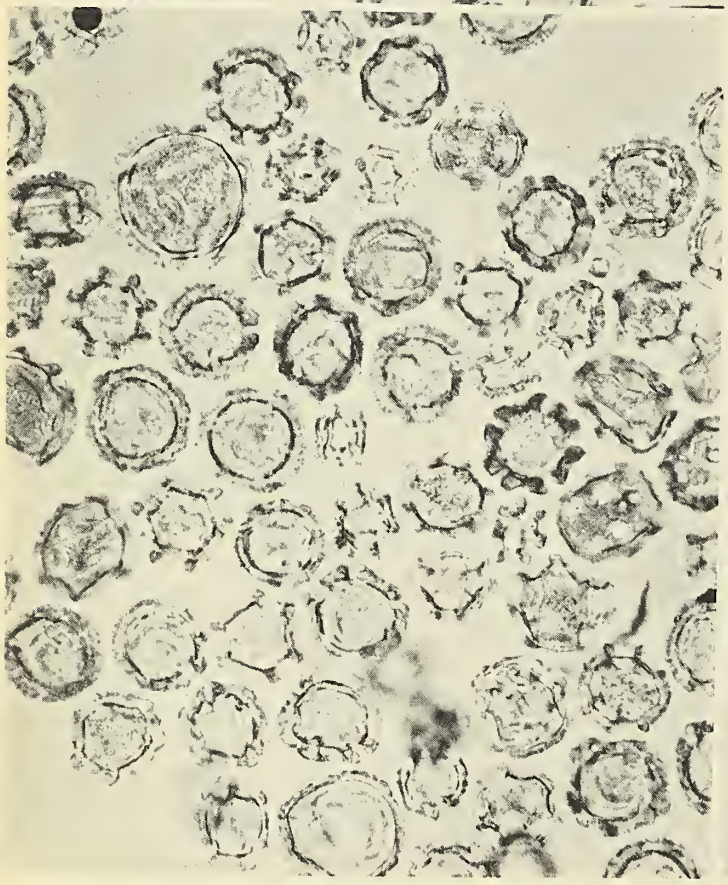
PUBLISHED by THE NATURAL HISTORY SOCIETY OF MARYLAND
2103 BOLTON STREET, BALTIMORE, MARYLAND
JANUARY, APRIL, JULY, OCTOBER

VOLUME XIV No. 2
APRIL 1944
A DOLLAR A YEAR

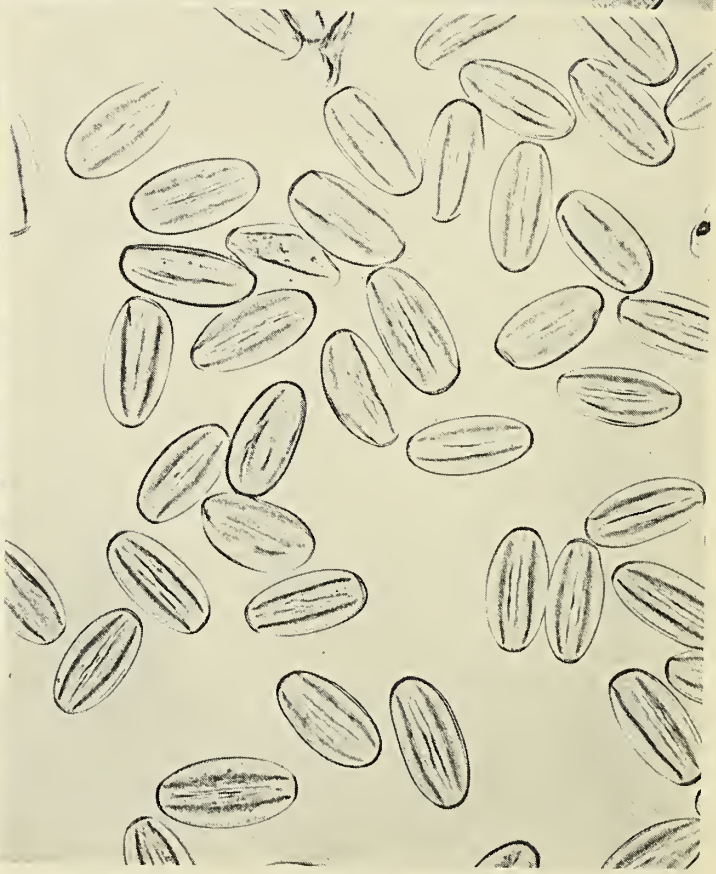
1. Pollen. Tulip Flower. X 100.

2. Pollen. Buttercup. X 400.





3. Pollen. Dandelion. X 400.



4. Pollen. Wild Rose. X 400.

POLLEN ALLERGY.

by Joseph S. Didusch, S.J.

About 15% of Americans are victims of diseases grouped under the generic term "allergy". The word itself is a very modern one. You will find it listed among new words in the 1933 edition of Webster's Unabridged Dictionary. But the diseases for which it stands are probably as old as dental caries (tooth decay), unmistakable evidences of which are found in the fossil skulls of the most primitive races of men. Indeed, our word "asthma" is borrowed literally from the ancient Greeks to whom deep, labored breathing was known as "asthma" and who called the victim who gasped for breath an "asthmatic". The blind bard Homer who sang his immortal verses in the streets of Athens eleven centuries before the Christian era, refers to it twice in his Iliad. Many years later, during the golden age of Pericles (490-429 B.C.), Hippocrates, the most renowned of ancient physicians and "Father of Medicine", wrote a dissertation on one of the food allergies, the effects of cheese on patients who were made ill by it.

Among the Latins, Aurelius Cornelius Celsus, who lived in the reign of Tiberius (19 B.C. to 37 A.D.), grouped the diseases which cause shortness of breath into three categories, dyspnea (hard breathing), asthma (labored breathing accompanied with wheezing, coughing and a sense of constriction) and orthopnea (inability to breathe except in an upright position). In the second half of the second century Aretaeus, a Cappadocian living in Rome, wrote two treatises, each consisting of four volumes, on "The Causes and Effects of Acute and Chronic Diseases" and on "Their Treatment", in which he accurately described the paroxysms of asthma. From that time until nearly four centuries ago, little of note appeared in medical literature on the subject.

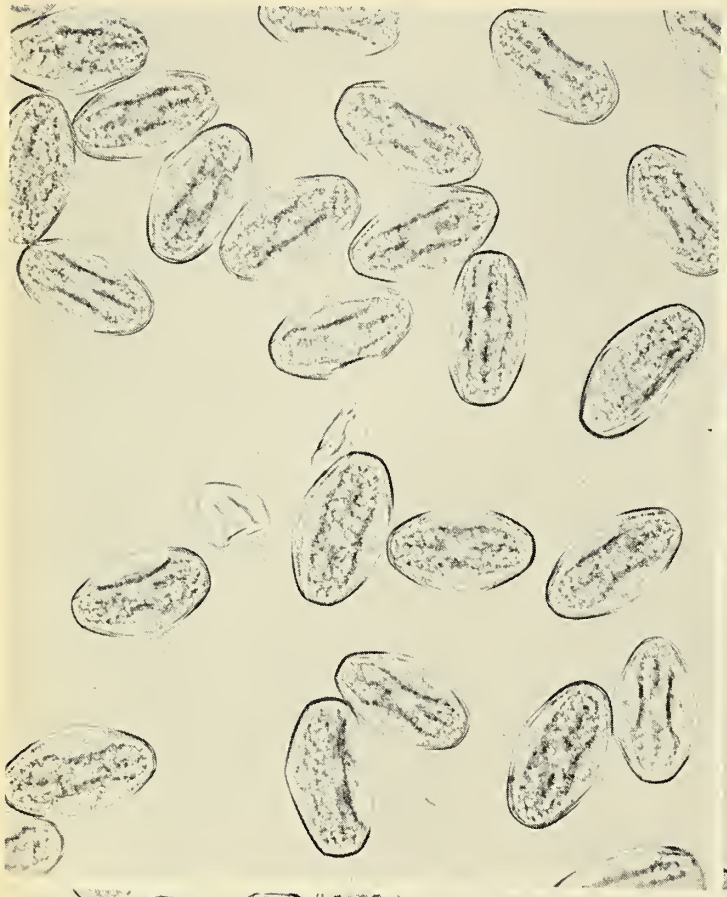
In 1575, Jerome Cardan, a renowned Padua physician, was summoned to England to attend the Archbishop of York who was suffering for many months from an aggravated attack of asthma. After a careful study of the patient's condition the doctor recommended certain changes in his diet and the removal of the feather bed on which he had been sleeping. The prelate's speedy recovery was regarded as miraculous. Dr. Cardan was far ahead of his times, for it was not until the end of the seventeenth century that asthma was identified as a definite disease entity which was caused by agents which are innocuous for most people.

Hay fever is probably as old an affliction as asthma, but it was not recognized until the beginning of the last century. In 1819, John Bostock who held the chair of physiology at the University of London, read a paper at a meeting of the Royal Medical and Chirurgical Society of London on "A Case of Periodical Affection of the Eyes and Chest". This was a seasonal incidence from which he himself had suffered from childhood. Later he described it as "Catarrhus aestivus" or "Summer Catarrh". We now call it hay fever.

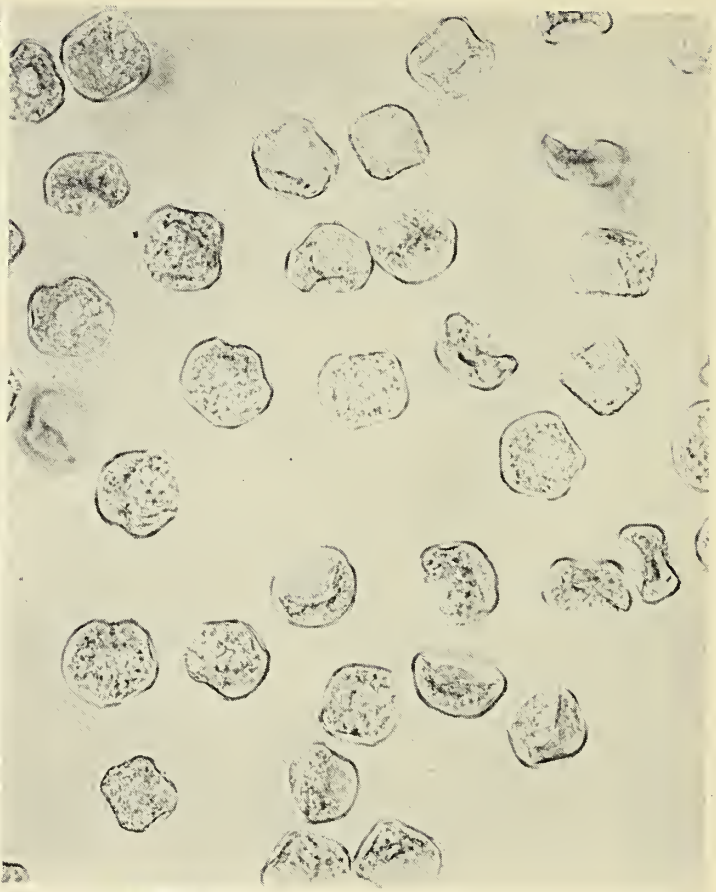
The first recorded experiment with hay fever carried out by a patient on himself, is that of a German physician, Dr. W. P. Kirkman. He had in his hothouse a solitary plant of sweet vernal grass (Anthoxanthum odoratum) which was laden with pollen. He removed the pollen, rubbed it in his hands and sniffed the powder into his nostrils. The result was an immediate attack of hay fever which lasted an hour. He was fortunate to get by so easily.

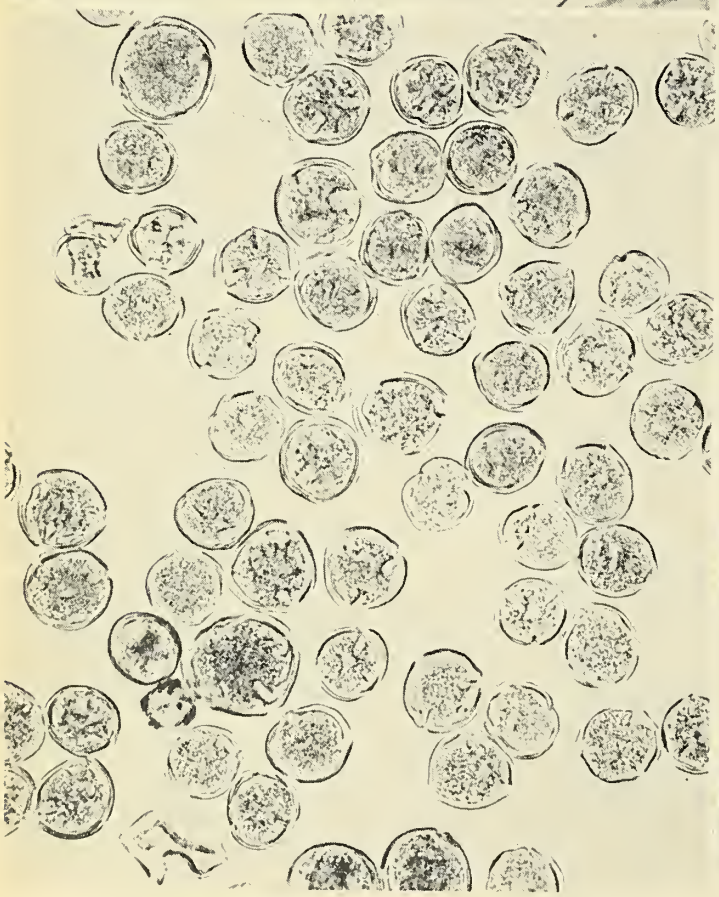
Credit for having proved beyond doubt that plant pollens are the cause of hay fever goes to Charles Harrison Blackley, of Manhattan, England. He performed on himself clinical tests with nearly a hundred different kinds of grass and flower pollens. It is a long cry from 1873, when these tests were made, to the present day, but our methods of hunting down allergies, except for some minor modifications, are the same as those which Blackley employed in his experiments.

5. Pollen. Flowering Dogwood. X 400.

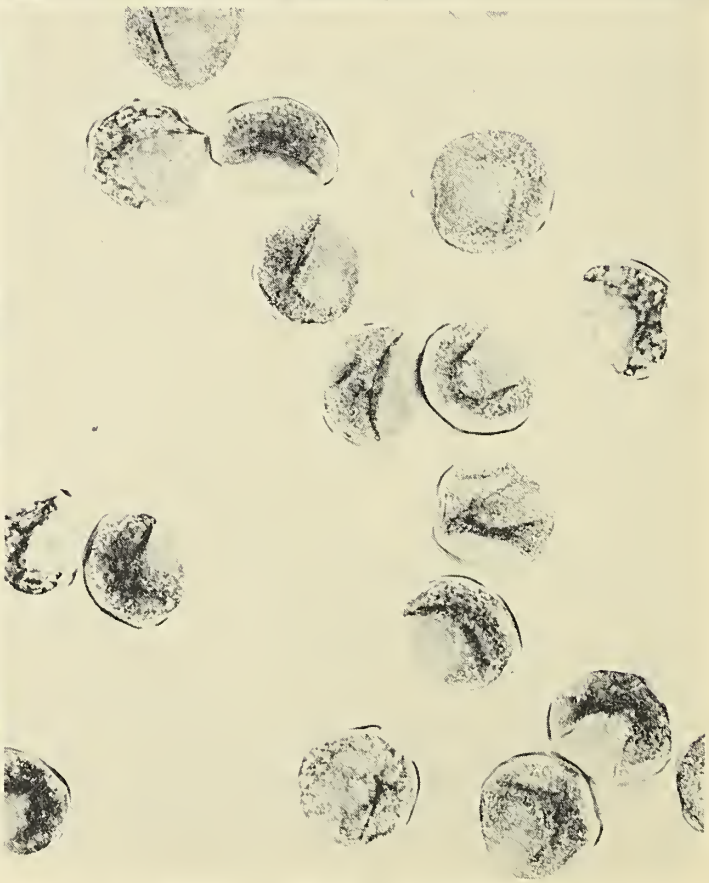


6. Pollen. American Elm. X 400.





7. Pollen. White Oak. X 400.



8. Pollen. Black Walnut. X 400.

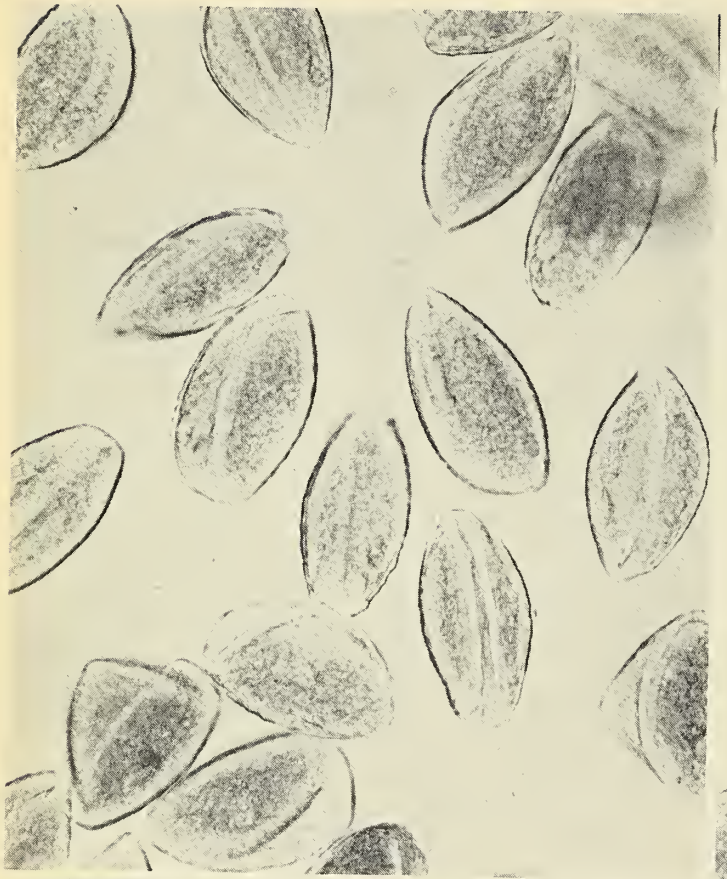
In America the first noteworthy contribution to the study of allergy came from Dr. Morrill Wyman. In his lectures at the Harvard University Medical School, in 1854, he described the symptoms and effects of the disease as he found them in himself and other members of his family who were victims of hay fever for three generations. His clinical data led him to the conclusion that the pollen of ragweed was responsible for the autumnal form of the malady which, in 1866, he designated as "Autumnal Catarrh".

However, for forty years after Wyman's observations the pollen of the goldenrod was still thought to be the etiological factor in hay fever allergy. It remained for Dr. William Scheppegrell, in 1906, to call attention to the concurrence of the pollinating season of ragweed with the incidence of August-September hay fever and definitely identify ragweed pollen as the causative agent of the disease.

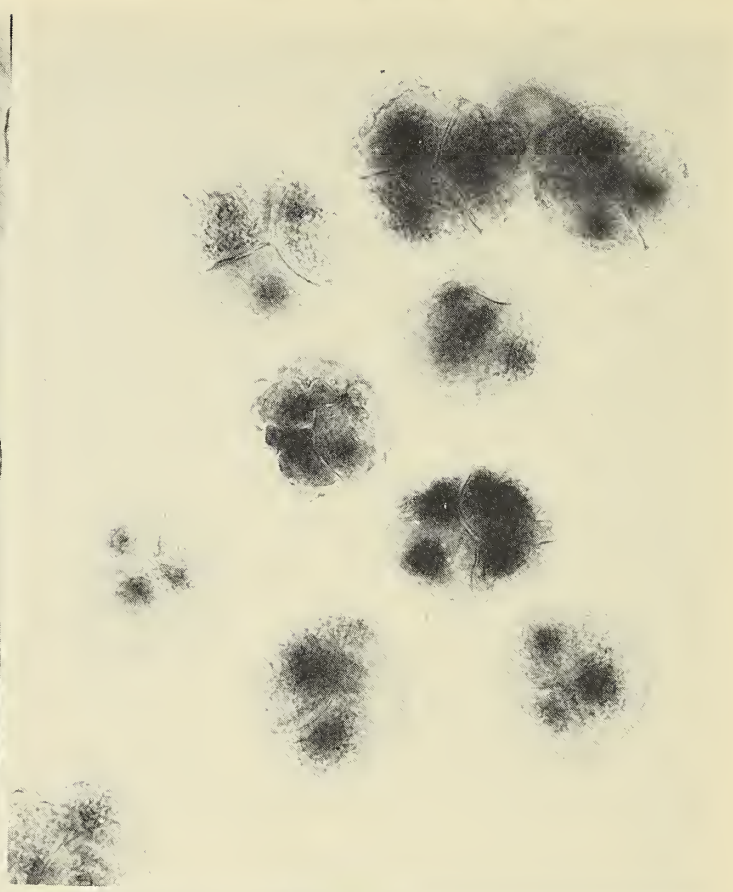
When a person reacts, a substance which is harmless for most individuals, he is said to be sensitive or hypersensitive to that substance. He has an idiosyncracy for that substance. If the symptoms are in his nose, he is said to have hay fever; if they are in his chest and he wheezes and has difficulty in breathing, he has asthma; if his hands itch and burn when they come in contact with formaldehyde, he has an attack of eczema. In each case the symptoms occur on contact with the irritating substance and disappear when this contact is broken. There are, to be sure, certain substances to which people normally react. Almost everybody is sensitive to pepper, raw onions, mustard and certain drugs. But there are whole groups of substances, including foods and dusts, which cause a reaction only in those who by reason of some constitutional maladjustment are sensitive to them while the great multitude remains immune. This minority is said to have a "changed reaction capacity". Hippocrates, whom we mentioned above, thus described the phenomenon in the case of cheese: "Cheese does not prove equally injurious to all men, for there are some who can take it to satiety without being hurt by it in the least but, on the contrary, the vigor it imparts to those with whom it agrees is wonderful; however, there are others who cannot take it at all, their constitutions are different and they differ in this respect that what in their bodies is incompatible with cheese, is aroused and put in commotion by eating it, and those in whose bodies such a humor happens to prevail in greater quantity and intensity are likely to suffer more from it. But if cheese had been pernicious to the whole nature of man, it would have hurt all". The underlying thought of this dissertation was generalized later by the scholarly Roman, Lucretius, in his essay on "The Nature of Things" (De Natura Rerum), when he wrote: "What is food for some may become an irritating poison for others". Our modern version is contained in the familiar adage: "One man's food is another man's poison".

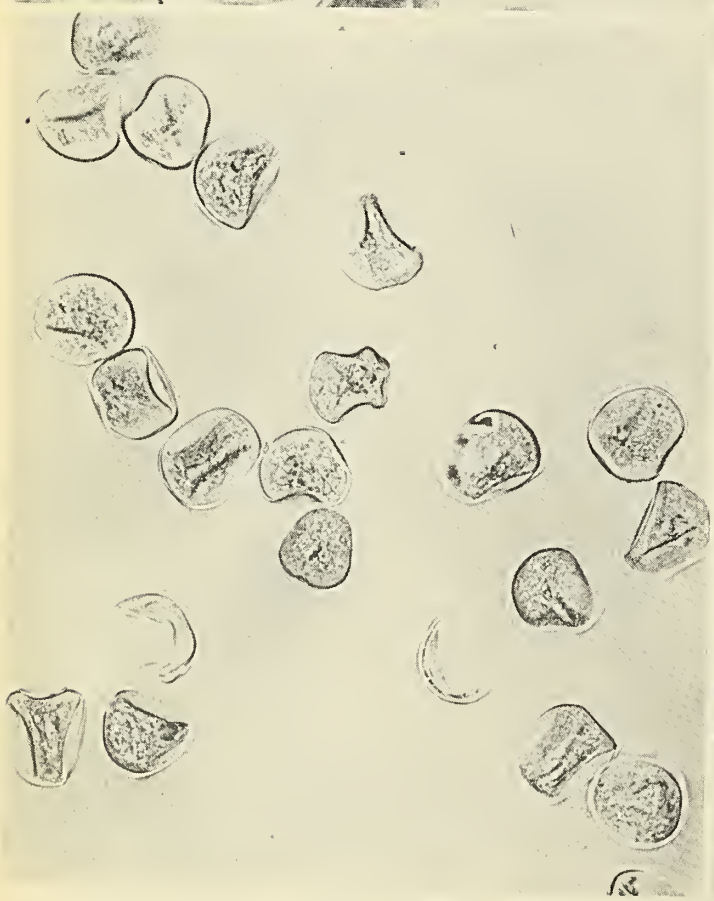
Considerable confusion has arisen from the modern terminology employed in designating this phenomenon of hypersensitiveness. In the beginning of the present century, Dr. Charles Richet, Professor of Physiology at the University of Paris, became interested in the study of the effects of poisons. He experimented on laboratory animals with extracts of the sea anemone. This member of the sea fauna which is related to the jellyfishes, sea-fans and precious corals, is rooted to the bottom of the ocean like a plant but feeds like an animal. Its upper surface is covered with tentacles which secrete a poison that causes itching and burning and reddening of the skin, like the tentacles of a sea nettle, but to a lesser degree. Dr. Richet found that several injections of the extract, in small amounts, produced no notably untoward results in his animals. But one day he reinjected one of his dogs with a quantity much smaller than usual and, much to his surprise, the dog died of convulsions within a half hour. The previous injections instead of rendering the animal immune to further injections had the opposite result, they made him highly sensitive to the poison. Shortly after our

9. Pollen. Tulip Tree. X 400.

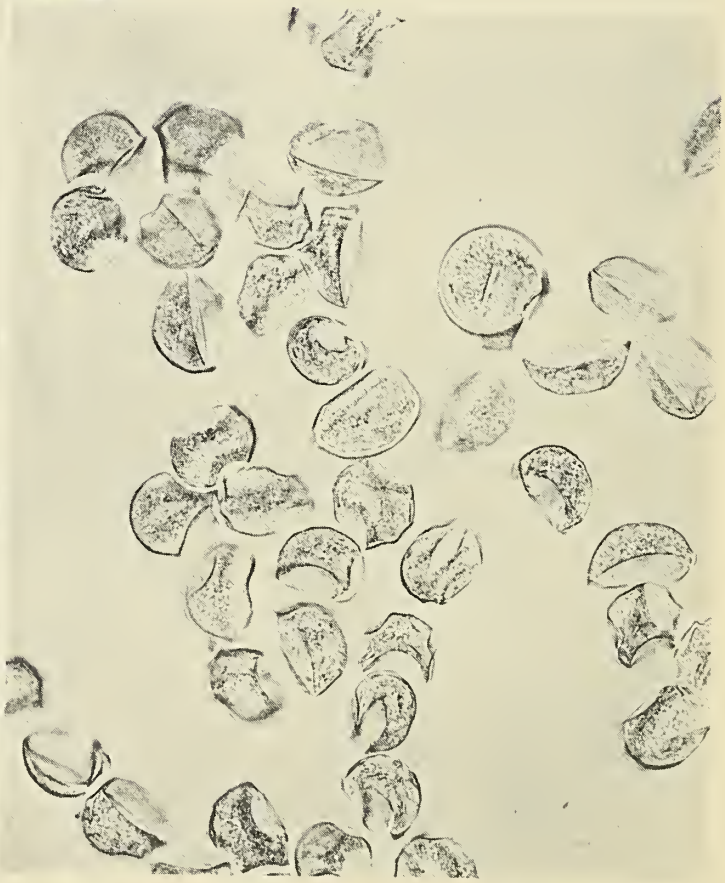


10. Pollen. Catalpa. X 400.





11. Pollen. Timothy Grass. X 400.



12. Pollen. Orchard Grass. X 400.

recruits are inducted into the service they are given a number of injections to render them immune to certain diseases, typhoid fever, lockjaw, etc. These injections "favor" protection against disease and that is why they are called "prophylactic". Dr. Richet's extract had the opposite effect, it ran counter to"phylaxis" (protection), it produced a condition in the dog's system which made him more susceptible to the toxin. This condition he called "anaphylaxis" (against protection).

The word "allergy", now in common use, was coined by Dr. Clement von Pirquet, a prominent Viennese pediatrician, who is famed for his skin test for tuberculosis. It is derived from the two Greek words, "allos" meaning "other", and "ergon" meaning "work" or "energy". He originally intended that the term should express a constitutional change in either direction, of immunity or susceptibility. By 1912 the word had lost its double meaning and from that time on has been assumed to signify susceptibility to disease in human beings, while anaphylaxis was restricted to the phenomenon of artificially induced susceptibility in animals.

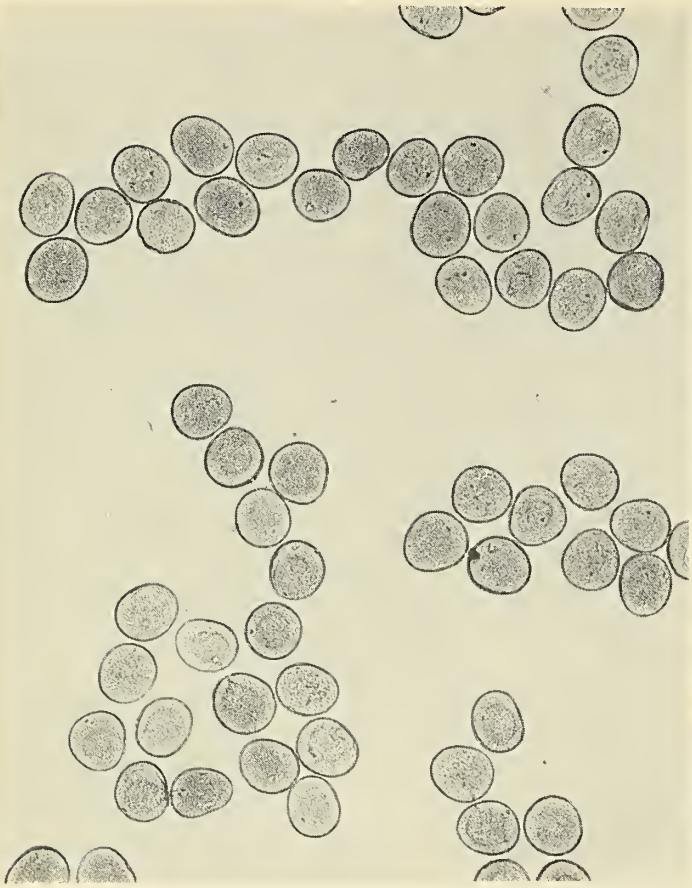
In 1920, Dr. A. F. Coca suggested the name "atopy", from the Greek "alpha" implying a negation, and "topos" meaning "a place", the combination signifying "out of place" or "strange". And allergic diseases are strange maladies indeed. However, the term as it is now understood, is applied only to those forms of human hypersensitivity which are subject to hereditary influence and do not occur in animals.

The whole matter may be simplified by taking allergy to mean a group of diseases due to an abnormal consitutional hypersensitiveness of some individuals to substances which are harmless for most individuals. The substances which produce these diseases ar called "allergens". The abnormal sensitiveness may be hereditary or acquired. Individuals who are immune to an allergen in their early years may become hypersensitive to it later in life and, on the other hand, individuals who are allergic in adolescence may become immune in adult life.

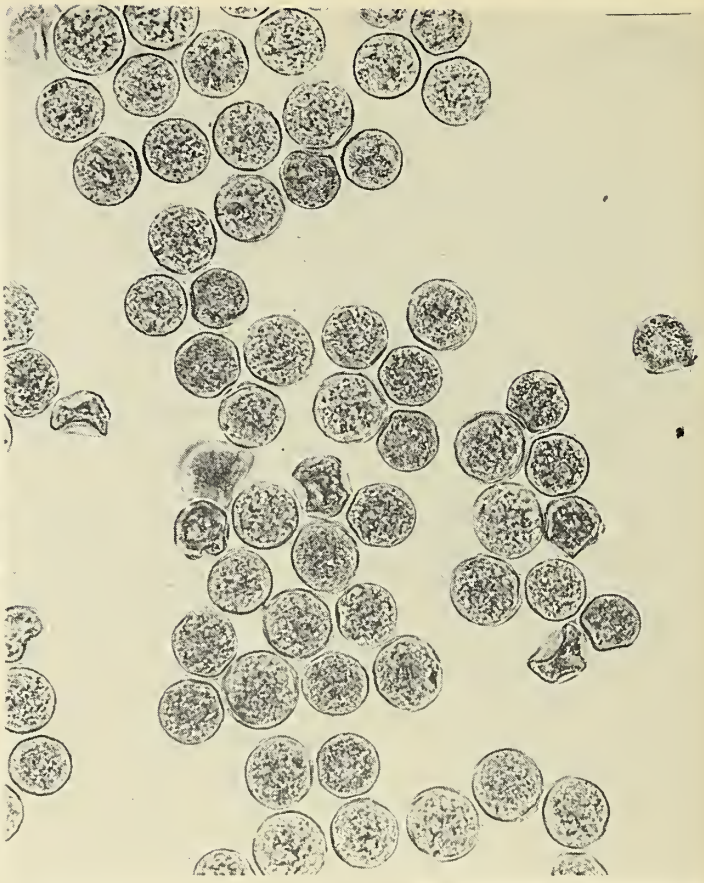
The more common allergies are vasomotor rhinitis (hay fever), asthma, urticaria (hives), eczema (inflammatory skin disease with blisters, scales and crusts), ivy poisoning and migraine (sick headache). The less common forms have formidable names. In angioneurotic edema the tissues under the skin become swollen. An unfortunate victim may, all of a sudden, get a swollen eye or swollen lips, though any area of the body may be involved. Periarteritis, as the name implies, is an inflammation of the tissues around an artery and is often accompanied by asthma. Agranulocytosis has as least ten synonyms. It causes the neutrophils, the white protective cells, to disappear from the blood stream and leaves the patient susceptible to infection. This may be due to allergic sensitization to certain drugs, as sulfanilamide and arsphenamine or salvarsan which is a specific for syphilis and Vincent's angina.

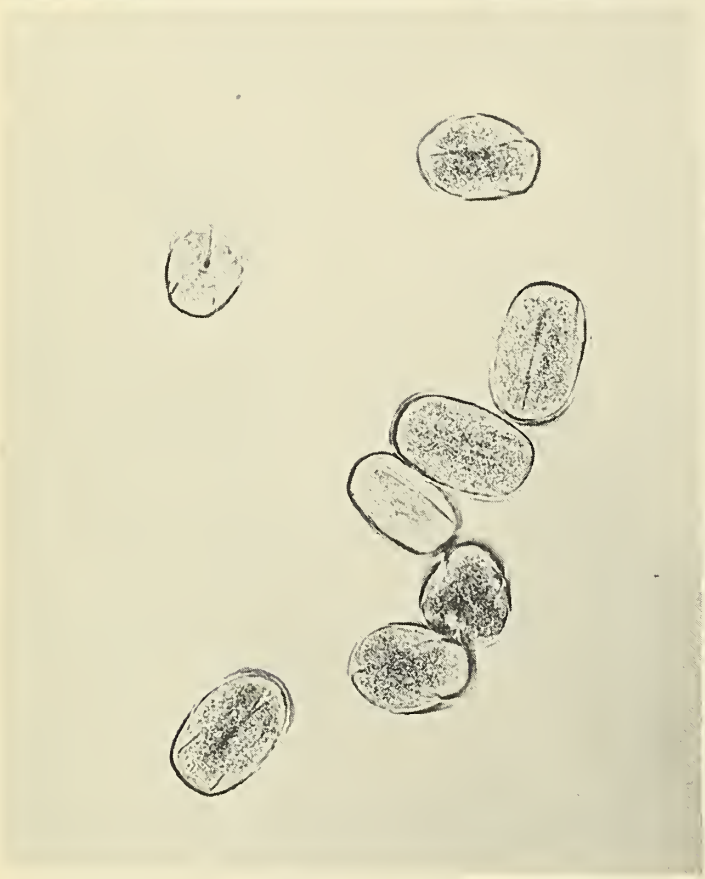
Since the field of allergy is so vast, we shall devote our attention chiefly to pollen allergy or pollinosis. Pollens vary in size from seven to more than a hundred microns and when we consider that it takes twenty-five thousand of these biological units to make one inch, we can realize how small these tiny grains are. In seed plants they occur in masses of spores (microspores) which are white or more usually yellow in color. Each spore is a single cell or biological unit of structure and function and, according to the plant species, may be round, elliptical, rectangular or irregular in shape. They are formed by pollen mother cells and each spore is surrounded by an outer wall or membrane, the exine, which is often finely sculptured. Within the exine there is another transparent membrane, the intine, which is in immediate contact with the pollen cell substance. The grains are conveyed either by insects or the air to the stigma, the viscid apex of the pistil of the flower, where they germinate by sending out a tube through a pore in the

13. Pollen. Indian Corn (Maize). X 100.



14. Pollen. Common Plantain. X 400.





15. Pollen. Meadow Clover. X 400.

16. Pollen. Common Daisy. X 400.

exine. Through this tube the male germinative nucleus passes to the ovule where it fuses with the egg nucleus of the embryo sac in the ovary of the flower. Countless millions of pollen grains never reach the stigma but are carried afar by the wind, if they are of the wind-borne type.

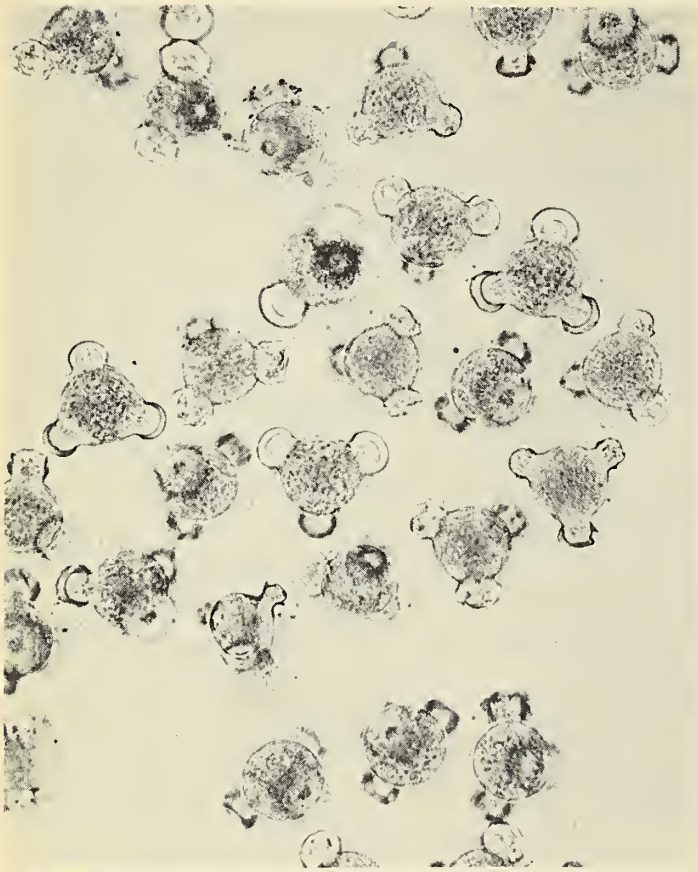
There is hardly a month in the year in which plants are not in bloom. Among our earliest harbingers of spring are the tulips and folks begin to complain of "tulip fever". They get their name from the Persian "toliban" meaning a "turban , which the inverted flower resembles. There is no telling how many species or varieties there are and to add to the confusion of names, there are two different methods of specifying them. Botanists base their classification on technical botanical factors whereas gardeners name them primarily according to the color and shape of the flowers or other marked external features. The pollen grains shown in Illustration 1 were taken from a pure white flower. They are triangular in shape, about 80 microns long, and have a purple color. Since they are not carried from flower to flower by air currents they do not constitute an allergen menace and the source of the "fever" must be sought elsewhere. However, tulip bulbs are allergenic. They contain a toxic alkaloid, tulipine, which causes a swelling of the hands when the bulbs are handled in great numbers. Florists call the allergy "tulip fingers".

While the tulips are in bloom our vacant lots and fields are growing yellow with early buttercups, hedge mustard and dandelions. It was Pliny the elder (23-79 A.D.), the Roman naturalist, who called the buttercup "ranunculus" (the diminutive form of "rana", meaning a frog) because he saw in its leaves a resemblance to the webbed feet of the frog. The family comprises about 35 genera and 1100 species. It includes plants from which some of our most important narcotics are derived. Helleborus niger and viridis provide helleborein, a poisonous glucoside, but prescribed sometimes, in very small doses, for heart disease. The dried leaves of our beautiful purple delphinium or larkspur, Delphinium exaltatum, furnish us with digitalis, the well known heart stimulant. Aconite, a cardiac and respiratory sedative, is made from the dried roots of Aconitum napellus, more commonly known as "monkshood". But our early flowering buttercup, Ranunculus fascicularis, makes no claim to therapeutic importance. Its round pollen grains (Illustration 2) are about 40 microns in diameter and their surface is coarsely granular and shows a prominent germ pore.

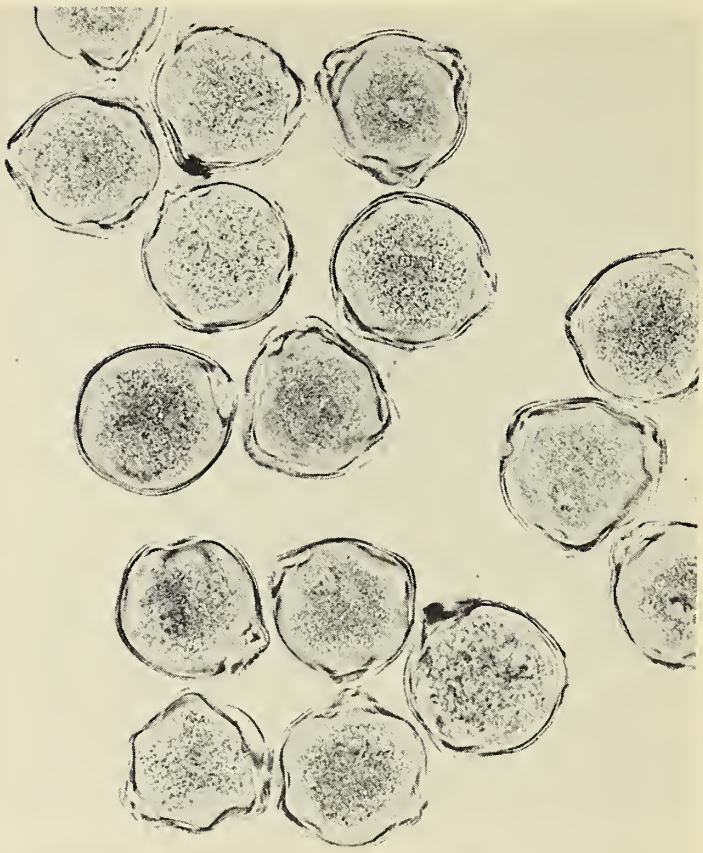
The dandelion came originally from Greece but has established itself so thoroughly in this country that it has become a veritable nuisance. We appropriated the term from the French who call the plant "dent de lion", "lion's tooth", from the teeth on the border of its leaves. Botanists have named the genus "Taraxacum", from the Greek "taraxis" which signifies "confusion". The reference is partly to the bizarre pollen grains produced by the flowers and partly to the suspicion that the plant has lost its sexuality. Its embryos seem to develop by "apogamy", i.e., from unfertilized seeds. The pollen grains (Illustration 3) are most unusual. Many of them are unsymmetrical, they do not conform to the basic type. The normal grains of the common dandelion, Taraxacum officinale, are from 24-27.5 microns in diameter, if they really have a diameter. Their exine is thrown into ridges which bear spines on their crests They are entomophilous, i.e., they are transported by insects. Though the plant is a nuisance, it has some redeeming qualities. It is extensively used for table greens and for this purpose is cultivated in Europe and various parts of this country, especially in the rural districts of Boston. The root is used medicinally under the name of "taraxacum". It contains a bitter principle, taraxin, which, as an extract either in the dry or liquid form, is prescribed for certain disorders of the stomach, kidneys and liver.

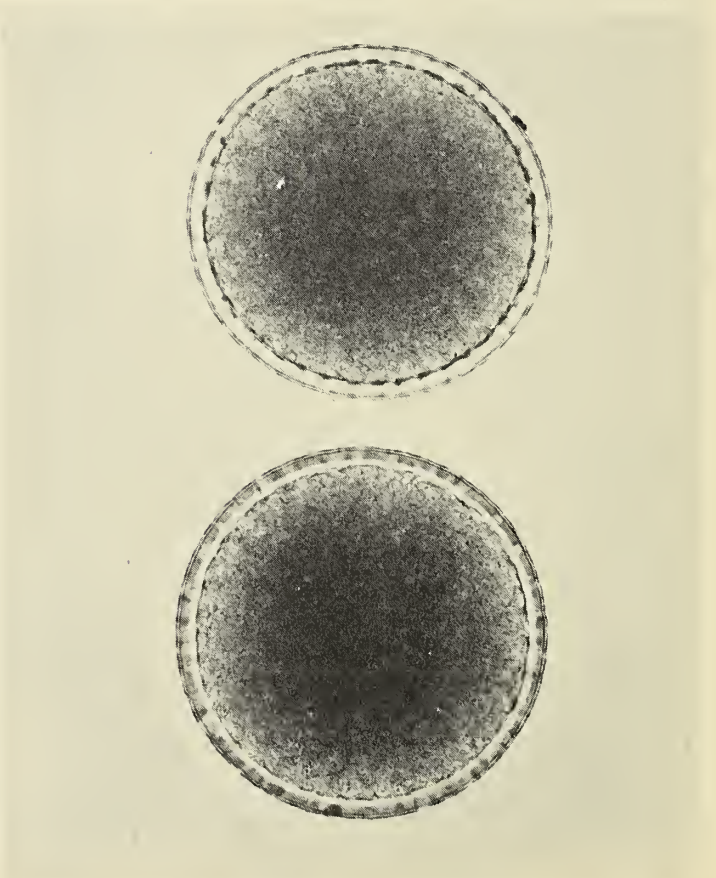
At the arrival of spring, with the first breath of balmy weather, the urge to discard winter flannels for lighter nether garments is irresistible. But

17. Pollen. Chicory. X 400.



18. Pollen. Honeysuckle. X 400.





19. Pollen. Wild Lily. X 400

20. Pollen. Hollyhock, X 400.

early spring is apt to have intermittent periods of cool weather. People begin to sneeze, the nose begins "to run" (rhinitis), and they have a "head cold" (coryza). They are unaware of the fact that at this time, on neighboring lots, in nearby fields and in their gardens, weeds and plants, emerging from their winter sleep, are shedding pollen in profuse abundance. They are not suffering from a cold but from an allergy.

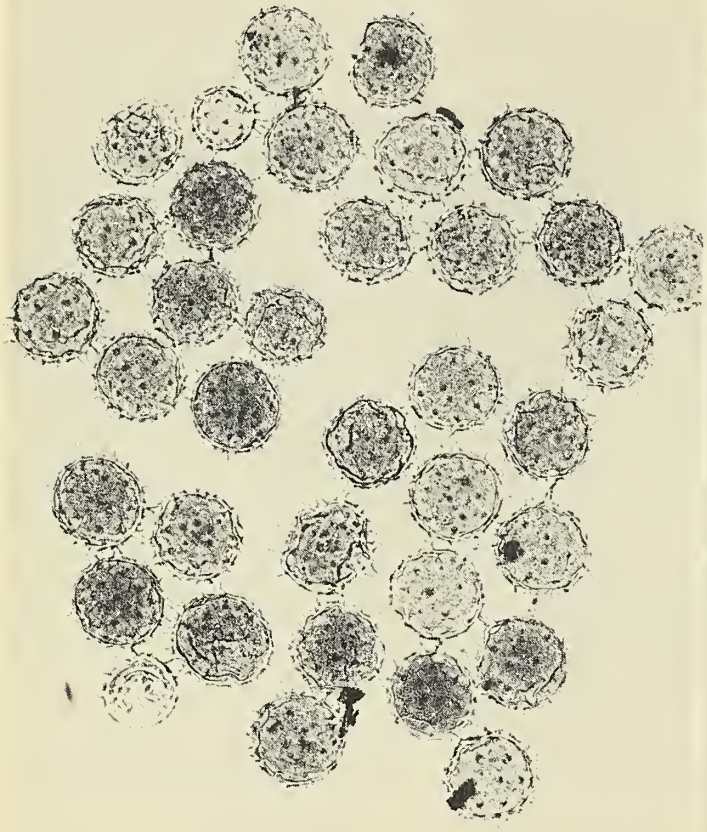
Some of the victims who have had a recurrent experience of spring hay fever for many years will tell you that they have "rose fever". Among the early roses is the pretty Fragrant Sweetbrier, Rosa rubiginosa, the "Eglantine" of Chaucer, Spencer, Shakespeare and Milton. Originally a wild rose, it has found a place in many of our gardens. The pollen (Illustration 4) is yellow and about 34 microns long. Its exine is furrowed and finely granular. Other wild roses blooming at this time are, the Climbing Rose (Rosa setigera), the Meadow Rose (Rosa blanda), the Dog Rose (Rosa canina), the Pasture Rose (Rose virginiana) and the Evergreen Rose (Rosa bractiata) which has an abundance of soft yellow flowers and is cultivated extensively in gardens. Gardeners call it Rosa Hugonis. Some of the authorities on allergy dispute the claim that rose pollen is allergenic. But it is very light and, though entomophilous, is often carried in great quantities over long distances by the air. These factors justify the belief that it can be a menace.

While the early bushes and shrubs are blossoming the trees are also in flower. Some of their flowers are conspicuous and very beautiful, though many of them are drab and shabby and we usually do not become aware of them until our streets and sidewalks are littered with their fallen catkins. The Flowering Dogwood is always a favorite in spring and would long ago have become extinct if our State Legislature had not made it a penal offense to strip the trees of their flowering branches. More than twenty species of dogwood are listed. Some of them are shrubs but most of them are trees. Besides being ornamental some of them are of practical use. Our pink dogwood, Cornus florida, the most attractive member of the genus, furnishes a substitute for quinine. Its bark contains all the therapeutic ingredients of Jesuit or Peruvian Bark from which quinine was derived before the war. It is claimed that malaria fever can be warded off by merely chewing the twigs. The dried powdered bark makes a good tooth powder and combined with iron sulphate yields a good black ink. Because the wood of the trunk is tough, the dogwood is called "Cornus", from the Latin "cornu" which means "horn". It is heavy and close-grained and makes good tool handles. The name "dogwood" originated in England from the practice of washing mangy dogs with a concoction of the bark of Cornus sanguinea. The fruit or berries are, according to the species, white, bluish-white, blue, black or red. The scarlet berry of Cornus mas, known as the "cornelian or carnelian cherry", is pulpy, soft and sweet. It is nearly the size of an olive for which it is sometimes served as a substitute at the dinner table. The small red berries of Cornus suecica, the flowers of which have a deep violet color, are eaten by the Alaskan Eskimos. The pollen of the Flowering Dogwood is shown in Illustration 5. The grains are about 37 microns long and their exine is finely granular. They were collected on March 4.

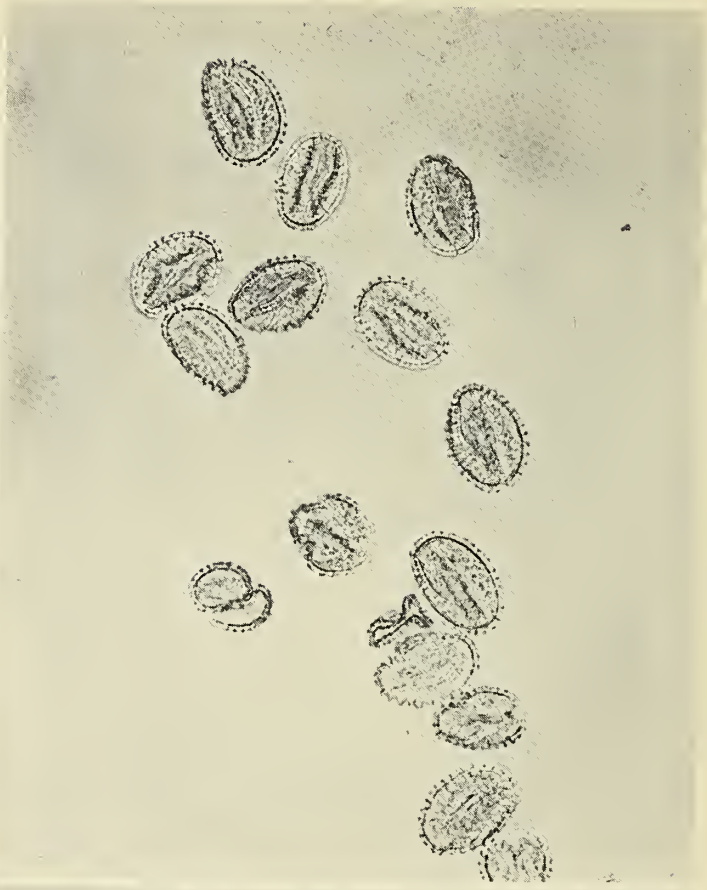
The flowers of the oak, maple, chestnut, hickory, black walnut, sycamore and other large trees appear before the leaves. They are odorless and produce pollen in enormous quantities all of which, with the exception of the maple, is anemophilous or air-borne. The grains are nearly or quite smooth and lack spines and furrows. These structural features distinguish them from entomophilous pollens.

The American Elm, Ulmus americana, begins to shed its pollen at the end of March. The grains (Illustration 6) are about 27.8 microns in diameter and were collected on March 28. The pollen sometimes produces hay fever and asthma.

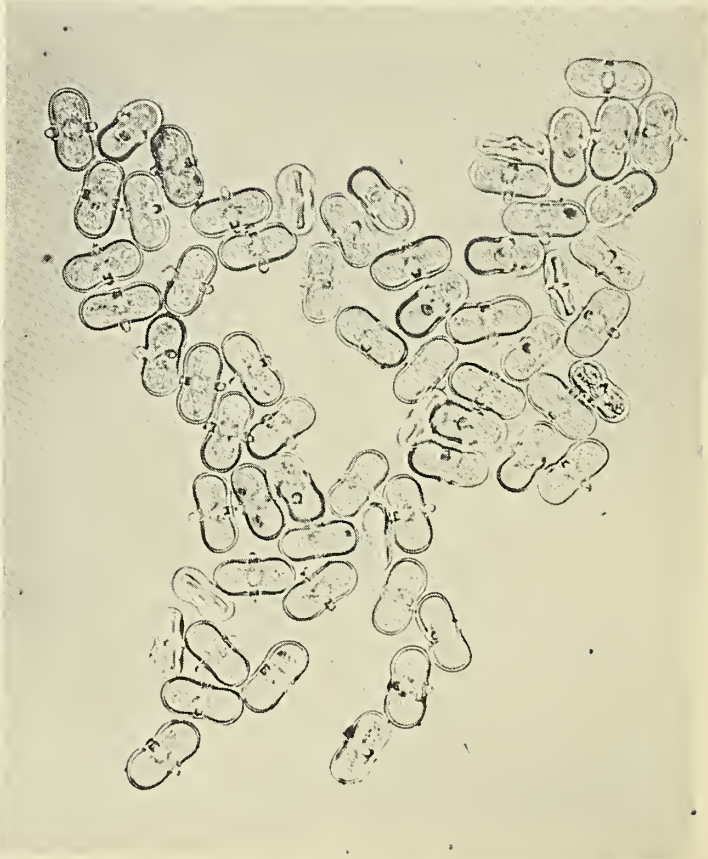
21. Pollen. Hibiscus. X 100.



22. Pollen. Privet. X 400.



23. Pollen. Yarrow. X 600.



24. Pollen. Wild Carrot. X 400.

About five weeks later the air is filled with the pollen of the White Oak, Quercus alba. The pollen grains of all the oaks seem to be essentially alike. There are minor variations in the texture of the exine and the number of furrows but they are too unreliable to form a basis for distinguishing one species from another. The grains (Illustration 7) are, on the average, 34 microns in diameter and bear some resemblance to those of the locust which is a member of the Pulse Family. These pollens were collected on May 6.

At this same time the long, dark green catkins of the Black Walnut, Jugulans nigra, pollinate. The grains (Illustration 8) are somewhat larger than those of the oak, about 36 microns in diameter, and are irregularly spheroidal. They sometimes cause hay fever.

Among the trees with large, attractive flowers which bloom towards the end of May and early in June are the Tulip Tree and the Catalpa. There are only two kinds of Tulip Trees in the whole world, one in China and the other in North America. Our native species is called "Liriodendron tulipifera", which literally means "the tulip-bearing lily tree". It belongs to the Magnolia family. It is not only an ornamental tree but its timber, known to the trade as "poplar", is one of our most important soft woods. The pollens of the Tulip Tree (Illustration 9) are about 68 microns long and have a conspicuous furrow. They are negative in hay fever.

A rather engaging sight in early June is the flowering Catalpa. The Indians gave it that name and botanists later appended qualifying adjectives to distinguish the various species of which there are two in North America. The flowers are white without and mottled with yellow and purple spots within, and are grouped in loose compound clusters (panicles). They produce long cylindrical pods with numerous oblong compressed seeds bearing a tuft of white hairs at each end. Because of these pods the Catalpa is known as the Indian or Smoking Bean and sometimes as the Bean Tree or Candle Tree. The beauty of the flowers is reflected by the pollen grains (Illustration 10), the outer surface of which shows a very unusual lace-like sculpture pattern. They are large, about 71 microns in diameter.

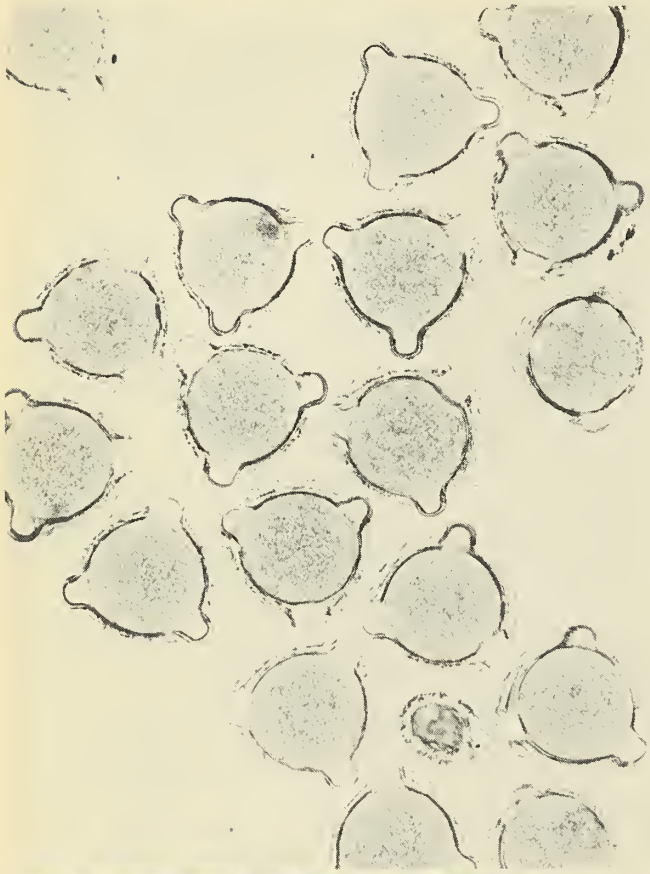
So far our attention has been centered on the early pollens of a few of the more conspicuous and attractive plant and tree flowers. Only a small number of them are allergenic. But at this time of the year the chief and least obtrusive offenders are the grasses. There are 3,500 kinds of them, a large number indeed, though they are outnumbered by four other genera of plants, the Compositae, Legumes, Orchids and Madderworts. But in the number of individual plants they far exceed all other families. With few exceptions, they are pollinated by the wind and some of them produce great quantities of pollen which may be carried many miles from the plants. The worst grass allergens in our region are, Kentucky Blue Grass (Poa pratensis) and Timothy (Phleum pratense). Of less consequence are, Orchard Grass (Dactylis glomerata), Indian Corn (Zea mays), Common Rye (Lolium perenne), Bearded Rye (Lolium temulentum), Wild Rye (Elymus) of which there are at least ten species, and Bermuda Grass (Cynodon Dactylon).

There are about 200 kinds of Blue Grass and 90 of these are found in the United States. Poa pratensis reaches its highest development in the Central States, especially in Kentucky. It begins to flower here towards the end of May. The pollen grains are round and from 28-32 microns in diameter. Since the grass is in great demand for lawns, it is abundant in our cities and suburbs.

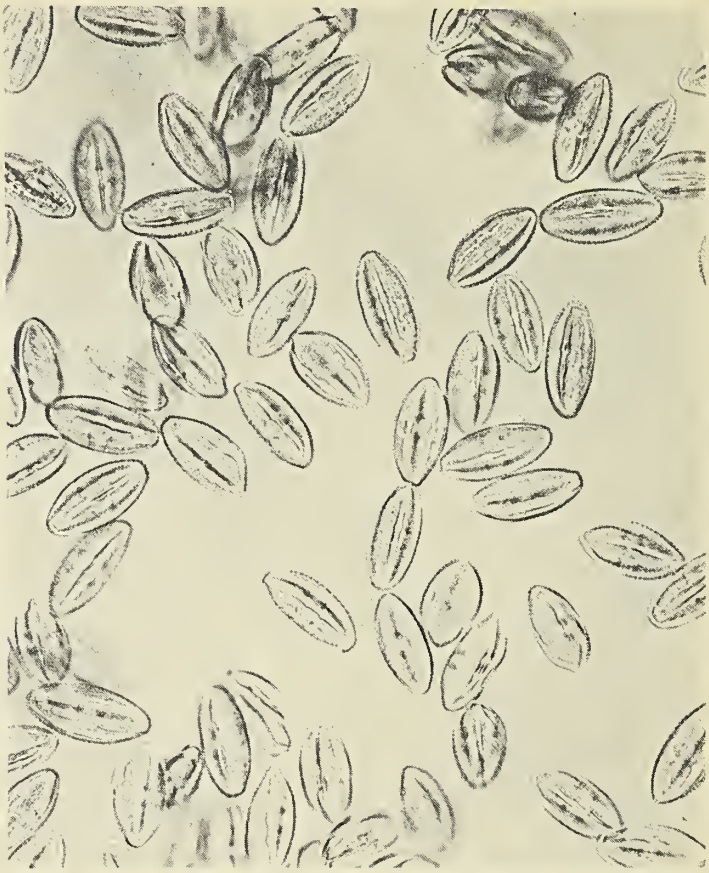
Timothy gets its name from Timothy Hanson who brought the seeds from New England to Maryland in 1720. It is primarily cultivated for hay but grows wild in most of the Northern States. The pollen is produced on cylindrical spikes and the spheroidal grains (Illustration 11) are from 32-36.5 microns in diameter, a little larger than those of Kentucky Blue Grass.

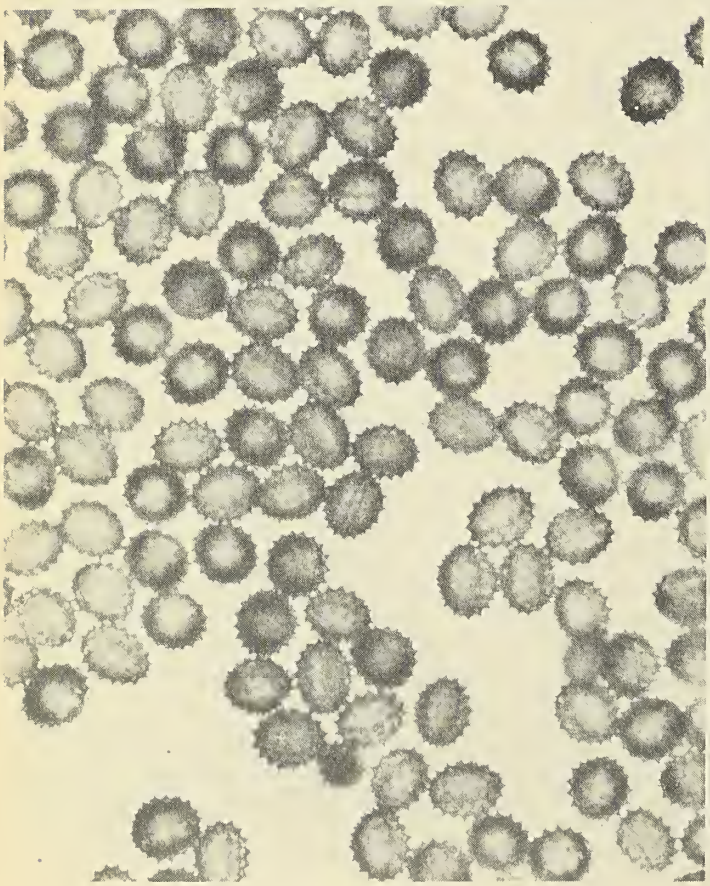
Orchard Grass sometimes reaches a heignt of three feet. It grows in

Pollen. Field Thistle. X 400.



26. Pollen. Poison Ivy. X 400.





27. Pollen. Goldenrod. X 400.

28. Pollen. Cocklebur. X 400.

large tussocks or tufts which produce stiff panicles on which the pollen is produced. It is an important pasture and meadow grass but often escapes to orchards. Sometimes it is sown on shady lawns where other grasses which require more abundant sunlight cannot thrive. The pollen grains (Illustration 12) are larger than those of Timothy, approximately 43 microns.

Indian Corn or Maize, universally known in the United States as "corn", is a native North American cereal grass. It has been cultivated since the discovery of this continent and is one of our most important grain crops. Its pollen grains may be spheroidal, ovoidal or elliptical and are very large, from 88-114 microns. In the photomicrograph (Illustration 13) they are magnified only a hundred times. The pollen was taken from a solitary plant found growing from a random seed in a neighboring city field. The outer surface is reticular (like a network) and has a single prominent germ pore.

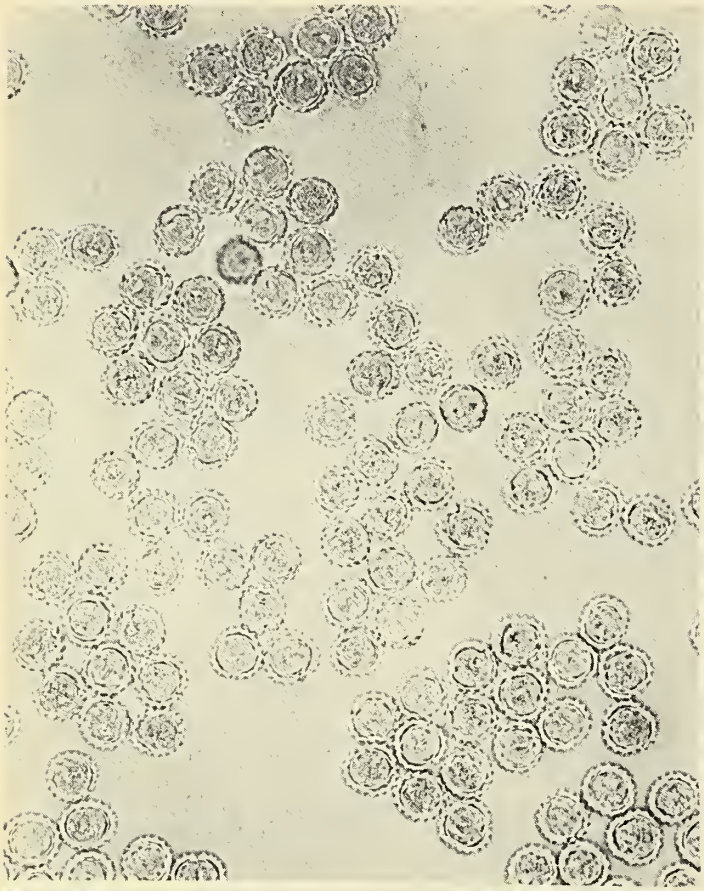
Before dismissing the grasses, a word about the plantains may be in order. They are among the worst of our lawn weeds and thrive through the severest spells of drought when the grasses succumb and wither away. There are about 200 species of them in many parts of the world and about 20 of them are found in North America. The Common or Greater Plantain, Plantago major, is very abundant here. Its pollen grains (Illustration 14) are round and small, about 20 microns in diameter. Their exine is rough and mottled. Plantains are occasionally the cause of mild attacks of hay fever.

There are 7,000 kinds of legumens, twice as many as of grasses. Many of them are of great agricultural importance. They are forage plants, cover crops and green manure, and provide some of our staple foods. Among them are alfalfa, clover, beans and peas. Alfalfa and various kinds of clover are found in most of our city fields and lots. Meadow clover, Trifolium pratense, is very common. Its pollen grains (Illustration 15) are 36 microns long and their surface is finely pitted. Though the flowers of legumens are pollinated by insects, the pollen sometimes gets into the atmosphere and may cause hay fever or asthma. This is especially true of Alfalfa (Medicago sativa), White Sweet Clover (Melilotus alba) and Yellow Sweet Clover (Melilotus officinalis).

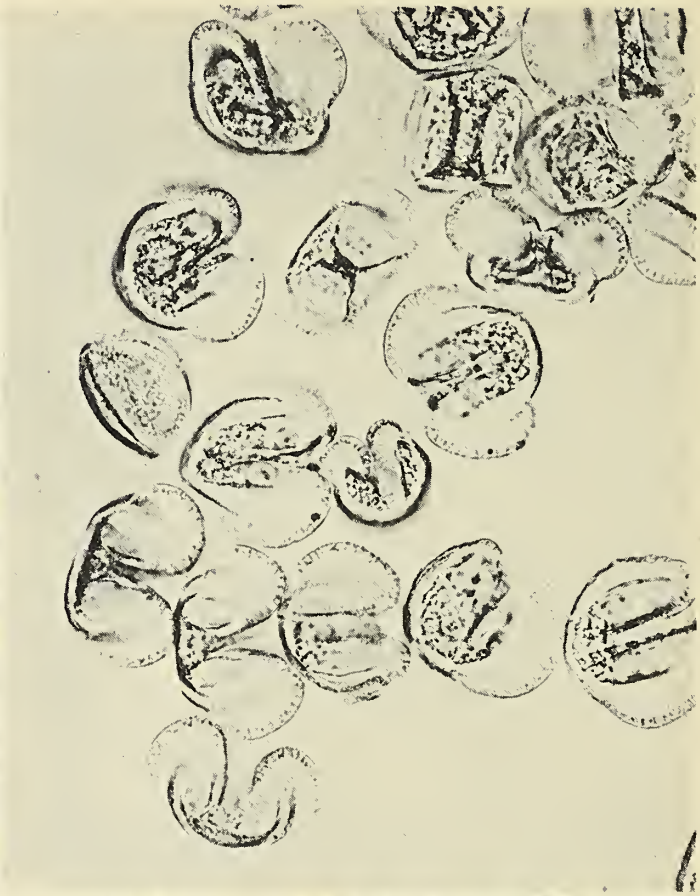
One need not go to the country for wild flowers, there are plenty of them within the city limits, though they often go unnoticed, and they are in bloom from early spring until well into autumn. Very familiar is the White or Ox-eye Daisy, Chrysanthemum leucanthemum. The old Greeks gave it the family name, "chrysanthemum", meaning "golden flower", from its yellow disc, and "leucanthemum", meaning "white flower", from its white rays, was added to distinguish it from other members of the genus. Though it is one of the commonest weeds in the eastern States, it is a near relative of our garden chrysanthemums. Some of the species are of commercial value. The insect powder known as "pyrethrum", is produced from the dried flowers of Chrysanthemum cineriaefolium and Chrysanthemum coccineum. The former grows wild in Dalmatia and is cultivated extensively in France. The latter is cultivated in California and the product is known as "buhach". Dalmatian insect powder is used especially for exterminating household insect pests. The pollen grains of the daisy (Illustration 16) are spheroidal and from 24-28.5 microns in diameter. They have a thick, coarsely granular exine, with sharp pointed apines, and are similar to the pollen of garden chrysanthemums.

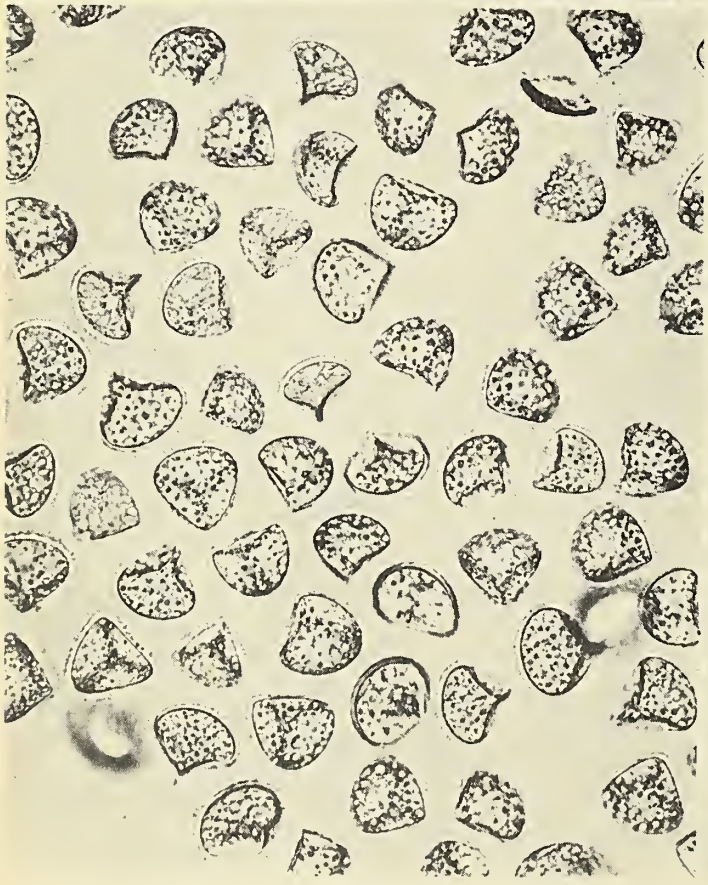
Blue flowers are rare, and chicory is one of them. It is a native of Europe but has been naturalized here. For most of us it is only a weed, but it is sometimes used as a potherb or a salad. It is the principal adulterant of coffee and in the late nineties and early part of the present century its use for that purpose was so extensive that chicory became an American farm crop. However, the industry was abandoned because the imported root seemed to be of better quality and it was cheaper. During the first World War importation of the root was interrupted

29. Pollen. Giant Ragweed. X 400.

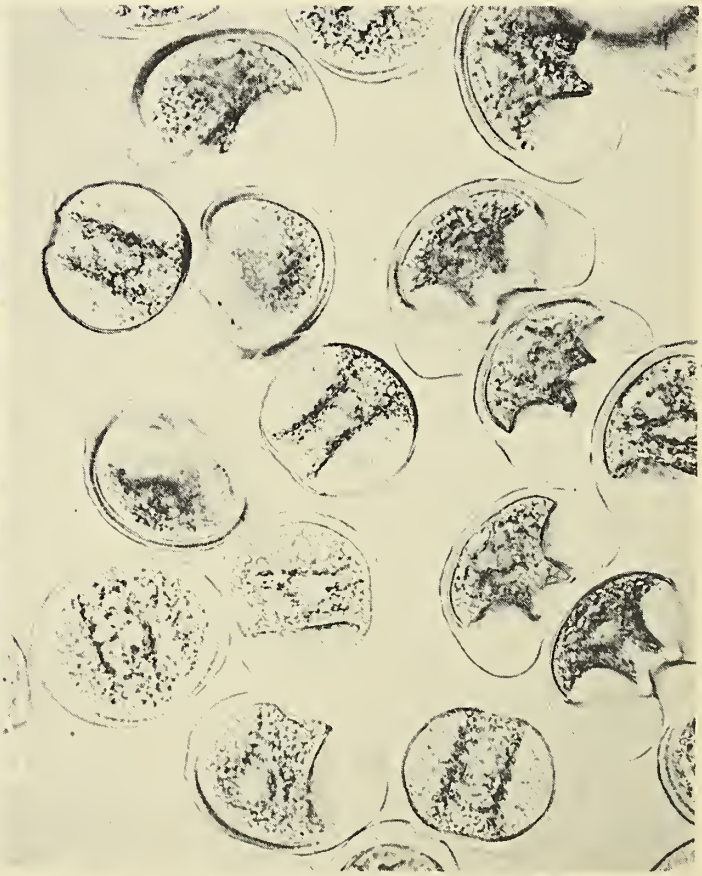


30. Pollen. White Pine. X 400.





31. Pollen. Lycopodium. X 400.



32. Pollen. Deodar Cedar. X 400.

and we heard nothing more of chicory until a few months ago when the complaint was made that the coffee marketed in the Middle West contained too much of the adulterant. This was at the time when coffee was rationed and dried beans and peas were also added to increase the bulk.

Chicory pollens (Illustration 17) are from 24-27.5 microns in diameter. Their outer membrane is thrown into ridges which bear spines on their crests. They are entomophilous but sometimes can be detected in the air. In this part of the country chicory has run wild along our waysides and in dry fields and though the plants have been relegated to the category of bad weeds, the sky-blue flowers, which open only in the sunlight, are very attractive.

There are about 175 species of honeysuckle of which 90, besides numerous varieties and hybrids, are in cultivation. The botanical name for the genus, "Lonicera", is derived from Adam Lonicer or Lonitzer, a German physician and naturalist (1528-1586). As shrubs or bushes, climbing vines or ground covers, most of them have beautiful and often fragrant flowers, white, yellow, pink, purple or scarlet, followed by red, yellow, white, blue or black berries. The pollen shown in Illustration 18 was collected from the Japanese honeysuckle, Lonicera japonica. Its flowers are at first white or pink and then fade to yellow, the berries are black. Brought originally from Asia, it escaped from cultivation and has established itself in woods and thickets all along our eastern coast. The pollen grains are rather large, about 51 microns in diameter.

Lilies are cultivated plants, but the Wild Orange-red Lily is an exception. Their name is derived from the Greek "lilios" which means "white". The Greeks presumably borrowed the word from the Celtic "li" which also means "white". About 400 species have been described but, more than likely, there are really less than 100 distinct species. The Wild Orange-red Lily is often grown in gardens but the best plants are found in the wild state, in fields. The pollen grains (Illustration 19) are very large, about 153 microns long and 53 microns at their widest point. They have a single furrow which extends nearly along the entire length of the grain.

The Hollyhock, Althea rosea, is not a wild plant, but it often escapes from gardens to nearby fields where it is very conspicuous and quite at home among the humbler wild flowers and motley grasses. It belongs to the Marsh Mallow Family and is a native of China where it is among the oldest of cultivated flowers. Large quantities of pollen are produced which is rather heavy. It is not known to be allergenic. The beautiful grains (Illustration 20) are about 154 microns in diameter and are the largest shown in this article. They are covered with long, pointed spicules. The exine and intine appear distinctly in the photomicrograph.

The Hibiscus and Privet, like the Hollyhock, can thrive on neglected estates and in fields without the gardener's care. They are both popular hedge plants. The Hibiscus, Rose Mallow, was known to the ancient Greeks and Romans from whom we have borrowed the name literally. Its meaning, if it ever had any special significance, has been lost long ago. There are almost 100 species and about 20 of them occur in the United States. Horticulturally, there are four general groups of them, perennial borders, herby annuals, the hardy shrubs and the hothouse shrubs. Besides these, there is in the tropics a large tree-like species which is planted commonly about dwellings and along roadsides. The pollen grains of Hibiscus oculiroseus, the Crimson-eyed or White Hibiscus (Illustration 21), are 100 microns in diameter and are provided with long, blunt spines. Here they are magnified only a hundred times.

There are about 50 species of Privet, some of which shed their leaves in autumn while others are green all the year round. The common species in the eastern United States and Canada, Ligustrum vulgare, was introduced from Europe and

33. Pollen. European Larch. X 400.

The Great Ragweed, Ambrosia trifida.

Asia. Its pollen grains (Illustration 22) are oval, 30 microns long, and have three furrows. The exine is coarsely reticular with a mesh of beaded ridges. Privet flowers abundantly in June and is pollinated by insects, especially bees. The pollen sometimes escapes into the air and causes hay fever occasionally.

Yarrow and the Wild Carrot are conspicuous wild flowers, not by reason of their floral beauty but because of their abundance. Yarrow belongs to the genus "Achillea", so named because Achilles, the famed Greek warrior, is said to have discovered its virtues. Either as an extract or as a volatile oil, it is a good stimulant tonic while its glucoside, achillein, is a good antiperiodic against malarial recurrence. The round pollen grains of Common Yarrow, Achillea millefolium, also called "Milfoil", are about 22 microns in diameter (Illustration 23). They have three germ pores and are covered with blunt spines.

The Wild Carrot monopolizes our fields towards the end of July. It is a native of Europe and Asia and has run completely wild in our eastern States. Though one of the worst of our "bad" weeds, it has at least one redeeming quality, our cultivated carrots are derived from it. To botanists both the wild and cultivated plants are known as "Daucus carota". The pollen grains (Illustration 24) are elongated and constricted in the middle. They are small, 24 microns long, and have prominent germ pores. The exine is finely granular.

The Thistle family is a very large one. There are about 800 genera and not less than 10,000 species widely distributed throughout the world. There are at least 51 kinds of Common or Plumed Thistles in North America. Their name, "Cirsium", is derived from the Greek "kirsos" which means a "swollen or varicose vein", for which the Thistle was used as a remedy by the ancient Greeks. The flowers of the Field Thistle, Cirsium discolor, are usually light purple or pink and are really pretty, though the whole plant is covered with sharp, menacing spines. They are pollinated by insects. The pollen grains (Illustration 25) are large, 51 microns in diameter, and have three germ pores. The outer membrane is granular and is provided with short, blunt spines.

Among the least conspicuous of the wild flowers is the greenish-yellow flower of the Poison Ivy, Rhus toxicodendron, which grows abundantly in the eastern coastal States and Canada. The flowers lie close to the stem and are generally hidden by the leaves. They are not pollinated by insects and since the pollen is heavy it is probably not carried very far from the flower by the wind. The flowers develop into clusters of green berries which, when mature, are white and waxy and sometimes remain on the stem through the winter. The leaves bear on their under surface a large number of extremely fine hairs, which contribute to the toxicity of the plant. Ivy poisoning is an old malady. In China it has been known for over 2,000 years and the time-honored remedy of applying crushed crab meat to an ivy dermatitis is still in vogue among the Chinese to-day. Though the Chinese Poison Ivy, Rhus vernicifera, is of a different species from ours, the plants are much alike and are equally toxic. The whole plant is poisonous and at all times of the year. The active principle of the poison is a nonvolatile oil, toxicodendrol, which if taken internally, does not produce any untoward effect on the lining of the digestive tract. It is sometimes prescribed by homeopathic physicians as an internal specific for rheumatism. Ivy poisoning is an enigma. A great number of people are affected by it at all times. Some who have been sensitive to it for years suddenly become immune, while those who have not been susceptible become allergic. Some are not affected unless they come in direct contact with the plant, whereas others need only to get near it. Contact with the smoke issuing from a smoldering fire of the dead wood of the plant will cause poisoning in hypersensitive individuals. The Poison Ivy pollen shown in

Illustration 26 was gathered on May 25 when the pollinating season was at its height. The grains are elliptical, about 30 microns long, and have a broad furrow extending almost along the entire length of the long axis of the grain.

For many years late summer or autumnal hay fever was erroneously associated with the goldenrod. These beautiful and sometimes fragrant plants flower at the end of July, through August and September and late into October. There are about 125 species, sixty of which are found in the eastern States. The pollen grains of the Sweet Goldenrod, Solidago odora, shown in Illustration 27, were collected on August 7. They are from 21-22.5 microns in diameter and bear numerous short, conical spines. The leaves, when crushed, suggest the scent of anise.

At this time of the year the unattractive cocklebur is also in flower. Its botanical relationship with ragweeds has made it a pathogenic suspect and, in fact, it does sometimes claim a hay fever victim. The name of the genus is "Xanthium" and is derived from the Greek "xanthos", meaning "yellow". The allusion is to a yellow dye which is produced from the plants. Illustration 28 is a photomicrograph of the pollen of American Cocklebur, Xanthium canadense. The grains are 30 microns in diameter.

The worst agents of pollinosis are the ragweeds. There are about sixty different kinds of them, but the two most abundant in our region are the short ragweed, Ambrosia elatior, and the giant species, Ambrosia triffida. The bouquet of giant ragweeds shown on Page 46 flatters the weeds. In their natural habitat they are not a pleasing picture. The plants from which these flowers were gathered were ten feet tall. They sometimes reach a height of 17 feet. The three-lobed leaf in the foreground of the picture is one of the distinguishing marks of the species, "trifida" meaning "triply cleft" or "split into three parts". Linnaeus, the great Swedish naturalist who originated the binomial system of botanical nomenclature, could have intended but a quip of irony when he named the ragweed genus "Ambrosia", which to both the Greeks and Latins of old meant "the food of the gods". Insects fight shy of ragweeds and pollination is effected solely by the air. The grains (Illustration 29) are small, 20 microns in diameter, and are covered with spines. The amount of pollen shed by the plants is enormous. It has been estimated that a single plant of ragweed may produce eight billion grains per square foot of field surface while its flowers are in bloom. This would amount to sixty pounds on a city lot of one acre overgrown with the weed. Probably a million tons of ragweed pollen are produced in the United States each season. These tiny particles are extremely light and air currents bear them many miles from their source, and even over the ocean. This is the reason why condidates who suffer from hay fever or asthma are not admitted to the air service either in the army or navy. Not only is the pollen of the ragweed allergenic but the oil in the leaves and stems is capable of producing a distressing skin irritation. The story is told of a boy who, knowing that he was allergic to the pollen, contrived to prolong his summer vacation and escape the first week of the fall school term by rubbing his face with the crushed flowers and leaves of the weed. He not only went to bed for a week with an attack of asthma but spent two weeks more in nursing a bad eczema.

Most of the evergreens, the pines, spruces, cedars and firs, pollinate in March, April, May or June. The grains shown in Illustration 30 are those of the White Pine, Pinus strobus, favored as an ornamental tree and greatly valued for its timber. They were gathered on May 22. They are biconcave and rather large, 51 microns in diameter, exclusive of the "bladders" or "wings". The pollen of all the pine species is anemophilous and their "wings" render them especially adaptable for air transportation. Sometimes the pollen is gatnered in clouds by the wind and deposited in showers at far distant points. In 1873 a pollen shower fell in St. Louis which made the streets appear as if they had been dusted with powdered sulphur.

The pollen came from a pine forest four hundred miles away. Fortunately, only two species of Pine, the Yellow Pine, Pinus ponderosa, and the Scrub Pine, Pinus contorta, bear hay fever pollens and these are toxic only in certain sections of the country.

However, there are a few evergreens which produce their pollen in the fall. At this season of the year, in the days before our country roads were surfaced with concrete, in regions where the lowly Crowfoots abounded, the countryside was covered with a pall of yellow dust which was generally believed to have been blown from the roads. But the microscope would have revealed this dust as the pollen of one of the Club Mosses or Ground Pines. Illustration 31 shows the pollen grains of Lycopodium complanatum. The plant is used extensively for Christmas garlands and is, for this reason, popularly known as the "Trailing Christmas-green". The generic name, "Lycopodium", is compounded of two Greek words, "lukos" meaning "a wolf", and "pous" meaning "a foot", from the fancied resemblance of the branching roots of some of the species of Ground Pines to a wolf's foot. The pollen grains have a rounded triangular outline, are about 33 microns in diameter and are divided on their dorsal surface by a triradiate crest.

The Cedars of Lebanon are of special interest not only on account of their antiquity but also because they are commemorated in Sacred Scripture. They are beautiful trees of characteristic appearance. Of the several kinds, the Deodar Cedar, Cedrus libani, variety deodara, is the most attractive Unfortunately, there are very few of them in this country, outside of California. As far as I know, there are only two trees of this variety in Baltimore and both of them are in the Guilford district. The pollen grains shown in Illustration 32 were collected on October 1. They are about 61 microns in diameter, without the "wings". There was no difficulty in getting enough pollen for the mount from which the photomicrograph was made. A curious neighbor on seeing the shower which my effort to secure a few of the pollen cones precipitated, remarked that he now understood why his whole house was filled with "yellow dust".

The last of the pollens to mature in this area are those of the European Larch, Larix decidua. This rather rare cultivated evergreen is much more attractive than our American species, the Tamarack, Larix laricina, which grows abundantly in the New England States. There is a marked difference in time between the pollinating seasons of the two species. The Tamarack pollinates in March and April, whereas the European Larch produces its pollen at the end of October and in November. The pollen grains of Larix decidua (Illustration 33), like those of the cedar and pine, are "winged", but they are larger, about 72 microns, without the "wings". They have a thick exine and intine and the latter expands when moist and casts off the exine.

Pollens are not the only allergens nor are hay fever and asthma the only allergies. Various forms of skin diseases are produced by a host of agents with which we come in contact daily and which are not only harmless for most people but useful and beneficial. There are foods, drugs, cosmetics, shoe polishes, plastics and rubber articles, linen, silk and synthetic fabrics, animal danders, dusts and what not, to one or more of which one may be sensitive. Space limitations prevent us from entering this vast field of allergies.

What, then, is there in these tiny pollen grains that causes hay fever and asthma? The answer generally given is, the protein in them. The word "protein" is derived from the Greek "protos" which means "first". The proteins are of primary importance to the life and function of the body cells and are a constituent of all living cells, whether of animals or plants. They are highly complex substances and consist basically of amino acids. These are acids in which the nonacid hydrogen has

been replaced by NH_3 which is known as the "amino group". At least twenty-two of them have been obtained by breaking down proteins. Not all of them are contained in any one protein but one of the proteins, casein, yields nineteen different amino acids. Every species of plant or animal has its own kind of protein and it is these specific differences that make one kind of protein antagonistic to another. In other words, allergy is presumably a matter of protein sensitization.

Living cells ordinarily protect themselves from foreign protein by producing and throwing off into the blood stream "antibodies" which combine with and neutralize the effects of foreign protein before it can reach them. This is known as "immunity". But let us suppose that, for some reason or other, the reaction activity of the cells has been inhibited or altered so that they cannot produce antibodies. In this case they are unable to resist the foreign protein and will be a prey to allergenic disease. However, it is not clear how the antagonistic protein of one substance can act upon another except by the intervention of some process of solution or digestion. Pollen grains of ragweed subjected to the mucous secretions of the nose for thirty days still remained intact. But the film of oil and wax with which the grains are normally surrounded, was completely digested within an hour. This would arouse the suspicion that the film and not the protein in the cells is responsible for the allergy. All pollen grains are surrounded by such a film. Its color is usually yellow. This film must be removed by a suitable solvent to reveal the structural features of the surface of the pollen grains. The solvent used in the preparation of the microscope slides from which the photographs in this article were made was, in some instances ethyl alcohol, in others, xylol. Some of the specialists who have worked extensively in this field of research are not convinced that allergies are caused by antagonistic proteins in the allergenic agents.

Recent statistics show that there are approximately 6,000,000 victims of hay fever in the United States. The estimated number of asthmatics ranges from 600,000 to 3,500,000. About 3,000,000 patients suffer from recurrent sick headache, 4,000,000 from either intermittent or continucus hives and the same number from indigestion due to allergic causes. The number of those who are afflicted with allergic eczema is placed at 600,000, but if the occupational diseases are included, it would probably be ten times as great.

The record is rather disconcerting. Since the turn of the century science has learned definitely to recognize allergy incidence and in many instances to offer at least palliative assistance. But assured immunity to and permanent recovery from allergic disease are cherished boons still to be hoped for.

COMMON SPIDERS OF MARYLAND

"Common Spiders of Maryland" by Dr. Martin H. Muma has just been released by the Society.

The book is $5\frac{1}{2}$ X $8\frac{1}{2}$ inches, contains 178 pages with 10 half tone pages of spider illustrations, 5 pages of 20 each anatomical drawings and a plate of general anatomy of the dorsal and ventral view of the spider. Also there is a glossary of scientific terms and two indexes, one of scientific names and the other of common names. A portion of the book is devoted to the biology and to the collecting and preserving of spiders.

The price of the book is $1.50.

ARBORETA

by Hollis J. Howe,
City Forester
Baltimore, Maryland

Living collections of trees and woody plants have been popular with horticultural enthusiasts since the famous physic garden was founded in Tokyo some eight-hundred and fifty years ago. In spite of what we are learning about the Japanese at present, they have long been expert plantsmen and some of our most valuable plant-material is of oriental origin.

The largest collection of woody plants of temperate regions, in Europe, is in the Royal Gardens at Kew, England; while the most comprehensive collection of tropical trees in the world is in the Dutch Colonial Garden at Buitenzorg, Java, now in the hands of the Japanese. In this country, the Arnold Arboretum at Jamaica Plain, Massachusetts, perhaps most closely approaches Kew Gardens and the Fairchild Tropical Gardens near Miami, Florida, should ultimately rival those at Buitenzorg. Dr. Fairchild's books describing his plant explorations are most interesting to those who are tree-minded.

In the middle of the sixteenth century a collection of trees was made at Touvoye, France, by Rene' du Bellay, Bishop of Mans, which was pronounced the richest in France, Germany and Italy. Like most of the early collections made by individuals, (and many of those made later, in fact) all traces of the trees are now gone.

Two centuries later, Duhamel du Monceau, head of the French Marine and a man of scientific attainments, established the first arboretum made with scientific purpose. It was said to contain a thousand species belonging to one hundred and ninety-one genera. Du Monceau described his collection in his "Traite' des arbres et arbustes qui se cultivent en France" in 1755.

In 1825, Pierre Phillippe Andre' de Vilmorin established what is still one of the most important dendrological stations in Europe at Les Barre near Loiret, France. He was especially interested in timber trees and, hence, made large plantations. The arboretum was purchased and enlarged later by the French government, named "Arboretum National des Barres" and used as a school of silvaculture.

Alfonse Lavalle'e planted an arboretum at Segrez, in 1857, later supplementing it with a botanical library and herbarium. He died thirty years later and only a few specimens remained a few years ago. This would seem to be a good example of what to expect unless all-time provision is made to perpetuate such effort.

Another arboretum at la Maule'vrie, France, established and, until recently, maintained by Monsieur G. Allard, contains a most remarkable collection of oaks and conifers. It will be apparent that we should be concerned about the survival of these several collections of horticultural treasures now in the hands of the enemy.

