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PROCEEDINGS OF THE ROCHESTER ACADEMY OF SCIENCE
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THE VEGETATION OF BERGEN SWAMP*

II The Epiphytic Plants

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The flora of Bergen Swamp includes several species of flowering plants that occur but rarely or not at all elsewhere in New York state. This swamp, about three miles long in a general east-west direction and varying from one to one and a half miles in width, is situated some 600 feet above sea-level in Genesee County in western New York. The restricted distribution of certain vascular plants of Bergen Swamp is largely accounted for by the peculiar soil conditions in and about the marl areas of the swamp rather than by climatic factors.

Epiphytes are plants which grow attached to other living plants. As used here the term, epiphyte, signifies plants of corticolous habit, without soil connections, which complete their life cycle supported on woody "hosts" from which they are nutritionally independent except for the moisture or inorganic matter obtained through superficial absorption from the surface of their bark substratum. In temperate zones lichens, liverworts and mosses occur rather commonly and conspicuously as epiphytes. Somewhat less conspicuous are epiphytic algae. Ferns may be seen infrequently as epiphytes, while truly epiphytic phanerogams rarely occur outside tropical and sub-tropical regions.

During the spring and summer from 1944 to 1946 I had opportunities to study the distribution of the epiphytic plants in Bergen Swamp in connection with a study of the distribution of epiphytic plants in New York State. (Brown, 1948.) Collections of epiphytic plants were made every month from April to November, in all of the main areas of the swamp from the few to several woody species characteristic of each. These included the hardwood, the hemlock-pine, the arbor-vitae, the open marl and the alluvial swamp areas. The 30 woody species examined embraced 26 common hardwoods and 4 conifers.

In making a collection samples of all visible lichens, algae, liverworts and mosses were removed from or with a small piece of the bark from the stump or trunk of the "host" within the reach of the arm. All samples for a given species of woody plant were placed in a bag and taken to the laboratory for study and determination. Samples from several individuals of a given woody species in an area were taken wherever possible. The

* Part I under this title, The Vascular Plants, by Walter C. Muenscher (Proc. Roch. Acad. Sci., 9:64–117, 1946) includes a general discussion of Bergen Swamp.

crown bases and crowns of taller trees in most areas could not be conveniently examined except where a tree had recently fallen or stood in a much inclined position. In the open marl, however, stunted specimens of *Pinus strobus, Larix laricina, Thuja occidentalis* and *Acer rubrum* could readily be examined from stump to crown.

The distributions of epiphytic plants in Bergen Swamp are recorded by hosts in Tables I to III. (30 species are listed in the tables; 3 other species were observed that are not listed) The only alga observed, *Protococcus viridis* Ag., is not included in the Tables since it was found on every host examined.

I wish to thank Professor Walter C. Muenscher of Cornell University whose generosity and interest in Bergen Swamp made many of the collecting trips possible. I should like also to acknowledge the assistance of Professor LeRoy Andrews of Cornell University in the determination of various key specimens of mosses. I am grateful, too, to Mrs. Volney H. Jones, Curator of the Lichen Herbarium of the University of Michigan, for the identification of several critical specimens of lichens.

Specimens of many of the epiphytes have been deposited in herbaria at Cornell University.

SUMMARY

An examination of living specimens of 33 kinds of trees and *Cephalanthus occidentalis* growing in Bergen Swamp, New York, yielded a total of 59 species of epiphytes on their trunks or branches.

The list of epiphytes includes 18 lichens, 1 alga, 15 liverworts and 25 mosses.

The hosts with the richest flora and the number of epiphytes found on each follow: *Tilia americana,* 30 species; *Fraxinus nigra,* 28; *Fraxinus americana,* 27; *Thuja occidentalis,* 26; *Acer saccharinum,* 25; *Ulmus americana,* 24. All these trees have a rather rough, spongy, persistent bark which readily absorbs and retains moisture.

Other species with more than 10 kinds of epiphytes observed on each are:

Quercus borealis var. *maxima,* 21; *Acer rubrum,* 20; *Acer saccharum,* 19; *Fraxinus pennsylvanica,* 18; *Juglans cinerea,* 18; *Carya ovata,* 15; *Platanus occidentalis,* 15; *Larix laricina,* 14; *Betula lutea,* 14; *Populus tremuloides,* 14; *Salix nigra,* 14; *Quercus bicolor,* 13; *Liriodendron tulipifera,* 11. These species except *Larix* have harder bark which remains smooth longer and does not absorb water as readily as that of the above species. The bark of *Larix* early becomes granular and rough and absorbs moisture readily. The bark of *Platanus* and *Betula* peels off in large sheets except about the basal part of the trunk with the result that few epiphytes colonize the trunk except on the rough fissured basal parts of old trees.