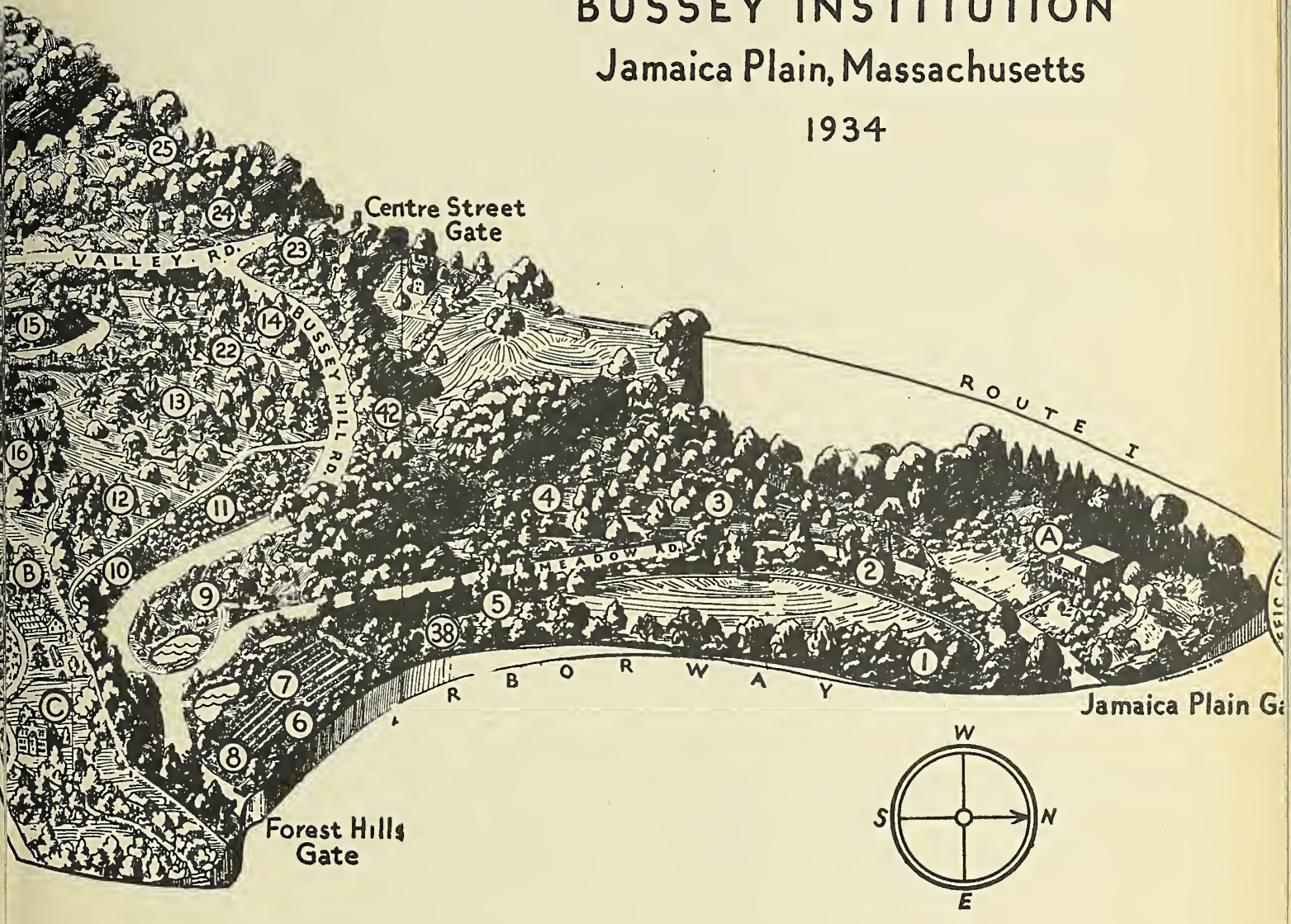
Prince Frederick of the Netherlands developed an arboretum on his estate at Muskau in Silesia which, through the efforts of Heinrich Hermann von Puckler, excelled in beauty of arrangement. A catalogue of its plants by Petzold & Kirchner published in 1864 is still a standard work on cultivated trees and plants, although the arboretum reverted to a commercial nursery, with but a few of its original specimens surviving.

The only scientifically managed arboreta in Great Britain are the national

gardens at Kew, Edinburgh and Dublin. These have greatly increased the knowledge of trees and encouraged planting, not only in that country but throughout the world.

At Kew Gardens can be found the largest number of species of trees and plants in any one place in the world, because of the advantageous climate. The gardens had been in existence some three hundred years before it was begun to be treated systematically by Sir William Hooker in 1848. This resulted in the establishment of many important arboreta on large estates in England, Scotland and Ireland and, no doubt, accounts for an inborn love of plants which is so general among these people today.

Few interesting collections of trees were made early in America. One excep-



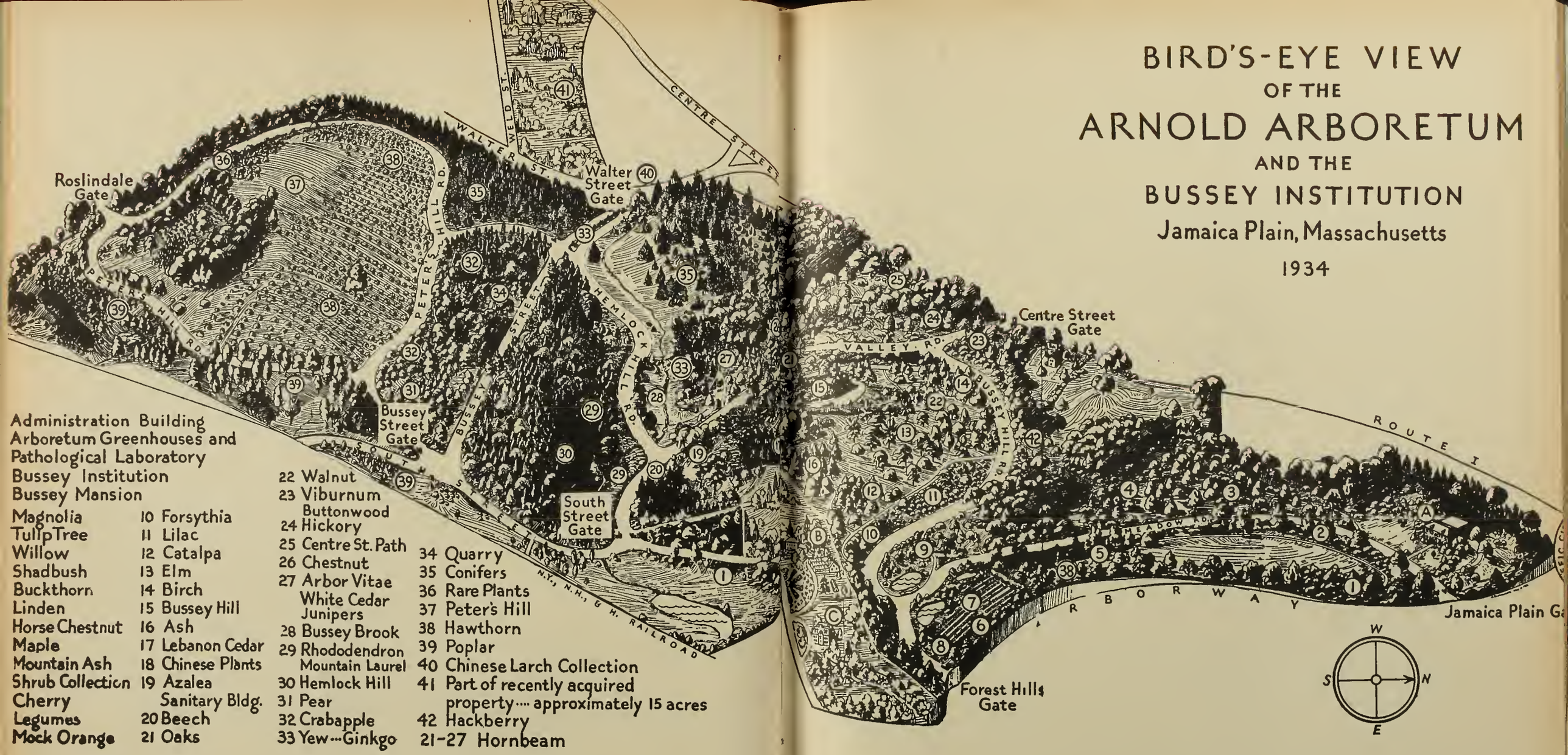
tion was that begun by John Bartram near Philadelphia some fifty years before the Revolution. He was appointed Botanist to the King of England and exchanged plants with that country. After being converted to a nursery and suffering from decline, his property was purchased by the city of Philadelphia in 1891 as a public park.

Bartram inspired his cousin, Humphrey Marshall, to plant a number of trees near the Bradford Meeting-house in the village of Marshalltown near West Chester In 1875, Marshall published the "Arbustum Americanum", the first descriptive book on plants written by a native-born American. Many of his trees still flourish and are, perhaps, the most interesting of the old collections in the country.

Another interesting garden and arboretum was planted about 1830 by John

BIRD'S-EYE VIEW
OF THE
ARNOLD ARBORETUM
AND THE
BUSSEY INSTITUTION
Jamaica Plain, Massachusetts

1934



Administration Building
Arboretum Greenhouses and Pathological Laboratory
Bussey Institution
Bussey Mansion

Magnolia
TulipTree
Willow
Shadbush
Buckthorn
Linden
Horse Chestnut
Maple
Mountain Ash
Shrub Collection
Cherry
Legumes
Mock Orange

10 Forsythia
11 Lilac
12 Catalpa
13 Elm
14 Birch
15 Bussey Hill
16 Ash
17 Lebanon Cedar
18 Chinese Plants
19 Azalea
Sanitary Bldg.
20 Beech
21 Oaks

22 Walnut
23 Viburnum
Buttonwood
24 Hickory
25 Centre St. Path
26 Chestnut
27 Arbor Vitae
White Cedar
Junipers
28 Bussey Brook
29 Rhododendron
Mountain Laurel
30 Hemlock Hill
31 Pear
32 Crabapple
33 Yew---Ginkgo

34 Quarry
35 Conifers
36 Rare Plants
37 Peter's Hill
38 Hawthorn
39 Poplar
40 Chinese Larch Collection
41 Part of recently acquired property---approximately 15 acres
42 Hackberry
21-27 Hornbeam

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Few interesting collections of trees were made early in America. One exception was that begun by John Bartram near Philadelphia some fifty years before the Revolution. He was appointed Botanist to the King of England and exchanged plants with that country. After being converted to a nursery and suffering from decline, his property was purchased by the city of Philadelphia in 1891 as a public park.

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Evans in Delaware County, about twelve miles west of Philadelphia. He corresponded and exchanged plants and seeds with Sir William Hooker and ultimately had many rare Himalayan and other little-known plants.

About 1870, Josiah Hoopes, author of the "Book of Evergreens", planted a large collection of conifers which became famous. The Hoopes Pinetum should be visited by those interested in the cultivation of evergreen trees. It is worthy of note that the Philadelphia region is particularly well provided with tree collections, as will be seen later.

In 1841 Henry Winthrop Sargent, of Boston, bought a twenty-two acre estate, Wodenethe, overlooking the Hudson River above Fishkill Landing, New York. A neighbor, A. J. Downing, encouraged him to plant a collection of trees, expecially conifers. His effort was shortlived, but it accomplished much, in that it showed what species were not hardy in that latitude. By way of further contribution, it stimulated the activities of his relatives, Horatio Hollis Hunnewell and Charles Sprague Sargent, who distinguished themselves later, as will be shown, in the field of plant study.

Mr. Hunnewell began developing an estate in the Charles River Valley near Boston and which is now well known as Wellesley, in 1852. While many deciduous sorts were planted, coniferous trees were favored and the pinetum, in the number of species and beauty of individual trees, is perhaps the most important extant.

In Highland Park, Rochester, New York, the park department has one of the largest collections of trees and shrubs in the country. The city is in the center of a great commercial horticultural area which serves to encourage a wide interest in plants.

The Dominion of Canada has plantations at its Central Experimental Farm at Ottawa. Their arboretum can teach much with regard to the northern limits of certain plants.

Most State Colleges of Agriculture and Forestry either have tree and shrub collections of interest or have been of assistance in establishing them locally. The University of Maryland has gotten together a considerable number of specimens, largely through the cooperation of the Maryland Nurserymen's Association.

At "Hope House" on the Miles River near Easton, Maryland, the late Mrs. William J. Starr began adding to an already fine group of older trees in 1925, by procuring trees from the various states. It is to be hoped that this collection may endure. Some of the older trees there, particularly an unusually fine old English beech. are mentioned in H. E. Wilson's "Aristocrats of the Trees".

A wide variety of trees may be seen about the Lake Montebello filtration plant and in our Baltimore parks. Johns Hopkins had a splendid collection, remnants of which still remain, in what is now Clifton Park. But all such efforts seem destined to decline, unless associated with an institution of learning. The Johns Hopkins Botanical Garden at Homewood, though small, should endure for that very reason.

What should eventually become the most outstanding collection in the world may be anticipated at The United States National Arboretum on the Anacostia estuary. During the past ten years the Division of Plant Exploration and Introduction of the Bureau of Plant Industry, Soils and Agricultural Engineering, United States Department of Agriculture, has geen acquiring small pieces of land which now total 395 acres.

To date little has been done except the clearing of woods, sowing of cover crops, grading and draining. Roads have been laid, several artificial lakes have been made and the area fenced.

At present it is largely occupied by the army and little may be expected to take place with the exception of maintenance. It is intended to develop the area as a post-war project. Considerable plant-material is already being propogated and grown on at Beltsville, Maryland, and at other stations.

In addition to the older tree collections near Philadelphia and West Chester, there is the newer Tyler Arboretum at Media, Pa. and the Morris Arboretum at Chestnut Hill. The latter, being connected as it is with the University of Pennsylvania, bids fair to remain intact over the coming years.

Anyone spending a few days in New York City could devote some time very profitably at either the New York Botanical Garden near Bronx Park or the Brooklyn Botanic Garden near Mt. Prospect Park. Both are very highly scientific and educational. For a less exhaustive study of trees, such collections as those at Dosoris near Glen Cove or at Douglastown, Long Island, might prove adequate.

Perhaps the most outstanding and yet fairly accessible arboretum in the east is the Arnold Arboretum at Jamaica Plain, Massachusetts, which is administered by Harvard University. Its first director was Charles Sprague Sargent, already mentioned. Professor Sargent had been head of the department of botany at that institution before his appointment to the directorship.

In 1868, Mr. James Arnold, a New Bedford merchant, died and left an estate of $100,000 "to be devoted to the advancement of agriculture and horticulture". One of the trustees, Mr. George B. Emerson, author of "The Report of the Trees and Shrubs of Massachusetts", proposed that the legacy be given to the President and Fellows of Harvard College to develop an arboretum, provided they would turn over for the purpose part of a farm that had been given to the university by Mr. Benjamin Bussey.

At first, 125 acres were set aside "for the purpose of growing a specimen of every tree and shrub capable of supporting the climate of eastern Massachusetts". This region is particularly fortunate, so far as climate is concerned, and advantage was taken of exposure and the shelter afforded by tree-growth already existing before the plantings were begun.

An agreement was entered into with the city of Boston, whereby the latter agreed to add certain adjoining land; to construct and maintain carriage-drives and walks as planned by F. L. Olmstead, the elder; to police the grounds and to assume all taxes for one thousand years. In return, the university agreed to open the grounds to the public from sunrise to sunset every day of the year, but reserved control over all collections and all the grounds, exclusive of roads and walks. The thousand year clause precluded the possibility of the plantings ever being disturbed.

In 1894, seventy-five acres, known as Peter's Hill and a part of the Bussey farm, were added, making a total of two-hundred and twenty acres of meadow, hill and valley. One of the three hills is covered with a natural woods of hemlock and mixed hardwoods. Other wooded areas occur elsewhere. A small stream flows through one of the valleys, making possible an appropriate use of marginal trees, shrubs and plants, as well as a collection of acquatics in a pond.

The purpose being to increase the knowledge of trees and other woody plants, there is, in addition to the out-door museum, a dendrological laboratory, a library, an herbarium and a bureau of publication, exploration and exchange. Taken as a whole, it is a clearing house of scientific information regarding trees and shrubs and it is possible to procure rare plants for accredited use through exchange or purchase. Foreign students, particularly those from the Orient, are enabled to make more exhaustive study of the flora of their native land than they are at home, at The Bussey Institution.

In the living collection, the species are arranged in groups of genera and families, wherever soil and situation permit, and, at the same time, to harmonize with the native woods. All the groups of trees and shrubs, both specimen and native, are easily reached by grass paths. Most exotics are planted as single specimens. All native plants are so spaced as to permit at least one individual to develop its natural shape in the open.

For the convenience of study, the shrubs of genera of which there are no hardy trees, and all vines, are arranged in sequence in rows near one entrance; but shrub genera of which there are tree-forms are planted adjacent to the latter. The various species of several large genera of shrubs are grouped elsewhere and not in rows, so that they present a pleasing natural appearance. Sheltered positions are selected for little-known species where they may receive special observation, care and protection if necessary.

Many of the trees and shrubs have been raised from seeds collected in eastern North America, northern Europe, Siberia, China and Japan. A record of origin and history of all plants is kept in a card catalogue and their position in the groups is recorded on a large-scale map. Metal labels showing the Latin and English names and the region they inhabit are placed at the height of the eye on individual specimens and on at least one of any group of similar trees, always facing drives and walks. Metal labels on upright standards are used in the shrub collection. But few wooden markers are employed. All plants, whether otherwise labeled or not, have a zinc tag inconspicuously attached as a check.

The library contains about 30,000 bound volumes and some 10,000 pamphlets. In addition to making reports and publishing books and bulletins on trees and shrubs of this and other countries, the arboretum prepared the Jesup Collection of North American Woods housed in the American Museum of Natural History in New York. Explorations for plants have been made in Central and South America, as well as in Europe, Asia and the Orient.

The Arnold Arboretum has geen discussed at some length because it represents the most comprehensive American attempt in this field which was begun early enough and in such a way as to show what contemporary arboreta should be in years to come. It is perhaps not too well located from the standpoint of wide variety of possibility. The arboretum at Anacostia should ultimately surpass it in this regard.

Situated as we are here in Baltimore, there would seem to be every reason that an earnest effort be made to establish a modest collection, at least, in or near the city proper, where climatic conditions are most favorable to a wide variety of plants and where there is a natural local interest and manifest desire for a better knowledge of them. Such a museum would not only contribute to knowledge with respect to trees, shrubs and plants; but provide an excellent locale for the observation of insects, birds and mammals and the study of geological and other related phenomena.

LECTURES AT THE SOCIETY DURING JANUARY, FEBRUARY AND MARCH 1944

January 4--Annual Chess and Checker Tournament
11--Lecture by George Maugans "Some Important Phases Relative to the Science of Herpetology."
18--Motion Pictures "Trees and Men".
25--Lecture by Dr. Martin Muma "Timber Ridge Caves and their Fauna.
February 1--Lecture by John B. Calder "Some Notes on the Development of the Geological Sciences".
8--Lecture by F. Wallace Taber "Migratory Water Fowl..Abundance, Disappearance and Management."
15--General Assembly, Trustees Meeting.
22--Motion Pictures "Ramparts we Build."
29--Lecture by Charles Ostrander "The Story of Tin".
March 7--Lecture by Dr. Clyder Reed "Rafinesque".
14--Lecture by Joseph Bures "Axonometric Projection in Nature Drawing".
21--Fifteenth Annual Meeting of the Society. Report by the President. Motion Picture "Wheels Across India".
28--Lecture by Elra M. Palmer "Fossil Deposits of St. Mary's County, Maryland".

JUNIOR DIVISION MEETINGS

January 8--Annual meeting of the Junior Division. Election of Officers: Douglas Oler, Chairman; Frank Atwell, Vice Chairman; Jerry Hardy, Secretary: Council members the three above officers and Eurath Hardy, and James Hill.
15--Discussion of Field Trips held during the Christmas holidays.
22--Motion Pictures "Trees and Men".
29--Nature Quiz.
February 5--Talk by Douglas Oler "Prehistoric Reptiles"
12--Lecture by Joseph Bures "Bats of Bare Hill".
19--Talk by Frank Atwell "Myths of Natural History".
26--Motion Pictures "Once upon a Time and The River".
March 4--Nature Quiz "How Many do You Know".
11--Talk by James Hill "Some Reflections on Philosophy and Evolution".
18--Talk by Charles Freed "Sand".
25--Junior Anniversary Program. Address by the President. Motion Pictures "California Quail and Fetch".

AN APPEAL TO BIRD LOVERS

THE STATE OF MARYLAND HAS LONG NEEDED AN ORGANIZATION DEVOTED TO THE CONSERVATION OF BIRD LIFE. THE NUMEROUS REQUESTS RECEIVED BY THE SOCIETY CONCERNING THE FORMATION OF SUCH AN ORGANIZATION HAVE RESULTED IN THE DECISION TO FORM A BIRD CLUB TO BECOME AFFILIATED WITH THE NATIONAL AUDOBON SOCIETY.

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COMMON SPIDERS OF MARYLAND

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PROCEEDING NO. 9. SOME INDIAN VILLAGE SITES OF TIDEWATER MARYLAND

Mimeographed with printed cover, 30 pages with 18 halftone plates and 20 maps and illustrations. Price .60 By mail .65

In course of preparation -- Annotated List of Maryland Birds

The Natural History Society of Maryland

Founded 1929

"To increase and diffuse knowledge of Natural History"

* * * * *

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MARYLAND

A JOURNAL OF NATURAL HISTORY

Young Blue Jays
W. B. Tyrrell

The Natural History Society of Maryland

JULY 1944 VOLUME XIV No. 3

MUSEUM OF NATURAL HISTORY
MARYLAND HOUSE DRUID HILL PARK

Open daily 10 A. M. to 5 P. M. except Monday.

MARYLAND

A JOURNAL OF NATURAL HISTORY

THE VALUE OF THE SOCIETY TO THE STATE

The Natural History Society of Maryland has a definite value to this State. It has made available much useful information and data otherwise unobtainable.

For the past fifteen years the Society has been a service and information bureau relative to the wild life and natural resources of Maryland. During this time it has cooperated in every move where conservation of natural resources was concerned. It has aided school and industry, teachers, pupils, students and those seeking information relative to nature.

During these years the work of the Society has been reflected in its books, leaflets, proceedings, bulletins and this Journal. These publications are intended to acquaint, aid and interest our citizens; they may be had for a small cost. These publications are to be found in every library in Maryland.

This is a service of no little value and every year the Society adds additional information from the results of its research.

Edmund B. Fladung
President

PUBLISHED by THE NATURAL HISTORY SOCIETY OF MARYLAND
2103 BOLTON STREET, BALTIMORE, MARYLAND
JANUARY, APRIL. JULY, OCTOBER

VOLUME XIV No. 3
JULY 1944
A DOLLAR A YEAR

EDWARD McCOLGAN

EDWARD McCOLGAN

On May 28th, the Society lost one of its best friends, a distinguished member and Staff worker, Mr. Edward McColgan.

Mr. McColgan was one of the first persons to join the Society after its founding in 1929. He was intensely interested in the Society's work and served as Trustee from 1932 to 1937 and Treasurer from 1932 to 1936.

Upon the opening of the Department of Photography in 1937, he was Curator, a position he held at the time of his death. He was also Assistant Curator in the Department of Ornithology and Mammalogy, in which position he conducted the Bird Banding work of the Society for many years.

He took many nature photographs, the most outstanding and valued were a series of the Turkey Vulture and the Bald Eagle.

Mr. McColgan was also a member of the Maryland Historical Society, Sons of the American Revolution, Sons of the War of 1812, Oliver Hibernian Society of Baltimore, and past commander of the Maryland Guard Memorial Post, American Legion. He was a 2nd Lt. in the 1st world war, serving in Hdq. Co., 115 U. S. Infantry.

Perhaps the best tribute to be paid to Mr. McColgan was the one expressed by his fellow worker in the department of Ornithology, Pvt. C. Haven Kolb, now serving in Normandy. "Mac, as we all called him, was truly a lovable character. Everyone liked him at once and he was so much a part -- such a unique part of our Society, that all who knew him will miss him greatly. No one was a better companion. He appreciated beauty, enjoyed all good things, was witty and amusing, a wonderful talker with a great fund of knowledge, always welcomed at our work and recreation. He was a devout man with a warm heart." I believe every person who knew Mr. McColgan will agree with Mr. Kolb's tribute.

Mr. McColgan is survived by his wife, Mrs. Helen Vaugh McColgan and his son, Lt. James McColgan, of the United States Navy, who is also a member of the Society.

Edmund B. Fladung
President

MARYLAND'S LARGEST SHELTER CAVE
By Martin H. Muma

In any classification, study or discussion of caves often the last to be considered is the so-called refuge or shelter cave. The many reasons for this include lack of size, lack of beauty, lack of fauna and lack of mystical allure. To the speleologist the dark depths of limestone caverns hold a greater attraction. Most shelter caves are nothing more than an overhanging ledge or a wide crevice in a cliff and are neither large enough or dark enough to excite interest. Only when a shelter cave is large or is found to contain archeological material is the interest of the speleologist aroused. Such is Sand Cave, Maryland's largest shelter cave. Located in Garrett County, four and four-tenths miles southeast of Loch Lynn, Maryland, Sand Cave contains the largest natural underground room in the state.

As the name implies, this cave is developed in sandstone. The entrance, one hundred feet long and varying from two to five feet in height, is located in the face of a low ledge. At one time the cave must have been much larger than it is at present for the entrance is partially hidden by a jumble of sandstone blocks extending for forty to fifty feet down the mountain side. The blocks, now covered with moss and ferns, appear to be remnants of a past roof. This suggestion of a once larger cave is strengthened by the fact that the entrance occurs in an extensive depression area. Much of the cave, however, still remains. From the entrance it widens to one hundred and twenty-five feet and extends one hundred feet into the mountain. The room is a rough dome increasing in height from two to five feet at the entrance and sides to fifteen feet near the center and at the back. Three rock pillars, two fairly large and one small, appear to support the roof. The small pillar is near the back end of the room at the center while the larger ones are on the right and left sides nearer the entrance. Large sandstone boulders cover much of the floor and conceal the course of the small stream which flows through the cave. This stream originates at two points at the back of the cave, one a small spring on the floor near the center, the other an active stream which flows out of a crevice about thirty feet to the left of the spring.

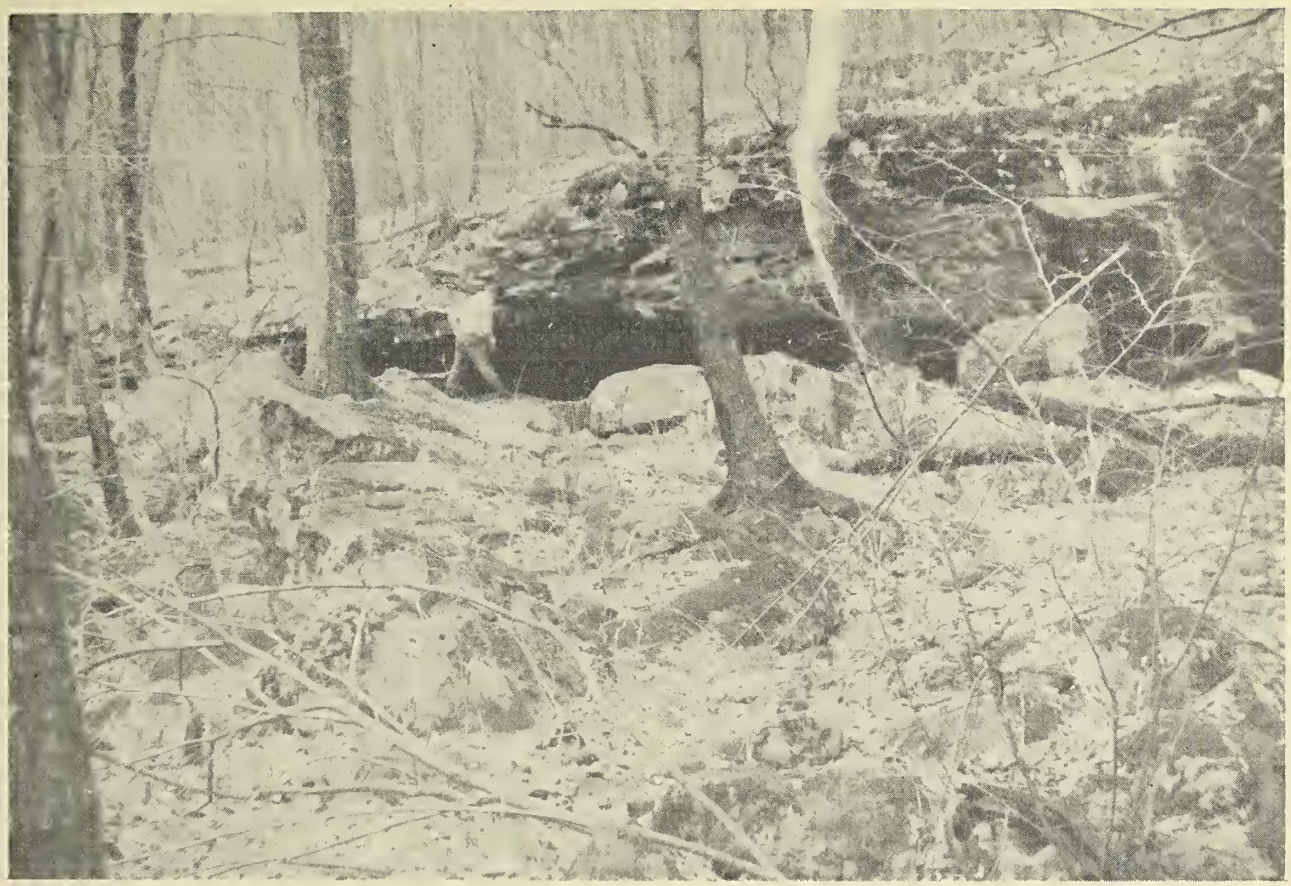
Due to the actively flowing water the air of the cave is quite cool and humid. On one occasion the difference in temperature and moisture content between the outside and inside air was great enough to cause a heavy fog in the cave.

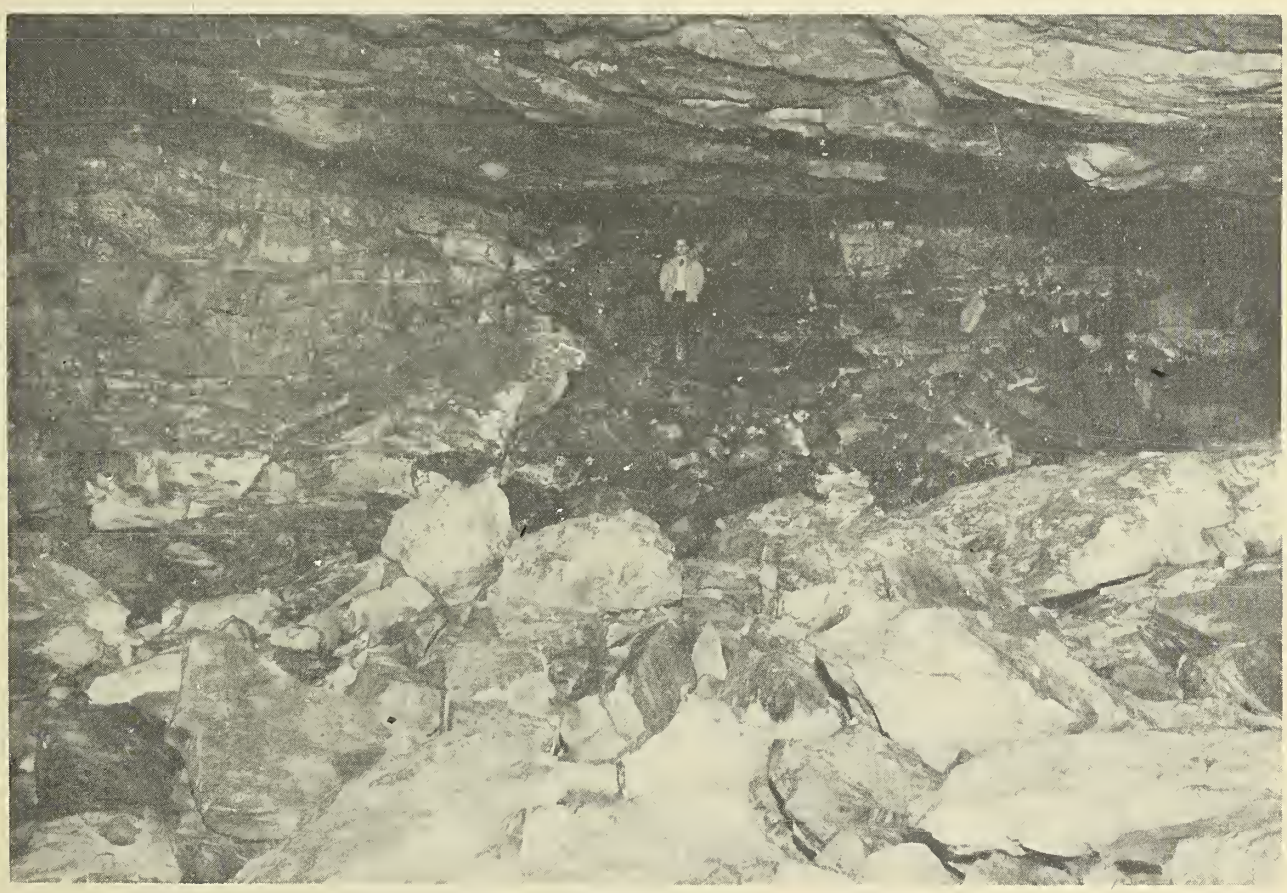
Most of the three hours spent on the first visit to the cave were consumed in exploring, mapping and collecting fauna with only a very few minutes devoted to taking an archeological sample of a three foot area of the floor. The accompanying map of the cave shows the results of exploration and survey.

Fauna collected in the cave consisted of several as yet unidentified craneflies and cave crickets, one unidentified harvestman, several specimens of the cave spider Meta menardi Latrielle and one female spider of the species Theridiosoma radiosa McCook. The unnamed fauna have been turned over to specialists, but identifications have not as yet been received.

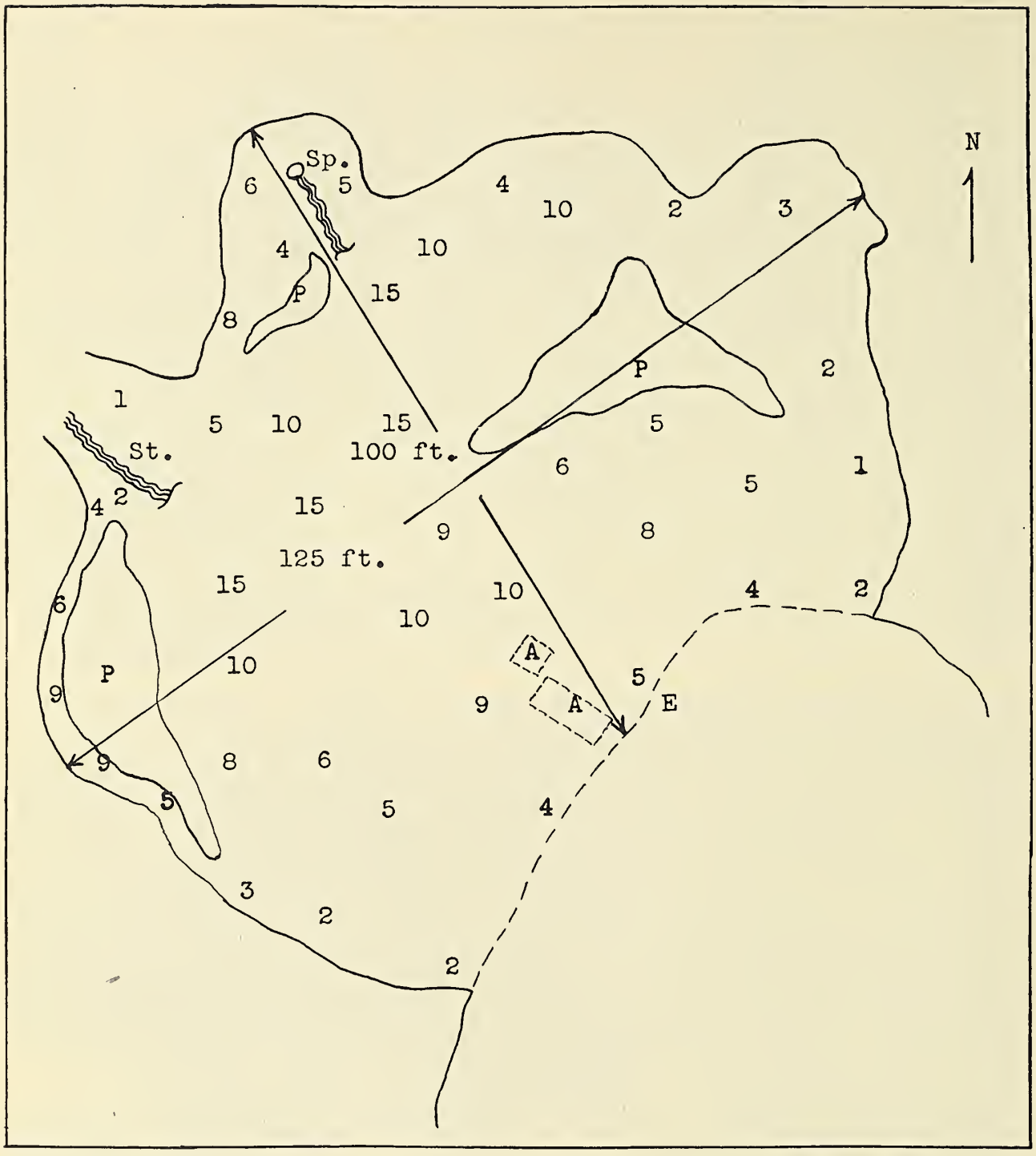
Archeological material taken from a six inch excavation of a three foot square consisted of a peck of charcoal, four arrowheads, three imperfect and one perfect, many flint chippings, one bone instrument and several pieces of charred and uncharred bone. Following field trip requirements of the National Speleological Society, the artifacts taken on this and the succeeding trip to this cave were turned over to the archeological committee of that society.

Exterior of Sand Cave





Interior of Sand Cave



DIAGRAMMATIC MAP OF SAND CAVE

A = Archeological Diggings
E = Entrance
P = Rock Pillar
Sp. = Spring
St. = Stream
Numbers = Ceiling Height

On the second trip to this interesting cave most of the two hours available were spent in further surveying the archeological possibilities. This time a trench three feet wide and six to eight feet long was excavated to a depth of eight inches. Again the most abundant material found was charcoal of which two or more bushels were removed. Three perfect and several imperfect arrowheads, and many pieces of fire hardened bone concluded the material taken on this visit. The areas of the floor which have at the present time been experimentally excavated are indicated by dotted squares on the map.

Sand Cave, from the few artifacts obtained on two preliminary visits, appears promising from an archeological standpoint. As it is the largest sandstone cave in the state it is of geological interest. Minute stalactitic formations taken from the roof of the cave have been analyzed by Dr. R. J. Holden, Blacksburg, Virginia as siliceous and may be of interest to mineralogists. From the biological standpoint little of interest was found, but a more extensive survey of the fauna would be necessary before any definite statement could be made.

A NEW HOMING RECORD FOR THE LARGE BROWN BAT (EPTESICUS FUSCUS FUSCUS)

By Elias Cohen, S/Sgt., A.U.S.

More than 26 homing experiments, to date, have been published which reveal that bats have a well developed homing instinct, even when transported as far as 156 miles from their home roost or cave (Griffin, 1940). Previous homing records for Eptesicus fuscus fuscus are as follows:

(a) (1924) A. B. Howell and L. Little recaptured on June 16, 1923, at Covina, two out of five specimens that had been banded and released July 20, 1921 at Pasadena, California, 20 miles from their home roost.

(b) (1940) D. K. Griffin secured "returns" on five of six specimens that had been released 19 miles from their home roost at West Andover, Massachusetts, when he revisited the roost 36 days after the banding.

At noon October 4, 1941, four adult specimens of this species were collected from behind the second-story shutters on the north and south sides of the Marvey Tourist Home, at Berwyn, Prince Georges County, Maryland. The specimens were then transported by automobile to the northeastern part of Baltimore, Maryland. Number one aluminum bird bands, donated by the Fish and Wildlife Service (U. S. Dept. of the Interior), were fastened around the tibia of three of the bats.

Band #41-71223 - Male Specimen
Band #41-71224 - Female Specimen
Band #41-71225 - Female Specimen

At 7:30 P.M., after a seven hour period of captivity, the bats were released in northeastern Baltimore, an air-route distance of 26.56 miles from Berwyn.

The shutters of the home roost were examined daily to insure finding the bats as soon as they returned. On October 15, twelve days later, at 12:45 P.M., a banded male was discovered hanging behind the same second-story shutter from which it had been collected. The bat appeared to be in good condition, but

its droppings were not as hard packed or as bulky as before its flight. Of the three banded specimens this was the only return. October is rather late in the year to work with a summer colony because the majority of Eptesicus return to their winter caves or mines. It was considered likely, however, that the other two specimens would have been discovered as "local returns" the next season. They were not recovered and the writer's military service interrupted further study.

The circumstances surrounding this record are worthy of mention. First of all, the bat probably had to cross the business and industrial districts of Baltimore. Secondly, a main highway that carries heavy and noisy traffic passes within 50 feet of the home roost. One would have expected that the bat should have returned to any one of many quieter old houses and barns, between Baltimore and Berwyn, some of which also have Eptesicus summer colonies.

Eptesicus fuscus fuscus

Myotis lucifugus lucifugus

The estimation of the speed of homing of "bat #41-71223" would be interesting speculation. Various factors prevent an accurate estimation of the homing speed. The bat may have been confused or disturbed by the banding process and, therefore, may have spent some time in orientation. As the weather during the bat's trip was clear and warm the bat may have devoted much of its time to feeding instead of searching for its home roost. However, an examination of the droppings before and after the experiment revealed that there was some difference. The preflight droppings were more compact and bulky as they contained much insect chitin while the droppings collected after recapture were soft and less compact. Eliminating any difference due to food selectivity, one may venture to assume that the bat had devoted very little time to feeding and had spent more time in searching or flying for its home roost. Yet, here is another possibility; it is known that much of the fluttering manner of the flight of bats is caused by the mammals catching insects as they fly. However, the Maryland Academy of Sciences Graphic Time Table (1941) set 11.67 hours as the average length of each of the nights of this particular flight.

If the bat traveled from sunset to sunrise, each of the eleven nights, the distance of 26.56 miles was traveled at the rate of approximately 2.27 miles a night. Although this estimation is not reliable, one cannot fail to be impressed by the similarity of the time of travel shown by the notes of C. E. Mohr (1934). He records the return of three Myotis lucifugus lucifugus

in 12 days over a distance of 30 miles. Other bat banders have paid little attention to the speed of homing, but have been more concerned with getting homing returns.

It seems indicative that future homing experiments, with special attention to the speed of homing, are needed to aid in understanding this phenomenon.

Mr. John Hamlet, of the Fish and Wildlife Service, is responsible for the daily observations at the Berwyn roost.

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BLACK-EYED-SUSAN
MARYLAND STATE FLOWER

The black-eyed susan, though not a native of Maryland, was voted the State Flower by an act of the Maryland Legislature as it more nearly approaches the State colors than any other flower common to Maryland.

It was introduced from the West as a vagrant in shipments of clover seed. Its present range in this country extends west to the Rocky Mountains and probably beyond, with no determined limit on its southern extension. It has even gained a foothold in European gardens and, judging from its history in this country, is also to be found in European fields as well.

The plants are approximately twelve to thirty-two inches high with the stems simple or branched near the base, stout, rough and bristle-hairy. The leaves are nearly entire, the upper ones being lanceolate and sessile, the lower spatulate and petioled. The flowers form in single large heads with bright yellow sterile florets radiating from the dull purplish-brown cone in which are formed the numerous fertile florets.

The flower is fertilized by bees, wasps, butterflies, beetles and flies; but only insects with long slender tongues can reach the nectar which is deep down in the tubular brown florets. Crawling insects cannot fertilize the flower because they can not ascend the bristled stems. The flower is also known as the yellow daisy or nigger-head. The latin name is Rudbekia hirta (Linnaeus).

NOTES ON A MUHLENBERG TURTLE

By Robert H. McCauley, Jr. and Romeo Mansueti

Up to now, no reliable observations have appeared on the Muhlenberg's turtle in Maryland. With the discovery of a specimen along Poplar Run, near where it is crossed by the Grave Run Road, about 1 mile north of Grave Run Mills and about 2 miles west and slightly south of Rockdale, in Baltimore County, this species may be regarded as indigenous to Maryland.

MUHLENBERG TURTLE

This is rich farming country and the surrounding area is hilly or rolling in character, very sparsely wooded, and without prominent rock formations. The plant life is in a rapidly changing stage and affords excellent ground cover for game. This turtle was collected by Joseph Bures and Conrad Kenny on August 8, 1941.

The turtle was found imbedded in hard yellowish-brown clay beneath a board, and lay right side up in a torpid condition with its head and limbs withdrawn. Several hours later it became active and emitted an odorless liquid in the pocket of one of the collectors.

Earlier in the season the stream was larger and the muddy areas bordering it were extensive, as indicated by the drying streams and muddy beds. Undoubtedly it had been in this condition when the turtle burrowed beneath the board under which it had been found. Subsequent hot weather dried the site and apparently produced in the turtle a state of aestivation. Marsh plants described by the collectors as "cat-tails, arrowroots, various burrs, and thistle plants" grew around the board.

This specimen is a large adult male which shows signs of consider-

able age. The carapace is 96 mm. long with nearly parallel sides, and measures 66.3 mm. in width at the posterior edge of the bridge. The total length of the plastron is 86.5 mm.; it is 46 mm. wide before the bridge and 45.4 mm. wide behind the bridge. The head measures 26.6 mm. in length (from hind angle of head to snout) and is 18 mm. wide at the ears. The carapace at one time was damaged but healed leaving two large cracks on the posterior half. The larger of these ends in a large notch dividing the tenth and eleventh left marginals. Another healed crack runs completely across the left bridge. The entire shell is worn smooth.

The nuchal scute is very narrow and the vertebrals are somewhat wider than the costals. The general color above is dark brown vaguely mottled with black and the scutes have black edges. The plastron is symmetrically, and about equally, blotched with buff and dark brown.

The head is dark brown above mottled with black. The pair of orange spots on the rear of the head so characteristic of Muhlenberg's turtle are rather narrow on this specimen. They begin just above the ears curving diagonally posterio-medially. In color they are reddish-orange.

In captivity, this specimen was highly nervous, and usually hissed violently, drawing its head in, whenever approached. When handled, it strove to claw the hands of the holder, but I did not see it snap at the hands of anyone. It ate lettuce, ground meat and earthworms rather voraciously. After being in captivity awhile, it lost much of the debris that usually is found on the carapace, thus making the shell look quite shiny. It is R-450 in the herpetological collection of the Natural History Society of Maryland.

"TIN" THE UNUSUAL METAL
By Charles Ostrander

It is interesting to note that tin, the number one strategic metal of America which is so necessary to our national defense program and normal civilized way of life, was once reported found in its ore cassiterite in the hilly Catoctin Region in the western part of our State of Maryland. This report was made by Keith in 1884 while working on the geology and mineralogy of the Catoctin Belt.

When we consider the wide variety of mineral species and rock types accumulated within the narrow confines of our State it does not seem strange that we should find this rare metal here in its mineral form Cassiterite. Only a small quantity was found at the time and nothing of importance has been reported since.

The metal tin of which Cassiterite, or tin stone as it is commonly known, is the chief ore, has been in the past the object of numerous scornful remarks, such as "There goes a tin lizzie" or "That is awfully tinny". Today it has skyrocketed to the apex of the heavens where it ironically shines forth in all of its brilliance as America's most desired, most necessary, and yet most woefully lacking mineral. With all of our vast mineral resources there is little more tin to be found in the entire United States in proportion to its size, than is found in our small State of Maryland.

Let us glance at this metal which is so desired by our present day and age, and the use of which dates far into the past. We find that it has a chemical symbol of Sn taken from the Latin (stannum) and not after the Anglo-Saxon (tin). It has an atomic weight of 118.70, and an atomic number of 50 with a valence of 2 and 4. Tin is classified as one of the rarest and most indispen-

sable of metals being less abundant in the earth's crust than the usually considered rare metals cerium, yttrium, titanium, beryllium, lithium, zirconium and vanadium. It was known as a metal to the ancients and discovered back in prehistoric times. Tin is a silvery white metal with a bluish tinge, and does not tarnish readily in pure air. It melts at 231.9° C, is softer than zinc but harder than lead. Being very malleable it can be hammered or rolled into thin sheets (tin foil), at 100° C. it can be drawn into wire, and at 200° C. it can be pulverized.

The structure of bar or block tin is distinctly crystalline and when a bar of tin is bent a distinct creaking or what is commonly called the "cry of tin" is heard. The sound is caused by the friction of the crystals rubbing on one another during bending. Tin is one of the few minerals which has such a high social position as to be subject to a disease and a contagious one at that. The metal is afflicted by low temperatures at which time small gray radiating spots appear which gradually spread until the tin is reduced to a grey powder. An unaffected piece can be contaminated by merely touching it with a diseased piece. The disease is known as "tin pest". The explanation of this phenomenon is that the grey form is an allotropic modifaction which is the stable state at a low temperature. The affected tin can be converted back to white tin by heating on a water bath.

Tin forms alloys with many metals such as soft solder (Pb 50 - Sn 50), babitts (Sn - Sb - Cu), brass (Cu - Zn - Sn - Pb) and bronze (Cu - Sn).

Tin occurs in nature in its most important ore as the mineral Cassiterite (tin oxide). The mineral as found usually includes small percentages of impurities as iron and tantalum. It is confined geologically to highly silicic rocks such as granites, pegmatites and quartz. Its presence is generally due to the pneumatolytic process. Traces of tin are also found in ilmenites, micas, feldspars, columbates and tantalates. Native tin is very rarely found, and when reported is usually eventually discredited. Vein deposits are seldom found and mining is usually done in alluvial or placer deposits formed when rock weathering and crumbling took the place of man's ball mill's and crusher's. Running streams and rivers sort out the heavy ores from the light weight impurities as in a number of our western gold deposits. This action accomplishes during a period of thousands of years, small deposits that men could ill afford to tackle.

The metallurgy of tin is very simple when compared to other rare metals, or even the more common ones. The process that is used is essentially the same as it was 2,000 to 4,000 years ago. After roasting to remove any sulfur, etc., the concentrate contains 83 - 88% Sn 02. This is fused with powdered coal in a reverberatory or blast furnace. Lime is introduced to form a fusable slag. The crude tin thus obtained may be refined by repeated fusion, by liquation or electrolytically. The "standard" quality must have a a minimum 99.75% Sn.

The history of tin as a metal goes far back into prehistoric times. No one really knows who first discovered this shining white metal. Probably one day in the dim past an early barbarian may have thrown some alluvial tin bearing sand on his fire to put it out and found to his surprise a little later, a small puddle of this bright metal. Whether or not be put this new found substance to any use is not known. Articles of copper and copper alloys found in Mesopotania during the period of 4,000 B.C. did not contain tin as an alloy. The first bronze age was probably Oriental, when the Chinese enjoyed a flourishing bronze industry around 1,500 B.C. Many of the present uses of tin by

the Orientals in the form of beaten foils for trimmings for funeral occasions have been handed down from the distant past long before the Christian era.

The Egyptians appear to have been the first of the Western civilizations to use tin, whether from their own discovery or by acquiring it from the Orientals is not known. An analysis of an Egyptian bronze mirror from the period 1,600 B.C. showed the presence of tin. About 1,000 B.C. the Phoenicians, famed traders of their day either worked or bartered for tin ore from the mines at Cornwall, England, before the Roman conquest. These long famous mines supplied the tin for the western bronze age and the classical civilizations of Rome. That the Egyptians knew of tin and some of its properties is proven by the fact that a strip of tin foil free from lead and silver was found in the wrappings of a mummy from the period 700 to 600 B.C.

Tin was used in the Arts during the Grecian Age of Homer and the Biblical time of Moses. In the book of Numbers of the Bible, Moses includes tin on his list of metals then known. The Hebrew word "bedil" was translated cassiteros in the Greek versions, and stannum in Latin translations, whereby the modern chemical symbol was derived. Pliny regarded tin as a variety of lead in his "Historia Naturalis", telling of the high value of this white metal brought from the Atlantic islands in boats and even gives a brief discourse on its metallurgy. In the Bible, Ezekiel refers to the tin commerce of the Phoenicians at Tyre. It has been found by chemical analysis that the ancients did not use tin indiscriminately to harden copper or in their alloys such as bronze, but introduced definite percentages depending upon the use for which the article was intended.

Early metallurgy consisted of using the crudest facilities for smelting. A trench was dug in the ground and lined with clay. The trench was filled with brush and branches or other inflammable material, set on fire and allowed to burn to a bed of glowing coals. Tin ore (cassiterite) in the form of sand or gravel was sprinkled in the glowing embers. As the ore was reduced the metallic tin was collected in puddles and allowed to cool and harden. It was then used in various amounts to make the alloys desired.

Although pure tin is far more durable than lead or copper, vessels of tin are rarely found among Greek or Roman antiquities, but alloys containing tin are common.

The Greeks named tin Hermes, but later in 500 A.D. Alchemists renamed it Zeus or Jupiter and identified it with the symbol 4.

A Latin named Geber in his "Summa Perfectionis Magisterii", probably written about the twelfth century, noted a number of the characteristics of tin such as coloration, creaking sound given off upon bending, hardness, melting point, and the fact that when alloyed with other metals it became brittle.

Coating iron with tin has been traced as far back as 25 A.D. when a hot dipped method was used by the Romans to coat their iron and other miscellaneous articles. This hot dipped method is very similar to that used today in coating with zinc forming galvanized iron.

Except for the working of the Spanish tin mines which was interrupted by the advent of the Moors, most of the world's supply of tin came from the mines of Cornwell around the thirteenth century. Deposits in Bohemia and

Saxony were discovered about this time and proved to be of some importance, particularly in the field of fabrication. It is believed that tin plate originated in Bohemia late in the fifteenth century and was kept as a trade secret for some time. Finally an agent for the Duke of Saxony ferreted out the secret of the tin plate manufacture and returned to Saxony where a similar process was set up in 1665. This ended the monopoly of the Bohemians and a similar industry was set up experimentally in England in 1670. However, it was not until 1720 that a tin coating works was set up at Putypool by a Major Hanbury. Plates or wrought iron were heated on a Smitheys forge and hammered as thin as possible. Several sheets were then placed together and beaten again. The formation of a heavy oxide film on the sheets kept them from sticking together. Finished pieces were trimmed and since acid pickling was still unknown, they were cleansed by immersing in barley water for several days. After washing, the plates were dipped into hot grease to get rid of any moisture and then dipped in the bath of molten tin covered with a film of palm oil. The number of repeated dippings depended upon the thickness of the tin coating desired. Polishing was then done with a sheep fleece.

It is interesting to note that about this time in working an alluvial deposit at St. Anstills Mon the purest kind of tin sand brought 13 parts of tin metal for 20 parts of ore taken to the smelter after having only been washed.

Our now world famous and indispensable tin can was patented by Peter Durand, an Englishman, in about 1810. Dried produce such as beans, coffee, etc. had been packed in reed baskets called cannisters, the word being derived from the Greek word for reed. Durand's invention became known as a "tin cannister" being hand made from tin plate soldered up the side and with the top and bottom soldered on. Surely, it was a heavy and cumbersome container in comparison to our tin can of today.

Before World War II, the Federated Malay States, Bolivia, and the Dutch East Indies produced three fourths of the world's supply. Most of this was controlled by the British. During the years 1920-27 the world production amounted to 140,000 to 155,000 tons of which the United States took 50%. Today with the loss of our supply from the Federated Malay States and the Dutch East Indies the situation is difficult to say the least. The United States is smelting 20,000 tons monthly in Texas as well as importing 17,000 tons monthly from Africa, and meanwhile consumes 45,000 tons monthly, thereby dipping into the Metal Reserve Corporation stockpile of 100,000 tons at the rate of 8,000 tons monthly. We now use approximately 530,000 tons yearly, more than three times the amount produced in 1920-27.

It is quite natural that there has been a concentrated hunt for local deposits of tin ore. Traces have been found in most of our States such as California, West Virginia, North and South Carolina, Texas, South Dakota, Nevada, Maryland, etc. Covering all of this territory there is not enough produced to even begin to fill our home needs. The nearest deposits of importance are the famous Bolivian mines situated on a high plateau rising from 12,000 to 20,000 feet, about 1,000 miles wide and 500 miles long. The deposit is particularly interesting because it is mined as vein material.

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NOTES FROM FIELD AND LABORATORY

A single specimen of Cnemidophorus sex-lineatus, the six-line race-runner, was observed on the beach opposite the Sandy Point lighthouse on Sunday, August 13, 1944. The occurrence of this lizard in Anne Arundel County, in local areas, is not unusual. This note is interesting in that the individual, a very young lizard, was inhabiting a very narrow stretch of beach, not wider than 20 feet, bounded on one side by the Chesapeake Bay and on the other by a brackish marsh. The only vegetation present was a few beach grasses which were intermixed with the bordering marsh grasses.

Gilbert C. Klingel

CHIMNEY SWIFTS GATHERING NEST MATERIAL.

One seldom thinks of birds nesting in the center of a busy city and rarely gives a second glance at the sight of those seen flying above our streets. Two Chimney Swifts were observed flying over Cathedral Street near the Pratt Library on June 8, 1943 and were only casually noted at first. Their actions soon attracted close attention as they were observed to fly against the end of a dead branch of a tree in front of the Cathedral. They performed this way a number of times swerving away and gaining height. They swooped low over the street and up in a graceful curve to hit the tip of the branch. The branch waved to and fro each time. It was not possible to see whether their feet were used to clutch at the twigs. Possibly they were collecting twigs for their nests but it may have been a playful act. An incident similar to this has been recorded in one of the ornithological journals, but was later in the season, long after the breeding period.

Irving E. Hampe.

AN UNUSUAL COLOR PHASE OF THE SHORT-TAILED SHREW

The Short-tailed Shrew, (Blarina brevicaunda), is one of the most numerous small mammals indigenous to the Baltimore area. Among the specimens taken by the writer is a very light-colored individual, trapped near Arion Park, Baltimore on November 30, 1940. The unusual winter pelage of this species is dark slate-colored above and lighter underneath. This specimen is pale gray above with a faint brownish wash and silvery gray underneath. Both specimens were trapped in the same area within a week.

Irving E. Hampe.

A COMMON DUSKY SALAMANDER WITH EGGS

On March 31, 1940, I collected an unusually stout Desmognathus fuscus fuscus (Rafinesque), and thinking that it may have had an unusually large meal, I dissected it. It was a female with twelve costal grooves, and had part of its tail broken off. The tail had begun to grow again and appeared as a stump. The measurements were:

Total length - 69 mm.
Tail length - 27 mm.
Head length - 11 mm.
Head width - 8 mm.

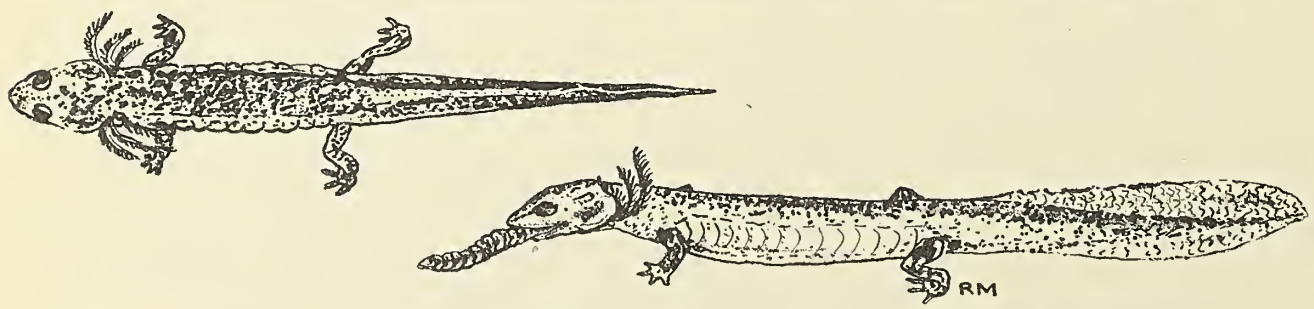
I found a batch of eggs within the specimen arranged in a mass on the left side of the body. All were small, about the size of the "o" of a typewriter key, and these adhered closely in a longitudinal mass from 6 mm. behind the left forelimb to the base of the hind left limb. Each egg was irregularly-shaped. Approximately 50 eggs were present in the salamander. The eggs were a creamy white in coloration.

Figure 1. Sketches of female Desmognathus fuscus fuscus (Rafinesque) showing pattern, regenerate tail and eggs.

Romeo Mansueti.

FOOD OF LARVAL COMMON RED SALAMANDERS

On April 7, 1940, I collected a large larval Pseudotriton ruber ruber (Latreille) near Arbutus, Maryland, under a board among some matter grass and mud which were in a stream that flowed into the ponds. When handled, it immediately began to regurgitate an earthworm. Later it disgorged a small white soft-bodied grub. Several other Pseudotriton larvae have given off food from their stomachs in the form of earthworms after being placed in chlorinated tap-water. The chemical reaction upon their internal organs causes them to emit their bulkier food.



Pseudotriton ruber ruber (Latreille) swallowing an earthworm.

Another dusky salamander which I collected between Vineyard and Glenartney in the Patapsco State Park, Maryland on March 31, 1940, was still in the larval state. By scooping up a handful of leaves and mud from a small stream issuing from a spring, I collected this particular specimen attempting to swallow a very thick earthworm. The salamander immediately disgorged this worm and after being in a jar for a few minutes it regurgitated a larger portion of another earthworm.

Romeo Mansueti.

POISONOUS SNAKES OF THE EASTERN UNITED STATES WITH FIRST AID GUIDE

By Harry T. Davis and C. S. Brimley

The North Carolina State Museum has just published a leaflet which should be of interest to nature lovers, especially herpetologists, boy scouts or anyone doing field work.

This pamphlet of 16 printed pages, describes the poisonous snakes of the Eastern United States. It is well illustrated with color plates and halftones and contains a special section devoted to First Aid for snake bites. This portion has very fine illustrations giving each step in first aid treatment.

The pamphlet can be purchased for 10¢ from the N. C. Bird Club -- Book Fund, Box 2281, Raleigh, N. C.

AN APPEAL TO BIRD LOVERS

The State of Maryland has long needed an organization devoted to the conservation of bird life. The numerous requests received by the Society concerning the formation of such an organization have resulted in the decision to form a bird club to become affiliated with the National Audubon Society.

An opportunity will be given to prospective members to formulate plans for a program of bird walks, lectures, and similar activities.

If you are interested, please write the Society at once.

LECTURES AT THE SOCIETY DURING APRIL, MAY AND JUNE 1944

April 4--Lecture by Paul S. Watson "A Voyage Through Space".

11--Motion Pictures "East of Bombay".

18--Lecture by John P. Hill "Origin and Use of Tung, Linseed, Castor and Soya Oils".

25--Lecture by Pearce T. Blogg "Our Birds in Their Native Haunts".

May 2--Lecture by William Voight, Jr. "The Izaak Walton League".

9--Motion Pictures "Trees and Homes".

16--Lecture by Charles Ostrander "The Story of Tungsten".

24--Motion Pictures "Our Bird Friends".

30--Lecture by Benjamin T. Kurtz "A Reconstruction of the Past".

June 6--Lecture by Charles Ostrander "The Story of Chromium".

JUNIOR DIVISION MEETINGS

April 1--Lecture by Charles Ostrander "Minerals in and around Baltimore".

8--Nature Motion Picture Quizz.

15--Talk by Robert Bartlett "White Mice".

22--Talk by Eurath A. Hardy "Dwarf Fruit Trees".

29--Junior Debate "Should Birds of Prey be Protected".

May 6--Talk by John Hill "Birds".

13--Motion Pictures

20--Junior Nature Symposium.

27--Lecture by

June 3--Lecture by

17--Talk by Douglas Oler.

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* * * * *

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MARYLAND

A JOURNAL OF NATURAL HISTORY

The Woodcock

The Natural History Society of Maryland

OCTOBER 1944 VOLUME XIV No. 4

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MARYLAND

A JOURNAL OF NATURAL HISTORY

THE FUNCTION OF NATURAL HISTORY IN A TECHNICAL WORLD

The art of living with the passing of the years is becoming more and more involved. The trend of the age is technical, mechanical and materialistic. Contact with the world of nature is becoming more rare and difficult; indeed, the face of nature itself, due to the encroachments of a progressing, although not always progressive civilization, has changed or is changing rapidly.

There is a need in the midst of all this materialism and mechanization for an alleviating influence or, at least, of perspective. The point of view may readily become distorted.

One function of the study of Natural History may well be to serve as a focusing point from which to consider and assess the goal and status of progress, technical or philosophic. The progress of man apart from his background of nature and of his association with natural phenomena may not be truly assessed.

PUBLISHED by THE NATURAL HISTORY SOCIETY OF MARYLAND

2103 BOLTON STREET, BALTIMORE, MARYLAND

JANUARY, APRIL. JULY, OCTOBER

VOLUME XIV No. 4
OCTOBER 1944
A DOLLAR A YEAR

HOLLY
(Ilex)

by Hollis J. Howe

From earliest times it has been customary for man to decorate his home and his place of worship with greenery on festive occasions. This has been true both in primitive and in modern times. By this custom we are but carrying out a tradition of most ancient days. Paganism is responsible for the use of holly as a Christmas decoration.

The Romans celebrated the festival of Saturn in December and used holly as a decoration for the Saturnalia, as it was called. Early Christians followed their example in celebrating the birth of Christ, primarily to avoid persecution. Through usage, holly became accepted as a universal symbol of the event.

There are about 275 species of holly extant throughout North and South America, Tropical and Temperate Asia, together with a few in Africa, Australia and Europe. Here in America we are likely to encounter but about 50 of them. There are but 3 species that ordinarily contribute toward our yule-tide decorative scheme and one of these is not native.

The holly belongs to the family AQUIFOLINACEAE (or ILICINEAE). The English holly is known botanically as Ilex aquifolium. The holly-leaved oak of Italy is referred to as Quercus ilex and resembles our native holly. Quercus agrifolia of our South-west is more like the English sort. But we digress.

American holly (Ilex opaca)

Just as we can be proud of many other things American, we can say without qualification that our own holly is more decorative than its British competitor. Its thick, glossy-green leaves, together with its substantial, smooth, gray twigs, make for durability. Its berries (drupes) are borne in such profusion, particularly if the trees are judiciously pruned, that a considerable loss in handling is not readily apparent.

English holly (Ilex aquifolium)

The English holly does not grow quite as tall as our own species and, in cultivation, is often shrubby. Its leaves are thinner and more deeply cut. They are also more wavy and the spines along the margin are longer and, hence, more unpleasant to handle. The twigs are thin and green and the berries are not so plentiful, particularly after shipping. English holly is used almost exclusively in the far west, where there are numerous "orchards" that are operated on a commercial basis. With proper management, such practice might be found profitable here with our own species.

Vandalism, which has already made it imperative to protect the flowering dog-wood, has also made it necessary for the State Forestry Department to bring about legislation to save the holly as well. There is a serious penalty for anyone to be found with holly or other Christmas greens for which they cannot produce satisfactory proof of ownership. Certified holly is obtainable on the holiday market through the cooperation of the above-mentioned agency.

Winterberry (Ilex verticillata)

The winterberry is a deciduous holly which, while its fruit maturing as it does in October is somewhat early for inside use, is suitable for out-door decorations where the heat cannot turn the berries black. These berries are borne in great profusion and add an agreeable dash of brightest vermillion coloring to an otherwise drab late-autumn landscape. They will usually be found along the margin of a stream or swamp. This shrub is ideal for planting in such a situation, where a naturalistic effect is desired. The berries are sometimes used to supplement the lack of fruits, or complete absence of them, on holly foliage from male plants - which, by the way, is often of better color and texture than that of the female.

The fact that the male and female flowers of American holly are borne on separate trees makes it necessary to plant both sexes to insure fruiting, unless the plantation is in close proximity to outside sources of pollen. This is sometimes corrected by grafting scions of the missing gender on a rotted plant to its opposite. Where plants of both sexes are used together, the female plants are most logically used in the foreground.

Holly may be transplanted either in late fall or early spring, before new growth starts. Unless they are nurserygrown, small trees are most successful. A liberal, solid ball of earth should be lifted with the roots. The planting soil should be at least one-third leaf-mould. A shady, well-drained location is best, unless the tree has been growing in the open before moving. Nearly all of the leaves should be removed to prevent drying out by wind and sun before the tree becomes established. An occasional application of cotton-seed meal worked into the soil during the coming years will supply necessary nitrogen. If transplanting is done in the fall a mulch of leaves is helpful.

The leaves of holly are sometimes affected by a disease known as "tar spot". The spots are yellow in May, turning brown and then black by fall. This condition can presumably be controlled by preventive sprays containing copper, such as Bordeau mixture, at two-week intervals, beginning in late spring when the new leaves are fully developed. Other leaf spots may occur on the two-year-old leaves, due to drought or poor growing conditions. Infected leaves should be picked off and burned. Spraying may sometimes be injurious. Improving the soil condition should obtain better and more lasting results.

Perhaps the most serious trouble to affect holly is caused by an insect known as a leaf-miner (Phytomyza ilicis). It causes yellow or brown serpentine mines or blotches in the leaves. The insect is a yellowish-white maggot, about one-sixteenth of an inch long, which feeds between the leaf surfaces. If present it may be seen readily by holding the leaf up to a bright light. In late April or early May it emerges as a small black fly and makes slits in the lower surface of the leaf where it deposits its eggs.

The best method of control is to pick off the infested leaves and burn them or keep watch for the adults to emerge, if the foregoing is impossible because of the size of the tree, then spray with a nicotine-oil emulsion. Arsenate of lead, when the eggs hatch, will also reduce infestation.

The white fly sometimes attacks the under-surface of the leaves. These may be controlled by using a nicotine-soap spray. More than one application may be necessary at two-week intervals.

A serious stem canker of English holly is reported from Oregon. A disease called "die-back" affecting the new twigs of our own American holly on the Atlantic Coast has been observed and isolated as a fungus belonging to the genus Fusarium. Pruning to sound wood and spraying with Bordeaux mixture should bring about successful control in both cases.

When the smooth gray bark of American holly, which on older wood is characterized by numerous wart-like protuberances, is removed, the wood is found to be very close-grained and almost white. It thus finds ready use for fine inlay and delicate turning and carving.

Upon close observation, it will be found that there is considerable variation in the shape of the leaves of American holly. They persist on the tree for three years, the older ones turning yellow and falling off as the new leaves are forming and just before the yellowish-white, inconspicuous flowers appear. When not in fruit, male and female(berry-bearing) trees may be differentiated by the staminate and pistilate flowers. A hand-lens may be helpful at first.

Aside from their popular use at Christmas time, this splendid genera constitutes a very valuable plant material for landscape treatment. This is not only true of the three varieties already mentioned, but applies as well to the several forms of exotic holly offered by nurserymen.

There are many variations in the holly group. There are English varieties with leaves four inches long and those having leaves but one inch in length. Several forms have no spines and others have varegated leaves.

Ilex perad has fruits one-half inch in diameter which are dark red or nearly black. One variety of American holly, (Ilex opaca var. xanthocarpa) has yellow fruits. A specimen of this plant is growing in a front yard in the 400 block Rosebank Ave., Govans, Baltimore, Maryland.

Tree forms of Ilex that may be found in Florida and elsewhere in the far south are Youpon (Ilex vomitoria) and the Dayhoon holly (Ilex cassine). The former is sometimes shrub-like but both are quite tolerant as to soil, light and otherwise adverse growing conditions.

Of the deciduous varieties, our own native winterberry (Ilex verticillata) is undoubtedly the best. A Japanese sort (Ilex serrata) is similar, but with smaller leaves and fruit. Some of the others have dull red and orange fruits. One of them, Ilex amelanchier, indeed resembles the shrub of that name.

Several evergreen, exotic forms are offered by nurseries. The Chinese holly (Ilex cornuta) has large rectangular leaves with a spine at each corner. Its fruits are red. The Japanese holly (Ilex crenata) and its several varieties have mostly black fruits. One form (Ilex crenata var. Buxifolia) has leaves resembling boxwood. Another one (Ilex crenata var. microphylla) has real small leaves. The inkberry (Ilex glabra) has very dense dark-green foliage and star-like flowers followed by black berries. It is quite hardy. All of this latter group of plants are very desirable, particularly when an evergreen screen or hedge is wanted.

When we think of holly there immediately comes to mind such pleasant thoughts as gift-lists, anticipated remembrances, open-house and cheer, either of a liquid or gastronomic nature. It should be apparent that the holly group as a whole has a definite place in any large-scale plantation and, while their flowers are for the most part inconspicuous, their other fine qualities tend to off-set that shortcoming. It would seem that we might well say as Dickens did of the ivy, -

"A merry plant is the holly (ivy) green".

NOTES ON MAMMAL SPERMS

by

Irving L. Towers

The familiar small animals common to the fields and woods of Maryland are a source of diversion and recreation to many in a variety of ways. Most outdoorsmen are interested from the standpoint of dog and gun, others choose the field-glass or camera while in this instance the paraphernalia employed consisted of trap and microscope. There is much to be said in favor of any one or all of these pursuits for in rambling over hill and dale or in investigating little frequented fields of biology, the probability always exists that the unforseen or the unexpected lies just beyond, thus furnishing added impetus.

In dealing with the actions and habits of such extemely minute organisms as are the seminal cells of mammals it is necessary to offer evidence of a circumstantial nature which can not always be accepted at face value without reservation for in isolated instances it is frequently misleading. On the other hand jurists are inclined to credit indirect evidence if it is coordinated in such a way as to form links in a chain of events or if the scattered fragments, gathered hither and yon, can be assembled to reconstruct a reasonably clear picture. By approaching the subject from this angle it will become fairly evident that the male cells of most species of mammals can grasp and hold on thru the power of suction.

This particular function of the cell has not, perhaps, received attention as is indicated in part at least by the concluding sentence of the following paragraph taken from a standard text book of anatomy.

"A spermatozoon, like an ovum, is a nucleated mass of cytoplasm, but it presents a striking modification in structure. It is very small and possesses a head, a neck, a body, a tail and an end piece. In addition it is provided with a head cap which covers more than the anterior half of the head. The cap is modified over the apex into a sharp cutting edge, by means of which the spermatozoon, driven forward by the movement of the tail, pierces its way through the oolema of the ovum."

This would make it seem that the tiny seminal cell with a total length scarcely equal to one fifth of the diameter of the ovum, has the power to penetrate a comparatively thick envelope by merely swimming against it. The typical mammal sperm as shown in Figure 1 has a rounded front end which, although the edge is sharpened, is nevertheless unfitted for an abrupt passage thru so formidable a barrier. Two of the very common rodents, as indicated in Figures 2 and 3, have sperms which show that in order to penetrate the egg coating, repeated thrusts or incisions are required by highly specialized cell organs which largely influence the whole contour and structure of the sperm head thus indicating that penetration is a primary function.

The cell of the rat is armed with a decurved perforatorium used in conjunction with a hair-trigger hinge joint enabling it to strike obliquely downward with results that are only too obvious.

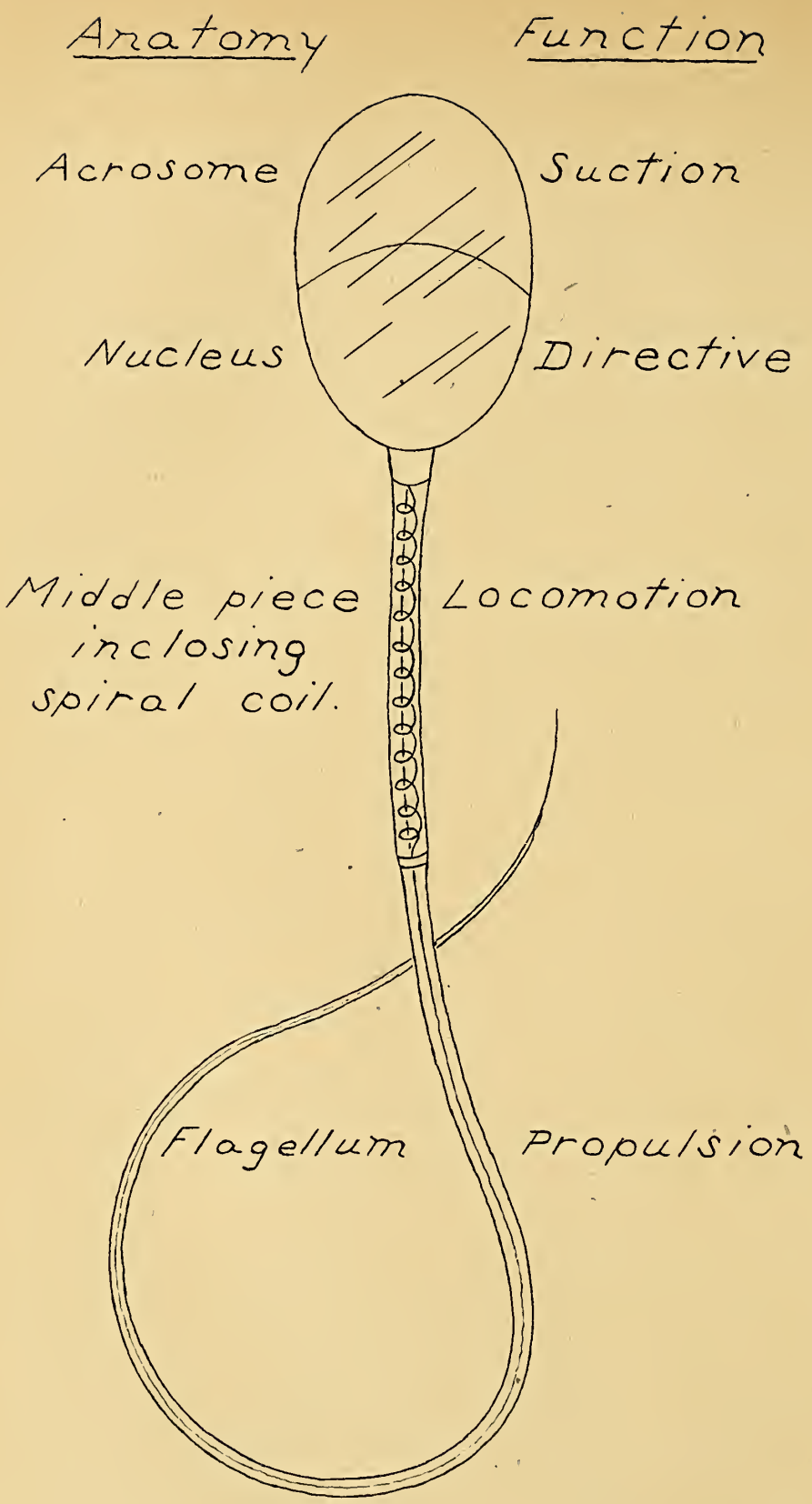


Figure 1. - Schematic Diagram of a Typical Mammal Sperm.

Figure 2. -
Sperm Heads of the Rat, Rattus norvegicus (Erxleben) X 4,700.

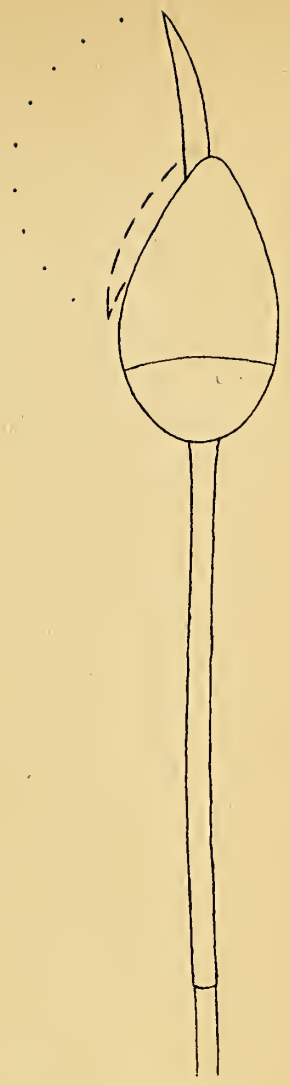


Figure 3. -
Sperm Head of the Deer Mouse, Peromyscus leucopus (Rafinesque). X 4,700.

The cell of the deer mouse operates along somewhat similar lines although its general appearance is quite different. This is probably the most frequent mammal in this area and its sperm offers features which might make further study worth while. Its sickle-shaped perforatorium is capable of being extended and retracted with sufficient energy to incise the egg coat thus indicating the presence of an activating agent within the acrosome. To accomplish this two sets of muscle fibrils would be essential. The relative arrangement of these fibrils is suggested by the unusual shape of the acrosome.

Comparatively few sperms are fitted with such devices,

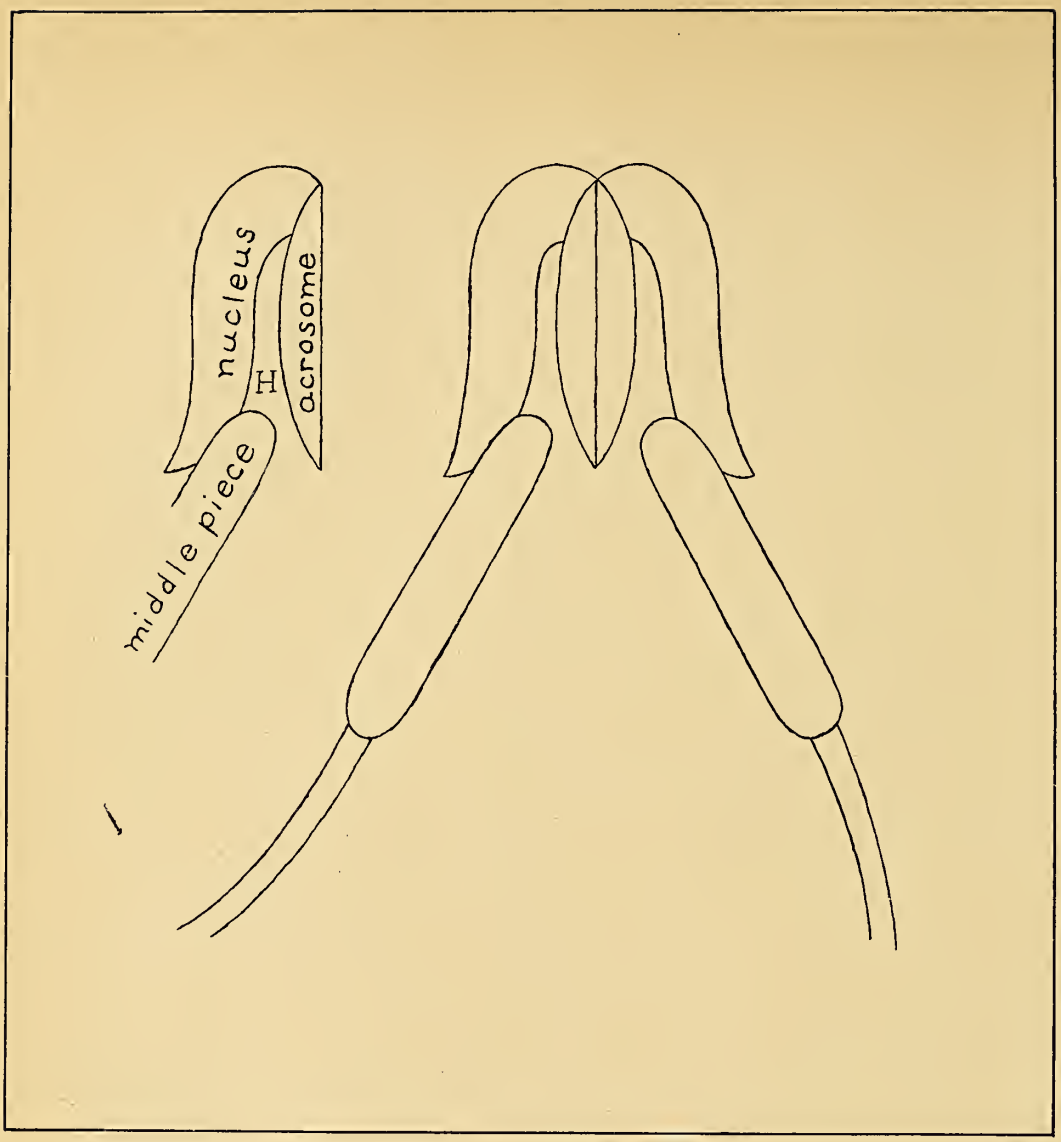


Figure 4. - Sperm Heads of the Opossum, Didelphis virginiana, Kerr. X 6,200.

however, most of the heads examined appeared only as flattened ovoids completely devoid of extraneous piercing or incising organs. Among such male cells it is believed that a sucking disc exists in front, enabling them to grasp and hold on while working their way gradually thru the egg membrane. This disc has a dual purpose for it is also used in the cooperative efforts of the sperms. Among protozoa the Suctoria are perhaps comparable.

From observations made on the opossum it would appear that the power of suction is developed by the acrosome which, because of the specialized anatomy of its cells, is discernible as in the act of holding a fellow cell. Figure 4 shows these sperms with their acrosomes bent down and in so as to oppose their dorsal surfaces. It thus appears that the organisms are lying on their sides while being held together by a

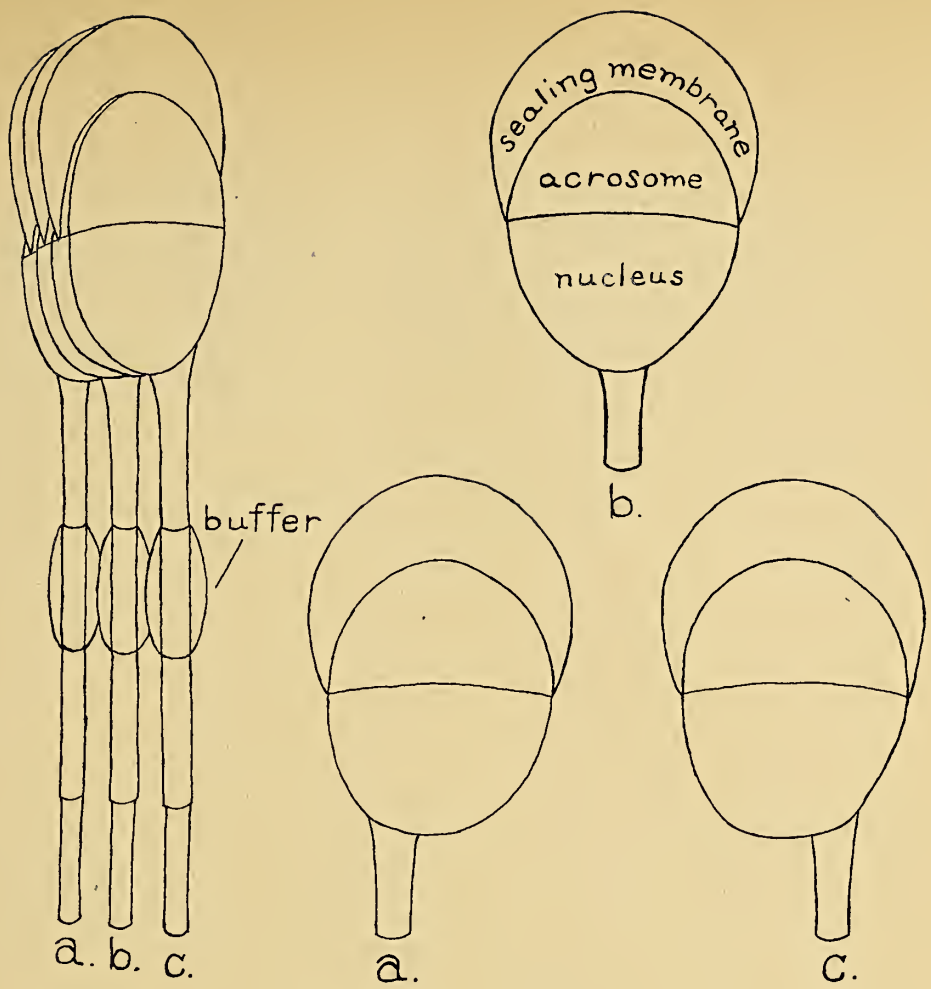


Figure 5. - Sperm Heads of the Guinea Pig, Cavia porcellus, Blumenbach. X 4,700.

means that is none too secure. With reference to the relative cell positions it may be recalled that opossums in mating also lie on their sides, possibly to accommodate transmission of these horizontal elements with minimum interference, for should the duplex cells become separated their chance of reunion would be slight and their efficiency consequently reduced.

In order to get truly representative cells of this animal it was taken when prime. The opossum in Maryland mates close to the middle of February. After dispatching a boar the gonads were excised and placed in a cup of tepid water which was allowed to cool to a distinct chill. After waiting two hours the gonads were dissected and the epididymis removed. This organ is about the size of a grain of corn and serves as a vestibule for the mature sperms prior to their exit. This slightly elongate structure was next incised and touched to a micro slide and a cover clip applied lightly.

Under the microscope the cells appeared numerous, well spaced

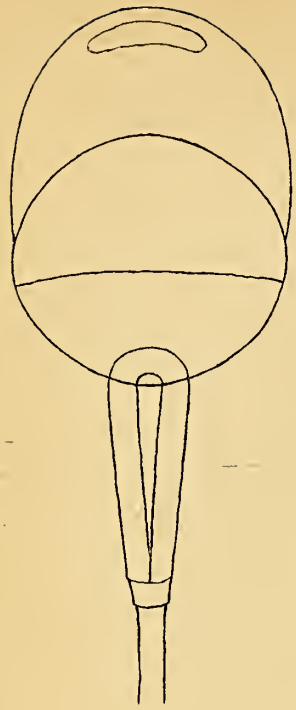


Figure 6. -
Sperm Head of the Gray Squirrel, Sciurus caroliensis, Gmelin.
X 4,700.

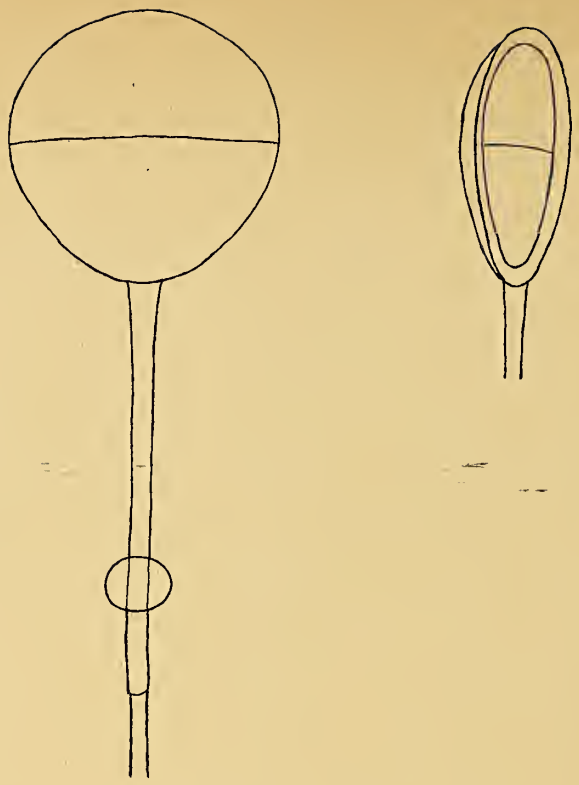


Figure 7. -
Sperm Heads of the Skunk, Mephitis nigra (Peale and Beauvois). X4,700.

and fully activated. It requires only a glance to see that they are hunting, seeking and searching in a thorough and methodical manner. The motion of the opposed flagella is oar-like but alternate. First one flagellum and then the other reaches upward to an angle of approximately 60 degrees and then by a strong, deliberate, sweeping motion descends, driving the duplex head obliquely thru the medium. The course taken simulates that of a beagle in exploring the broom sedge for a lead. The hound in making a series of short obliques makes a systematic search to cover a maximum area.

In order to get a clear picture of the opossum cells it is necessary to study newly formed cells for older ones are frequently modified in appearance thru the presence of an exudate collecting in crevices to obliterate structures which otherwise are in no way obscure. Fresh cells show an inner chamber bounded by the acrosome, nucleus and middle piece as indicated in Figure 4 by the letter H and designated as Hampe's chamber for Irving E. Hampe, Maryland naturalist.

The supposition that suction is the force responsible for the cohesion is supported by an anatomical structure of cells of the guinea pig as shown in Figure 5. This particular cell organ is a visor-like membrane attached to the outer edge of the acrosome. From directly

above it is crescent shaped and its function is to supplement the actively engaged acrosome by helping seal the necessary vaccum which must be maintained. As the nucleus accomplishes this function just posterior to the acrosome, this membrane counter-balances its influence in front.

Cooperative action of the guinea pig cells is for a different purpose than in the opossum. Here an increased viability is attained so as to enable them to fulfill their destiny a fortnight or more after issue. An additional organ assists them, however, when it becomes necessary to maintain a long wait in the generative tract of the female. In order to hold their position a constant swimming motion is required which obviously would lead to harmful friction were it not for another supplemental cell organ. Thus one-half way down the middle piece is found a hyaline buffer which protects the delicate mechanism inclosed in much the same way as do interference pads on the fetlocks of horses. These small bead-like structures require an oil immersion objective, focused closely, to make them visible.

It could be added that in order to furnish a natural medium for the guinea pig cells, fluid from the huge seminal vesicles was taken.

The cell of the gray squirrel in Figure 6 is patterned somewhat after that of the guinea pig with one major deviation. Here the middle piece is looped so that when a team of cells pool their efforts and swim in unison this vulnerable structure is held more rigidly and the wearing surface is doubled which apparently answers the purpose as well as does a buffer.