The other 11 species of hosts listed in the tables supported only a few kinds of epiphytes, mostly fewer than 10 species.

An examination of the epiphytes found in Bergen Swamp shows that most of them are species with a widespread or general distribution in New York State, occurring also in such widely diverse regions as Montauk Point on Long Island, the Finger Lakes region and the Adirondack Mountains.

Unlike that of the flowering plants in Bergen Swamp, the study of the epiphytes so far has revealed but few species with a restricted distribution in New York State.

TABLE I
EPIPHYTIC LICHENS OF BERGEN SWAMP

EPIPHYTE / HOST	Alectoria chalybeiformis	Cetraria ciliaris	Cladonia pyxidata	Evernia prunastri	Graphis scripta	Leptogium tremelloides	Mycoblastus sanguinarius	Parmelia caperata	Parmelia olivacea	Parmelia pertusa	Parmelia physodes	Parmelia rudecta	Peltigera canina	Physcia astroidea	Physcia endochrysea	Pyrenula nitida	Ramalina calicaris	Total
Larix laricina	x	x	x	x						x	x	x						7
Pinus Strobus			x								x	x		x				4
Tsuga canadensis			x					x										2
Thuja occidentalis			x	x				x		x	x	x						6
Populus grandidentata			x															1
Populus tremuloides			x						x		x							3
Salix nigra								x	x			x		x				4
Juglans cinerea			x		x				x						x			4
Carya cordiformis								x							x			2
Carya ovata			x					x	x		x	x		x				6
Ostrya virginiana																		0
Carpinus caroliniana			x						x			x						3
Betula lutea			x													x		2
Fagus grandifolia			x		x													2
Quercus bicolor			x					x				x		x	x			5
Quercus borealis			x		x			x	x			x			x			6
Quercus macrocarpa			x												x	x		3
Ulmus americana			x					x	x			x	x	x	x	x	x	9
Liriodendron tulipifera			x		x													2
Platanus occidentalis			x					x	x			x		x		x		6
Amelanchier arborea															x			1
Pyrus Malus			x															1
Prunus serotina			x					x										2
Acer rubrum			x		x			x	x		x				x			6
Acer saccharum			x		x			x	x			x		x	x			7
Acer saccharinum			x		x	x		x	x			x		x	x	x		9
Tilia americana			x		x	x	x	x	x		x	x		x	x			10
Fraxinus americana			x					x	x		x				x		x	6
Fraxinus nigra			x		x	x		x	x		x	x		x		x		9
Fraxinus pennsylvanica			x		x			x	x		x	x		x				7

TABLE II
EPIPHYTIC LIVERWORTS OF BERGEN SWAMP

EPIPHYTE / HOST	Bazzania trilobata	Calypogeia Trichomanis	Cololejeunea Biddlecomiae	Frullania eboracensis	Lepidozia reptans	Lophocolea heterophylla	Porella platyphylloidea	Porella pinnata	Ptilidium pulcherrimum	Radula complanata	Riccardia latifrons	Riccardia pinguis	Trichocolea tomentella	Total
Larix laricina						x			x					2
Pinus Strobus						x								1
Tsuga canadensis	x					x			x					3
Thuja occidentalis		x	x	x	x	x			x	x	x	x		9
Populus grandidentata				x		x			x					3
Populus tremuloides				x		x			x	x				4
Salix nigra						x				x				2
Juglans cinerea			x	x			x			x				4
Carya cordiformis			x	x						x				3
Carya ovata				x		x				x				3
Ostrya virginiana			x	x		x				x				4
Carpinus caroliniana						x								1
Betula lutea			x			x			x	x				4
Fagus grandifolia						x			x	x				3
Quercus bicolor				x						x				2
Quercus borealis			x	x		x	x		x	x				6
Quercus macrocarpa			x			x	x			x				4
Ulmus americana			x	x		x				x			x	5
Liriodendron tulipifera			x			x				x				3
Platanus occidentalis				x		x				x				3
Amelanchier arborea			x			x			x	x				4
Pyrus Malus				x		x								2
Prunus serotina				x					x	x				3
Acer rubrum	x			x		x	x	x	x	x				7
Acer saccharum			x	x		x	x		x	x				6
Acer saccharinum				x		x	x		x	x				5
Tilia americana			x	x		x	x		x	x				6
Fraxinus americana		x	x	x		x			x	x				6
Fraxinus nigra			x	x		x	x		x	x				6
Fraxinus pennsylvanica	x			x		x				x				4

TABLE III
EPIPHYTIC MOSSES OF BERGEN SWAMP

HOST \ EPIPHYTE	Amblystegium serpens	Amblystegium varium	Anomodon attenuatus	Anomodon rostratus	Brachythecium oxycladon	Brotherella recurvans	Campylium chrysophyllum	Dicranum flagellare	Dicranum fulvum	Dicranum montanum	Fissidens adiantoides	Hypnum imponens	Hypnum reptile	Leucodon sciuroides	Orthotrichum strangulatum	Plagiothecium denticulatum	Platygyrium repens	Thuidium delicatulum	Ulota crispa	Total
Larix laricina				x		x				x						x				4
Pinus Strobus										x						x				2
Tsuga canadensis								x		x						x				3
Thuja occidentalis		x	x		x		x	x	x							x	x	x	x	10
Populus grandidentata					x		x	x								x	x			5
Populus tremuloides					x		x					x	x			x	x			6
Salix nigra		x	x		x		x					x				x	x			7
Juglans cinerea			x	x	x		x							x		x	x	x	x	9
Carya cordiformis			x													x	x			3
Carya ovata			x	x	x												x	x		5
Ostrya virginiana			x													x	x			3
Carpinus caroliniana							x									x				2
Betula lutea	x				x		x	x		x						x			x	7
Fagus grandifolia										x						x	x			3
Quercus bicolor			x		x		x									x	x			5
Quercus borealis			x		x		x	x		x						x	x	x		8
Quercus macrocarpa			x													x				2
Ulmus americana			x	x	x								x		x	x	x	x	x	9
Liriodendron tulipifera	x						x	x									x	x		5
Platanus occidentalis		x	x		x		x										x			5
Amelanchier arborea			x		x	x											x			4
Pyrus Malus					x		x										x			3
Prunus serotina								x								x	x			3
Acer rubrum						x	x	x		x						x	x			6
Acer saccharum			x	x				x								x	x			5
Acer saccharinum			x	x	x	x					x			x	x	x	x		x	10
Tilia americana	x		x		x	x	x	x	x			x		x		x	x	x	x	13
Fraxinus americana	x		x	x	x	x	x	x				x	x	x	x	x	x		x	14
Fraxinus nigra		x	x	x	x		x	x			x	x				x	x	x	x	12
Fraxinus pennsylvanica		x	x		x		x									x	x			6

ANNOTATED LIST OF EPIPHYTES OBSERVED IN BERGEN SWAMP

Lichens

PYRENULACEAE

Pyrenula nitida (Weig.) Ach. On lower trunk of several hardwoods.

GRAPHIDACEAE

Graphis scripta (L.) Ach. Locally common on smooth bark on trunk of hardwoods.

COLLEMACEAE

Leptogium tremelloides (L.) S. F. Gray. Local in fissures of moist, shaded bark on lower trunk of *Acer saccharinum, Tilia americana* and *Fraxinus nigra.*

PELTIGERACEAE

Peltigera canina (L.) Willd. Rare, on the lower trunk of *Ulmus americana.*

LECIDEACEAE

Bacidia Schweinitzii (Tuck.) Schneid. On trunk *Fraxinus americana.*

Mycoblastus sanguinaris var. **alpinus** (E. Fries) Stein. On rough bark on lower trunk of *Tilia americana.*

CLADONIACEAE

Cladonia pyxidata (L.) Hoffm. On the lower trunk and stumps of the conifers and most of the hardwoods.

PARMELIACEAE

Cetraria ciliaris Ach. On crown and smaller branches of *Larix laricina.*

Parmelia caperata (L.) Ach. Common on the upper trunk and larger branches in the crown of hardwoods and *Tsuga canadensis* and *Thuja occidentalis;* chiefly on isolated or exposed trees.