A laminated group of these small creatures can probably swim against the ciliary current of the female for 21 days or possibly considerably longer. A. Brooker Klugh writing in the Smithsonian Report for 1928 was frankly puzzled by the breeding habits of the red squirrel in Ontario. He presumed that half-grown animals noted in the fall resulted from early spring matings as the squirrel is thought to mate only once in that region.

The skunk cell, as depicted in Figure 7, furnishes only one clue as to the role it probably plays prior to fertilization. This is the globular buffer placed low on the middle piece, indicating that these minute sparks of life, at some stage of their existence, unite with their fellows in cooperative effort. The significance of this pad remained in doubt for two years or more as it required several observations, made at intervals, to find that skunk sperms conjugate only when the necessity arises, apparently preferring to remain unencumbered at all other times.

Information relative to the breeding habits of this animal is not readily obtained. Ernest Thompson Seton writing in Volume II of his "Lives" refers to an investigator in the Hudson Bay region who reported skunks mating in October before going into torpor for the winter. The Canadian naturalist further states that others found a varying gestation ranging up to 72 days. Close timing seems difficult as mating is said to take place mostly in the den and at night so to be safe it may be said only that an unusually variable period obtains.

In order to better visualize the antecedence in this connection it may be feasible to compare this animal with another member of the same family in which the mating habits are well known. This is the mink which has a normal gestation of 42 days but upon occasion parallels the skunk in going 72 days. Mr. W. E. Kane owner of a long established enterprise at Duluth, Minnesota, found that when mink were mated particularly during the early part of their season, or late in February, the young were frequently 30 days late in arriving. This authority further stated that in coitus the animals require an average interval of two hours, in some instances one hour suffices while in others three may elapse before completion.

Mink cells were not available for study but if the two animals are comparable then their mating habits could be readily understood on the assumption that the sperms require two hours to conjugate after coitus starts and then after issue the cooperating individuals can survive for 30 days awaiting their destiny.

The recapitulation theory deals only with the developing embryo. It is biologically sound, however, to go one or two steps further and compare the sex elements with the protozoa and when viewed in this light there is possibly quite a little information to be gleaned from these animalcules.

A COLLECTION OF SALAMANDERS FROM ALLEGANY COUNTY, MARYLAND.

J. A. Fowler

The notes which follow represent the results of a collecting trip to portions of Allegany County from April 7-9, 1944. The purpose of this trip was to secure salamanders from the county and thus help to fill one of the many gaps in our knowledge of the distribution of these amphibians in the State. To make this report more complete, records obtained at various times during the summer of 1944 in the same region by Dr. Martin H. Muma have also been included.

Previously published herpetological work for western Maryland deals solely with Garrett County. There are apparently no published papers concerning Allegany County. The reasons for this interest in Garrett County are readily apparent. It includes the highest elevations in the State and is located entirely within the Allegheny Mountain section of the Appalachian Plateaus. It is representative of the Alleghanian Fauna of the Transition Zone but also includes small areas of the Canadian Zone at the higher elevations. Finally, it is drained by way of both the Atlantic Slope and Mississippi River drainages.

Physiographically Allegany County includes two subdivisions of the Appalachian Highlands, the Valley and Ridge province and the Appalachian Plateaus province. Those parts of the county located within these two regions are thus known as the "Ridge District" and the "Plateau District", respectively. So far as the present paper is concerned, the areas visited were--with one exception-- in the Ridge District, since this constitutes the greater part of the county. The single exception was the area in the vicinity of Frostburg which lies west of the eastern foot of Dans Mountain and hence is within the Plateau District. The drainage of all of the regions collected from was into the Potomac River. The elevations varied from about 700 to 2100 feet.

ANNOTATED LIST OF SPECIES

Triturus viridescens viridescens (Rafinesque). Common Newt*

RECORDS: McCool.

REMARKS: Collected from a pond choked with coontail (Ceratophyllum). Several other specimens were seen crushed on the highway adjacent to the pond.

Ambystoma maculatum (Shaw). Spotted Salamander.

RECORDS: Tributary of Georges Cr., Frostburg; Wills Mt., nr. Cumberland.

REMARKS: The Georges Creek tributary record, while based only on eggs, serves to establish this species in the Allegheny Mountain section of the Appalachian Plateaus in Maryland in the absence of published records from Garrett County.[1] The specimen from Wills Mountain was collected during breeding activities at a pond on the night of April 8, at which time other specimens, including a mating pair, were observed.

Desmognathus fuscus fuscus (Rafinesque). Dusky Salamander.

RECORDS: Wolfe Mills, Evitts Cr., nr. Cumberland; Murley Br., Warrior Mt., nr. Flintstone; route 40, 6 miles west of Flintstone; between Cresaptown and Pinto: tributary of Georges Cr., Frostburg; Rocky Gap: and Belle Grove.

REMARKS: Dusky salamanders were found at all stations where salamanders were collected. At the tributary of Georges Creek one was collected under a rock at the edge of a flood-plain pond together with a single D. o. ochrophaeus.

Desmognathus ochrophaeus ochrophaeus (Cope). Allegheny Salamander.

RECORDS: Tributary of Georges Cr., Frostburg.

* This specimen was collected in October, 1941.

1 While there are no published records of A. maculatum from Garrett Co., the writer collected a specimen on the flood-plain of Two-Mile Run, Piney Grove, 5 miles east of Grantsville, on April 19, 1941.

REMARKS: It is significant that the only record for this species was also from the only locality visited that was in the Plateau District. This species is thus apparently confined to the Appalachian Plateaus province in Maryland.

Plethodon glutinosus glutinosus (Green). Slimy Salamander.

RECORDS: Wolfe Mills, Evitts Cr., near Cumberland.

REMARKS: Only a single juvenile specimen was secured. The dearth of this common salamander at the localities visited was probably due to the fact that the collecting was done so early in the year rather than to an actual lack of this species.

Gyrinophilus porphyriticus porphyriticus (Green). Purple Salamander.

RECORDS: Murley Br., Warrior Mt., nr. Flintstone; between Cresaptown and Pinto.

REMARKS: This salamander which is well known on the Appalachian Plateaus province in Garrett County has recently (Fowler, 1944, Copeia, No. 1., p. 60) been recorded from the Blue Ridge province in Maryland. There are, however, apparently no published records for the intervening area representing the Valley and Ridge province. These Allegany County records are thus representative of this latter province.

Pseudotriton ruber ruber (Sonnini). Red Salamander.

RECORDS: Between Cresaptown and Pinto; Rocky Gap.

REMARKS: It is interesting that this species, which is often associated with G. p. porphyriticus, is so much more widely distributed than the latter. In Maryland both species occur--often together--throughout the Appalachian Highlands including the Appalachian Plateaus, Valley and Ridge, and Blue Ridge provinces. East of the Blue Ridge, in the Piedmont Plateau and Coastal Plain provinces, P. r. ruber occurs to the exclusion of G. p. porphyriticus. It should be worthwhile to attempt to determine the factors which limit the distribution of the latter species but which do not similarly limit the distribution of the former.

Eurycea longicauda longicauda (Green). Long-tailed Salamander.

RECORDS: Rocky Gap; route 40, 6 miles west of Flintstone.

LITTLE KNOWN NEIGHBORS

C. Haven Kolb

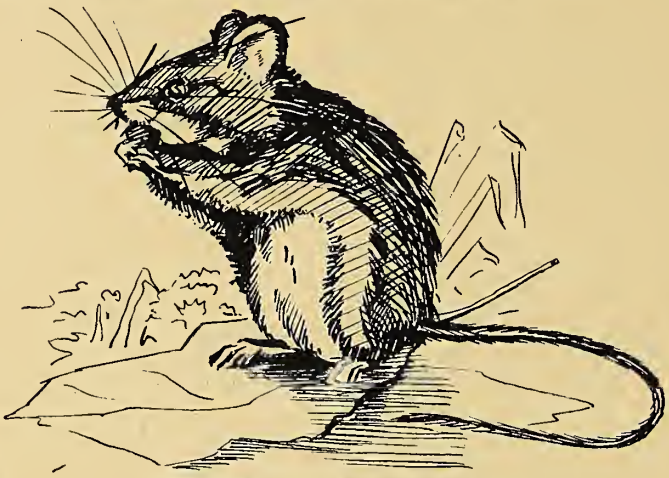
If you live in the suburbs, if you live in the country, you are a giant. No matter how light your step, no matter how soft your movements, you are a huge lumbering beast whose tread sets the sod to quivering, whose path is destruction. So at least you appear to your neighbors, neighbors of whose existence you may well be ignorant. In the nearby woods and fields, on the vacant lot across the street, in your own winter-browned garden, there lives a community of little warm-blooded creatures, whose striving, breeding, and dying are conducted with far less fanfare than our own, but with no less reality, and (were man not the measure of all things) with little less importance.

These little furry animals whose lives are so inconspicuous, whose activities are so concealed, are ancient inhabitants of this land. For decades dainty and cleanly native wild mice have been gradually pushed back by advancing brick and extending asphalt until today they cling precariously but tenaciously to the periphery of the city while their ancestoral territory is overrun by the only too familiar brown pantry thief, whose forefathers, immigrants like ourselves, have been our table companions, so to speak, for long European generations. But the wild trio, the white-footed mouse, the meadow mouse, and the pine mouse, shun the works and the gaze of man, and like the country mouse of the fable, prefer the smell of brown earth and the taste of fresh green food to the reek of kitchens and the flavor of strange fare, even though starvation may stalk with the winter wind and the winged death hover in the night.

Of these three mammals the white-foot is the most mouse-like in appearance. A sharp face, stiff whiskers, and a long slim tail immediately point out his relationships. Yet how different he is from the ordinary parasitic mouse, a dull dirty brownish gray animal suited for a filthy existance. The white-foot, always trim and neat, is strikingly bicolored, fawn varying to a rich dark brown above and pure white below, a sharp contrast extending even to his long finely-haired tail. His ears are large and thin. His eyes are big and round, for he is nocturnal in habits. Everything from soft glossy pelage to sensitive nose indicates an animal of refinement whose being is intimate with the clean humus of the forest floor.

"Vole" is the name given to the English relatives of our meadow mice and it is a convenient term of differentiation for these animals are decidedly unmouselike. Their heads are round, lacking the long muzzles of the mice; their tails are short and useless; their ears are so small that they almost disappear in the long soft fur. They are rounded, fluffy, humpbacked creatures with bright little beady eyes ever on the alert for the death which is an ever-present part of their life. Near relatives are the pine mice which resemble them closely. Pine mice, however, have shorter, silkier hair and even more insignificant tails.

Where now do these little neighbors live? All three have been found within the compass of an ordinary back lot in southwestern Baltimore, but there are more favorable spots. There is a small piece of woodland on a short rocky slope. Beyond a little stream is a grassy meadow, and on the opposite hillside an old orchard, half overgrown with weeds and brambles. This might be the description of a dozen places within our city's borders, odd bits of land quietly awaiting the builder or the Leakin fund. Here dwell the timid, here, harried by foreign foes and native predators, the defenseless, the easy victims of a host of natural enemies, wield in obscurity their only weapon --- fecundity.



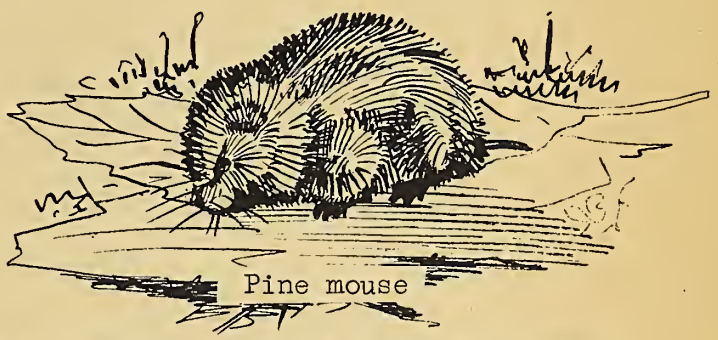
White-footed mouse

The white-foot we will find in the woodland. Perhaps no type of country is unknown to him, for he is the most wide-ranging of American mice, but about Baltimore he prefers the soft leaf-mold, the shelter of old logs and rocks, and the natural paths of old gnarled roots. In the evening he will appear, searching the ground for seeds, beech nuts, and small acorns, some of which he may carry away in his large cheek-pouches to store them in little caches. With the coming of the morning light he disappears.

Though we do not see him, yet we can learn much about his wanderings. Tiny footprints on the wet mud beside the brook betray him. In winter the same footprints may weave an extensive tracery over the snow, for the white-foot is active during the entire year. The winding mark of his long trailing tail will help to distinguish his tracks from those of voles.

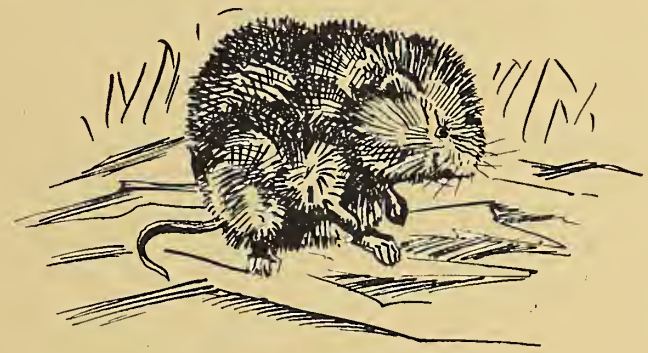
A large moss and fern covered rock sloped down to the edge of the Gunpowder River. Upon its crest we had gathered some stones about a campfire for a picnic lunch. Presently we noticed a mouse running up a small ledge of the rock. It came up almost to our feet and disappeared in a crevice. In a moment it had darted out again, leaped down along the ledge, and vanished behind one of the rock's lower shoulders. Perhaps a minute passed and then the maneuver was repeated. We marveled that a shy woodland creature should approach us so closely to partake of the left-overs of our lunch. A third time the mouse came back and we watched more intently. That dark gray bundle that was carried off was surely no part of our lunch! Before we could move a fourth trip was made and this time there was no doubt. We eagerly rushed to the crevice in the rock, a deep hollow which had been protected by one of the stones we had used in our fireplace. But the mouse had finished her rescue. All that remained was a great heap of fine grasses and plant fibers, closely matted into a warm felt. It was the first nest of a white-footed mouse that I had ever seen.

To find an occupied nest is something of an accident but old nests can be easily located. Old rotting logs in a good woods are usually equivalent to a Times Square. They are focal points for the tunnels of many small woodland creatures. Consequently nests can often be found by overturning or splitting old logs. In autumn and winter old birds' nests with unusual lumps in their centers will bear investigation for the white-foot is as agile in a tree as a squirrel and will willingly rent for the season the abandoned abode of a Florida-wintering catbird.



Pine mouse

More earth-bound are the meadow and pine mice. Meadow mice indicate their home with their name, but the pine mouse is a deceiver: he might better be called old orchard vole, or mole mouse. He prefers brushy places on the edge of gardens or badly kept orchards. But he is more than deceiver: he frames the innocent. "The moles are eating my young plants", complains the gardener, observing the long ridges in his vegetable beds. And so the useful, grub-consuming mole, who has no more use for vegetable food than an Eskimo, is persecuted, while, unknown to the gardener the pine mice play about through the mole's deserted tunnels leaving a ruin of plants in their wake.



Meadow Mouse

Like most small mammals the meadow mouse finds Mother Earth his safest retreat, and so his warm winter nest is placed in a burrow beneath the roots of the meadow grass. In hunting for food, however, he runs about on the surface and since a split second may save his life, his pathways are kept clear and free of obstruction.

Thus an intricate maze of little inch-wide paths in field or meadow with all grasses and weeds carefully cut or bent aside is a sure sign of meadow mice. In winter these runways become little tunnels beneath the snow and activity continues here when all above the protecting mantle is cold and dead. Then must the gyrfalcon and snowy owl fly far in their foraging.

Summer nests are often constructed on the surface of the ground, for when the green grass lengthens in the spring how can a mouse foresee the haying? Though he escape the heavy hoofs of the horses and the flickering knives of the mower, yet his home is left exposed to the sight of his enemies. Few farmers share the feeling of Burns. Did not this little beast nip the tender stalks of the young wheat? Did not

his family shear off the fresh shoots of the alfalfa? Did not his whole accursed race peel the tangy bark from the young peach trees last winter? They did.

Truly these small animals are a serious problem to farmer and forester. Though individually pine and meadow mice are but weak creatures, in large numbers they become formidable antagonists. For a long time the depredations of a few may pass unnoticed. But beneath the tussocks, under corn shocks, within the burrows, litter after litter of young mice are being reared in rapid succession. Finally a winter of woe bursts upon the astonished agriculturalist. Whole orchards may be girdled by gnawing teeth, whole fields of forage crops may be demolished, even to the roots. At times ruin may face the farmer and orchardist.

But before the year is out the mice are victims of their own prosperity. Hawks and foxes, weasels and owls are attracted to the scene from miles around and life becomes even more difficult for each individual mouse. Yet this is not all. Mouse after mouse begins to feel a drowsiness stealing over him. He does not dare move from the burrow to feed for his movements have become dangerously sluggish. His long fur becomes damp and oily. The muscles of his neck and shoulders begin to twitch. He falls to one side. Gasping and throwing out his hind legs, he is seized by convulsions and the end is at hand. What may cause this distress we do not know, but the next winter will find the old burrows nearly deserted. Yet let not the mice be forgotten, for in the appointed year they will once more flood the land.

We who live so closely together that we can toss pebbles into our neighbors' gardens need not fear quite such dreadful invasions. Nibbled annuals and gnawed bulbs are the most we have to fear, for our acres are not wide enough to provide an opportunity for murine expansion programs. To us a soft nest of dark silky-haired mouselings may be as interesting as our bed of fine tulips. And if our discretion decrees their deaths, let the sentence be executed without hate, without malice.

March had arrived; the season of most pressing peril was passing. The hawks were drifting away northward across the blue sky. Along the banks of the little stream, the green grasses were again sprouting, sweet and succulent after the period of short commons. He had come safely through the winter, spared by predator, by disease and by starvation. But flood waters of February had washed little masses of dead weed stalks into the usually clear runways, and now with food in plenty before him and the soft southern breeze singing in the valley he lay a prisoner, his hind foot tightly entangled in the weeds. How long he had struggled I do not know. The flesh was stripped from his leg, the bare bone was broken, yet the foot was still held as tightly as though in a steel trap. There was no hope for him. If he should finally break the shred of skin which was all that was now left to hold him, he would be left a crippled and the crippled receive no mercy. Otherwise a hawk, a fox, a weasel.....In the wild tragedy is the monotonous ending to every story.

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At the
edge of
the Barrens
W. W. Coleman

MARYLAND

A JOURNAL OF NATURAL HISTORY

The Natural History Society of Maryland

JANUARY 1945 VOLUME XV No. 1

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MARYLAND

A JOURNAL OF NATURAL HISTORY

The world is too much with us; late and
soon,
Getting and spending, we lay waste our
powers:
Little we see in Nature that is ours;
We have given our hearts away, a sordid
boon!
This sea that bares her bosom to the moon,
The winds that will be howling at all hours,
And are up-gathered now like sleeping
flowers;
For this, for everything, we are out of
tune;
It moves us not.- Great God! I'd rather
be
A pagan suckled in a creed outworn:
So might I, standing on this pleasant lea,
Have glimpses that would make me less
forlorn;
Have sight of Proteus rising from the sea;
Or hear old Triton blow his wreathed
horn.

William Wordsworth.

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JANUARY, APRIL. JULY, OCTOBER

VOLUME XV No. 1
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A DOLLAR A YEAR

The Semi-palmated plover at nest.

TO CHURCHILL FOR BIRDS OF THE BARRENS

W. W. Coleman

EDITORS NOTE

It is our usual policy to restrict our articles to the State of Maryland. However, this account of the Hudson Bay County written by Mr. W. Wallace Coleman, one of the Society's Founders, is so excellent that we break our editorial rule with pleasure. Mr. Coleman's photographs of bird-life of the North Country have received international recognition.

In 1927 the engineers of the Canadian National Railways accepted the challenge of the Barrens. The determination to establish a terminal opposite the historic Fort Prince of Wales at the mouth of the Churchill River crystallized into activity. Skeleton tracks were laid over snow and ice. Equipment and locomotives were moved into Churchill during the winter of 1927-28. Thereafter permanent construction proceeded from both extremities. Two years later they had completed a ribbon of steel which connected The Pas with Churchill. With the completion of this stupendous project a new world became readily accessible to the traveller and scientist alike. Now, even on the slow spring schedule the teeming tundra is but two days from The Pas.

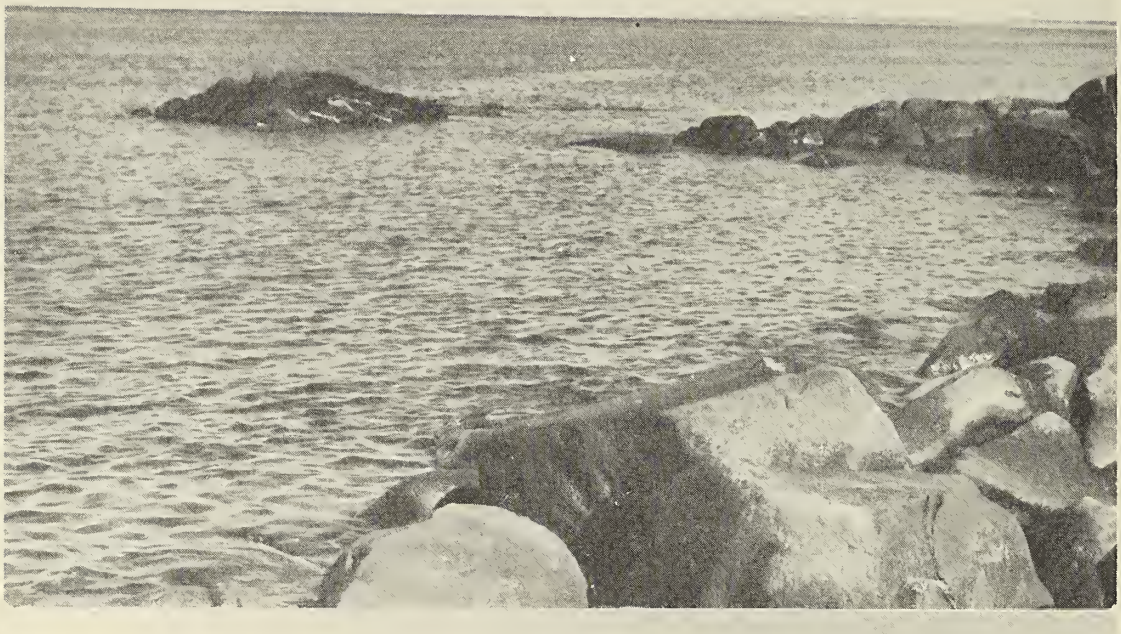
The journey north from The Pas, although marked by a certain sameness, nevertheless exerts a fascination. As the train draws away from the neat brick station and gently rumbles across the bridge which spans the North Saskatchewan, one's attention is attracted by the huge rafts of logs floating idly in the river - lumber for the empire. Almost immediately the coniferous forest closes in upon the train's right of way and the dense stand of timber offers a nearly impenetrable wall to the train-bound traveler.

The train's passengers are an interesting group. Miners and missionaries, trappers and fur traders, Indians and half-breeds, all going "in". Upon acquaintance they prove to be a friendly crowd, quite willing to contribute their share to the conversation. Tales of prospecting, of finds and disappointments, of the plight of the Indians and the even greater difficulties which confronts the half-breeds, of the art and science of trapping fur-bearers and the complexity of judging fine furs. All these stories are yours if you will but make the first advances. As the talk and friendly chatter continues your respect for these men steadily increases - life on the frontiers is never easy.

The first evening is spent at Waboden, a divisional point. The opportunity to leave the train and examine the surrounding country is most inviting. To the west of the tracks is Waboden Lake one of the many island-studded bodies of water which form the complext drainage system of this region. To the south-west a well defined trail leads to Stepping Lake.

The second day's journey continues north east-wards through similiar country, but a certain change becomes noticeable. A new type of flora is

A Hudson Bay vista.



Waboden Lake, an island-studded body of water typical of many in Northern Manitoba.

observed, dwarf willows, spindly conifers, the blooming shrub, Labrador tea, have all made their appearance. There is a distinct feeling of being well within the Hudsonian Zone. The evening stop is made at Gillam, another divisional point where the population is nearly entirely Indian and half-breed.

Early the following morning the train glides across the historic turbulent Nelson River and your thoughts drift back to the time when just such a waterway as this with its hidden and treacherous perils was the accepted route of transportation. Today much of the North country is served by airplane. At this point a group of Indians, more than amply loaded, left the train and greeted friends who shared the weight of heavy packs and filled the air with excited Cree. Skilled wielders of the paddle they looked forward to an exciting journey down the river to their home near Port Nelson.

From this point on the journey steadily became more interesting from a geographical point of view. Continuing northward the tree growth declines and the country takes on a most desolate and empty appearance. The flatness of the country comes as a surprise even to one who knows the prairies. The seemingly empty landscape offers little to the train-bound traveler who has not learned to appreciate vastness for itself.

About twenty miles south of Churchill the train enters a small strip of bush, a finger of the Hudsonian Zone projecting into the Barrens. The stunted trees, nearly branchless on their northern side, are knarled and twisted, mute evidence of the fierceness of the northern gales. Their struggle for sustenance goes on, yet the ice just three or four feet below the surface of the ground shall finally triumph.

A few miles outside the Port of Churchill this bit of brush gives way to the level moss covered tundra which becomes more grassy and boulder-strewn as we approach the coast of Hudson Bay.

There are always a set of vivid first impressions when one arrives at a new destination. Churchill is no exception. The howling of the huskies, the solemn Indians, the happy visiting Eskimos, the white whales in the Bay and last but not least, those birds which for some reason insist upon an arctic setting in which to raise a family.

The surface pipe-line, insulated with a thick covering of moss and further protected by heavy sheathing of corrugated iron pursues its tortuous course over the point of land and effectively divides the settlement into two divisions. The "Department" lying north and east of this pipeline and the "Townsite", south and west. To the west the lands slope down to the coarse gravelly beach of the Churchill River while an imposing rocky ridge of quartzite guards the Bay side. To the south extends the carpet of tundra. Except for a small section of the Department there is little concentration of buildings. The structures located upon the Townsite are even more scattered, thus leaving much land available to the birds as nesting territory.

Tundra Lakes, a prominent characteristic of Canada's cold desert.

The white whales, which are really porpoises (Delphinapterus leucas) form an important article of diet for the huskies.

An interesting feature is the variety of nesting sites encompassed by what we might call the town's limits. Grassy meadow-like areas are found beside patches of true tundra. High gravelly beaches and dwarf willows offer their respective invitations. Consequently it is not surprising to find a wealth of bird life concentrated within a small area.

Less than ten paces from the shack which served as my headquarters I found a nest. However, this bird was no stranger, on the contrary, an old familiar friend, a Northern Horned Lark whose young appeared to be a husky, hungry lot. While I squatted down and pondered why these individual birds should begin life in this arctic setting when their cousins were content with the prairies of Saskatchewan, a fleeting shadow swept by, behind it trailed the piercing cry of "killdee-killdee", another prairie bird on a summer excursion. Gone were my feelings of being among strangers; old friends were in possession here. My purpose, however, was to find and photograph those birds which scorn southern prairies as a home.

About my "netted" head swarmed a horde of mosquitoes. They were quite a nusiance at first but eventually I learned to ignore them except when a stronger breeze brought the laden netting in contact with my skin.

With the irregular rocky ridge of dark blue-gray quartzite, which guards the Bay, acting as an objective, I crossed the townsite. This for the most part is of a gravelly nature inter-spaced with patches of tundra, some of it very low-lying and marshy. Such patches often supported a rank growth of white-tipped sedges, the arctic cotton so familiar to travellers of the north. The higher and consequently drier areas were studded with a multitude of blooming Drydas.

Securely anchored in the upright fork of a dwarf shrub growing beside the ridge I found a nest of the Common Redpoll. The small compact nest with its complement of attractive eggs was placed at a height of about three feet. The boldness of the incubating bird suggested that the time of hatching was not far distant and I decided that this might well begin my "blind-line". Fifty yards further I found another nest of the same species, yet this bird took alarm most readily.. Why does the degree of fear exhibited by different birds of the same species vary so tremendously, even when they are caring for young or eggs of the same age? This variation within the species I have noticed time after time during the field trips of many summers. Some individuals have been so shy that it was a conquest just to see them, others I have had the pleasure of feeding by hand while they carried on with the duties of incubation. What is the explanation of this difference of behavior?

The next morning having been rudely awakened by a wandering, noisy husky, the desire to visit some of the nests under observation was strong and since breakfast was still two hours distant there was no reason why I should not pursue the inclination. I chose the Redpoll for the dubious honor of being spied upon. Approaching carefully I entered the blind and

(Left) A visiting eskimo obliges the author with a spontaneous pose.

Chipewyan woman, one of the few full-blooded representatives of her race in this district.

settled myself comfortably without alarming the bird. We were both enjoying a sort of careless watch when the Redpoll suddenly appeared to have swallowed a vibrator. She became a bundle of nerves and they were all on edge. Even the slender twigs which supported the nest were shaking in accompaniment. This was no silent performance either, small choked-off chirps tumbled over one another in their efforts to be freed, the hysterical scene had just reached an impossible peak when the cause of the disturbance appeared. It was Mr. Redpoll and he tenderly presented his offering, one bug! It was received with one ecstatic gulp, he departed and all was quiet and serene. But to myself I could not help but murmur, "What gratitude ".

Among the smaller birds none boasted a more attractive color pattern than the male Lapland Longspurs. By comparison the females were indeed an inconspicuous group yet it appeared their lot to care for the potential family while the male indulged himself in song. The Longspur which I chose to photograph was one of the most conscientious birds I have ever met. Fear was an emotion unknown to her. The bird crouched steadfastly upon the nest as I erected the blind less than three feet away. Indeed she flushed only when my hand was within six inches of the nest, when I found it necessary to tie back a bit of shrub which was causing an objectionable shadow. All the nests of this species were built upon the ground, often beside a sheltering stone or shrub. The lining in every instance was a thick layer of soft feathers. The seven small, brown, heavily marked eggs quite filled the nest to its capacity. Returning inside my blind to check upon composition and lighting I was quite pleased to see the bird return to the nest and, without any hesitation, settle down upon the eggs.

However, apparently all was not to her liking, because instead of incubating motionlessly there was considerable squirming and twisting about. Since I was not making motion pictures all this movement was a bit exasperating and I believe the bird shared my feelings. Just as my release finger was developing a cramp the bird perched upon the rim of the nest eyeing the home very critically, then reached down and with her bill deftly plucked out the offending leaf my carelessness had tossed in among the eggs. Another point of interest was her manner of approaching the nest after having been disturbed. The first part of the advance would be marked with a certain amount of dignity and decorum but when a foot or so away all this was thrown aside and she would literally rush up and jump into the nest. There was something patheticaily funny about the entire performance.

The inland side of the rocky ridge was the favorite haunt of the White-crowned Sparrow. Here among the flower-studded crevices they sought their food or perched upon some rocky prominence; the males would pour forth their glorious song. Beneath a friendly willow I found their nest of fine grasses and plant stems. The young were hatched. Blind, and naked except for a light covering of natal down, they squirmed about the nest. Their ungainly heads with mouths agape wabbled grotesquely in anticipation of food. Both the parent birds took part in the feeding of the young although the female appeared to

The Lapland Longspur preparing to incubate.

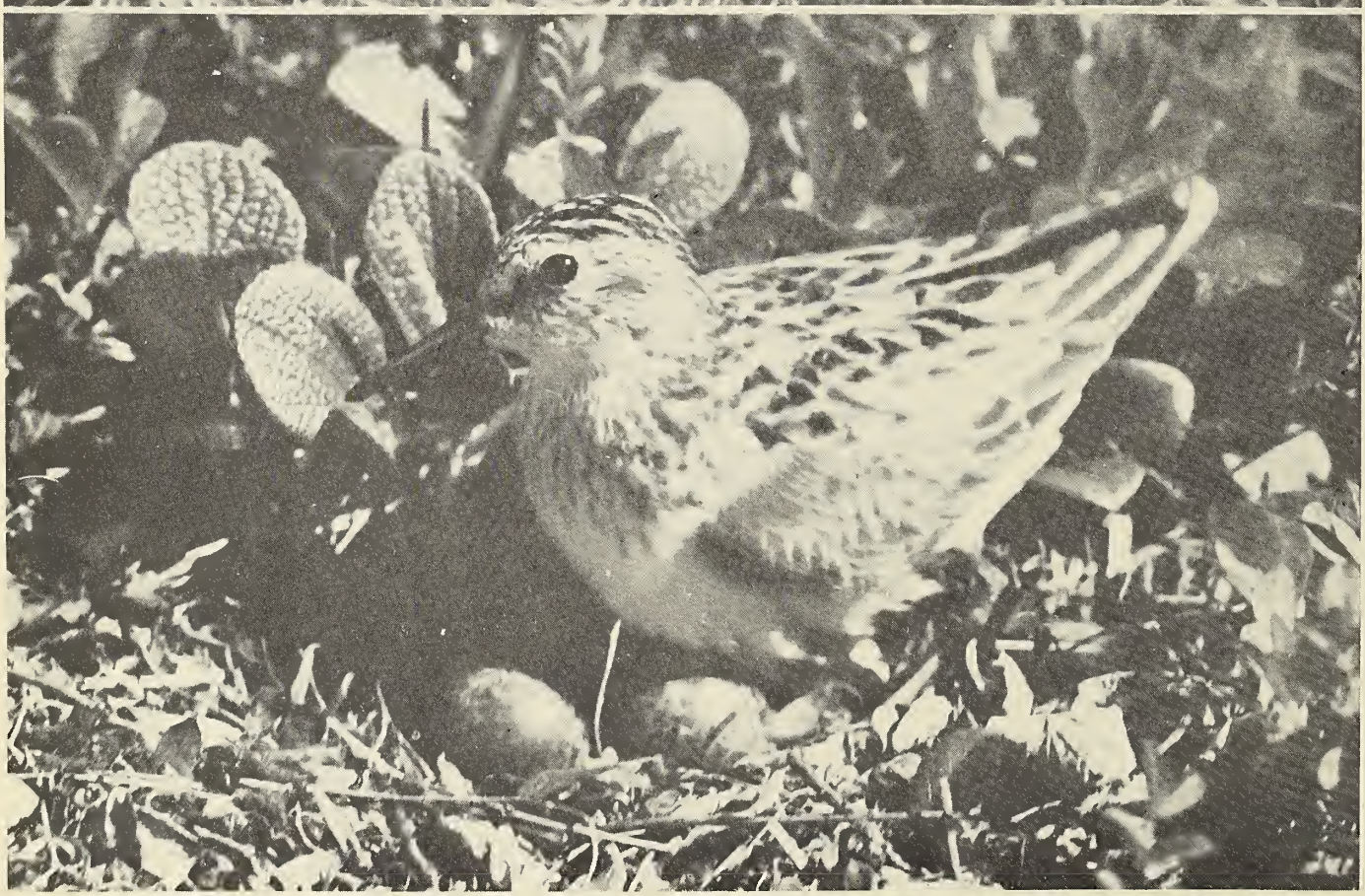
The White Crowned Sparrow.

be a much more successful provider. During the three-hour observation period she averaged a feeding visit every nine minutes whereas the male brought food but twice during that same period. The male preferred to offer moral stimulus and perched upon a nearby ledge, would indulge his vocal powers to the utmost. While nearly all the nesting birds I have observed have shown a definite nest approach path, that of this sparrow was one of the most interesting. On her return flight laden with food she would pass within twelve inches of the nest yet would continue for a yard or so before alighting, then carefully and circumspectly she returned on foot to the nest. Quite often this walk would be punctuated with a plaintive worried note of "tssp, tssp" repeated and repeated. In addition to supplying food there was also the chore of keeping the nest clean of excreta; this problem was solved very simply, she ate it.

My original intention had been to spend my little available time with only those birds which we associate with the far north. The Horned Larks in my yards, the Robins in the wood pile, the Kildeers on the hilltop, had all failed to swerve me from my original intent but when I nearly stumbled over the nest of a Savannah Sparrow, the first it had been my good fortune to find, my intentions were immediately forgotten. Perhaps it was my arrival at such a crucial time that made the difference, for as I peered into the nest one of the eggs suddenly showed a fissure which soon ran completely about the circumference. I was in attendance at the birth of a Savannah Sparrow. The wee sharp notes of distress that the mother bird chirped so earnestly were sufficient hint that my services were neither required nor appreciated. To remain when my presence would prevent the return of the parent bird to provide the necessary brooding warmth seemed too utterly selfish. I made a hurried record and left. A few days later with the "hide" in position the parent bird returned the courtesy and posed very attractively for me. We were both well pleased about the whole affair.

An uneasy conscience now hurried me along to seek the home of some true bird of the Barrens. The quest was not prolonged. Near the end of a gravelly spit which thrust itself into the town slough I found a nest and four heavily marked eggs, but no bird. The nest was placed at the base of a clump of coarse grass which eked out a starving existence. The identity of the owner proved to be no small difficulty. The locality made any but an obvious approach impossible and no matter how often or how carefully I crept up to the nest I never saw the bird, yet the eggs were warm, proof enough that I had been outwitted. Later a combination of happy circumstances made the identity certain. The wary bird was a Northern Phalarope. This was welcome news, here was a true bird of the tundra and I looked forward to the engagement. The following evening the observation tent was put in place at some distance from the nest. This proved an even wiser precaution than I suspected; that night the wind freshened considerably and this combined with the exposed position, soon pulled out the feeble stakes and collapsed the structure. Had this happened at the nest there would have been an unpleasant sequel. However, the mishap was soon repaired and the judicious use of many and large stones made a recurrence unlikely. The third morning following the placement of the hide I decided to attempt photography. I suspected

The Northern Phalarope would approach the nest with consumate stealth.



The Semi-palmated Sandpiper shuffles onto its nest.

a longish wait. The first hour passed fairly swiftly, but at the end of the second the cramped quarters were beginning to tell on my good nature. It was well into the third hour when I discerned a slight movement in a nearby clump of grass. Suddenly and soundlessly the male Phalarope stalked into view. His hesitant, nervous journey to the nest consumed considerable time. Both of us were quite relieved when at last he settled down upon the eggs. Then followed a period of considerable squirming about and no end of pushing, poking and turning of the eggs with his bill. When the eggs were finally adjusted to his minute specifications and satisfaction, I breathed a sigh of relief, now perhaps I would reap the fruits of my patience. My sigh was wasted. Now that the eggs were off his mind he must needs turn all his attention towards improving the concealment. To this end he began to pull all the nearby grass straws over his body. Eventually I secured the records which I desired but not that first morning.

The trying efforts down on the flat with the Northern Phalarope sent me back to the Bay's rocky ridge for this was the choice habitat of another boreal bird, the American Pipit. I was very keen to photograph a member of the Wagtail Family for they are not numerous on this continent. Of the three nesting birds I observed all proved to be close sitters. They would often wait until I was within a foot of their nest before taking alarm. This characteristic combined with the nests recessed position within a crevice or under a ledge made finding them a bit difficult.

One of the nests found was ideally situated for photography and the usual preparations were soon made. The first mornings efforts were fruitless, yet the bird did not appear to be alarmed by the new structure which had so suddenly appeared before her nest. Since she would often perch upon the peak of my blind and twitter her disapproval. On another occasion when she was on the ground, her tail feathers were poked inside the hide, yet she steadily refused to enter the nest. A possible solution occurred to me and I placed a spacious sun shade over the lens of the camera Within twenty minutes I had been offered some very attractive poses. The lens shade had cut out the reflections and these must have been responsible for the bird's reluctance to enter the nest.

The striking color pattern of the Semi-palmated Plover makes it one of the most conspicuous and familiar birds of the arctic prairies. Added to this is an even more attention arresting performance when their nesting territory is invaded. The brooding bird silently leaves the nest and having run a safe distance either to right or to left of the intruder, puts on a show. Uttering the most plaintive cries and assuming a very distressful posture with tail spread fanwise and either one or both wings extended helplessly at the sides the bird would scuttle along before me in a most pathetic effort to detract attention from the nest. The very nervous temperament of the bird suggested a goodly time interval should elapse before attempting any photographic efforts, however when I did get around to making the attempt it was a most pleasant experience. The bird would return to the nest on foot advancing with many pauses and affirmative bobbings of the head as if to assure itself that all was well. In true plover style the eggs would be straddled, all the feathers of the underparts

The least sandpiper with newly hatched chick.

The American Pipit, one of the few wagtails to be found on this continent.

puffed out, then settling down upon the eggs give a few shuffles just to ensure the proper contact and incubation would be resumed.

Among the ground-nesters none were more common than the Sandpipers. In the course of the week's wandering, no less than fourteen nests were observed. There did not appear to be any particular preference so far as the type of ground preferred for nesting. Nests were found upon the old high gravelly beaches, among the grasses of the sandy areas, and on patches of tundra, all within the limits of the town. Both species flushed rather readily and exhibited a very similiar series of posturings and distress calls as the plovers.

Of the fourteen nests found two were of the Least Sandpiper, the others of the Semi-palmated. To what extent this could be interpreted as an indication of their numerical distribution in this restricted locality is debatable. The birds themselves are very similiar. The most readily observed field distinction being the greenish legs of the Least contrasted to the blackish color of the Semi-palmated. When I had enjoyed the privilege of a very close inspection such as is possible from an observation tent other differences became apparent, namely that of bill construction and the distinctiveness of facial markings. To my limited experience the nest and eggs of the two species were indistinguishable. The nests were shallow depressions, deeper when placed in the moss of the tundra than when on firmer ground and all were lined with a thin layer of dry "stuff". This varied considerably with the locality. Equally interesting was the uniformity of the clutch - every nest contained four eggs. The coloring of the eggs varied greatly ranging from a pale through a deep olivacious buff and profusely marked with blotches of varying shades of brown.

Late one afternoon Alex, an admirable youngster who had volunteered to help me find "lots of nests", burst into my shack, the personification of excitement. I must stop my work right away and hurry over the hill for the eggs of the Least Sandpiper were hatching. We were soon at the nest and sure enough one of the young, still damp, lay crouched in the shallow cup. Of the remaining three eggs one showed a weak crack, the others appeared quite sound. It was eight o'clock, the stage was set, but there is a limit to what you can expect of photographic material. There was naught we could do but wait the morrow and hope that the young would remain in the nest. When I arrived the following morning, the remaining eggs had hatched and the young were snuggled beneath one of the parent birds. Well hidden from their gaze I spent a short but pleasurable time. A few hours later I attempted to make records of the young, which by this time were quite active; it was then the fun began.

Picture for yourself a gangly man bent double, head swathed in mosquito netting, hands encased in awkward gloves, clumsily trying to coordinate focus and composition upon a wee bit of fluff mounted on three inch stilts tearing over the tundra. It was back-breaking and temper-tormenting but it was funny.

Time passes all too swiftly when spent among the birds of the Churchill region. Yet to have had such an experience is more than sufficient compensation for the time and distance involved. The store of pleasant memories and the broader knowledge of Canada's wealth of Arctic flora and fauna is most worth-while.

NOTES ON BIRDS OCCURING IN THE BALTIMORE AREA

by

Irving E. Hampe

I - THE ROBINS

The Robin is the best known of the native songbirds in the vicinity of Baltimore. The occurrence of three subspecies of the Robin in this area was brought to light by the study of a series of specimens in the Society's collection. Mr. C. Haven Kolb, Jr., Assistant Curator of Ornithology, became interested in this problem some years ago and by judicious collecting brought together a fine series of Robins. Specimens were taken in nearly every month of the year.

The Southern Robin (Turdus migratorius achrusterus)

The breeding subspecies, The Southern Robin, (Turdus migratorius achrusterus), has been taken as early as February 18th. The males evidently precede the females and set up breeding territories. During March the territorial songs of the males becomes louder and are heard more often, especially in early morning and late afternoon. Mated pairs have been observed in late March and early April carrying nesting material.

Observations on a pair of Robins breeding during the spring of 1938 are fairly typical of the species in this locality. The male was heard singing early in March from the top of a maple tree in the western suburbs of Baltimore. Fighting over territory was observed frequently during the month. About the first of April the male procured a mate and the fighting against intruding males increased. On April 16th a nest was started under the eaves of a shed but was abandoned. On the 18th a nest was started in a low bush that grew through a wire fence. By April 20th the foundation was finished. It was anchored against the wire fence. The framework of the nest was completed on April 21st and mud was being added. April 23rd found the lining complete. The first egg was laid on April 26th, the second egg on the 27th and the third egg on the 28th when the female began incubation. The male was observed to incubate on one occasion. He flew to the nest when the female left and settled down on the eggs. There was very little difference in the colors of the birds' plumage and it was assumed that the slightly darker bird was the male from observations of behavior. It was this richer colored bird that protected the nesting area and was observed singing from a perch in the

nearby maple tree.

The first young hatched out late in the afternoon of May 10th. The second was found early in the morning of May 11th and the third egg was pipped. Late afternoon of May 11th all three were being brooded. No signs of the egg shell were found in the vicinity of the nest. One of the young birds was missing on the 13th of May. Both parents fed the young. The young left the nest on May 24th and were observed in company with the adults for over a week.

The Robins breeding in this area usually have two or three broods. The fall moult takes place during September after which they gather in small flocks. October finds the flocks on the move and they seem to lose their confiding nature. The urge to migrate possesses them and they become wary and take flight quickly when approached. Soon they are gone and the passing flocks remind us of the approaching winter.

The Eastern Robin (Turdus migratorius migratorius)

The Eastern Robin (Turdus migratorius migratorius) breeds to the north of our area. The earliest fall specimen in our collection was taken on October 4th. Probably the majority of Robins observed during October and later are of this subspecies. Enormous flocks of these Robins can be observed migrating through the Baltimore area until late in November. Some few winter here in protected situations. The Loch Raven Area and the Patapsco State Park are among the localities where they have been recorded in winter. It is these wintering individuals that occasionally wander into the suburbs of Baltimore and give rise to the newspaper stories of the first Robin of the year.

Early in February the first of the migrant Robins appear and the species is abundant until late April when the Eastern Robin has, in most cases, passed north to their breeding grounds. Occasional stragglers may be found as late as May 7th when a specimen was taken near Arbutus, Maryland.

The Black-Backed Robin (Turdus migratorius nigrideus)

The Black-backed Robin (Turdus migratorius nigrideus) a recently described subspecies, was added to our local list by Mr. C. Haven Kolb, Jr. Two specimens were collected in the vicinity of Loch Raven by Mr. Kolb. These specimens were taken on January 25th and March 13th, suggesting the possibility of a wintering population.

Before entering the armed service, Mr. Kolb took most of the specimens to the National Museum in Washington and submitted them to Dr. John W. Aldrich of the Fish and Wildlife Service for inspection. Dr. Aldrich kindly checked and identified the subspecies for us. Additional specimens, taken recently, have been measured and compared with those identified by Dr. Aldrich.

NOTES ON MARYLAND HERPETOLOGY

CARPHOPHIS AMOEMA AMOEMA (Common worm snake) (Say)

On May 29, 1938, I collected two specimens of the common worm snake near Crownsville, Anne Arundel County Maryland, on the south side of a densely wooded hill above some swamps. Each snake was coiled several inches away from its hole under this particular rock imbedded in the earth, and after uncovering them they immediately sought to escape by entering their burrows. Also captured with the pair of snakes was a young specimen, probably of last year's brood, which was patterned differently from the adults. It was colored very dark brown or black with a bright red ventral surface. When I picked up the two snakes they exuded their characteristic musk and attempted to prick my hands with their tiny spine-like caudal appendages.

The female was the largest of the three snakes and was quite stout; the male was smaller and was somewhat thinner. They were glossy and shiny, and felt velvety and smooth. The dorsal coloration was a rich brown, with a light pink ventral surface; somewhat different from the juvenile's coloration. The female was approximately ten inches in length while the male was about eight inches. The juvenile specimen was only about five inches in length, and was comparatively very thin. When handled the adults coiled around my fingers with constricting holds and there clung tenaciously, searching with their inquisitive heads and bright red tongues about the mysteries of my hand. They could not be induced to bite: their small subterranean-adaptive heads were not suited to such an attempt.

In a terrarium they were extremely secretive and were erratic when disturbed. During the light hours, they always remained burrowed under the rich black earth provided for them. In the evening, though it was dark, they came often to the surface to seek means of escaping. I provided them with food in form of earthworms, thick-bodied grubs and mealworms. Although I never witnessed their partaking of the food, I noticed that most of the earthworms disappeared, whereas the mealworms were not touched. The male regurgitated a grub as I handled it one morning. Water was provided, but I never saw them drink.

These snakes appeared to be mates, but I was never quite sure. One night I chanced to look in the terrarium and noted that the posterior portion of both individuals were entwined, yet they were not in the actual state of copulation. I watched for a minute but they separated and continued to forage about the box. On June 2, 1938 the female laid three white, elongated and smooth eggs. After being in captivity for a day, both specimens burrowed a system of holes and passageways, of which some where visible against the glass of the terrarium. Often I observed them to rest in the passageway motionless with only their respiratory pulsations indicating life. Once the male crawled directly to the female as she lay motionless in the burrow: the female did not move, but the male backed out in a series of peristaltic motions.

The eggs were deposited about one quarter to one half inch below the surface of the earth, and must have been laid in one of the burrows. These oblong eggs were about three quarters of an inch long. After some time I noticed that the eggs began to crumple and later they were spoiled. I believe they were ruined by too much moisture which was unavoidable in the terrarium. After several weeks in the terrarium the snakes developed white tubercles or wart-like projections on the various parts of the body. The male particularly was inflicted with large growths on the back and head. The damp environment of the confinement probably promoted this new difficulty. At first these growths were small, but gradually they increased in size and spread to the other parts of the body. Treating this disease with iodine (7%) invariably killed the bacteria that caused this discomfort, but the scales were usually ruined as witnessed by subsequent sloughs. After a wound was cured others were formed, finally killing the snakes. While suffering from this disease the reptiles grew very thin and listless; they may have died from malnutrition.

LAMPROPELTIS TRIANGULUM TRIANGULUM (Common milksnake) (Lacepede)

James Leake captured a young milksnake in March 1938 among a heap of rocks in a residential district of Baltimore City, Maryland, bounded by the Western Maryland Railroad Tracks, Gwynns Falls Parkway, Hilton Street and Liberty Heights Avenue. This snake a juvenile, probably of the 1937 brood, was collected with several other adult milksnakes while hibernating. The collector dug rocks from a depth of three or more feet to uncover the snakes.

This particular individual was about ten inches in length in September of 1938 and was rather thin. While in the Leake Collection, it ate a small Dekay snake, Storeria dekyvi (Holbrook), but for some unknown reason fasted for quite a long time after that.

In my collection on August 2, 1938 a large female Dekay snake gave birth to twelve young. About three or four months later, the milksnake sought out the baby Dekay snakes and ate five of them. It would approach the listless youngsters, still dazed from birth, seek an advantageous place near the head from which to bite, and would then bite and swallow the snakes head first. After that incident, the juvenile milksnake would not eat for some time. I bought two very young hairless mice of the brown fancy variety and placed them before the snake. It did not take the slightest interest, but after I had gone and returned in a few minutes I found that the snake was vigorously chewing on the head of the infant mouse, and attempting to swallow it. The mouse was moving weakly. Obviously the snake had not attempted to constrict it, but proceeded to swallow it alive. Trying not to make the snake disgorge the mouse, I left, returning about six minutes later. The mouse had been swallowed, and the snake was drinking water from a container placed in the terrarium. The bulge of the mouse remained in the snake's body for sometime.

This snake often bit unexpectedly, sneaking its head along my fingers and opening its mouth widely, clamping on its objective and then

chewing actively. Most of the time it was quiet, non-aggressive, lying under a piece of bark in its cage during the daylight, and crawling about the cage at night. This juvenile milksnake finally died after refusing additional food during September 1938.

A large female from the same locality laid eighteen eggs at the Leake's residence, but as James Leake was away, most of the eggs spoiled. This specimen mysteriously disappeared from its cage, and several days later was found in an alley with a mutilated back. A boy found it and mistaking it for a copperhead, attempted to kill it. The snake did not lay all of its eggs. Because of its broken back, it could not deposit the four eggs which I could discern in the body. After a week, it died.

Romeo Mansueti.

LECTURES AT THE SOCIETY DURING OCTOBER, NOVEMBER AND DECEMBER 1944.

October 10 - Lecture by Benjamin T. Kurtz "A Visual Reconstruction of the Past".
24 - Lecture by Gilbert C. Klingel "Temperature and its Relation to Natural History".
November 14- Lecture by Dr. George F. Carter "The American Squashes and Pumpkins as a Key to the Pre-Columbian Development of Culture in North America".
21- Lecture by Charles Ostrander "The History of Glass".
December 5- Lecture by Harry W. Dengler "Our Maryland Trees, their Lives and Legends".
12- Lecture by John B. Calder "Types of Climate and Regions on the Earth where they are found".

JUNIOR DIVISION MEETINGS

September 9 - Motion Pictures "Through Venezuela, Our Garden and All American".
16 - Summer collecting. A series of talks by Junior members after the summer vacation.
23 - Talk by Douglas Oler "Crabs"
30 - Lecture by Robert Buxbaum "Minerals Used in the Airplane Industry".
October 7 - Talk by George Krause "Amphibians"
14 - Nature Quiz. True or False.
21 - Lecture by George Maugans "Reptiles of Maryland".
28 - Motion Pictures. "Fishing with Rod & Reel and Where to Now".
November 4 - Talk by Franklin Atwell. "Keeping of Snakes".
11 - Talk by E. B. Fladung "The Society".
18- Lecture by Charles Ostrander "Minerals of Maryland".
25 - Talk by Douglas Matranga "Reptiles and White Mice".
December 2 - Lecture by Charles Brack. First in series of Photography. "Lenses".
9 - Junior Debate. "Resolved that Mans Method of Controling the English Sparrow is More Harmful than Beneficial".
December 16 - Annual Christmas Party.

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MARYLAND

A JOURNAL OF NATURAL HISTORY

The Natural History Society of Maryland

APRIL 1945 VOLUME XV No. 2

MUSEUM OF NATURAL HISTORY
MARYLAND HOUSE DRUID HILL PARK
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MARYLAND

A JOURNAL OF NATURAL HISTORY

THANATOPSIS

To him who in the love of nature holds
Communion with her visible forms, she speaks
A various language; for his gayer hours
She has a voice of gladness, and a smile
And eloquence of beauty, and she glides
Into his darker musings, with a mild
And healing sympathy, that steals away
Their sharpness, ere he is aware. When thoughts
Of the last bitter hour come like a blight
Over thy spirit, and sad images
Of the stern agony, and shroud, and pall,
And breathless darkness, and the narrow house,
Make thee to shudder, and grow sick at heart;--
Go forth, under the open sky, and list
To Nature's teachings, while from all around --
Earth and her water, and the depths of air, --
Comes a still voice

William Cullen Bryant

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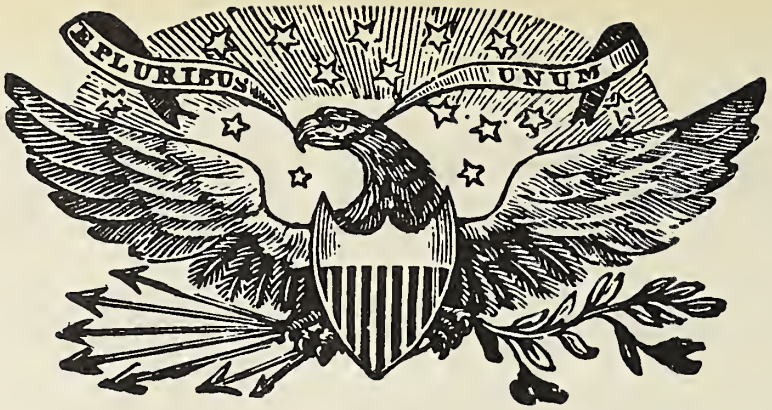
A DOLLAR A YEAR



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PLEASURES OF NATURE

Percy Thayer Blogg

Selbourne is a small town in Hampshire, England, and there, over a century ago lived Gilbert White, who has made that place famous and has given to the world a classic which will forever be a treasure, not only to lovers of natural history but to all readers of books -- "The Natural History of Selbourne."

Early and late he walked into the freedom of the woods and fields and studied all things as they grew or lived, and made friends with the sunbeams, flowers, trees and birds, and knowing, loved them, and told of them so truly and so well that others came to know and love them too.

At a later period we have such naturalists as Audubon, Agassiz, John Burroughs and many others who have found time to become eminent in science. The natural history of Maryland is yet to be put into print, but it is being studied all the time, and there are many young naturalists among us who may make a name for themselves in this attractive field.

Why not as opportunity serves, leave the bricks of the city behind you and turn your faces toward the glorious country? If the sunshine is hot, don't mind that, rejoice in its glow; it will come down flooding the world, and if you will let it, filling your hearts too with its gladness. But for its warmth the wild flowers would forget to bloom, the beauty of the budding trees would be lost and you would miss the pleasure of seeing some of the birds dusting in the road as you approach.

And if the clouds appear, then indeed is the lover of nature a very king, so rich are the treasures spread before him; for there all the birds are out searching for food, the squirrels are making the woods lively with their barks, and, perhaps a stray rabbit may jump up at your feet.

Whatever the season, or the weather, there are always pleasures, always joys for him who seeks them. You cannot tell what wonderful thing may await you while you walk, as Charles Lamb says, "about, not to and fro."

Will you fancy for a moment, the pleasure of a tramp, early on a spring morning, "Over the hills and far away?"

Perhaps your path will be along the bank of a clear stream, which runs between the hills, winding and twisting in every direction, wherever it can find the easiest course.

The first thing to greet you - and perhaps the most delightful of all, as the sun leaps above the horizon, is the mingled chorus of birds. From the bushes by the roadside come the musical notes of the song sparrow; from the edge of the wood the love call of the cardinal, the clear whistle of the robin, as he sits near the top of some tall tree while his companions are feeding in the meadow near; a golden-winged woodpecker is drumming away on some old tulip poplar tree, making the woods resound with his work, while the

thrushes, bluebirds and various sparrows are seen everywhere.

You enter the woods on this beautiful morning in May; and never in the round year are the charms of our woodland scenery greater than at this very hour. The leaves are already well unfolded, for spring is early; and the many wild flowers, peculiar to the time of the year in this locality, are in full bloom. Hepatica, almost the first of all to show itself, even venturing to come when the snow is on the ground, that dainty little flower, sometimes white and sometimes blue, bloodroot, spring beauties and marsh marigolds are past their prime, indeed; but the cresses, the toothworts, the adder's tongues, the violets, and above all the trillium, are now in the very height of their glory; while the mitre-worts and the several varieties of the Solomans-seal are just beginning to display their delicate beauties.

The whole woods is one immense flower-garden. Ah, the fragrance of this delightful morning air! Involuntarily one takes long, deep breaths, as if the very act of respiration was a luxury.

Green ferns hang over the rocks and banks of the little stream, and as we emerge from the wood into the meadow where the vegetation always affords a great variety of the tints and shades of green, so that a strongly contrasted fabric might be woven without introducing any other color, we note that these shades are never so varied as in the early spring for other colors are then inter-mixed.

The beeches have a tinge of yellow, the willows and poplars are hoary, the maples and beech saplings are reddish, the ashes have a dash of deep purple or brown, the green of the wheatfields differs from that of the meadows in short, next to the brilliant effects of autumn are the softer tints of early spring.

So go forth, I beg you, "Shepherds all and maidens fair," open your eyes to the wonderful things all around you. Look for beautiful things and you will find them. As someone says, "He who goeth into his garden to look for spiders and cobwebs will doubtless find them, but he who goes out to seek a flower may return to his house with one blooming in his bosom."

And already I see in the future the flowers that we look for blooming in our hearts, for intercourse with God's beautiful world will not only enrich our minds with a wider knowledge, but will fill our lives with such sweet thoughts and memories that we shall feel stronger to battle with everyday cares and perplexities.

We shall be better men and women for knowing nature better, and, as Wordsworth tells us: "Nature never did betray the heart that loved her."

NATIVE FERNS IN MARYLAND GARDENS

Andrew and Katherine Simon

The native fern has been all too often "the forgotten man" of our gardens. Good landscape architects use native material with excellent effect in shady spots or in woodland plantings, but the emphasis is more often on the flowering plants. Ferns, however, can be used to lend real beauty to any wild garden, or even a shady corner near a modest home. The varied texture and shading produce a charm that few other plants can muster.

Ostrich Fern

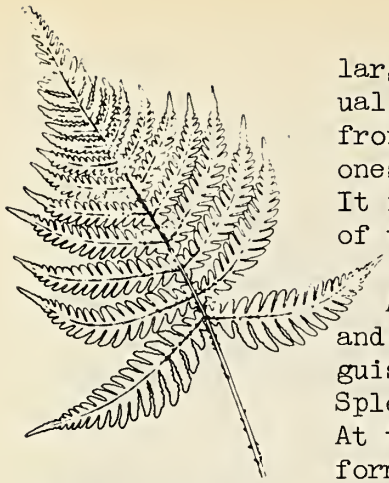
Perhaps first on the list suitable for Baltimore and vicinity would be the Ostrich Fern, Pleritis nodulosa, which grows from three to five feet under average conditions. In ideal locations, however, it may even attain a height of five to seven feet. Planted in partial to full shade, not too dry, it will need plenty of room. It spreads by underground branches. Interrupted Fern, Osmunda claytoniana, is one of the loveliest and hardiest of our taller ferns. With plenty of leaf mold it will grow well in dense shade or fairly sunny locations among rocks, and it thrives on the north side of the garden.

Interrupted Fern

Cinnamon Fern, Osmunda cinnamonea, is another of our hardier ferns that will respond under most conditions, but will do its best in moist open ground or shady spots, when not too dry. It must have two or three inches of leaf mold. Even after a long dry summer the fronds are fresh and strong. These taller ferns will grow well in company with our taller native flowering plants, such as the Cimicifuga racemosa (Black Cohosh), Actaea rubra (Red Baneberry), Aralia nudicaulis (Wild Sarsaparilla), Aster divaricatus (White Wood Aster), Lilium Grayi (Gray's Lily), Cypripedium pubescens (Yellow Lady Slipper), Thalictrum dioicum (Early Meadow Rue), Chelone glabra (Turtle Head), Arisaema triphyllum (Jack-in-the-Pulpit), Eupatorium urticaefolium (White Snake Root), and Lobelia cardinalis (Cardinal Flower). For best results most of our native flowers should be planted in October, with a very heavy mulch of oak leaves.

Cinnamon Fern

The more dwarf types of Ferns are at home under approximately the same conditions as the taller varieties. The Winged Beech Fern, Phelypteris hexagonoptera, will form thick clumps without the tendency to wander about, and will stay fresh even after prolonged drought. The New York Fern, Phelypteris noveboracensis, is strikingly beautiful when planted in



Winged Fern

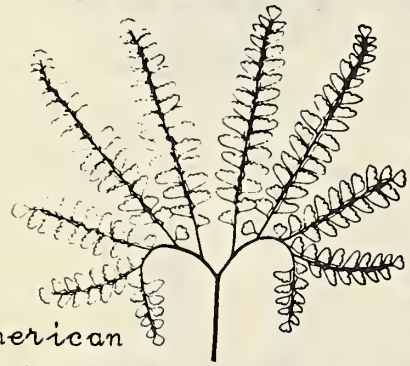
large colonies, as well as in individual groups in native gardens. The fronds are lacy and perfect, and fresh ones appear throughout the summer. It is best kept in the drier section of the garden.

A very lovely heavy fern in spring, and certainly one of the most distinguished in late summer, is the Silvery Spleenwort, Athyrium acrostichoides. At the time when the fruit-dots are forming the silver glistens as the wind whips the fronds back and fourth.

New York Fern

Perhaps the best known, and dearest to our hearts, is the American Maidenhair, Adiantum pedatum, a very hardy and showy variety. Its delicate beauty and peculiar form, unlike that of any other fern, gives the woodland spot a fairy-like quality that can hardly be described. Fresh fronds continue to grow all summer, and so keeps their beauty until frost. There is perhaps no more breath-taking sight in our woods (and it can well be repeated in our own wild gardens) as a great patch of maidenhair and the beautiful, stately Yellow Lady Slipper among moist moss, and lichened rocks. Add to the group the Nodding Trillium, Trillium grandiflorum, and False Mitrewort, Tiarella cordifolia, and the picture will be complete.

Silvery Spleenwort



American Maidenhair

The Leather Woodfern, Dryopteris marginalis, is a standby for all native gardens. The fronds are evergreen and leathery, twelve to eighteen inches long, and attractive throughout the year. It is at home near rocks and must have perfect drainage in the coolest, driest side of the garden.

Leather Woodfern

The Christmas Fern, Polystichum acrostichoides, also an evergreen, asks for the least attention and gives in return the maximum of satisfaction. Plant in the highest part of the garden and see that is has good drainage. It is good for Christmas decoration if packed from your own garden. To keep in best condition it should be divided every four or five years, otherwise the clumps will tend to become smaller and smaller. Plant it with May Apples and Heuchera Americana (Common Alum-root).

Christmas Fern

These ferns are only a few of the more than fifty varieties that may be found in the vicinity of Baltimore. Many lend themselves readily to garden use. In future issues of "Maryland" other uses of native ferns will be suggested, those suitable for bog gardens, rock walls, ground covers, and rock gardens.

DESCRIPTION OF A TEMPORARY INDIAN CAMP SITE NEAR COLLEGE PARK, MARYLAND

by Walter F. Jeffers

In 1935 several stone chips were observed on the surface of the ground in a wooded area near College Park, Maryland. Little attention normally would have been paid to such chips, as they are rather abundant in nearby fields, but these were on a slightly raised, mound-like area that was rather clearly defined from surrounding land.

The raised area was roughly circular in outline with a diameter of about 25 feet and on its surface were a few small trees and bushes but no large trees. Its surface was about 1 foot higher than surrounding land but the edges were not clearly defined. Test diggings showed the soil of the raised area to be very sandy and quite loose and to contain many flint chips scattered throughout the first foot. A layer of charcoal extending from 2 inches under the soil to about 1 foot was also found.

In spare time during the summer of 1935 and for several years afterward, this camp site was carefully excavated. A trench about two feet deep was dug along one edge after test diggings to a depth of four feet showed no chips below one foot in depth. Using small scrapers the soil was pulled back into the ditch until the whole raised area had been crossed. In this way approximately a bushel of quartzite chips together with several arrowheads and other simple artifacts were found. A list of the artifacts found is given below.

35 complete arrowheads and several that were broken
3 fragments of steatite pottery (one having a hole bored in it)
2 hammer stones
1 anvil stone (size $6\frac{1}{2}$ in.)

Most of this material is shown in figures 1 and 2.

In addition to these definite indian relics a clay pipe having "MacDougal" printed on one side and "Glasgow" on the other side was found. This was located near the center of the site at a depth of about four inches. However, just beyond the edge of the raised area a piece

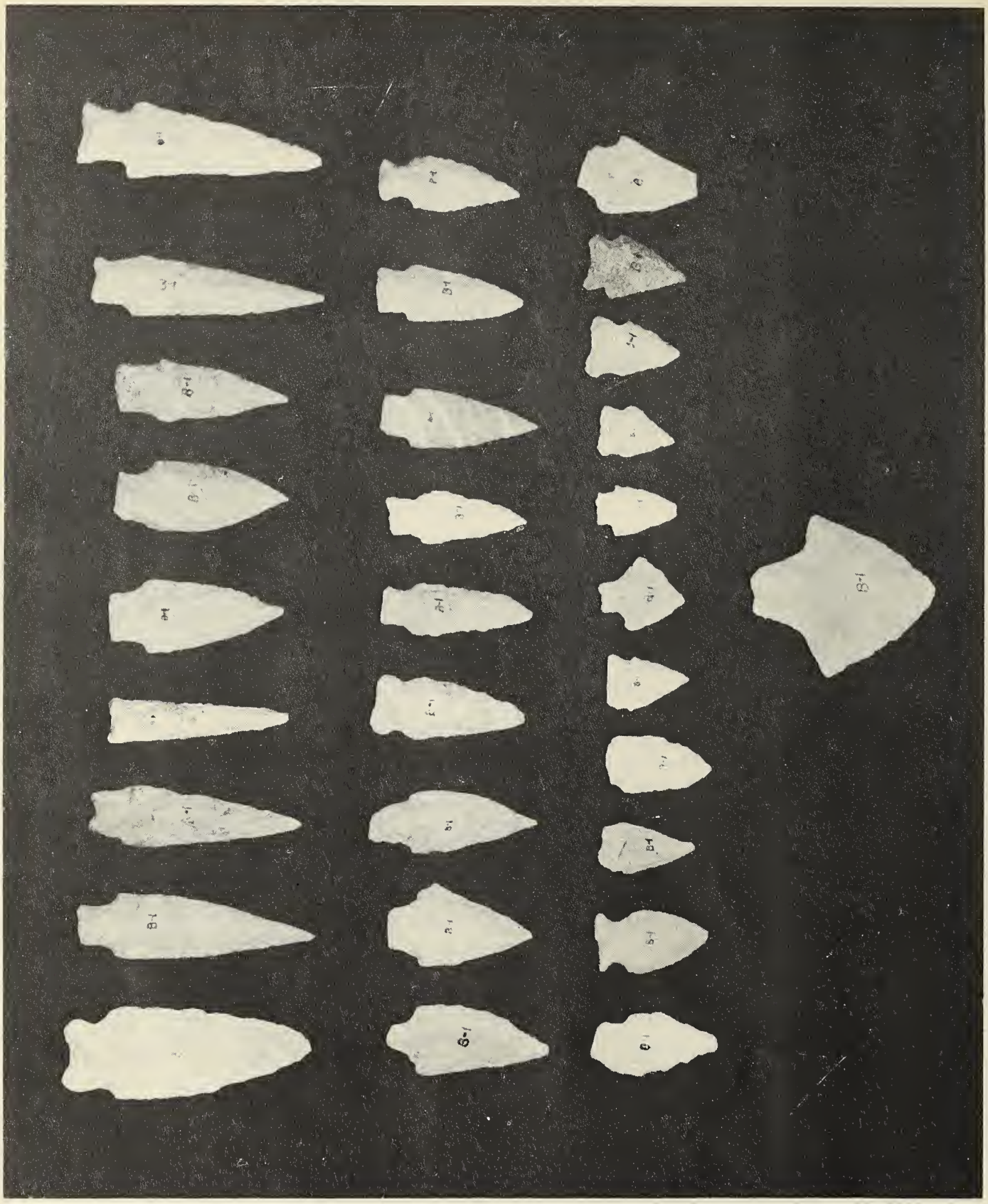


Figure 1. Arrowheads taken from a temporary indian campsite near College Park, Maryland

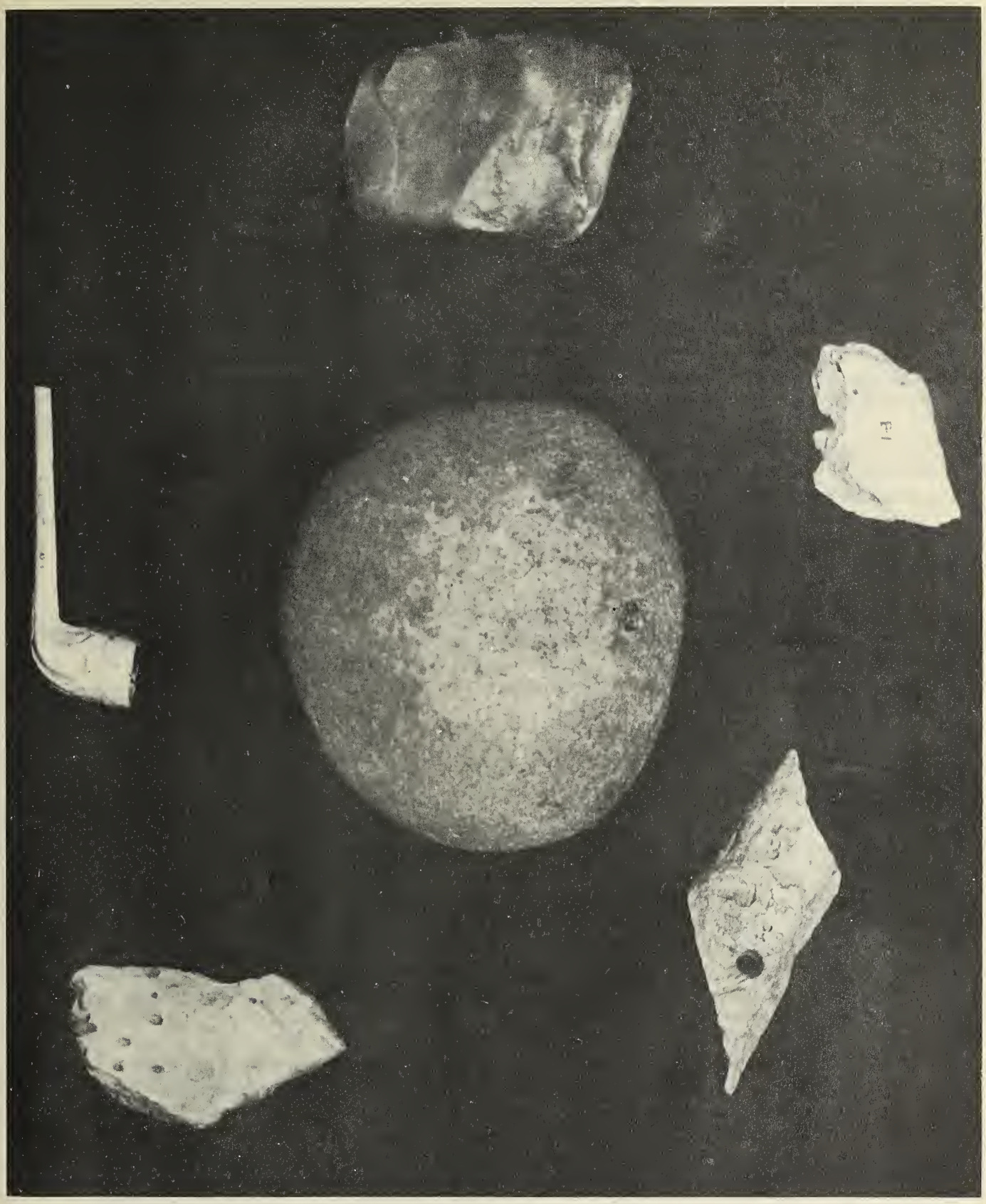


Figure 2. Other artifacts taken from the same site.

of old cast iron skillet and several pieces of window glass were found so the pipe may have no connection with the indian artifacts. Just below the bed of charcoal a small bone resembling the process of a vertebra was found.

The relics were scattered throughout the area from a depth of one inch to about one foot and some were mixed with the charcoal. It is of interest that when found the triangular hammer stone was lying on top of the anvil stone. The charcoal was in a circular area, about ten feet in diameter, in the center of the site and extended to a depth of about one foot. Beneath the charcoal were several flat iron-ore stones weighing about 50 pounds and smaller pieces were in the excavated area.

Apparently the original nature of this area was a temporary camp site for several indians. Perhaps it was used for only a short time during a hunting trip. The size of the charcoal bed indicates that one large fire or several smaller ones had been there and the number of stone chips indicates the use of this site for at least a few days.

There are several facts concerning this excavated area which are confusing and cast some doubt on its authenticity. First, the soil is quite loose as if recently disturbed. Second, the clay pipe found in the area and iron and glass at its edge are of relatively recent origin. Third, there are only small trees, perhaps 25 to 30 years old, growing on the raised area.

However, the relics found are undoubtedly authentic and have been underground most of the time since they were made, for the arrow points are very sharp and show none of the signs of deterioration that arrowheads exposed to the weather often show.

A FLICKER-STARLING BATTLE

By Hervey Brackbill

There is so much of value and interest about the Starling that it is a pity there is also so much to be said against this bird. The things upon which it feeds are, in the main, worrisome pests of the farmer and the gardener; although sometimes large flocks of the birds do damage to crops, an elaborate study by Government ornithologists also showed that: "As a destroyer of such pests as the clover-leaf weevil, the Japanese beetle, May beetles, cutworms, and grasshoppers it is even more energetic than some of our protected native birds."

In its manner of feeding, it is often highly interesting. There is the way in which large, compact flocks sometimes forage across expanses of open ground: the birds along the rear edge of the mass suddenly rise together, sweep low across the rest, and alight again as the forward edge. The maneuver is much like the curl of an ocean wave, and occasionally the flocks progress appreciable distances by a succession of such lap-overs. The aerial feeding in which the Starling engages at times is

also worth watching, with its peculiar slow mode of flight and sharp little climbs.

What bird is more expert on the wing? Flying to and from their roosting places, great flocks abruptly rise and fall as if controlled by a single mind, when some especially tall obstacle looms in their path and then is left behind. At their suburban summer roosts, what further marvels of coordinated flight are shown before the flocks finally quiet for the night. And at their winter roosts downtown, with what headlong, blinding speed each bird--again become an individual--dives twistingly out of the flock to its chosen place!

Vocally, too, the Starling offers entertainment; through its mimicry. And although it does not, like the Mockingbird, reel off its imitations in a stream that lasts for minutes, but just occasionally bursts out with one or two, or slips some in amid the jabbering, clacking and screeching that comprise its song, the listener who keeps notes of those he hears may well have in a surprisingly short time a surprisingly long catalogue. Sounds as different as the Catbird's mew, the Flicker's wicker and the song of the Meadowlark are within its powers.

On the other hand the bird, as already mentioned, when overnumerous can do much damage to small fruit and some other crops. The noise and dirt of the big roosts make these objectionable in suburban and business districts alike. Furthermore, the alien Starling has either displaced entirely or greatly reduced in numbers, in many places, half a dozen or more of our native birds which like itself are hole-nesting species. Bluebirds and Flickers have been termed the chief sufferers, but Red-headed Woodpeckers, House Wrens, Purple Martins and even Robins are molested as well.

The arrival of another April, bringing this competition for nesting sites again to its most intense pitch, recalls a battle between Starlings and Flickers that was witnessed in northwest Baltimore on April 20 and 21, 1939. It is only necessary to explain that the tree in which the fight occurred was visible from a window of my home to introduce, practically verbatim, the account as it stands in my notebook:

April 20.

Having yesterday noticed a Flicker clinging just below a knothole some 30 feet up the big white oak, when I saw one there again this evening I was satisfied that the hole held a nest. I sat down to see what the bird--a female--would do. It was 5:45 o'clock.

Twenty-five minutes passed, and except for making one little dash toward a Starling that came too near, the Flicker did nothing at all but cling there at the lower edge of the hole and, very occasionally, thrust her head inside as if to reassure herself about something. After that time, however, she flew away; in just a minute and a half came back and clung for a few seconds more at her old place, then climbed a foot or two above the hole and preened for a while.

Then she again returned to her station below the nest. But this time, instead of resting there motionless, she immediately leaned halfway inside the hole and began tugging violently with her bill. For several seconds she tugged and then--dragged out a Starling bodily! A moment she clung, holding the Starling struggling in the entrance hole, then, still locked together, both dropped flapping to the ground. There the Flicker gave a few little cries, but she seemed nevertheless to emerge the victor for she quickly flew partway up the trunk, and then--after a dangling golden wing feather had broken off and fluttered away--back once more to her guard post.

She straightened her plumage a bit, hung quietly for a minute more, and again flew away. And now a Starling--the same one, no doubt--took a perch close by. Beyond question, it was during the Flicker's previous absence that the Starling had first slipped into the hole, but before it could do so this time, the Flicker returned. Strangely, she made no move toward the Starling; not only did she, in the next ten minutes, merely cling at various places about the hole--once giving two low songs, and once several calls--but she even made two more brief flights away.

A third time she flew away--it was now 6:39 o'clock, only about a quarter hour from sunset. Her absence reached two minutes, then three, and the Starling must have felt, as I did, pretty confident that this time she had gone for the night. Not until four minutes had passed, however, did the Starling make a move. Then it entered the nest and began throwing out the Flicker's furnishings. Working as fast as it could gather them up and bring them into the entrance, in three minutes it tossed out twenty-one billfuls of chips. Rested for two minutes, then went back and threw out four more. Rested again, but only briefly, and threw out still fourteen more--a total of thirty-nine.

And then, after perching for one more minute, it flew toward the downtown roosts.

April 21.

A quarter hour before sunrise this morning--at 5:06 o'clock--a Starling came from the direction of town and took a perch near the Flicker's nest hole. Before long a second arrived, and later several more, and from then on there was always from one to a handful somewhere in the nest-tree, one or more of them often screeching.

Four minutes behind the first Starling, the first Flicker appeared; it was the male, and he flew to the lower edge of the nest hole and clung there. Eleven minutes more went by before the female appeared; she alighted on a limb some distance above, uttered a few "flicker" calls, then flew off again, leaving the male still doing guard duty.

Now began what conceivably was a struggle by each Flicker to make the other watch the nest while it itself got some breakfast. After another three minutes the male flew off, too, but in a few seconds came back to his post--and, as if he had brought her--almost at once the female also returned to the limb above.

Immediately the male climbed up near her, then he flew away and she swept down and mounted guard. For several minutes she clung at the hole, but then again went off and a minute later the male returned. This time he stayed five minutes, then once more he went away.

All this time the Starlings had made no move whatever toward the hole, but now almost at once one entered. However, by the time it had thrown out one billful of chips the female Flicker returned. Immediately she leaned far into the hole and began yanking, after a number of yanks pulled out the Starling bodily as she had done last night--apparently gripping it by the bill--and, locked together, they dropped flapping straight down to the ground.

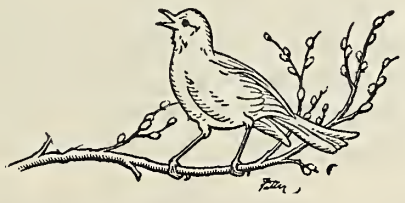
Before they had separated a second Starling went into the hole. The Flicker, back in a couple of moments, at once reached in and yanked this one out. And while those two birds now were falling to the ground together, a third Starling (or maybe the first again) entered. This one, too, the Flicker hauled out upon her quick return, and now these two dropped flapping, again apparently gripping each other by the bill. But this time the Flicker uttered continuous cries as she fell, and continued them on the ground, where the two birds continued to flap around, the Flicker apparently being dragged by the Starling with considerable ease.

For a full minute this went on; for several minutes; and the Flicker's cries--becoming perceptibly weaker--drew more Starlings, a Blue Jay, and a Robin to the scene. Finally I myself dashed out of the house to the spot, but although I still heard a few faint cries when I was within 50 feet, by the time I negotiated the intervening hedges and shrubbery and reached the actual place of battle all was quiet and empty; several minutes' search of the bushes and deep carpet of dead leaves disclosed neither Starling nor Flicker.

It was 6:20 in the evening until I could watch again. Within a few minutes a Starling emerged from the hole with a few chips, perched at various places nearby for about half an hour, then flew to town. No Flicker ever appeared.

April 22.

At 5:40 this morning a Starling again is at the hole, so the outcome of the battle is clear.

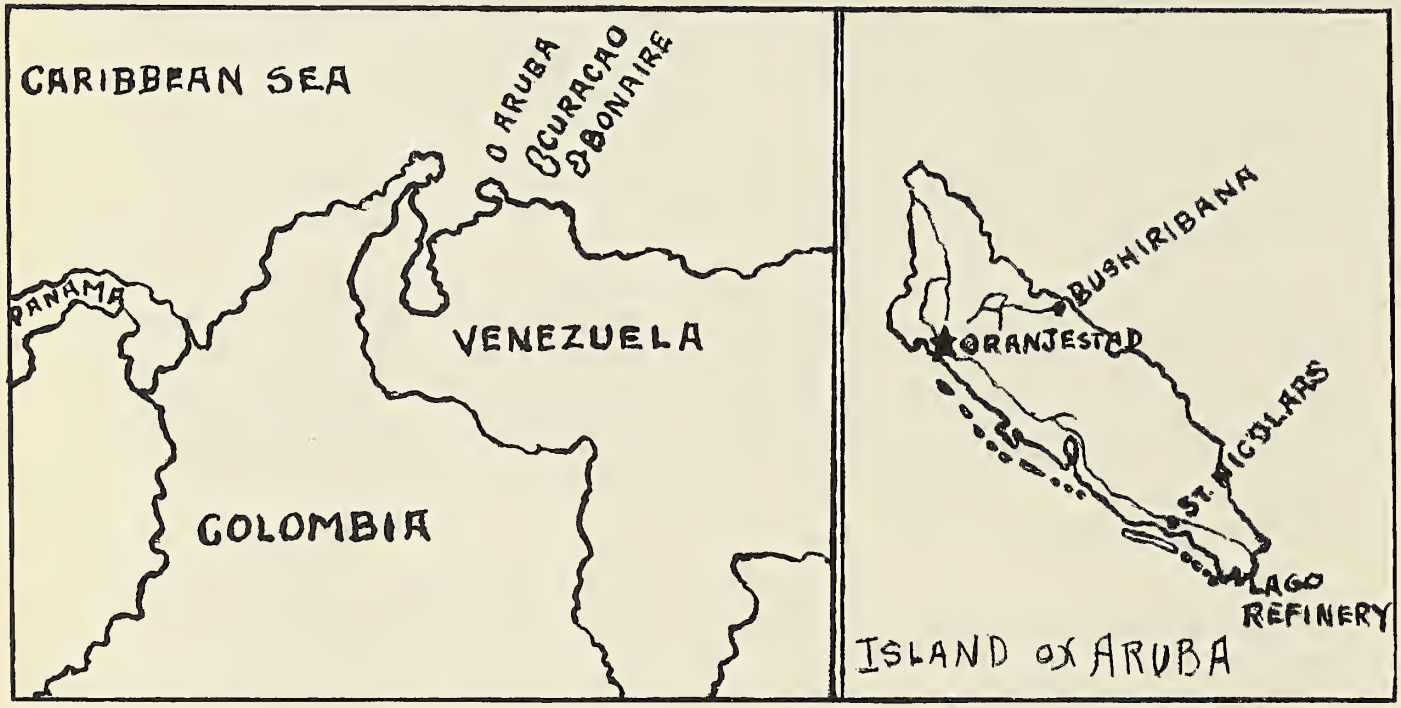


INDIAN ARTIFACTS FROM THE ISLAND OF ARUBA

Richard E Stearns

Off the coast of Venezuela is one of three islands of the West Indies group, which for many years were heard of by relative few people, but has become better known since the Lago Oil Refinery was established, on this particular island. I am speaking of the island of Aruba.

The island of Aruba is the smallest of the islands comprising this group. The other two islands are Curacao and Bonaire. Of the three, Aruba, owing to the oil refinery is the most important. Its total area is 69.9 square miles, whereas Curacao is 172.5 square miles and Bonaire is 111.9 square miles.



Aruba was discovered by the Spaniards with the other of the West Indies in the early sixteenth century and colonized in 1529. It was placed under the Governor of Caro, Venezuela. In the year 1634 it was seized by the Dutch along with Curacao and Bonaire. During the course of a 100 years it was taken by the French, then by the British and finally returned to the Dutch, under whose dominion it is today.

Aruba is the driest, flatest and has the least vegetation of these three islands. Here drinking water is scarce. There is only one natural spring on the island. Water for drinking purpose is taken from wells sunk in solid rock, far enough from the sea to insure it from being brackish. Rain water is mostly used.

There are three cities on Aruba which present a queer contrast. Oranjestad the capital, is a modern city, with wide paved streets, up-to-date government buildings and offices and stores.

St. Nicolaas is a mixture of dirt streets, wooden shacks, Chinese restaurants and saloons. A typical American frontier town.

Bushiribana is a desert, swept clean by salt laden air, with the ruins of an abandoned gold smelters plant.

Notwithstanding this peculiar contrast of old, new and abandoned the western shore has a south-sea look. It is bordered by cocoanut palms along white beaches of white sand. The south-western coast is protected by a coral reef which has been blasted out to form the harbors of St.Nicolaas and Oranjestad. The north-western portion of the island is best suited for agriculture. Here the rural part of the population live. A road runs inland through low hills with cactus and large boulders, red earth and soft gray-green dried bushes.

Today the influence of the Indian is stronger on Aruba than on other Dutch possessed islands, though neither pure blooded Indian or Negro exists. They both have fused during the centuries that have elapsed.

The Indian language has died out and has been replaced by what is called Papiamento. The Papiamento on Aruba differs from the Papiamento spoken on the other islands, as it contains a larger number of Indian and American words.

The original stock in all probability were Arawaks or Taonos. The Arawaks were not a single tribe, but a number of tribes having a similar linguistic stock. In 1816 there were still 564 pure blooded Indians upon the island.

As to the appearance of the original stock we can only form a conjecture. From what is attributed to Americo Vespucci's account, who was one of the party of Ojedas, an idea may be formed:

> "We found (afterwards) that a race of very great stature dwelt therein: we then landed and could not find fresh water: and imagining that the island was not inhabited because we saw no people, going along the shore, we beheld very large footsteps of men on the sand.....we came upon a pathway which led to the interior of the land:.....we beheld five of their huts,.. and found five women, two old ones and three girls, so lofty in stature, that we gazed at them in astonishment: and when they saw us, so much terror overcame them that they had not even spirit to flee away: and the old women began to invite us as with words, bringing us many things to eat, and they put us in a hut: and they were in stature taller than a tall man.....we were all of a mind to take away the three girls from them by force: and to carry them to Castile as a prodigy: and while discussing, their began to enter through the door of the hut full 36 men much bigger than the women: more so well built that it was a famous sight to see them...

They carried very large bows and arrows, with large knobbed clubs.....they went entirely naked like the others. I call the island the Isle of Giants because of their great size:"

The writer had occasion to visit the island of Aruba in August of 1942, stopping for two days at the town of St. Nicolaas. Upon approaching the southeastern end of the island I noticed on the Carribean side, that is, the side opposite St. Nicolaas, a line of cliffs which appeared to extend for five miles or more along the coast.

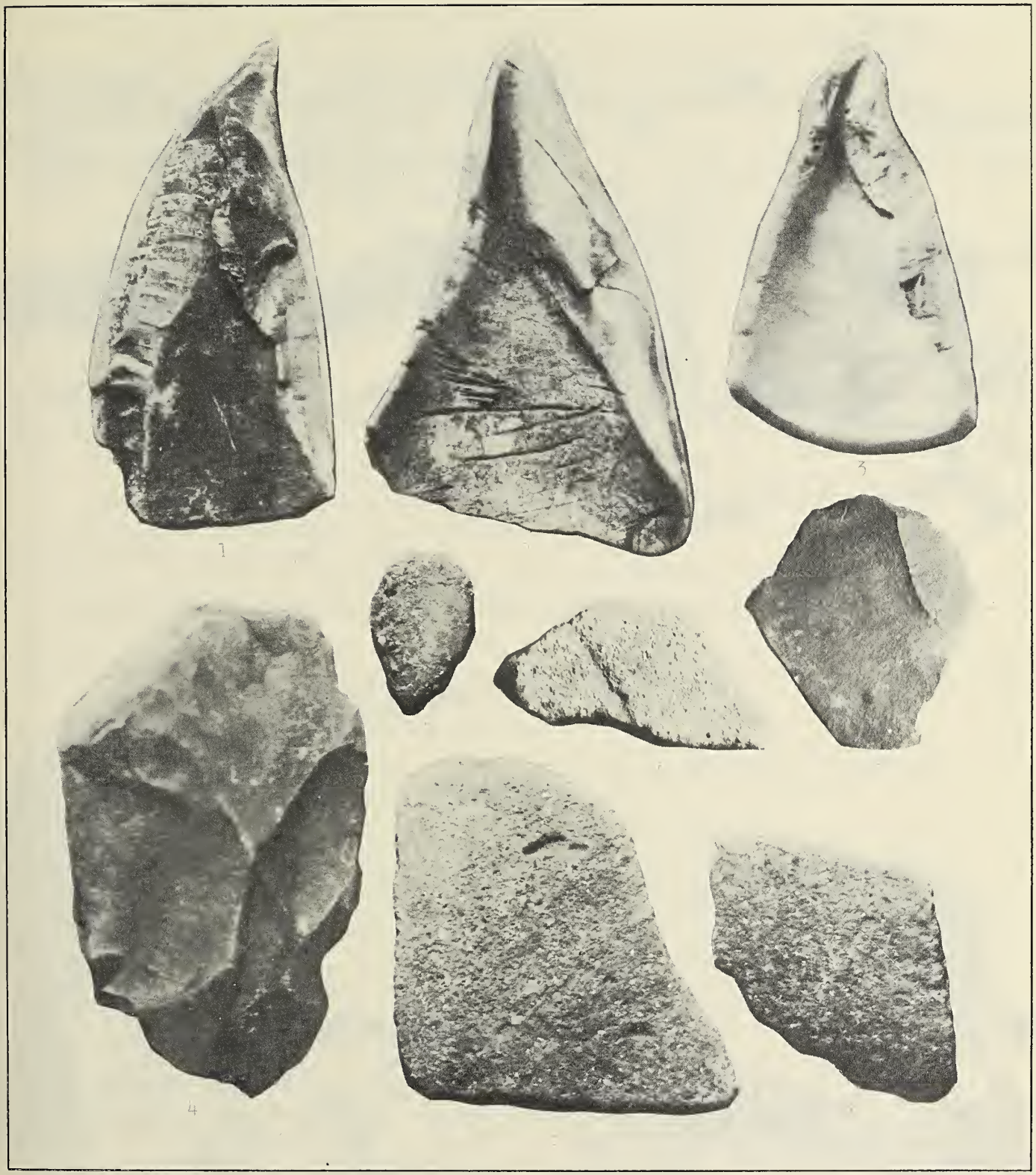
On the following day, having a few hours of leisure, I walked across the island over the rough, stoney roads that connect the outlying districts of St. Nicolaas. Gaining the further side I was fortunate enough to arrive at the head of a draw or ravine which led down to the base of the cliffs. These were from 40 to 50 feet high. It was apparent that the sea had beat against them at one time as they contained a series of caves at their bases. At the present time however; the beach is a half mile or more away. Most of the caves are quite shallow in depth, while several appeared to go some distance back. As I had no light I made no attempt to explore them.

To ascertain whether or not these caves had once served as shelters for the ancient inhabitants, I examined the ground in front of them, soon finding a few flakes of a hard greyish stone, quite different from the rock of the cliffs which was composed for the most part of fossil shells and coral. Eventually, I came to a place in front of one of the shallow caves where a great mass of the cliff had fallen away in ages past, and had come to rest in the same position it had occupied when it formed a part of the cliff. The part resting on the ground had formed the roof of a cave and in its present position now formed a small shelter about 8 feet in diameter and $3\frac{1}{2}$ feet in height. At one time there may have been a little more height to the roof as a quantity of rocks and loose material had been washed in on the floor.

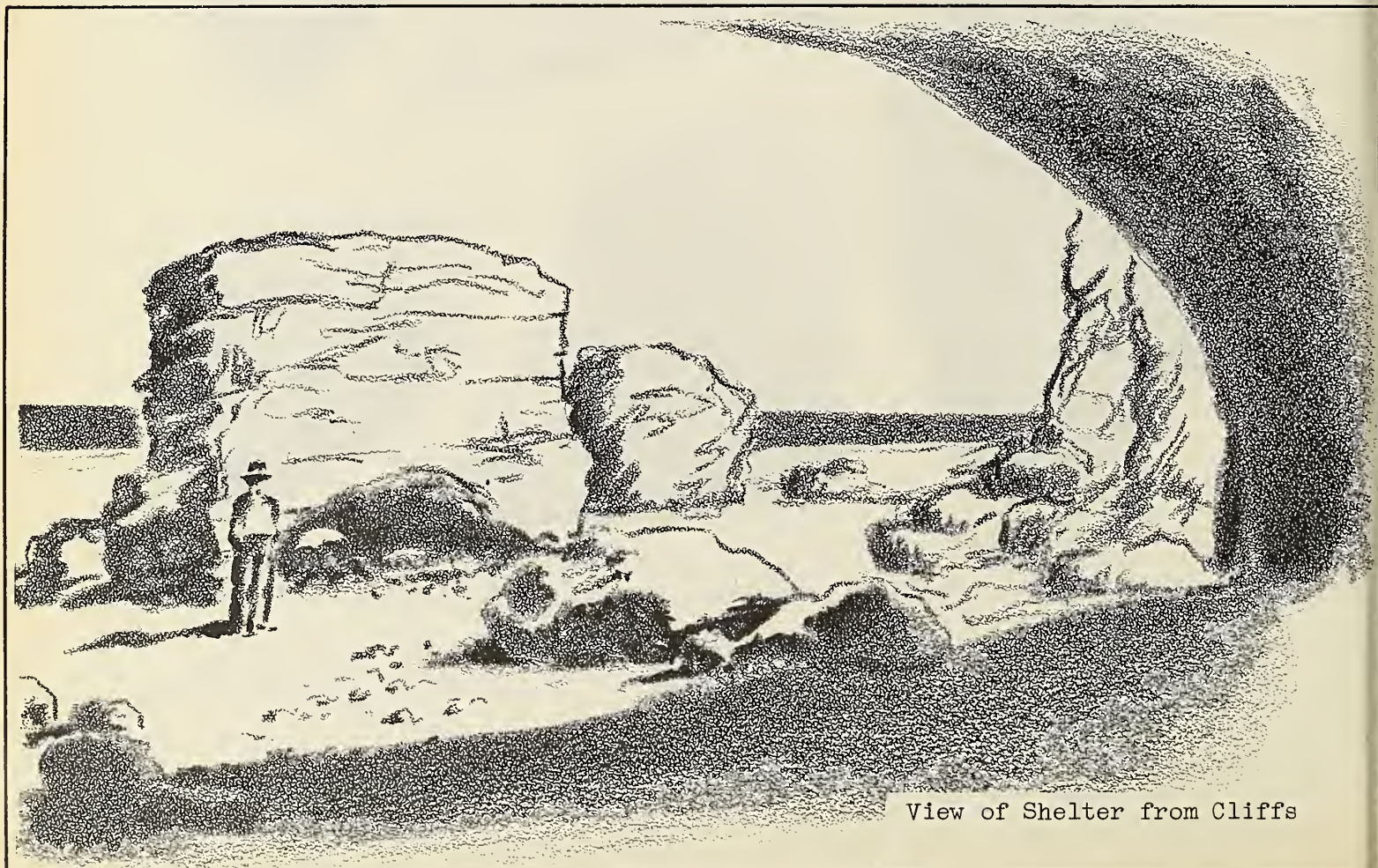
In the area between the shelter and the cliff I found on the surface some 30 pot-sherds and a shell gauge (Fig. 3). I turned over some of the rocks in the shelter and found some crab claws and two large conch shells that had been pierced in the sides to remove the snail.

About one hundred yards further along the cliff a small shell heap had been exposed by some recent grading. This shell deposit had been placed against the cliff and at about 10 feet out, where the grading had been done was about 2 feet thick. There were no sherds in this deposit, but scattered through the earth that had been removed by the grading operations was a number of chips of the same hard grey rock, mentioned heretofore, and a blocked out regect, which may have been intended for a celt. (Fig. 4). In addition a shell regect was found, which was probably intended for a gauge, and a finished gauge, which had been badly weathered so that no tool marks are apparent on its surface (Fig. 1 and 2).

The sherds (Fig. 5, 6, 8 and 9) are buff colored on the interiors. The tempering material appears to be shell, but as the particles are



View of Shelter and Cliffs in Bank



View of Shelter from Cliffs

rather fine it is difficult to tell whether it is shell or limestone. Only two bowls appear to be represented by the sherds, of a simple type and without decorations.

On the ground at the top of the cliffs, near the head of the ravine mentioned previously, a few chips were found and a small section of an implement that may be a pestle made from igneous rock.

THERE ARE NO DULL DARK DAYS

Percy Thayer Blogg — H G Roebuck, 1944, $2.50

"There are No Dull Dark Days" is truly a delightful little book for nature lovers and sportsmen.

The book is from the pen of our fellow member, Mr. Percy Thayer Blogg, who is known through his nature writings in various sport and nature papers.

The volume includes a series of reminiscences on birds and places in Maryland, and deals entertainingly with a variety of sporting themes. Dispersed through these essays are a number of poems.

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LUNA MOTH.....COVER DESIGN

The Luna Moth is one of our largest moths and is considered to be the most unique and exotic in appearance.

This moth is double-brooded in our State, that is, it has two generations per year. The eggs are white when first laid, but turn lead color before hatching, which occurs in three weeks or less. The eggs are laid on oak, hickory, birch or sweet-gum leaves, the food plant of the newly hatched larva. The mature larva are about three inches in length and of a bright yellow-green color ornamented with a lateral stripe of yellow and several rows of reddish tubercles. The tubercles are short and subject to color change. When about to pupate the upper surface of the Luna larva changes from green to pinkish.

The larva spins a loose brown cocoon, very thin and oval in shape, among the dead leaves upon the ground where it pupates.

The cocoon is spun inside a leaf, and are not as frequently found as some of the other moth cocoons. The adult moth is pale-green.

LECTURES AT THE SOCIETY DURING JANUARY, FEBRUARY AND MARCH, 1945

January 16 - Lecture by Hugh V. Stabler "Some Archaeological Highlights of the Potomac Valley".

16 - Lecture by Carl W. Buckheister "The Arrival of the Leach's Petrel". Also excellent colored motion picture on birds.

February 20- Lecture by Edward M. David "Soil Conservation in Maryland".

27- Lecture by Gilbert C. Klingel "The Tides".

March 20- Lecture by Dr. Joseph T. Singewald, Jr., "Up the Amazon and Across the Andes".

27- Motion picture "Oil of Peru".

JUNIOR DIVISION MEETINGS

January 6- Annual business meeting. Election of officers.

13- Talk by John Cooper "Fresh Water Fish in Maryland".

20- Lecture by Charles Brack, second of photographic series, "Use of the Small Box Camera".

27- Motion pictures "Travels in Brazil and Columbia" and "Henry Brown, Farmer".

February 3- Talk by Herbert Bangs, Jr. "Igneous Rocks".

10- Laboratory night.

17- Lecture by Charles Brack, third in photographic series "Developing of Negatives".

24- Nature Quizz "What Do You Know About Nature".

March 2- Talk by Charles Freed "History of Copper".

10- Insect Course by Edmund B. Fladung. First of series.

17- Camera night. Part of photographic course given by Charles Brack.

24- Laboratory night

31- Business meeting and general discussion.

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In course of preparation -- Annotated List of Maryland Birds

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* * * * *

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A JOURNAL OF NATURAL HISTORY

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JULY 1945 VOLUME XV No. 3

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MARYLAND

A JOURNAL OF NATURAL HISTORY

A Cloud

Darting, diving, dipping,
   As it glides along on high.
Soaring, sliding, slipping,
   As it quickly passes by.

Twirling, turning, twisting,
   As it journeys on its way.
Mounting, massing, misting,
   Ever wending through the day.

Rifting, roaming, roving,
   As it drifts in some far place.
Listing, leaning, loving
   Its forever tumbling race.

Blowing, bowling, bending,
   All alone or in a crowd.
Rising, rolling, rending
   For you see "It" - is a cloud!

Martin H. Muma

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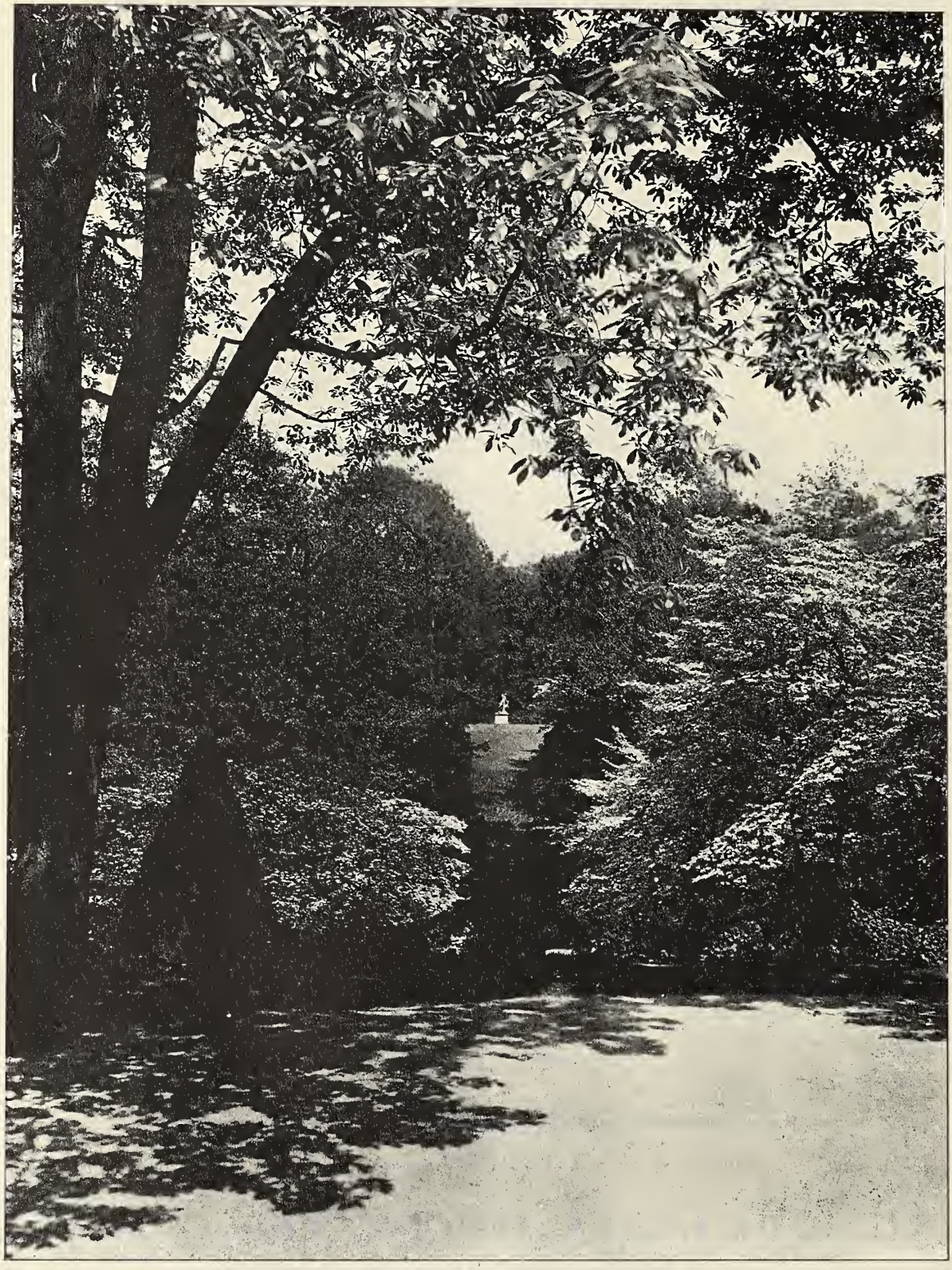
JANUARY, APRIL. JULY, OCTOBER

VOLUME XV No. 3
JULY 1945
A DOLLAR A YEAR



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SOME THOUGHTS ABOUT OUR TREES

by

Hollis Howe

In the well considered words of the late Dr. E. P. Felt (a starred man of science): "Shade trees in the broad sense belong to all. Even those on private property contribute in a general way to the comfort and pleasure of everybody. This generation holds a trusteeship obligated to pass on unimpaired its glorious heritage of shade and ornamental trees".

Fortunately, there are many who love trees and have taken the trouble to learn about them. There are those who tolerate them but do not know one variety of tree from another. Unfortunately, there are a few (and among them are some in high places) who regard our most heroic of plants as inanimate. If they are in the way, they are pushed aside and not protected, eliminated and not fostered. The condition, location and variety of a tree will determine the logic in attempting to save it. Vandalism of a deliberate or careless sort is more common than might be supposed by the layman.

Those of us familiar with trees, realize that they are alive and that they must breathe and have food and rest, the same as we ourselves. The giant Redwoods and Sequoias of the Pacific Coast, many of them over 300 feet in height, are the oldest living things. They were of good size long before the first Christmas. Some of them are estimated at about 7,000 years of age. A 100 year old Greenland willow, on the other hand, is usually less than one foot in height. All of them, however, along with their fellows, have been living and breathing (and dying) all this time, helping to balance extremes of temperature and run-off of water and transforming the deadly carbon-dioxide in the air into life-giving oxygen. How can we fail to appreciate them?

The usual scientific treatise on trees deals first with the evergreens. At the approach of the winter, to be sure, most of us think in terms of them, not only because of their decorative value when other plants are not so much in evidence but because of their friendly warmth, both apparent and actual, as they shelter us from a cold winter wind. We should not lose sight of the characteristic silhouettes produced by various forms of deciduous trees and shrubs when their branching-habit may be studied against the back-ground of the sky. All of them are resting at this time, but they breathe like us in sleep. If a comfortable mulch has been provided, for broad-leaved evergreens, particularly, they are happy. Snow that remains on the ground is one of the best of mulches.

Winter injury, so called, may be of several sorts. Many trees and plants unable to replace the moisture lost through the drying action of

the sun and wind when the ground is frozen suffer, unless the winter is unusually mild. Frost-cracks develop on rapid-growing trees that are somewhat outside their natural habitat. Ice storms, followed by high winds, are often serious. Much of this injury can be avoided if previous and judicious arboricultural practices have been employed. Decay and borer invasion often follows if resulting injured portions are not promptly and properly treated.

As soon as the ground is free of frost in the spring, weak plants should be fertilized. Scale infestations should be treated with the appropriate spray at this time also (when the temperature is above 45 degrees). Oil sprays should not be used on any of the maples, beeches or walnuts. Almost before any comprehensive planting has been completed, it will be found that the elms will be in full leaf and should receive a poison spray for the elm-leaf beetle. This insect was particularly serious last season; so much so that its work was often mistaken for Japanese beetle injury (which, by the way was so light as to give promise for the future). We are not, however, justified in relaxing our effort toward its control. Other spray applications may be necessary as the season progresses. So far as leaf-eating insects are concerned, the best spray practice is one of prevention. Get the spray on ahead of the insect except in cases where a contact spray is the only type effective.

Scale, red-spider and bag-worm are perhaps the most serious insect pests commonly affecting evergreens. All of them may produce fatal results, although each has its effective spray. The ability to recognize them is of prime importance. Other forms of diagnosis call for years of practice.

The identification of tree diseases is often somewhat baffling. Their control is usually even more so. The average so-called "tree-expert" will admit that his fund of knowledge is limited; but, if he is alert, he will know of sources of information to supplement his experience. Many methods of disease control are complicated. Some of them are of doubtful value.

It is proposed that Maryland adopt a certified tree-expert law, such as those already in effect in several other states, to protect the tree-owner as well as the trees. A quack tree-man went on a spree here in Baltimore last summer. In one instance he charged $70.00 for throwing perhaps 70¢ worth of sulphur around, with about $7.00 worth of damage to the lawn and, I hope, no damage - certainly no benefit-to the three or four small trees in which it is obvious their owner took praise-worthy pride.

Trees enhance real-estate values. To lose them through neglect is a monetary loss as well as an aesthetic one. A logical procedure would

appear to be to have a periodical inspection made of them, just as we in the municipal department do in the case of more important plantings, and have the necessary corrections made, while still possible at a minimum of cost and effort and thus perhaps prevent complete ultimate failure. "A stitch in time saves nine".

Severe storms may cause appalling tree damage. We are inclined to think of certain sections of the country as being vulnerable to violent weather. As a matter of fact, no section of the country is immune to freak meteorological phenonema. Here in Maryland, in recent years, we have had local disturbances which have not only caused severe property damage but loss of life as well. Good advice before roots are cut and judicious care might fore-stall much of such trouble. Some half dozen storms causing major tree damage have occurred during the past year. The storm of Sunday July 2nd, made it necessary to devote our entire effort for the next half month to emergency work, exclusively. Because of the shortage of help due to the war effort and the pressure of other work, we have still not repaired the damage in its entirety.

It will pay us to know our trees. We can avoid varieties subject to injury due to weather or give them needed protection. We can also avoid needless pampering, so far as insects and diseases are concerned; for no matter how well we care for our own, our neighbor's plants are potential carriers of ailments if neglected. An ambitious nursery salesman with one or two over-stocked items can influence the tree population of any neighborhood for all time, so far as our lives are concerned, providing his clients are sufficiently gullible. The Norway maple, for example, an excellent tree in its place, has been perhaps, as over-planted as barberry, yet its dense shade precludes the possibility of growing grass beneath it. Why not select some of the many flowering trees for our lawns? They cost more, of course; but, after all, we should assume at the start, at least, that we will be living with them for a long time.

The small tree of the present may be the historic landmark of the future, if located where growing conditions are favorable to longevity. Many otherwise logical plantsmen will insist that certain trees are dying of old age. Consider the "Wye Oak" at Wye Mills, recently acquired, with the surrounding land, by the State as a park or, the "Lafayette Oak" at Rising Sun, where the French sympathizer had his camp, or, yet, the enormous Tulip Poplar at Annapolis where Washington resigned his commission and it will be apparent that, given nutrients, trees are capable of a long life span. If further evidence is needed, attention is called to the group of large English elms at "Mount Clare" the home of Charles Carroll of Carrollton in Carroll Park and another English elm at Charles and Mulberry Streets, on the Archbishop's grounds, which appears in old prints of "Belvedere", the colonial estate of Charles Eagar Howard. We should be proud of such splendid products of Maryland soil and interest ourselves in their future welfare.

Children are bound to associate events of their early lives with trees. It is not unusual to encounter someone who is happy to reflect

on such an association. Birds and other animals are attracted by the food and shelter which they afford. We too can utilize them for our own food, shelter and privacy. There is a tree for almost every taste and purpose throughout the year, from the present, when they display their pleasing form, until the fall when they take on their rich, harmonious coloring only rivaled by the finest tapestry or Oriental rug.

Today there is a movement toward the planting of trees as memorials to the dead. The replacing of the cold marble of the tombstone by trees and shrubs imparts a living atmosphere to the cemetery, which becomes a spot of beauty and makes one feel as though the personality of those who have passed to the great beyond are still about us. It makes us feel that there is something after this life in their very presence which imparts to us peace and comfort. Let us learn to live with and for them and we are bound to be benefited.

Someone has said:

"Heaven and earth helps him who plants a tree.
His work its own reward will be."

GALLS FOUND ON THE CANES OF BRAMBLES IN MARYLAND

BY

Martin H Muma and Walter F. Jeffers

Plant galls are abnormal growths resulting from the work of insects, fungi or other organisms. They occur on many different plants and may be found on the roots, stems, foliage, flowers and fruits and seeds. The size, shape and color of a gall depend upon the causal agent, the plant and the part of the plant on which it occurs.

Most plant galls fall into one of the following classes: monothalamous, galls in which the causal agent (usually one or more insect larvae) occurs in a single cavity or cell, and polythalamous, galls in which the larvae occur in two or more cells. Many characteristic names have been applied to galls depending upon their shape and position on the plant. Several of the more descriptive are blister galls, bud galls, bullet galls, leaf galls, leaf spots, oak apples, pouch galls, rosette galls, roots galls and stem galls.

Over 2,000 different plant galls have been recorded from North America. The principal gall makers are, in order of their numbers, the gall wasps (Cynipidae), gall midges (Itonididae) and gall mites (Eriophyidae). These three groups cause more than 80% of the galls now known on this continent. Other gall forming organisms include aphids, other insects, nematodes and fungi.

The adult gall wasps are tiny hymenopterous insects usually an eighth of an inch or less in length. They are wasp or ant-like in ap-

pearance, possessing four wings and a stout avoid abdomen, and are mostly black or reddish brown in color. The larvae or grubs are whitish maggots that may be found inside the completely closed galls. Most of the galls found on oaks are caused by these insects. Many of the gall wasps exhibit life cycles that include alternate generations of winged individuals and agamic or wingless individuals.

The gall midges are small delicate flies that measure one-quarter of an inch or less in length. They have two transparent wings and a more or less elongate abdomen but otherwise vary greatly in structure and color. The maggots or young are usually moderately stout and vary in color from yellow to orange. Many of the maggots can throw themselves an inch or more by curling the two ends of the body together and straightening suddenly. A gall midge may often cause galls on different parts of different plants.

Gall mites are of microscopic size and may be distinguished from other mites by the possession of only four legs and elongate pear-shaped bodies. They occur on many plants some living on leaf surfaces causing dense masses of leaf hairs called erineums while others cause bud and pouch galls.

Aside from the many and varied galls found on the oaks those that occur on the canes of various briars or brambles are probably the most often seen and noted. Bramble canes or stems are commonly infested with several gall insects that cause characteristic enlargements. For several seasons malformations of the canes of blackberry, dewberry and raspeberry in this state have been collected and studied. The several galls recorded are described below along with notes on the causal agents, distribution and host.

The authors wish to express appreciation to Dr. Lewis H. Weld for identifying several batches of reared gall wasps.

Blackberry Knot Gall

This is probably the most common cane gall found in the state. It is a rounded or elongate polythalamous swelling that may vary from one or more separated globular knots to a swollen knotty ridged gall measuring five or six inches in length and one-half to one and one-half inches in width. In the summer and early fall the color varies from green through a greenish red to a deep mahogany. A typical ridged gall often has the ridges red or reddish brown while the creases are green. Old galls turn brown. Figures 3 and 5 show typical and malformed specimens of this gall.

A moderately large gall wasp known technically as Diastrophus nebulosus causes this common gall. The larvae occur in rather widely separated cells and are frequently the hosts of various parasitic insects. Several tiny hymenopterous insects often inhabit the gall as "guests". Birds occasionally eat the larvae after pecking holes in the galls.

Figure 1. Ridged Cane Gall caused by gouty gall beetle.

Figure 3. Blackberry Knot Gall, typical form.

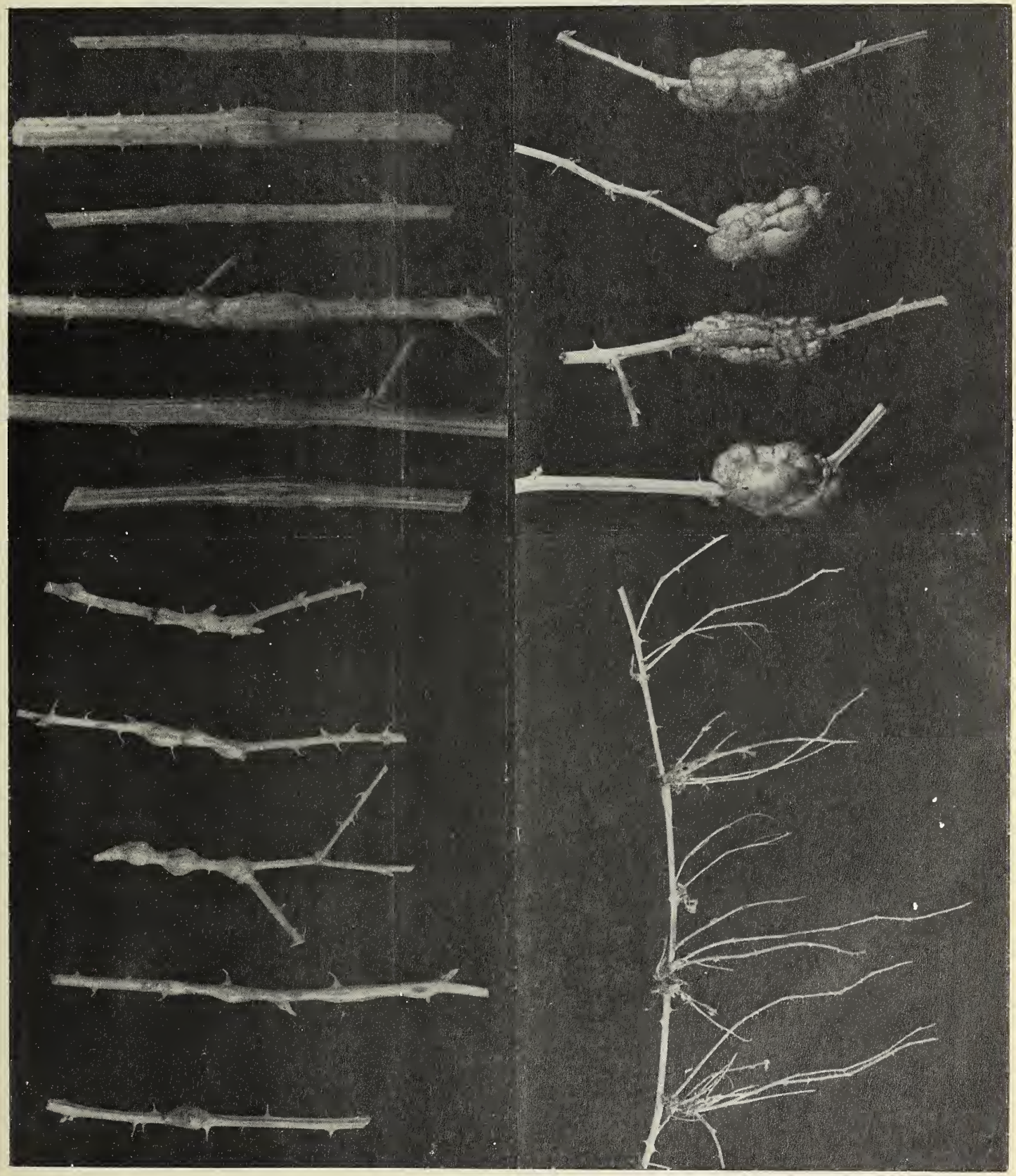


Figure 2. Nodular Stem Gall caused by a gall midge.

Figure 4. Witches Broom caused by a fungus.

The blackberry knot gall has been recorded from the Eastern Shore, the central counties and the western part of the state. It has been seen on tall blackberry, Rubus argutus Link., the highbush blackberry R. alleghensis P. and the sand blackberry R. cuneifolius Pursh.

Bassett's Blackberry Gall

This gall has not been collected by the authors. It is recorded by Dr. L. H. Weld from Glen Echo, Maryland as collected by J. C. Bridwell. It is a more or less globular greenish or reddish swelling that occurs on the roots or stalk at or near the crown.

Diastrophus bassetti Beutm. is the name applied to the wasp causing this gall.

It is recorded from blackberry.

Blackberry Seed Gall

As the common name implies this curious gall consists of clusters of seed-like greenish or reddish galls. The clusters may vary in number from two to many sometimes extending two or more inches along the cane. Each "seed" is prolonged at the distal end into a spine that sometimes is filamentous causing the composite gall to appear hairy. Old galls turn dark brown and the spines are quite brittle. A widely separated form of this composite gall is shown in figure 6.

A single larva of the gall wasp Diastrophus cuscutaeformis O.S. lives in each seed. Like D. nebulosus O.S. this wasp harbors several parasites.

The seed gall has been collected on tall and highbush blackberry in the central and western counties.

Nodular Stem Gall

This small eliptical subcortical gall is nearly as common in the state as the blackberry knot gall. It usually occurs on the small canes or lateral branches. Several elliptical swellings have been found on the ridges of large canes and are believed to be the same gall. The gall is green or reddish green and is easily overlooked due to its small size. Several specimens of this gall are shown in figure 2.

A gall midge known technically as Lasioptera nodulosa Beutm. causes this interesting gall. A single orange larva inhabits each swelling.

The nodular stem gall occurs in all sections of Maryland on tall and highbush blackberry. It has been taken on dewberry, R. baileyianus Britt. in the central counties. On the slender trailing canes of dewberry the gall is more symmetrical than on blackberry. Several specimens were also taken from the sand blackberry on the Eastern Shore.

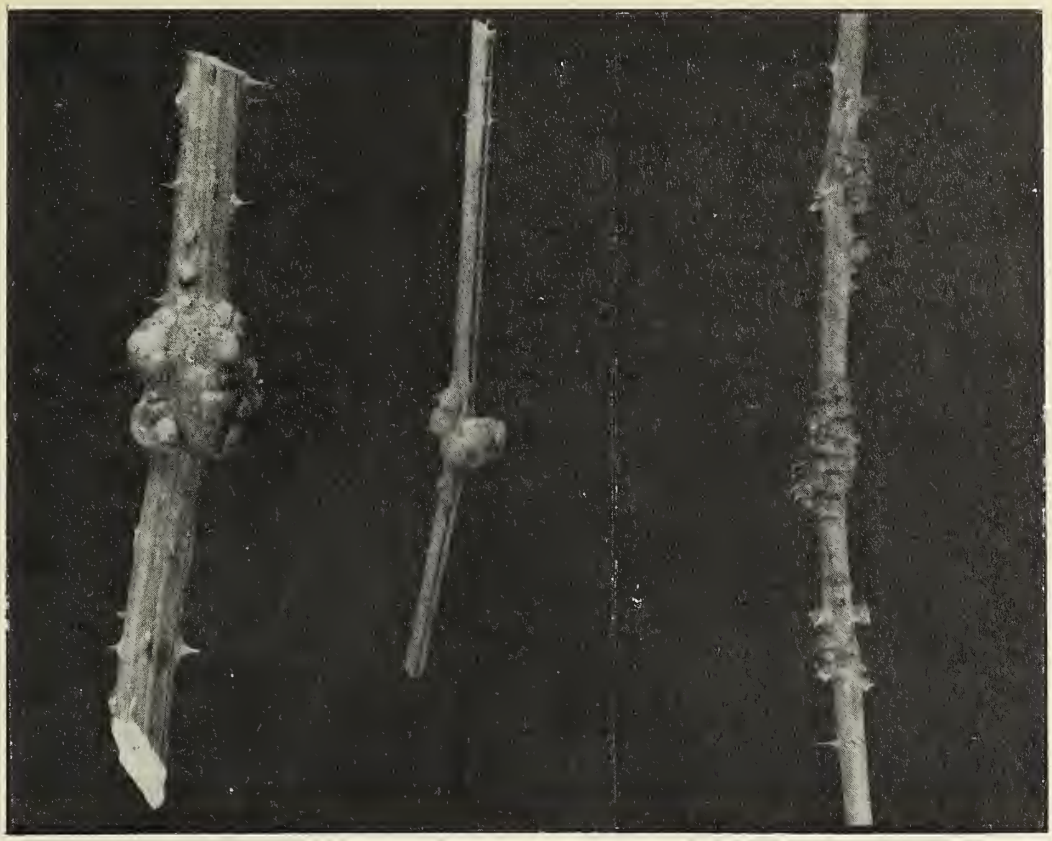


Figure 5. Blackberry Knot Gall, malformed by parasitism.

Figure 6. Blackberry Seed Gall, widely separated form.

Ridged Cane Gall

This gall is an irregular subcortical stem swelling that is easily overlooked. The common name is derived from the fact that the swollen portion of the cane often splits revealing the lighter inner tissues. Canes occasionally break at the position of one of these galls. On large canes the gall is often nearly symmetrical while the small canes exhibit the more irregular forms. Figure 1 shows several typical specimens of this gall.

The gouty gall beetle, Agrilus ruficollis Fabr., is responsible for this gall. One to several larvae live in each gall. They may be found in the sinuate tunnels within the gall.

It occurs commonly on tall and highbush blackberries throughout the state and has been found on dewberry in the central counties and on black raspberry, R. occidentalis L., in the western counties.

Raspberry Cane Gall

A variable stem swelling that appears somewhat like the ridged cane gall is found on raspberry. Unlike the latter, however, this gall is accompanied by girdling of the cane above and below. It has

only been found once in the state and is not believed to be common.

This gall is caused by a beetle known commonly as the raspberry cane girdler, technically as Oberea bimaculata Oliv.

It is recorded only from black raspberry.

Crown Gall

This gall differs from the previously described galls in that it is caused by a bacterium, Pseudomonas tumefaciens (S. and T.) Duggar, whereas the other galls were caused by insects. Other names commonly used to describe crown galls are crown knot, root tumor and black knot. Typical blackberry crown galls consist of tumor-like swellings from one quarter of an inch to two inches in diameter located on the lower stem and roots. The material composing this gall consists of plant tissue which has been stimulated to abnormal growth by action of the bacteria. Sometimes the gall is quite woody while in other cases it may be soft and spongy.

Crown gall is reported to occur commonly on most species of Rubus but the authors were able to find it only on rare occasions. Cultivated raspberries in Western Maryland appear to have a higher percentage of infection with this disease than do the wild raspberries and blackberries.

Witches Broom

Witches broom is caused by a fungus, Fusarium rubi Wint. This organism causes a malformation and twisting of blossoms which is known as double-blossom and stimulates an excessive production of branches. This latter condition is known as witches broom and consists of the production of many slender branches at plant joints. Large bunches of branches may be produced at only one place on a stem or may be produced on several places. (see figure 4.)

Witches broom occurs quite commonly on blackberries but is not known to occur on raspberries.

Curled Tips

Abnormally curled and twisted tips of the black raspberry have been noted. The raspberry leaf aphid, Aphis rubifoliae appeared to be responsible for the condition.

While not a gall in the strictest sense of the word this condition is felt to be worthy of mention here.

MALARIA AND THE MALARIA PARASITE

Michael F. Groves PLM-2c
U.S.S. Lyon

Since our entry into the present war America has become malaria-conscious! Most of today's battlegrounds are in areas where malaria has long been endemic; great numbers of our troops are returning from overseas victims of the disease; newspaper and magazine articles constantly remind the public of the terrible sabotage that it is doing to our war effort and troops in training are flooded with lectures and G.I. literature on preventiveness. The following notes on the disease and its etiological agent, may be of interest. Special emphasis will be placed on the agent --- a microscopic, animal parasite.

Malaria is due to the infection of the red blood cells of a suitable host by a parasitic protozoan of the genus Plasmodium (Class Sporozoa). The mode of transmission is by the bite of an infected, female, Anophilene mosquito. There are a number of species of the genus infecting---beside man---monkeys, goats, buffaloes, squirrels, numerous species of birds and several lizards. Here, we will confine discussion to the forms affecting man: P. falciparum, which causes malignant tertian malaria; P. vivax, the agent of benign tertian malaria and P. malariae, the cause of quartan malaria. A fourth type, P. ovale, is known to infect man, but it has a limited distribution, brings on a very mild infection and is considered clinically unimportant. Of the three important forms, falciparum malaria is the most severe and is some times fatal, but it is claimed to be the easiest to control. Conversely, an infection with malariae is the mildest type, but it is also the most resistant to treatment. Vivax malaria is the most widespread and responds well to routine therapy.

It sometimes happens that more than one species infects a single victim, in which case, the patient is said to have a "mixed infection". The combination most frequently encountered is infection with falciparum and vivax.

The geographical distribution of the malarial parasites is extensive; thus we find vivax with practically a world-wide range from 60°N to 30°S latitudes, being particularly prevalent in coastal areas. Malariae is known from Mediterranean Europe, southern Asia, Africa, the Phillipines, New Guinea, the West Indies, Brazil and the southern United States. Falciparum is common in most tropical countries and southern Europe and it is also found in the extreme southern part of the United States.

The Plasmodia undergo two life cycles: a sexual cycle in the mosquito and an asexual one in man. The life histories of the forms parasitizing man are very similar and an outline of the cycles of P. vivax will suit our purpose.

The asexual cycle begins on the injection of sporozoite forms of

the parasite into the blood stream or subcutaneous tissue of man by the infected mosquito. The sporozoites --- long, slender, worm-like bodies ---undergo some unknown extracellular activity for perhaps a week, at which time they enter the red blood cells and round up into "ring forms". With suitable staining, these "ring forms", or young trophozoites, appear under the microscope in the shape of a signet ring within the blood cell. Within 18 hours, the trophozoites have grown in size and assumed an amoeboid shape: small, brownish pigment granules can be seen in the parasite and, meanwhile, the blood cell has become swollen. After about 36 hours the amoeboid trophozoites have matured; the nuclear chromatin then divides into from eight to sixteen particles and scatters throughout the cytoplasm. These particles form centers about which part of the cytoplasm gathers and the resultant bodies are termed merozoites. After about 48 hours of its life in the blood cell, the organism ruptures liberating the merozoites into the blood stream; these invade new red blood cells and become "ring forms", thus completing the asexual cycle. Malarial symptoms --- chills, fever, etc. ---- occur on the rupture of the cells with consequent liberation of toxic substances into the blood stream; however, several cycles may be completed before the parasites are in sufficient number to cause clinical malaria.

The asexual cycle repeats itself continually, rapidly increasing the concentration of parasites in the blood. After the completion of a number of cycles certain merozoites, instead of becoming "ring forms", develop into sexual forms --- the microgametocytes (males) and macrogametocytes (females). The patient then becomes a carrier of malaria as well as a victim, for it is only the sexual types that can undergo the corresponding cycle in the mosquito.

After a female Anopheles mosquito has taken a blood meal containing gametocyte forms of the parasite, the sexual cycle begins within its body. The ingested male gametocytes develop flagellum-like appengages, which, by lashing about, free themselves from the cell. These structures move about and eventually pierce the female gametocyte, which, meanwhile, has undergone certain nuclear changes. The resulting fertilized cell is the zygote. The latter, with worm-like movements, burrow their way through the wall of the mosquito's stomach, coming to rest just under the outer layer, where, after 3 or 4 days, they encyst. Through repeated subdivision of the nuclear substance, the growing cysts give rise to great numbers of sporozoites (the infective form for man). There may be 10,000 sporozoites in a single cyst and 500 cysts in a single mosquito. After full development, the cysts rupture, delivering the sporozoites into the body cavity of the mosquito; some of these eventually find their way to the salivary glands and then to the hypopharynx, from which point they are introduced into the person bitten.

The sexual cycles of all three types of human malaria probably consumes about the same length of time. The asexual cycles of P. falciparum and P. vivax are completed after 48 hours, but that of P. malariae lasts for 72 hours.

The parasites are fairly easy to demonstrate in blood smears of patients showing clinical malaria and diagnosis depends largely on this demonstration. The finger of the patient is superficially punctured with a small scalpel or other suitable instrument and two drops of blood from the puncture are placed on a microscope slide close to the end. With the end of another slide, the drops are spread evenly over the surface of the first slide and the smear is allowed to dry. Wright's stain (methylene blue in methyl alcohol) is then applied to the smear for one minute, after which time an equal amount of distilled water, buffered to a pH of 7, is poured on and mixed with the stain. This preparation is allowed to stand for four minutes and is then washed off with water. After drying, the stained smear is examined with the oil-immersion lens of the microscope. The red blood cells should be stained a salmon-pink and these are inspected for parasites. This method is in use on this ship, on which the writer is serving as laboratory technician, and has given excellent results. Another method consists of making a much thicker smear (thick-drop method) and staining it with Giemsa's stain; this last has the advantage of making the parasites easier to find, due to the much greater concentration of blood cells, but also has the disadvantages of requiring more time and work and of staining the cells less distinctly, thus making identification of species extremely difficult.

By use of the thin-smear preparation all forms and species of the parasites can be identified. Young trophozoites appear as "signet-rings"---the ringed part (cytoplasm) staining blue and the "signet" (nucleus) appearing as a red dot. Older trophozoites are recognized by their amoeboid or band-shaped cytoplasm containing pigment granules and red nuclei. The fully matured parasites are recognized by the clusters of merozoites contained within the cells. Gametocyte (sexual) forms stain light blue and contain a number of small black dots. The females are somewhat larger than the males. The following points serve in species identification: In vivax and falciparum malaria the infected blood cells are swollen to about one and one half times their normal size; blood cells infected with malariae show no such swelling. As a rule, the "ring forms" of vivax and malariae occur one to a blood cell, whereas falciparum "rings" frequently occur two or three to a single cell. Older trophozoites of malariae appear in the form of bands across the blood cell: those of vivax are seen as sprawling amoeboid forms, while the older forms of falciparum are rarely seen in the peripheral blood and diagnosis must be made from the character of the "rings" or from the gametocytes; these latter are crescent shaped in falciparum. On the basis of these, and a few more technical characters, the doctor or technician can, with a little practice, make very accurate diagnoses of the species of parasite causing the infection.

Falciparum malaria is the only type likely to prove fatal, though the great majority of cases are cured. However, the great harm that this and the other types cause is the long debilitation and frequent complications such as anemia and blackwater fever. Of particular importance to us is the disabling of large numbers of our troops in the combat zones. The writer has seen at first hand the importance of this last. While the ship on which he is stationed, an attack transport,

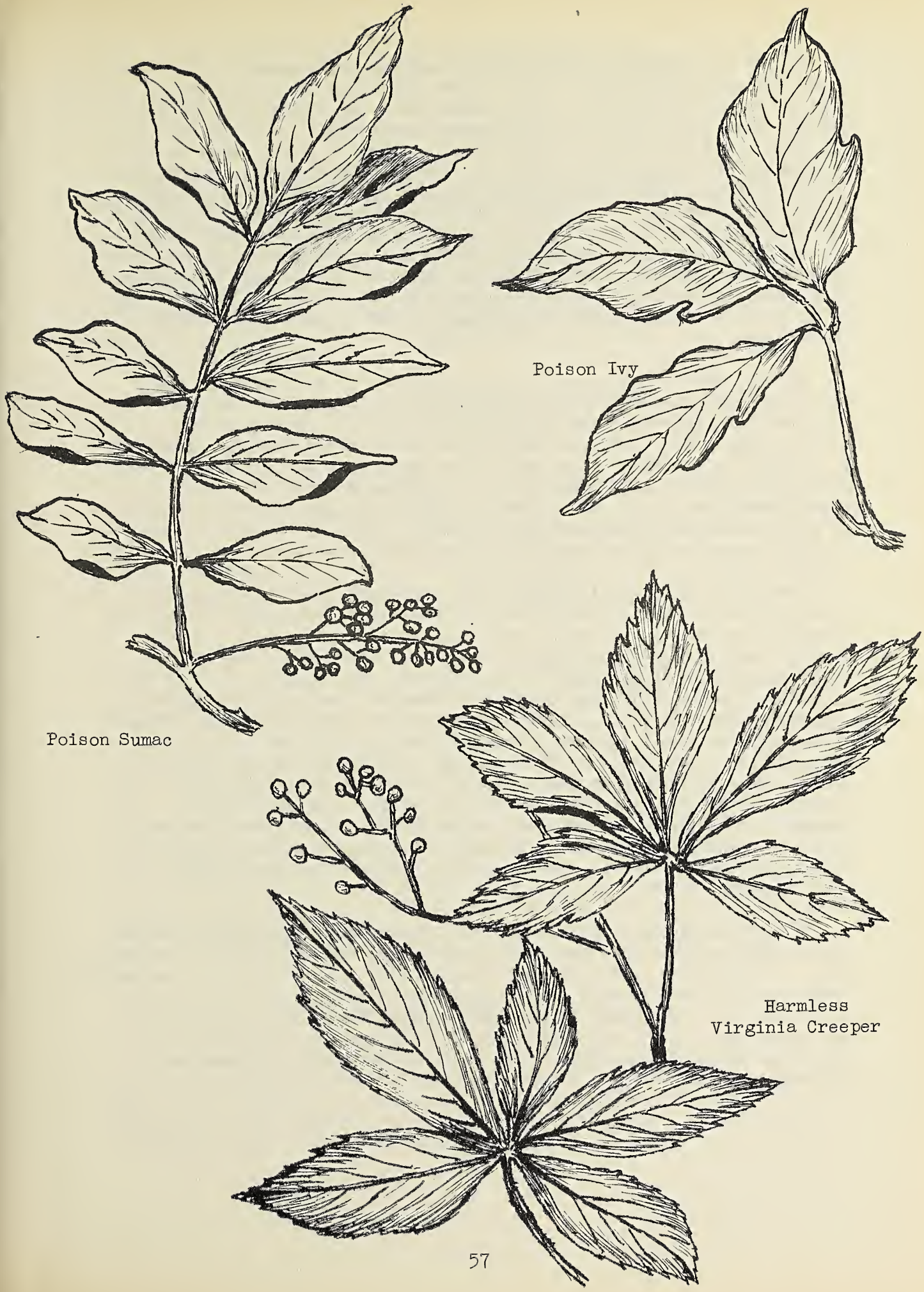
was proceeding toward a beach-head in the invasion of southern France, several soldiers, members of combat teams, were stricken with vivax malaria enroute. This resulted in their absence from and consequent disruption of their teams on D-Day. On subsequent trips to the beach-head with reinforcements for the troops already landed, a number of other men were stricken and had to be evacuated. Another important aspect of the malaria situation is the fact that with the return of infected troops to the United States, a hugh reservoir of infection such as never before.existed will come into being and unless proper and adequate control measures are instituted, this country may have serious malaria outbreaks added to our already long list of post-war problems.

The military authorities, cognizant of the importance of malaria control, had specially trained anti-malaria units in the field soon after our penetration into endemic areas. Army malaria control units and Navy "skeeter-beaters" are doing wonderful work in such regions. Control measures comprise the draining of stagnant pools and swamps or spraying them with oil or insecticide; cutting away of underbrush from the edges of flowing streams and policing of bivouac areas to make certain that no tin cans, pots, etc. are lying about to collect rain water. Such measures are directed against mosquito breeding. Other measures are the protective screening of troops, particularly those known to be infected; prophylactic dosing with atabrine and the education of personnel. Such precautions have undoubtedly kept the disease within reasonable limits. Much of the success in the fight against malaria must be credited to atabrine, the new drug which came to the fore when our quinine supply fell into the hands of the Japanese. Without it, the situation may well have got out of hand. It is to be hoped, that with increasing experience, newer and better control and therapeutic measures will be found, and that existing dangers will be reduced to a minimum.

TROUBLESOME MEMBERS OF THE SUMAC FAMILY

John P. Hill

Maryland's three most annoying poisonous plants are all close relatives. They are representatives of a botanical family which contains over a score of plants having extremely poisonous juices. Members of this family are important articles of commerce in the United States, South America and the Far East. The leaves or shoots of the smooth or staghorn sumac are widely used in leather tanning and processing, and are believed by some users to be more effective and more easily processed than oak bark. The cashew nut, which is grown in the American and Asiatic tropics and is a favorite delicacy of many Americans, is also a member of this family. The nut must be roasted to drive off the poisonous, acrid yellow oil before the nut is edible. A similar oil extracted from the shells was long used by bookbinders in Asia in the treatment of leather to protect it from insects.



Poison Ivy

Poison Sumac

Harmless
Virginia Creeper

All of the members of this family contain a resinous or milky acrid juice, which in poison oak, poison sumac and poison ivy is a vesicant (blister-producing) poison. Any contact with the plant, and it is claimed that even being in the vicinity is a contact, will produce the blisters. All authorities concede that contact with the smoke from the burning plants will effect people who are sensitive to the poison. The effect of this poison is similar to that of the poison gases of war, mustard and Lewisite. Contact of the skin produces blisters varying in size with the size of the droplets of the poison. If these blisters are broken while still containing the poison (often many weeks), the fluid in the blisters will produce new blisters on the surrounding area. Upon first infection the blisters caused by the poison are itching and later cause a burning sensation accompanied by a swelling of the affected parts.

Poison sumac (Rhus vernix) is a shrub five to fifteen feet high, smooth or nearly so, having a compound leaf with seven to thirteen entire leaflets (see accompaning sketch). It is our most poisonous species, and grows in swamps from Maine and Southern Ontario southward to the Gulf of Mexico and as far west as Minnesota and Missouri. The plant blossoms in June, bears fruit in late summer and its leaves turn red in early fall. The wood is soft, pithy and very light. The fruit is a small, greenish-white, drupe or berry. In some localities this plant is known as the poison dogwood or poison elder.

Poison ivy (Rhus toxicodendron) is sub-erect and bushy, scrambling over fences, walls, etc. One variety (radicans) climbs to considerable heights by rootlets, particularly in wooded areas. It begins to blossom in May and June; the flowers are small, fragrant, yellowish-green and arranged in densely clustered spikes. In the fall these develop into smooth, white waxy berries that last through the winter (apparently no wild life will eat them). The leaves are shiny green, short-stemmed, generally entire and oval-pointed. This plant is frequently confused with the Virginia creeper and poison oak. It can be distinguished from the Virginia creeper by the number of leaves to a group - - - three in poison ivy and five in Virginia creeper. Although poison oak and poison ivy are close relatives and both are poisonous, they are separated and distinct species. The poison ivy leaf is entire and the poison oak leaf is conspicuously three to seven lobed.

Poison oak (Rhus quereifolia) is erect and nine to eighteen inches high. The leaflets are broader and more blunt than those of poison ivy and, as previously mentioned, are lobed. They have heavy soft fuzz on the underside and are slightly coarser and more heavily veined than those of poison ivy. The fruit is slightly smaller than that of poison ivy and lacks the smooth waxy appearance. The plant is commonly seen in woods and barrens, and ranges from Southern Maryland southward and southwest.

NOTE ON HIBERNATING SPRING PEEPER

by
Romeo Mansueti

On March 10, 1940, Mr. Irving Hampe pursued a white-footed mouse (Peromyscus) in an area above the railroad tracks between Vineyard and Glenartney, Patapsco State Park, Baltimore County, Maryland, and uncovered two red-backed salamanders, Plethodon cinereus cinereus (Green), and a spring peeper, Hyla crucifer Wied. After uncovering the two salamanders, he placed them in a small tube. When I received them, they were motionless, seemingly unconscious, but after about five minutes in the open air and in the warmth of my hand, they began to wriggle and crawl about.

After uncovering the salamanders, he dug more deeply after the mouse, and uncovered a frog about five inches beneath the soil in a hole. The nearest body of water was about a hundred yards away.

After the peeper was uncovered, it remained in a sluggish state until it had absorbed some heat from my hand. The peeper was collected at about 5:15 P.M. at dusk; the temperature was about 39 degrees F. Undoubtly the specimen had been awakened from its hibernation. In a cabin, in that same vicinity, it appeared dazed. When it jumped from my hands it fell in an awkward manner. After a few hours, however, it became quite agile and could leap almost two feet.

The specimen was an adult female, $1\frac{1}{4}$ inches in length, and 11/16 of an inch in width at the widest point of the body, indicating that its stoutness was caused by eggs. The ventral surface color was as follows: the abdomen was an immaculate white, the lower hind and front limbs were colored pinkish, the throat was pinkish white, and the dorsal surface was whitish. In a terrarium after a few hours of confinement, the ground color became a light reddish, approaching a tan and pink. The eye was black, bordered with orange, and from eye to eye, curving backward, was a line which superficiously resembled a triangle. This line was thickened at the middle to form this triangular-shaped mark. The tympanum was slightly smaller than the eye. There was an oblique cross on the dorsal area, and on each side of the cross were two brown markings, while an inverted V shaped mark was found above the anus on the back. The posterior limbs were banded with brown bands, while other brown blotches and bands were on the small front limbs.

MARYLAND ORNITHOLOGICAL SOCIETY

The above Society will resume its meetings on Friday, September 14th. A program of lectures, movies and bird walks are held each month. The program will be mailed to those applying for same. If interested, address Mr. Irving E. Hampe, c/o Natural History Society of Maryland, 2103 Bolton St., Baltimore 17, Maryland.

GIFTS TO THE SOCIETY

During the past year, the Society has received some very fine gifts. We want here to express our thanks and appreciation to our members and friends for remembering us.

Mr. William H. Brown presented us with all his nature books and a collection of lantern slides of reptiles. The books cover birds, insects plants and reptiles.

A collection of 150 lantern slides of birds were presented to us by Mr. J. Hammond Brown.

Many books and pamphlets on plant life were received from Mr. J. Hollis Howe, City Forester. Among the collection was quite a number of New York State Museum Reports.

Mr. Karl E. Pfeiffer, our Assistant State Forester, contributed many books, phamplets and maps on forestry and trees.

A collection of 182 preserved spiders was presented to us by Dr. Martin H. Muma. A catalogue of all the data and notes accompanied the collection.

LECTURES AT THE SOCIETY DURING APRIL, MAY AND JUNE, 1945

April 17 - Sound motion pictures "Oil of Peru" and "Road to Tomorrow".
24 - Lecture by Irving E. Hampe "The Migration of Birds".

May 15 - Lecture by Dr. Martin H. Muma "Some Biological Notes on Several Common Spiders".

22 - Lecture by George Maugans "Legend of the Serpent".

29 - Sound motion pictures "Africa, North of the Sahara" and "The East Indian Islands".

June 5 - Lecture by Joseph Bures "Audubon, the Artist".

12 - Sound Motion Pictures "Mystic India" and "Bali and Hawaii".

JUNIOR DIVISION MEETINGS

May 5 - Sound Motion pictures "Rail Birds" and "The Life History of the Muskrat and its Uses".

12 - Lecture by Irving E. Hampe "Migration of Birds".

19 - Lecture by Charles Brack. Continuation of the Photographic Course, "Paper, Films and Filters".

26 - Talk by Richard Whittington "Black Bass".

June 9 and 23 - Lectures by Charles Brack on "Photography"

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In course of preparation -- Annotated List of Maryland Birds

Prices listed above effective July 1, 1945.

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MARYLAND

A JOURNAL OF NATURAL HISTORY

The Natural History Society of Maryland

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MARYLAND

A JOURNAL OF NATURAL HISTORY

OCTOBER

October's days are bright and gay
And clothed with colors rare.
The leaves once young and green in May
Come sweeping through the air.

Alight and swirl and twist around
Until they come to rest.
In colored patterns on the ground
O'er burrow, den and nest.

A thousand shades of browns and reds
And many yellows too,
Lie heaped in autumn's leafen beds
Until October's through.

Martin H. Muma

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OCTOBER 1945
A DOLLAR A YEAR

WORMSEED PLANT
Chenopodium ambrosioides L.
Var. anthelimticum Gray

WORMSEED

CHENOPODIUM AMBROSIOIDES L.-Var., ANTHELMINTICIUM, GRAY

Earl H. Palmer

Maryland, with its geographical and climatical location, has proved itself of great scientific interest. From the seashore on the East to the mountains on the West one gets a cross section of animal and plant life that is hard to rival. The swamps of the Potomac River yield many forms of life that are typical of warmer climates while along its northern boundary one finds the fauna and flora of our more northernly neighbors. Even in its industrial life, Maryland is quite unusual -- ranging from boat building to mining, from fishing to farming, and one of its most unusual and little known crops is "Wormseed Oil."

As the cold breath of winter gradually leaves the soil, the farmers of Carroll County begin to think in terms of one of their large financial crops, Wormseed. Late in the month of February, while the frost is still in the ground you will frequently see the "tiller of the soil" walking along his fence rows and new ground. It is here that the seed bed for the Chenopodium ambrosioides will be prepared. Once the place has been selected, the ground is burned over, manure spread, and shallow cultivation begun. This is followed very soon by the sowing of the seed, (two tablespoons to a 100 square feet). The seed bed is very seldom worked because the burning has killed most of the weeds and weed seeds that might be present. The farmer will, however, carefully hoe the ground to keep it loose.

Early in June when the plants are between six and eight inches high the laborious job of transplanting begins. The seedlings are carefully pulled from the ground so as not to injure the tiny root structure. They are then transplanted in the fields that have been prepared, placing them in rows about three feet apart with each plant about fourteen inches in the rows. Generally this field is composed of Manor loam soil or else Manor gravel loam. These types of soil are rather stony, being composed of sharp edged quartz and schist, making for excellent drainage which seems to be so necessary to the hearty growth of the wormseed plant. In color, the soil is generally yellowish brown, and is high in potash.

Looking out across the fields in this section of Carroll County, the rolling hills seem to stretch in an unending march toward the blue veiled ridges of the mountains beyond. Here and there in the many valleys and on hilltops are to be seen various shades of green of the summer foliage silhouetted against the blue of the sky and the brown of the freshly plowed fields. It is in this picturesque setting that ninety-five per cent of the world's crop of wormseed oil is grown. The remaining five per cent is grown in the States of Michigan, Washington and South Carolina. In many states of the Union this Chenopodium grows wild, but produces little oil. Some attempts are being made to produce wormseed in Brazil, but at the present time its success seems to be negligible.

Unloading Shed of a Worm Seed Distillery

Fig. 1. Plant of Carroll County Essential Oil Co

After the seedlings are transplanted, the farmers are at the mercy of the elements. An abundance of moisture just prior to transplanting and shortly thereafter is, in the vernacular of the farmer, a "Season." Moisture at this time is vitally important to the tender root structure of the young seedlings. However, once the plant has taken hold of the ground and new shoots begin to appear, the farmer wishes for less rain and more sunshine. A maximum of sunshine is important and a minimum of rainfall as it helps lessen cultivation, and more important, it increases the oil content of the plant. It is necessary to make frequent cultivations of the field to keep weeds down. This is generally done by means of shallow plowing. However, when the plants reach about twelve inches in height and begin to spread out and become bush-like it is necessary to do this cultivation by hand. This is a very laborious task, especially when a farmer plants five to twenty-five acres.

It is also necessary to fertilize the soil rather heavily, the rate of application being from five hundred to one thousand pounds of fertilizer per acre. Most of the farmers use a 3-12-6 or else a 2-9-5 fertilizer (nitrogen - phosphate - potash); however, a 4-8-4 produces better results. The heavy use of fertilizer is necessary because the plant is "hard on the soil" since it draws out most of the moisture, thus seriously depleting the plant nutrients. This is evidenced by the fact that fall plantings of cereal crops do poorly in soil that has been used previously for the growth of wormseed.

The fully grown plant is glabrous or slightly glandular-pubescent. It is green in color, strong scented, with an erect angularly-grooved stem. The mature plant will measure two to three and a half feet high. The leaves are ovate to lanceolate, generally acute at the apex, strongly toothed, petioled, undulate and rather numerous on the upper reaches of the stem. The flowers are white, small, densely axillary on the often leafy spikes. The calyx is three parted, completely enclosing the fruit.

In the month of October, as the air becomes snappy with the first tinge of fall and the leaves take on their painted colors the harvesting of this peculiar crop begins. At this time of the year the plants are tinged with yellow and the seeds are seventy-five per cent matured. It is then that the laborious task of harvesting the crop begins. The farmer and his helpers, frequently the entire family, armed with straight edged corn cutters begin to move across the field cutting the woody stemed plant by hand. The use of machinery is impractical because the fully matured black seeds are easily shattered by rough handling. The cut Chenopodium is then left to dry in the field. It is at this time that the farmer hopes for dry sunny days because a spell of rain will cause the plant to become moldy, and will affect the quality of the oil. Dry plants produce fine quality oil; rain, fog, and damp weather makes for poor quality and quantity of "wormseed oil." After drying in the autumn sun, approximately one week, the crop is hauled directly to the wormseed distillery. The manual labor of the farmer is now done and machinery comes into play.

At the distillery (see figure 1) the volatile oil, known com-

Fig. 2 Wormseed in distillation kettle

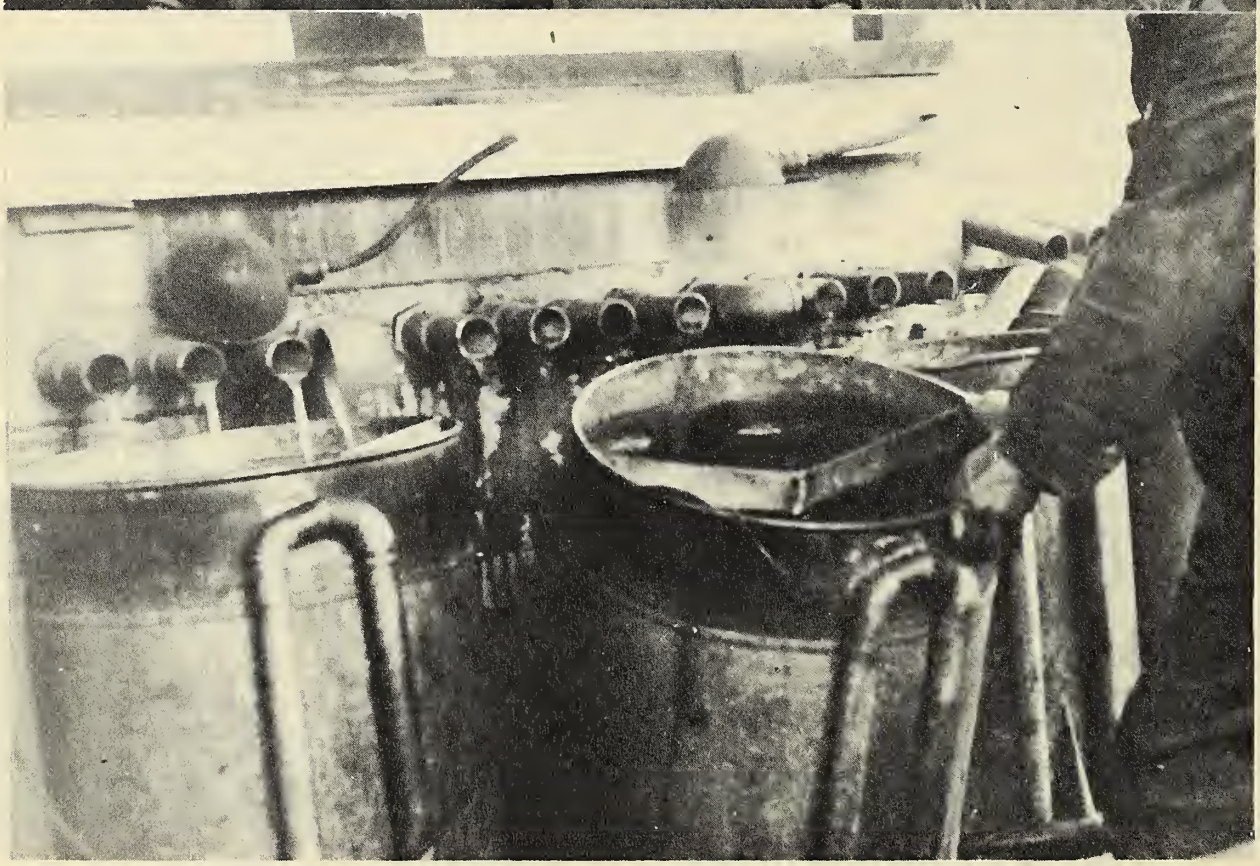

Fig. 3 Condensate Being Collected in Florentine Flasks

mercially by one of three names "Baltimore Oil", "Chenopodium Oil" or "Wormseed Oil", is abstracted. The entire herb, minus roots, is placed in huge iron kettles holding two hundred to four hundred pounds of the dried plant (see figure 2). Live steam, under ninety to one hundred pounds pressure, is forced through the bottom of the kettle for fifteen to thirty minutes. The vapor thus formed is condensed through twenty-five to forty feet of iron pipe, cooled by water from a neighboring stream usually dammed for the purpose. (This cooling bath must not be too cold-55°to 65° F. is best.) The condensate is collected in fifty gallon Florentine flasks, and since the oil is lighter than the water it floats on top thus allowing the waste water to be drained off the bottom (see figure 3). The oil thus collected is placed in suitable receptacles while the waste water is redistilled by steam siphon. This double distillation method recovers oil of a higher percentage than the original condensate contained. The value of the wormseed oil is measured by the percentage of ascaridole (the active ingredient) present. In the distillation of three thousand six hundred and ninety pounds of herb forty-four pounds of oil were recovered with a sixty-five per cent ascaridole. The distillation of the waste water recovered seven pounds of oil with eighty-five per cent of ascaridole present.

Back in 1860 the Shipley's of Carroll County grew, distilled, and carried to Baltimore "Oil of Wormseed" which was sold to a local drug concern. This oil was crudely distilled in an open field. The plants were put in large iron kettles with a fire underneath and enough water to keep the plants from burning. This was then covered over with corn stalks to keep too much steam from escaping. After several hours of boiling the fires were allowed to die down, the plant was removed and the droplets of oil skimmed from the water by hand. It was not until many years later (1912-15) that steam distillation was used. In 1919 the first steam distillery was built in Woodbine and operated under the name of "Growers Distilling Co." Later, this company was reorganized and is still operating as "The Carroll County Essential Oil Company."

There are two general types of wormseed plants in the "wormseed oil district" of Maryland. Type "A" is larger, greener, and with more erect branches than type "B" which is smaller, and has a reddish stem. Type "A" has longer flower buds, flowers and seeds than type "B" which is wider in these three characteristics. Weiland, Broughton, and Metzger (1) performed a series of experiments in order to determine which portions of the wormseed plant produce the most oil as well as to find out whether type "A" or type "B" was more productive. The results of their findings are shown in the table below:-

Type of Plant "A" No. of Plants 3 Parts of Plants	Wt. of Material Grams	Plant Material (Percent)	Ascaridole (Percent)	Total Ascaridole (Grams)
Seed stems - - - - -	24	4.7	0.25	0.06
Leaves - - - - - - -	33	6.4	0.52	0.17
Fruit (Seed) - - - -	236	45.9	1.08	2.55
Stalk - - - - - - -	221	43.0	0.03	0.06
Total - - - - - -	514			2.84

Type of Plant "B" No. of Plants 4 Parts of Plants	Wt. of Material Grams	Plant Material (Percent)	Ascaridole (Percent)	Total Ascaridole (Grams)
Seed stems - - - - - - - -	8	7.5	0.27	0.02
Leaves - - - - - - - - - -	2	1.9	0.52	0.01
Fruit (seed) - - - - - - -	57	53.2	1.12	0.64
Stalk - - - - - - - - - -	40	37.4	0.03	0.01
Total - - - - - - - - -	107			0.68

An analysis of this table indicates that type "B" is higher in oil content than "A". It further shows us that the seeds and leaves produce more oil than any other portion of the plant.

The Chenopodium oil is prescribed by doctors as a cure for hook worms and other intestinal parasites in man and beast; however, it is of little value to sheep, cattle, or poultry. The shattered seed that falls on the distillery floor is mixed with feed and used as a vermifuge for domesticated animals. During World War I, when there was a shortage of thymol, a constituent of Wormseed oil, the oil was broken down in the scarcity of this drug was thereby partially eliminated. The spent herb, after distillation, is frequently used as live stock feed while it is still warm. Once allowed to dry the plants seem to loose their appeal to the animals.

The University of Maryland conducted an experiment which showed that only by quick-drying out of the herb after distillation, will the live stock continue to feed upon it. However, none of the distilleries are equipped for this purpose; therefore, the spent herb is discarded in hugh piles or else reloaded on the farmer's wagon. It is hauled to the field where it is spread and allowed to stand during the ensuing winter. In the spring, these fields are then plowed and the wormseed plant helps to make the soil more arable and light. An analysis made of the spent herb by the University of Maryland indicates a rather high nitrogen content which is of value to the spent soil. The high percentage of crude protein present indicates the herb's value as an ingredient for livestock feed.

Feed Analysis	Percent	Fertilizer Analysis	Percent
Moisture - - - - - - - - - -	7.61	Moisture	7.61
Ash - - - - - - - - - - - -	13.42	Ash	13.42
Crude Protein - - - - - - -	12.75	Phosphorus as P_2O_5	.36
Crude fat - - - - - - - - -	3.78	Calcium as CaO	3.86
Fiber - - - - - - - - - - -	30.00	Magnesium as MgO	.14
Nitrogen free extract - - -	32.44	Potassium as K_2O	.34
		Nitrogen as N_2	2.04

There are many legends concerning Wormseed Oil. The Digger, Navajos, Utahs, Pueblo and Zuni Indians, so we are told, knew about the

Enlarged spike of Wormseed Plant showing minute white flowers.

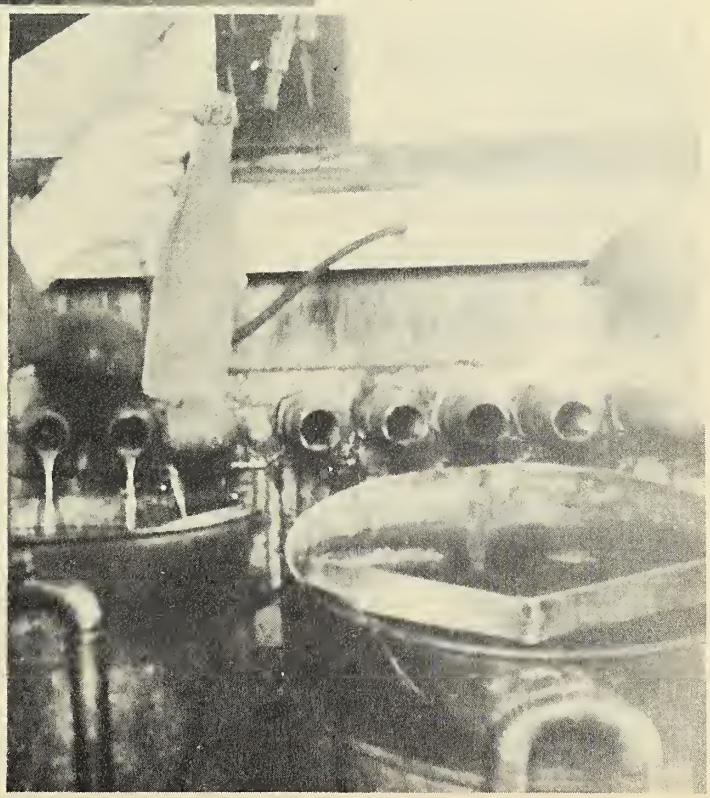

Fig. 4
Checking specific gravity of Wormseed Oil

worm removing qualities of this plant before the white settlers came to America. They brewed a tea from the plant in the fall of the year, which they took as medicine when the need arose. This same custom has carried over to within the life span of many of the older inhabitants of the country and backwoods. Paul C. Standley states that the natives of Columbia brew "baico" from the Chenopodium which they use as a remedy for "tropical anemia."

It has been further stated that during the era of clipper ships much of the wood used in the construction of these fine boats was treated with Chenopodium oil as a preservative against the ravages of tropical insects. (I have been unable to find definite proof for this statement.) It has been claimed, however, that insect eggs deposited on wood treated with this oil are incapable of hatching.

Today, the center of the wormseed industry is at Woodbine,Carroll County, Maryland. It extends from this point over an area of approximately forty miles in diameter and takes in the northern portions of Howard and Montgomery Counties as well as the eastern portion of Frederick County. This area produces nearly all of the 50,000 pounds of oil required for world consumption. There are many small distilleries located throughout this area, but the largest and most scientifically developed is at Woodbine.

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ROBINSON C. WATTERS

On April 19, the Society lost one of its friends and oldest members, Mr. Robinson C. Watters.

Mr. Watters traveled a good deal in America and abroad. At one

time he attended a school in Hanover, Germany. He was a lover of nature and an ardent student of bird life, and cooperated with our department of ornithology, turning over all his notes on his bird observations.

During his life Mr. Watters was a member of the Maryland National Guard and tried to join up with the regular army at the time of our entry into the war with Spain. Later on he became Post Commander of the Department of Maryland United Spanish War Veterans and also Corresponding Secretary of the National Body of the same veterans. Owing to poor eyesight, he was rejected for overseas duty in World War I, but was finally accepted by the Maryland Council of Defense and was made a Sergeant of Company G, 2nd Regiment of Infantry. Toward the close of the war he was commissioned 1st Lieutenant of the temporary War College, Johns Hopkins University. After the war he was made Honorary Captain of the American Legion.

Mr. Watters was born in Baltimore and was the son of William W. Watters of the firm of Armstrong - Cator Co. At one time he was editor of the Fidelity Journal of Baltimore. Later on he made his home in Cambridge, Dorchester County, Maryland.

In his will, Mr. Watters bequeathed to the Society his entire ornithological library of 150 books, his pictures and some specimens of birds and mammals. Among his books is a miniature set of Audubons Birds of America and three sets of Wilson.

He was a member of many historical and scientific societies, among which are the Sons of the American Revolution and the Maryland Historical Society.

He was a most genial, courteous and enthusiastic gentleman of the old school. His sister, Mrs. Morrison, and a brother, Sidney Watters, survive him.

AN UNSPOTTED RED SALAMANDER

J. A. Fowler

The Red Salamander, Pseudotriton ruber ruber (Sonnini), is one of the commonest of the tailed amphibians in Maryland. This species is of statewide occurrence and is,typically,found in and around springs and spring-fed streams, although also found in other situations, such as under logs or boards in wet meadows. The usual coloration of this salamander is a coral-red on the back with lighter pink on the lower sides and belly. Scattered over the back of the head, body and tail are many small black spots which frequently tend to fuse together. With increasing age the color gradually becomes darker, often assuming an almost purplish-brown hue.

So far as dorsal spots in this species are concerned, there is considerable variation. Thus Fowler (1906, Amphibians and Reptiles of New Jersey, p. 72) indicates that in some specimens these spots are "large and blotched while in others they may be finely punctate or absent altogether."

For a number of years the writer has been engaged in collecting and studying the herpetofauna of Maryland and the District of Columbia with particular reference to salamanders. During this time hundreds of red salamanders have been observed and collected. None of these, however, lacked the dorsal black spots although there was some variation in this respect. On March 21, 1943, while collecting from a spring at the mouth of a small tributary to the Chesapeake and Ohio Canal near Watts Branch in Montgomery County, Maryland, one specimen in a series of red salamanders secured from this spring completely lacked the characteristic blue-black dorsal spots. A description of this specimen from life follows:

> Entirely lacks characteristic blue-black pigment spots; ground color obscured by a suffusion of grayish-black pigment such as ordinarily lies between the dorsal spots in typically marked specimens. Between this suffusion of pigment, where there are breaks or clear regions, traces of the underlying pinkish pigmentation show through. The grayish-black suffused pigmentation extends over the sides and on to the dorsal surface of the limbs. Posterior to the level of the vent this stippling becomes minute, while the extreme tip of the tail is almost devoid of this darker color (possibly because of regeneration of the tail tip). Ventrally the skin is immaculate and flesh-colored, except for a few small flecks of black on the lips of the vent and the edge of the lower jaw. This ventral surface is quite transluscent and there is a suggestion of the underlying organs, particularly the heart and the liver. The ground color, as compared with normal specimens, is not so brightly coral-red being more of a salmon color and thus suggesting more nearly the color of the purple salamander, Gyrinophilus porphyriticus.

THE INCUBATION PERIODS OF SOME BIRDS AT BALTIMORE

Harvey Brackbill

In the determination of birds' incubation periods opportunity and luck so greatly outweigh patience and will that there are not too many closely calculated figures on record. A few observations that I have made in Baltimore are therefore given here; some of these are not as precise as could be wished, but they at least fix the periods within very narrow limits. All of the times given are Eastern Standard.

KILLDEER (Charadrius vociferus) --One observation: about 25 days.

Set of four eggs completed April 4, 1939, before 4:37 p.m., hatched between 5 p.m. on April 28 and 3:50 p.m. on April 29. The nesting was on a stony slope in Hanlon Park.

ROBIN (Turdus migratorius)--Two observations: from a few hours more, to a few hours less, than 12 days.

Third of four marked eggs, laid July 6, 1943, between 12:01 and 12:27 p.m., hatched July 28 between 6:39 and 7:18 a.m.; maximum possible period 11 days 19 hours 17 minutes. Hanlon Park vicinity.

Third of three marked eggs, laid May 12, 1945, at 11:30 a.m., hatched May 24 between 1:19 and 3:04 p.m.; minimum possible period 12 days 1 hour 49 minutes. Hillsdale Park.

WOOD THRUSH (Hylocichla mustelina)--Six observations: 12 1/3 to perhaps 13 days.

Third of four marked eggs, laid May 17, 1943, between 9:29 and 11:14 a.m., hatched May 29 between 5:05 a.m. and 5:42 p.m.; maximum possible period 12 days 8 hours 13 minutes. Hanlon Park vicinity.

Third of three marked eggs, laid June 4, 1943, between 6:56 a.m. and 7:17 p.m., hatched between 7:38 p.m. on June 16 and 6:27 a.m. on June 17; maximum possible period 12 days 23 hours 31 minutes. Hanlon Park vicinity.

In my experience, the last egg of this species' clutches usually hatches at night. This makes precise determination of the incubation period very difficult, but at the same time indicates a normal period within the range that I have shown.

COWBIRD (Molothrus ater)--One observation: about 11 1/3 days.

Egg laid May 18, 1944, before 8:48 a.m., in Wood Thrush nest and incubated steadily. Hatched May 29 at 1:25 p.m. Hanlon Park vicinity.

SONG SPARROW (Melospiza melodia)--One observation: between 13 days and 13 days 10 1/2 hours.

Third of three marked eggs, laid May 15, 1945, between 4:53 and 5:27 a.m., hatched on May 28 between 5:20 a.m. and 3:46 p.m. Howard Park section.

ADDITIONAL HARVESTMEN RECORDS FROM MARYLAND

by

MARTIN H. MUMA

A preliminary list of Phalangida or harvestmen found in Maryland was given in the January, 1944 issue of this Journal. Since that time additional collections have added a large number of records. These records have increased to fourteen the total number of species found in the state. The added species with additional records for those previously listed are given below. Only one record of the species in each county is included. Unless otherwise stated collections were made by the author. All identifications were made by Dr. and Mrs. C. M. Goodnight of the American Museum of Natural History, New York City.

Family Phalangodidae

Phalangodes acanthina Crosby and Bishop

Records: In addition to further collections from Prince Georges County one specimen of this small harvestman was taken in John Friend's Cave near Sang Run, Maryland by J. A. Fowler.

Ecology: With the exception of the one specimen taken from a cave all specimens of this species in the state have been sifted from leaf mold.

Family Phalangiidae

Leiobunum crassipalpe Banks

Records: 4 specimens from Berwyn; ; specimen, Cranberry; 3 specimens, Sparks; 2 specimens, Keedysville; 1 specimen, Princess Anne; 6 specimens, Atholton.

Ecology: All specimens of this harvestman have been collected on trees at dusk or under litter and bark during the daytime.

Leiobunum formosum (Wood)

Records: 6 specimens from Berwyn; 5 specimens, Churchhill.

Ecology: All specimens were taken under boards or logs during the daytime.

Leiobunum longipes Weed

Records: 1 specimen from Berwyn; 1 specimen, John Friend's Cave, Sang Run by James A. Fowler; 3 specimens, Sand Cave, near Loch Lynn by James A. Fowler and M. H. Muma.

Ecology: The specimens taken from caves were collected in the twilight zone. The Berwyn specimen was a female and was taken by sweeping open woodland.

Leiobunum politum Weed

Records: 1 specimen from the entrance of Athey's Cave near Rush; 4 specimens, Cranberry; 1 specimen, Berwyn.

Ecology: This species has been taken in caves, under stones and in houses.

Leiobunum uxorium Crosby and Bishop

Records: 2 specimens from Cumberland; 3 specimens, Swallow Falls State Park; 1 specimen, College Park by Walter F. Jeffers; 9 specimens, Berwyn.

Ecology: This species has been taken on trees at dusk and by sweeping during the daytime.

Leiobunum ventricosum Wood

Records: 3 specimens from Cumberland.

Ecology: This species was collected on trees during the daytime.

A HIBERNATING WATER SNAKE

S. A. Fowler

On March 21, 1943, in the same spring from which an unspotted red salamander was also taken, a hibernating Common Water Snake, Natrix s. sipedon, was found.

This spring, at the mouth of a small tributary of the C & O Canal near Watts Branch, Montgomery County, Maryland, flowed from the hillside slope adjacent to the main stream. Both the spring and its outlet were almost completely obscured by a deep covering of leaves. Removal of these leaves revealed a considerable flow of water from the spring.This spring originated as a series of trickles pouring out from beneath an overhanging outcrop of rock.

Upon digging out the head of the spring, a medium-sized N. s. sipedon was seen tightly wedged into a crevice in the out-cropping rock from under which the water flowed. This snake was quite torpid and moved only slightly when disturbed. Presumably this snake had been hibernating in this spring all winter where the deep layers of leaves and constant temperature of the spring water protected it from freezing.

J. A. Fowler

TWO RECORDS OF SALAMANDER MONSTROSITIES FROM MARYLAND

Elias Cohen

On February 16, 1941, the writer collected an adult Desmognathus fuscus fuscus from the cold water flowing through a deserted chrome mine at Bare Hills, Baltimore County.

Close examination of that specimen (sex undetermined) reveals that from the right parasagittal plane of the tail, 15 mm. from the base of the tail, another tail 10 mm. in length has been developed.

The additional tail is heavily pigmented on its dorsal surface and it is laterally compressed, as is its "parent" caudal member.

Another salamander, collected November 8, 1941, from the same locality and habitat, is just as unusual anatomically. Its sex is undetermined, but it is an adult Eurycea bislineata bislineata.

From the postaxial plane, at the distal end of the "femur" of the right hind limb, a perfectly formed leg, 5 mm. long, has been developed.

Both salamanders were under observation in captivity. Their locomation was not inhibited by their extra morphology.

The two specimens have been preserved in herpetological collections of the Natural History Society of Maryland.

THE ICELAND GULL IN MARYLAND

Irving E. Hampe

On February 18 1945, the writer and Mr. Gilbert Klingel were observing Ring-billed and Herring Gulls at the Matapeake Ferry landing on Kent Island, Maryland. A pure white gull landed at the water's edge about 100 feet from where we stood. For fully twenty minutes we carefully watched this gull feeding amid a group of both Herring and Ring-billed Gulls. It was somewhat smaller than the Herring Gull and much slimmer. When it took flight it was more buoyant and graceful. Its bill was about the same length as that of the Ring-billed Gull. We both identified it as the Iceland Gull.

Mr. Ray J. Beasley accompanied the writer to Matapeake on February 25 1945 to look for the Iceland Gull. About a half hour before we left the gull put in its appearance and we were able to observe it in good light at distances varying from 100 yds. to 200 yds. At rest or in flight, its plumage, size, and buoyant flight set it apart from the other gulls.

With the exception of a questionable record by Kirkwood (1895), the Iceland Gull has never been recorded from Maryland. Its occurrence is not surprising as this species has been recorded as far south as North Carolina.

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THE LESSER SCAUP IN MARYLAND IN LATE SUMMER

On August 26, 1945 I observed a male Lesser Scaup Duck on the Severn River at Annapolis, Maryland. The bird was in the eclipse plumage. When first observed it was sitting on a board at the edge of the water. It allowed me to approach within six feet before it took to the water and swam away. Late the same afternoon, the bird was discovered in the same spot.

Wildfowl occasionally are found during the summer in what is normally their wintering area. Due to gunshot wounds, or other reasons they are unable to join the migrating flocks.

Another observation of this type was made on July 12, 1939 when Haven Kolb and I found a male Ruddy Duck on the Patapsco River marsh near the Hanover Street bridge.

Irving E. Hampe

BOOK REVIEW

THE REPTILES OF MARYLAND AND THE DISTRICT OF COLUMBIA

By Robert H. McCauley, Jr., Published by the Author, Hagerstown, Maryland, 1945. 194 Pp., 46 Maps, 48 Photographs. Paper $2.50

A most welcome contribution to the ever-increasing publications on the fauna of the Middle Atlantic states is this very detailed, complete and authoritative book on the lizards, snakes and turtles of Maryland and the District of Columbia. Both amateur and professional naturalists will hail this easily read and interesting account of cold-blooded animals. It seems strange that until now no full treatment of the reptile fauna has appeared of such an area as Washington and Maryland, where the center of biological activity in the whole of the United States began and is still carried on. The most successful contribution to the study of herpetology in this area has been Dr. Howard A. Kelly's "Snakes of Maryland", but Dr. McCauley's account of serpents, lizards and turtles treated in an exhaustive manner will be looked upon for years to come as the standard State reptile survey. The neighboring states of Virginia, West Virginia, Pennsylvania and Delaware will do well to refer to it because state lines are merely artificial barriers in the distribution of reptiles and these states have no publications to compare with its usefulness and information.

This work begins with a most interesting historical account of reptilian observation from the writings of Captain John Smith in 1607, through Cope, Kelly and up to today's herpetological investigations in the Maryland area. Maryland's physiography, topography, climate and life zones are treated in great detail. A wealth of original information is imparted in the account of the life zones with their relations to reptiles, and the distribution of each species is explained fully with a discussion of the species' affinity to each particular biotic zone in Maryland.

A total of 44 species is recognized in Maryland: of these 6 species are lizards, 26 species are snakes and 12 forms are turtles. Nomenclature follows the 5th edition of the "Check List of North American Amphibians and Reptiles" by Stejneger and Barbour. The coal skink, Eumeces anthracinus, which Dr. McCauley has shown in Copeia to be falsely recorded from Maryland, is included in the account on lizards, the specimens really being from Georgia.

Unfortunately, the common names used are selected according to the most common usage, and not to the most applicable and descriptive, such as the field of ornithology enjoys. Several professional herpetologists have endeavored to stabilize the common names of herpetological creatures, and have urged the local investigators to more or less standardize the popular names to simplify the identification of each form. If anything will interest the layman more than the reptile itself, it will be the popular name. Perhaps the next check list of North American herpetofauna will have a common name for each species listed - then local students will "spread the gospel" for the benefit

of American zoology. Common names are only used once (under the account of each form) and do not accompany the technical names under the life zone discussion, maps, photographs, or phylogenetic lists.

The simple and very usable key will aid students no end, and the descriptions in the text of each reptile are full and concise, but somewhat long. Scale counts and dimensions are treated in detail which most collectors will welcome.

Very complete distribution records are enumerated, but in a few common reptiles the distribution is generally stated. The maps, which illustrate the distribution of each form minutely, are well done and are reproduced in planograph, with each record indicated by a black circle. Tiny county maps accompany each distribution map. The life zone map could have been much improved with a sharper shading of the various zones.

The text on the natural history of each species of reptile is very complete with much original life history data presented. Each lizard, snake and turtle is treated with information about size, habits, food, habitat, reproduction, enemies, etc. The economic value of each reptile to man is brought out, and in particular, the saga of the famous Chesapeake diamondback terrapin is admirably presented, which is a boon to Maryland and should stimulate some interest.

The photographs are excellent but the planograph process does not do justice to several of them. The majority, by Arthur L. Smith, are taken from kodachromes, and if they could have been reproduced in color, the usefulness of the book would have been increased. It seems to me that more illustrations in color should be reproduced for herpetological species, simply because the other vertebrates have enjoyed that prominence for the last century.

The most complete herpetological bibliography of Maryland is presented, indicating that much time and research were spent just compiling this. There is a valuable index.

"The Reptiles of Maryland and the District of Columbia" will occupy a preeminent position among state faunal publications, and its excellence in data and presentation will not be equalled for many a year. Two things must be striven for by the herpetological student; popularization of standard names, and fine colored illustrations to help in the easy identification of amphibians and reptiles. Ecological research is developing by leaps and bounds, and this book is an excellent contribution to the ecological aspect of the study of herpetology.

Romeo Mansueti

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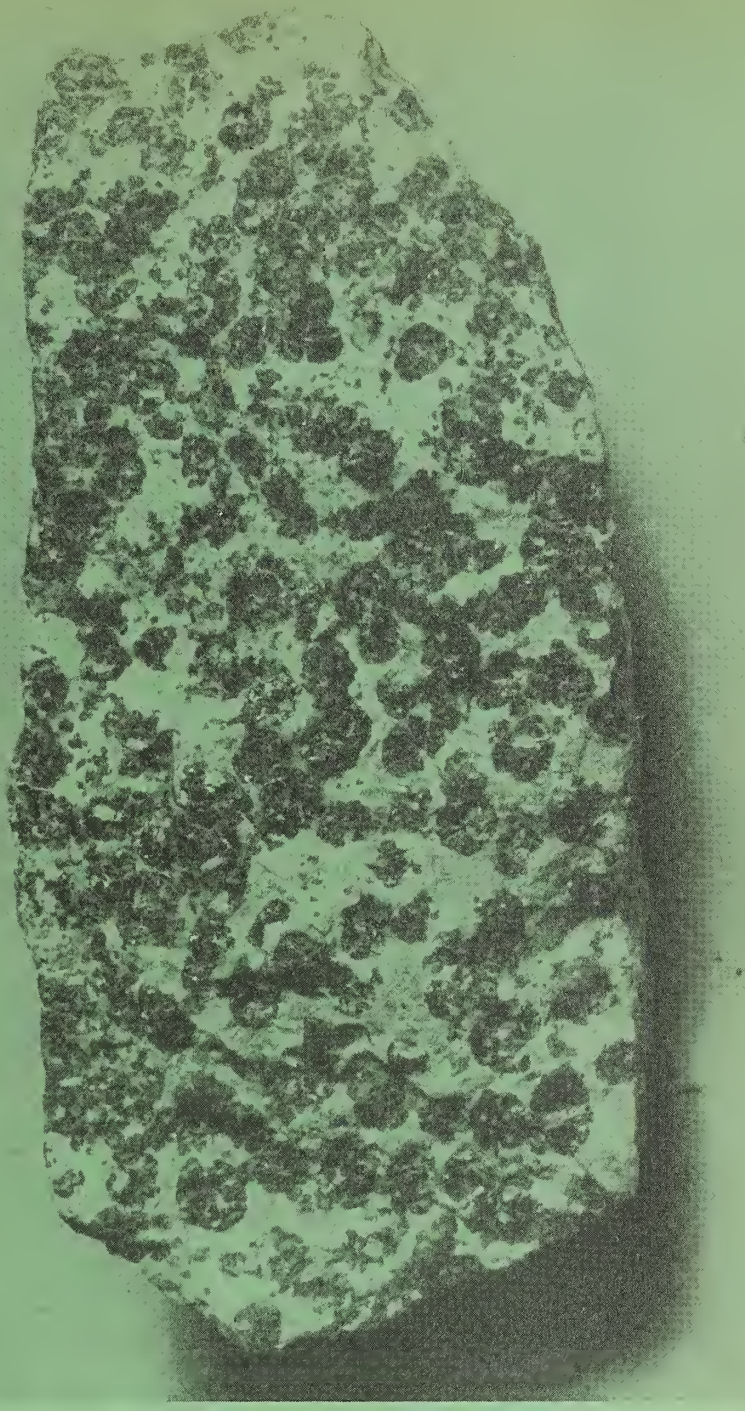

Disseminated
Chromite
in Serpentine

Richard E. Stearns

MARYLAND

A JOURNAL OF NATURAL HISTORY

The Natural History Society of Maryland

JANUARY 1946 VOLUME XVI No. 1

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WOODS IN WINTER

When winter winds are piercing chill,
   And through the hawthorn blows the gale,
With solemn feet I tread the hill,
   That overbrows the lonely vale.

O'er the bare upland, and away
   Through the long reach of desert woods,
The embracing sunbeams chastely play,
   And gladden these deep solitudes.

Where, twisted round the barren oak,
   The summer vine in beauty clung,
And summer winds the stillness broke,
   The crystal icicle is hung.

Chill airs and wintry winds! my ear
   Has grown familiar with your song;
I hear it in the opening year, --
   I listen, and it cheers me long.

Henry W. Longfellow

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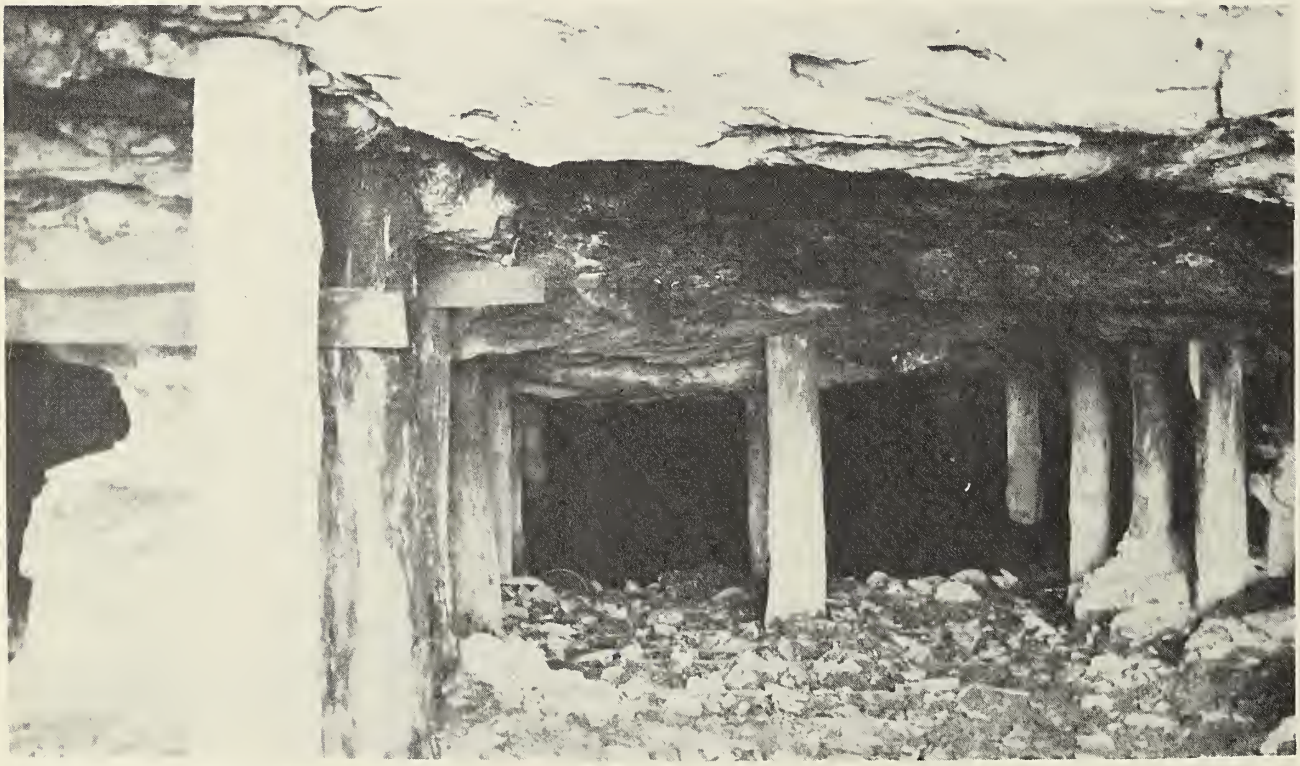
Choate Chrome Mine, Soldiers' Delight, Md.