Parmelia olivacea (L.) Ach. Common in small close patches on the trunk of hardwoods.

Parmelia pertusa (Schrank) Schaer. On trunks and larger branches of *Larix laricina* and *Thuja occidentalis.*

Parmelia physodes (L.) Ach. Common, mostly on branches and upper trunk, *Pinus Strobus, Larix laricina, Thuja occidentalis,* hardwoods.

Parmelia rudecta Ach. Common on trunk of conifers and many hardwoods.

USNEACEAE

Alectoria chalybeiformis (L.) Rohling. On trunk and branches of *Larix laricina.*

Evernia prunastri (L.) Ach. Infrequent on the upper trunk and crown of *Larix laricina* and *Thuja occidentalis.*

Ramalina calicaris (L.) Nyl. Local on trunk and branches of *Ulmus americana* and *Fraxinus americana,* chiefly on isolated trees in open swamp.

PHYSCIACEAE

Physcia astroidea (Clem.) Nyl. Local on trunk and larger branches of *Pinus Strobus* and hardwoods.

Physcia endochrysea (Hampe.) Nyl. Common on the trunk of hardwoods.

Algae

Protococcus viridis Ag. Common on the trunk and lower branches of all species, included in the tables; also on *Cephalanthus occidentalis* and *Juniperus virginiana.*

Hepaticae — Liverworts

PTILIDIACEAE

Ptilidium pulcherrimum (Web.) Hampe. Common on trunk of *Larix laricina, Thuja occidentalis* and many hardwoods.

Trichocolea tomentella (Ehrh.) Dum. Rare on lower trunk of *Ulmus americana.*

LEPIDOZIACEAE

Bazzania trilobata (L.) S. F. Gray. Infrequent on lower trunk and roots of *Tsuga canadensis, Acer rubrum* and *Fraxinus pennsylvanica;* more common in moist shaded places on rotting logs, stumps and humus.

Lepidozia reptans (L.) Dum. Rare on the lower trunk of *Thuja occidentalis.*

CALYPOGEIACEAE

Calypogeia Trichomanis (L.) Corda. Infrequent on stumps of *Thuja occidentalis* and *Fraxinus americana.*

HARPANTHACEAE

Lophocolea heterophylla (Schrad.) Dum. Common on the trunk and stump of conifers and many hardwoods.

PLAGIOCHILACEAE

Plagiochila asplenoides (L.) Dum. On lower trunk, *Ulmus americana.*

PORELLACEAE

Porella pinnata L. Infrequent on the lower trunk and stump of *Acer rubrum.*

Porella platyphylla (L.) Lindb. Infrequent on the lower trunk of *Salix amygdaloides.*

Porella platyphylloidea (Schwein.) Lindb. Common on the trunk and larger branches of several hardwoods.

RADULACEAE

Radula complanata (L.) Dum. Common on trunk and stump of most hardwoods and infrequent on *Thuja occidentalis.*

FRULLANIACEAE

Frullania eboracensis Gottsche. Common on smooth bark of trunk of most hardwoods and *Thuja occidentalis.*

LEJEUNEACEAE

Cololejeunea Biddlecomiae (Aust.) Evans. Locally common among larger liverworts and mosses growing on the trunk of *Thuja occidentalis* and many hardwoods.

RICCARDIACEAE

Riccardia latifrons Lindb. Rare on base of trunk of *Thuja occidentalis.*

Riccardia pinguis (L.) S. F. Gray. Rare on base of trunk of *Thuja occidentalis.*

Musci — Mosses

FISSIDENTACEAE

Fissidens adiantoides (L.) Hedw. Local on lower trunk of *Populus balsamifera, Fraxinus nigra* and *Acer saccharinum,* with base subject to inundation.

Fissidens Julianus (Sani.) Schimp. On stump and lower trunk of *Acer saccharinum;* submersed during high water.

DICRANACEAE

Dicranum flagellare Hedw. Local on the trunk of *Thuja occidentalis* and many hardwoods.

Dicranum fulvum Hook. Local on the lower trunk of *Thuja occidentalis* and *Tilia americana.*

Dicranum montanum Hedw. Frequent on trunk of *Tsuga canadensis, Pinus Strobus, Larix laricina,* and several hardwoods.