Interior of Choate Mine, Soldiers' Delight, Md.

THE HISTORY OF CHROMIUM

AND ITS DEVELOPMENT IN MARYLAND

Compiled by Charles Ostrander,
L. Bryant Mather and Elra M. Palmer

Among the materials which during the past century and a half have made important contributions to science and progress, chromium and its chemical compounds hold high rank. Discovered in the beginning of the most remarkable period of scientific and industrial expansion ever known, these materials were developed and adapted to the changing needs and accelerated tempo of a completely revolutionized economy.

The end of the eighteenth and beginning of the nineteenth centuries marked the dawn of what was to become the Age of Science. It is interesting that Nature should have withheld its secrets about chromium until an age which not only needed and could employ them, but one whose progress was to be paced and liberally marked with corresponding developments in the use of chromium products.

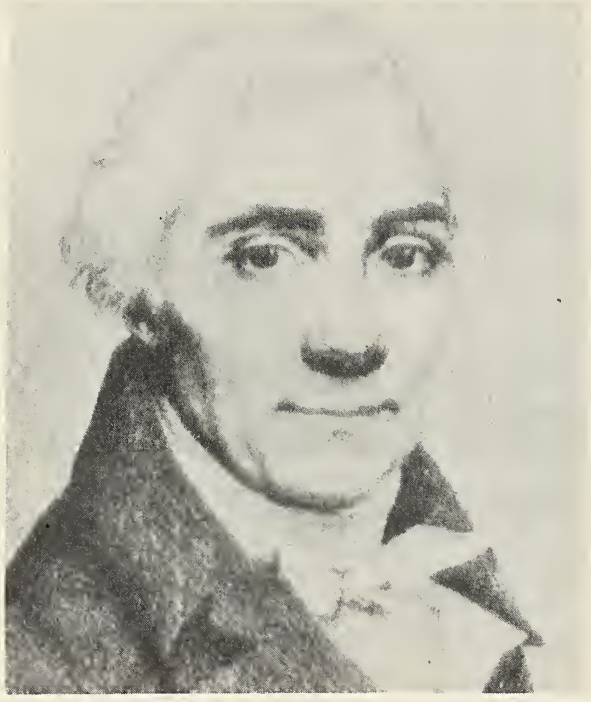
It is easy to understand why chromium made a comparatively recent entrance upon the industrial stage. The sole ore from which it can be economically recovered is not a common mineral and, in addition, it is most refractory and is unimpressive in appearance. In fact, chromium was first isolated, not from the ore which is today its commercial source, but from a rare, exceedingly beautiful mineral found in a Siberian gold mine.

In 1765 M. Pallas, a Russian geologist, discovered, in the Beresof mine near Ekaterinburg, a mineral whose gorgeous red color and handsome four-sided prisms promptly made it a favorite of collectors. Good specimens sold for their weight in gold, and broken fragments were appropriated by artists who valued it highly as a pigment for its beautiful, permanent, orange-red color. It was named "Crocoite".

At that time chemical science was being created by a score of brilliant, eager analysts who were breaking down all sorts of compounds and identifying, for the first time, many of their component elements. So striking a mineral as crocoite was sure to arouse their curiosity and half a dozen pioneer chemists studied it. They agreed that it was a lead salt, but half a dozen different mineral constituents - iron, copper, sulfur, arsenic, even molybdenum were suggested.

These conflicting reports inspired Nicholas Vanquelin, a Norman peasant boy, who ten years before had tramped barefoot to Paris to study chemistry, to analyze this "Siberian red lead". Several years earlier he had made a similar, but unsuccessful, attempt but was aware that, in the meantime, rapid advance had been made in chemical knowledge. He was conscious, too, of his own improved technique, so decided to resume his study of the mineral. Late on a summer's afternoon in 1797 Vanquelin gingerly

withdrew a tiny crucible from the bed of charcoal in which it had been fiercely heated for half an hour. Peering into it, he saw its sides encrusted with minute needles of a glistening, silvery metal. The element chromium had been isolated.



Vanquelin

Vanquelin has left us a detailed record of his great discovery, emphasizing that in every step of all his experiments, whatever reagents he used, he found that each filtrate and every precipitate was brilliantly colored: yellow, red, green. From its colorful compounds, he named his new metallic element "chrome" (chromium) from the Greek word chroma meaning color.

When, a few months later, Vanquelin stood before the distinguished membership of l'Institut National to report his discovery, he displayed samples of the new metal and several of its brightly colored compounds and he prophesied, with pardonable pride, that these new chemical compounds would shortly become useful in many arts. So long as the rare and costly crocoite was the sole source of chromium this prophecy could not be commercially fulfilled but in the next year (1798) a new chromium-bearing ore, chromite, was found in Russia in the Ural Mountains. Despite the stubbornness with which it yielded to smelting operations, it proved to be the best commercial source of all chromium compounds. Chromite has since been found in commercial quantities in many parts of the world, and it continues to be the basic raw material for all chromium products and compounds. When this economic source of chromium became available, scores of chemists were stimulated to study chrome compounds. "From many experiments," says the very first chemical reference to chromium compounds in the Dictionnaire Technique, "reaching back to the first years of the century (1800), the opening up of the ore (oxidation) with soda and lime and the further application of the roast product have been learned, so that there have been developed whole processes that leave little to be desired in method or use." Thus chromium chemicals, chiefly as paint pigments and ceramic colors, were first employed in the industries.

A pupil of Vanquelin, who, like his master, had tramped to Paris to study chemistry and later had emigrated to England to become a chemical manufacturer, became an early leader in the preparation of chrome colors. Andreas Kurtz began his manufacturing ventures in London in 1816 and in 1822 moved to Manchester. There he made potassium

bichromate which he introduced to the English market at the handsome price of five shillings a pound. When competition and cheaper chrome ore brought this price down to eight pence, he decided to manufacture chrome pigments. Kurtz's chrome yellow became famous and the name is still found in the British color catalogs. For a time this product was a commercial success. Princess Charlotte, popular daughter of George IV, had her coach painted this brilliant hue (forerunner of our "yellow cabs") and set a fashion that became profitable to the inventor. Meanwhile, John and James White, who, in 1810, had begun as soapmakers in Glasgow, ten years later started manufacturing potassium bichromate and began to specialize in other chrome chemicals.

Other new uses for chromium chemicals began to develop. Back in 1818, Zuber in France had adopted chrome yellow and chrome green for printing wallpapers. The latter was a notable advance since it replaced the poisonous arsenic colors previously in use. In 1820 the great German chemist, Köchlin, used potassium bichromate in the preparation of Turkey-red and introduced it as a mordant in wool dyeing. From paints and pottery the use of chrome colors extended to glass and porcelain. In chemical plants chromates were preferred as oxidizing agents in numerous synthetic processes. As the oxidizing agent used in producing alizarin from anthracene, potassium bichromate was important in the development of the great coal-tar industry.

Broader use and larger demand meant insistent pressure to lower costs and improve processes. Originally potassium bichromate was prepared from chromite and potassium nitrate, and the first step towards cheaper production was the substitution of potash carbonate for saltpeter. Mechanical improvements in the furnaces increased the efficiency of the oxidation operation. A great improvement came when Stromeyer introduced slaked lime into the furnace charge. This difficulty fusible material not only kept the mass of ore and alkali in a spongy condition, assisting oxidation, but it also facilitated the decomposition of the intractable ore. The early eighties saw the introduction to commerce of sodium bichromate. However, the greatest single factor in lowering the early cost of chromium chemicals was the discovery of substantial, readily available deposits of chromite in America.

Chromite in Maryland

Before 1827 the supply of ore came from the vicinity of Ekaterinburg in the Ural Mountains. There it was loaded on rafts, floated down stream to navigable waters, to the Obi River, thence to the Arctic Sea. This part of the long voyage often lasted through two summers, so it was frequently three years after the chromite was mined before it reached the ports of Western Europe. Naturally, supply was scanty and price high; and these restricting influences handicapped the early commercial development of the new chemicals. In 1811 a series of coincidences led to the discovery of valuable chromite properties close to Baltimore.

That city was the home of Jesse Tyson, a wealthy grain exporter, whose son, Isaac, was so interested in chemistry that he had left a snug

One of the workings in a gulch off Old Pimlico Road showing overgrown refuse piles.

View of Serpentine barren from Falls Road with pits dug in the search for chrome ore

berth in his father's grain warehouse to sign up as apprentice to an apothecary. Later, the young man started, with a neighbor, Howard Simms, in the manufacture of paints, a business that flourished modestly and was subsequently turned over to his partner.

Jesse Tyson owned a large estate, known as Bare Hills, situated on the northwest outskirts of Baltimore. The rolling lawns and spacious flower beds were tended by a little army of negroes under the surveillance of an imported English gardener. This man, named Henfrey, had once worked in a chemical plant where chrome pigments were manufactured. On the Bare Hills estate he found some heavy, black stones which he recognized as chromite and showed them to his employer's chemically-minded son.

"These," he said, "are what we used to make chrome yellow out of in the Old Country."

At work within one of the few areas in the United States where this ore occurs, probably the only man in America who could have identified it brought it to the attention of one of the few men in the land who had any comprehension of its practical uses and the means to develop them.

The chief ore of chromium and that worked by Tyson is Chromite or Chrome Iron ore. It crystalizes in the cubic, hexoctahedral class, but is rarely found in octahedral crystals. It usually occurs in fine, granular, compact masses, or as disseminated grains in veins and irregular masses in peridotite or basic rocks (rocks low in silica) especially serpentine, as is the case in Maryland. The deposition is often the result of magnate segregation. Chromite is closely related to the common ore of iron, magnetite, but is unlike that mineral in the fact that it is not magnetic unless the iron content is very high.

Realizing the value of this ore, Tyson immediately began mining it. The exact date at which the mining commenced is uncertain. However, the sketch map which H. H. Hayden made in 1833 locates many of the openings now existing. The operations are referred to in the past tense and as having been abandoned for sometime. Therefore, the mining probably began about 1812 or 1813. At present date seventeen openings may be found on this locality, some of which are not found on Hayden's map, so that we can conclude that work was resumed after 1833.

Hayden, in an article "A Geologic Sketch of Baltimore" (1) mentions the occurrence of small octahedrons of chromite at Bare Hills and remarks on the fact that this is a singularly rare occurrence of this mineral. He also includes a description of the Bare Hills serpentine barrens, which follows very closely the appearance of the other chromite deposits of the state, and it is of such literary quality as to merit quoting. Mr. Hayden writes: "The mind seems involuntarily to feel the impulse of melancholy. For the thinly scattered soil, which has been perhaps for ages slowly accumulating from a few decayed vegetables which some friendly breeze has borne on its barren surface is scarce sufficient to nourish a few scattered tufts of grass. A gloomy silence prevades around while every root on the serpentine range bears the most decided marks of sterility. The stones which cover its surface in many places, and of which the hills

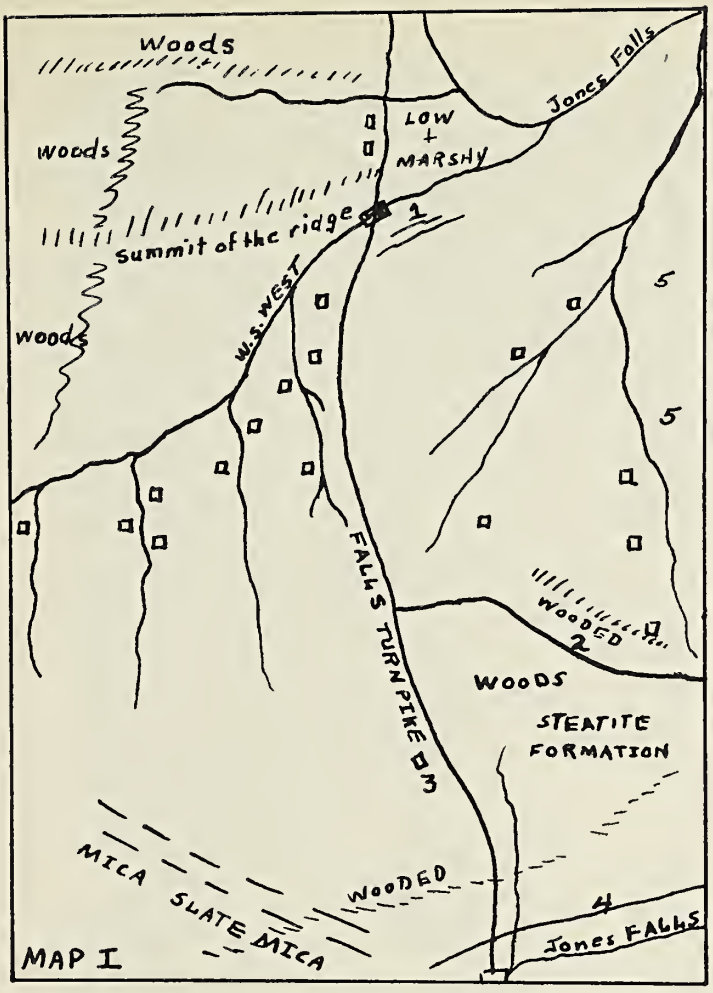
are mostly composed, bear the evident marks of sterility. The stones of which the hills are composed bear evident marks of partial decomposition which gives the whole a smoky brown appearance, as if it had been subjected to perpetual sulphurous exhalations on streams of sub-terraneous fires. If a fratricidal Cain had here committed his Heaven insulting deed we need not wonder; it bears so much the appearance of having experienced the unappeased wrath, the eternal curse of an offended Deity. Scarce a solitary lizard, or a creeping ant is here seen, seeking among the moldering serpentine a peaceful borough in which to deposit its daily spoils and screen its brood from the chilling blasts of winter wind which sweeps in triumph over this dreary waste." The barrens have changed but little since Hayden's time and on a cold, dreary day his words seem well befitting the mood of the place.

An interesting account of the discoveries of chrome ore in Maryland was written in 1895 by William Glenn.(2) Apparently Glenn had overlooked H. H. Hayden's 1811 letter in which the discovery of chrome is attributed to Mr. Henfrey. According to Glenn, in 1827, Tyson saw in Belair market, Baltimore, a cart containing a cider barrel held from rolling by some heavy black stones which he recognized to be chromite. The source of the stones was traced to what became the site of the Reed mine near Jarrettsville in Harford County. The property was owned by the Reed family and operated under lease by the Tyson Mining Company. This mine produced 100,000 tons making it the second largest chrome ore producer in the United States at the time.

The following year Tyson, having noticed that the chromite was confined to serpentine rock, the occurrence of which could be predicted by the "barrens" produced in regions underlain by it, in following out serpentine areas, discovered chromite in the State Line Serpentine formation. The point at which the first discovery here was made was on the Wood Farm, later the site of the Wood Mine. This deposit was opened in 1828 and the property was purchased outright in 1832. (3)

A short time thereafter other deposits in Maryland and Pennsylvania were discovered both in the neighborhood of the three already known (i.e. Bare Hills, Harford County near Jarrettsville, the State Line area) and in new regions, particularly west of Baltimore at Soldiers' Delight, which has probably been the most productive area in the State of Maryland. This region is located about ten miles northwest of Bare Hills. Four important mines are located here: the Choate, the Weir, the Harris, and the Calhoun. A concentrating mill treated ores from the Weir and Harris mines. The serpentine outcrops of Montgomery County contain little chromite, and hence are of no commercial value. Thus, although a shaft was sunk in Etchinson, it was early abandoned. In all the serpentine areas throughout the state, the streams and runs draining the areas have been worked to obtain sand chrome, which is merely the grains of chromite freed from their matrix of serpentine by weathering. The sand is screened and then washed in a long narrow trough, known as a buddle, through which water is run. The lighter grains of sand are carried off, leaving the heavier grains of chromite.

In the State Line Chrome District there have been a large number of



1. Footpath
2. Road leading to the Gunpowder works on Jones' Falls
3. Small house in the woods by the side of the road.
4. Baltimore and Susquehanna Rwy.
5. Eastern slope of Bare Hills

The squares represent chrome holes.

(From Description of Bare Hills, H. H. Hayden, American Journal of Science, Vol. 24, pp. 349-360. On the original map the chrome holes are designated by letters in squares. It is in this way that the author refers to them specifically in the text. There are also a few other special references to places discussed in the article.)

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small openings made, many of them merely prospect pits. There have been, however, in addition to the Wood Mine, a number of sufficient magnitude to receive names. Some of these are: Line Pits (Low's Mine), Red Pit, Jenkin's Mine (Rock Springs Mine), Reynold's Mine, Carter's Mine, Scott's Mine, Moro Phillip's Mine, and Peebles' Mine. For further descriptions of these workings see the papers by Knopf, Gordon, and Fisher (4,5,6).

Of this large number of openings only one, Line Pits, is in the state of Maryland and in this particular case the shaft of the mine is exactly bisected by the Mason-Dixon Line at a point approximately 100 yards from one of the milestones. (7)

There has been considerable discussion in regard to this mine as to whether the larger part of the ore body lay in Maryland or Pennsylvania. Glenn (8) states that the body pitched to the north, which would put the larger part of the ore in Pennsylvania. On the other hand Knopf, (9) Gordon, (10) and Fisher, (11) all agree that the ore body pitched S 75°E at an angle of approximately 60°, which would put the larger part of the ore in the State of Maryland.

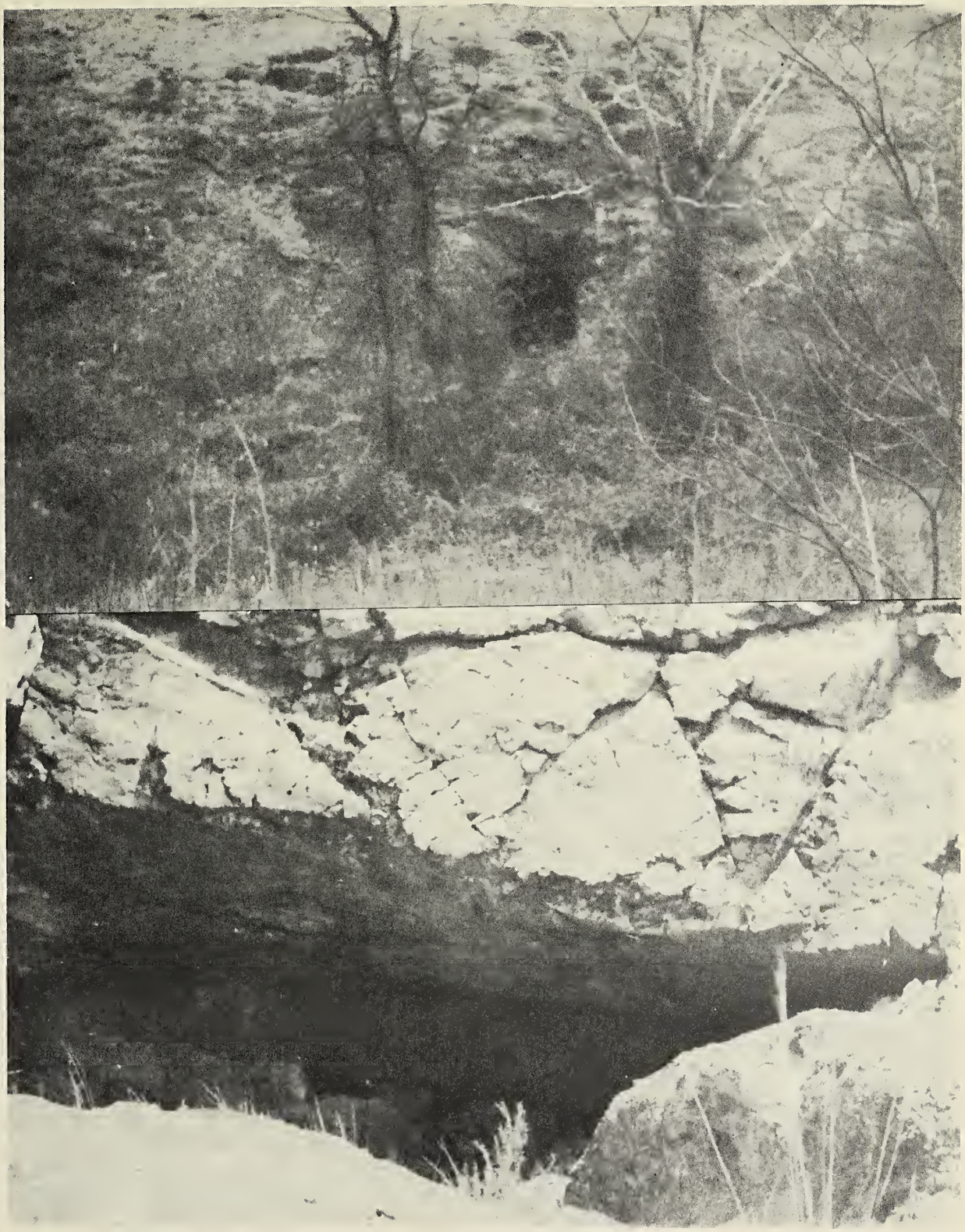
The State Line Serpentine formation is a unit in a series of ser-

pentinized, ultra basic, intrusive rocks that are found in the Piedmont Plateau province throughout the Eastern United States. It is in the serpentine units of this series of areas that all the chrome of the Eastern United States is found. The belt comes into Maryland from the south and soon after it enters Montgomery county there is a chromite locality (Etchison). Then proceeding northeasterly parallel to the regional strike there are seen intermittent outcrops until the areas west and north of Baltimore City are encountered (Soldiers' Delight and Bare Hills); then in Harford County there are numerous occurrences and the belt becomes almost continuous as it passes through Harford County into Cecil County. Here it trends more in an easterly direction along the state line between Cecil County, Maryland and Lancaster and Chester Counties, Pennsylvania, as shown in the map (Map II). Bascom classifies these rocks as indicating "various phases in the metamorphism of non-feldspathic igneous rocks" (12). Knopf (13) states that the parent rock of the serpentine was probably a differentiate of a gabbroic magma indicating a floor phase of intrusion. Fisher (14) believes, from a study of thin-sections of the rock, that the parent rock was not a saxonite as Gordon had suggested but was rather a dunite.

Whatever may have been the exact nature of the original rock from which the serpentine has been derived, all the authors are agreed that it was a basic igneous intrusive and that the chromite was an original constituent thereof. Some have suggested that the chromite was the earliest crystallizing constituent of the magma and as the chromite crystallized out there was a segregation of the solid phases of chromite by a process of gravity settling. This hypothesis would seem to be supported by the shape of some of the ore bodies, especially, for example, at the Wood Mine, where, as will later be pointed out, the chromite appears to have been segregated at the northern periphery of the intrusive mass and is today found dipping steeply to the south.

By 1833 Tyson held a monopoly on the chrome mining in the United States, the ores being sent to London and Paris where they were treated and made into pigments. During the year 1828 Tyson established a factory on what is now Washington Blvd. Baltimore, for the manufacture of chrome yellow. At first he was unsuccessful. In 1833 he attempted to establish a successful plant but again failed. In 1845, however, the great Tyson Chrome Works - The Baltimore Chrome Works - were established in Baltimore and monopolized the manufacture of chromium compounds in this country for over forty-five years, long after the Maryland mines received an economic jolt when the great deposits of chromite were discovered at Brusa, near Constantinople, Turkey in 1848. In 1870, when the chrome deposits in Maryland were nearing exhaustion, the Tyson Company sent prospectors to California and leased all the workable deposits. The ore was sent by sailing vessels, by way of Cape Horn, to the Tyson plant at Baltimore. From 1827 to 1860 the Tyson Company of Maryland controlled the world's production of chromite and the manufacture of pigments. In 1861 still larger and richer deposits of chromite were discovered in Turkey, and from that date to 1897 the Turks produced most of the chrome ore. Singewald (15) says, "The Tysons, however, maintained the prestige of their Baltimore Chrome Works until they sold out to the Mutual Chemical Company of America in 1908 and finally withdrew from the chrome business."

Bare Hills off Old Pimlico Road. Long adit extending under main incline and other workings.



Bare Hills off Old Pimlico Road. Main opening, an incline at an angle of 45° in a southeasterly direction.

The Bare Hills Chrome Mine

The numerous openings made in the general area known as the Bare Hills center at the intersection of Falls Road and the Old Pimlico Road. It is interesting to note the great number and wide distribution of the points at which chromite was found. Considerable sand chrome was also obtained from principal gulches and runs of the area, but little indication is left of this work.

The chrome is generally found in widely disseminated grains in the serpentine but also has been found in veins 1/2 to 2 inches thick.

A total of 32 pits and trenches have been counted in this area. These vary; what appears to be the main workings along Old Pimlico Road near its intersection with Falls Road consist of a tunnel or adit driven into the hill for a considerable distance without making connection with an incline, a long cut, and two adits up the hill. The incline goes down at an angle of 45° in a southeasterly direction but is now nearly filled with debris. The cut extends diagonally down the slope of the hill in a southwesterly direction to the bottom of the hollow from which point a long adit runs back under the higher workings. A second adit full of water enters from the main run on the north and extends back under the upper workings.

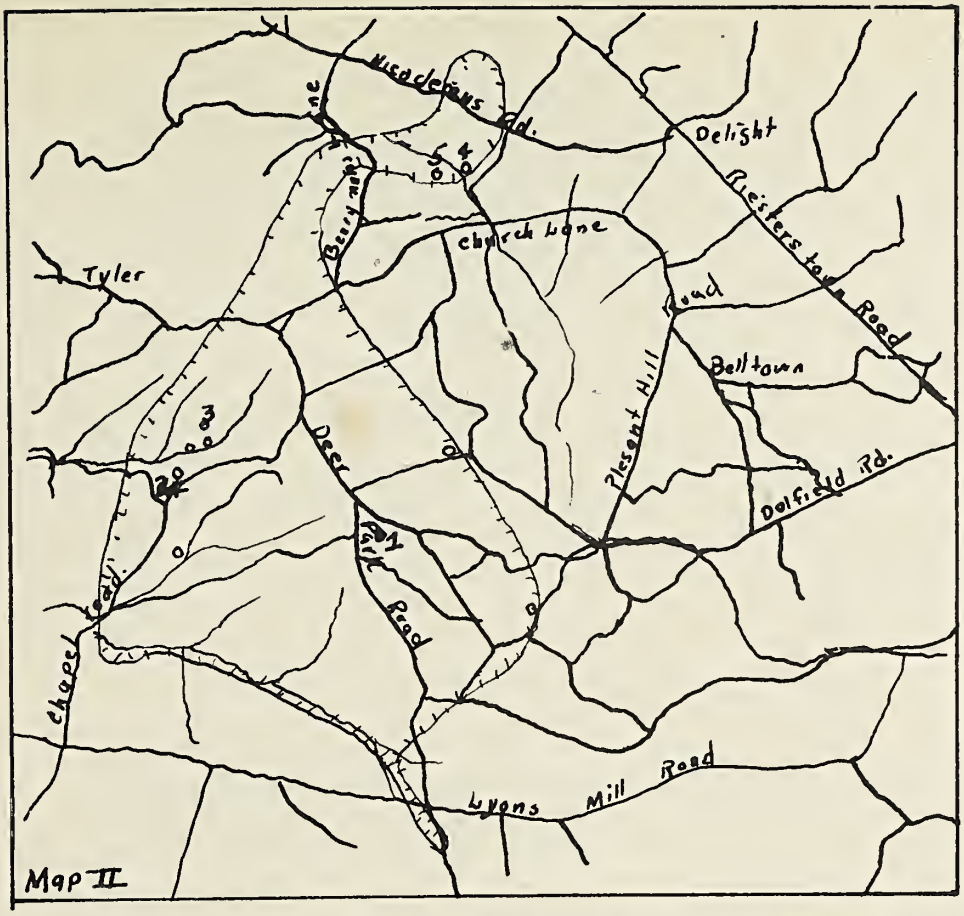
At the present time two abandoned serpentine quarries stand on adjacent sides of the Falls Road at its intersection with Old Pimlico Road.

Minerology

This area has long been the goal of local mineralogists and Sunday hikers and, in being so, has been pretty well gone over. However, good specimens can still be collected by observant seekers. The minerals to be found in the general vicinity are as follows:

Serpentine varieties
- Picrolite
- Baltimorite
- Marmolite
- Williamsite
- Procellophite
- Chrysolite, etc.

Chromite
Talc
Hyalite
Chalcedony
Opal
Moss-agate
Sepiolite (meerschaum)
Magnesite
Chlorite
Rhodochrome
Gymnite (deweylite) in chalcedony
Dendritic wad
Pyroxene
Hydromagnesite



Map of portions of Baltimore County showing serpentine areas and localities at which Chrome Ores have been produced.

Scale, one inch equals one mile

The Soldier's Delight Serpentine Area

This area is located in Baltimore County about two and one-half miles west of Owings Mills and about one mile north of the Maryland State Police Sub-station on the Deer Park Road. The occurrence of chromite is very similar to that at Bare Hills, being found in disseminated particles in serpentine.

1. The Choate Mine

The Choate Mine, which reopened for a short time in 1917 after having lain idle for 40 years, was the last worked in this area. The mine workings consisted of an incline 165 feet long with a dip of 20° in the direction S 75° W from which drifts had been run 80 feet to the south and 40 feet to the north. The opening followed a vein which varied from nothing to four feet in thickness (17).

Minerals from the mine are as follows:

Serpentine varieties
- Williamsite
- Picrolite
- Baltimorite

Chromite (birds eye ore)
Talc
Chalcedony
Jasper
Magnesite
Rhodochrome

2. The Weir Mine

This mine lies about 4 miles west of Owings Mills and was the largest mine of this area. There are two vertical shafts 60 feet apart in a line 60° E. Adjoining the second shaft and running in the same direction is a cut over 100 feet long, 15 feet wide and 6 feet deep. Thirty feet north of the second shaft is a third shaft almost completely filled in. A number of the trenches and cuts mark the general vicinity (17).

Minerals from the mine consist of:

Serpentine var.
  Picrolite
Chromite
Talc
Chalcedony
Deweylite
Magnesite
Rhodochrome
Calcite

3. The Harris Mine

The Harris is located a quarter of a mile northeast of the Weir Mine and across the run from it. The surface openings extended for about 200 feet in the direction N 15° E and consisted of 4 timbered shafts filled with water (18).

Minerals found are as follows:

Serpentine var.
  Lamelar
  Picrolite
Chromite
Chalcedony
Calcite
Talc

4. The Calhoun Mine

This mine on the northern edge of the Soldier's Delight Serpentine area is one mile west of the Reisterstown Road at Delight, Maryland. The workings, shut down since 1880, consisted of two shafts: one was worked to the depth of 100 feet; the other is now worked by the Soldier's Delight Serpentine Quarry.

Minerals found are as follows:

Serpentine var.
  Williamsite
  Picrolite
  Baltimorite

Dolomite
Calcite
Antigorite
Chalcedony
Opal (common white)
Magnesite
Deweylite
Jasper
Moss Agate
Magnetite
Garmerite

The Collection of Chrome Sand

Several buddles are found scattered about the valleys of the Soldier's Delight Serpentine barren. These were of considerable importance at one time because of the high grade chrome sand collected from them. The most important were known as the Dolfield, Gore, and Triplitt buddles.

The Etchison Chrome Mine, Montgomery County

The mine is located on the Griffith property one mile west of Etchison, and a little east of Great Seneca Creek. The openings, of which there were three, were made in serpentine and phyllite. The largest and only accessible one consists of a pit 30 feet in diameter and 15 feet deep from which a gallery runs with a steep down grade for 50 feet N 20° W and then turns N 70° E for 30 feet. A second opening, 80 feet distant in the direction N 35° E, and a third, 50 feet N 75° E of the second, are now completely filled in (20).

Minerals to be found are:

Serpentine
Chromite
Chrome Ore (chrome spinel-picotite?)
Tourmaline, green chrome
Fuschite
Margarite, green
Rutile in reddish brown encrustations
Magnesite
Amesite
Magnesioferrite

The Wood Mine near Texas, Pennsylvania

The Wood Mine is located near the town of Lyles, locally called "Texas", about 1 mi. (1.2 km.) SW of Lee's Mill; it is approximately 5 mi. (8 km) NW of Rising Sun, Cecil Co., Maryland, about 4 mi. east of the Susquehanna River, and is in the Lancaster county side of an oxbow in Octoraro Creek, which is at that point the boundary line between Lancaster and Chester counties.

This mine was in operation producing chromite from 1827-1868 and from 1873-1882 and has recently been unwatered preparatory to resuming production. Prior to its being closed down in 1868 it was producing at the rate of 400-500 tons per month; however, when it was reopened in 1873 production was resumed only at the rate of 400-500 tons per year (21). The total production at the Wood Mine has been variously estimated as follows: Glenn knew of 95,000 tons (22); Gordon gives 120,000 tons (23); Genth is said to have placed it at 125,000 tons (24); Gorrecht, from an examination of the size and extent of the old workings as they have been revealed by the recent unwatering, believes that the correct figure is nearer 250,000 tons. He suggests that during the period of most active working production was at the rate of 10,000 tons per year (25).

Between 1828 and 1860 the chrome mines in the State Line District were the only source of chrome for the world and the monopoly was hence in the hands of the Tyson Company. From 1873 to 1880 the Wood Mine was the only producer in the Eastern United States (26).

Geologically the Wood Mine is about two miles north of the main eastward trend of the serpentine belt, and the chromite occurs in a body having the shape of a vein with a well defined "hanging" and "foot" wall at the northern periphery of the serpentine mass. Glenn (27) believed the ore body to be a fissure vein and Gorrecht (28) still holds that view. There is no question that this deposit is extremely unusual in many ways but to assume as Gorrecht and Glenn have done merely from its form that it is a true fissure vein does not seem to be justified.

If, however, the deposit should be a true fissure vein, it would be the only vein deposit of chromite known to exist anywhere in the world. The deposit, which up until the discovery of deposits in British Rhodesia was the largest known deposit of chromite in the world, has been worked to a depth along the dip of 720 feet making it the deepest chromite mine in America. In the period of first operation by the Tyson Mining Company the body was proved to the depth of 720 feet and to an average width of 300 feet; its thickness varied from 10 to 35 feet, averaging 20 feet, but according to Gorrecht (29) the dimensions of the ore body increased greatly below the 400 foot level, there being places in the lower levels where the body was over 70 feet thick. The present unwatering has revealed that there were ore shoots and lenses branching off from the main ore body at very many places. In most cases it has been found that these were followed by drifts so that the entire area is honeycombed underground with interconnecting workings. Mr. Gorrecht estimated that there were from 75 to 100 such side shoots that had been worked. According to Gordon the strike was nearly E and W at the outcrop and N and S on the lower levels, and the body had a pitch of 40°-60°

In the present unwatering there have been some interesting facts ascertained about the mining methods employed when the mine was formerly worked. It has been verified that there were no power pumps in

operation and that there were but three hand operated pumps at three levels below the surface, all three of which have now been found. It has been further established that there was employed no system of lighting other than candles, some of which have been recently recovered from the long submerged workings (30).

When the mine was reopened in 1873 at a much reduced production rate it was found to be flooded and was not unwatered below 200 feet. At that time there was constructed at this depth a wooden buttress sealing off the lower levels, and the working was confined to robbing the mine mouth, which was located in a mass of solid chromite, at this point almost 125 feet wide; but work was continued to a depth of 128 feet before the final abandonment of the property in 1883.

Mr. Gorrecht believes that the chromite body of the Wood Mine is continuous downward in two separate but parallel veins (75-100 yards apart) for an unlimited distance and says that this was also the belief of Mr. Glenn. He also thinks that the alignment of the ore pits, which was noticed by Gordon (31) and which Mr. Gorrecht says was known to the Tysons, indicates that there is a continuous chromite ore body extending at least from the vicinity of the Wood Mine for a distance of about four miles to, and perhaps beyond, the Line Pits opening, and that it can be profitably exploited at this time by his "American Chrome Corporation" (32,33).

Adjacent to the chromite the serpentine showed a prismatic structure, the cracks of which extended normally to the chromite for a distance of a half inch or more and were filled with magnesite or deweylite. This secondary phenomenon occurred during the serpentinization of the pyroxenite or peridotite and indicates to Gordon that the chromite deposit was formed prior to serpentinization (34).

The ore at this mine was of an exceptionally pure character and for the most part was hand cobbed, only a small part needing further concentration, and when that was required the method used was jigging (35).

Analyses of the ore show the following percentages:

massive ore	(maximum)	56.5%	Cr_2O_3	
	(average)	48.0%	"	(36)
massive ore		52.64%	Cr_2O_3	
" "		63.384%	"	
disseminated ore		24.26%	"	(37)

Mineralogy

In connection with the occurrence of chromite ores in the State Line Serpentine there is developed a long suite of accessory minerals, the occurrence of which has long made this region, especially the Wood Mine, a mineralogical locality of much prominence. Below are the lists

of minerals reported from the Wood Chrome Mine ("Texas", Lancaster County, Pennsylvania of Dana).

Pyrite	G
Chalcocite	G
Millerite	G,D
*Hematite	G,D
Magnetite	G,D
*Limonite	
*Quartz	G
Jasper	G
*Hornstone	G
*Chalcedony	C
Brookite	G,D
*Chromite	G,D,B
Ilmenite	D
*Brucite	G,D,B
Calcite	G,D
*Aragonite	G,D
*Magnesite	G,D,B
*Hydromagnesite	G,D,B
*Dolomite	G,D
*Zaratite	G,D,B
Enstatite	G
Bronzite	G,D
Anthophyllite	G
Olivine	G
Vesuvianite	G,D
Uvarovite	G
*Clinochlore	G,D,B
Ripidolite	G
*Penninite	G,D
*Kammererite	G,D
*Rhodochrome	
*Vermiculite	G,D
*Antigorite	G,D,B
*Marmolite	G,D
*Williamsite	G,D,B
*Chrysotile	G,D,B
Picrolite	G,D,B
Baltimorite	D
*Deweylite	G,D,B
Genthite	G, D

(38, 39, 40, 41)

It is of interest to record that as the old workings are being again opened up, the veins of accessory minerals, whose occurrence is so famous at this locality, are being again encountered. Mr. Gorrecht reports that in the early part of January 1938, there were quite a few specimens of brucite found in the mine both as fissure fillings and also as the beautiful radiating "star" brucite on rock (42).

The Line Pits Chrome Mines

The Line Pits Chrome Mines have been mentioned before in regard to their unusual geographic setting, astride the Mason Dixon Line, and their early history. They are situated approximately 3/4 mi. NW of Rock Springs

Cross Roads. This deposit was worked by the Tysons and presents a number of unusual features; it is, in some respects, the most remarkable ore body in the region. The deposit may be described as a rough, irregular, cylindrical mass with the average diameters of 5 by 8 feet and has been worked to a depth of about 250 feet. The chromite body pitches S. 75° E. at an angle of about 60° (43).

This is the only chrome mine in Cecil County and was abandoned by the Tysons in 1877. Prior to that time it had been exploited as follows: there was first a 92 ft. vertical shaft with a 75 ft. drift at its base and then an incline at 76° for a distance of 106 feet (44). This body produced only about 1000 tons of chromite, yet it was the one chosen for reopening by the Garrison Company in 1918, at which time the mine was unwatered to a depth of 200 feet (45).

However, according to Gorrecht (46) all the ore struck by Garrison was in magnesite, whereas that mined by the Tyson Company here was in williamsite. Hence Gorrecht believes that the failure of the Garrison Company to locate profitable ore here was not due to any lack of continuance of the originally worked vein but rather to their failure to locate that original vein; he further attributes this failure to improper mining methods, especially the use of excessive charges of explosive. He believes that these two operations at this locality were in the southwestward continuation of the two veins, whose existence he postulates at the Wood Mine, and which he thinks are continuous to the Line Pits region. He states that he has found outcrops of serpentine containing chromite at very many places on this line.

The ore produced here is said to have shown an analysis 50.0% Cr_2O_3. There is still to be seen there today the remnants of a pile of massive ore collected in 1918 by the Garrison Company. Samples from this pile were studied by Shannon (47) mineralogically, his report covering especially the magnesite and kammererite found in association with the ore here. According to Singewald the property now belongs to W.T. West and all that is available for study is on the dumps which he estimates contain 3000-4000 tons of rock (48).

The ore mass here is surrounded by a thick sheathing of a translucent, green, jade-like, serpentine known as williamsite averaging about a foot in thickness, beyond which lie the ordinary types of serpentine rock. Thick tabular masses of williamsite form partings in the chromite deposit, while veins of it may extend into the serpentine walls. Fractures in the chromite are filled with clinochlore or kammererite (49).

Gordon interprets the form and position of the body as indicating that it was formed later than the surrounding rock but previous to its serpentinization. He suggests that after most of the magma had crystallized to peridotite the pipe-like mass of liquid was injected, further differentiated, and crystallized into enstatite and chromite. Hydrothermal solutions later altered the enstatite to chromite. This is contrary to the general belief that chromite deposits are magmatic segregations in situ (50).

It is interesting to note that in the general chromite region in Maryland and adjacent states, within a few miles of the chrome workings

there have also been workings of at least three other mineral resources. About $1\frac{1}{4}$ miles NE of Rock Springs crossroads there was, at one time, an opening in a basic igneous rock outcrop, for the purpose of exploiting as an iron ore a magmatic segregation of magnetite (Fe_3O_4) occurring there (51). The second mineral product formerly mined in this region was magnesite ($MgCO_3$) which was used in the manufacture of epsom salt. Of this resource Carpenter (52) makes the following statement: "About $\frac{1}{4}$ mile SE of "Texas", in the Little Britain Township, Lancaster County, Pa. there is a working operated by McKim, Sims and Company of Baltimore in magnesite which is producing raw material for the manufacture of epsom salt at the rate of 1,500,000 lbs. per year and is thus supplying from this locality virtually the entire demand of the country." Also in this vicinity there have been for many years workings in the soda pegmatites for feldspar. These deposits are well described by Bastin (53) and Singewald (54) and for accounts the reader is referred to these papers. Suffice it to say that these pegmatites are dikes that are believed to have been differentiates of the same basic magma which has given rise to the gabbroic rocks of Harford and Cecil counties in Maryland and adjacent parts of Pennsylvania of which the State Line Serpentine represents a metamorphosed, ultra basic facies. These dikes are said by Bastin (55) to be the only true soda pegmatites in the United States. Until very recently there was a working in one of these dikes by Golding and Sons only about one fourth of a mile southeast of the Line Pits chrome mine near Rock Springs, Cecil County, from which a considerable quantity of soda feldspar was shipped. This working, when visited recently, appeared to have been abandoned. The material here was studied mineralogically and was found to be a plagioclase feldspar with optical properties which indicate that it corresponds in chemical composition to an albito-oligoclase.

From the Line Pit Chrome Mine the following minerals have been recorded:-

*Chalcedony	S	*Rhodochrome	S
*Hematite	D	*Antigorite	G,D,S
*Chromite	G,D,S	*Williamsite	G,D,S
*Brucite	G,D,S	*Chrysotile	G,D
*Magnesite	G,D,S	Baltimorite	D
*Hydromagnesite	G,D	Picrolite	G,D
Zaratite	G,D	*Talc	G,D
*Clinochlore		*Deweylite	
*Penninite	G	*Sepiolite	S
*Kammererite	G,S	Genthite	G,D

(56,57,58,59)

Shannon in his special study finds the mineral kammererite as it occurs here to be identical in every way with that which has elsewhere been called "rhodochrome". From his chemical analyses he recalculates for this material the following chemical formula: $7MgO.Al_2O_3.4SiO_2.6H_2O$ (60).

The mineral "lancasterite" was described from this region in the early part of the nineteenth century and was later reinvestigated by Smith and Brush and discredited as a species, since they performed analyses to show that it was a mixture of brucite and hydro-magnesite.

It was found as a seam-filling in veins about ½ inch thick and with a radiated structure. (61).

Uses of Chrome Ores

Chromium ores were formerly used chiefly in the chemical industries, but the main use of chromium now is in metallurgy. In the chemical industries, chromium is used for the manufacture of pigments, dyes, chemical compounds, and in the tanning of leather. Chrome green, chrome yellow, chrome orange, and chrome red are valuable because of their strength and permanence. Solutions of chromates and bichromates probably find their greatest application in the dye industries, not so much as a direct dye but as a mordant for fixing and producing "fast" colors(62). Bichromates and chromic acids are also used in chemical laboratories as oxidizing agents. Chromic salts are used to tan light glove-leather, such as calf, kid, etc. Chrome also makes the leather tougher and waterproof.

The greatest use of chrome ore today is in the manufacture of chromium alloys. In 1922 there was a rapid expansion in the consumption of the chromium alloys and the amount has steadily increased (63). The principal alloy is ferrochrome, which is used primarily in steel of great hardness and toughness. This chrome steel can be bent cold and can be welded to iron, forming an impermeable surface. Hence its use for armor-plate, burglar proof safes, tires, stamp-mill shoes, etc. Steel containing about thirteen to fifteen percent chromium with one percent nickel or carbon forms an alloy which is impervious to oxidation by water, air, and certain acids. This alloy is known commercially as stainless steel and is used chiefly in cutlery. It also has many other uses in such things as exhaust valves of aeroplane engines, turbine blades, acid pumps, etc.

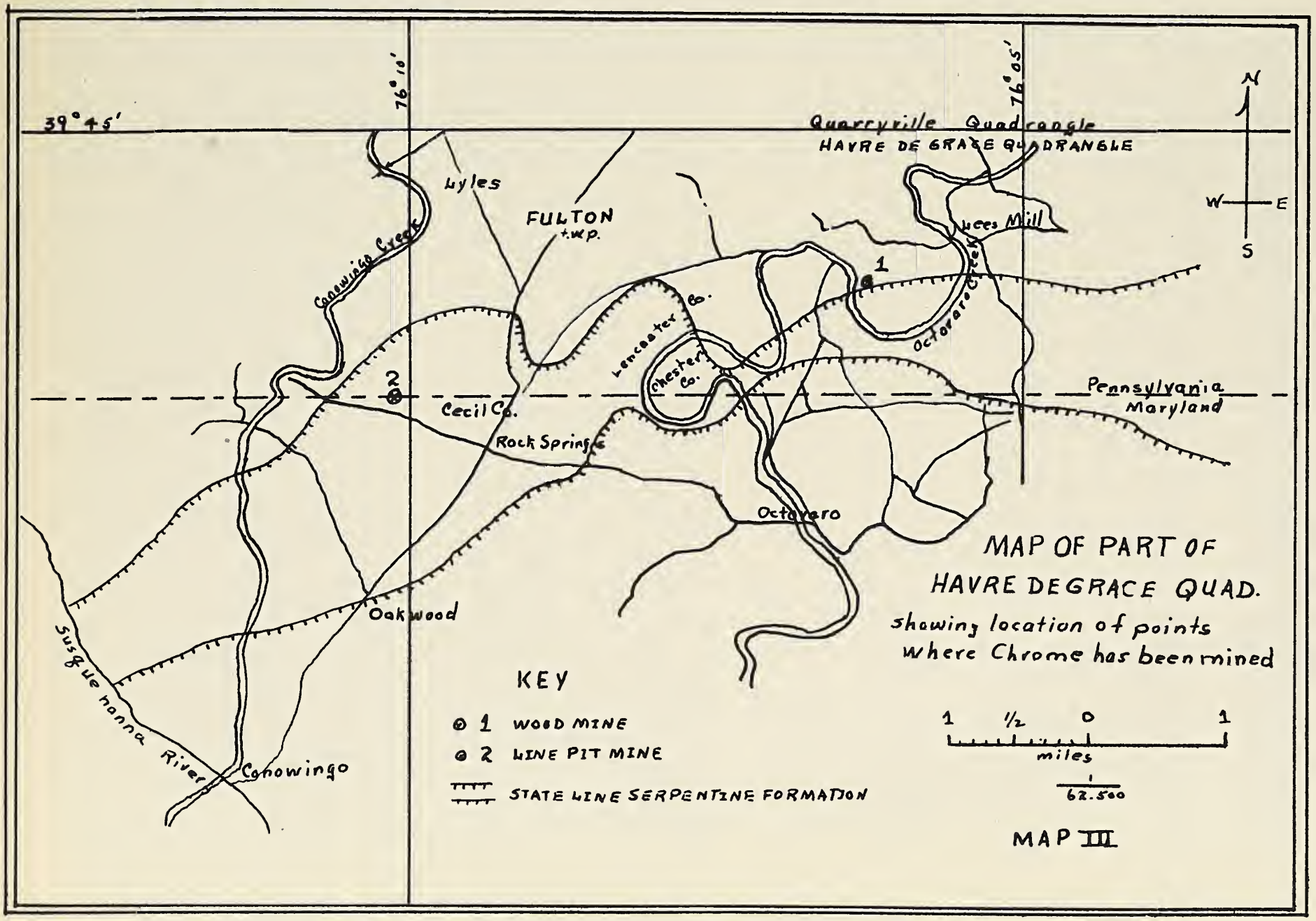
A chromium alloy known as stellite contains cobalt and chromium. This alloy is the only serious rival to steel, as it takes a good cutting edge, can be run at high speed without softening and is rustless.

The automobile industry is now using chromium plate almost exclusively due to its high permanent lustre. The United States Bureau of Engraving is putting a thin plate of chromium on its electrotype plates which are used in printing paper currency (64).

Although no longer producing any chromium ores, Maryland is still very active in the chrome industry. Ore is shipped to the Mutual Chemical Company of America (the successors to the Tyson Chrome Works) at Baltimore. The ores are here converted to pigments and chromic salts. The Rustless Iron and Steel Corporation of Baltimore is probably one of the largest chromite consumers in the United States.

It is quite evident that Maryland has given much impetus to the chromium industry; and although future chromite mining in the state is problematic, Maryland will undoubtedly continue to be one of the leading states in the consumption of chrome ores.

SPECIAL ACKNOWLEDGEMENT is due THE MUTUAL CHEMICAL COMPANY OF AMERICA for the early history and development of CHROMIUM from their publication "Chromium Chemicals, Their Discovery, Development and Use."


39°45'
76°10'
76°05'
Quarryville Quadrangle
HAVRE DE GRACE QUADRANGLE
N
W
E
S
Lyles
FULTON
twp.
Conowingo Creek
Lees Mill
Octoraro Creek
Lancaster Co.
Chester Co.
Cecil Co.
Pennsylvania
Maryland
Rock Springs
Octoraro
Oakwood
Susquehanna River
Conowingo
1
2
KEY
1 WOOD MINE
2 LINE PIT MINE
STATE LINE SERPENTINE FORMATION
1 1/2 0 1
miles
1
62,500
MAP OF PART OF
HAVRE DEGRACE QUAD.
showing location of points
where Chrome has been mined
MAP III

NOTES

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(18) Singewald, op. cit.
(19) Singewald, op. cit.
(20) Singewald, op. cit.
(21) Knopf, op. cit.
(22) Glenn, op. cit.
(23) Gordon, op. cit., 1921, p450.
(24) Genth (op. not seen) quoted by Gorrecht, oral communication, Jan. 9, 1938.
(25) Gorrecht, president of American Chrome Corporation, interviewed at Wood Mine, Jan. 9, 1938.
(26) Knopf, op. cit.
(27) Glenn, op. cit.
(28) Gorrecht, oral communication, Jan. 9, 1938.
(29) Gorrecht, oral communication, Jan. 9, 1938.
(30) Gorrecht, oral communication, Jan. 9, 1938.
(31) Gordon, op. cit., 1921, p454.
(32) Gorrecht, oral communication, Jan. 9, 1938.
(33) "The American Chrome Corporation" is a recently formed and purely local corporation having no interest in any other chrome deposits than those in the State Line Chrome District. It is neither a subsidiary nor an affiliate of any larger corporation. In 1904 the property and mining rights of the old Tyson Mining Company are said to have come into the ownership of the Pennsylvania Waterpower Company, a subsidiary of the Pennsylvania Railroad Company, in connection with the hydroelectric developments at Holtsville on the Susquehanna River, about 15 miles to the north. In 1918, due to the scarcity of and demand for chrome, these rights were taken over, especially in respect to the Line Pits, by the Chrome Mining Company of Mr. J. Lynwood Garrison of Philadelphia. Later, according to Mr. Gorrecht, there was litigation, the outcome of which was the reassignment of the chrome

mining rights to the Pennsylvania Waterpower Company from which they were obtained by the present company.

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The Natural History Society of Maryland

APRIL 1946 VOLUME XVI No. 2

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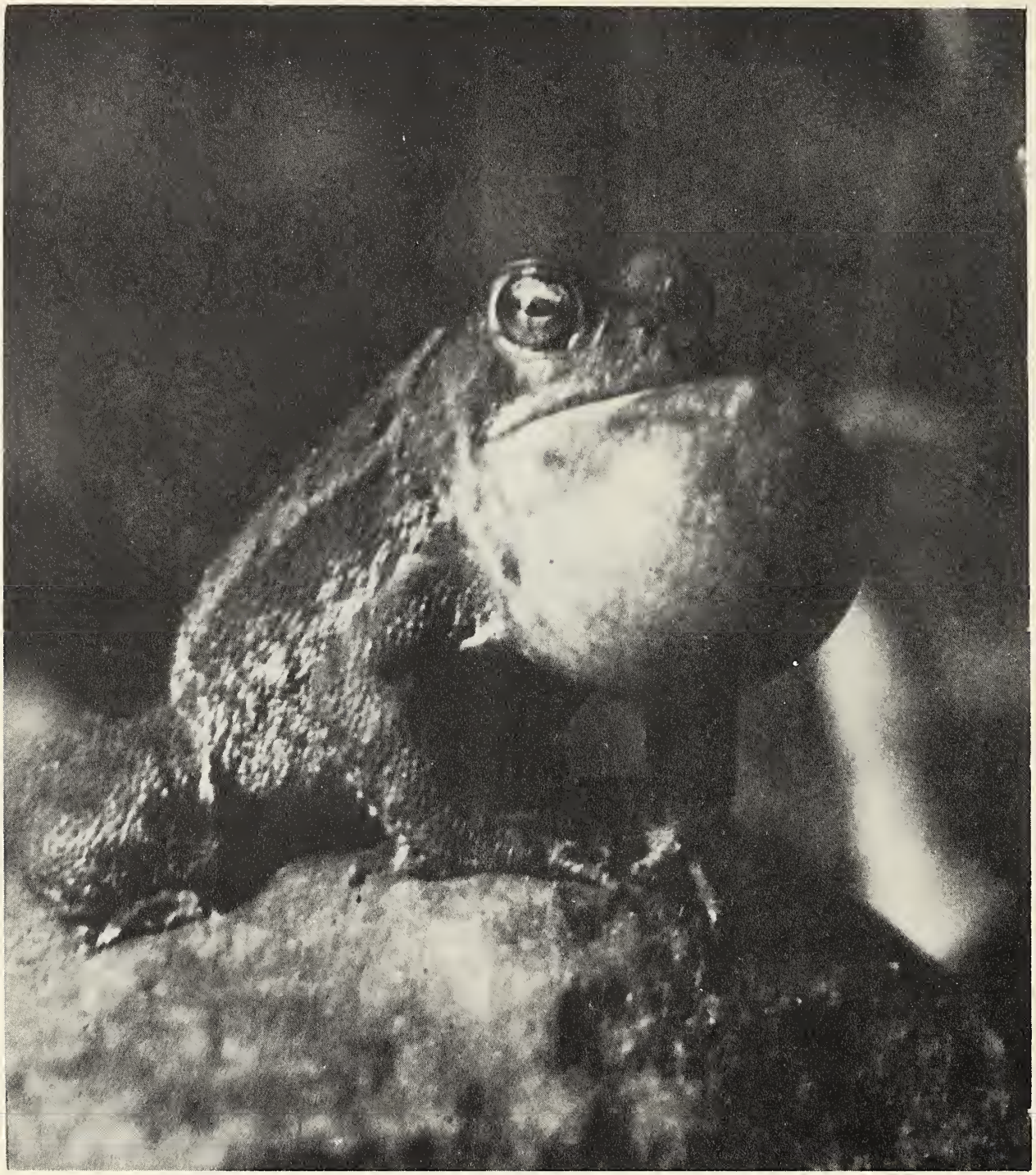

American Toad Gilbert C. Klingel

VOICES OF SPRING

NOTES ON SEVERAL MARYLAND CAVES[1]

by
Martin H. Muza

Several years ago the author began recording and studying the caves found in Maryland with the intention of compiling data for a monograph. With the advent of the war and the subsequent curtailment of travel, the study, except for incidental observations, has been neglected. It is hoped, however, that the work may be resumed and completed now that the war is over.

The following notes, although general, sketchy and incomplete represent a step toward the filling in of a gap in our knowledge of the natural history of the state. For the sake of simplicity the caves discussed have been divided into two types: deep caves, those extending to total darkness, and shallow caves, those not extending to total darkness. In all, sixteen caves have been located and explored; nine of these have been classed deep while seven are shallow. Several other caves, two in Garrett, three in Allegany, one in Carroll, and one in Anne Arundel have been brought to the author's attention, but have not as yet been visited.

DEEP CAVES

As stated above the caves discussed under this section extend to total darkness. Considerations of size, complexity, or interest were not taken into account. If the cave passageway developed in such a manner that light was excluded from the innermost point the cave was considered deep, even though it extended less than one-hundred feet into the earth.

Athey's Cave

This small but interesting cave is located on the Athey farm about one mile east of Rush in Allegany County. The entrance, hardly larger than a ground-hog hole, lies about 300 feet southeast of the road in the side of a ridge. From the steeply inclined entrance passage the cave opens into four closely grouped cone shaped rooms that average 30 feet in height and 10 feet in diameter. Each room occurs on a different level and all are connected by one or more narrow, tortuous passages. The total length of all passages and rooms does not exceed 200 feet.

The cave is nicely decorated with flowstone in the form of draperies, blankets and bacon. A type of deposit known commonly as cave coral occurs in abundance on the walls of the first two rooms.

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1. Acknowledgments are due the National Speleological Society for the use of facilities with which to make this study.
Any information concerning caves located in Maryland and not reported here would be appreciated. Address correspondence to 9601 51st Avenue, Berwyn, Maryland.

The only so-called cave animals found were the Georgian bat, and a species of cave cricket. Other animals occurring accidentally or hibernating during the two visits to the cave included two or more species of mosquitoes, one species of gnat, a moth fly and a harvestman. Droppings of a small rodent were also observed.

Crystal Grottoes

Crystal Grottoes, the only commercial cave operated in the state, lies one mile south of U.S. Route #40 at Boonesboro in Washington County. The cave is developed in a southeasterly direction and is quite nicely decorated with flowstone and dripstone. All of the main passages have been excavated to facilitate public entry.

No scientific data has been collected on this cave as the author's only visit was a conducted tour. Several bats, probably the Georgian bat, were noted and six specimens of the cave spider, Nesticus pallidus Emerton, were collected.

Dead Horse Cave

An unfortunate accident to a farm animal gave this cave its gruesome title. It is located on the farm of Austin Twigg at Twiggtown in Allegany County. The vertical entrance, situated at the bottom of a small sink, is located about $\frac{1}{4}$ mile south of the farmhouse. Although quite small this cave is interesting. The entrance room, about 15 feet wide, 30 feet long, and 8 to 10 feet in height, is connected by several passages to two small, well decorated rooms. In all the cave is about 100 feet long.

Two visits were made to this cave. Most of the skeleton of the horse still remains near the bottom of the entrance. Animal life consisted of several species of flies and mosquitoes, two species of cave crickets, one spider and several bats.

Devil's Den

This cave is located about one mile south of Flintstone in Allegany County and lies 150 yards east of the road in the side of a hill. The origin of the local name of this cave has not been determined. From the large vertical entrance which drops about six feet the cave extends about 70 feet to a single room. This room is 10 feet wide, 20 feet long, and averages $3\frac{1}{2}$ feet in height. The east wall and north end of this room are covered with dripstone and flowstone.

The only animal life found was near the entrance and consisted of several spiders and cave crickets and one young specimen of the longtailed salamander.

Goat Cave

This small cave is located on Patterson Avenue just inside the city limits of Cumberland in Allegany County. The name originates from the

reputed incident of a billy goat entering the cave in an effort to escape capture. The height and width of the passages and rooms of this cave are quite small requiring crawling or sliding on the part of the investigator. Two levels of passages occur and total more than 150 feet in length. Several blind passages end in clay fills or chokes. The only formations in the cave are on the walls of the 15 foot vertical passage that connects the two levels.

Abundant animal life found on two separate visits included spiders, flies, moths, beetles, and centipedes. Most interesting of the animals found were several specimens of an elongate fly larva that had built webs on the under side of ledges near the back end of the cave. Each web consisted of a single coarse strand of silk about six inches long suspended and supported by several guys attached to the wall and ledge. The larvae resisted capture by sliding back and forth along the main thread.

John Friend's Saltpeter Cave

This is the second largest cave now known in Maryland. It is located in the side of a rolling hill on the farm of Mr. John Friend about two miles northwest of Sang Run in Garrett County. From the vertical entrance, which is about 20 feet deep, the cave meanders more than one-quarter of a mile in a southwesterly direction. The upper of two levels is only 150 feet long. A small, active stream flows through the lower level which lies 40 feet below. Points of interest in the cave include a large drip-pool about 200 feet from the entrance, an interesting series of rooms 300 feet from the entrance, the "saltpeter rock" which is believed to be the remnants of a large stalagmite, and a large stalactite shaped much like a hornets' nest. The two formations are located near the back end of the cave.

The walls of the cave are covered with dates, names, and initials telling of earlier visits. A series of dates and names running from the present time back through the years to 1776 were recorded. The earliest date, that of 1776, was accompanied by the name, Mary Hinebaugh.

Animal life collected on three different visits included four springtails, three flies, several mosquitoes, one species of cave cricket, three species of harvestmen, and two species of spiders. A young Allegany wood rat was noted running along the wall about 150 feet from the entrance. Nests, believed to be those of this rodent were seen in several places. Three species of bats are recorded from the cave.

Plant life observed consisted of many lichens on the walls, some occurring thirty or more feet from the entrance and long, filamentous fruiting bodies of a fungus growing in the numerous rat droppings.

Mt. Etna Cave

Although developed for commercial purposes, this cave is not open to the public at the present time. It is located about three miles north of Beaver Creek on the road between Boonesboro and Cavetown in Washington County. The owner, Mr. C. C. Martin, accompanied the author on two visits to the cave.

From the entrance the cave runs southeast about 300 feet along a well decorated passage. Most of the formations are on the west wall and occur in such profusion that the passage at times is almost blocked. Northeast of the entrance are three rooms averaging 25 feet in width and 10 feet in height. These rooms are also nicely decorated. The exit is cut in the west wall of the northernmost room.

Animal life found in this cave consisted of young mites found on the surface of a drip pool and one specimen of the cave spider, Nesticus pallidus Emerton. Several bats were also noted.

Snively's Cave

Located on the Snively farm about two miles southeast of Keedysville in Washington County, the entrance to this cave is small and quite difficult to find. It occurs in a face of limestone on the east side of a stream which forms the west boundary of the farm. From the very small entrance the cave opens up into three medium-sized rooms which develop toward the southeast and are connected by narrow passages. The total length of all rooms and passages is less than 200 feet. Two drip pools occur in the innermost room. Formations consist of several columns, many stalagmites, and a series of rimstone pools.

Life found in the cave consisted of several species of spiders, several mosquitoes, one cave cricket, and several specimens of the Georgian bat.

Twiggtown Cave

This cave, the largest in the state, is located on the farm of Austin Twigg at Twiggtown about seven miles east of Cumberland in Allegany County. The entrance lies about 100 yards southwest of the farm house in the side of a knoll and consists of a vertical slit in the rock about 15 to 20 feet deep. From the entrance the cave develops toward the southwest in four levels. The upper level consists mainly of a large "L"-shaped hallway about 15 feet wide, 10 to 20 feet high, and 60 to 70 feet long. The second level, situated to one side and about 20 feet below the top level, is a slanting hallway over 200 feet in length and averages 15 feet in width and height. At the lower end vertical shafts connect this level with the third level. These shafts do not permit complete exploration of this room. In normal seasons the third level, which lies 50 to 60 feet below the second, is the bed of an active stream. During dry seasons a fourth and apparently blind level lies below the stream bed. This level fills in wet seasons permitting the stream to flow along the third level. At the stream bed the cave has been explored about 300 feet downstream but nothing is known of the portion upstream. Downstream this level ends at a funnel-shaped opening in the floor through which the stream pours with a deafening roar. Many side passages are found on the first and third levels and most were left unexplored.

Life found in the cave was of particular interest. About 40 feet from the entrance hundreds of the striped cave cricket were noted on the walls and ceiling. At this point the walls and ceiling were sculptured with many

grooves and pockets and each indentation contained from one to ten crickets. Near the angle of the "L"-shaped first level a single-stemmed white leafed plant was observed. It was about one foot in height and contained no chlorophyll. No identification was made and it was missing on a later visit to the cave. Just beyond the plant the still recognizable body of a rabbit was found. Apparently the animal had fallen in the entrance and had died after moving a short distance into the cave. The walls and floor of all levels were heavily coated with mud so no life was found after the first 100 feet. A single spider was taken at the bottom of the entrance and several bats were noted in the first room.

SHALLOW CAVES

Under this section are placed those caves that are natural openings but do not run to complete darkness. Overhanging ledges and cracks and crevices in rock taluses are omitted. Caves of this type often indicate the presence of deep caves in a region. They are also of particular interest to the archeologist as Indians frequently used them on hunting trips for overnight camp sites.

Beaver Run Cave

The entrance to this refuge cave is located on the north bank of Beaver Run about five miles east of Alesia in Baltimore County. The cave runs back about 20 feet to partial darkness from the 3 foot entrance and ends in a low room about 10 feet wide, 10 feet long, and 3 to 4 feet high.

Two species of spiders, one the cave orb-weaver, Meta menardi Latrielle, were found near the entrance.

A test digging in the talus slope at the entrance yielded many fragments of charred bone but no artifacts.

Camel's Den

This is a refuge cave located about one-half mile southeast of Daniels in Howard County. Natives gave the cave its unique name and have used it for beer and card parties for many years. It is about 15 feet deep, 6 feet wide and 6 to 8 feet high.

Two separate archeological diggings have been made at this cave. Large numbers of artifacts were reputedly removed on both occasions. A test digging made in 1943 revealed no remaining artifacts.

Cavetown Quarry Caves

Three small caves are located in a limestone quarry at Cavetown in Washington County. Two of them open in the working face of the quarry and a third just outside of the workings. Those in the quarry are simple solution tunnels that appear to be remnants of a larger cave once located at the quarry site. The third includes a small room about 20 feet in diameter.

No fauna was collected.

Cumberland Quarry Caves

Two simple solution tunnels occur in the face of a quarry that parallels Valley Street in Cumberland, Allegany County. They are located in the east wall and neither of them extends more than 20 feet.

No fauna was collected.

Murley's Branch Cave

The entrance to this cave is on the east side of the road about one mile south of Rush in Allegany County. It is visible from the road as a large spring emerging from the rock face. The cave divides five feet inside the entrance; the west lead extends about five feet further and then dips to the surface of the water, while the east branch turns perpendicularly to the entrance and leaves the water and extends for about 20 feet. Formations of flowstone line the walls of the east lead.

Many spiders and cave crickets were found on the walls and ceiling of this cave. A pair of the common water snake, Natrix sipedon sipedon (Linne), was taken from the east branch. Several bats were also seen in this lead.

Round Top Cave

This small cave is located within 100 feet of the top of Round Top Mountain near Hancock in Washington County. The vertical entrance lies about 25 feet north of the road. There is a single room about 30 feet below the entrance; it is about 20 feet long and tapers out at both ends. The west wall of the room is well decorated with flowstone.

Animal life in the cave consisted of a species of cave cricket and several spiders.

Sand Cave

This is the largest refuge cave in the state. It was completely reported in the July 1944 issue of this Journal.

POND POLICE

by

Irving L. Towers

A few miles south of Laurel there occur a series of ponds and pools excavated years ago during the removal of iron ore for the furnaces at Muirkirk. Two of these ponds are located on an adjoining 20-acre, wooded tract of

heavy clay land. A casual survey of the mosquito production and its control in them affords a diversion and in addition has, perhaps, a utilitarian value as well.

The first of these ponds to be studied is about 80 feet in diameter and is approximately waist-deep in the middle. It is spring fed, the water being comparatively clear with a fairly constant temperature. An aquatic grass rims most of the margin and in addition it supports a close growth of an emergent weed further out from shore. A moderate degree of shade is afforded for over one-half way around and withal it makes an ideal habitat for a host of small aquatic forms.

The plants occurring here are so closely associated with mosquito production that their specific names seem worthy of note. Specimens sent to the Maryland University were identified by Professor Russell G. Brown who found the marginal grass to be rice cut-grass, Leersia oryzoides (L.) Sw., and the emergent weed with small ovate leaves to be the water purslane, Ludwigia palustris (L.) Ell. This latter plant grows in water up to about knee-deep with clusters of close set, 3/4-inch leaves emerging sufficiently to form a deep carpet on the surface. The cut-grass, attaining a height of about 18 inches, is usually found closer to shore. The older stems, in falling over into the water, form a dense protective mat for a variety of insect life while the new stems provide the necessary shade.

The anopheline or malaria mosquito finds conditions to its liking here, for during the season production is steady with four different species being collected. Wings of each type were mounted on micro-slides and deposited with the Museum. These were as follows:

Anopheles punctipennis (Say)
" quadrimaculatus Say
" walkeri Theobald
" crucians Weidmann

Approximately 90% of the mosquitoes in this pond are of the first named species.

In order to obtain the mature insects, the larvae or wigglers were first skimmed from the surface with a white china bowl and transferred to one-pint jars about half full of water. The jars are capped with muslin, labeled, and taken to the laboratory where the adults usually emerge after an interval of a few days.

The anopheline wiggler feeds mostly at the surface from whence it is suspended by four pairs of minute floats on its posterior segments as depicted in Figure 1. When observed under a low-power lens these floats look like asters with very short stems. The petals of the "flowers" are sharp pointed in order to cut through the surface film when the wiggler emerges from a dive.

The second pond to be studied is of nearly the same size, but by contrast is deeply shaded by a close growth of tall oaks and maples. The banks are steep and high without vegetation and the pond is also devoid of plant life. A powdery, green Euglena coats much of the surface, being favored by the high

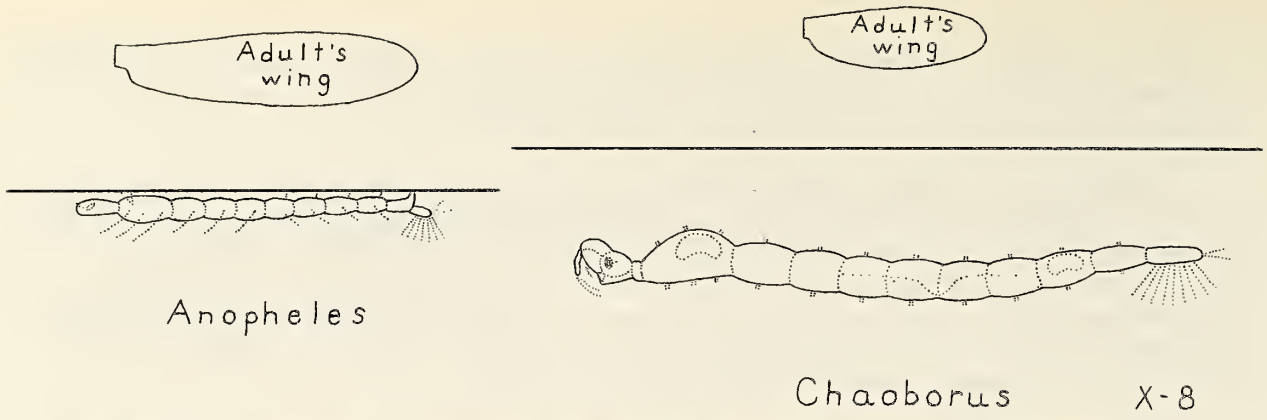

Fig. 1 Diagram to indicate relative aqueous content of larvae.

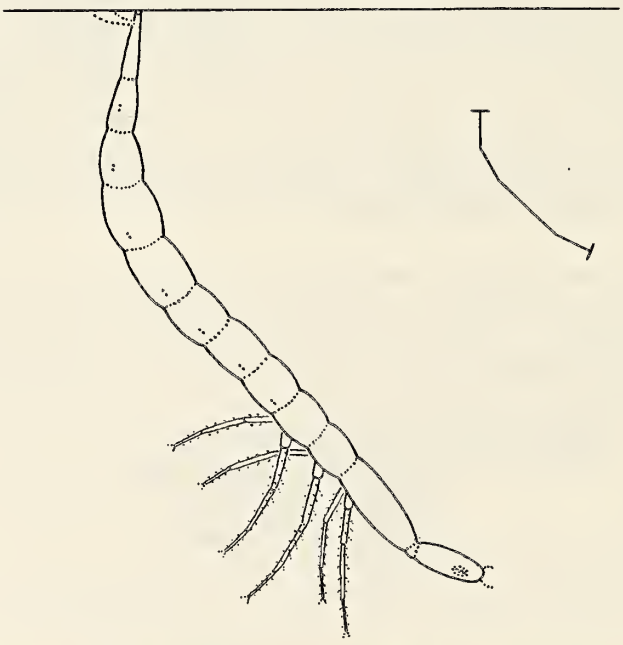

Fig. 2 Larva of a Diving-beetle, Acilius, breathing.

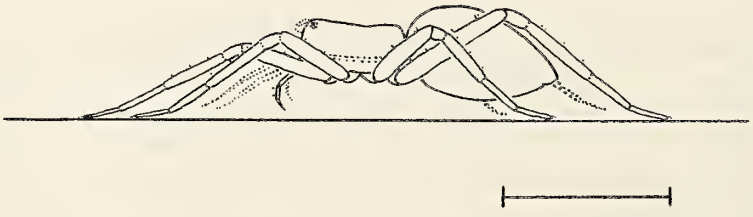

Fig. 3 A diving-spider, Dolomedes.

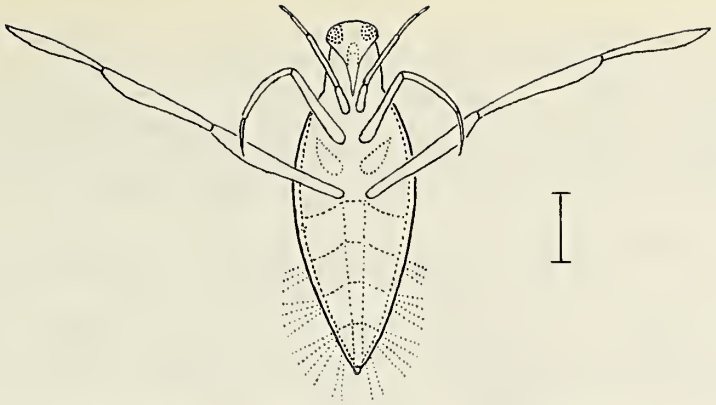

Fig. 4 A Back-swimmer, Notonecta.

banks which reduce surface disturbances.

The water is discolored and turbid from the presence of decaying vegetation consisting of fallen leaves which, being blown in from the surrounding woods, form a thick mat of compost on the bottom. Small frogs abound and a large specimen of the common water snake, in making its forays through the depths, keeps the water much roiled by stirring up the underlying clay.

Several dead saplings, which have fallen over and lie partially submerged, do not improve this somewhat unattractive setting and, in fact, it requires no stretch of the imagination to picture a mysterious, not to mention even a sinister influence lurking beneath the murky surface of the dark pool.

Were this pond additionally polluted from an animal source, this possibly would not be an over-estimation of its potential, for here dwell the phantom larvae of the short-beaked mosquito, Chaoborus flavicans (Meigen). This unusual wiggler derives its name from its almost transparent, illusive appearance and also, possibly, from the fact that the head, when viewed from in front through a hand-lens, is reminiscent of the symbol used by druggists to insure precaution.

Authorities state that the study of this mosquito has been neglected, as comparatively little is recorded concerning it. Possibly this is due to the distinctly unsalubrious breeding places it must of necessity select, for its young feed largely upon the small, free-swimming crustaceans which, in their turn,must find their nourishment suspended in the water.

A new note may be added to its life history by stating that this mosquito spends the winter in an active, larval stage. In being able to do this it takes advantage of an abundant food supply together with an entire withdrawal of its natural enemies.

Further deductions made from its biology might implicate it, indirectly, in the distribution of the dread poliomyelitis. This assertion is based on two premises; first, because of the extremely high aqueous content and the absorptive power of the larva and, secondly, because upon emerging this gnat shows a preference for ripe fruit. There are other mosquitoes which propagate in polluted waters and then feed on fruit juice but none other is exposed for this interval nor do the others have the permeable soma of the

phantom larva. The relatively high aqueous content of this wiggler is shown diagrammatically in Figure 1. Since the polio virus has been demonstrated in severely polluted water this is, perhaps, an important point to consider, for as this wiggler absorbs its oxygen directly from the water, the virus could doubtless also enter the tissues in a like manner.

The most favorable time to take these larvae during the winter is just after a light freeze when they may be frequently found in schools just beneath the ice. Further observations relative to this topic could be offered but the main purpose is rather briefly to describe some of the mosquitoes' enemies which are engaged in a work of suppression in this area. These are namely, a spider, a bug and a beetle.

It is probable that the most effective enemy of the entire mosquito family is the diving-beetle, Acilius, the larva of which is indicated in Figure 2. The adult is of approximately finger-nail size and simulates a small terrapin in shape. It commences its destructive activities at an early stage and continues indefinitely. Being known as the water-tiger while in the larval stage, it lives up to its name. It has derived this appellation because of its viciousness and possibly also from the way it prowls through the water in search of its quarry..

The larval beetle uses its fringed legs to paddle through the water where its progress is not rapid until the prey is sighted, when it lunges forward to make the kill. After seizing the mosquito wiggler in its tong-like mandibles, it shakes it like a terrier shakes a rat. The water-tiger usually takes the young mosquito by the head and after dispatching it, requires about ten minutes to suck the juices. The crumpled and depleted wiggler, upon being released, sinks slowly to the bottom, but this still is not enough. Younger and smaller beetle larvae, mere cubs as it were, wait below to attack the broken carcass and proceed to shake it thoroughly again before completing the extraction.

While searching through the cut-grass and purslane it was noted that spiders were unexpectedly numerous and varied as to size and markings.Several were captured and tested in aquaria in an attempt to gauge their mosquito-destroying propensities, but apparently only one small, comparatively insignificant species specializes on anopheline wigglers. This is one of the diving-spiders, Dolomedes. It has an olive-green ground color, dotted and dusted with silver. A narrow, longitudinal, red stripe is present on either side of the cephalothorax somewhat as indicated in Figure 3.

This small spider is necessarily cautious and does not often venture out over the open water in search of its prey, but instead it selects a likely location among the emergent stems and there awaits the approach of a wiggler. It stands with three or four of its hind feet grasping a stalk and with the others resting on the water, thus being in the enviable position either to advance, retreat, climb or dive as the occasion requires. When a wiggler approaches sufficiently close, it springs in a split second and, without releasing the stem, it grasps the unsuspecting victim in its out-stretched claws. Ingestion is slow as it masticates throughly and after about ten

minutes discards a pellet of pin-head size which floats away.

The third and last of these pond police is one of the true bugs. Known as the back-swimmer, Notonecta, it is of a mottled green color with red eyes and has a trailing pubescence somewhat as indicated in Figure 4. This upside-down posture has been assumed because it feeds at the surface, otherwise, on account of the position of its beak, it would have to simulate a shark and turn over on its back when feeding at the top.

It is a fast, furtive insect and when placed in an aquarium remained concealed by day under stones or stems. Anopheline larvae, supplied frequently, would regularly disappear during the night, but just how this was accomplished was not learned.

In considering these pond police collectively they would appear uniformly small, inconspicuous forms which might, themselves, readily fall prey to larger predatory forms, thus indirectly aiding the mosquito. Their efficacy is probably high, however, for both the diving-beetle and the back-swimmer are capable of flight and are thus able to patrol temporary ponds or to go wherever the mosquito breeding is the densest. The diving-beetle does not appear to be influenced by pollution while, on the other hand, the back-swimmer was noted only in comparatively clear water.

In summarizing it may be noted that each of these small insectivores has its own individual method of attack, thus working well together as a team. This recalls, in a way, the exploits of three athletes with the old Chicago Cubs, namely Tinker, Evers and Chance, whose collective ability to effect a double-play has, perhaps, never been surpassed on the ball field.

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THE BROWN KING SNAKE or MOLE SNAKE (LAMPROPELTIS RHOMBOMACULATA) IN MARYLAND

by

Henry F. Howden

The first Maryland specimen of the brown king snake, Lampropeltis rhombomaculata, was recorded by Charles W. Richmond in 1889 at Bladensburg, Maryland (No. 17294 U.S.N.). Several others were recorded from the District of Columbia about this time.

The general opinion seems to be that the brown king snake is very uncommon in Maryland. Fowler (1945) working on the herpetofauna of the National Capital Parks and the District of Columbia Region listed the brown king snake as uncommon, with no records from the parks. McCauley (1945) lists 17 records from the District of Columbia and Maryland. He states that they are very uncommonly found.

However, this opinion should perhaps be revised. Cope (1898) stated that perhaps they were not as rare as it had previously been believed, as eleven of these snakes were taken in and around the District of Columbia. Later, Blanchard (1921) said that "its apparent rarity is undoubtedly due to its secretive and burrowing habits, but it is sometimes found in the open".

In the spring of 1944 there were eleven of these snakes caught within a radius of ten miles of College Park, Maryland. Nine of them were caught in the Patuxent Game Refuge. The other two I have in my possession. One was caught on the road leading into the Refuge; the other was caught on the Washington Boulevard, one-half mile north of College Park. It was on the side of the road and several boys were busy exterminating it. When the snake was rescued its back was broken and it had to be preserved. This snake had unusually light coloration, the blotches being very pronounced. This condition is usual in young snakes, but not in adult specimens.

Several of the snakes mentioned above were caught along the edges of fields which were bordered by woods. This seems to indicate that, at least in spring time, the mole snake is not as secretive as supposed. Ditmars (1907) mentioned finding a specimen in the open.

The mole snakes caught in Maryland around College Park averaged in length between two and one-half to three feet. The adults are brown in color, fading into a lighter yellow-brown along the sides. Along the back there are 50 to 65 blotches of dark brown, edged with black. The blotches are six to seven scales wide transversely and two to three scales wide along

the median line of the back. There is another alternate row of blotches, much smaller and indistinct, along the sides. These blotches do not cover more than three or four scales.

In the adult snake this pattern becomes very dark, and just before shedding, the snake appears to be a uniform dark brown unless examined in a strong light. Miller (1902) described an adult of this description. The abdomen is a cream or yellowish color, irregularly spotted with reddish-brown blotches. In very young specimens the pattern is very pronounced, the blotches along the back being a bright reddish-brown. Even in some adults this pronounced pattern may be noted. Hay (1902) described a well-marked specimen.

The first mole snake that I obtained was caught on May 4, 1944, about one-half mile north of College Park on the Washington Boulevard. The day was clear and warm, the temperature being about 75 degrees F.; the time, eleven A.M. It has already been mentioned that its back had been broken by some small boys. This specimen is thirty and one-half inches long, the tail being four and one-eighth inches long. Its greatest diameter does not exceed one-half inch. The markings on this snake were very pronounced, the blotches along the back being a brick red. The scale count around the neck is 21, in the middle of the body 21 and 23, and just before the anus 19. The ventrals number 201, the caudals, 46. The locality in which this snake was caught was fairly heavily wooded, with a sandy and gravelly soil. There was a moderate growth of underbrush with numerous fallen logs.

The second specimen was caught on May 8, 1944, about two-thirty P. M. on the edge of the road leading into the Patuxent Game Refuge. It was a clear, warm day, about eighty degrees F. On each side of the gravel road were several fields and open woods. The soil was sandy, mixed with clay, with several small streams nearby. This was the type of location in which many of the mole snakes were caught.

The specimen, which remained alive and in good condition until February, 1945, when it was preserved, was 45 inches long. The scale count at the neck was 21, in the middle of the body 22, and just before the anus 21. The number of ventrals was 199, of caudals, 46. The snake shed one week after being caught, again on August 9, 1944, and then on September 20th. After the third shedding the snake had increased five-sixteenth of an inch in length since the day it was caught.

During the summer, this mole snake consumed two mice a week on the average. Lizards were put in the cage but this snake seemed to prefer mice. It even fed just before shedding. The snake quickly became very tame, and fed while being handled. This seemed unusual for, from all reports, the mole snake is a morose captive. Blanchard (1921) stated that "generally speaking these snakes are sluggish captives and uninteresting in captivity".

The method of feeding is usually by constriction. However, at times, the specimen mentioned would seize a mouse by its head and kill it by wedging the mouse in a corner of the cage with a coil, pressing it to death.

Many times this did not work and the snake would resort to constriction. When dead the mouse was seized by the head and gradually swallowed. The entire process took from thirty minutes to an hour. Toward the end of September this snake began to feed at more irregular intervals and not as readily as before. This perhaps was due to the change in the weather and the tendency of the snake to hibernate, as the specimen remained in good condition until February, 1945, when it was preserved.

Little is yet known about the breeding habits and natural food of this interesting species of snake. However, Groves (1943) obtained a Maryland specimen 41 inches in length, near the District of Columbia, which laid 15 eggs on July 11th, 1936. Unfortunately, the eggs did not hatch.

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CHROMITE IN HARFORD COUNTY, MARYLAND

Supplement to Article in January 1946 Issue compiled

by

Charles Ostrander, L. Bryant Mather, and Etra M. Palmer

The chrome mines of Harford County rose to prominence as the meager supply taken from Bare Hills mines failed to fill the ever increasing need of the rising demand for chrome. Several areas of serpentine were located in Harford County, only one of which was found to contain enough chrome ore to warrant exploitation. This deposit lies about two miles northwest of Coopstown and about a mile east of Jarrettsville where the Reed and Wilkens mines are located. The area at Chrome Hill and Cherry Hill were prospected and several buddles established, but no major attempt at mining was made. The old Ayres mine at Chrome Hill was the largest.

THE REED MINE

The Reed mine, which proved to be one of the most productive chrome mines in the State, is located about one mile northeast of Jarrettsville and about two miles northwest of Coopstown on the Reed farm. It is credited with an output of more than 100,000 tons, which were taken out during the two main periods of the mine's operation during the middle and later 1800's. About 30 tons of ore were found on the surface within a circle roughly one hundred feet in diameter. A shaft was sunk on the site which at the depth of eight feet encountered a pocket of ore dipping 75° westward. The deposit proved to be 80 feet in length, 25 feet in width, and four to eight feet in thickness. Two smaller pockets were found nearby. At the southern end of the operations a quarry with a working face 180 feet long and 15 feet high supplied road material.

An opening about six feet wide, now filled with water to within 15 feet of the top, runs from this point for 100 feet in the direction 60°W, and thence S 75° W for another 100 feet. Twenty feet north to the west end of this opening is a shaft, and 100 feet north of the shaft a series of cuts and pits running S 75° W for 200 feet. Another series of such openings parallel to the former lies 25 feet to the north of it and has a length of 125 feet. The mine was reopened in 1922 by the Maryland Chromite Company and later in the 1940's, but operations have been short lived.

Minerals are -

Serpentine varieties,	Chromite
Picrolite	Rhodochrome
Williamsite	Magnesite
Chrysotile	Brucite
Baltimorite	Limonite
	Chalcedony

THE WILKENS MINE

The pits of which the old Wilkens mine consist are to be found just off the road about a mile northeast of Jarrettsville on the road to Coopstown. Six openings were made and worked for two years about 1870, but little massive ore was found. The widely disseminated character of the ore made it impractical to continue operation. Most of the refuse from the pits has been carried off for road stone.

Minerals -

Serpentine varieties,

Williamsite (translucent)	Chromite
Picrolite	Rhodochrome

COOPSTOWN AND VICINITY

On the serpentine barrens and around the old chrome prospects, are found the following minerals -

Chromite	Bronzite	
Picrolite	Aragonite	
Antigorite	Chlorite	
Williamsite	Deweylite	
Rhodochrome	Magnesite	
Actinolite	Dendritic Wad	
Talc	Magnetite	) Tyson
Diallage	Chalcopyrite	)

AYRES MINE

A mile and a half east of Chrome Hill on the John Ayres farm is located the Ayres Mine which consists of an opening 30 feet long, and four to eight feet wide now full of water. It is claimed the pit reached a depth of about 75 feet, which is corroborated by a fairly large dump. The mine was in operation about 1870 but yielded little ore.

GIFTS TO THE SOCIETY

We wish to express our thanks and appreciation for the very fine gifts recently received from our members and friends.

Miss Olga Kelly presented us with the entire collection of lichens of her father, Dr. Howard A. Kelly, Fellow of this Society. She also presented a collection of minerals, fossil fish, insects and cabinets, turtle shells, two walnut filing cabinets, and a series of lantern slides of reptiles, fungi and snow crystals.

From Mrs. Edward McColgan, wife of the late Edward McColgan, who was Curator of Photography, we received over 1000 negatives of natural history subjects, a number of nature books, an Encyclopedia, and a quantity of photographic equipment.

From our member Mr. Leander McCormick-Goodhart, our library received a fine collection of books, mostly on birds.

A collection of Coleoptera of the eastern United States, was donated by Mr. Henri Seibert, a member of our Society. This collection consists of approximately 700 identified species of beetles, with many Maryland records. These will be a very valuable addition to our present study collection.

LECTURES AT THE SOCIETY DURING

OCTOBER, NOVEMBER and DECEMBER, 1945

and

JANUARY, FEBRUARY and MARCH 1946

October 23 - Illustrated lecture by Dr. Joseph T. Singewald, "Across Africa from Capetown to Cairo".

November 6 - Lecture by Charles W. Ostrander, "The Building Stones of Maryland".

20 - Illustrated lecture by James A.Fowler, "Amphibians and Reptiles, Their Habits and Habitats".

December 11- Illustrated lecture by Elra M. Palmer, "Water Fantasy"

January 22 - Lecture by Ivan B. Anthony, "Moose and Pheasants and Trout".

February 12- Illustrated lecture by Earl H. Palmer, "The Identification of Trees by Their Twigs".

26- Illustrated lecture by Benjamin T. Kurtz, "Africa from Cairo to Casablanca".

March 12- Lecture by Sgt. Elias Cohen, "Migration of Bats: Experiments and Results."

March 26- Annual meeting of the Society. Reports by the President and Curators. Sound and color motion picture, "Realm of the Wild".

JUNIOR DIVISION MEETINGS

September 15- Nature discussion.

22- Illustrated lecture, "Minerals and Mineral Localities in Maryland" by Herbert Bangs and Harold Levey.

October 6- Lecture by Edmund B. Fladung, "Photographic Hints for Beginners".

12- Talk by Douglas Oler, "Some Facts in the Past Lives of Our Maryland Indians".

20- Laboratory work night.

27- Sound motion picture, "Wheels Across Africa".

November 3- Laboratory work night.
10- Talk by Franklin Atwell, "Conservation"
17- Lecture by Edmund B. Fladung, "Cobbs Island, the Home of Gulls, Terns, and Skimmers".
24- Nature Quiz.

December 1- Nature discussion.
8- Talk by Jim Kuethe, "Collecting of Natural Science Material".
15- Lecture by Charles Ostrander, "The Solar System".
22- Annual Christmas party.

January 5- Nature discussion.
12- Lecture by C. Haven Kolb, "Bio-Geography"
19- Talk by Charles Freed, "The Atom".
26- Laboratory work night.

February 2- Sound motion pictures, "South America from Miami and Back Again", "Fishing in Idaho".
9- Nature Discussion.
16- Laboratory work night.
23- Lectures by Romeo Mansueti, "The Fathers of Herpetology," and "Natural History while a Prisoner of War".

March 2- Nature Quiz.
16- Talk by Jerry Hardy, "The Natural History of Camp Conoy".
9- Lecture by Irving E. Hampe, "Modern Bird Study".
23- Society Birthday celebration. Sound motion pictures "South of the Border" and "Introduction to Haiti".
30- Junior Division host to Y.M.C.A. Nature Club. Speakers Jerry Hardy, Charles Freed, and Jack Hill.

OTHER MEETINGS

November and February 22, 1946 Junior meeting of the Maryland Fish and Game Protective Association.
First Wednesday of each month, The Isaac Walton League.
Second Friday of each month, The Maryland Ornithological Society.

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FRINGED GENTIAN
Photograph by
Elra M. Palmer

MARYLAND

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MARYLAND

A JOURNAL OF NATURAL HISTORY

Nature gives to every time and season some beauties of its own; and from morning to night, as from the cradle to the grave, is but a succession of changes so gentle and easy that we can scarcely mark their progress. ----- Dickens.

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VOLUME XVI No. 3
JULY 1946

Cicada

By Gilbert C. Klingel

SUMMER SONGSTER

LIMULUS POLYPHEMUS - THE KING CRAB

by

Bryant Mather

Any one of several more dramatic titles could have been chosen for use in connection with this article, and indeed others who have written about Limulus have used titles such as "Witness of the Past", "Living Fossil from the Sea", "America's Oldest Animal", "The Oldest Inhabitants", and so on. It is however not the purpose of this article to dwell so much on the ancient lineage of Limulus, interesting though that subject is, as it is to suggest that proper consideration be afforded Limulus as a member of the contemporary fauna of Maryland. At the outset it is the writer's desire to make clear the fact that he is not a biologist nor can he, in this article, contribute any data that are new to science. If this note regarding Limulus were to be regarded as in some way extending the coverage of the Arachnida of Maryland in the publications of this Society and hence supplementing the excellent work of Dr. Muma * on the spiders, the aim of the writer would be fully realized.

Although the specimens which are figured herein were taken in New York and Florida, they are regarded as typical not only of those states but also of material which might be obtained in Maryland. It is regretted that individuals from Maryland were not available to the writer for use as illustrative material. Mr. Elra M. Palmer ** has recorded that a number of tests and small specimens have been taken at Miles River, and large animals are occasionally taken in the Chesapeake Bay. He also mentions having taken a specimen which measured two feet in length at Cape Henlopen on the Delaware Bay; the specimen shown in Figures 1 and 2 is about this size.

Limulus polyphemus, Latr. is usually regarded as one of the two contemporary species of the genus Limulus, the other being L. molluccanus which is found in the waters of eastern Asia from southern Japan to Singapore.*** Limulus is the only recent genus of the class Xiphosura and has existed relatively unchanged since the Triassic; however, at least six species assigned to the genus are known from Triassic rocks, all of which are different from the two recent species.

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* Muma, Martin H., "Common Spiders of Maryland", Natural History Society of Maryland, Baltimore, 1943.

** Palmer, Elra M., "The King Crab (Limulus polyphemus)", Bulletin, Nat. Hist. Soc. of Md., vol.XI, No. 5, May-June 1941, p.90.

*** Of the several authorities consulted in the preparation of this article (see Bibliography) only one, (5), suggested that other genera than Limulus existed in the class Xiphosura, or that there were more than two living species in the genus Limulus. This reference assigns L. polyphemus to the genus Xiphosura and sub-divides L. molluccanus into two genera and four species : Tachypleus gigas (- molluccanus), T. tridentatus, T. hoeveni, and Carcinoscorpius rotundicauda. Since the writer is not in a position to consider the validity of taxonomic usage in this matter, he will follow that of the majority of the authorities which he has consulted.

The recognition that Limulus was more closely related to spiders and scorpions than to the crustaceans, and hence properly classed as an arachnid, was first made in 1829 by Straus-Durckheim. Subsequent work by such men as Lankester (8) and Owen (11) in the last quarter of the last century definitely established Limulus as an arachnid. Since Limulus more closely resembles the extinct, but paleontologically very important trilobites, than any other living creature, no text-book on paleontology, (e.g.(2),(13)) or historical geology, (e.g. (7)) fails to discuss the anatomy and habits of Limulus in connection with the consideration of trilobites.

Limulus polyphemus occurs along the eastern coast of North America from Maine to Yucatan and is frequently found in great numbers. A single specimen was taken in the harbor of Copenhagen, Denmark in the 18th century, but is believed to have been taken over from North America while clinging to a ship or by some other artificial means. Both Crowder (4) and Ley (9) quote the statement by Fowler (6) that in 1850 a resident on the shore of Delaware Bay could have collected 100,000 specimens a week on a beach frontage of 100 rods and that 1,200,000 could have been taken on a single mile of beach in 1856. Crowder (4) then expresses the fear that at the present (1923) rate of decrease the species will be practically exterminated during the lifetime of persons now alive. Ley (9), on the other hand, cites the National Geographic Magazine as a reference for the statement that in 1927, 500,000 were collected at Bowers, Delaware; and goes on to state his belief that no danger of extinction exists.

It has been said that the meat of Limulus is a more tasty seafood than that of the lobster. In the East Indies L. molluccanus is used not only as a food animal but it is reported (5) that the natives save the telsons (spines) as tips for weapons and the carapaces for use as ladles or pans. The chief uses made of Limulus in the United States have been as fertilizer, which has been sold under the name "Cancerine" at $25.00 to $30.00 per ton, and as poultry food.

The name of the class, Xiphosura, is derived from words meaning "sword-tail", a reference to the posterior spine; and the name Limulus is derived from words meaning "cross-eyed". The blunt, semi-circular, anterior carapace, known as the cephalothorax or prosoma, from which the popular designations of "horseshoe crab" or "horsefoot crab" are derived, stamp Limulus as a bottom dweller which is more at home in mud than swimming freely in the water. The position of the eyes on the dorsal surface is likewise indicative of the adaptation of the species to living on the bottom. The cephalothorax carries seven pairs of appendages on its underside and bears not only two large compound eyes which are laterally-directed from the most elevated central part of the top but also a pair of eye spots near the frontal margin. The abdominal segments are consolidated and the mesosoma and metasoma are not differentiated, being covered by the posterior carapace which carries a row of marginal spines. The posterior carapace is the portion of the animal most likely to be preserved and washed up on shore after death. The writer has collected posterior carapaces of adult Limuli along the strand at Rye Beach, N.Y. on several occasions when complete specimens were not found. The muscles between the cephalothorax and the abdomen and between the abdomen and the telson are powerfully developed. Of all the arachnids, only in

Limulus has the mouth moved backwards, become enlarged and surrounded by the basal joints (gnathobases) of the prosomatic appendages. Limulus is also the only arachnid that takes other than liquid food. The feeding habits of Limulus are very remarkable, consisting of a search of the bottom for marine worms and small molluscs which, when found, are delivered to the region of the mouth by movements of the appendages. The food animals are then masticated between the gnathobases or basal joints of these same appendages, and finally the masticated food is taken into the mouth.

The respiratory organs of Limulus are gill books which consist of piles of tiny leaflets through which the blood circulates, and are the most primitive type of such organs. There is a special muscular mechanism for opening and shutting the leaflets in the water and thus facilitating gaseous exchange. Gill covers and a lid-like operculum have also been developed to prevent the gills from becoming fouled by the mud in which Limulus lives.

Adult Limuli spend most of their time off shore in water from two to six fathoms in depth and come up on shore only in May, June, and July to breed. During these months, at times of high spring tides, the adult female will crawl toward the shore and climb up the beach to slightly above the high-water mark. In this progression she carries the smaller adult male Limulus on her back, he holding on by specially developed "nippers" on one pair of appendages. Frequently he in turn will have another male holding on to his telson, and occasionally a whole string of males will be hitch-hiking to shore in series on and behind a single large female. Upon arrival at the desired point on the beach, the female digs a shallow hole in which she deposits upwards of 10,000 green, perfectly spherical eggs, each about 1/12 of an inch in diameter, in total volume about 1/2 pint. The male then assumes a position over the eggs and, in a manner suggestive of the procedure of fertilizing the eggs employed by frogs, deposits the milt by which the eggs are fertilized. This process completed, the adults return to the sea leaving the eggs to be hatched by natural processes.

After about one month, assisted by solar heat, the eggs hatch and larval forms about 0.1 inch in length emerge. These larvae lack a telson and are three-lobed in shape and hence are known as the "Trilobite" stage. Limulus is again unique among the arachnida in passing through such a larval stage. These larvae return to the sea and pursue a planktonic existence, moulting about six times during the first year. The telson appears after the second moult and at the end of the first year they are about one inch long. Between the first and fourth years they moult only about once a year and reach maturity at the age of four years. In moulting the shell splits along the front edge of the anterior carapace and the animal merely crawls forward out of it. Full grown Limuli reach lengths of $2\frac{1}{2}$ feet and have carapaces about one foot in width. The adult specimen shown in Figures 1 and 2 is 23 inches in length and has a carapace 11 inches wide.

Limulus is an extremely awkward swimmer, usually preferring to move about by crawling along or plowing through the mud of the bottom. According to Arnold (1) the thoracic feet are used when crawling, while when swimming the abdominal appendages are employed. The telson is used both for the pur-

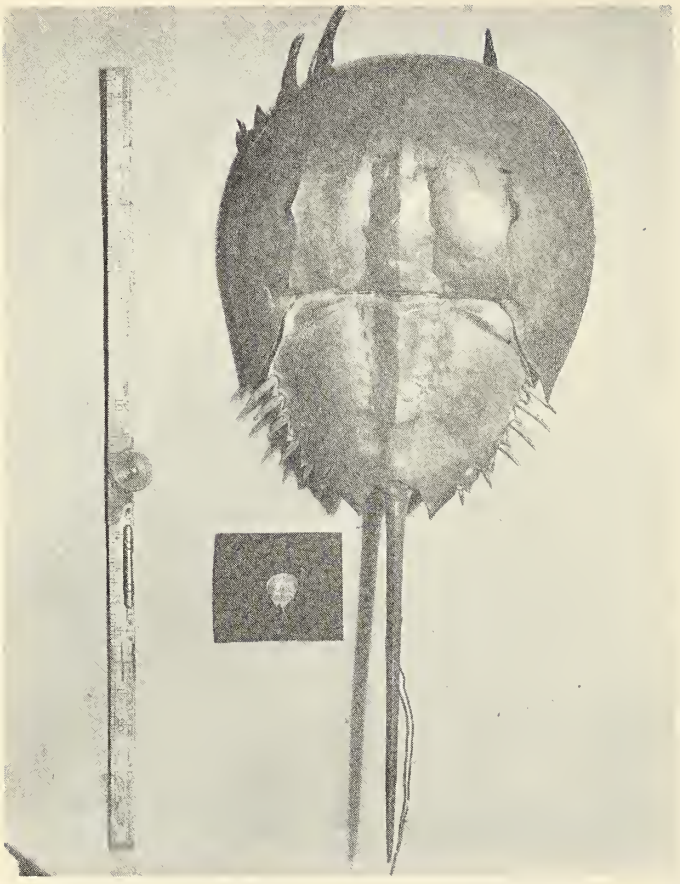

Figure 1 - Limulus polyphemus, Latr. Dorsal view of adult and of young individuals, taken at Rye Beach, New York, October 12, 1944.

Figure 2 - Ventral view of adult Limulus shown in Fig. 1

pose of righting the animal when overturned and as a lever when more rapid movement is desired. Verrill (14) says that when Limulus wants to swim it levers itself up into the water from the bottom by pressing down with the telson. Then, off the bottom, it paddles furiously but without making much progress, soon sinking again to the bottom. The fact that considerable use of the telson had been made by the individual shown in Figures 1 and 2 is evidenced (Fig. 2) by the noticeable degree to which the undersurface has been abraded for about three inches near the tip. Experiments reported by Crowder (4) showed that, although Limulus can detect light, its vision is extremely poor. Crowder observed that Limulus finds its way to the shore and back to the sea by going up and then down the slope and is not handicapped in this process if its eyes are covered by asphaltum.

Various sorts of sessile marine organisms frequently attach themselves to the carapace of Limulus. Rogers (12) reports that upwards of 100 limpets (Crepidula) may be found so attached to a single adult. The specimen shown in Fig. 1 carries a small barnacle near the right hand margin of the posterior carapace.

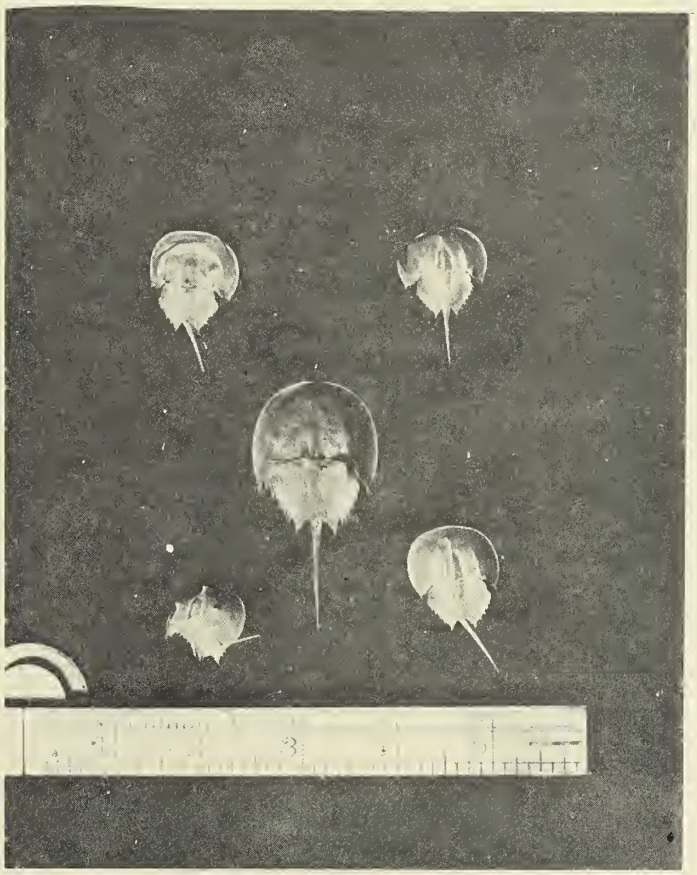

Figure 3 - Dorsal views of young Limuli. Center specimen from Florida; others collected at Rye Beach, N.Y. October 12,1944

The class Xiphosura is known to date back as far as the Cambrian, and the genus Limulus has existed since the Triassic, its remains having been found in the Bunter sandstone of that age in the Vosges Mountains. Fine specimens have been found in the Solenhofen limestones of Jurassic age in Germany and others are known from Cretaceous and Tertiary beds. These ancestral Limuli lived in both marine and fresh water environments. Appropriate to this ancient lineage is the fact that Limulus is quite literally a blue-blooded animal. It is almost inevitable that such a creature should be considered by at least some students as a "missing link". Most biologists regard attempts to indicate it as an ancestral form to higher groups as ingenious but illusory since it is evidently a highly

specialized type. However at least one such speculation may be mentioned. Reference (5) mentions that W. H. Gaskell has selected Limulus in a very general way as the closest living representative of such an arthropod type as might in his opinion, have been the vertebrate ancestor. He finds remarkable analogies between the organs of Limulus and various structures in the vertebrates. He points out that when the earliest known craniates appeared, large arthropods, essentially like Limulus, were abundant, and thinks it possible that vertebrates arose from such a dominant invertebrate group.

Thus it may be that Limulus is not only one of our larger and more interesting contemporary invertebrates, which has many features unique among other living invertebrates, but may also provide valuable clues to the behavior of creatures extinct for many eons.

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FOODS, DRUGS, AND POISONS OF THE NIGHTSHADE FAMILY

by

John P. Hill

The Solanaceae, the potato or nightshade family, is a relatively small botanical family of some seventeen hundred species in eighty genera, but it includes probably more plants of economic importance than any other single family. The family includes such foods as the white potato, tomato, the eggplant, and a multitude of varieties of the pepper.

Probably the most important member of this family is the potato (Solanum tuberosa), commonly called the white potato, Irish potato, or spud, which has an origin that belies its name since it is a native of Peru, where it has long been cultivated by the natives of the cool upland districts who used it for good. It was introduced into Southern Europe where it was grown largely as a curiosity. It is very uncertain whether the potato was introduced into the United States by the Spaniards or by native Americans. In any event it was taken to England by the early Virginia colonists. There the strains, which were returned to this country and primarily used here until about 1850, were developed. It gained early popularity as a food in this country, but was probably not generally accepted in Europe as such until the middle of the 18th century. At the present date it is an important article of diet to the inhabitants of the temperate regions of the world. It is also used occasionally as a stock food particularly for hogs. Industrially the culls and the surplus stock are processed to produce starch

and alcohol. The plant is two to four feet in height, with numerous spreading branches. The leaves are deep green, pinnately compound and variously lobed. The flowers are from one to one and a half inches in diameter - tubular, five-lobed, and white with blue or purple tones or stripes. The fruit is a globular berry usually containing many small seeds imbedded in a green pulp though often the seeds may be very few. The fruit is of little importance since it is used only in experiments to produce new varieties and is not the primary method of propogation. The green stems are annual, but the tubers will survive a moderately hard winter in the ground thus giving the plant a perennial nature, or a chance to regrow the following season. The tubers are formed at the tips of modified underground branches called stolons, which radiate outward from the base of the stem and are frequently mistaken for roots. The stolon and the tubers begin growth very soon after the appearance of the green portion of the plant. The mature tuber has a definite though modified stem structure. For commercial propogation tubers of choice shape and size are cut into sections containing two or three nodes or eyes in each of which is a bud. Because of the high content of starch in the tubers they are both an excellent food and an ideal method of producing a young plant which is well provided to start growth. These tubers range from brown through yellow to dull red in "skin" color, though the inner portion is almost always white. One strain apparently common only to the Peruvian Andes, and developed there by the natives, has a purple skin, is edible after freezing and, in fact, is not edible until frozen, thus becoming an ideal strain or variety for mountain people with little or no facilities for warm storage. In all green parts of the potato there occur poisonous alkaloids, solanin and solanidine, which may also occur in portions of the tubers which have been above ground and exposed to light long enough to become green in color. Tubers in this condition are generally discarded before they reach the market and if eaten may be poisonous. The potato is generally considered edible only when cooked.

The love apple is no longer considered poisonous; now we eat it under the name of tomato. The Lycopersicon esculentum (Bailey) is a native of South America where it grows wild, its habitat being similar to that of the potato - open patches or clearings in wooded or semi-wooded areas in the cool upland districts. In its native habitat the tomato is a short-lived perennial. However, in the United States it is generally an annual coarse herb with many partially erect branches, and alternate, compound, pinnate leaves five to fifteen inches long, having seven to nine short-stemmed leaflets. The stems are round, soft, and brittle in the young plant, becoming coarser, stronger and somewhat woody in the mature plant. The flowers are one-quarter to one-half inch in diamter, though sometimes smaller, with five sepals,

petals and stamens. They occur in clusters and are yellow; the corolla is somewhat tubular with recurving petals which are symmetrical and broadly lance-shaped. The fruit is a definite indication of the varieties which are possible in this particular species; namely, the large yellow tomato, the small yellow tomato (pear-shaped or oval), the cherry or cocktail tomato, the large pink meat or beefsteak tomato, and the several strains of the deeper red and somewhat more globular variety that comprise the bulk of the fruit which is marketed.

The fruit of the tomato plant is a berry in which the calyx is attached to the stem end and is not part of the fleshy portion. It is two to many-celled with pulpy flesh and numerous small kidney-shaped seeds covered with short bristly hairs. The fruit is eaten raw, stewed, baked, fried or pickled.

The tomato was introduced into Southern Europe in the late fifteenth or early sixteenth century and was probably known in Central Europe and England by 1600. In England, however, and upon its introduction into the United States, it was grown only for decorative purposes and was still considered poisonous even after it had become very popular as a food in Southern Europe. Probably the primary reason for the long delay in the acceptance of the tomato as a food in England and this country is the fact that it is a member of the nightshade family, which contains quite a number of poisonous species.

Solanum melongena, the eggplant, is a bushy plant growing to a height of from two to four feet with woody, hairy stems. The leaves are large, slightly lobed and alternate; the flowers are purple, two inches across and are borne opposite the leaves usually one to a leaf among the top leaves. The shape, size and color of the fruit indicate the commercial varieties of the plant; however, the botanical varieties are defined by shape and size. The most common variety has a large, pear-shaped or egg-shaped berry varying in color from dark blackish purple to a lighter purple or whiter yellowish color sometimes striped. The variety serpentinum has a long narrow shape (sometimes a foot in length) and is generally curved; the dwarf plant (var. depressum) is a smaller, less hairy plant than the other two varieties, with leaves that are nearly entire and fruit about four inches long. The plant is a native of India and its introduction into this country probably took place by way of Mediterranean Europe. It is cooked generally in one of two fashions - either peeled and baked or peeled, sliced and fried - generally after dipping in an egg batter. The market crop value is about $1,000,000 per year in this country.

Capsicum frutescens, the pepper, includes at least five botanical varieties, the products of which are known to the consumers as sweet or bell peppers, pimento, cavenne or chili, the cherry peppers, Paprika and Tabasco.

The pungent or biting aromatic flavor present in the fruit or seeds of the varieties of this species is due to the presence of the drug capsician. The peppers are a native of tropical America. They are now cultivated and used throughout the entire world. They were introduced into Europe by Columbus after his first voyage. The varieties as classified by Bailey in 1924 are five in number namely cerasiforme (cherry peppers), conoides (cone peppers), fasciculatum (red cluster), longum (long peppers) and grossum (bell or sweet peppers). These varieties are classified according to size, shape and pungency of the fruit and general size and shape of the plant. The leaves range from two to three inches in length in grossum, are generally oblong or ovate, a rich green color, entire, alternate or in adjacent pairs and rather smooth surfaced. The flower is greenish white, five petaled, five sepaled, with five stamens, is generally solitary and ranges from one-quarter inch in the smaller fruited varieties to an inch or more in the sweet or bell pepper. The fruit of all the varieties when ripe is red, varying from a bright red orange to a deep rich almost maroon color. In the bell peppers and pimento the podlike fruit is fleshy, somewhat leathery and sweet, not pungent; in the cherry, cluster, cone and long peppers it is very pungent. The seeds of all the varieties are rich in the sharp, biting drug capsician and are small, kidney-shaped, and white or greenish-white. The plant as a whole is herbaceous, or shrubby, having a tendency in a warm climate to be perennial, though it dies quickly when subjected to frost.

The peppers referred to here do not include the so-called black and white peppers which are products of the plant Piper nigrum of the family Piperaceae. This plant is a native of India and its sharp biting flavor is due to the aromatic oil present in the berries largely peperidic aldehyde.

The green, sweet or bell peppers are used as a food in many ways- raw, cooked and pickled. The pimento is a comparatively sweet pepper and, while slightly stronger in flavor than the bell peppers, is used in a similar fashion though generally cooked or pickled. The pungent varieties are used as condiments - as dry powdered flesh of the pepper, the whole fruit, or the juice pressed from the flesh of the fruit. The cherry peppers are occasionally pickled although they are rarely eaten by themselves.

The most important members of this family classified as drugs include Atropa belladonna, Datura stramonium (jimson weed), Capsicum frutescens

(pepper), Solanum dulcamara (bittersweet), Nicotiana tobacum (tobacco), and Solanum carolinense (horsenettle). The Paprika and pimento are also included as unofficial drugs. There are numerous other official and unofficial drugs in this family. Almost all the members of this family which are classed as drugs contain alkaloids. Alkaloids are powerful poisons; many possess high medicinal value; some are habit-forming. They are generally accumulated in the fruit, seeds, and bark of a plant, but are present in reduced quantities in all the plant. Some of the alkaloids derived from members of this family are nicotine, atropine, belladonine, scopolamine or hyoscine (truth drug) and hyoscyamine. Practically all the alkaloids present, including the ones mentioned above, as well as quite a few others are poisonous in large doses, are relatively habit-forming, and intoxicating or narcotic (nerve depressing, exhilarating, producing poor coordination, dilation of the pupils of the eyes in some cases, and in the case of scopolamine and possibly one or two others, a complete deadening of certain portions of the brain).

Those who are in any way familiar with the chemical composition of tobacco will freely admit that it is a drug; however, there is considerable difference of opinion as to whether it is beneficial or detrimental. Tobacco in a sufficiently large dose can be poisonous.

The species which is the source for most commercial varieties of tobacco probably orginated in South America, was introduced into Europe by the Spaniards, and probably was used in the British Isles two decades before the founding of the Jamestown colony. The species which the Virginia colonists found in this country was Nicotiana rustica and was the species cultivated by the North American Indians particularly those of the Atlantic Coastal areas. Nicctiana tabacum, which probably originated in Brazil, was introduced to the Jamestown colony, was successfully grown there, achieved great popularity and even became an article of trade or barter with the Indians who preferred it to their own rustica. The production of tobacco in the Virginia colony was probably the greatest single economic factor in its success as a crown colony, since the venture did not produce, as was expected, silk, gold, iron, and other products of value.

Tobacco is an annual, growing three to seven feet in height. The stem and leaves are very hirsute; the fairly large flowers are pink or purple to white or yellow and have a five-lobed, tubular, funnel-shaped corolla, five stamens and a capitate or head-shaped stigma. The calyx is five lobed, persistent and encloses the capsule. The fruit, which is derived from a two-celled superior ovary, is a two to four valved capsule containing many small seeds. The flowers are borne in large terminal racemes which sometimes branch. The position of the flowers makes it easy to remove flowers or the flower buds at any time during the plant's growth

period to facilitate the growth of leaves with certain particular characteristics. This process is known as topping. The leaves are alternate and simple; the matured leaves vary from eight to twenty inches in length and approximately half as much in width, are entire and frequently have a wavy margin.

Commercially tobacco is classified into several qualities and types. Some of the standard commercial types are: Perique, Burley, Broadleaf, Gebhardt and Havana seed. These types are classified by size, shape and color of the leaf, method of curing, gum, resin or juice content, burning characteristics and the locality in which they are produced. Curing methods vary from the air-cured, which is hung on sticks in a barn through which free circulation of air is allowed, to the flue-cured which is cured in a barn containing two large metal flues that run the length of the barn and back. The heat given off through the metal flues is the curing agent. The fire-cured type of tobacco is subjected to the heat and smoke of open fires.

The only portions of the tobacco plant generally used for smoking, chewing, or for snuff are the leaves. The stems and tops are sometimes used in the production of insecticides, and some Nicotiana rustica, which has a high nicotine content, is grown in this country for use in insecticides.

The annual tobacco production of this country is approximately two billion pounds. Under normal conditions our tobacco exports are slightly higher than our imports. Turkish or Oriental, Philippine and Puerto Rican are imported to blend with American tobaccos in the production of cigars and cigarettes, while American tobaccos are exported to countries all over the world to be used by local processors either straight or blended with other tobaccos. Both our exports and imports vary sharply with economic and political conditions in the buying and selling countries. Present prices paid to the growers of American tobacco vary from about thirty-five to sixty cents per pound. When this price is compared with the prices paid by the ultimate consumer it is easy to realize that tobacco is a large source of revenue and income to the tax-collectors and processors; however, it is to be realized that there is still considerable loss or waste in the tobacco as produced when compared to the finished product.

The most important drug plant in the nightshade family is the Atropa belladonna or the deadly nightshade. The belladonna is a perennial herb with a thick, fleshy, creeping root. The erect stem is three to five feet high, somewhat hairy, fairly heavily leafed, and branched at the top. The leaves are alternate, entire, and oval; the flowers are solitary with five-lobed calyx, a five-lobed, bell-shaped corolla which is purple with a yellow base, and have five stamens and a two celled ovary. The fruit is a black, globose, many-seeded berry with purple juice. The plant is not a native of America but was introduced from Europe as a drug plant and has become naturalized in a few waste places in the Eastern States. The plant is the source of the alkaloids atropine, belladonine and hyoscyanine. The ability of a solution of belladonine

to dialate the pupils of the eyes has long been known and has been used in various manners. Probably its earliest use along these lines was by women of Europe and Southern Asia to enhance their beauty. Apparently at that time all beautiful ladies were supposed to have been starry-eyed. Belladonna literally translated means "beautiful lady". Today, however, the drug's primary use in this fashion is to prepare the eyes for examination; it is also used as an anti-spasmodic and a relaxant. In excessive doses it is a deadly poison, as are all portions of the plant if eaten. The chief sources of drug solutions are the leaves and tops and the root.

The only other official drug plant listed in this family, with the exception of Capsicum which has been covered earlier in this article, is Hyoscyamus niger or black henbane, which was introduced from Europe, but has become locally rather common in Southern Canada and the Northern States. It is an annual or biennial herb. The stem is much branched, hairy and six inches to two feet high. The leaves are large, alternate, unevenly toothed, hairy and have a fetid odor. The flowers occur in leafy spikes, are similar in shape to the Belladonna, are botanically the same, but are thicker and broader. They are a full yellow color with prominent purple veins. The fruit is a two-celled capsule with numerous seeds and a transverse lid. It is the source of the alkaloids hyoscyamine, hyoscine and scopolamine. This plant is a deadly poison if administered incorrectly.

Solanum dulcamara, Solanum nigrum, Datura stramonium, Lycium halimifolium, and Physalis heterophylla are listed as poisonous plants in the United States. Solanum dulcamara, Brunfelsia hopeana, Duboisia myoporoides, Scopola carniolica, and Solanum carolinense are listed as unofficial drugs. Solanum psuedc Capsicum (Jerusalem-cherry), Petunia hybrida (Petunias) and Physalis alkekengi (Chinese lantern) are fairly well-known decorative plants of this family.

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JEFFERSON'S SALAMANDER IN MARYLAND

by

M. Graham Netting

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My friend Romeo Mansueti has generously called my attention to the fact that five Carnegie Museum specimens of Ambystoma jeffersonianum (Green) from Allegany County are the only preserved Maryland specimens of this species. He has insisted, furthermore, that I prepare a note upon these specimens from Maryland.

Ambystoma jeffersonianum was first reported from Maryland by Brady in his list of the reptiles and amphibians of Plummers Island, Montgomery County (1937, Proc. Biol. Soc. Washington, 50: 137). His entire statement with reference to the species was: "Breeds in the ponds in February. Known from eggs only on the property." More recently, Fowler included A. jeffersonianum in his list of "The Amphibians and Reptiles of the National Capital Parks and the District of Columbia Region." Mr. Fowler has informed me by letter (March 2, 1946) that his inclusion of the species was based solely upon Brady's record. Although the egg masses of jeffersonianum are usually quite distinct in appearance from those of maculatum, confirmation of this record by the collection of larvae or adults upon Plummers Island appears desirable.

In the late 1930's Mr. Leonard Llewellyn, then situated at Swanton, donated to the Carnegie Museum numerous Allegany County specimens. On April 3, 1937, he collected at Carlos one adult male jeffersonianum (CM 12912), with a snout-to-vent length of 81 mm. Carlos is situated near the western border of Allegany County, three miles SSE of Frostburg, at an altitude of about 2,000 feet. The area is drained by Georges Creek, an affluent of the North Branch of the Potomac River. Mr. Llewellyn reported that in 1937 A. maculatum, which was common at the same locality, remained in the ponds much later than usual, but subsequent search yielded no more Jefferson's salamanders.

Mr. Llewellyn had greater success in 1938. On the evening of March 12 he collected four specimens "coming down through field to pond" at Carlos.

Three of these were sent to the Carnegie Museum; two are adult females (CM 13687-88) with snout-to-vent lengths of 94 and 88 mm., respectively; and one is an adult male (CM 13689) with a snout-to-vent length of 80 mm. On March 19 he collected three specimens in the pond, of which one (CM 13691) reached our collection. This specimen, an adult female with a snout-to-vent length of 88 mm. and a total length of 176 mm., has now been sent to the Natural History Society of Maryland on exchange, and bears the number NHSM-A910.

The Allegany County specimens are characteristic of the large type of jeffersonianum that is widespread in Pennsylvania and eastern West Virginia. Of the five specimens listed here, the three with damaged or regenerated tails range from 131 to 155 mm. in total length; the two with perfect tails, a male and a female, measure 159 and 176 mm., respectively. These measurements are not remarkable for jeffersonianum from the Alleghenies, but they are notably greater than those of the small, dark, heavily blue-spotted type of jeffersonianum that ranges from western New York to the Middle West. Bishop (1943, Handbook of Salamanders: 134) states that ten mature individuals of the latter type from western New York average 115.7 mm. in length. Determination of the exact status of this northern or dwarf "jeffersonianum" is a problem that merits careful study.

THE A. A. ROOP COPPER MINE

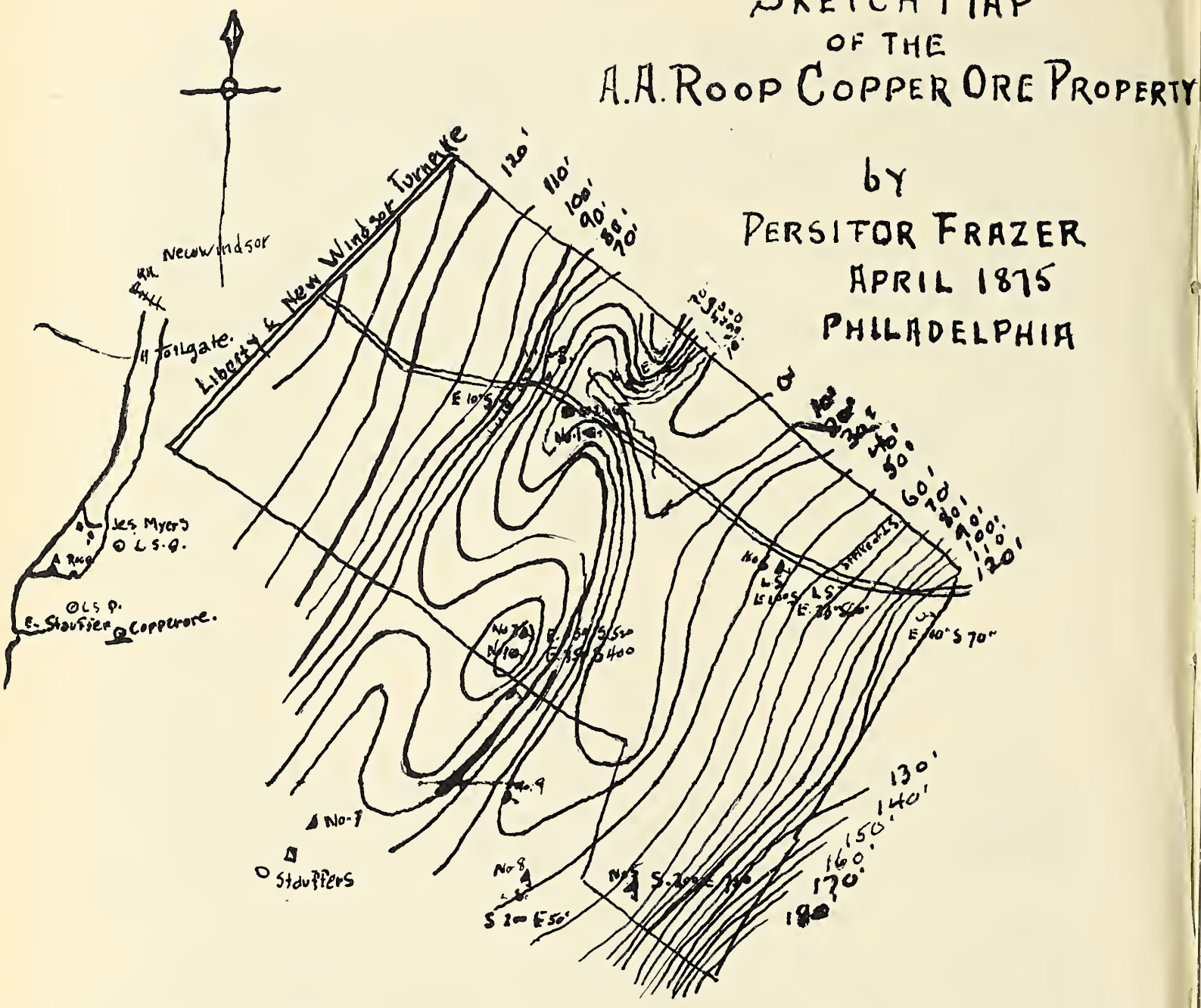
by

Herbert Bangs

In 1881 Professor Persifor Frazer wrote an account of the mining operations on the Roop Farm, near New Windsor, in Carroll County, Maryland, for Volume IX of "The Transactions of the American Institute of Mining Engineers". Frazer gave a very complete description of the old workings and described the occurrence of several interesting minerals.

Lewin Thomas and I visited the locality in October, 1945. In New Windsor we met a close relative of the Mr. Roop who had attempted to exploit the copper deposit. Although he was only a boy when the main shaft was sunk, he remembered the operations quite well and told us that the deposit did not live up to its early promise and was soon abandoned. The property is now owned by Mrs. Smeltzer of New Windsor and farmed by Mrs. Charles Ecker.

The farm is situated in a narrow limestone valley which is divided lengthwise by a low, broken ridge. An abandoned limestone quarry is located in the side of this ridge, a few hundred feet south of the huge stone livestock barn. The floor of the quarry is overgrown with young trees and swamp grass, but at the foot of the south face a water-filled shaft marks the deposit. Several feet of mineralized limestone are exposed; the copper sulfides, chalcocite and bornite were found, filling seams and cracks in



the rock, accompanied by a wide belt of snowy white stone very beautifully impregnated with the copper carbonates, malachite and azurite. We collected several specimens here, including a small group of minute radiating azurite crystals. We next visited the No. 5 Pit, which is 1600 feet on an azimuth of 170° from No. 1. The sides of this little quarry are overgrown with grass and bushes, but the few rocks still exposed contain traces of a metallic mineral, possibly sphalerite. At Pit No. 2 we found no indications of metallic minerals. We did not visit Pit No. 7, the only other working still accessible, but copper ores have been reported there by Frazer.

Professor Frazer described the copper ores as occurring in a broad

sheet along the contact between the limestone and the altered acidic and basic extrusives. Dr. Robert M. Overbeck classified the New Windsor ores with those of the New London and Liberty Mines. He believed that the character of the minerals and their association pointed to deposition from hot ascending waters at moderate depth. The contact between the limestone and the schist offered a plane of structural weakness along which solutions could travel.

This locality is interesting geologically. It is practically unknown to the mineral collector and further investigation will probably reveal the presence of more minerals and furnish many specimens for the cabinet.

NOTES FROM FIELD AND LABORATORY

OCEAN CITY NOTES

On November 28, 29 and 30, 1945, I noted the following birds at Ocean City, Maryland.

Herring and Ring-bill Gulls were very common everywhere and in the inlet there were quite a few Bonaparte Gulls. Only a very few Great Black-backed Gulls were positively identified.

Many large flocks and some small flocks of Canada Geese and Greater Snow Geese went by occasionally. I estimated that I saw at least 350 Brant. The Black Duck was the commonest duck with a few Old Squaws, Mallards, Buffleheads. The Red-breasted Merganser was the next to the commonest duck at this time.

Red-backed Sandpipers were all along the mud flats and two Least Sandpipers were positively identified. Black-bellied Plovers were certainly not common, but there were a few. About fifteen Purple Sandpipers were counted. They were very trusting and pretty little birds.

In the grassy country above, but near, the beach were here and there some Northern Horned Larks and some Ipswich Sparrows. I saw two very wary flocks of Snow Buntings; one contained about forty birds and the other was somewhat smaller. Two Marsh Hawks were noted also.

Of course, there were other birds but these might have been seen in any part of our State. I was disappointed that I did not see any Lapland longspurs or Tree Sparrows which I had heard spend the winter here. I think I did see several Sharp-tailed Sparrows but the identification was not positive.

R. Bruce Overington.

THE JAPANESE BEETLE STAGES A COME-BACK

Notwithstanding the devastating effect of the atomic bomb, and perhaps even that of the much publicized D.D.T., our recent adversary in the Pacific has left us with a heritage that is not altogether pleasant. Reference is

made, of course, to the Japanese beetle.

During the war years most people were so highly concerned with winning over our human enemies that they had little time for much in the way of horticulture, except the splendid efforts that were made in the matter of victory gardens. These were indeed most meritorious.

Control of the Japanese beetle was relaxed during this time of stress and, as might very properly be expected, the insect is now gaining the upper hand. Unless everyone having plants or a lawn takes steps to curb this pest, the results will not be pleasing to observe.

As has been borne out by experience in the original seat of infestation, it was predicted that if control measures were relaxed, the beetle would stage a come-back. This appears to have taken place.

It behooves all of us with plants under our care to take recommended steps to control this pest or it may control us. The University of Maryland will be glad to cooperate. By getting in touch with its department of insect-control we can do our part in this horticulturally serious situation.

Hollis Howe

TWO NEW CARROLL COUNTY MINERAL LOCALITIES

On March 13, 1945 we investigated a quartz crystal locality approximately two miles due west of Finksburg and two miles due north of Gamber. We found large boulders of quartz containing seams of quartz crystals, in the woods a few yards from the edge of a field. The crystals lay in a typical vein quartz deposit, in the chlorite, albite, Wissahickon schists. Some specimens were completely covered with singly terminated crystals of many sizes and shapes. One slab, about one foot broad and two feet long, was entirely covered by transparent crystals ranging up to two inches long, while a single crystal found loose in the field was approximately five inches long. We found right hand crystals, left hand crystals, curved and distorted crystals, striated crystals, and many twins. We also found small amounts of limonite and hematite in pockets in the quartz. Although 300 pounds of crystals were obtained there is still much interesting material for the collector.

Lewin Thomas reported cubes of limonite pseudomorph after pyrite on his father's farm, a mile and a half northwest of New Windsor, Carroll County. Pyrite, iron disulphide, commonly crystallizes in cubes, octahedrons and pyritahedrons. In the presence of oxygen and water, pyrite alters to limonite, the hydrated oxide of iron, quite readily to without changing the crystal form of the original mineral. We visited the locality in April, 1945. We found pseudomorphs not only on the Thomas farm but also on neighboring farms. The largest collected averaged eleven and one-half millimeters on an edge, was dark brown in color, and was striated. Lewin, however, has found crystals measuring twenty-five millimeters on an edge. Mr. John J. John, the county surveyor, said he had found "jackstones", as the pseudomorphs are locally called, near Uniontown and at other places in the Harper's Slate and Phyllite region. We intend to investigate these localities in the future.

Herbert Bangs and Harold Levey

Gift to the Society

A collection of lantern slides of birds, reptiles, fish, marine forms and views of Inagua was received from Mr. Gilbert C. Klingel; also some equipment and photographs.

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* * * * *

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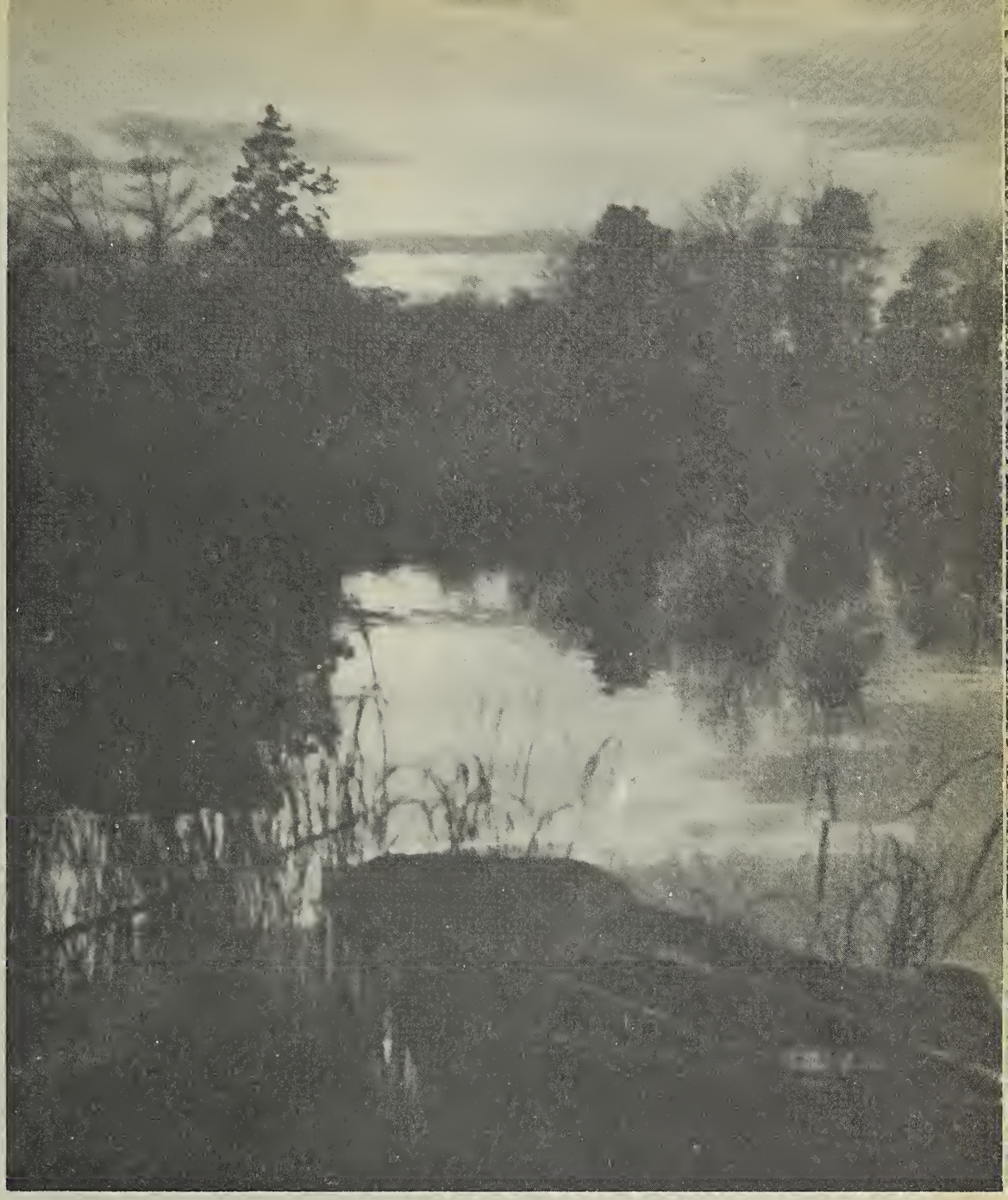

NOCTURNE

SEVERN RIVER
INDIAN LANDING, MD.

Photographed by
August Selckman

MARYLAND

A JOURNAL OF NATURAL HISTORY

The Natural History Society of Maryland

OCTOBER 1946 VOLUME XVI No. 4

MUSEUM OF NATURAL HISTORY
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MARYLAND

A JOURNAL OF NATURAL HISTORY

OCTOBER

Ay, thou art welcome, heaven's delicious breath!
When woods begin to wear the crimson leaf,
And suns grow meek, and the meek suns grow brief,
And the year smiles as it draws near its death.
Wind of the sunny south! oh, still delay
In the gay woods and in the golden air,
Like to a good old age released from care,
Journeying, in long serenity, away.
In such a bright, late quiet, would that I
Might wear out life like thee, 'mid bowers and brooks,
And, dearer yet, the sunshine of kind looks,
And music of kind voices ever nigh;
And when my last sand twinkled in the glass,
Pass silently from men, as thou dost pass.

William Cullen Bryant

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JANUARY, APRIL, JULY, OCTOBER

VOLUME XVI No. 4
OCTOBER 1946

Brown Thrasher
by
W. Wallace Coleman

ASBESTOS IN MARYLAND

by

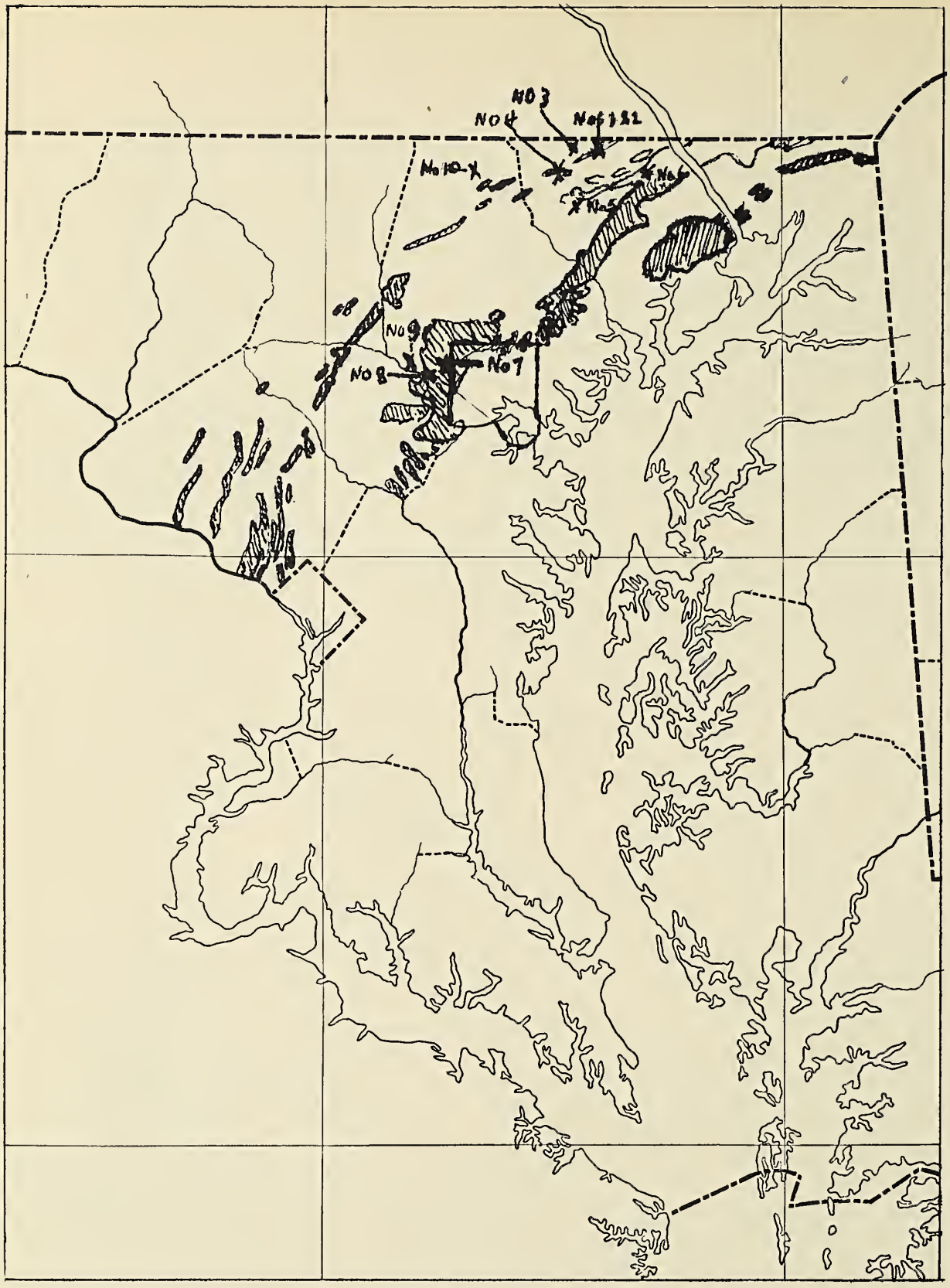
Herbert Bangs

Asbestos did not achieve a prominent position among modern mineral products until the latter part of the 19th century. Within the past 50 years the industry has so expanded that its products are used everywhere and asbestos is practically a household word. Few people realize that Maryland was at one time prominent in the asbestos trade and pioneered certain branches of the industry. Although the deposits of commercial importance are now largely exhausted and there is but a bare possibility that asbestos will ever be worked again in Maryland[1], the deposits themselves and the industry they have fostered are interesting enough to merit a discussion.

A brief summary of some of the most important facts about asbestos may facilitate the discussion of the Maryland deposits. Asbestos is found as cross fiber, slip fiber and mass fiber. Where the individual strands are at right angles to the walls of the vein or seam the asbestos is known as cross fiber. Most commercial deposits are of this type. In slip fiber deposits the individual strands lie nearly parallel to the vein walls. Slip fiber frequently shows evidence of crustal movement (slickensides) because it usually occupies shear or fault zones where the rock has been subjected to movement and pressure. In mass fiber deposits the entire rock is composed of interlocking bundles of fiber without definite orientation.

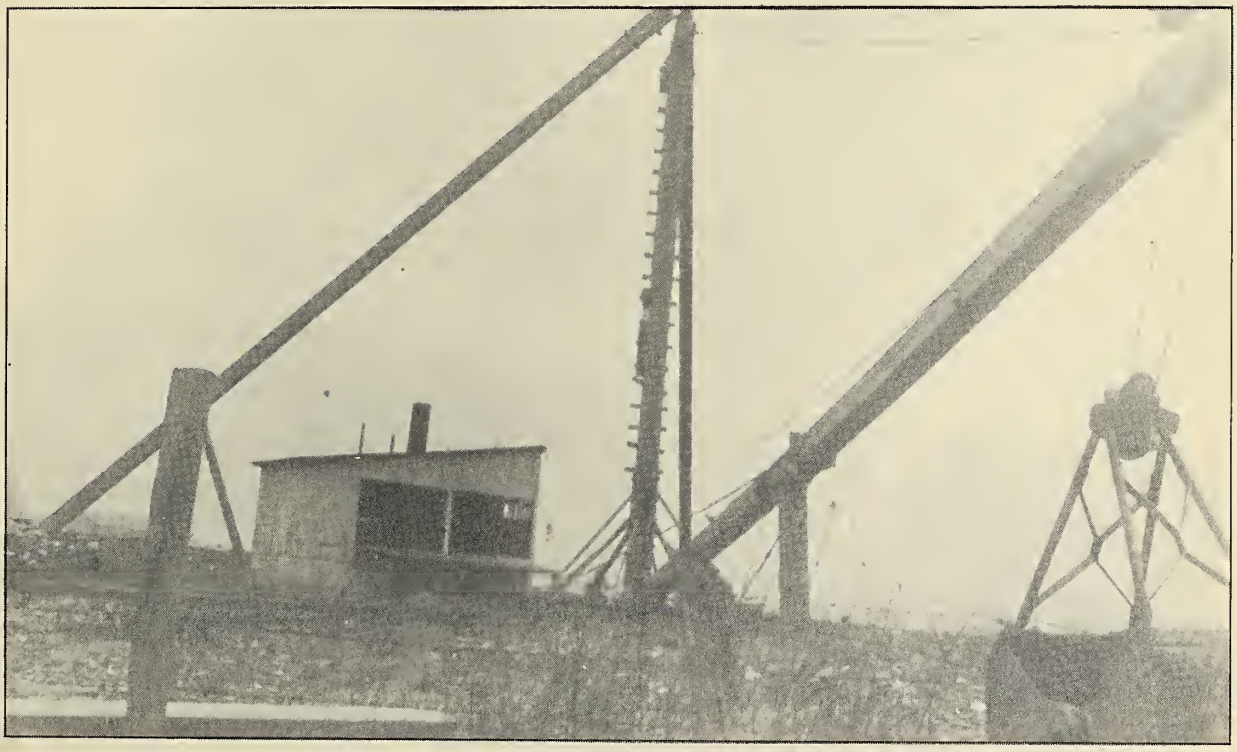
"Asbestos" is not the name of a distinct mineral species but is a commercial term applied to the fibrous varieties of several minerals. The asbestos minerals found in Maryland are chrysotile and members of the amphibole group. Chrysotile is chemically a hydrous magnesium silicate ($H_4 Mg_3 Si_2 O_8$), and is a fibrous, crystalline form of the massive mineral, serpentine, with which it is invariably associated. It has a beautiful, silky luster in various shades of green and greenish yellow and easily fluffs out into a woolly mass. The fibers have remarkable tensile strength and can be spun into strong, lightweight asbestos cloth. Because of its strength, durability and common occurrence in the serpentine, chrysotile is the most important variety of asbestos.

Chrysotile occurs sparingly in the Maryland serpentines. Small seams of silky fiber may be found in the serpentine of Bare Hills[2]. None justifies exploitation. J. T. Ducatel[3] in 1838 mentions asbestos in speaking of the chrome ore associated with serpentine in the vicinity of Coop Town, "Mine Old Field" (probably Mine Fields) and Dublin. He mentions chrome, serpentine, a variety of magnesian minerals and then says, "Associated with these minerals there are varieties of asbestos, that within a few years have come to be extensively used in the manufacture of what are called Stone Paints." The asbestos mentioned by Ducatel might possibly be chrysotile because of the reference to serpentine. If so, this represents the only production of chrysotile in Maryland. The composition of the amphibole group is near that of a metasilicate (R Si Os). It is found in long, white, gray or brown fibers of low tensile strength. Because of its resistance to heat and acids the amphibole group is especially valuable in the manufacture of chemical filters. Amphibole usually occurs as slip fiber in shear zones of such basic rocks as dunite and olivine.



Map showing basic igneous rocks in relationship to asbestos mines

Jenkins Asbestos Mine, Pylesville, Md.



Asbestos Mine of the Powhatan Mining Co.,
Woodlawn, Md.

Slip fiber amphibole has been mined successfully at many points in Maryland in weathered fault zones associated with basic igneous rocks. The weathering and softening of the amphibole determines the depth to which the mineral may be worked. Where the amphibole has not been weathered it is splintery, hard and of little or no value. In most Maryland deposits the soft, fibrous asbestos extends only to a depth of about 25 feet. This factor, combined with the limited extent of the individual fault zones, precludes the use of heavy machinery and extensive operations at any single locality except in a few special cases where the weathering has been more effective at greater depths.[4]

The Maryland asbestos is associated with pyroxene, peridotite or rocks altered from these basic intrusives. Rocks, composed essentially of pyroxene, a dark colored silicate, are known as pyroxenites, while rocks composed of olivene, an iron-magnesium silicate, and pyroxene are known as peridotites. These two rocks are believed to have been formed at the time of the widespread intrusion of gabbro (a dark basic igneous rock) into the piedmont plateau of the Eastern Coast, by differentation[5] of the heavier ferromagnesian constituents out of a gabbroic magma[6,7]. They alter readily to serpentines and talcose rocks and it is possible that the asbestos was formed as an alteration product. Exposures of pyroxenite and peridotite cross Maryland in a northeast to southwest direction, entering the state in Harford and Cecil Counties and passing into Virginia near Great Falls.[8] The distribution of asbestos conforms to this belt of igneous rocks as shown in Figure I. The numbered circles indicate deposits of special interest which will be described.

The Jenkins Asbestos Mine at Pylesville (No.1) was the largest and most important asbestos deposit in Maryland. The formation, according to J. S. Diller,[9] a geologist in the service of the U.S. Geological Survey in 1917, is "a weathered gneissoid schist". Mr. Fred A. Mett, who was responsible for the development of the mine believes that Mr. Diller may be in error and that the country rock is dunite, a rock associated with peridotite but composed almost entirely of olivine. Along fault planes where the movement producing slip fiber tremolite (one of the amphibole group) was more intense and of greater extent, with deeper weathering, suitable fiber extended to a depth of fifty to seventy-five feet. The tremolite was unusually stable and acid resistant and iron free; that from the Jenkins Mine and the nearby Neikirk Mine was believed the best fiber for the manufacture of chemical filters found in the United States. The deposit has unfortunately been exhausted and there is no possibility that asbestos will be worked again at Pylesville.

A small tonnage of high grade fiber was produced at the Neikirk Mine, which adjoined the Jenkins Mine on the west. The deposit was small and weathering shallow, so that operations were short-lived.

Small amounts of asbestos were produced at the Slade Farm (No. 3), the Durham Farm (No. 4), near Coopstown (No. 5), near Dublin (No. 6) and at Powhatan, near Woodlawn (No. 7). This fiber was also produced for use in chemical filters.

At the Bok Asbestos Mine (No. 8) near Hollofield, in Baltimore County, anthophyllite was mined for a short time for the manufacture of asbestos

shingles.[11] The deposit was a typical small, shallow, slip-fiber occurrence. It is doubtful if operations could have been profitable considering the low tensile strength of the amphibole group.

Anthophyllite (another amphibole) was also mined at Alberton (No.9) and an amphibole mineral was mined at Parkton (No.10), but the quality of the deposits was not high enough to meet modern standards and the workings have been abandoned for over fifty years. Asbestos has been found at many other places in the belt shown on the map, but at no point were the indications favorable to further development.[13]

Asbestos mining in Maryland has had a long, interesting history. J. T. Ducatel,[14] in his report of 1837, mentioned the use of asbestos for "stone paints" and as a lining for fire-proof chests. It is probable that this asbestos was anthophyllite. This is the earliest reference to the working of asbestos in Maryland, and many refer to it as one of the first asbestos mining operations in the New World. G. P. Merrill[15] in 1895 described the asbestos from Alberton, Parkton, and Pylesville, gave analyses, and showed the first to be anthophyllite. He mentioned an abandoned shaft and a few shallow prospect holes at Alberton, indicating former operations. The last reference to early asbestos mining in Maryland is in a Maryland Geological Survey publication of 1906.

"In 1880 one mine in Harford County and three in Baltimore County produced a total of forty tons, valued at $1000, but the discovery of extensive deposits in other regions has now stopped any operations for this mineral in Maryland."[16]

After 1880 the history of asbestos mining in Maryland is, with the exception of the relatively unimportant Bok Mine, the history of the Powhatan Mining Corporation. In 1916 the ship shortage of the first World War cut off the supply of chemical filter tremolite from Italy. Mr. Fred A. Mett of Woodlawn attempted to find a use for Maryland tremolite which occurred a short distance from his home at Powhatan (No. 7 on map). With the cooperation of the U.S. Geological Survey and the Bureau of Standards he developed a filter fiber superior to the Italian product.[17]

Mr. Mett worked the deposit at Powhatan for a year, and then abandoned it in favor of the better quality Pylesville deposit. The mine was opened by simple pick and shovel methods. Veins were located, the overburden removed, and the long slip-fiber carefully removed by hand. In 1926 it became necessary to follow the veins to greater depths and a stiff-leg derrick with clam-shell bucket was set up for removing the overburden. In 1928 this arrangement was replaced with a power shovel, which was used continously until the working was finally abandoned in 1940.

Pylesville asbestos supplied the Powhatan Mining Company, the organization formed by Mr. Mett, for a number of years, but the steadily rising demand for the new filter product caused Mr. Mett to prospect extensively through Maryland for other deposits of amphibole. Thousands of holes were drilled with an earth auger in Harford, Baltimore and Howard counties. Wherever indications were favorable test pits were dug and all high grade

asbestos removed. In this manner the mines at the Slade farm, the Neikirk farm, the Durham farm, Coopstown, Rocks and many other lesser points were opened. A power shovel was employed at some of these places but no single locality was nearly as extensive as the deposit at Pylesville. Collectively, however, they yielded a large tonnage of good quality fiber. Mr. Mett estimates that an overburden covering fifteen acres was removed while working these shallow deposits. As the Maryland mines were systematically exhausted Mr. Mett continued this prospecting into other parts of the United States, and when the Jenkins Mine at Pylesville was finally abandoned, all the asbestos used by the corporation was brought in from localities outside Maryland.[18]

The company describes the manner in which they process their material as follows. "At the plant at Woodlawn the asbestos is carefully selected, hand cobbed, washed and concentrated by specially designed machines which remove all gangue (non-fibrous matter) and extraneous impurities. The fibers are dried and digested with pure hydrochloric acid until the iron and other impurities are completely dissolved. By a special filter apparatus and an abundance of wash water all traces of acid are completely eliminated, as well as 'fines' or dust like matter (very minute fibers). This leaves the thoroughly separated asbestos chemically pure and stable. The fibers are dried, graded according to length, and packed for shipment."[19]

The prepared fiber, known under the trade name of "Powmingo" can be ignited in a laboratory Meker burner for fifteen minutes with a loss of only 0.31%. After ignition it is chemically stable and shows no further loss upon continued ignition. This fact, coupled with its extremely low loss after digestion by concentrated acids makes it very valuable for laboratory work, especially where it is necessary to burn off organic matter. The following figures compare losses on ignition and digestion in hot, concentrated HNO_3 between Powmingo and Italian asbestos.[20]

	Powmingo	Italian Asbestos
Loss on 15 minutes ignition in a Meker Burner	0.31%	1.39%
Loss after 5 minutes digestion in hot, concentrated HNO_3	0.01%	0.52%

The Powhatan Company has expanded into other fields of the asbestos industry. Fiber is now used for plastics, fire proofing asphaltic and bituminous composition, heat insulation, composition flooring, furnace linings, fire brick, paints, furnace cement, retort cement, and quite a number of uses that the manufacturers prefer not to mention.[21] Fifty men are employed by the company at the mines and mill and the daily production averages one carload of finished product. Three shifts were operated during the war, but this has now been discontinued. The company appears to possess fine machinery, modern processes and a well established business.[22]

Asbestos will probably never again be mined in Maryland. Mr. Mett thoroughly covered the asbestos production belt in Maryland with drill holes and test pits and it is unlikely that any other commercial deposit will be discovered in the future. Asbestos mining is now only an interesting chapter in the history of our state.22

FOOTNOTES

1. Oral communication with Mr. Fred A. Mett, President of the Powhatan Mining Corporation, the organization chiefly responsible for the development of Maryland asbestos.

2. J. T. Ducatel, Ann.Rept. of the Geologist of Md., 1838, p.5

3. Material in this paragraph obtained by oral communication with Mr. Fred A. Mett, President of the Powhatan Mining Company.

4. Differentation in this case means the settling of heavier crystallized matter.

5. A magma is a mass of molten rock.

6. Md. Geological Survey, Baltimore Co., Baltimore 1929, p. 117.

7. Md. Geological Survey, Geological Map of Md., Baltimore, 1933.

8. J. S. Diller, "Asbestos in 1917," Mineral Resources of the U.S., Washington, 1917, p. 202.

9. Material for the foregoing two paragraphs, with the exception of Mr. Diller's statement, was obtained by oral communication with Mr. Mett.

10. Oral communication with Mr. Bok, owner and operator of the Bok Asbestos Mine.

11. A larger amount of asbestos must be present in an anthophyllite shingle to give strength equal to that of chrystotile.

12. Oral communication with Mr. Fred A. Mett.

13. J. T. Ducatel, Ann. Rept. of the Geologist of Md., Baltimore, 1837, p.15.

14. G. P. Merrill, "Notes on Asbestos and Asbestoform Minerals," Proc. U.S. Nat'l. Museum, Vol. XVIII, Washington, 1895

15. Md. Geological Survey, Rept. on the Physical Features of Md., Baltimore, 1906, p. 208.

16. Material in the foregoing three paragraphs obtained by personal communication with Mr. Mett.

17. Advertising material of the Powhatan Mining Company.

18. Information and data taken from the advertising material of the Powhatan Mining Company.

19. Foregoing material in this paragraph, taken from "The History of the Powhatan Mining Corporation", Asbestos, Sept. 1929, Vol. XI, No. 3, P.22.

20. Foregoing material obtained by oral communication with Mr. Mett.

T. Milton Oler, Sr.

IN MEMORIUM

On July 1, 1946, the Society lost one of its best friends and members, Mr. T. Milton Oler, Sr.

Mr. Oler, a member for many years, was intensely interested in the work of the Society. He contributed greatly to the building of our Museum exhibits and the exhibits for which we were awarded medals and ribbons at the various outdoor life shows and flower shows. He lectured and instructed staff members in the plaster casting of reptiles and plants and modeled the elephants and prehistoric animals now on exhibition in the Museum at Druid Hill Park.

Mr. Oler was a genial gentleman of the old school who had a kindly word and encouragement for all, especially our Junior members. He is survived by his wife Mrs. M. Estelle Oler, his son, T. Milton Oler, Jr., Curator of our Museum, a daughter, Mrs. Margaret Wilson of England, and a grandson, Douglas Oler, a member of our Junior Division.

THE CYPRINODONTS OF MARYLAND

by

Frank Yingling

There is a family of small fishes found in the brackish waters of the Chesapeake and its tributaries, known as the Cyprinodontidae, more commonly referred to as "mummichogs" or "killifishes". These fish are of no value as food for man as they do not attain a large enough size, but they are important as forage for our greater fishes. They are also sold to some extent commercially as bait for the fishing of pike and yellow perch.

The killifishes are easily recognized by the presence of a single dorsal fin, which is situated rather far back; the ventrals are located on the abdomen and there is a small terminal mouth.

One of the peculiarities of these fishes is that some of the species are quite hardy, and are able to remain out of water for a longer period of time than most fishes. Often they are transported in a container free of water and as long as the atmosphere is moist the fish remain alive for quite a few hours.

Some of the tropical species of this family have been reared by fish fanciers. The main reason for this is that they are more gaudily hued, while the ones found in our waters have a much duller coloration. During spawning season, however, the fish found in our region are rather brilliantly toned, but this color is lost soon after the nuptial act is accomplished.

The family is comprised of three genera and seven species. Cyprinodon is readily recognized by its short, deep, compressed body and the teeth are in a single series. The genus Lucania has an elongated body while the head is more or less depressed. The genus Fundulus has the teeth in bands which are all pointed; the head is depressed, rather flattened on top.

Of the first genus but a single species, Cyprinodon variegatus, is found in the bay. It is widely known as the variegated or sheephead minnow.

The female has a rather brassy lustre on the back, and sides with a dusty marking which at times forms bars on the lower part of the body. The dorsal fin is olive and a black blotch is found in the middle of the posterior rays. The males are much darker-colored with a bluish tint on the upper parts of the body in front of the dorsal fin. During the breeding season this changes to a brilliant blue along the entire back, the abdomen becomes a deep orange, and the dorsal fin is edged with pink or orange.

Spawning is rather protracted, lasting through the spring and summer; that is, one female will lay eggs several times during one season. We have had the unusual opportunity of observing these fish spawning in a small cove on the Patuxent River in St. Mary's County. The action took place in very shallow water. It seemed that if there were an exceptionally low tide the eggs would be left out of the water unless they receded with the ebbing tide. The male selected the spawning place, after which he swam a short distance

away and picked a female. Then, after swimming around and driving her to the place he had chosen, he enticed the female to lie down on her side. After a few moments in this position her body quivered while the ova were expelled. When the female had accomplished this he drove her off, then hovered over the eggs and fertilized them. He then swam a short distance away and selected another mate, driving her to the same location and going through the same procedure. If, during this time, another male ventured too close, he would promptly drive him away. Some observers claim that these fish are quite ferocious in confinement, constantly attacking other fishes.

The eggs of this species are spherical in shape and they range in size from 1.2 to 1.4 mm. In the laboratory at summer temperatures the period of incubation is from five to six days; and the larva are about 4mm in length when hatched.

This species is chiefly herbivorous, though in an aquarium it feeds quite readily on the flesh of other fish and finely chopped meat. It is quite gregarious in habit and may be found to be quite common in localities suitable for it. The maximum size attained is 76mm (about 3 inches).

The genus Lucania is represented by a single species, parva which is commonly called the "rainwater fish".

This fish is one of the smallest of the family and the maximum size attained is 58mm, (2 3/16 inches). It is recognized by this small size and a plain greenish coloration. There are no stripes or bars present on the body.

The color of the female is a dark olive above; the ventral part of the body is pale with scales dark-edged. The male has a somewhat brighter coloration and during spawning season the anal and ventral fins are tinged more or less with a reddish hue.

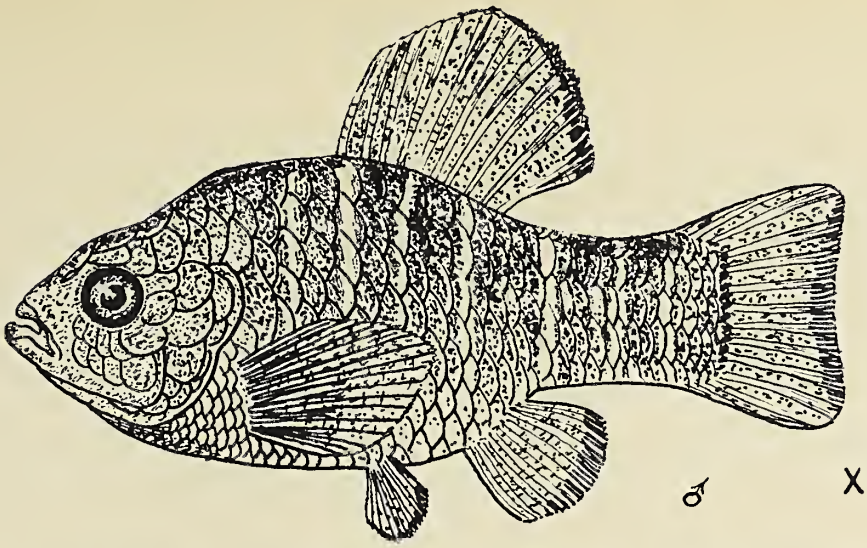
It is most likely that this species spawns more than once during the season, as females taken with ova had them in different sizes in the ovaries; that is, some were ripe enough for spawning while others would ripen later in the season. When mature the eggs are about 1mm in diameter.

The "rainwater fish" is found abundantly in the brackish waters of the bay traveling in schools in association with Fundulus and Gambusia. It has been reported by investigators that this species is of value for mosquito control because of its environment. As this has been based on its habitat rather than its stomach contents, there is very little definite information available as to the truth of the statement. It seems to feed chiefly on small crustaceans but without a doubt it also feeds on other small animal life.

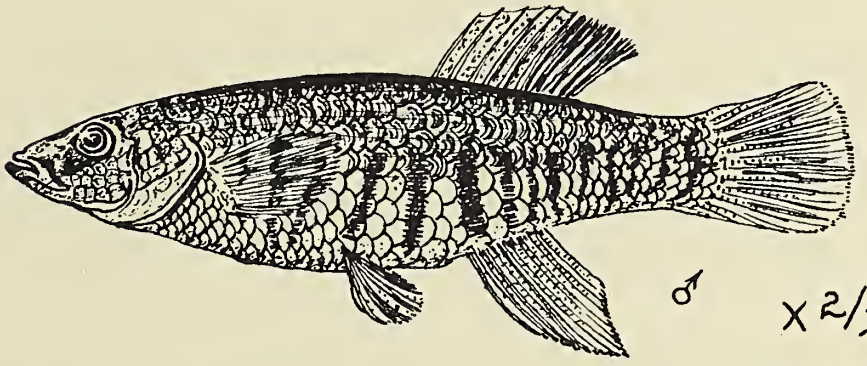
The genus Fundulus is represented by four species found abundantly throughout the brackish waters of the bay. F.heteroclitus reaches a maximum length of 125mm (4 7/8 inches). It is commonly known as the "mud minnow" or "pike minnow".

The coloration of an adult female is brownish green above with a lighter shade on the ventral part of its body. Smaller females, however, have 13 to 15 dark cross bars on the sides. During the spawning season the males are dark

Cyprinodont Fishes Of Maryland



Cyprinodon variegatus Lacépède. Sheepshead Minnow



Fundulus majalis (Walbaum). Striped Killifish

Fundulus luciae (Baird). Baird's Killifish

After Hildebrand & Schroeder
R.M.

The spawning season is most likely confined to April and May, because gravid specimens are only taken during these times. This species seems to feed upon small crustaceans, insects and small mollusks. Its habitat is mostly marshes, where the water is muddy and brackish.

"Baird's killifish", Fundulus luciae is about the smallest of the Cyprinodonts. The largest specimen so far taken was 40mm (1 9/16) in length. The male of this species is rather difficult to distinguish from the brighter hued males of F.heteroclitus. The slightly more posteriorly placed dorsal of F. luciae is one of the distinguishing points of the two. The most definite character for identifying the species is the length of the dorsal, the two or three lesser rays of the fin usually numbering eight, while the number of rays of F.heteroclitus is 11 or 12.

The coloration of the female is grayish-green, lighter below. The eye is dark with a fine golden band. The body has a dark vertebral line. The males are olive-green above and the sides are golden with 11 to 14 dark cross bars. The ventral part of the body is orange-white. The dorsal fin has a black ocellus on the last few rays and is usually bright orange to reddish.

Through the bay regions the spawning period is mostly during April and May as gravid females were only taken at this time. The eggs are about 2mm in size and spherical in shape.

It is not very common and the specimens that have been taken are usually found in shallow, brackish water. Due to its rareness and small size this species is of little value either as forage for our greater fishes or as food for man.

The "fresh-water killy," Fundulus diaphanus, frequents fresh water more than any others of the genus Fundulus. It is very common where the water is only slightly brackish and quite often ascends streams. We have often collected this species in fresh water ponds, some distance from the tidal waters of the bay.

It is said that this killifish is of some value as an exterminator of mosquito larva and without a doubt it does feed on the larva because of its fresh water habits. Up to the present this statement is based on its habitat, as specimens examined by us for stomach contents had no larvae of the mosquito present. They feed chiefly on mollusks, insects, crustaceans and annelid worms.

The maximum size, according to reports, is about 111mm (4 3/8 inches.) The males are usually smaller than the females. The color of the male is a greenish-olive above and white on the abdomen, while on the sides there are about 20 to 22 opalescent bars. The dorsal fin is slightly dusky and at times there are small spots present at the base of it. The female is olive above, silvery-white below, and abdomen white. The sides have approximately 16 to 2o fine greenish bars.

The spawning period runs from April to September. The ova when ripe are about 2mm in diameter and spherical in shape. All the young up to 50mm have the color of the female; but above this size the coloration of the sexes begins to distinguish itself.

SOME INDIAN ARTIFACTS FROM THE VICINITY OF BERWYN, MARYLAND

by
Walter F. Jeffers

From 1935 to 1941 the author spent much of his spare time collecting Indian artifacts in the vicinity of Berwyn, Maryland. The method of collecting consisted of examining cultivated fields for the presence of stone chips. These chips or flakes were produced by Indians in the process of making arrowpoints and other stone objects and indicate locations likely to yield artifacts. When an abundance of stone chips was found the limits of the area were determined as carefully as possible, and an intensive search was then made. Such locations would be visited several times a year and over a period of years would thus be examined many times. After each season's cultivation new material was apt to be uncovered. The best time for finding artifacts was after the ground had been packed by heavy rains, for then most surface stones were washed free of soil.

Most of the material found consisted of arrowpoints, but there were also other stone objects such as hammerstones, axes, bannerstones, drills, scrapers, blades and mortars. Only two fragments of clay pottery were found. The scarcity of potsherds seems a bit unusual, for in many other Maryland sites they are common. Implements found in the Berwyn area were in general rather crude, but this can probably be partially explained by a lack of good working materials. Nearly all of the arrowheads were made of quartz or quartzite which is difficult to work. Some artifacts were made of hardened shale and rhyolite.

Outstanding of all the material collected were the thirteen large rhyolite blades shown in Figure 4. These show good workmanship and are unusually large. Their use is subject to question but apparently several were fashioned for use as spearheads. Others could have been used as hoes, knives or scrapers. However, since these objects show little wear, they may have been kept as highly valued pieces.

These blades were all found in location #3 and apparently had been cached, for they were in a relatively small area and do not appear to have been exposed very long. Most likely these blades were brought into the Berwyn area from some other location. No similar artifacts have been observed in any collection seen by the author.

In Figure 1 are shown the principal locations from which material was collected. Number one is a kitchen midden which was excavated by the author and previously described in the April, 1945 issue of this journal. In locations 2, 4, 5 and 6 the materials found were very similar, consisting mainly of quartz and quartzite arrowpoints. Material from location 3 differed considerably. It apparently was a work site, for it is located in an old stream bed where there is an accumulation of quartz boulders. Here many hammerstones, flakes, rejects and broken points were found. Of the intact arrowpoints found there was a much higher ratio of shale and rhyolite than in the other locations. The large rhyolite blades, previously mentioned, were also found here.

No complete bannerstones were found, but from the broken pieces it is evident that these were of a rather simple type.

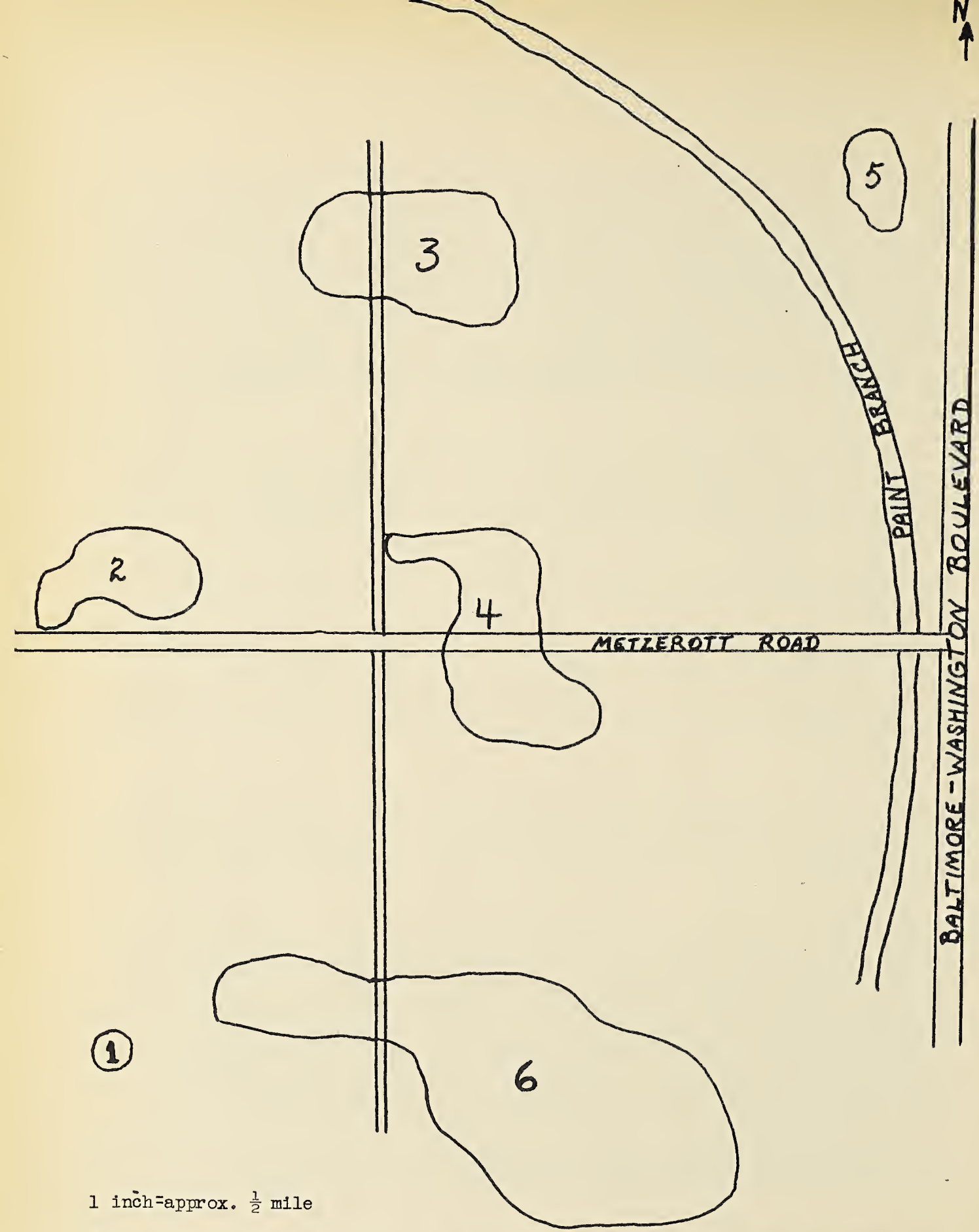


Figure 1. Approximate location of areas in the vicinity of Berwyn, Maryland, in which Indian relics described in this article were collected.

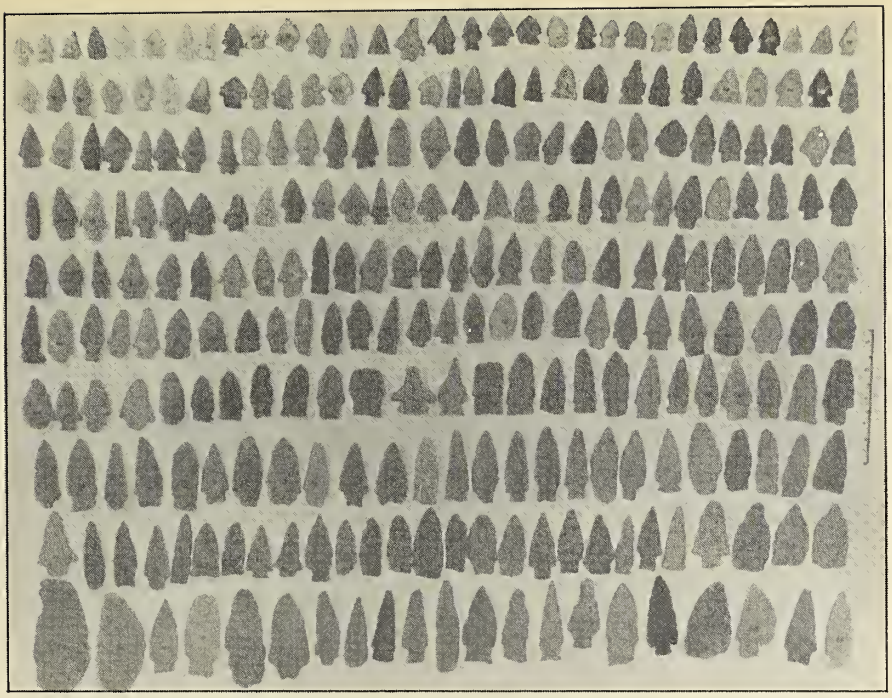


Fig. 2. Some of the types of arrow points found in the vicinity of Berwyn, Maryland. Some larger implements are also included.

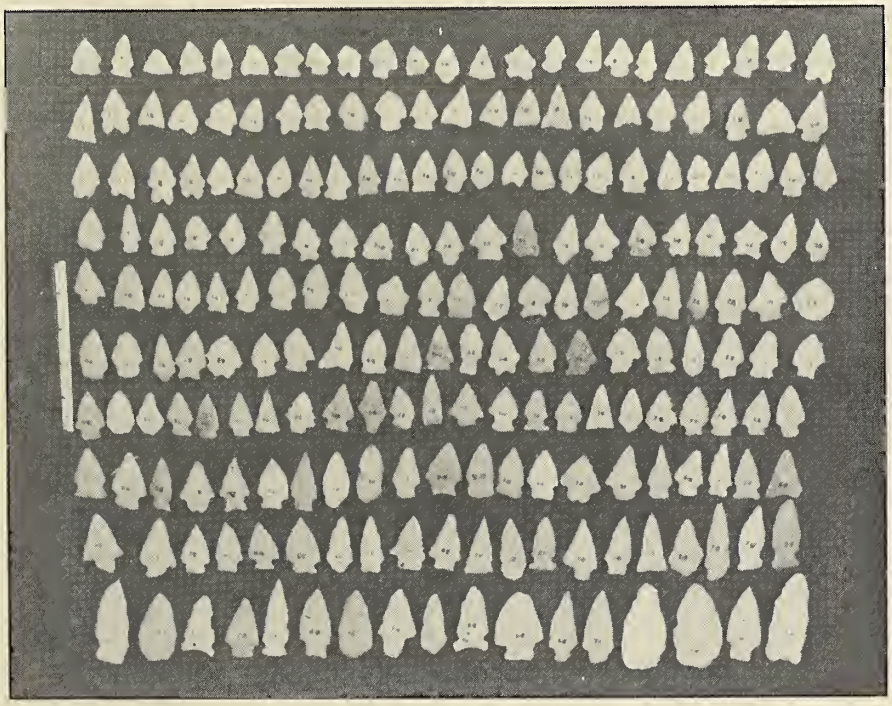


Fig. 3. Arrowpoints and other implements from the vicinity of Berwyn, Maryland.

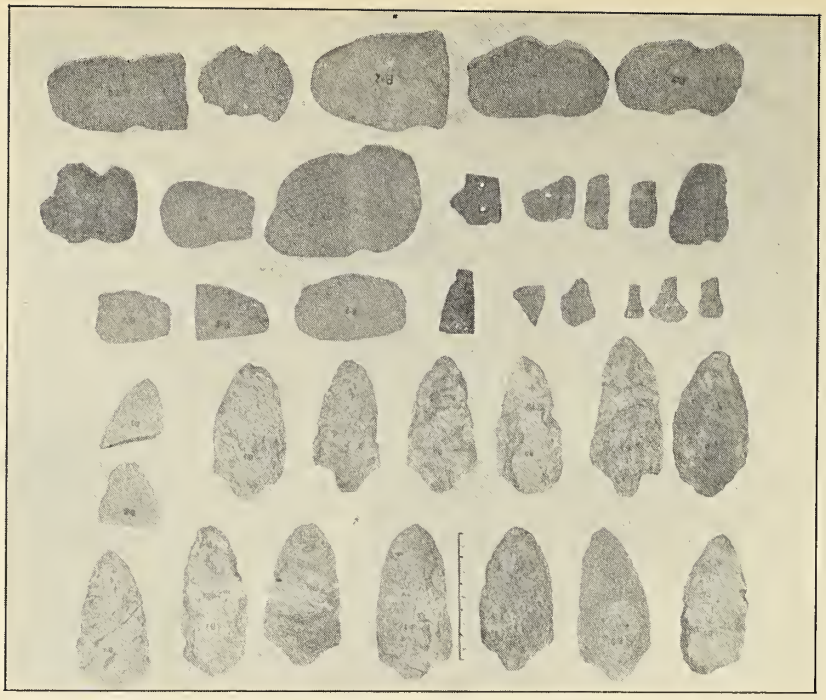


Fig. 4. Rhyolite blades, axes, drills, bannerstone and potsherds from the areas described.

Fig. 5. Some of the better hammer-stones found in the areas described.

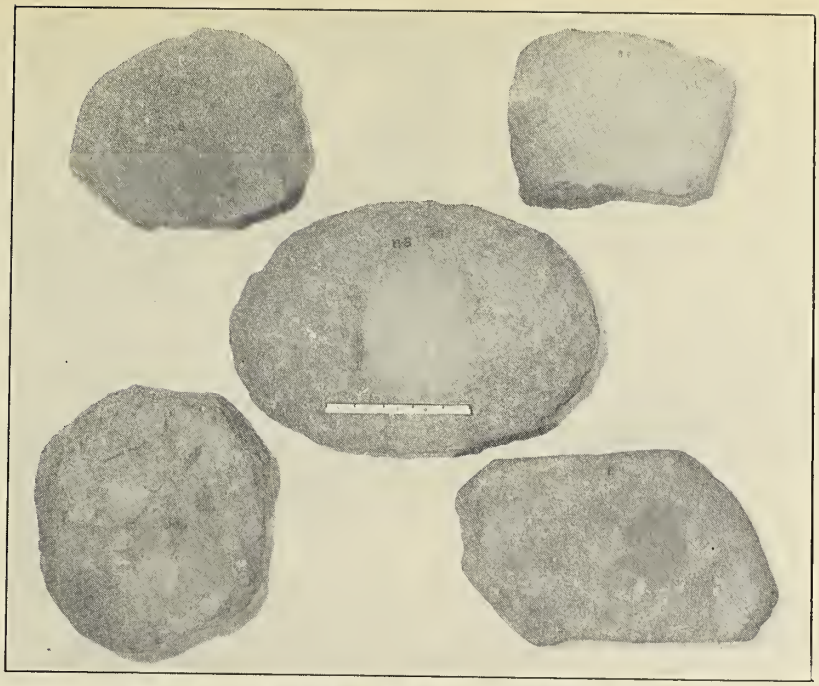


Fig. 6. Mortars or grinding stones found near Berwyn, Maryland.

The axes were crude and in most cases had merely been slightly changed from the original shape of the stone. Several mortars were found but these too were of poor quality. Most of the material collected is shown in Figures 2, 3, 4, 5, and 6.

A summary of the artifacts found is given below.

509 arrowpoints
13 large rhyolite blades
200 (approx.) quartz blades
15 pitted hammerstones plus many which were not kept
10 axes
5 mortars
5 bannerstones (broken)
2 clay potsherds
4 steatite potsherds

Several hundred broken arrowpoints were found and other collectors are known to have found many artifacts in this vicinity. Thus it is quite evident that there was once a thriving Indian population in the vicinity of what is now Berwyn, Maryland. It also can be assumed that many Indians were buried in this vicinity, but to date no evidence of burials has been found by the author.

OVIPOSITION IN THE EASTERN WORM SNAKE

by

Michael F. Groves

McCauley (1945, Reptiles of Maryland and the District of Columbia, Hagerstown, Md. p.55) states regarding the worm snake (Carphophis amoena amoena), "The time of mating of this species in Maryland has not been noted. There are also no exact dates of the egg laying of this species in Maryland." The following observations from my notes then may be worthy of publication.

A female amoena, 248 mm total length, collected at Tolchester Beach, Kent county, Maryland, deposited three eggs on July 3 or 4, 1937. These were discovered in a spoiled condition on the 4th but may have been laid on the 3rd, as I failed to examine the cage containing the snake on that date. When found, the eggs were dried and shriveled and none of them hatched.

Another worm snake collected near Glen Burnie, Anne Arundel county, Maryland, and measuring 245 mm total length laid one egg on June 21, 1942 and another on June 30. This specimen died a few days after the latter date with one egg still in the body and easily discernible through the translucent belly. These eggs were also in bad condition when found, being soft and yellow with dents in the integument.

A third specimen from Briarcliff-on-Severn, near Arnold in Anne Arundel county, deposited two eggs on June 11, 1946. These were dried, dented, and shrunken and no attempt was made to hatch them. This specimen was found beneath a small piece of decaying timber in company with a male of the same species on May 4 and mating may have occurred within a few days prior to this date. Since this day was cold (40°F) and the two snakes were semi-torpid it seems hardly likely that mating took place right at that time; however, since the preceding few days were somewhat warmer mating may have occurred sometime between May 1 and 3.

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JANUARY 1947 VOLUME XVII No. 1

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MARYLAND

A JOURNAL OF NATURAL HISTORY

HARVEST OF THE YEARS

In my harvest of the years I find, finally, a store of philosophy deduced from my experiences in Nature's school. Philosophy is still a branch in our universities, but philosophical reflection grows rarer day by day. We are so intent on efficiency, money making and keeping abreast of the times, that we cannot find the leisure to examine ourselves and Nature sufficiently to draw conclusions.

Which way does our future lie? Why do we progress so slowly? After more than 13 centuries of Mohammedanism, 20 centuries of Christianity, 25 of Buddhism and Confucianism, and 4000 years of Hebrew religion, we are still greedy, cruel, selfish, shortsighted, and ready to go to war on almost any pretext. We dissipate in a few months the savings of decades, the flower of our youth, and the friendliness it has taken a century to build. After spending hundreds of years fostering education and scientific research, we will throw all our hard-earned lessons aside in a moment of anger or rapacity and become savages again. Is there no hope for us?

If we look in the textbooks we are certain to be baffled in our search for an answer, but if we go to Nature we discern more than one glimmer of light. For we should see how steadily and surely the force in Nature is impelling us all toward a better and higher destiny.....

Luther Burbank

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JANUARY, APRIL, JULY, OCTOBER

VOLUME XVII No. 1
JANUARY 1947

White - Eyed Vireo

by

Edmund B. Fladung

NOTES ON BIRDS OCCURRING IN THE BALTIMORE AREA

by

Irving E. Hampe

II The Vireos

In mid April the early migrants claim the attention of the bird student. The appearance of the first warblers is greeted with rapture and the countryside is scoured for others of this interesting family of birds. Among this bright and hurrying throng are numerous birds, closely resembling the warblers, that are given a check on daily lists and often forgotten while the search for their brilliant relatives continues. The vireos, somberly clad when compared with the warblers, are quite as interesting, many of them remaining to nest close by our homes. Careful study of the data available shows that their appearance in spring is noted by most bird students, but less attention has been given to their home life in our area. The following accounts give some information on the status of these interesting birds as noted by the writer and other students. Published data is meager.

White-eyed Vireo *(Vireo griseus noveboracensis)*

April 22d is the earliest date the white-eyed vireo has been found in the Baltimore area. By the first week in May the males have taken up territory and their song may be heard throughout that month and well into June. The white-eye seems to prefer a low, dense growth near water with tall shrubs or trees conveniently located nearby for singing perches. The cup-shaped, pendant nest is usually slung quite low between the forks of a limb. Nesting data at hand give the height from the ground as not more than four or five feet. A nest found in the Patapsco State Park near Glenartney on May 19th is typical of those to be seen in our area. On that date a nearly completed nest was discovered. May 26th there were four eggs and the female was incubating. The following week-end, June 3rd, there were three young in the nest. They were only a few days old and heavy rain prevented prolonged observation. Photographic studies were made on June 9th when the young were beginning to be well feathered. All three left the nest by the 15th of June.

The white-eyed vireo apparently does not nest very close to human habitation, most of the nests observed being found in quiet woodlands near streams.

The latest date for the Baltimore area is October 8th.

Yellow-throated Vireo *(Vireo flavifrons)*

The yellow-throated vireo, the most brilliant of the genus in our area, is quite numerous in migration. Both spring and fall data are available, but very little has been recorded by our observers concerning its nesting. It appears during the first week in May and is commonly seen in our woodlands

throughout the month and well into June. During September the southbound migrants are numerous. Our latest date is October 15th.

From the available data we assume that the yellow-throated vireo is an uncommon breeding bird. Nesting dates are as follows: May 27th, 3 eggs; and June 19th, 4 eggs. The yellow-throated vireo is an inhabitant of the tree-tops, which may account for the scarcity of breeding data.

Blue-headed Vireo *(Vireo solitarius solitarius)*

This species is an uncommon migrant appearing early in April. Our earliest date is April 13th, most of our observations being made in this month. The height of the migration seems to be the last two weeks in April. Fall dates are not numerous; most of our records are for October. Brackbill observed a singing bird on October 12, 1938, and a silent bird on October 29, 1939, which date is the latest for our area.

Red-eyed Vireo *(Vireo olivaceus)*

The best known of the vireos is the red-eyed vireo. An abundance of migration data and many nesting records are at hand, yet there is much to be learned concerning its breeding habits. The first arrivals are recorded about April 20th, becoming numerous thereafter. Our latest date for the fall is October 15th.

Nesting dates range from May 15th, nest just completed, to August 25th, where a young bird just out of the nest was found. Three or four eggs usually complete the clutch.

The following notes, received from Mr. Hervey Brackbill, are of special interest.

"Hanlon Park vicinity, August 10, 1938, nest with one well-fledged young bird found; it left the nest that day or the next. Nest was 6 feet above the ground, about 2 feet from the end of a slender branch of a young white oak. Great deal of white crepe paper was used in outer cup of nest; lining was of fine grass; terrific infestation of mites prevented thorough analysis.

"Hanlon Park vicinity, July 15, nest with 3 good-sized young found in 1940; young had left by morning of July 19. Nest in a sassafras sapling, hung from a slender fork near the end of a low branch. Leaves of the same branch spread over it almost like a lid and completely concealed it;nestlings' calls betrayed it. Nest rim 46 inches above ground. Skeleton of the bag was made of string, long grass, leaves, long and narrow strips of grape bark; outer cup was of paper, one or two sassafras leaves, grass, more bark; fairly neat lining was of fine grass. Very full of mites after desertion.

"Hanlon Park vicinity, nest 9 feet up in a 40-foot black locust found in 1943, with 4 eggs; 1 egg infertile, others hatched July 12-14, and the three young left July 22 to 24. Both parents fed the nestlings."

It is interesting to note that the young birds do not have the red iris during the nestling stage. All that the writer has examined have a muddy brown iris with a slight reddish tint. The pupil of the eye is dark brown.

Another interesting fact concerning the red-eyed vireo was discovered by Mr. Brackbill. He found that the female occasionally begins incubation before the clutch of eggs is completed.

Philadelphia Vireo *(Vireo philadelphicus)*

Apparently a very uncommon migrant in the Baltimore area. The only record at hand is of a specimen (NHS Md 418) collected near Loch Raven on October 11, 1941 by Mr. C. Haven Kolb.

Eastern Warbling Vireo *(Vireo gilvus gilvus)*

This vireo is a common summer resident in some localities within our area. It would be interesting to discover the reason for its spotty distribution. In the Patapsco State Park the warbling vireo is found in the tree-tops above the swampy bottomlands. It arrives in our area about the first of May, and is more often located by its song than by sight. The few records of the nest at hand seem to indicate a preference for height. None of the nests discovered was accessible for study. By the end of May nesting duties have curtailed the song of this species and sight records are uncommon until the fall migration begins. Fall migration records are more numerous than those of spring. The latest date is October 11th.

The writer wishes to thank Messrs. Hervey Brackbill and Haven Kolb for use of their records.

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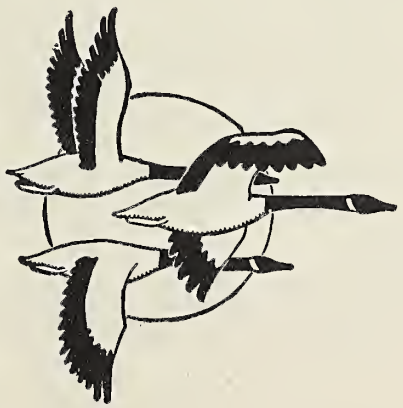

THE OCCURRENCE OF HYLA FEMORALIS IN MARYLAND

by

J. A. Fowler, Biology Department, The Sidwell Friends School, Washington, D. C.

and

Grace Orton, Department of Herpetology, Carnegie Museum, Pittsburgh, Pennsylvania

The pine-woods tree frog, Hyla femoralis, Latreille, primarily an inhabitant of the Southern and Gulf Coastal Plain, was recorded from the Dismal Swamp of Virginia by Brady (1927). There appear to be no published records of the species north of this area. We are indebted to Dr. Norman Hartweg of the University of Michigan Museum of Zoology, who has permitted us to report on a series of four specimens (UMMZ 91960) collected along Battle Creek near Gray's Corner, southwest of Prince Frederick, Calvert County, Maryland, in 1937 by Dr. Carl L. Hubbs. This represents a considerable northward range extension, and is apparently the first record of the occurrence of femoralis in Maryland. All four specimens are females, two of them gravid. The snout-vent lengths range from 31 to 35 mm.

Battle Creek is a region of considerable ecological interest. It is in the Coastal Plain of southern Maryland in that part known locally as the "Western Shore" and is on a peninsula between the Chesapeake Bay on the east and the Patuxent River on the West. In its valley occurs one of the few cypress swamps in Maryland. It was from this cypress swamp that the specimens of H. femoralis were collected. Although the mouth of Battle Creek is an estuary, the portion in which the cypress swamp occurs is quite narrow and is at the head of tidewater. The trees in this swamp are second-growth, most of the large trees having been removed. The characteristic "knees" of the cypress are of frequent occurrence on the partly inundated floodplain of the creek.

The association of H. femoralis in Maryland with cypress is apparently significant. Thus the Carnegie Museum collection contains two femoralis (CM 19041-42) collected at Shackelford Farms, near Lanexa, New Kent County, Virginia, on August 15, 1940, by Neil D. Richmond. Both these specimens and the Battle Creek series were taken in areas where small remnants of cypress swamps have persisted and probably represent isolated populations which have survived in the north only in such limited favorable localities. In the far south, however, femoralis is apparently most abundant in the pine flatwoods and does not show as close association with cypress as do certain other hylids (vide Wright, 1932). In connection with the occurrence of H. femoralis in cypress swamps in the north, such swamps also exist on the Eastern Shore of Maryland and Southern Delaware and may also be inhabited by this frog.

The addition of H. femoralis to the amphibian fauna of Maryland is of particular interest because of two other southern species of amphibian and

reptile which have been recently recorded from the state. Noble and Hassler (1936) have thus recorded Microhyla carolinensis from Calvert County, and McCauley (1939) has recorded Abastor erythrogrammus from Charles County.

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THE SPADEFOOT TOAD IN MARYLAND

by

Romeo Mansueti

The spadefoot toad, Scaphiopus holbrookii holbrookii (Harlan), is one of the strangest and wierdest-looking Anurans of Maryland. On the Coastal Plain of the Eastern seaboard its rarity is accounted for by its secretive, burrowing habits, and its short breeding period. Burrowing underground during the day, and emerging at night to hunt for food, the spadefoot toad is easily one of our queerest amphibians. The spadefoot toad receives its name from the large, dark, spade-like or horny process on the inner sole which is used as an aid in digging burrows. It is the only Maryland amphibian with elliptical pupils; an indication of nocturnal habits. Although it resembles a toad, it is not a true Bufonid, but is really a Scaphiopodid, which is perhaps the most primitive toad family of Eastern North America.

Its occurrence in Maryland is extremely sporadic as may be noticed by the records. Hay (1902 - A LIST OF THE BATRACHIANS AND REPTILES OF THE DISTRICT OF COLUMBIA AND VICINITY, Proc. Biol. Soc. Washington Vol. 15, Pp. 121-145) records the species in his study, but cites no particular locality.

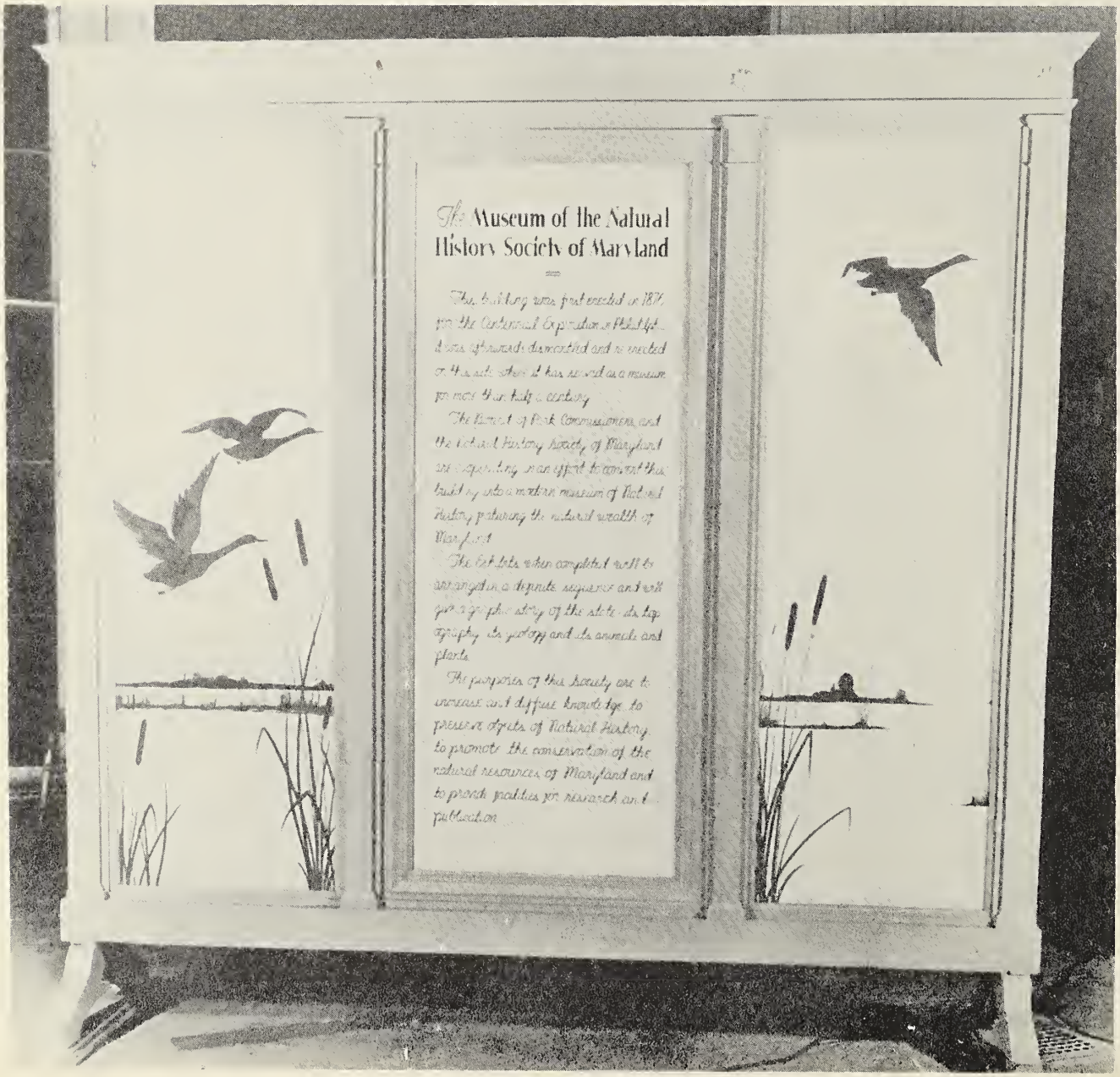

DISTRIBUTION OF THE EASTERN SPADEFOOT TOAD IN MARYLAND
PENNSYLVANIA
GARRETT
ALLEGANY
WASHINGTON
CARROLL
CECIL
HARFORD
FREDERICK
BALTIMORE
WEST VIRGINIA
HOWARD
BALTIMORE CITY
KENT
MONTGOMERY
MARYLAND
QUEEN ANNES
ANNE ARUNDEL
D.C.
DISTRICT OF COLUMBIA
DELAWARE
TALBOT
PRINCE GEORGES
CAROLINE
CALVERT
CHARLES
DORCHESTER
ST.MARYS
WICOMICO
SOMERSET
WORCESTER
VIRGINIA
VA.
RM 46
Scaphiopus holbrookii holbrookii
● LOCALITY RECORDS
SCALE OF MILES
0 5 10 20 30
MARYLAND
79°
78°
77°
76°
Longitude West from Greenwich

He comments upon its rarity. Conant (1945 - AN ANNOTATED CHECK LIST OF THE AMPHIBIANS AND REPTILES OF THE DEL-MAR-VA PENINSULA, Soc. Nat. Hist. Delaware Pp. 1-5) officially lists it from Maryland on the basis of specimens from widely scattered Eastern Shore counties. Fowler (1945 - THE AMPHIBIANS AND REPTILES OF NATIONAL CAPITAL PARKS AND THE DISTRICT OF COLUMBIA REGION: U. S. Dept. Int., Nat. Pk. Serv., Washington, Pp. 1-4) also lists it as rare from the Washington area, but cites no definite records.

It is significant to point out that areas where extensive collecting has been carried on, such as the Patuxent Research Refuge at Bowie, Maryland, fossorial and little-known forms are readily uncovered. Mr. F. M. Uhler of the Food Habits Section of the Patuxent Research Refuge very kindly allowed me to examine a large series of spadefoot toads from that immediate area. Mrs. Lucille F. Stickel, Biologist of the Economic Investigations Laboratory, very graciously supplied me with detailed notes of the records which are reproduced below:

Date	Locality	Collector	Remarks
13 July 1941	One mile east of Glenndale and one mile south of Springfield, Maryland	Ford Wilke	Many calling in a pool about 10 inches deep in mixed pine, oak, and sweetgum area.
29 July 1941	Bowie-Laurel Road at Refuge	Leonard M. Llewellyn	Found on road at midnight after shower.
25 July 1942	Window pit in headquarters area at the Refuge.	Lucille F. Stickel	
30 July 1942	"	"	
31 July 1942	"	William H. and Lucille F. Stickel	Three specimens collected.
9 August 1942	"	Lucille F. Stickel	
10 August 1942	Window pit of residence	Margaret Coburn	
6 September 1942	Window pit in headquarters area	Lucille F. Stickel	
10 September 1942	"	"	
13 September 1942	Moist forest area near headquarters area	R. E. Stewart and W.O.Pruitt	Recently transformed young.

Exhibits from Museum



our

BEACH SCENE FROM COVE POINT, MARYLAND

This habitat group portrays the nesting of the Least and Common Terns near the lighthouse at Cove Point, Maryland.

Habitat Group prepared by T. Milton Oler, Jr.
Photographs by Earl H. Palmer

INTRODUCTORY PANEL

This introductory panel greets you as you enter our Museum of Natural History in Druid Hill Park. The panel introduces the history of the building, the exhibits and the aims of the Society.

Date	Locality	Collector	Remarks
21 September 1942	Terrace area about 1/2 mile from headquarters	W. R. Greiner	Recently transformed young.
27 September 1942	Window pits in headquarters area	Lucille F. Stickel	Five very small juveniles and one adult.
20 September 1942	Forest Service headquarters near Bowie	William H.and Lucille F. Stickel	
15 October 1942	Window pits in headquarters area	Lucille F. Stickel	One very small juvenile and one adult.
15 October 1942	Crushed in driveway in headquarters area	"	
16 October 1942	Window pit in headquarters area	"	Very young juvenile
19 October 1942	Window pit in headquarters area	Lucille F. Stickel	Very small juvenile
23 October 1942	"	"	"
26 May 1943	"	"	"
3 August 1945	Window pit in headquarters area	William H. Stickel	Adult

In addition to these records, Dr. Remington Kellogg of the Division of Mammals of the United States National Museum has recorded these toads in fair numbers in the vicinity of Woodridge, District of Columbia. He informs me, however, that their habitat, of pine and sandy nature, has been destroyed by housing projects.

That their distribution over Maryland is probably widespread in the Coastal Plain region is exemplified by the capture of several juveniles from Cove Point, Calvert County, Maryland. Mr. James A. Fowler, who collected these small spadefoot toads, informs me that he has found no adults after several years of diligently looking for the species at this locality. Dr. Robert H. McCauley, Jr. has collected a specimen from Denton, Caroline County (USNM 104406), and another is deposited in the Washington College Collection (#57) from Goldsboro, Caroline County.

Mr. Roger Conant, Curator of the Philadelphia Zoological Gardens, in connection with his study of the herpetology of the Del-Mar-Va peninsula, very kindly supplied me with notes of Eastern Shore specimens collected at Willards, Wicomico County. On June 14, 1941, Mr. Conant with Amos Taylor,

William Hice, and Richard Knox collected them hopping across sand roads at night after heavy rains. The first one was taken about 1 A. M., at a temperature of 72 degrees F., and the other was captured in the early evening (the next night, but the same date).

While perusing notes willed to the Natural History Society of Maryland by the late Dr. Howard A. Kelly, I came across an interesting reference to the spadefoot toad on the Eastern Shore. Toward the latter part of September of 1928 Dr. Kelly became interested in a news item relative to a "rain of frogs" on the Eastern Shore. On the 4th of October, W. S. Seymour, M. D. of Easton, Maryland sent the following letter to Dr. Kelly:

> "I am today forwarding a few frogs - which happened to have been left in my cellar by my hired man. About two weeks ago there were suddenly found myriads of small frogs hopping about my lawn - and likewise on adjoining property of the distance of perhaps two city blocks. These frogs were practically all the same size and color; they were found only on the ground, pavements and state road. I saw none except as noted. I have made diligent inquiry, but no one appears to have noted them except on yards and roadways. There were doubtless millions of them. The State Road and pavements were black with them. There was a constant trail of them crushed in the traffic lines, and were scattered everywhere over lawns and gardens for possibly 5 or 6 days, when they gradually began to disappear until now there are none to be found where once they were quite dense west of the town. About 200 yds. is a low lying field and ditch, which ordinarily has a small pond of water during the summer months, but on account of continued heavy rains this probably covered an area of 2 or 3 acres to a depth of two feet or more. This pond had numerous frogs. These small frogs were seen hopping about an adjacent lot for a day, before getting through to the state road running north and south through the town after an all night deluge of rain which filled this pond and adjacent lots. These frogs were found coming from direction of this pond, hopping everywhere in countless hordes and as many were crushed by the traffic their places were soon taken by many more, hopping constantly across the roadway. This as I mentioned continued for about 5 or 6 days. I am of the opinion that these frogs came from the aforementioned pond."

The few specimens sent to Dr. Kelly by Dr. Seymour were dispatched to the American Museum of Natural History. There the specimens from Easton, Maryland were identified by the late Dr. G. Kingsley Noble, the Curator of Herpetology, as young spadefoot toads.

Dr. Kelly notes that on the 4th of October, Dr. Samuel T. Earle told him of a visitation of toads, most of which were tiny and brown, in Queen Anne's County. This occurred two weeks later than the Talbot County exodus. He remarked that it appeared as if there were thousands of them, covering the road as thickly as a horde of grasshoppers during their swarming.

During the breeding season, this species often comes in great numbers to temporary pools where they breed at all hours, making a frightful uproar. At this time they are conspicuously abundant. It is possible that the prolific number of toads noticed in Talbot County may have been made up of recently transformed Fowler's toads, Bufo woodhousii fowleri and the spadefoot toad. Perhaps the conditions may have been favorable after the heavy rains for the transformation of the majority of the tadpoles, which had hatched from the thousands of eggs laid sometime before at a congregation of toads. Enemies, lack of sufficient food, and other conditions often kill off huge numbers of eggs and tadpoles even before transformation begins. Spadefoot toads usually disappear by instinctively burrowing in soft earth or sand a day or so after emerging from the tadpole stage; however, Fowler's toads hop about in search of food for a week or so before finally scattering enough through the surrounding locality.

The spadefoot toad should be looked for in Maryland in sandy regions with pines predominating. During July their appearance from their burrows is usually coincident with a long, warm, drizzling rain. They usually remain in the ponds for only one night, or two at most, accompanied with a loud continual chorus of shrill, ear-splitting cries from the male spadefoot toads.

THE HELLBENDER (CRYPTOBRANCHUS ALLEGANIENSIS) IN MARYLAND

by

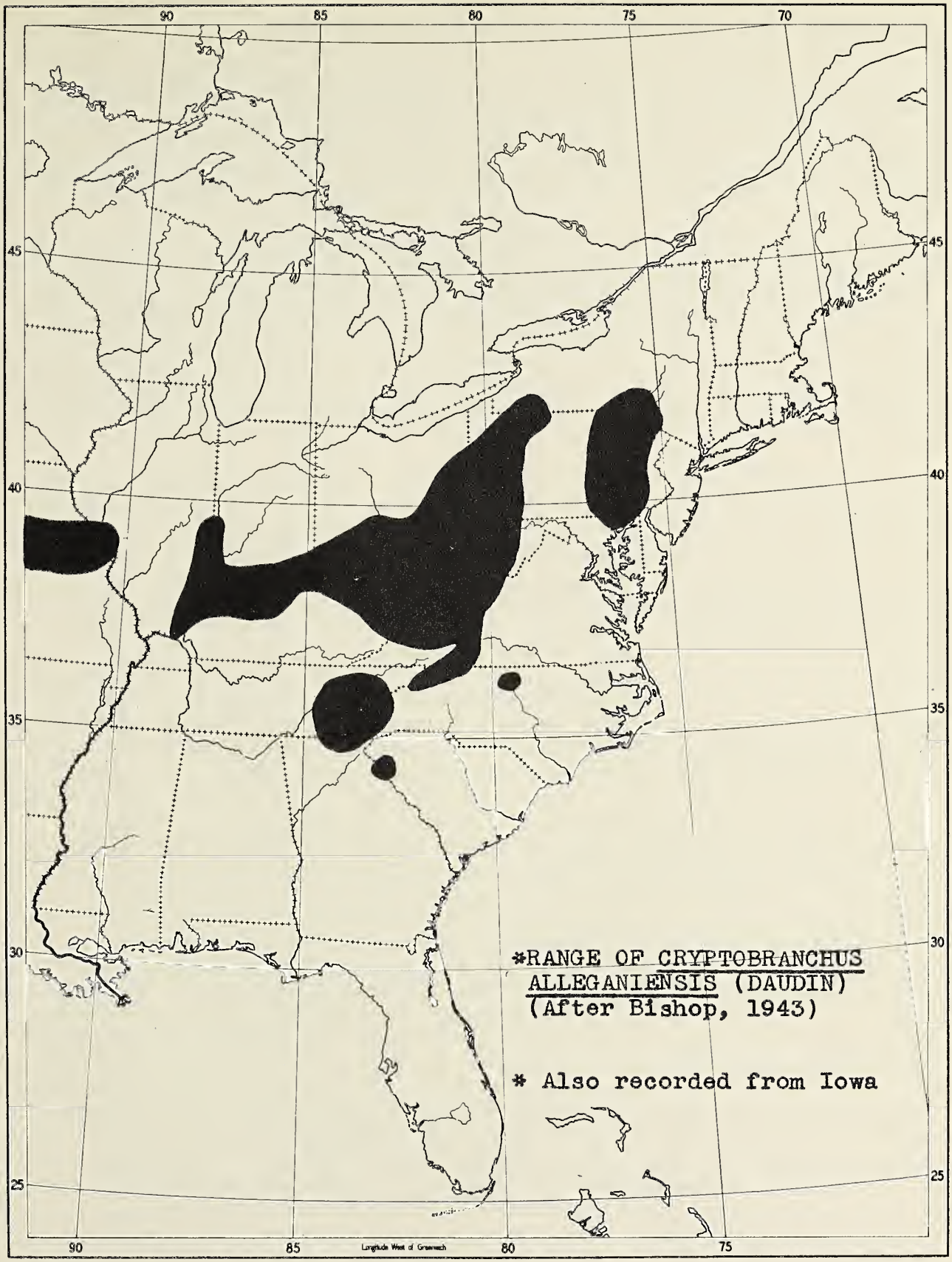
James A. Fowler

The hellbender, Cryptobranchus alleganiensis (Daudin), is the largest salamander in Maryland. In this species adult specimens average about 17 inches in length. Males vary from 11 to 22 inches, while females may reach a maximum length of about 27 inches (Bishop, 1943, p. 61).

The range of the hellbender includes the Susquehanna and its tributaries in New York, Pennsylvania, and Maryland; the Ohio and its tributaries including the Allegheny; the Mississippi River southward to Missouri, Arkansas, and Georgia. It has also been recorded from Iowa (Fig. 1) (Bishop, 1943, pp. 59-60).

In Maryland the hellbender has been recorded both in the eastern and the western part of the state. In the east it occurs in Cecil County in the Susquehanna River and in the shallow area near the head of Chesapeake Bay known as the Susquehanna Flats (Conant, 1945, p. 2). Fowler (1915, p. 38) also mentions it as occasional in the Susquehanna River and records it from the following localities in Cecil County: Conowingo, Octoraro, and Bald Friar.

In Western Maryland this salamander occurs only in Garrett County where it has been recorded from the Castleman and Youghiogheny rivers. Both of these rivers are in the Ohio River drainage. Supporting its occurrence in the Castleman (Cassellman) River, the American Museum of Natural History has



*RANGE OF CRYPTOBRANCHUS ALLEGANIENSIS (DAUDIN)
(After Bishop, 1943)

* Also recorded from Iowa

two specimens (Nos. 51549-51550) collected from this river. These records were made available through the courtesy of Mr. Charles M. Bogert. In the Youghiogheny River, McCauley and East (1940, p. 121), while seeing no specimens, report that it is caught on hook and line by fishermen. Moreover, natives with whom the writer talked were familiar with this creature in the same river under the colloquial name of "alligator". There are, however, apparently no specimens extant from the Youghiogheny. It is therefore of interest to record the capture of a specimen from this river.

On April 13, 1946 the writer secured a specimen of this species from the Youghiogheny River between Selbysport and Geices. The river at this point is quite shallow and swift and is full of boulders of various sizes. The specimen was taken in the early afternoon from a quiet pool between the shore and a small island about 6 feet offshore in water about 2 feet deep. When first seen it was lying with its head between two rocks. Just prior to being seized it began to crawl slowly across the silty bottom. Upon being grasped behind the head and lifted from the water, it opened a cavernous mouth and squirmed vigorously exuding a viscous white slime from its skin.

It was brought back alive to the laboratory and put in a large tank in about 6 inches of water. Two days after being placed in this tank it was offered earthworms as food. These it voraciously accepted swallowing each in almost a single gulp. In the quiet water of the tank it occasionally rocks from side to side aerating the conspicuous lateral folds of its body which serve as accessory respiratory devices. In addition it comes to the surface from time to time and fills its lungs with air at which time bubbles frequently escape from its mouth. At this writing the specimen has been in captivity for about a month and is apparently thriving. The only unfavorable condition that has been noted in this specimen is the presence of parasitic worms. Thus on three different occasions it has passed a number of tapeworm proglottids, while on another occasion a long slender roundworm was removed as it emerged from the subcutaneous tissues of its hind foot.

It is hoped that the publication of this brief account will stimulate further interest in this most interesting Maryland amphibian. Thus observations on its breeding habits in the state are especially desirable as well as more complete data on its distribution. In this latter connection it is possible that the hellbender may ultimately be found in the Potomac River drainage. The Potomac and its headwater tributaries with their higher gradients are thus encroaching upon those of the Youghiogheny to the westward. This is particularly the case along the Savage-Youghiogheny divide which once stood along the Great Backbone-Big Savage crest but which is now on its way to a new resting place upon the Meadow Mountain-Roman Nose range (Abbe, 1902, pp. 53-54).

In closing it seems pertinent to mention the fact that the entire area along the Youghiogheny River from Friendsville, Maryland to Confluence, Pennsylvania traversed on this trip is soon to be inundated in connection with a flood control dam now under construction. It is therefore hoped that those interested in herpetology and other phases of natural history will endeavor to visit the area for the purpose of securing representative material while it is still possible to do so.

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NOTES ON THE EGGS AND YOUNG OF THE COMMON SKINK (EUMECES FASCIATUS)

by

Michael F. Groves

Two cases of oviposition in the common skink (Eumeces fasciatus) noted during the past summer seem worthy of publication as a contribution to the knowledge of the life history of this species.

An old female measuring 76 mm., snout to vent, and about twelve years old was collected at Arnold, Anne Arundel County, Maryland in the spring of 1946. In July, over a period of three days, she deposited seven eggs: one on the 5th, three on the 6th and three more on the 7th. These were measured just after deposit and were immediately placed in faintly damp sawdust to incubate. They varied in length from 11.6 to 13.6 mm. and the extremes of width ranged from 7.4 to 8.0 mm.; the average for the whole clutch of seven was 12.9 mm. long by 7.7 mm. wide.

On July 21st, after two weeks of incubation, the eggs were removed from their medium to be measured again. It was noted at this time that one of them had spoiled. The second measurement showed them to vary in length from 13.2 - 15.9 mm. and in width from 9.1 - 10.9 mm., with an average for the clutch of 14.9 long by 10.4 mm. wide. These figures represented a mean increase for the two week period of 2 mm. in the length and 2.7 mm. in the width. The average weight of the eggs at this time was found to be 0.82 grams. Since the identities of the eggs were maintained it was possible to assemble the following table showing the individual growth for the two week period.

Eggs are lettered according to order laid.

	First measurement (July 5,6,7)		Second measurement (July 21)
(a)	13.1 X 7.4	(a)	15.9 X 10.9
(b)	13.5 X 8.0	(b)	15.2 X 10.8
(c)	13.6 X 8.0	(c)	spoiled
(d)	12.9 X 7.5	(d)	15.3 X 10.6
(e)	12.8 X 7.4	(e)	14.9 X 10.5
(f)	12.6 X 7.8	(f)	14.7 X 10.4
(g)	11.6 X 7.6	(g)	13.2 X 9.1

An examination of the eggs on August 4th, showed all to be badly dented and apparently lost. However, on August 6th, after 30 days of incubation, a hatchling was found buried deeply in the sawdust. The young one became quite active when exposed to the light and it was noted that he was in the process of shedding; the latter point indicated that hatching had occurred on the previous day. Only the one egg hatched and the hatchling survived for just seven days. After its death it was measured and found to be 26.5 mm. from snout to vent, with a tail 34 mm. long.

The second case concerns a younger female found with her eggs at Briarcliff-on-Severn, near Arnold, Anne Arundel County, Maryland. This specimen was much smaller than the first, measuring just 56.5 mm. from snout to vent and was in about her sixth year, still exhibiting the juvenile color pattern except that the tail was gray rather than blue. She was found coiled about her nine eggs under a small piece of timber, about three feet long, on July 20, 1946. The eggs were arranged closely together beneath the log in a small cavity in dry, sandy, and somewhat "caked" soil beside a dirt road leading between a deciduous forest and an open campus. This site was in the midst of an active community consisting of a dozen or so houses; in fact, the nearest house was not more than forty feet distant. The dry nature of the incubating medium was surprising in view of the fact that moisture is essential to proper growth and development of reptile eggs, and also because skinks show a decided preference for damp habitats.

The mother was loathe to leave her clutch of eggs until she was actually touched, when she tried to make her escape into surrounding foliage. The eggs were carefully packed, and when brought to the laboratory were measured, then placed in damp sawdust. The average measurements for the entire clutch were 13.1 mm. long by 10.0 mm. wide, with extreme lengths of 12.3 - 14.0 mm. and widths varying from 9.3 - 10.8 mm. The average weight was 0.55 gms. Evidently they had been deposited about one week previous to their discovery.

On August 4th, two of the eggs hatched and a third hatched on the following day. Two other hatchlings emerged half way out of the egg but succumbed at that point. The living lizards began moulting two days after hatching. By August 12th, all had died. Post mortem measurements were as follows:

	(a)	(b)	(c)
Snout to vent:	27.5 mm.	27.0 mm.	26.0 mm.
Tail	32.5 "	34.0 "	30.0 "

Two Minerals from the Gwynn's Falls Gneiss Quarry

by

Herbert Bangs, Jr.

An interesting crystal of pyrite (iron disulphide) was found at the Gwynn's Falls Gneiss Quarry in the summer of 1944. Once it was a perfect, yellow, half-inch cube in a chlorite schist. Then in some remote geological epoch there was a minor strain in the earth's crust. Something gave. The chorite schist was thrust up against the crystal and buckled down along one cubic face. The crystal itself was twisted, roughened, curved and distorted. Its angles were irresistibly forced away from the perpendicular. Today it is a mute witness to the tremendous forces packed within the crust of the earth.

Another unusual specimen was collected from the quartz vein in the north end of the quarry in the summer of 1944. In a piece of the white, crystalline quartz a funnel-shaped opening, partially filled with chalcedony, leads down toward a bit of red chalcedony which shows a distinct rectangular crystal form. This mineral is believed to be quartz pseudomorphic after pyrite, but the fact that that is the only cubic mineral found in the quartz vein would make it improbable that the chalcedony could be pseudomorphic after anything else. Only one specimen has been discovered, and as operations at the end of quarry have been discontinued, it is unlikely that any others will be found.

In Memorium

Percy Thayer Blogg

On December 31st, the Society lost one of its valued members, Percy T. Blogg. Mr. Blogg was a naturalist, sportsman, artist, and author. He will be remembered for his bird lectures at the Society, especially his perfect imitations of bird songs, and for his articles on birds that appeared in our Journal "Maryland" and in other papers. He was an ardent conservationist and voiced his opinion against the abuses of hunters and those who ignored our game laws.

His latest publication, "There are no Dull Dark Days", a gem of a little book of bird reminiscences and nature poetry, warmed the heart of any naturalists. He was a kindly, sympathetic gentleman, whom every one was happy to see and meet.

Lectures at the Society

October, November and December, 1946

October 15 - Lecture by Charles Ostrander: "The Great Smokies"
" 22 - Illustrated lecture by Dr. W. Gardner Lynn: "The Natural History of the Isle of Jamaica"
November 15 - Color Motion Pictures of Birds by Dr. Richard Tousey through the the courtesy of the Maryland Ornithological Society
" 22 - Sound Motion Picture: "Venezuela Moves Ahead"
" 26 - Illustrated Lecture by C. Haven Kolb: "Maryland Ducks"
December 10 - Illustrated lecture by Charles E. Mohr: "Descent to the Underworld"
" 13 - Illustrated lecture by J. H. Passmore: "Gulls and Terns". Through the courtesy of the Maryland Ornithological Society
" 17 - Illustrated lecture by John B. Calder: "Fossils, What They Are and Where They Are Found in Maryland".

JUNIOR DIVISION MEETINGS

September 7 - Laboratory Night
" 14 - Lecture by Romeo Mansueti: "Expeditions and What They Do"
" 21 - Talk by John Cooper: "Fish in the Gwynns Falls Stream"
" 28 - Talk by Charles Freed: "Rare Earths"
October 5 - Laboratory Night
" 12 - Talk by Joseph Gentile: "The Francis C. Nicholas Bird Sanctuary"
" 19 - Lecture by Elra M. Palmer: "Crabs in Maryland"
" 26 - Motion Picture: "The Heritage We Guard"
November 2 - Laboratory Night
" 9 - Address by President of the Society on the importance of the Junior program as a part of the Society's function. Illustrated with motion pictures.
" 16 - Illustrated lecture by John P. Hill: "The Collecting of Twigs as a Winter Study"
" 23 - Motion Picture: "The River"
" 30 - Talk by Franklin Atwell: "Collecting of Reptiles", followed by a short address on being a naturalist
December 7 - Laboratory Night
" 14 - Illustrated lecture by John P. Calder: "Fossils, What They Are and Where Found in Maryland"
" 21 - Christmas Assembly

Publications of
The Natural History Society of Maryland

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Paper cover, 103 pages, 11 plates in color and 33 black and white; with identification keys and distribution map. Price 1.50

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In course of preparation -- Annotated List of Maryland Birds

Prices listed above effective July 1, 1945.

The Natural History Society of Maryland

Founded 1929

"To increase and diffuse knowledge of Natural History"

* * * * *

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BLUEBIRD

Photographed
by
Edmund B. Fladung

MARYLAND

A JOURNAL OF NATURAL HISTORY

The Natural History Society of Maryland

APRIL 1947 VOLUME XVII No. 2

MUSEUM OF NATURAL HISTORY
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MARYLAND

A JOURNAL OF NATURAL HISTORY

THE WORLD

Oh earth! thou hast not any wind that blows
Which is not music; every weed of thine
Pressed rightly flows in aromatic wine;
And every humble hedgerow flower that grows,
And every little brown bird that doth sing,
Hath something greater than itself, and bears
A living word to every living thing,
Albeit it hold the Message unawares.
All shapes and sounds have something which is not
Of them; a Spirit broods amid the grass;
Vague outlines of the Everlasting Thought
Lie in the melting shadows as they pass;
The touch of an Eternal Presence thrills
The fringes of the sunsets and the hills.

Richard Realf

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VOLUME XVII No. 2
APRIL 1947

LONG-EARED OWL
by
W. Wallace Coleman

BREEDING OF THE LONG-EARED OWL NEAR BALTIMORE

by

Haven Kolb

It has generally been recognized that the long-eared owl (Asio otus wilsonianus), like most raptorial birds, has declined greatly in numbers. In the last quarter century, records of this bird in eastern Maryland have been few and usually confined to the winter months. It was, therefore, somewhat of a surprise when I discovered a pair of long-eared owls nesting in Baltimore County during the spring of 1946.

The extensive lands owned by the City of Baltimore in Dulaney Valley, north of Towson, together with the reservoir (Loch Raven) which they surround, offer to wildlife one of the largest tracts of relatively undisturbed country in this part of the state. Much of the area has always been in deciduous woodland, while a great many acres of land formerly cultivated have been reforested with pines of various species. It is not surprising that this region has proved attractive to many forms of wildlife. (See: Bull. Nat. Hist. Soc. Md. 9:1-5 and 11:12-15) and here, within a dozen miles of the center of Baltimore City many persecuted predators may find scope for their mode of existence.

In January of 1943 I first found the long-eared owl in the Loch Raven region when I flushed a group of five which were roosting in a dense pine plantation. Subsequent visits to the spot showed that these five birds kept very close to the same daytime retreat throughout the winter. The distribution of their pellets even indicated that they seldom moved from their favorite perching limbs. These birds were last noted on March 8, though several trips were taken to the locality in search of them during the succeeding spring.

The pine plantations are still so dense, being only about thirty years old, and in some places are so overgrown with honeysuckle (Lonicera japonica) that thorough search through them is difficult. Moreover I am seldom in the region at night to detect owl voices, so it is quite possible for owls to be present even though I am unaware of them. Nevertheless, since I had been traversing the region a dozen years before encountering the long-eared owl there, it must be recognized that the species must have been uncommon.

During the following two winters I was away from Maryland. When I resumed study at Loch Raven in January of 1946, my attention was narrowed to an ecological survey of an area of about fifty acres, perhaps half a mile from the 1943 owl roost. Adjacent to the study area was another pine plantation and I occasionally visited it during the winter without seeing any signs of owls, though I was on the alert for them because a small marsh was plentifully supplied with meadow mice (Microtus pennsylvanicus). In this marshy district on April 6 I found a secondary feather from a great horned owl (Bubo virginianus). This find prompted an investigation of old crow nests in the pines.

On April 14 near one corner of the plantation and about fifteen yards within it I flushed an owl. Instead of gliding silently away, it withdrew

only a short distance to the accompaniment of loud crying and chittering noises. The woods are plentifully provided with old crow nests and I started to climb to the nearest one. This action brought on a surprising performance from the owl, which reappeared, swept to the ground about ten yards away, spread its wings, and fluttered violently about, continuously uttering a variety of rather weird sounds. I could now glimpse a few stray pieces of down on the edge of the nest and, continuing the easy climb, I soon peered over the edge and found within two eggs, one young owl covered with white down, and one freshly killed but headless meadow mouse. In the meantime a second adult owl had appeared and the pair continued their vocal disapproval although only one indulged in the ground performance. As I descended from the nest the adults subsided somewhat, confining their remarks largely to clicking noises evidently made with their bills.

The nest was about 18 feet from the ground near the top of a pine, about 20 yards from the edge of the plantation and two hundred yards from the marsh with the abundant meadow mice. The birds must have been in the vicinity unnoted for some time since, according to Bent (Bull. U.S. Nat. Mus. No. 170, p. 158), the incubation period is about twenty-one days. The nest was undoubtedly an old one built by crows and did not seem to have been very much repaired by the owls.

Another visit was made to the nest on April 20. The nest now contained three young birds of three quite different sizes. The youngest was at about the same stage of development as the single chick of the first visit. This oldest chick was now becoming quite dark beneath where the feather sheaths were developing beneath the down. One adult bird was still on the nest when I arrived on this second visit and it did not leave until the tree was tapped. It flew to the ground but was not in view, so that its activities could not be observed. The second adult perched nearby and both birds began to voice their objections with sounds similar to the flock-calls of small birds. These were quite surprising utterances for owls and seemed to be preliminary anxiety-notes, for on this and subsequent occasions they only continued a short while. There was much bill-clicking as I climbed and later a series of grunts. Once or twice the perching bird flew toward me but always veered away when still about two yards from the nest.

The next visit was on April 28. Again an adult was brooding and again it flew to the ground indulging in the "injury-feigning" act in plain view, as on my first visit. As I climbed the tree an entirely new note was heard, a ghostly groaning whoo-oo-oo, produced by the second adult which was perched only about ten feet away in an adjacent pine. The smallest chick had evidently died shortly after my second visit, judging from the remains found at the base of the nest tree. Of the two remaining chicks, the older one, now at least two weeks old, was at least half again as large as the younger. It faced me defiantly, glaring with yellow eyes, and clicking its bill vigorously. Beneath the down the remiges with their barred pattern were quite plain to be seen and the "ear tufts" on the head were visible. A meadow mouse, dead but not mutilated, lay in the nest.

On May 4 I saw the birds for the last time. It was a rainy day and an adult was brooding with "ear-tufts" held far apart. Relying on this point, as it is depicted by Peterson (A Field Guide to the Birds, p. 89), a casual observer

might easily have misidentified the sitting bird. I was impressed throughout my study by the great variation in the position of these feather structures, perhaps an indication of the internal mood of the bird. There was still considerable difference in size between the two young birds. The larger one was now nearly fledged, the plumage being a grayish brown and very soft and fluffy. It immediately assumed a threatening attitude, backed across the nest, and spread and turned down its wings like two fans. The other young one, though now as old as the first had been when it showed defiance on April 28, made no movement.

I was unable to return to the nest until May 13, when nothing was seen of either parents or young. Young long-eared owls apparently leave the nest before they are able to fly, but the ages at which they leave or at which they fly do not seem to have been determined. Bent (op.cit..), speaks of them leaving at four or five weeks "long before they can fly", but quotes Sumner who found them crawling out of the nest at two or three weeks. Thus it is probable that the Loch Raven young left of their own volition, swelling the ranks of our natural mousers.

FLUORESCENT WERNERITE FROM TEXAS, BALTIMORE COUNTY, MARYLAND

by

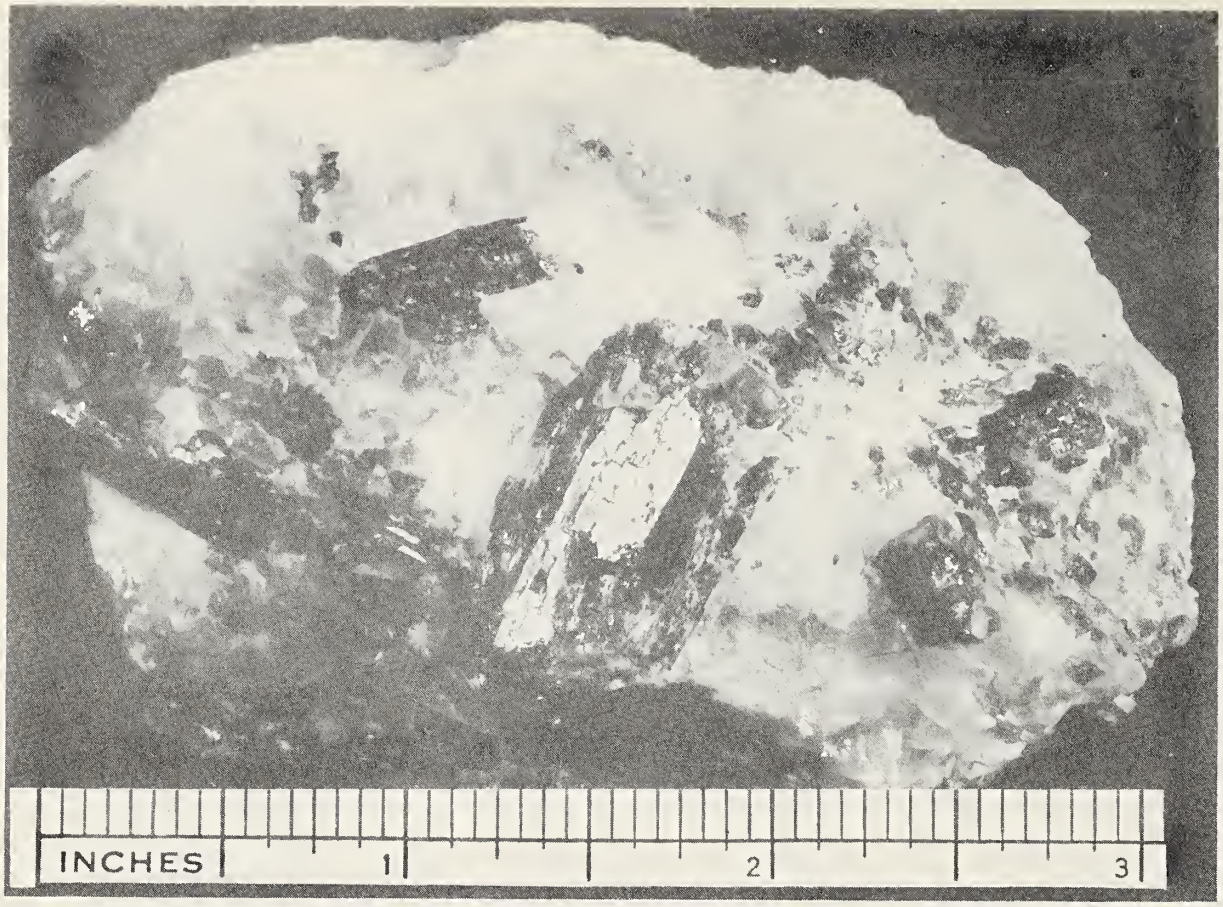
Walter E. Price, Jr.

Gray colored Wernerite, a mineral of the Scapolite series, was reported (1) in 1934 to be fluorescent yellow under ultra-violet light and to have been found in the crystalline limestone of Texas, Baltimore County, in the Campbell Quarry. The first mention of Scapolite to be found at this locality is in Old Dana's System of Mineralogy of 1892. Yellow fluorescing Wernerite had been previously reported (about 1932) to occur at Grenville, Quebec Province,Canada, and also, later, in Ontario Province. Soon after the finding in Maryland of the gray, yellow-fluorescing Wernerite, pink Wernerite was found in the same locality that fluoresced red. The Canadian type of Wernerite occurs in yellow cleavable masses, while the Maryland Wernerite occurs in distinct crystals.

The gray prisms of Maryland Wernerite fluoresce only in patches and not all specimens fluoresce, but the pink prisms fluoresce throughout. The Canadian Wernerite fluoresces throughout. To the knowledge of the author the Texas, Maryland locality is the only locality within the United States where yellow-fluorescing Wernerite occurs.

The Maryland Wernerite occurs in pure white coarsely crystalline limestone with other minerals (2) such as Tremolite, Phlogopite, brown Tourmaline, Pyrite, etc. in a formation known as the Cockeysville Marble.

The Wernerite at Texas usually occurs in small crystals, but coarse prisms of the gray variety as large as $1\frac{1}{2}$ inches square and 4 inches long have been found and, of the pink variety, $1\frac{1}{2}$ inches square and $2\frac{1}{2}$ inches long. The small prisms are frequently well developed and show the a(100) and m(110) prismatic forms and more infrequently the r(111) terminations. A typical gray crystal of medium size is shown in the photograph below.



The reactions of the Maryland gray and pink Wernerite specimens under long ultra-violet rays in comparison with the Canadian Wernerites is shown below.

Wernerite Sample	Color in Daylight	Color under Ultra-Violet Light (cold quartz lamp)
Texas, Md. Gray	dark gray	yellow
Texas, Md. Pink	pale pink	deep red
Quebec, Canada	yellow	brilliant yellow
Ontario, Canada	yellow	brilliant yellow

The gray and pink Maryland Wernerites analyze about 46% silica which identifies them as the common variety of Scapolite called Wernerite, containing from 46 to 54% silica. Wernerite is considered to be a mixture of the two mineral molecules of Marialite and Meionite the compositions of which are:

Meionite $CaCO_3 . 3\ CaAl_2Si_2O_8$ (Symbol Me)

Marialite $NaCl . 3\ NaAlSi_3O_8$ (Symbol Ma)

Wernerite varies in composition between $Me_{80}\ Ma_{20}$ to $Me_{60}\ Ma_{40}$ and from the above determined silica content this places the Maryland Wernerite at the lower limit of Wernerite toward Meionite.

The Maryland Wernerite is imperfectly decomposed by boiling hydrochloric acid as is to be expected, but this treatment leaches out the color from both

the pink and gray modifications. The gray apparently contains more iron as indicated from the color of the resulting acid solution.

A comparison of the arc spectra as shown by the Emission Spectrograph (3) of the gray and pink Wernerite with the Grenville, Canada Wernerite shows the qualitative elemental analysis to be similar as shown below.

Wernerite	Major Elements	Minor and Trace Elements
Texas, Md. Gray	Ca, Mg, Al, Na, Si.	Fe, Mn, Cu, K.
Texas, Md. Pink	Ca, Mg, Al, Na, Si.	Fe, Mn, Cu, K.
Grenville, Canada	Ca, Mg, Al, Na, Si.	Fe, Mn, K, B, Sr.

The Maryland pink and gray Wernerites are apparently very similar in composition, but contain different amounts of the same impurities. Manganese is probably the activator for fluorescence in the pink Wernerite that fluoresces red. The gray Wernerite contains more impurities that would mask an original pink color due to manganese, and these impurities that cause the gray prisms to fluoresce yellow only in patches are probably in the form of microscopic inclusions.

References:

(1) Price, W. E. Jr. "Some Recent Notes on Maryland Limestones" Bull. Nat. Hist. Soc. Md., Vol. IV, #9 (1934)

(2) Minerals of Maryland, Nat. Hist. Soc. of Md., Balto., 1940. p. 29, Campbell Quarry.

(3) Research in Pure Science Project, Stand. Oil of N. J., La. Div., Baton Rouge, 1946.

OBSERVATIONS ON THE NESTING HABITS OF THE BLACK VULTURE IN ANNE ARUNDEL COUNTY, MARYLAND.

by

Dr. Caleb Dorsey

During the spring and early summer of this past year the writer was fortunate in being able to observe a pair of black vultures (Coragyps atratus atratus) which nested upon his property about three and a half miles west of Annapolis. Black vultures are quite common in this vicinity during the summer months and are easily distinguished from the turkey vulture by their shorter wings and by their habit of flapping much more frequently in flight than the latter.

The nesting site of this pair was in an old,deserted, and partly demolished stable surrounded by a dense thicket. A portion of the roof had fallen in giving the birds free access to the interior, a part of which was protected by the remaining roof and reasonably secure side walls. Two eggs were deposited upon the bare earth which was dry and loamy in texture. No depression was made in the soil and no attempt at a nest was made, but the eggs were placed in a back corner of the building beneath an old manger

which rendered them quite inconspicuous. They were very pale green in color with chocolate brown markings and were first observed on April 7, 1946. The adults at this time were quite wary and would leave the nest at slight provocation. Throughout the nesting period only one adult at a time would be seen at the nest.

The nest was next seen on April 20, at which time the eggs were still in the process of incubation. The adult bird left the building hurriedly and was slow to return.

On May 6, the next observation was made and the two young were hatched, being about eight inches in length and quite active. They were covered with a light fawn-colored down and possessed black heads and feet. One was slightly larger than the other and this difference in size was noticeable throughout their entire period of development. They huddled together for mutual protection when disturbed and hissed weakly at the intruder. The parent bird was now much less wary and remained perched upon the edge of the roof for some time expressing her disapproval by regurgitating freely. She uttered several hoarse grunts upon leaving the nest. Her black head, which was quite different from the red head of the turkey vulture, could be readily seen.

One week had made a noticeable difference in the young vultures when they were next seen on May 13, as they were much more active and hissed with greater vigor. They resented being disturbed and moved about considerably when an attempt was made to photograph them. The adult bird was still slow to take flight, and when she did leave the building flew only a short distance away and perched in a bare tree watching the observer until he departed. It was interesting to note that during the entire nesting time the surroundings were clean and no remnants of food or offal were seen, but a rather unpleasant odor was noticeable.

On May 30, when the nest was again visited, the young had increased greatly in size and were very active. They hissed loudly when disturbed and regurgitated when approached too closely. The primaries of the wings and tail feathers were now beginning to develop, but the rest of the body was still covered with a heavy down. The nesting site was again visited that night and it was observed that the adult birds were not roosting in the building or in the immediate vicinity.

The last observation was made on June 16 and by this time the young were as large as a medium-sized hen. The primaries of the wings and the tail feathers were nearly complete in their development and "pin feathers" were covering the body. They ran about wildly when approached and darted out of the building when an attempt was made to photograph them. The surrounding brush made an excellent hiding place and it was impossible to locate them.

Circumstances prevented further visits to the nest, so additional data were impossible to obtain.

Visibility within the building was unfortunately very poor, which prevented clearer photography; and a disastrous fire within the writer's home caused further deterioration of the pictures obtained.

It might be of interest to state that a pair of black vultures nested in the identical location the preceding spring, but only one observation was made, on June 25. At this time two large young were seen with well developed tail and wing feathers; apparently they were nearly ready to leave the nest.

NOTES ON THE GREEN TURTLE IN MARINE WATERS OF MARYLAND

by

H. Charles Robertson

Perhaps the largest turtle found in Maryland waters is the green turtle, Chelonia mydas (Linnaeus). During the months of June and July this marine species enters the Chesapeake Bay and straggles considerable distances into our waters. Specimens are sometimes found along the shores of the Bay, presumably killed by ships that ply in the channel.

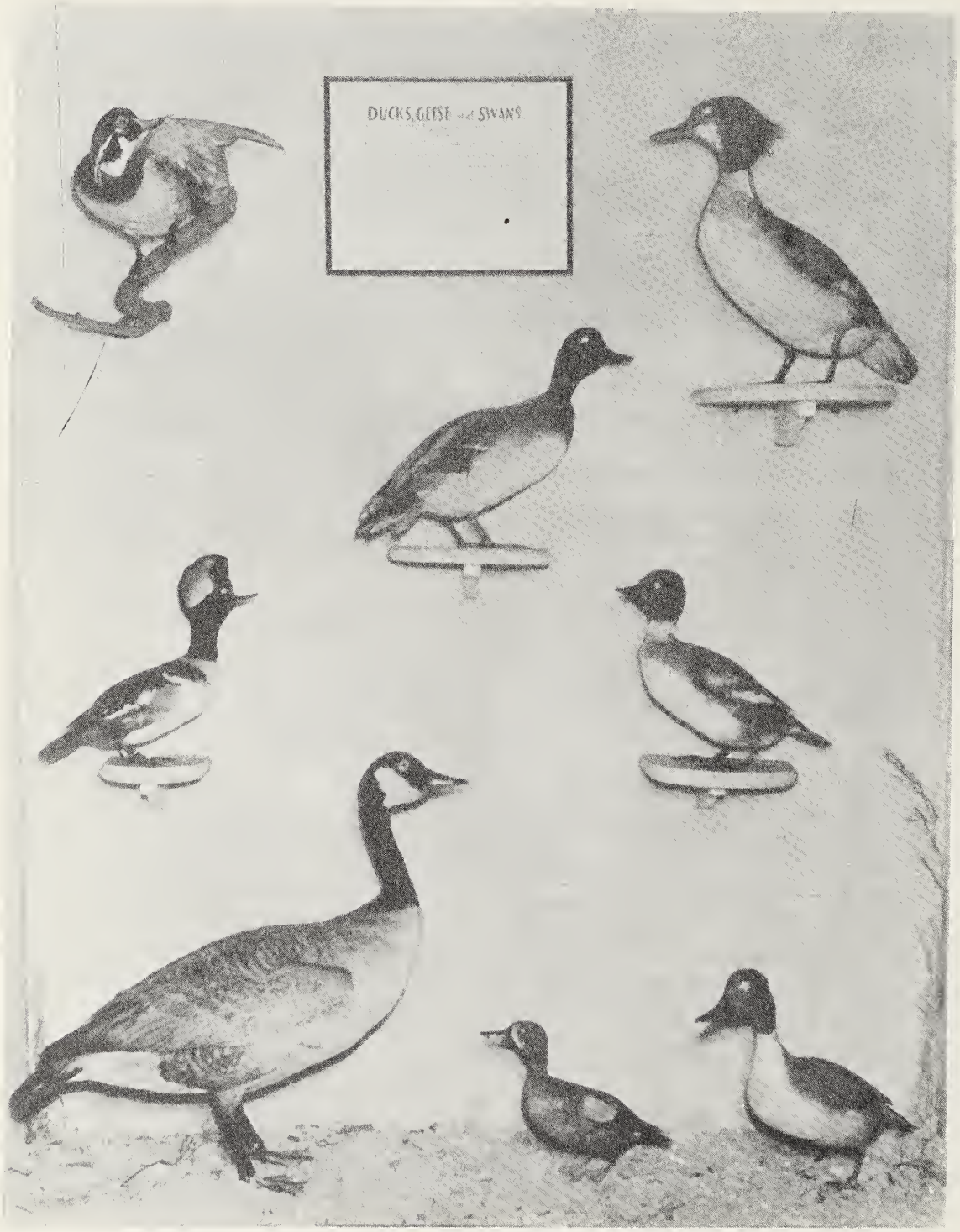
Of particular interest was a specimen found near the lighthouse at Cove Point, Calvert County, Maryland on July 30, 1934. The weight of this reptile, an adult, was estimated to be close to 175 pounds. The carapace or dorsal shell was encrusted with barnacles and algae.

Normally the carapace is olive in color and marbled with bright yellow which radiates from the center of the shields. On adults the edges of the shields do not overlap. The underside of the body, or plastron, is yellowish. The head plates are dull olive or brown and are outlined with white. The common name of this turtle is derived from the greenish hue of the flesh instead of from the external coloration. The average weight of specimens found in American waters is from 75 to 175 pounds.

The green turtle is primarily adapted for an aquatic life. The fore and hind limbs are actually modified into flippers for swimming, and the shell has

(Continued on page 32)

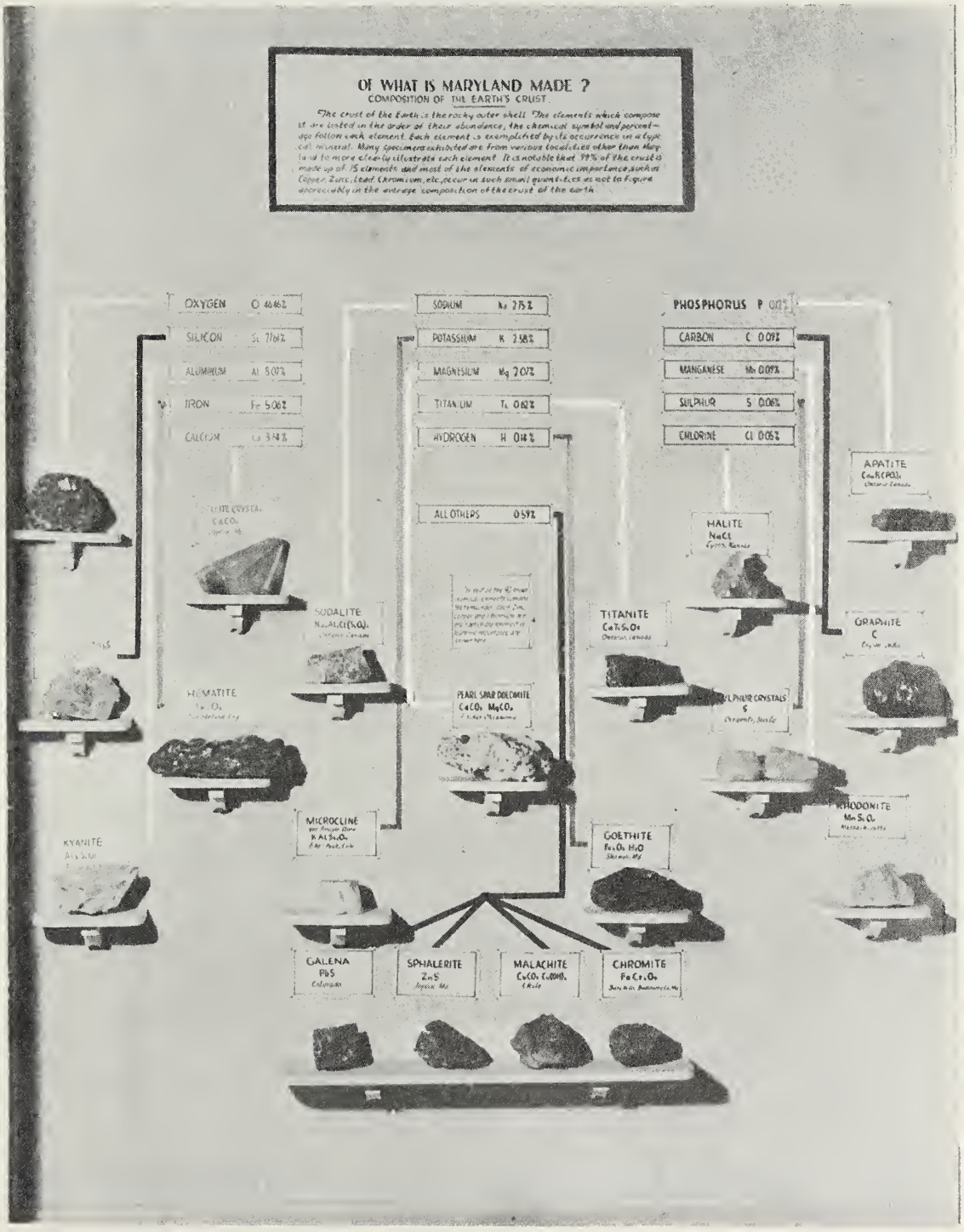
Exhibits from



DUCKS, GEESE AND SWANS

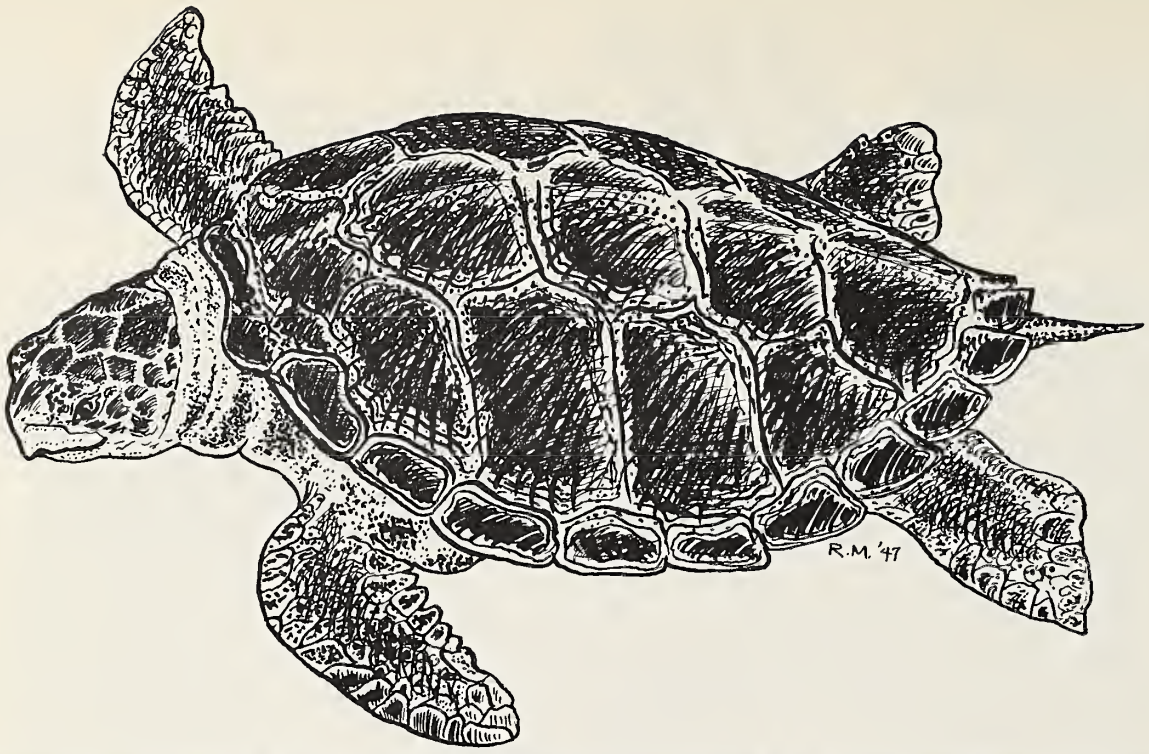
Representative ducks, geese and related birds
that are indigenous to our State.

our Museum



OF WHAT IS MARYLAND MADE?

Exhibit showing various elements and their percentages which compose the crust of Maryland's earth.



a stream-lined shape facilitating locomotion through a fluid medium. It is seldom that the green turtle comes ashore in Maryland, but it may often be observed close to land.

The following general notes may be of interest. The heavyweight record for this species is believed to be 850 pounds; this particular specimen was collected in tropical waters. Among all turtles this species rates foremost in economic importance. It is famous the world over as the basis for turtle soup. Canning industries derive much fat and oil from the turtle and its eggs. The shell has little commercial value. In Maryland this species assumes no economic importance because of its rarity. The green turtle can not be considered a species indigenous to Maryland. Obviously man is the reptile's greatest enemy.

Pleistocene fossil deposits prove that this species has frequented certain areas along the Atlantic Coast for tens of thousands of years. The life span of individuals has not been definitely established, but turtles generally outlive all other vertebrates. Because of its occurrence in all of the warmer seas, the distribution of the green turtle is world-embracing. It is the most common turtle in Bermuda waters, and individuals have straggled as far north as Massachusetts.

The nesting areas are in the tropics. The females use their flippers in the tedious process of digging nests for the eggs. Females deposit as many as 75 eggs. Incubation varies from 47 to 72 days, much depending upon the location and temperature.

The adults are herbivorous and subsist chiefly upon algae and sea weeds. Examination of stomach contents has shown that crustaceans and young oysters are also devoured.

METHODS OF CLEARING THE VEGETATIVE PORTIONS OF FERN PINNAE FOR VEIN AND SORUS STUDIES.

by

Clyde F. Reed

Two of the greatest hindrances in making good photographs of fern pinnae are water and air in the cellular structures. While studying veins and sori, the writer hit upon a method which seems very good for bringing out the veins so that they can be photographed in contrast to the rest of the vegetative tissue.

A portion of a pinna is dried thoroughly under pressure so that it will be as flat as possible. Herbarium specimens which are wrinkled may be prepared by placing a portion in warm water till it is thoroughly wetted. Then press and dry as a fresh specimen. When dry, place the portion in toluene until all the air is out and the specimen is clear. Color will not hinder the photographic technique, since filters can be used to contrast parts. It takes from three hours to three days to drive out the air. When the specimen is ready, place it on a clean microscope slide and mount it in "clarite". Either "clarite" in toluene or in xylene may be used. I prefer the "clarite" in xylene, since there is a tendency for air to form in the "clarite" in toluene. "Clarite" can be removed with xylene.

In photographing this material several methods may be used. One of the easiest ways to photograph these slides is to place the slide in a 35 mm. projector or enlarging camera, project the specimen on to sensitized paper, and expose. The time for exposure is a matter of experience. This gives a shadow print, requiring no negative.

One method which is used to get a negative consists in having a plate glass stage upon which the slide is placed. The glass is about one foot above a well illuminated white background. Then the specimen is focused upon at XI or X2, and photographed on Portrait Panchromatic film. Color filters help sometimes where the clearing method lessened the contrast between veins and vegetative tissue.

For very good photographic studies in venation, polarized light is used. The vasular tissue of the veins shines silvery in contrast to a dark or black background. These make fine prints, but they appear as shadow prints, since the negative is like the specimen and the polarized light image is like the positive. However, the second method is the best and most exact for ordinary use, i.e., taking a negative of the specimen on plate glass with a well illuminated background.

Sometimes the method for cleaning the specimen does not work. When failure is met, here is another method: A portion of the pinna is placed in lactic acid for a few hours at 54 degrees C. Watch carefully. When cleared sufficiently, wash in water and then put in 50% alcohol for 15 minutes. Then place for the same length of time in 70%, 95% and 100% alcohol. Finally, place the specimen in xylene and mount it in "clarite" as before. Be sure to

leave the specimen in 100% alcohol till all water is out, and be sure to leave it in xylene till all alcohol is out. Water and alcohol cloud in "clarite".

When the specimen is cleared too much, use polarized light or shadow printing for obtaining the best photographs.

IN MEMORIAM
E. LEE LECOMPTE

With the death of E. Lee LeCompte on March 16, 1947, the State of Maryland lost one of its most ardent conservationists and the Society one of its staunchest members.

In the early years of the Society when aid and encouragement were much needed, Mr. LeCompte was the first State official to come forward and lend his help. He was never too busy to see one and never refused this Society any request. Every aid within his power was willingly and cheerfully given us.

Mr. LeCompte was the first Game Warden of Maryland, serving in this capacity for 29 years. He was always interested in game protection and was President of the Dorchester County Game and Fish Protective Association long before there were any State game laws.

He attended almost every meeting concerning conservation and unhesitatingly voiced his opinion concerning any movement for the protection of game or conservation of our natural resources. He was fearless in prosecuting the violators of game laws and was responsible for the enactment of many laws on our statute books for the regulation and protection of wild life.

Mr. LeCompte was one of the first to establish game refuges as well as one of the first to introduce the propagation of quail in captivity by incubation, both of which since then have been adopted by other states.

He looked the part of the true outdoorsman and was a true naturalist and conservationist.

THE BALTIMORE ORIOLE

Icterus galbula

MARYLAND'S STATE BIRD - ADOPTED BY THE LEGISLATURE OF MARYLAND

Effective June 1, 1947

The Baltimore Oriole was so named by the great Swedish naturalist Linnaeus

in 1766, in honor of Lord Baltimore, whose family colors were orange and black, the same as the Oriole's.

The Baltimore Oriole is not too frequently seen, but when once seen is not easily forgotten. The nest, for which this bird is famous, is a beautiful piece of work, done solely by the female, the male standing by and serenading her with his pleasant song. In this nest is laid 4 to 6 white eggs with fine lines, scrolls and spots of dark brown and black.

The Oriole is a migratory bird, arriving sometime in the latter part of April or first part of May and leaving in the latter part of September or first part of October. The nest is built soon after arrival and the eggs are laid the latter part of May.

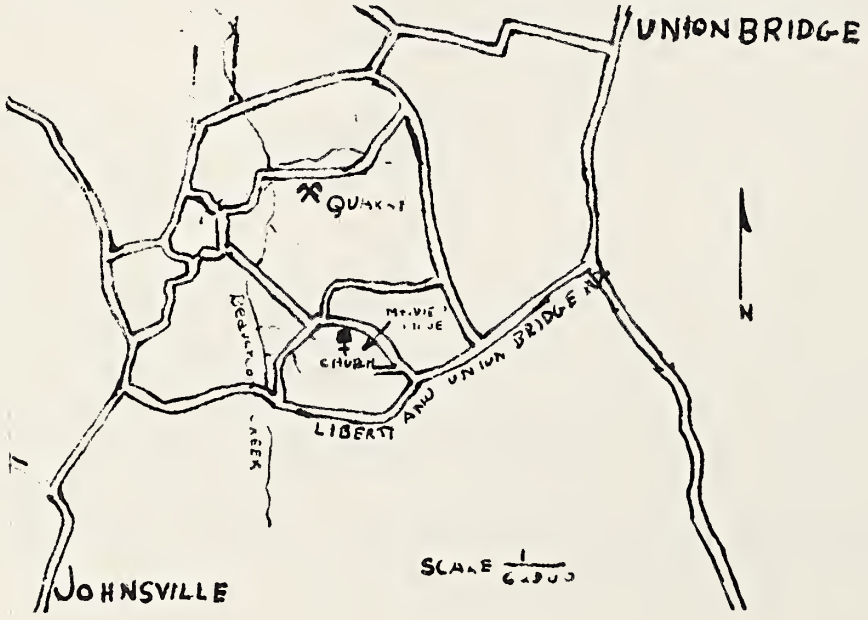
The Oriole's chief diet is insects. It is said that 34% of his diet is caterpillars. Plant and bark lice are so small that they are generally overlooked by most birds; but it is not so with the Baltimore Oriole which searches for these damaging little pests between and beneath the bark of trees. The larvae of the click beetle, which are the most destructive insects known, form part of this bird's food. Ants, grasshoppers, wasps, and spiders are also eaten by them. Where cotton is grown in the south they are considered the cotton growers' friends, as they arrive at about the time that the boll-weevils make their appearance, on which they then feed. In fact, 84% of their diet is insects and 16% plant materials.

A LIMESTONE QUARRY IN FREDERICK COUNTY

by

Harold Levey

On August 17, 1941, during one of the Department of Mineralogy's trips, we ran across this interesting locality. It is an opening in the Wakefield marble, located about one mile north of the famous Mountain View Lead Mine and approximately three miles southwest of the Carroll County, town of Union Bridge. The quarry is adjacent to the road and, therefore, is easily accessible by auto. Of most interest is the aragonite, a calcium carbonate, found here. It was deposited as a miniature cave formation in the limestone and many good specimens were obtained. This mineral shows a columnar structure, and occasionally there are minute crystals filling cavities of the limestone. Also found here were malachite (the green copper carbonate) and calcite crystals (another calcium carbonte).



ANNUAL MEETING MARCH 25, 1947

PRESIDENT'S ADDRESS

Today is the 18th anniversary of the founding of the Society. We have had a most successful year.

Most of our men have returned from the various theaters of war, and though a period of readjustment is taking place, a number have already settled down to a normal life. This is shown by the resumption of their work and their interest in the Society.

The Society ended its year with a balanced budget, showing that 51% of our expenditures were for educational work, 26.3% for operating or fixed expenses, 13.7% for administration purposes and 9% for miscellaneous outlays. Our income was greatly augmented through the acquisition of new members, the contributions of members, and the large sale of our publications.

We were not able to take over our next door property until December 1st, when the process of moving, cleaning and renovating was commenced. Since then the members' room, office, various work rooms and the laboratory of the Department of Herpetology have been completed, and the work on the other laboratories is under way. This work was mostly done by our members.

We lost by death three members: Percy T. Blogg, T. Milton Oler, Sr., and Latison C. Wilhelm.

This year considerable work was done in the Museum. Three new habitat groups were installed; one on Maryland fox, a typical Maryland swamp scene, and a reptile group. This group room was finally rewired, the Society furnishing the necessary materials. Other exhibits were restored and improved and several new displays were installed. The floors and exhibition cases were repainted by the Park Board. The attendance this year registered 50,215 for the $10\frac{1}{2}$ months the Museum was open. This shows that the Museum has a definite appeal to our citizens.

This fall and winter have shown an increased demand for loan specimens to schools and other groups. At one time we were unable to supply the unusual demand of birds for study purposes. In the coming months we will be able to fulfill a much larger demand through the acquisition of a number of mounted birds.

This year our Journal "Maryland" has been greatly improved, and we have received many fine comments on the publication. Demand for back numbers of both the Journal and our former Bulletin has exhausted our supply.

Our bird book is finally in the printer's hands and it was hoped that we would be able to present it to our members at this meeting, but unfortunately so much has to be done in the editing to insure a high standard of accuracy that its publication must be delayed for another few months.

Work in the departments has been resumed and augmented through the return of all our staff members. This is especially true in the Departments of Botany, Paleontology, and Marine Life, which were practically dormant during the war. The work of the Department of Herpetology stood out pre-eminently, with that of the Departments of Ornithology, Mammalogy and Mineralogy second in place of accomplishment.

Much has been done in the library. Work has been accumulating for the past four years and now through the efforts of C. Haven Kolb, librarian, and his assistant, Miss Wilma Metzger, progress is being definitely made. We now have approximately 12,000 books and pamphlets, besides a large collection of lantern slides and photographs.

This has been an outstanding year for gifts of books, specimens, and equipment contributed to the Society. Donations of many mounted birds, shells, insects and equipment were received from the Maryland Academy of Sciences, and other fine gifts of lantern slides, specimens, books, furniture and equipment were acquired from Gilbert C. Klingel, Edward O. Wegner, John Gladding, Merrill Towner, Mrs. Howard Griswold and the Rheems Manufacturing Company.

Our lecture program last year was a good one. A number of out-of-town lecturers were secured, bringing new phases of nature to the attention of our members.

The Junior Division was extremely active. This group is attracting many boys through its program.

The coming year should be an active one. Many new plans and changes have been made and are now in operation. With these new plans the Society should make greater strides than ever before.

This Society occupies an important niche in the cultural life of our City and State. Since it is the only organization devoted entirely to natural history in our State, it must be able to render service whenever required. Today with conservation as a part of the curricula of our schools, and people turning back to the great outdoors, the demand on us will be greater than ever. This is now being felt through the demand for loan material and the sale of our nature publications.

Among the publications planned for the near future are a series of nature leaflets and a booklet giving a general account of our State, its topography, geology, flora and fauna. These publications depend on the financial support we receive, as our budget this year does not provide sufficient revenue for this undertaking. These publications would provide the necessary information for a basic study of conservation.

I doubt if any organization in this State, in fact many States, has made the rapid strides we have in eighteen years. To accomplish our purpose we are using every means to foster the objectives laid down in our constitution; for the time is now before us when the need for conservation will be greater than ever. This is especially true of our own State. Only a small percentage of our people realize our plight.

The only way to bring conservation before the people is through education. The new generation of men and women must be so impressed that conservation becomes as much a daily part of their lives as democracy itself. Then and only then will the decline of our natural resources stop, and it is only through an institution like ours, wholly devoted to the study of the natural sciences and the vital part they play in our lives that this end can be accomplished.

Every man and woman, boy and girl who is nature-minded and wishes our natural resources to survive should be one of us, because only through the concerted effort of a large number of people can this task be done. For the stronger we become, the more we can do.

NOTES

LECTURES AT THE SOCIETY

January	10	-	Lecture by Joseph J. Hickey - "Territorialism in Birds" - through the courtesy of the Maryland Ornithological Society.
	17	-	Illustrated lecture by Paul Conger - "Miniature Glass Makers of Nature"
	31	-	Lecture by Elias Cohen - "Hands Off the Duckbill Platypus"
February	18	-	Lecture by Oscar Helm - "History of Baltimore Water"
	25	-	Illustrated lecture by Dr. George F. Carter - "Tracing Prehistoric Diffusion of Corn in the Eastern United States"
March	14	-	Lecture by Joseph Bures - "Bird Art"
	18	-	Illustrated lecture by Romeo Mansueti - "Voices of Spring"
	25	-	Annual Meeting Report by the President. Illustrated lecture by Jack Bell - "The Natural History of the Jungle of Brazil, Matto-Grosso Region of the Madeira River"

JUNIOR DIVISION MEETINGS

January	4	-	General Assembly
	11	-	Planning of Field Trip
	18	-	Talk by Dick Manson - "Experiences with Snakes"
	25	-	Illustrated lecture by T. Milton Oler, Jr. "Plaster Casting of Natural History Specimens"
February	1	-	Lecture by C. Haven Kolb - "Map Making in Natural History"
	8	-	Planning of Field Trip
	15	-	Nature Quiz
	22	-	The Junior Nature Fair
March	1	-	The Junior Nature Fair
	8	-	Planning of Field Trip
	15	-	Talk by Jim Kuethe - "Insects and Man"
	22	-	Lecture by Elias Cohen - "The Rattlesnake and Copperhead"
	29	-	Motion picture - "America The Beautiful"

Publications of
The Natural History Society of Maryland

MINERALS OF MARYLAND

Paper cover, 92 pages, 20 illustrations. Contains check-list of all known minerals of Maryland and principal locations. Price .75

SNAKES OF MARYLAND

Paper cover, 103 pages, 11 plates in color and 33 black and white; with identification keys and distribution map. Price 1.50

FAMILIAR BUTTERFLIES OF MARYLAND

Paper cover, 30 pages, 1 plate in color and 16 black and white plates illustrating 40 common butterflies of Maryland. Price .20

FAMILIAR MOTHS OF MARYLAND

Paper cover, 19 pages, 9 plates illustrating 11 common moths, principally the large species found in Maryland. Price .15

BIRDS OF BALTIMORE AND VICINITY

Paper cover, 24 pages, with map. Contains arrival, departure and nesting dates. Arranged according to resident groups. Space provided for additional records. Price .15

COMMON TREES OF MARYLAND—HOW TO KNOW AND USE THEM

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Mimeographed with printed cover, 30 pages with 18 half-tone plates and 20 maps and illustrations. Price .75

In course of preparation -- Annotated List of Maryland Birds

Prices listed above effective July 1, 1945.

The Natural History Society of Maryland

Founded 1929

"To increase and diffuse knowledge of Natural History"

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Young Bullfrog

Photographed
Edmund B. Fladung

MARYLAND

A JOURNAL OF NATURAL HISTORY

The Natural History Society of Maryland

JULY 1947 VOLUME XVII No. 3

MUSEUM OF NATURAL HISTORY
MARYLAND HOUSE DRUID HILL PARK
Open daily 10 A. M. to 5 P. M. except Monday.

MARYLAND

A JOURNAL OF NATURAL HISTORY

Welcome, ye shades! ye bowery thickets, hail!
Ye lofty Pines! ye venerable Oaks!
Ye Ashes wild, resounding o'er the steep!
Delicious is your shelter to the soul.

James Thomson - *The Seasons: Summer*

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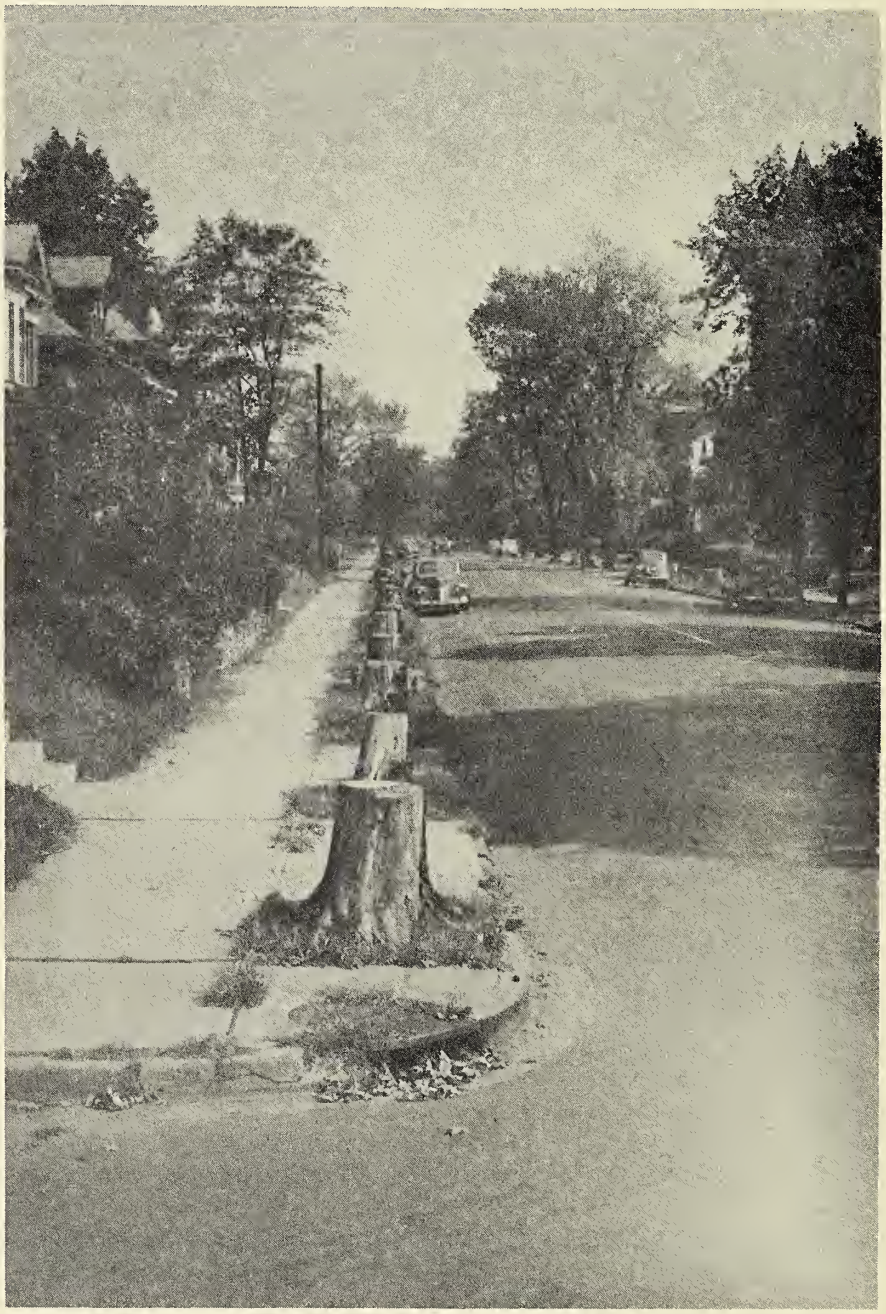


Courtesy of Trees, The American Journal of Arboriculture

Trees Killed by Phloem Necrosis
Columbus, Ohio

CONTEMPORARY TREE DISEASES AND THEIR ECONOMIC IMPORTANCE

by

Hollis J. Howe

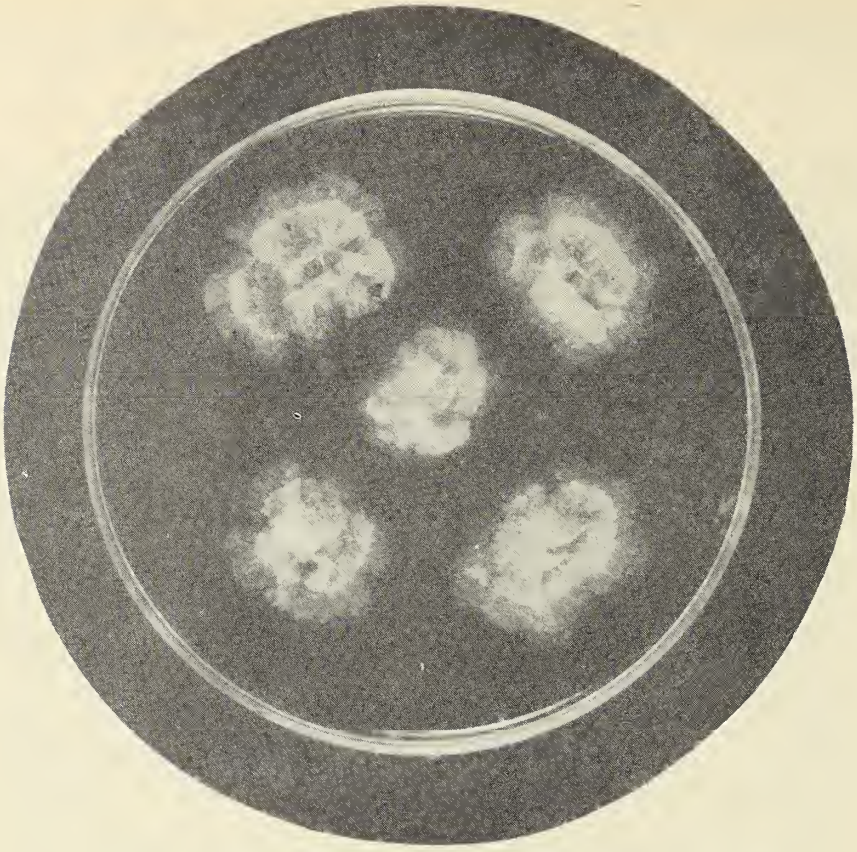
The layman is inclined to consider diseases of trees to be of little importance economically. Unfortunately he is seldom cognizant of the importance of plants, particularly trees, in thickly populated urban centers. Appropriations for most health agencies are freely subscribed to, whereas provision for intelligent tree-care too often is shown but passive interest. Even many of those who profess to appreciate trees and consider them of value and desirable, show their concern too late for timely treatment to be effective.

Chlorophyll is the substance which imparts its green color to most leaf structures and until a short time ago was very properly regarded as one of the wonders of natural science, because of the part it plays in the manufacture of carbohydrates, the basic plant foods. It is now produced synthetically, along with penicillin and certain other modern boons to health, and it is to be hoped that its use may stimulate a greater recognition of the importance of plants generally, and the need for adequate funds for research and control of plant diseases. That the cause of a disease is known, is of little value unless our plant life is placed in the care of someone capable of recognizing the early stages of decline, knowing or able to obtain advice on the proper control, and administering these measures.

Those having to do with trees and their care are perhaps asked one question more often and more difficult to answer than any other, namely: "What is the best variety of tree to plant?" The answer will depend not so much upon the purpose the tree is to serve or the landscape effect to be obtained as upon its susceptibility to disease and upon whether effective control measures have been worked out and whether there is likelihood of their being faithfully and intelligently administered. It is more or less true that no tree has a clean bill of health, as is sometimes complained: but, thanks to past study and, it is hoped, future research, most can be utilized if given reasonable care.

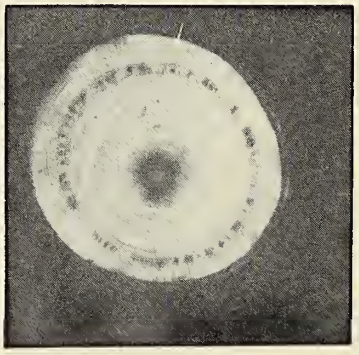
A majority of the serious tree diseases are of exotic origin, the organism causing them having been brought into the country on imported varieties of plants. Some of them also appear to be due to exotic species of trees being subjected to diseases of little or no importance to our native forms. Certain diseases are spread by insects and the elements, whereas in the case of certain others man appears to be the vector. In the past, establishment of quarantines was too late in some instances, but present barriers are regarded as quite effective.

As is to be expected, the disease causing the most concern in any given locality will be one affecting a predominating species. The chestnut blight comes to mind as a calamity thoroughly appreciated in the environs of its natural habitat. Many express the hope that this very desirable species will develop a tolerance for the blight. There would appear to be no sound reason to believe it will do so, however. Our only hope seems to be through the development of disease-resistant hybrids, a process which is



Petri dish culture of *Ceratostomella ulmi* on potato agar.

Scolytus multistriatus feeding in crotch of elm twig.



Discoloration caused by Dutch elm disease fungus.

"Photographs by the Bureau of Plant Industry, Soils, and Agricultural Engineering, USDA."

now well under way, as well as the hybridization of encouraging varieties of other affected species. Experimental plantations of chestnut in regions originally highly infected have been under observation for several years with no sign of the trees becoming diseased.

The canker of Lombardy poplar (which, by the way, appears now to have taken over the Carolina variety as well) is, or should be at least, of direct concern to those desiring a quick screen effect. Lack of knowledge as to the shortcomings of this tree is causing even now not only the loss of money spent for planting but ultimately added expense for removals, whereas the informed and reliable plantsman has appreciated the futility of planting this variety for years. One of the several other pyramidal varieties should be substituted. The greater original cost of the latter would more than offset the disappointment and expense incurred in planting the Lombardy poplar, perhaps a forgiveable mistake.

A canker of redbud has all but doomed this splendid ornamental; but two Southern cities, having aspired to be known as "The Redbud City", have planted these trees by the thousands, apparently in blissful ignorance of their destiny. Similar local plantations have not been successful. The white pine blister rust has justified the expenditure of millions of dollars by our government in the eradication of wild gooseberry and currant, the alternate hosts of the causal organism.

While the average individual may not attach much importance to the persimmon, it is a widely disseminated tree in the south-central states. Some ten years ago it was attacked by a very rapid-spreading wilt that was termed "explosive" by forest pathologists. In a short period of three years the disease spread from Tennessee south to Tampa Bay and west to Oklahoma and Texas. It is believed that the disease may have been introduced into this country on the cultivated Kaki variety from the Orient. The internal symptoms of the disease are fine brownish-black streaks in the wood. Externally it is characterized by a sudden yellowing of the upper leaves followed by wilting, eventually enveloping the whole tree. Infected trees usually die by late summer, but may put out small chlorotic leaves the following spring. The salmon-pink spores of the causal fungus, a *Cephalosporium,* are produced between the bark and wood. A secondary rot fungus rapidly destroys the wilt-killed trees and the decayed branches fall to the ground. Large cracks resembling those caused by frost develop in the trunk. The dead wood is of little value even for fuel.

The persimmon, a member of the ebony family, is of value, not only for its fruit, which constitutes a staple food for many game and domestic animals, but also for its wood which is of particular value for golf club heads and shuttle blocks used in the spinning industry. The disease has not as yet invaded Maryland, but it is a potential threat.

Perhaps the mimosa wilt would not seem to be serious except to those who have gone to the trouble of bringing the tree North for sentimental reasons; but any disease which suddenly becomes so widespread as it did about ten years ago should be given consideration, if for no other reason than to

avoid wasted effort. The plants should be examined carefully at the place where they are obtained. The first symptom of the disease is a wilting of the leaves. They soon fall off and the tree dies. The wood turns dark brown in color reaching into the roots. Trees to be transplanted should be selected from a locality where the disease is not known to exist. As the causal organism inhabits the soil, some other species should be planted where the disease is prevalent.

The canker stain of planetrees (1) appears to be a disease of the sort referred to previously as being one in which the introduced species, *Platanus acerifolia*, is more susceptible to the local causal organism, whereas the disease has apparently long existed and has been of little or no importance on our native sycamore, *Platanus occidentalis*. Because of its remarkable vigor, ease of propagation (hence cheapness) and its ability to thrive in congested locations where smoke, soot, and fumes are highly detrimental to more exacting varieties, the introduced species has enjoyed a wide popularity in the latitude where it is hardy.

The cankers occur as elongated, more or less depressed areas which follow the grain of the underlying wood and beneath which the inner bark is blackened and dead. During the first year of the infection most cankers are not sufficiently noticeable to be readily detected except by specialists or by those who have had long experience in their observation. Often there is more than one external canker which spreads with the passing of time and eventually girdles the tree, causing it to die above the infection. Even if this were not the case, the fungus also grows inward along the medullary rays and finally appears on the outer edge of the remaining sap-wood on the opposite side of the trunk, thus accomplishing the same purpose. This process causes a reddish-brown or bluish-black discoloration of the infected wood which accounts for the common name selected for the disease. The leaves of affected trees do not usually show signs of injury until the cambium has been killed around most of the circumference of the trunk. This is manifest by dwarfing and yellowing and the tree may be expected to die at least by the following year.

In the older stage of infection thick-walled spores are formed which are capable of penetrating even a slight abrasion of the bark. Transmission of the disease may, therefore, be accomplished by any agency which comes in contact with the infected portion of a diseased tree. Pocket knives, scout axes, lawn mowers and even moving vans may cause inoculation. Infection on native sycamores growing along streams was apparently spread by drift-wood.

Pruning operations are a highly effective means of spreading the disease. Saws, ropes, ladders and even climber's boots readily contaminate. All of these may be disinfected by liberal applications of alcohol of the type ordinarily used as an anti-freeze in automobile radiators, with the exception of rope. This last must be fumigated by exposure to formaldehyde vapor for a period of three hours. Perhaps one of the more frequent means of spread has been through the use of tree-wound dressing contaminated with infected sawdust. A gilsonite-varnish type paint containing 0.2% of phenylmercury nitrate will prevent carrying the fungus from one tree to

another, if sterile tools are used (1). The trimming of planetrees by pole-line companies and those who do a volume of such work for them should be done under careful and intelligent supervision.

Observation has shown that during the months of December and January there appear to be no spores capable of transmitting the disease and that the pruning of planetrees should be concentrated in that period. Wound dressing is not necessary at that time and, if not used, there is no possibility of infected sawdust being held in contact with the exposed wood where it might develop contaminating spores when atmospheric conditions become favorable later.

To protect our planetrees not already infected, diseased trees should be eliminated as promptly as possible. This will not only save many desirable trees but preclude the expense of removing large numbers of dead ones. Because of the fact that the fungus grows transversely through the trunk and branches, dead trees that are left standing any length of time become decidedly brittle and are a greater hazard than those killed by almost any other agency. .

Perhaps the most serious threat to our trees locally is the Dutch elm disease, so-called because it was first observed in the Netherlands after the first World War. At that time it was erroneously attributed to the effect of gases used in that conflict.

The disease spread to southern Europe and the British Isles. Its introduction into this country was eventually found to have been effected through the importation of disease-infected and beetle-infested "burl" elm logs, much in demand by veneer manufacturers because of the unusual patterns obtainable due to the abnormal grain. Beetle-infested logs which "laid over" in transit were the source of the beetles which caused the infection. The only known Dutch elm infected trees located in Baltimore up to the present time were found at Fort McHenry and along Fort Avenue some fifteen years ago and the burl logs carrying the beetle were at the Locust Point terminal. Since then, however, the disease has made further inroads with Brunswick, Maryland, a transfer point, as a center so that the disease is now a definite threat.

The Dutch elm disease falls in that group of tree diseases commonly referred to as "wilts". Wilting through yellowing of the leaves, followed by various degrees of defoliation and death of the trees or parts of them, are the usual symptoms. The more vigorous-growing trees are most highly susceptible. The water-conducting tubes of diseased trees are discolored and obstructed by a brown gummy substance. There are at least two native diseases of elms of lesser importance having symptoms so similar that accurate diagnosis is only possible if made by a competent authority in a laboratory.

The disease is caused by a fungus known as *Ceratostomella ulmi* Buisman. In the water tubes of a living elm the fungus exists in a yeastlike stage and the budding spores are rapidly distributed by sap movement. After the

host tissue dies, the fungus grows through the wood and produces saprophytic spores on the inner surface of the bark and on the outer surface of the wood. This is the particular region inhabited by the beetles in the larval and pupal stages, and in the latter they pick up the spores.

The disease is spread both by the breeding and feeding of these beetles. In Europe, of the two beetles carrying the disease, *Scolytus multistriatus* Marsh. is not as important as the larger and more voracious *Scolytus scolytus* Fab. While the former has been introduced in this country, as already stated, it is aided and abetted by the native elm bark beetle, *Hylurgopinus rufipes* (Eich.). The adults of the *Scolytus* beetle chew into small branches, commonly at crotches, and when they reach the region of the current season's water tubes infection may take place.

The beetles develop from egg to adult in the same portion of dying or dead elms as that in which the fungus produces its spores. They carry the fungus to broken hanging limbs and to fallen and cut elm wood that may never have had the Dutch elm disease. Here the fungus produces spores in time to contaminate the beetles of the new generation before they emerge and feed on growing elms.

Elms dying from disease attract the beetles when they are ready to breed. Many trees might recover if they were not weakened further in this way. The beetles do not ordinarily travel far unless aided by winds. This last accounts for the establishment of isolated centers of infection.

The native elm bark beetles, unlike the members of the genus *Scolytus*, construct over-wintering cells in the bark of healthy elms. They frequently chew inward into the wood, infecting it, and the fungus thus survives for years. The native beetle is a less effective carrier than *Scolytus multistriatus*. The disease appears to intensify more rapidly where both *Scolytus* beetles are present.

All species of elms native to North America are susceptible, with certain ones appearing to be less so than others. The Siberian elm, *Ulmus pumula* L., is highly resistant but less desirable. Cross breeding is under way. The Chinese elm, *Ulmus parvifolia* Jacq., is also highly resistant but is perhaps less desirable than the former. The dike-holding elm of the Netherlands, *Ulmus hollandica* var. *belgica* (Burgsd.) Rehd., is very susceptible. Nearly twenty years ago the Dutch began a search for a resistant variety and found one that they named "Christine Buisman", a seedling from *Ulmus carpinifolia* Gleditsch, to be the best. Small numbers of these elms are now under observation in experimental plantings in the United States.

It is thought possible that a considerable percentage of affected trees might outgrow the disease in time if not reinfected. In order to do this they must escape the attack of the beetles during the season in which the fungus has reduced their vitality. The removal of dead and dying wood eliminates a breeding ground for the beetles. Nearby sanitation against them has brought about recovery of some severely infected trees in England.

This last appears to be one of the most effective means of preserving elms from the Dutch elm disease. The emergence of the beetles should be prevented. Infested wood in which the beetles over-winter should be burned or debarked before May first, unless treated by spraying. If the bark is removed it should be destroyed. Formulae for destroying the beetles by spraying such wood are made available by the United States Department of Agriculture (2)

The new so-called "wonder insecticide", DDT, has been found to be very effective in controlling elm bark beetles in an experimental way. It is hoped that it will be found to be equally so under average field conditions. Exact formulations for the use of this material have not, as yet, been satisfactorily worked out so that they may be recommended for general use.

While a combination of the foregoing controls hold out some hope for the future, the combined efforts of federal and state agencies are not preventing the spread of the disease as yet. Portions of thirteen states are affected. About 1200 square miles have been examined in Maryland and the indications are that the disease is spreading, particularly in Carroll and Montgomery Counties. In Frederick County the disease is considered to be out of control.

Following the Fort McHenry infection of 1933 and the Brunswick outbreak of 1935, the disease put in an appearance near Cumberland in 1936, but no new trouble appeared there after 1941. However, eight infected trees were located in Frederick County in 1943 and 21 additional in 1944, together with five cases reported in Carroll County. Due to an increase in elm bark beetle population, by 1946 the following confirmed cases were reported: Frederick County 261, Carroll County 5, and Washington County 1. Only about half of the known diseased and beetle-infested elms have been removed due to a lack of funds for the purpose. This constitutes a definite threat, as is readily apparent.

From what has already been recorded it would seem that the American elm, which is, perhaps, first in value as a shade tree throughout the most highly populated portion of our country, is already in a sufficiently precarious position without added difficulty. The fact remains, however, that a virus disease called phloem necrosis has, since about the time of the advent of the Dutch elm disease, taken such a toll of this splendid tree in the region of the central and lower Ohio River Valley as to be a major disaster (3).

It should be of interest to know that the Dutch elm disease and the two beetles which carry it have also been found in the virus-infected area, thus complicating its control. Moreover, the external symptoms of the two diseases are sometimes quite similar. Both beetles attack dead and dying trees, without regard to cause.

Artificial inoculation experiments with phloem necrosis virus indicate that trees may be infected for from three to six months and even for a year or more before characteristic symptoms become apparent. Such trees in rare cases may survive for two or more years. All diseased trees

observed so far have eventually died, no positive cases of recover having been recorded.

The effect of the disease on the foliage varies, but in general it is similar to that produced by drought, girdling, pronounced nutrient deficiencies, and certain other disease. There may be a general decline throughout the crown of the tree or in some cases a single branch or a portion of the top may show weakness. Many times there is a slight scarcity of leaves at the extreme top or at the ends of the branches. The leaves droop and their blades curl up producing a troughlike effect. The under surface of the leaves being partially exposed gives them a light green or greyish appearance when viewed from a distance. The scarcity of foliage soon becomes very pronounced, the leaves turn yellow, defoliation follows and the tree dies. In some cases, however, the trees may suddenly wilt and die within a few weeks, leaving the brown leaves still intact.

The roots of infected trees die, the small fibrous ones first, and the typical discoloration, confined to the inner bark or phloem tissue, will be present in the larger roots, even before they die completely, and frequently extends to the trunk and some of the branches. The early discoloration of the phloem is yellow, becoming a raw-sienna color, often with small scattered brown or black flecks, finally turning dark brown and necrotic. The moderately colored phloem has a faint wintergreen odor not detected in healthy wood, particularly if held in the closed hand for a time. The color and odor are characteristic and serve to differentiate phloem necrosis from other known diseases of elms. The external symptoms are not conclusive but indicate the tree to be a suspect, particularly in the known infected area.

Unlike most of the other diseases already referred to, the causal agency of phloem necrosis is a virus, as has already been stated. Examples of other plant virus diseases are tobacco mosaic, aster yellows, peach yellows and raspberry leafcurl. Measles, small-pox, infantile paralysis and rabies are examples of some virus diseases of man. Hoof and mouth disease of cattle, now rampant in Mexico, is due to a virus.

Virus diseases differ from infectious diseases caused by bacteria, fungi, and protozoa in that the causal agencies are too minute to be seen under the highest magnification attained by the ordinary microscope. A few viruses causing diseases of plants have been isolated by chemical means, and analysis of some of them have indicated that they are proteins. Attempted isolation of others has failed and their nature remains unknown. They are all highly infectious, at any rate.

This disease is known to occur in parts of the following states: Ohio, Indiana, Illinois, Missouri, Iowa, Nebraska, Kansas, Oklahoma, Arkansas, Mississippi, Tennessee, Kentucky and West Virginia. The general disease area extends from southeastern Ohio and eastern Kentucky westward to southeastern Nebraska, eastern Kansas and northeastern Oklahoma. A southern disconnected projection extends through Tennessee to Jackson, Mississippi. It should be noted that one isolated infected area in southeastern Tennessee is near the head-waters of Atlantic coast streams.

In Ohio, where the disease has been under close observation for several years, the spread has been rapid. The vector has not been determined so far as this particular disease is concerned but it is known that in the case of certain other virus diseases it has been some type of sucking insect. The Bureau of Entomology and Plant Quarantine and the Bureau of Plant Industry have established a cooperative laboratory at Columbus, Ohio where a search is being made for possible insect carriers of the virus. In the past four years the disease has killed an estimated 25,000 elms in Columbus alone.

No cure for trees affected by phloem necrosis is known at the present time and no measure for protecting healthy trees has proved effective to date. The development of resistant varieties seems to be the only solution at present.

When the adverse conditions facing our tree population are considered, it would appear that a greater appreciation of their value is desirable. Trees have a definite relation to health conditions, they enhance real estate values and, during time of war, play an important role in the form of camouflage.

Tree diseases are costly, destructive, and hazardous. Large sums of money have been spent not only by federal and state agencies for research and control, but local governments and individuals are also caused expense. Many times it is beyond budget limits to remove large numbers of dead trees promptly and they become more of a menace to life and property as time passes.

It is imperative that those having trees in their charge keep informed as to pathological developments. Years of practice are required to attain the ability to arrive at even fairly accurate diagnosis, even when so informed. Logic is essential to good planting practice. Doomed trees should be known and avoided. Trees should not be planted either too close together or in "pure stands", which might be wiped out by an epidemic disease. Sanitation would appear to be of great importance. Not only dead and diseased trees should be removed promptly, but living ones should be kept free of dead wood which may harbor insects and disease. Periodical fertilization not only improves the appearance of trees, but by keeping them in a vigorous condition both infestation and infection are discouraged. The spraying of trees for both of these conditions should be carried out according to a carefully timed program.

Proper legislation is essential to healthy tree conditions. The planting,pruning, and treating of trees should be regulated by a competant authority. A genuine interest in trees on the part of the latter should cause a similar interest to be shown by the general public.

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Exhibits from

AGE OF REPTILES

GIANT DINOSAURS LIVED MILLIONS OF YEARS AGO

This exhibit shows the flying lizard, Pteranodon, the crested lizard, Parasaurolophus, and the ostrich-mimic, Struthionimus, being chased by the scourage of prehistoric monsters, the tyrant lizard, Tyrannosaurus. Ancient reptiles occurred in Maryland during the Mesozoic Era about 75,000,000 years ago. Dinosaurs vanished from the earth due to their inability to adjust themselves to changing temperature and moisture conditions.

our Museum

MARYLAND FOXES

RED AND GRAY FOXES PROWL IN MARYLAND

Easily distinguished by their colors, the two foxes are noted for their cunning and elusiveness before the hunters. Contrary to general belief, the fox does not feed exclusively on chickens and birds. Mice and grasshoppers are its main source of diet. Both species of foxes live in burrows and among rocks, and usually bear three to eight young.

THE "WATER MOCCASIN" MYTH IN MARYLAND

by

Romeo Mansueti

Every snake enthusiast has been bombarded at one time or another with stories concerning the occurrence of the "water moccasin" in Maryland. In most cases the rejection of such statements by herpetologists only increases the layman's conviction that he is correct. This fallacy has taken its place beside other superstitions and fantastic stories of our persecuted reptiles. The belief that the poisonous "water moccasin" occurs in Maryland has become so popular that today a herpetologist must indulge in acts of bravado by allowing captured "water moccasins" to bite his hands or arms in order to prove the snake's non-poisonous characteristics. The bite of a non-poisonous snake may be compared with the prick of several thorns.

Every competent Maryland naturalist knows that "water moccasins" - the venomous cottonmouth, *Agkistrodon piscivorous* (Lacepede) - are not native to our state. Diligent investigation in most of Maryland's nooks and crannies, along swamps, marshes, rivers and estuaries, as well as on land, has proven this correct. Unfortunately the name "water moccasin" is indiscriminately applied to any water snake by many people. Strictly speaking, the term is regarded as synonymous with the name "cottonmouth". In the Southeastern United States, natives call the venomous pit-viper "cottonmouth moccasin" while they reserve the "water moccasin" terminology for all water snakes. North of Virginia, people are more apt to call all brown or grayish snakes found in moist situations "water moccasins."

"Water moccasin" is perhaps one of the most familiar vernacular names for any of our Maryland serpents, and is one of the most misleading. This name is applied freely by laymen to our common water snake, *Natrix sipedon sipedon* (Linne), our most abundant non-poisonous species. Many other kinds of snakes are often designated as "water moccasin". The unfortunate use of "water moccasin" on a particular snake immediately brands the species as poisonous, regardless of size, shape, pattern, habitat or any other characteristics that might indicate that it is non-poisonous. In this manner many beneficial and otherwise harmless native snakes are killed wantonly.

Two poisonous snakes inhabit Maryland - the copperhead and rattlesnake. The latter is restricted to the mountains of Western Maryland, while the former is commonly distributed over all of Maryland - in the mountains, on the Piedmont Plateau, and to a lesser degree on the Coastal Plain. Constant reiteration of "there are no 'water moccasins' or cottonmouths north of the Dismal Swamp, Virginia" has been met with mingled reaction. In many cases, people interested in snakes will accept this statement, using it as a criterion for spreading useful propaganda concerning snakes. However, most people accepting the word of an authority on the absence of the "water moccasin" in Maryland, do so with reservation; at least their fears are suppressed until they see a huge brown snake plunge into the water at their favorite shore. Then they are sure that they were correct in the

Photograph From Dr. Howard A. Kelly Collection

By P. H. Wallace

COMMON WATER SNAKE

(Natrix sipedon sipedon)

KNOW YOUR SNAKES!

Non-poisonous

Poisonous

The poisonous "moccasin" is not found in Maryland.

COMMON WATER SNAKE

WATER MOCCASIN

Natrix sipedon sipedon (Linne)

Agkistrodon piscivorus piscivorus (Lacepede)

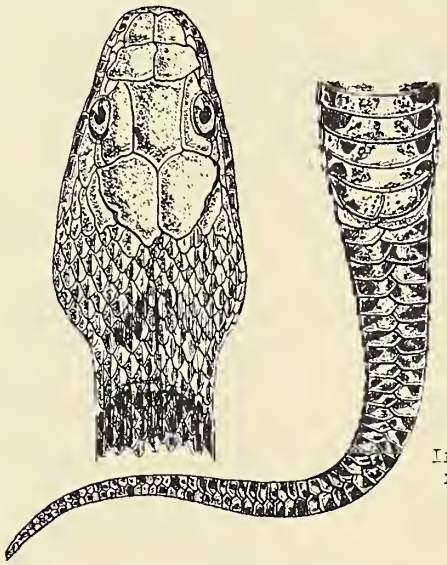
1. Pupil of eye round.

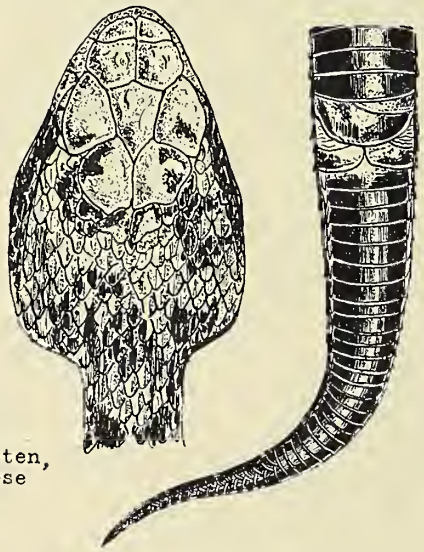
2. No sensory pit between eye and nostril.

1. Pupil of eye elliptical.

2. A prominent pit between eye and nostril.

The above-named characteristics may be observed on the snake's head from a distance of five feet.





If you are bitten, remember these points!

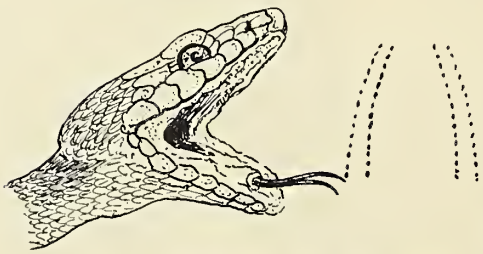
3. Head moderately lance-like. (When angered, the common water snake spreads its head quite triangularly.)

3. Head prominently lance-like.

4. Plates under tail in double row throughout.

4. Plates under tail in single row except near tip.

Size and pattern are not consistent enough for distinguishing the common water snake from the water moccasin.



5. Upper teeth small and uniform.

6. Lacerations from bite show four rows teeth marks.

5. Two large folding fangs in front of upper jaw.

6. Lacerations from bite show two rows teeth marks and large fang punctures.

first place - for the unexplainable association of snakes that are startlingly repugnant to those with venomous qualities is remarkably widespread.

The thorn in the side of the "water moccasin" myth is the impressive ugliness, thickness, and the usual uniform color of our common water snakes. Actually, most snake students will admit that there is no easy way of distinguishing a poisonous "water moccasin" from a harmless common water snake at a distance. Although we in Maryland need not worry about this problem, nevertheless it is an excellent idea to treat all water snakes with respect south of Virginia.

A newspaper account of a "water moccasin" attacking a fish, illustrated by a good candid photograph, in *The Evening Sun* of June 14, 1947 precipitated some discussion in Baltimore. The snake was simply identified as a "water moccasin". Although there was no mention of its venomous qualities, the name seemed to infer such a characteristic. It was obvious from the photograph that the snake referred to was the common water snake.

Aside from the attitude of the layman toward the common water snake, which really has perpetrated the "water moccasin" myth, several contemporary Maryland herpetologists have seriously considered the possibility that the true venomous "water moccasin" *may* occur in Maryland. Their efforts to trace down every incident relating to "water moccasin" poisoning in Maryland have been fruitless; all cases are directly traceable to the common water snake which bites viciously but does not emit venom. Dr. Robert H. McCauley, Jr., in "The Reptiles of Maryland and the District of Columbia," firmly states that the "water moccasin" does not exist in Maryland. He echoes Dr. Howard A. Kelly and Harry C. Robertson in "The Snakes of Maryland", where the campaign to debunk the "water moccasin" myth formally began. Roger Conant, in "A Check List of the Amphibians and Reptiles of the Del-Mar-Va Peninsula," is not definitely sure of its existence on our Eastern Shore. He has placed the species on his hypothetical list, but, to date, he has found *no* poisonous "water moccasins". All expeditions in search of them by members of the Department of Herpetology of the Natural History Society of Maryland have resulted in the collection of non-poisonous common water snakes.

Recently, Mrs. Elizabeth Foreman Lewis, Maryland author residing in Arnold, Maryland, and her son, J. Fulton Lewis, editor of *The Southern Maryland Times*, related to the author a curious serpent story which occurred following the hurricane of 1933. After most of the storm had subsided, an examination by residents of the shores of the Severn River and other points near marshes and swamps in that vicinity revealed some extraordinarily large dead snakes lying on the beach. The natives, who had gathered around the snakes, were obviously perplexed by this phenomenon. A bystander identified the snakes as "water moccasins". Since many animal forms are transported over water by winds and storms by attaching themselves to floating vegetation or logs, it was suggested that these "water moccasins" were transported to Maryland shores by the northbound hurricane, and that the real poisonous species may have established itself in some of our more impenetrable marshes and swamps. Since the identifi-

cation of the snakes was by a layman, the identity of these particular individuals will always remain questionable. In order to verify or to discount this story a meticulous search in this region is being continued. It is the opinion of the author, however, that these snakes were probably large common water snakes which were washed out into the river or estuary by the violence of the storm and were drowned.

Despite a widespread campaign to discount the "water moccasin" myth in Maryland, it must be admitted that the fallacy as it exists today is too deeply inveterated to be dislodged easily. There has been no authentic record of this poisonous snake being found in Maryland. This Society will be glad to identify any specimens collected or killed.

The accompanying illustration points out the distinguishing characterics of the non-poisonous common water snake and the venomous cottonmouth.

MARYLAND'S STATE TREE

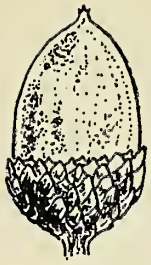
by
John P. Hill

In 1770 Otto von Muenchausen described the species of oak, commonly known as the "Blackjack" oak, and gave it the botanical name *Quercus marilandica* in honor of Maryland. This tree is not, however, the Maryland State Tree, although common throughout the State in dry barrens having little top soil.

In 1941, the Maryland General Assembly chose the White Oak, *Quercus alba* as the official State tree (Chap. 731, Laws of the State of Maryland 1941) (1). The Wye Oak was alone sufficient inspiration for such an act. This White Oak, which is located at Wye Mills in Talbot County, is the largest White Oak on record in this country and has a larger trunk and spread than any other tree on record in Maryland, being twenty-seven feet eight inches in circumference at a point four and one-half feet above the ground with a spread of one hundred sixty-five feet. It is, however, exceeded in height since it is only ninety-five feet high.

The White Oak is quite common throughout the eastern portion of the United States, in the rich sandy plains, moist bottom lands, rich uplands and even gravelly ridges. It is normally a large tree reaching a height of sixty to one hundred feet with a trunk diameter in excess of two to three feet, and frequently occurs in dense, pure stands, not often as large forests. The leaves are oblong, ovate, gradually narrowing to the stem and divided by three to four deep clefts nearly to the midrib forming seven to nine lobes. The mature leaf is thin and firm, smooth, bright green and fairly lustrous above, pale and downy below, five to nine inches long, two to four inches wide with a stout bright yellow midrib and conspicuous primary veins. The acorn, usually set close to the twig, may be raised on a slender flower stalk one to two inches long: it is about three-quarters of an inch long when fully grown and is green, ripening to a light-chestnut brown. It is enclosed for about one-quarter of its length in a pale or light brown cup. The wood of this

WHITE OAK, *Quercus alba*



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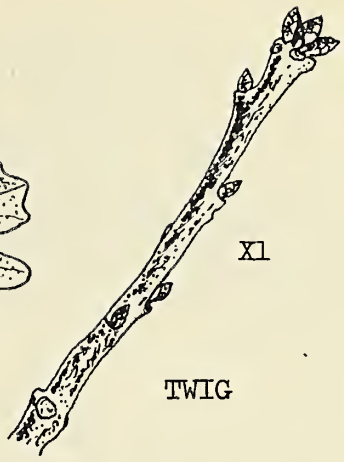
ACORN

LEAF

X½



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TWIG

oak is strong, very heavy, hard, tough, close grained, durable and light-brown with a thin, barely distinguishable sapwood. It is used for construction, in cooperage, hardwood floors, implements, wooden ship and boat building, and for numerous other purposes requiring its characteristics.

(1) Chapter 731 (House Bill 402)

"AN ACT to add a new section to Article 41 of the Annotated Code of Maryland (1939 Edition), title 'Governor--Executive and Administrative Departments', said new section to be known as Section 61A, to be under a new sub-title 'Maryland Tree' , and to follow immediately after Section 61 of said Article, providing that the White Oak shall be the Arboreal Emblem of the State of Maryland.

WHEREAS, the White Oak grows universally throughout the State of Maryland, has contributed much to the lives of its people and the development of the State, and

WHEREAS, the Wye Oak at Wye Mills, Maryland, is the finest specimen of White Oak in the whole United States, therefore

SECTION 1. Be it enacted by the General Assembly of Maryland, That a new section be and it is hereby added to Article 41 of the Annotated Code of Maryland (1939 Edition), title 'Governor--Executive and Administrative Departments' , said new section to be known as Section 61A, to be under a new sub-title 'Maryland Tree' , to follow immediately after Section 61, and to read as follows:

61A. The quercus alba or White Oak is hereby declared to be the Arboreal Emblem of the State of Maryland.

Sec. 2. And be it further enacted, That this Act shall take effect June 1, 1941.

Approved May 2, 1941."

BOOK REVIEW

WILD MAMMALS OF VIRGINIA by Charles O. Handley, Jr., and Clyde P. Patton. Published by Commonwealth of Virginia, Commission of Game and Inland Fisheries, 7 North Second Street, Richmond, Virginia: 1947.

The publication of this handy little volume deserves the attention of all students of wildlife in the Middle Atlantic States. It is the most recent list available for any part of the area. The authors are to be congratulated on their efforts to extend our knowledge of a neglected field of science.

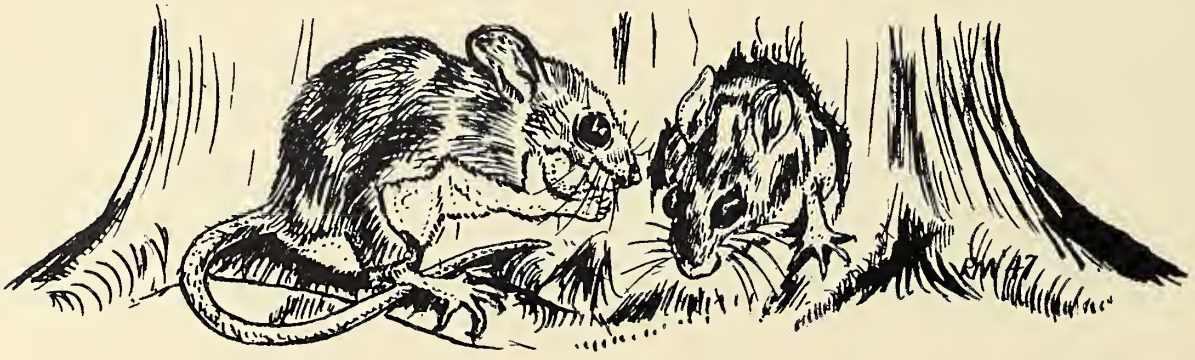
A chapter on the study of Virginia mammals gives the student directions for finding and studying mammals alive as well as for the preservation of specimens. The information on labeling study skins is very sketchy and should be supplemented by the note of W. J. Hamilton, Jr., in the *Journal of Mammalogy* (Vol. 19. p. 102.).

A poplar account of the mammals known to occur in Virginia is given under the headings of Game Mammals, Furbearers, Rodents, Insectivorous Mammals, Marine Mammals, and Vanished Mammals. Illustrated with photographs and containing many hints on the habits of mammals it should be a valuable text for the schools in teaching conservation.

The Natural Regions of Virginia are discussed briefly from an ecological standpoint. The checklist of the wild mammals of Virginia that follows contains a list of 109 forms known to occur in the state and 15 forms that may be expected to occur.

The systematic accounts of species gives the accepted scientific and common names of the mammals followed by the type locality, distinguishing characteristics, measurements, general distribution, distribution in Virginia and habitat. The keys to the identification of mammals are adequate to species only. Subspecies, particularly, among the shrews, are confusing and direct comparison with a series of skins from the type locality are necessary for proper identification. The distribution maps for each species enables the student to understand the known range at a glance. A bibliography of publications consulted in preparation of the manuscript completes the book.

Irving E. Hampe



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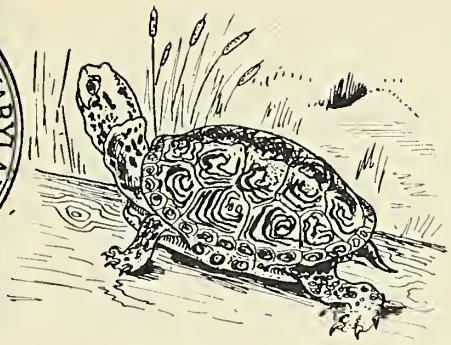

MARYLAND NATURE LEAFLET

MARYLAND MAPLES

by
Haven Kolb

"Pass the syrup" rings round the table when buckwheat cakes appear, and in America the chances are that it will be maple syrup. In the few centuries since English settlers learned from the Indians the art of tapping the sugar maple tree for its sap, the flavor of maple has become familiar to us. No longer do we depend as heavily upon this tree for sweetening as did our colonial ancestors, but the making of maple sugar is still an important industry, and, though the name of Vermont is generally associated with maple products, Maryland, too, has its sugar groves. The sugar maple[1] is a northern tree, so we cannot expect to find it very common in our State except in the cool uplands of the western counties. Garrett contains all the best groves and nowadays most of the product is used locally.

The sugar maple is one of a large family of trees and syrup is only one important product. Eastern Asia seems to be the region where maples are best developed and there are a great many different varieties in the forests of Japan, China, and Korea. Here in Maryland we have six kinds growing as natives and four other kinds have been imported from foreign lands. The maples are a group of trees which are very valuable for ornament, for shade, and for timber.

OPPOSITE ALTERNATE
(NOT MAPLES)
ARRANGEMENT
of LEAVES

It is easy to learn to identify a tree as a maple, a little more difficult to tell the various kinds apart. All the maples have their leaves arranged on the twig in pairs, one opposite the other, and all have seeds with a long wing attached in a fashion that

SUGAR

STRIPED

MOUNTAIN

is typical of the group. These seeds are usually in pairs, occasionally in triplets, and the whole fruit is called a samara or "key". The maple "key" is as characteristic of the family as the acorn is of oaks. With one exception the leaves of the maples follow a basic pattern which you will learn to recognize after a little study of the drawings on this page. But watch out for the sycamore or plane tree! It has leaves much like those of the maples, but they are arranged alternately on the twig instead of opposite each other; and, of course, the fruits of the sycamore are much different from those of the maples. The maple-leaf viburnum may also be confused for a true maple. It is a woodland shrub with decidedly maple-like leaves, which, unfortunately for identification, are also opposite in arrangement. However, the leaves can be recognized by their soft and downy texture; the fruit is berry-like.

The ash-leaf maple[2] is the exception to the general plan of maple leaves, for its leaf is compound, that is, its leaf is made up of a number of separate parts called leaflets. But its seeds, borne in "keys", proclaim it a true maple, even though it often masquerades under the name of box elder. The ash-leaf maple is abundant in stream valleys of the Western Shore east of the mountains. Its rapid growth and long root systems help to hold stream banks against erosion. Otherwise it is not very satisfactory for any of man's purposes, for it is subject to disease and its wood is soft and weak. However, birds find its seeds valuable, since they hang on the twigs all winter and so provide food during deep snows.

Two of our native maples are found only in the mountain region of our western counties. Both the striped maple[3] and the mountain maple[4] are small trees, sometimes not much more than bushes. In Maryland they are found too infrequently to be of any importance in the forest, but farther north they are often an important part of the understory of the woodland. Deer make use of the leaves and buds for food.

The lumberman generally distinguishes two kinds of maple timber: hard and soft. Hard maple is the wood of the sugar tree. The early settlers learned to appreciate the beauty and strength of this wood nearly as soon as they discovered the sweet sap of the living tree

and it has been a material for the making of fine furniture ever since. It is not only beautiful but also both hard and tough; dance floors and bowling alleys are made of this wear-resisting wood.

The term soft maple usually applies to wood from two different trees. Timber from the silver maple[5] is weak and brittle but the tree itself is a handsome one with finely cut foliage and a graceful shape. As a wild tree it is not abundant in Maryland and is quite rare in the mountains and on the Eastern Shore. Indeed, there is only one native maple which is common on the Eastern Shore. There in March the red maple[6] brightens the forest with its crimson flowers as it does generally throughout the State, especially on wet soils. The flowers are followed by brilliant scarlet seeds in late April, the leaves sway on red stems all summer, and in the fall the foliage becomes a mass of yellow, orange, and every shade of red. Few trees are so well entitled to their names as is this one. The red maple provides most of the wood sold as soft maple; it is heavy and close-grained but weak.

Curly maple and bird's-eye maple are odd variations which may occur in either hard or soft maple woods. They are very much valued for veneer use because of the peculiar and beautiful grain structure which gives them their names. The cause of such unusual growth is little known and the condition is seldom detected until the tree is cut. Then the lucky owner finds himself with timber worth much more than that of his ordinary trees.

Trees that produce lumber only, may be as unfamiliar to the city dweller as the bush which bears his coffee, but even in the center of our largest towns the maples find a familiar place. Good shade trees are always welcome and some of the maples are excellent. Best of all is the sugar maple, though it must be given a little more space than the city street will permit; in parks it is a strong and healthy, if somewhat slow grower. No other tree will produce such gorgeous color displays in the fall. A close second in autumnal coloring, however, is the red maple, but it must have even more favorable conditions to succeed. Both of these trees should be used as street trees only in the suburbs. The ash-leaf maple is not recommended, though it has been widely planted. It is short-

NORWAY MAPLE

lived, has a shallow root system which often disturbs nearby sidewalks, and frequently puts forth unsightly sprouts. Our silver maples have value not only as shade trees but as ornamentals. The deeply cut leaves are silvery-white below, providing a beautiful rippling of green and silver when the breeze stirs through the crown. When grown in the open the silver maple has a fine shape, sending out wide-spreading branches from which the branchlets droop gracefully. This form, reminding us somewhat of an elm, is well suited for shady avenues. Unfortunately, the tree is likely to be damaged by strong wind storms because of its brittle wood.

With such desirable native maples already among us it may seem strange that we have found it worthwhile to import other kinds Four foreign maples may be met with in Maryland, but only two of these are at all common. The Norway maple[7], a native of northern and central Europe may be the most familiar of maples to many city dwellers. It has been widely planted as a street tree and is more hardy under urban conditions than the sugar maple which it considerably resembles. So well has it adjusted itself to Maryland conditions that it now grows wild in some places without man's care. Whether in park or woodland it can always be distinguished from the sugar tree by the milky sap in the leaf-stems. The Japanese maple[8] has become widespread as an ornamental and for that purpose a great many varieties have been developed, mostly small and without shade value. Unlike many things introduced from Japan it shows no ability to establish itself outside the care of man, so that it is to be seen only in parks and on lawns. The sycamore maple[9] (not to be confushed with the sycamore tree) is a fine shade tree native to central Europe but it shows no particular advantages over the Norway or sugar maples. Consequently, it is only planted when there is a desire to show a large variety of trees as in parks or on large estates. Even more rare in Maryland is the European field maple[10] which can only be regarded as a showpiece.

SYCAMORE MAPLE

Illustrations by Romeo Mansueti

SCIENTIFIC NAMES:

1. *Acer saccharum*
2. *Acer Negundo*
3. *Acer pennsylvanicum*
4. *Acer spicatum*
5. *Acer saccharinum*
6. *Acer rubrum*
7. *Acer platanoides*
8. *Acer polymorphum*
9. *Acer pseudo-platanus*
10. *Acer campestre*

THE NATURAL HISTORY SOCIETY OF MARYLAND, 2101 Bolton St., Baltimore 17, Md.

Reprints of MARYLAND MAPLES are available at 8 cents each.

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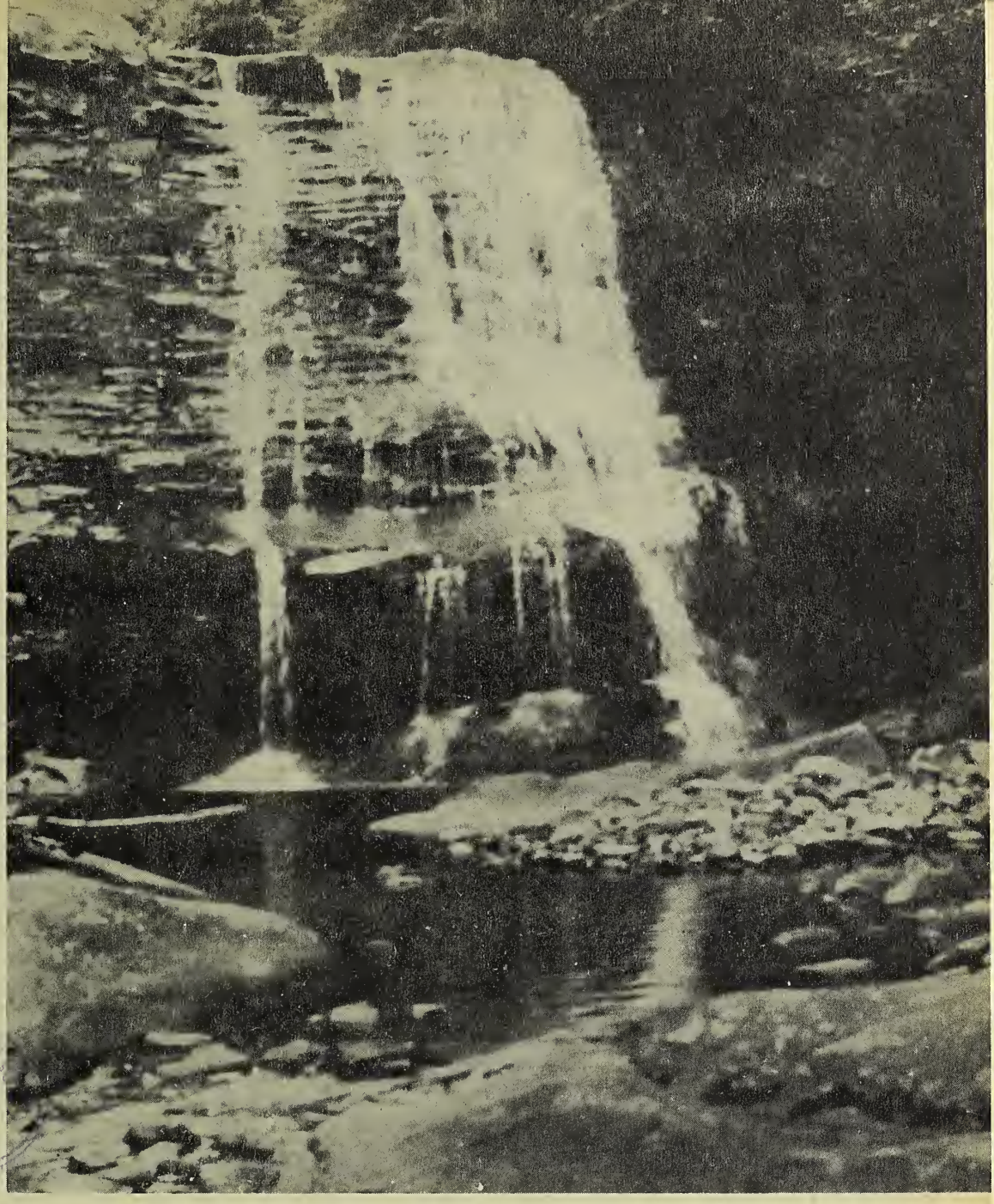

MUDDY CREEK
FALLS
Garrett County

PHOTOGRAPHED
by
EARL H. PALMER

MARYLAND

A JOURNAL OF NATURAL HISTORY

The Natural History Society of Maryland

OCTOBER 1947 VOLUME XVII No. 4

MUSEUM OF NATURAL HISTORY
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MARYLAND

A JOURNAL OF NATURAL HISTORY

THE THRUSH'S NEST

Within a thick and spreading hawthorn bush
That overhung a molehill large and round,
I heard from morn a merry thrush
Sing hymns to sunrise, and I drank the sound
With joy; and, often an intruding guest,
I watched her secret toils from day to day -
How true she warped the moss, to form a nest,
And modelled it within with wood and clay;
And by and by, like heath-bells gilt with dew,
There lay her shining eggs, as bright as flowers,
Ink-spotted over shells of greeny blue;
And there I witnessed in the sunny hours
A brood of nature's minstrels chirp and fly,
Glad the sunshine and the laughing sky.

John Clare (1793-1864)

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JANUARY, APRIL, JULY, OCTOBER

VOLUME XVII No. 4
OCTOBER 1947

Photographed by Irving E. Hampe

Killdeer on Nest

THE BREEDING BIRD CENSUS AND BIRD WATCHING

by

Irving E. Hampe, Robert M. Bowen, and Gorman M. Bond

Studies of the number of birds breeding on certain prescribed areas have become an important part of the work of most bird students. Today the value of such censuses is being appreciated by wildlife workers everywhere. For example, the recent studies of the effect of DDT on wildlife would not have been possible if the normal population of birds and other forms of life had not been known. "Before and after" censuses give the worker facts on the effect of the DDT on the forms living in the area. The same general technique is used to study the effects of lumbering, cultivation, fires, storms, and many other phenomena on the bird-life of any given region. Such investigations have an obvious importance in ascertaining proper management practices for game species, but, in addition, they make an equally important, if less conspicuous, contribution toward the solution of fundamental biological problems.

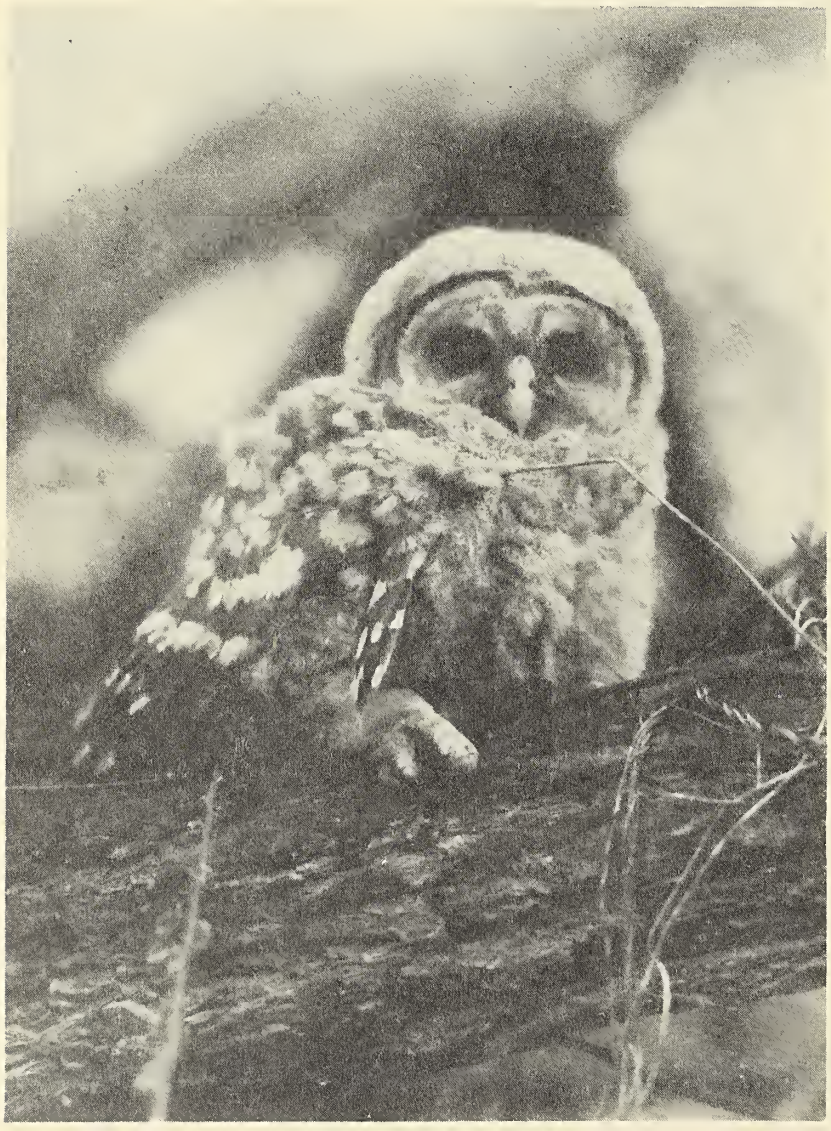
In planning a study of this type, mapping and preliminary surveys of the area are necessary. Heavily wooded areas of about 25 acres and open areas of 50 acres are large enough for one or two persons to census. Mapping should be undertaken early in the year when the trees are bare. It is advisable to divide the area into subsections which are 208 feet, 8.5 inches on each side, thus producing square units of one acre. Then by numbering or otherwise marking each unit, it is possible to locate with considerable exactness the spot on the map where each singing male or nest is observed. Two trips a week, and one evening trip per week to record nocturnal species, are the minimum required for accurate censusing.

On each trip the locations of all singing male birds are marked on a copy of the map. The identity of the various species may be indicated in a suitably brief manner by writing next to the symbol denoting the location of the bird the number given to that species in the Check-list of the American Ornithologists' Union (the "A.O.U. number"). Details of temperature and weather conditions as well as the exact time of starting and ending each trip are important items of information to be appended to the trip map. On returning home the observer should transfer the data to cumulative species maps. There is one of these for each kind of bird breeding in the area and on it all the records for that species throughout the season are noted. Some workers carry the species maps themselves into the field clipped to a board.

In the census described below the writers, after locating a male in the same area on several trips, searched for and found a number of nests. Although not essential for the general purposes of the census, the finding of nests or young lends definiteness to the records and leads to many interesting experiences. It is, of course, highly inaccurate to base a census only on nests or young actually found, because of the impossibility of ever locating a very large percentage of those which certainly exist. While, on the other hand, a count of singing males probably leads to some exaggeration, enough is known of territorialism in birds to show that such inaccuracy is within reasonable limits.

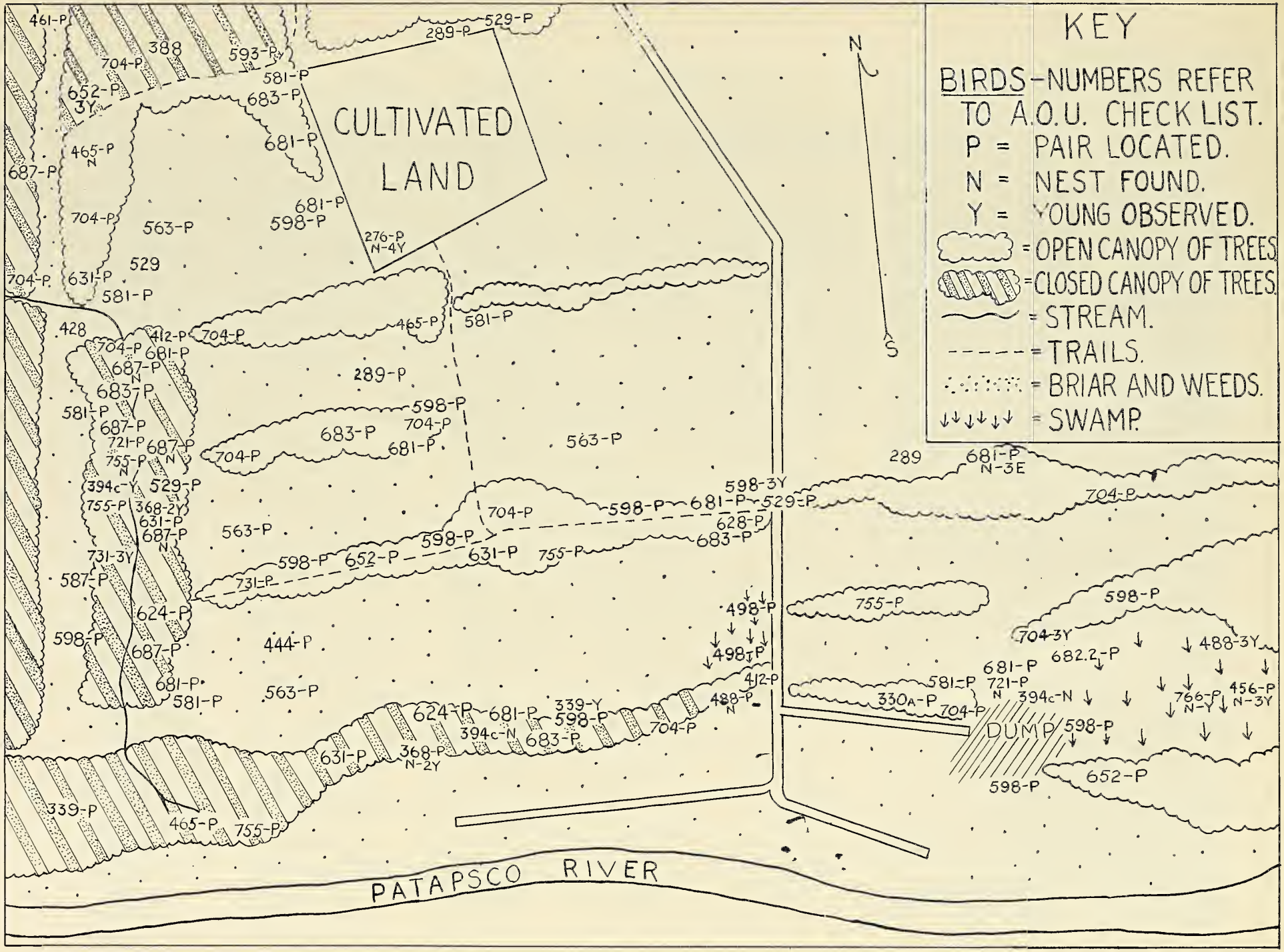
The census should be started early enough in the season to discover the nests of hawks and owls. The horned owl begins nesting in February, occasionally earlier in Maryland, and an effort to record this and other early breeders should be made if they are suspected of nesting in the census area. In April the transient migrants will be observed moving through the area. They should be noted but not marked on the maps. Migrant individuals of species that may possibly nest on the area should be marked, however; those not taking up breeding territory will not appear on subsequent trips and can be eliminated. May and June are the most important months and occasional trips throughout July should be made to observe and record late nesting species like the goldfinch.

At the end of the season the census should be written up and a map made showing the number of species breeding on the area. The National Audubon Society will publish the census in Audubon Field Notes if it follows the standard set by the editors. Students who are not able to follow such requirements or whose census is rejected due to limitations of space or other reasons should try to publish their efforts in the local bird journals.



Young Barred Owl

A bird census offers more than an opportunity to study mere numbers of breeding species on an area. The bird watcher, time permitting, can make a further contribution to the science of ornithology by studying many aspects of bird behavior. For example, during the census made by the writers in 1947 the incubation period of a killdeer was determined roughly as between 24 and 25 days. This nesting also furnished many valuable notes on behavior. During the early stages of incubation the pair left the nesting area long before we approached the nest. Unless pursued, they flew about uttering their alarm



RELAY CENSUS AREA, BALTO. COUNTY, MD.

note. Later the incubating parent (see accompanying plate) slipped off the nest when approached and began "injury-feigning" at a short distance. This type of behavior was of short duration. One of the pair, presumably the male, did not react in this manner and occupied itself by flying off some distance and calling incessantly. Four young were hatched at this nest and probably led away from the nesting area as no further observations were made after the young hatched.

To determine the incubation period the eggs should be marked with indelible ink as soon after laying as possible and a close check kept until they hatch. Early morning is the usual laying time of passerine birds; incubation does not begin, in most cases, until the full clutch is laid. Numerous observations are needed to establish incubation periods and much remains to be done in this line. They should be timed from the date the last egg is laid until that on which the final egg hatches. Still less is known of the period the young spend in the nest (if there is a nest) and the period the young are dependent upon the adults. The last can best be determined by banding with color bands, a technique which lies outside the scope of this article.

The weather is an important factor in nesting success. After a strong windstorm early in May of this year a pair of young barred owls was found, one on the ground (see photograph) and one up in a sapling. After being photographed, the young were placed in a tree and continuous observation throughout the season proved that they survived, and gradually moved to another section of the area. It was interesting to note, the few times we handled them, that the pupils of the eyes of the young, which were a pale blue, gradually became darker as the birds grew older. Six weeks after they were first found they were still together. They flew rather awkwardly and still had some down attached to the feathers of the body. The heavy undergrowth made it impractical to find pellets to record food prey, but on one occasion the remains of an eastern green heron were found under the tree where the young roosted.

The part taken by the sexes in building the nest varies among the different species. Among the redstarts observed on our area the female alone built the nest. Observations on two nests of the blue-gray gnatcatcher showed both birds taking part in building operations. One pair of blue-gray gnatcatchers not on the census area was observed gathering plant down and strands from the webs of the tent caterpillar.

The size of the breeding territory is one of the factors that gave trouble to the writers. Late in the present census a rough idea was gained of the area occupied by a few pairs. This furnished another instance where color-banded birds would be very desirable. Indigo buntings on the area were especially difficult to count. They nested or used singing perches in hedgerows, and were observed flying out from both sides. It was necessary for two observers to follow the hedgerows, one on each side, before an accurate account could be made.

As stated in the beginning, the primary reason for censuses is to count the number of pairs breeding on an area. If only one or two persons take part in the survey it is hardly possible to undertake extensive investigations of bird behavior. However, the need for such work is so great that every opportunity should be taken to add to our stock of knowledge. If possible, one should in-

(Continued on Page 72)

BREEDING BIRD CENSUS

Topography: Flood plain deciduous forest and brushy fields with hedgerows of second growth. Elevation 12 to 41 feet.
Size: Approximately 66 acres.
Location: Relay, Baltimore County, Maryland.
Coverage: Frequent late afternoon and evening trips in May and June. Infrequent trips in July. Total of 56 hours observing.

A.O.U.	Name	Pair	Nests	Young
339	Red-shouldered hawk	1		1
289	Bob-white	3		
276	Killdeer	1	1-4 eggs	4
388	Black-billed cuckoo	1		
368	Barred owl	1	1	2
428	Ruby-throated hummingbird	1		
412	Flicker	2		
394c	Downy Woodpecker	3	2	2
330a	Crested flycatcher	1		
444	Kingbird	1		
456	Phoebe	1	1	3
461	Wood Pewee	1		
465	Acadian flycatcher	3	1	
488	Crow	1	1	3
731	Tufted titmouse	1		3
721	House wren	2	1	
718	Carolina wren	1	1	
704	Catbird	12		
755	Wood thrush	4		
766	Bluebird	1	1	
628	Yellow-throated vireo	1		
631	White-eyed vireo	4		
624	Red-eyed vireo	2		
652	Yellow warbler	3		3
681	Maryland yellow-throat	9	1-3 eggs	
683	Yellow-breasted chat	5		
687	American redstart	6	4	3
688.2	English sparrow	1		
498	Red-winged blackbird	2		
587	Towhee	1		
593	Cardinal	3		
598	Indigo bunting	9		3
529	Eastern goldfinch	3		
563	Field sparrow	4		
581	Song sparrow	6		

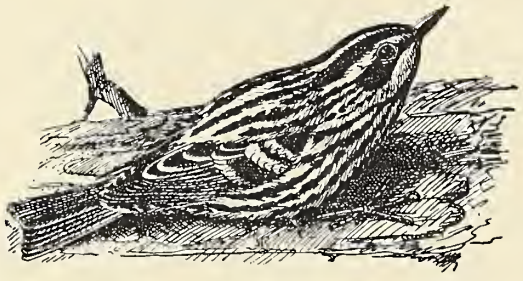
Total: 34 species, 102 pairs, 15 nests, 26 young.
Density: 155 pairs per 100 acres.

Feeding on or flying over area:

Eastern green heron, Cooper's hawk, Red-tailed hawk, Sparrow hawk, Broad-winged hawk, Chimney swift, Purple grackle, Barn swallow, Blue jay, Carolina chickadee, Mockingbird, Robin, Starling.

terest another person in undertaking a behavior study on pairs found by the census workers. The results of such an investigation will make future consuses of greater value.

The accompanying census is the first one made on the area described. The writers found the area too large and many opportunities for study of individual pairs were passed over. By reducing the size of the area and making use of techniques developed this year, it is hoped that future work may be more successful and may answer some of the problems uncovered in the course of our first year's work.



THE CARPENTER FROG IN MARYLAND

by

Roger Conant, Philadelphia Zoological Garden

Ever since its discovery in Delaware in 1936 (Conant, 1940), it has been virtually a foregone conclusion that the carpenter frog *(Rana virgatipes)* eventually would turn up on the Eastern Shore of Maryland. But eleven years of intermittent collecting have been required to find it. Two things have conspired to make this coastal plain endemic more or less of a rarity - the apparent requisite of a sphagnaceous environment and the circumstance that few such habitats remain in a region that has been extensively drained and otherwise altered for agricultural purposes. As a matter of fact, the frog still would be missing from the state list if a few amorous males had not given voice to their characteristic "hammering" call at just the right time.

During the late morning of April 10, 1947, my wife and I visited a small swamp, near the edge of the Blackwater Wildlife Refuge, where on several occasions I had previously collected a number of interesting reptiles and amphibians without encountering any evidence that *Rana virgatipes* might also be an inhabitant of the same body of water. The locality, near Gum Swamp, is approximately five miles south of Church Creek in Dorchester County. The bog, which is not very extensive, is bisected by an abandoned (formerly corduroy) lumber road. Loblolly pines, *Pinus Taeda*, are the dominant trees of the vicinity, but numerous sweet gums and red maples also grow in or at the water's edge. There are dense clumps of shrubs here and there, and the bog is thickly overgrown with sphagnum and other aquatic vegetation. The bottom is firm and, in so far as could be determined, the water nowhere exceeds about two feet in depth.

Shortly before noon we were startled to hear the unmistakable call of *virgatipes*. Three or four males joined in the chorus, but after not more than a minute they lapsed into silence. They called only one other time during the two hours we were in the vicinity. I made a circuit of the swamp, wading continuously for nearly an hour, and, although I was able to stalk close enough to make positive identification upon five individual carpenter frogs, I succeeded in catching only two. These were both males, with head-body measurements of 62 and 49.5 mm., respectively. They are numbers 568 and 569 in the temporary study collection being maintained at the Philadelphia Zoological Garden.

The only other species of frog that was occupying the identical habitat was *Rana pipiens*, but *Acris crepitans* was very numerous in marshy spots along the abandoned road. Other amphibians and reptiles collected near-by on the same or other days include *Ambystoma opacum. Bufo w. fowleri, Lygosoma laterale, Eumeces fasciatus, Coluber c. constrictor, Lampropeltis g. getulus, Natrix s. sipedon. Thamnophis s. sauritus,* and *Clemmys guttata.*

The carpenter frog probably will be found in other localities on the Del-Mar-Va Peninsula and possibly on the coastal plain of mainland Maryland as well. The most sensible way to search for it would be to visit sphagnum bogs and swamps during the calling season. It has been heard in Delaware on dates ranging from May 2 to June 20. (The only known locality for that state is in the remnants of the great Cedar Swamp south of Millsboro and just north of the Maryland line.) In the New Jersey pine barrens, where the species is abundant, choruses have been recorded as early as April 14 and as late as June 21, but I have also heard individual frogs or small groups singing up to and including August 4.

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THE UPLAND CHORUS FROG IN MARYLAND

by

James A. Fowler

The upland chorus frog, *Pseudacris brachyphona* (Cope), is one of the least known of our Maryland frogs and toads. At the present time this frog is known only from Garrett County in the extreme western part of the state. Its range, however, embraces the Appalachian Plateaus physiographic province from southwestern Pennsylvania to eastern Ohio, Kentucky, West Virginia, the western part of Virginia, eastern Tennessee, and as far south as northern Alabama (Walker, 1946). In Maryland, this species is likewise limited to the Appalachian Plateaus inasmuch as Garrett County lies entirely within this province.

Continued on Page 76

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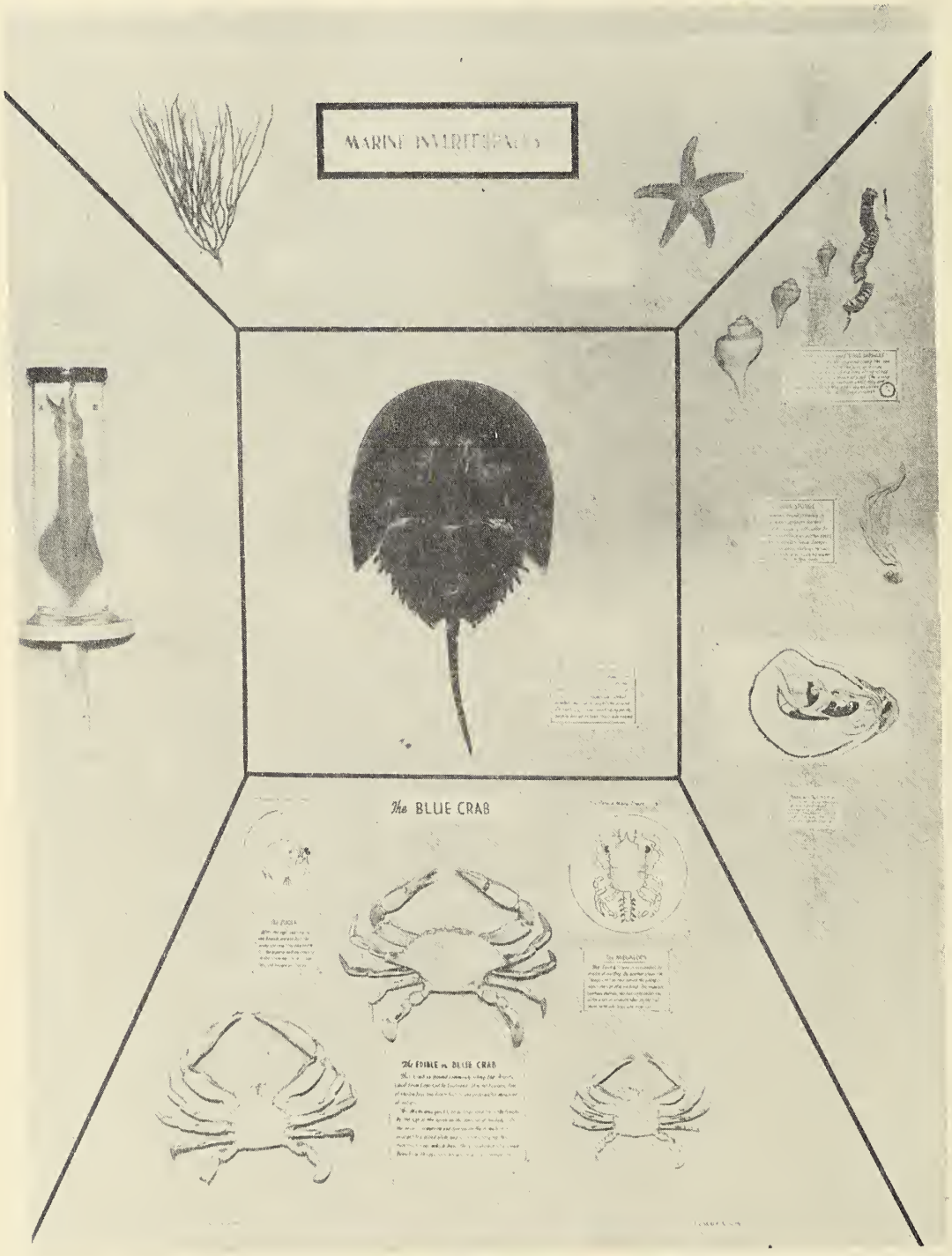

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Mostly the medium-sized mammals of our State-the raccoon, opossum, skunk, muskrat, weasel, several species of squirrel, and bat.

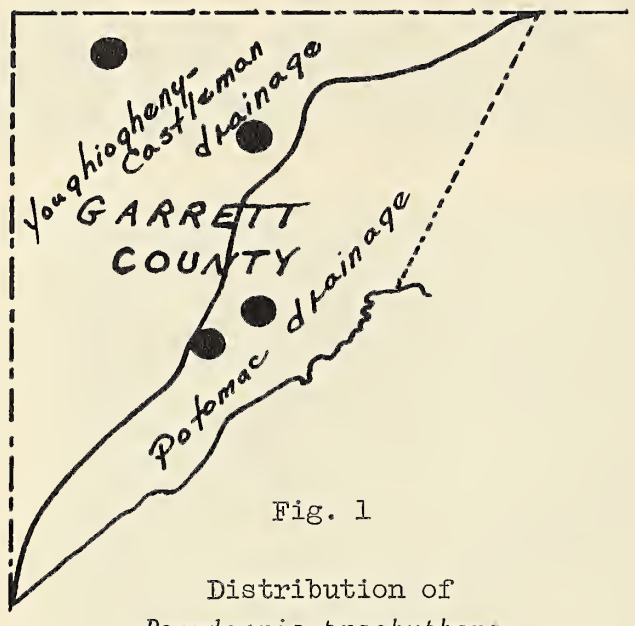

Fig. 1

Distribution of
Pseudacris brachyphona
in Maryland

Pseudacris brachyphona like other tree frogs (Hylidae), has the tips of its digits expanded to form adhesive disks. These disks are, however, quite small compared with those of the species of *Hyla.* Compared with cricket frogs *(Acris), P. brachyphona* has distinct tympanums and only slightly webbed hind toes. It is a medium-sized *Pseudacris* and is from 1 to 1 3/8 inches long. The undersides are yellowish in life and are covered with fine granulations. The dorsal color varies through several shades of brown. The dorsal markings consist of a black triangle between the eyes and a pair of broad, crescentric bands from the eye to the groin. In some specimens these bands curve inwards and meet to form a cross (somewhat as in *Hyla crucifer*) or they may be joined together by a bar to form the letter "H". A few specimens have no definite pattern. The limbs are also barred or spotted with dark.

Specimens of *Pseudacris brachyphona* from Garrett County, Maryland were mentioned by Walker (1932) on the basis of six individuals in the collection of the Academy of Natural Sciences of Philadelphia collected from Jennings. At that time these specimens constituted the easternmost records for the species. Since 1932, however, this frog has been recorded from three additional localities in Garrett County. These are as follows: Swanton, Backbone Mt., CCC Camp, June 4, 1937 (CM* 12946); Altamont, April 5, 1938 (CM 13678); Selbysport, April 16, 1946 (JAF 38). The Altamont and Swanton records are from the Potomac River drainage, while the Jennings and Selbysport records are from the Youghiogheny-Castleman drainage (Fig. 1). The three specimens from Selbysport were males and were calling from a small grassy ditch filled with water along a dirt road at the base of a hillside bordering the floodplain of the Youghiogheny River. Although no eggs were seen, these frogs were no doubt part of a breeding aggregation. Thus, according to Wright and Wright (1933), this species is known to breed from March to May and possibly into June. Moreover, Green (1938) in his studies of the breeding habits of this species in West Virginia has recorded eggs from April 5 to July 2.

Further collecting in western Maryland should greatly add to our knowledge of the distribution of this species in the state. In this connection it is anticipated that it will eventually be recorded as far east at least as that part of Allegany County which, like all of Garrett County, is in the Appalachian Plateaus.

*Carnegie Museum; specimens made available through the courtesy of M. Graham Netting, Curator of Herpetology.

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A NEW ANGLE ON AN OLD DISEASE

by

Irving L. Towers

When a carpenter frames a roof he first determines the pitch or the angle of inclination in order that he may proceed systematically. Figuratively speaking, this is true in many other lines of endeavor where, to accomplish a workmanlike job, some basic principle or pattern is primarily important.

Observations made both afield and in the laboratory near Laurel, Maryland, during the past two years would indicate that the presence of the short-beaked mosquito and the occurrence of poliomyelitis are associated. This Journal for April, 1946 contained a preliminary report and only a few months later a number of cases of this disease occurred at nearby Greenbelt. As the low-lying terrain at both places is comparable, it seems possible that such conditions may, in part at least, be conducive.

Stated briefly, these observations would give the impression that highway construction, through the inadvertent impounding of small bodies of water, has provided this very unusual mosquito with the specific environment necessary for its propagation. It is evident that such waters would be more frequently contaminated due to their proximity to habitations than would those located in more remote sections.

As reported previously, the short-beaked mosquito selects ponds or pools which are either heavily shaded or which support tree growth in order that an abundant supply of food will be available to its young over an extended period. I have frequently used a hatchet to chop through from 4 to 6 inches of ice and

then retrieved the larvae feeding around the trunks of fair sized maples found growing in comparatively deep water.

Highway construction, as tax payers can affirm, is an appreciable item so that engineers install culverts only at strategic points for reasons of economy. This, nevertheless, results in the impounding of small, permanent ponds and even swamps which, when located so as to become contaminated from animal sources, are doubtless danger points.

The time-factor enters the situation in such a manner as to indicate that road construction is indirectly associated with polio infection. Thus, although this ailment was recognized by the ancients, it was not until the initial epidemic of some thirty years ago that the man on the street had ever heard of such a malady. It is perhaps unnecessary to mention that motorized transportation also had its inception at about this time.

The presence of the short-beaked mosquito goes unnoticed because, unlike the orthodox type, it does not bite but instead utilizes plant juices and shows a definite liking for ripe fruit. Authorities state that poliomyelitis is spread by contaminated food and water but just how the virus gains access thereto is not mentioned. It might be presumed, however, that when one of these insects emerges from a contaminated pond in which it has spent six or seven months it would be fairly well impregnated with the virus. In this regard it may be recalled that both of the virus diseases, dengue and yellow fever, are transmitted by mosquitoes.

I have propagated a dozen or more of these gnats and find them more difficult to handle than are the anophelines. Being rapid in flight, extra precaution must be taken to prevent escape while being transferred from one container to another. As far as my observations extend, the life-span of the adult lasts only for a week or ten days, thus it is unlikely that it travels far; this however, would not preclude contaminated fruit from being shipped long distances or held in storage for extended intervals.

In dealing with the short-beaked species the literature on mosquitoes is quite disarming, it being assumed that they are even beneficial while admitting, at one and the same time, that little is known of their habits and life history. This family comprises our most virulent vectors and no member should be given a clean bill of health until all particulars are available.

There are some students of public health who hold the opinion that the June to October cycle of poliomyelitis would suggest that it is borne by insects. This present study concurs and attempts to make it more specific by offering another time-factor.

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BOOK REVIEW

REPTILES AND AMPHIBIANS OF THE NORTHEASTERN STATES A non-technical resume of the snakes, lizards, turtles, frogs, toads and salamanders of the Area, by Roger Conant. Published by the Zoological Society of Philadelphia: 1947, 41 pages, 111 photographs, 5 drawings, 1 map. $1.00.

At last a work has appeared on the herpetofauna of the most densely populated section of the United States. Roger Conant, curator of the Philadelphia Zoological Garden and one of the country's ablest herpetologists, realized the need for a comprehensive account of the amphibians and reptiles that would be presented in a readable yet scientific, up-to-date fashion. He writes with a flawless style; at the same time he has produced a handsome book.

The illustrations are striking and represent some of the finest herpetological photographs ever made. A candid essay precedes a short account of each creature of the large groups, such as frogs, snakes, etc. and promises good reading even for the most casual layman. Each species of snake, lizard, turtle, frog, toad and salamander is presented in a clear, concise manner, and immediately adjacent to the resume is a small photograph of the particular species. It includes a short description, food habits, size, reproduction and general habits and ecology of the species.

To the many herpetological enthusiasts who have periodical headaches over nomenclatorial changes, Mr. Conant has presented a check list and ranges of all the species that have been authoritively recorded in the Northeastern States, with their latest accepted scientific names.

However fine the illustrations are, one can not hope to identify a particular amphibian or reptile by simply comparing a specimen with a photograph.

The pictures, most of which were made by the staff of the Zoological Gardens, show the outstanding features of each species. In some cases better photographs would have improved the handbook's use. All 87 amphibians and reptiles are illustrated; of this group 78 forms may be considered indigenous to Maryland.

Maryland, which is at the southern tip of the Northeastern States, is considered faunistically east of our mountains; several of the species found in extreme Western Maryland are not included in the report. It is significant that Maryland represents the point of intergradation of the northern and southern ring-necked snakes, the common and the coastal plain milksnakes, the upland and lowland chorus frogs, and the green and Miller's tree frog.

An up-to-date account on first aid for poisonous snake bite is illustrated by graphic photographs. A section devoted to caring for captive specimens of amphibians and reptiles will be particularly helpful to pet-lovers, and the bibliography suggests aids for specific areas in the Northeastern States.

The booklet presents a good list of acceptable common names of the Eastern States' amphibians and reptiles, and represents one of the best attempts by a contemporary herpetologist to standardize common names. It is hoped that THE AMERICAN SOCIETY OF ICHTHYOLOGISTS AND HERPETOLOGISTS will further continue this campaign, which has been so well emphasized by Eastern herpetologists, in the next national checklist.

Whether a key to the amphibians and reptiles would have been advisable within the scope of this publication is questionable; nevertheless, considerable difficulty will be encountered by neophyte collectors in distinguishing certain species and subspecies from one another in the descriptions and illustrations. Emphasis has been made, however, on the use of more technical handbooks for detailed identification.

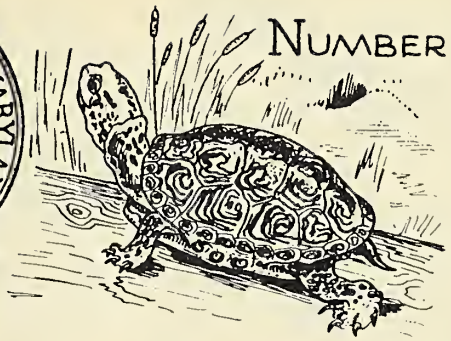
The large size of the booklet (9 x 12 inches) is unfortunate since it is rather awkward to handle. Perhaps a smaller issue or even a pocket copy may someday be issued, but the primary use of the present booklet is for reference purposes. Needless to day, this publication represents a decided progressive step in popular herpetological works. For Maryland naturalists, the "Reptiles and Amphibians of the Northeastern States", will prove fascinating reading and an invaluable guide to our native species.

Romeo Mansueti

BREEDING NOTE ON THE RED - BELLIED SNAKE

On August 4, 1941 a female red - bellied snake, *Storeria occipitomaculata* (Storer), collected on July 27, 1941 at Thurmont, Frederick County, Maryland, gave birth to five young. The first two were found in the cage at twelve noon and between that time and 2:30 P.M. the other three were born. One, apparently the last, was dead and still coiled within the membrane. The following day, late in the afternoon, the female produced another offspring, bringing the total to six. This one was also dead, being incased in the membrane. The young snakes averaged three inches in length and the four that lived had all shed within five days.

John E. Norman



NUMBER 2

MARYLAND NATURE LEAFLET

MARYLAND SALAMANDERS

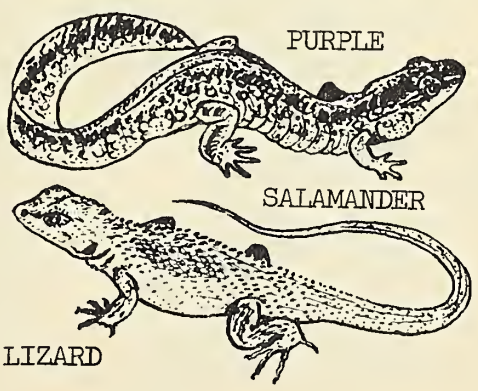
by

Romeo Mansueti

One day in 1505 in Florence little Benvenuto Cellini, not yet the celebrated Italian artist, was valled by his father to look into the flames licking the oak-logs newly placed in the fireplace. Suddenly the five-year old boy was amazed to see an animal "sporting in the core of the intensest coals". At that moment the father gave his son a resounding box on the ears saying, "My dear little boy, I am not striking you for any wrong that you have done, but only to make you remember that that lizard which you see in the fire is a salamander..."

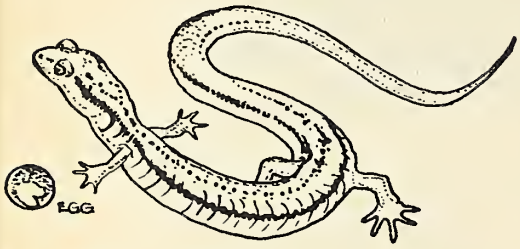
Giovanni Cellini, the father of Benvenuto, in pointing to the wonderful creature gives a clue to the origin of the belief that these peculiar animals live in fire. The salamander, a naked-looking, four-footed, tailed amphibian probably wandered from a pile of dead wood fresh from the forest or from the masonry of the fireplace, for salamanders quickly perish in a fire and die from lack of moisture in dry places.

Today salamanders are sometimes called "spring lizards" by country folk because they often live in springs. They are supposed to purify water, but this belief is unfounded; however, they are not harmful to drinking water. Marylanders frequently confuse these delicate, moist animals with lizards, which they resemble superficially. Salamanders are easily distinguished from lizards by their moist and shiny bodies, which are without scales. Lizards, like most reptiles, have dry bodies covered with scales and claws on their toes. They differ, too, in the selection of habitats; salamanders live in water or in damp forests, while lizards usually prefer dry, open areas.

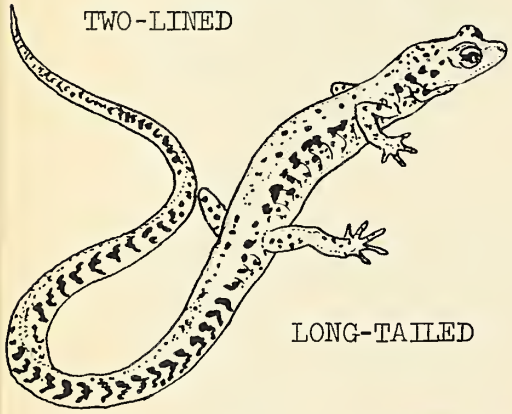


A gushing brook is a good place to look for salamanders, but they are equally at home in a spring or a shady pool of water. A back-breaking day devoted to tearing rotten logs apart will result in uncovering several salamanders. Look under a flat rock along the edge of a stream and you will surely startle a wriggling, shiny, brownish-black one, the common dusky salamander, *Desmognathus fuscus.* If you discover a female coiled around a cluster of small, whitish eggs, you will be surprised at her apparent fearlessness.

DUSKY

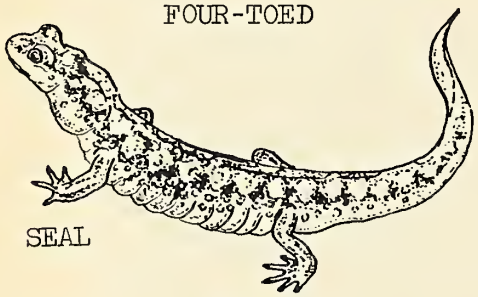


TWO-LINED



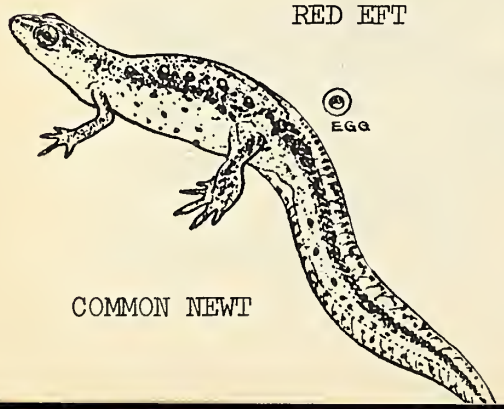
LONG-TAILED

FOUR-TOED



SEAL

RED EFT



COMMON NEWT

Her maternal instincts, however, are not as highly developed as you imagine, for she may be quickly dislodged from her brooding position simply by touching her. Turn over another rock and you may be greeted by another species, the two-lined salamander, *Eurycea bislineata*, with a golden back and yellow belly. It seems to move twice as fast as the dusky salamander, yet if you are an expert juggler, you may perhaps capture one, though salamanders seem as slippery as eels. Almost all Maryland salamanders can be handled without fear.

Deep in the damp woodland you may find the handsome long-tailed salamander, *Eurycea longicauda*, an orange- and black-speckled species, which is equally at home in caves and artificial tunnels. The recently transformed young of this species are often found, but in our State the eggs have never been discovered in nature. Apparently they are laid deep in the cool fissures among rocks and in caves.

When I collected my first red-backed salamanders, *Plethodon cinereus*, which hardly grow more than four inches long, I was warned to keep my mouth tightly closed for "they'll sure jump down your throat and choke you." Of course they did not leap into my mouth for their short legs are only capable of helping them to snap their tail and body when angered or frightened, causing an illusion of jumping. Despite the delicate nature of salamanders, a few are extremely hardy, particularly the red-backed salamander, which can often be found on mild winter days under logs and stones or, under very dry conditions, beneath moss and humus. Although their closest relatives, the frogs and toads, hibernate, many salamanders remain partially active during cold weather. In some instances, only freezing will deactivate them. Other species retire deep below the frost line under roots of trees, forest humus, and rocky formations.

If it were not for the secretive and nocturnal nature of many salamanders, the fact that there are at least twenty different species in Maryland would be better known. Even within Baltimore, an interesting variety of salamanders abounds. The richest salamander fauna occurs in the mountainous regions from Frederick to Garrett Counties, where in the damp forested areas and in the cold mountain streams, the many lungless salamanders live. Four of these have already been mentioned.

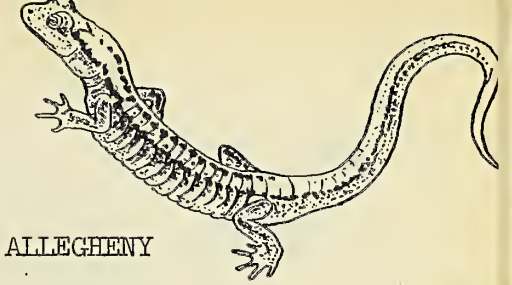
Amphibians are at home on land as well as in water with few exceptions, and during certain stages of their life history they spend long periods in the water. In the life cycle among salamanders there is a mating season, the details of which vary greatly among the different species; egg-laying follows, after which the larvae hatch. The larvae are equipped with prominent feathery gills.

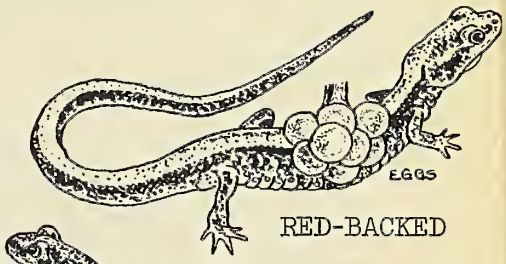
After a time larval salamanders metamorphose into adults, losing the gills, and frequently dressing themselves in startling bright colors, contrary to the drab colors of the larvae.

Most Maryland salamanders are four to eight inches long but hellbenders, *Cryptobranchus allegheniensis*, reach two feet and are by far the most unusual salamander because of their giant size and grotesque, wrinkled appearance. Fishermen who often catch them on lines, call them a "four-legged fish" and generally consider them poisonous, but they are quite harmless. The hellbender is found under flat rocks in shallow water along the Susquehanna River and in Garrett County. In September the female lays strings of pearl-like eggs, venturing away from them to feed on dead animal matter and aquatic life, while the male remains on guard with its head among the eggs. The great siren, *Siren lacertina*, a salamander which somewhat resembles an eel with small external gills and forelegs only, reaches a length of three feet. It is apparently very rare since it has only been recorded once in the District of Columbia in the Potomac River. Its diet of plants distinguishes it from all other Maryland salamanders, which are carnivouous.

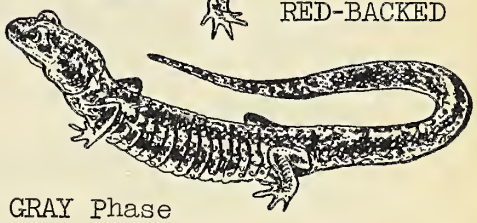
Although of the same species, the adult aquatic common newt, *Triturus viridescens*, is a far cry in body structure from its land stage called the red eft or ebbet. In spring certain ponds are filled with newts, the females of which lay single eggs. The gilled larvae remain in the water until late summer, when they change into inch-long terrestrial efts resplendent in orange with bright red spots. They inhabit damp forests from one to three years until maturity at which time they move near breeding ponds to hibernate. During the winter they develop fin-like crests on their tails and turn olive-green in color in preparation for an aquatic life. In Western Maryland this life history can be readily observed, the land stage sometimes resorting to water only for breeding. On the Eastern Shore and in Southern Maryland this salamander does not usually have a land stage but actually spends it whole life in the water.

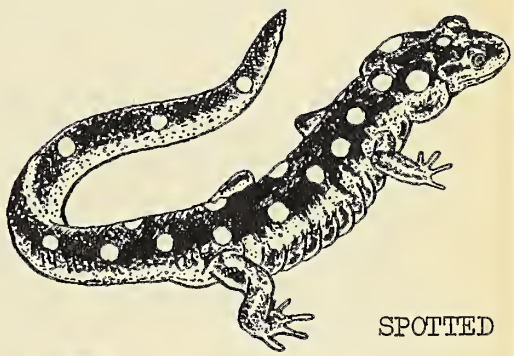
Salamanders are mute creatures, but an occasional squeak or clicking noise may be attributed to them, the sounds being purely mechanical in production. The lungless species are marvelous for their respiratory powers when they lose their gills. Breathing then takes place through the skin and through the mouth linings. After heavy showers in the mountainous areas of our State there is sufficient moisture to allow the Allegheny, *Desmognathus ochraphaeus*, and seal salamanders, *Desmognathus monticola*, to wander great distances from their homes in streams.


ALLEGHENY



RED-BACKED

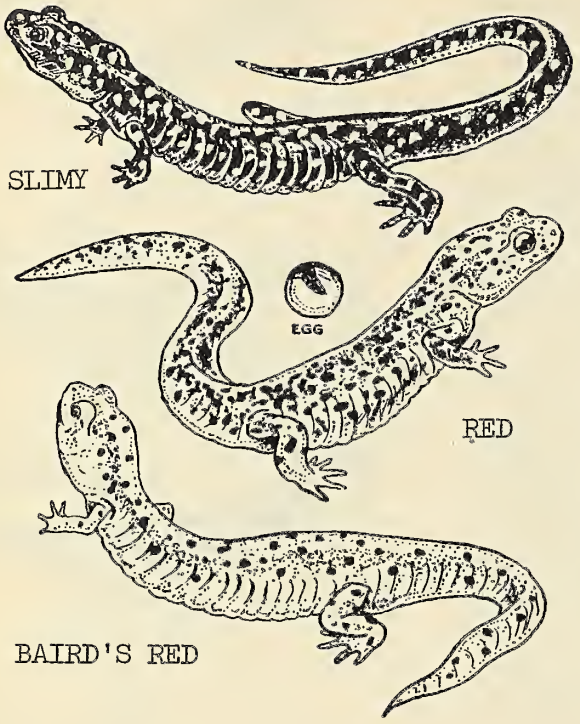

GRAY Phase


SPOTTED


TIGER


MARBLED

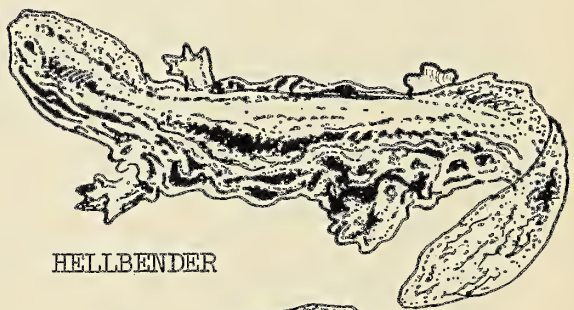

JEFFERSON'S

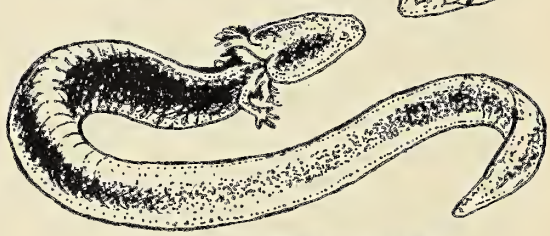


The annual migration of the yellow-spotted salamanders, *Ambystoma maculatum*, stimulated by the first warm rains of spring, is especially interesting. Great numbers come out of hibernation at the same time and enter ponds, where they perform odd nuptial dances. In March compact masses of eggs may be found attached to grass and twigs at the bottom of ponds after the adults leave the water.

The bright red coloration of the common red salamander, *Pseudotriton ruber*, and the salmon-hue of the Baird's red salamander, *Pseudotriton montanus*, are sometimes regarded as a warning of a poisonous nature. Actually both salamanders are harmless. In early winter the eggs are attached to the under surface of rocks in cold springs, but they are rarely found. The larvae with external gills vary from one to four inches and are commonly found resting at the bottom of springs.

Purple salamanders, *Gyrinophilus porphyriticus*, are among the cannibals of the salamander world in Maryland, but most salamanders would prefer feeding on aquatic larval insects, earthworms, snails, mosquito larvae, mollusks, and other small animals associated with them. Certain enemies, snakes, turtles, fishes, crayfishes, frogs, and fishermen, prey extensively upon them. On the whole they are not of economic importance.


HELLBENDER


GREAT SIREN

The Jefferson's salamander, *Ambystoma jeffersonianum*, often breeds so early in Western Maryland that snow is still evident. Its close relative, the marbled salamander, *Ambystoma opacum*, breeds in late summer and lays its pea-like eggs in depressions on land near streams. In late fall these areas are flooded by rain and swollen streams and the eggs hatch. The rare tiger salamander, *Ambystoma tigrinum*, found on the Eastern Shore spends so much time secreting itself from human eyes that little is known about its habits.

The slimy salamander, *Plethodon glutinosus*, is well named. No harm will result from contact with the slimy substance, but apparently it is distasteful to certain enemies. This silvery-speckled species may be found by turning over rocks and chopping up decaying logs. Almost all Maryland salamanders have four toes on the fore feet and five on the hind, but the four-toed salamander, *Hemidactylium scutatum*, a sphagnum bog-lover, has four toes on each foot. It is unusual for two reasons: it will detach its curiously constricted tail when grasped, in the same manner practiced by our lizards, and the female turns on her back during egg-laying. It may be seen therefore, that the salamander tribes are most interesting in their life histories and habitats.

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