ORTHOTRICHACEAE

Orthotrichum strangulatum Sulliv. On upper trunk of *Acer saccharinum, Fraxinus americana* and *Ulmus americana.*

Ulota crispa (Hedw.) Brid. On trunk and lower branches of hardwoods and *Thuja occidentalis.*

HYPNACEAE

Amblystegium serpens Hedw. On lower trunk of several hardwoods.

Amblystegium varium (Hedw.) Lindb. On trunk and stump of *Thuja occidentalis* and hardwoods.

Brachythecium oxycladon (Brad.) J. and S. Local on the lower trunk of many hardwoods and *Thuja occidentalis.*

Brotherella recurvans (Michx.) Fleisch. Local on the lower trunk of *Larix laricina* and several hardwoods.

Calliergonella Schreberi (Bry. Eur.) Grout. (*Hypnum Schreberi* Willd.) Local on stump of *Thuja occidentalis;* in wet bog.

Campylium chrysophyllum (Brid.) Bryhn. Common on the lower trunk of hardwoods and on *Thuja occidentalis.*

Heterophyllium Haldanianum (Grev.) Kindb. (*Hypnum Haldanianum* Grev.) Local on lower trunk of *Populus balsamifera; Populus grandidentata* and *Thuja occidentalis.*

Hypnum imponens Hedw. On lower trunk of hardwoods.

Hypnum reptile Michx. On lower trunk of *Ulmus americana, Fraxinus americana* and *Populus tremuloides.*

Leptodictyum riparium (Hedw.) Warnst. On basal parts of stems of shrubs of *Cephalanthus occidentalis* where subject to inundation.

Plagiothecium denticulatum (L.) Br. and Sch. Common on the lower trunk of most of the hardwood trees examined; *Thuja occidentalis.*

Platygyrium repens (Brid.) Br. and Sch. Common on the trunk of most of the hardwood trees examined.

Pylaisia intricata (Hedw.) Bry. Eur. On lower trunk of *Thuja occidentalis.*

LESKEACEAE

Anomodon attenuatus (Schreb.) Hueb. Common on trunk of hardwoods; infrequent on *Thuja occidentalis.*

Anomodon rostratus (Hedw.) Schimp. Frequent on trunk of *Larix laricina,* and hardwoods. *Acer saccharum, Fraxinus americana* and *F. nigra.* Frequently intermixed with *Anomodon attenuatus.*

Haplohymenium triste (Cesati) Kindb. [*Anomodon tristis* (Cesat.) Sulliv.] Rare, on lower trunk of *Tilia americana.*

Thuidium delicatulum (L.) Mitt. Local near the base of trunk of *Thuja occidentalis* and several hardwoods; chiefly in wet bogs.

LEUCODONTACEAE

Leucodon sciuroides (L.) Schwaeger. On exposed trunk of *Juglans cinerea, Tilia americana, Fraxinus americana* and *Ulmus americana.*

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THE VEGETATION OF BERGEN SWAMP *

III. The Myxomycetes

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The Myxomycetes or Slime-molds, also called Mycetozoa, are organisms that develop through two very different phases. Their spores, upon germination, produce small, flagellated, motile, amoeboid bodies which fuse and grow into the extensive, often highly colored, naked mass of motile protoplasm, the plasmodium or vegetative phase. The plasmodium, after a period of animal-like existence, becomes transformed into fruiting structures or spore-producing bodies resembling sporangia of fungi. While the plasmodia of some species of slime-molds have distinctive characteristics such as color, size and habitat preferences, it is the "fruiting" or spore-producing stages that provide the morphological characteristics used in their recognition and taxonomic treatment. The Myxomycetes by some have been considered as animals even though they possess some plant-like stages.

The Myxomycetes thrive best in a warm, moist habitat rich in decomposing vegetable matter. Decaying logs, piles of sticks, leaves, herbaceous stems and trash are suitable places for their development. In favorable localities a few kinds of slime-molds may be picked up almost any time during the growing season, but the best time to find good fruiting stages is during warm weather about four to six days after a rainy period. Any time when mosquitoes are out in "full force" is a good time for finding "fruiting" slime-molds. During dry seasons or extreme cold, slime-molds persist as spores or the plasmodia pass into a sclerotium or resting stage.

The spores of slime-molds are minute, mostly between 4 to 12 microns in diameter. Since these are widely disseminated by air currents, many species are widespread over the land areas of the world wherever congenial habitats occur.

Lister (1925) records about 300 species of Myxomycetes known from the whole world. Hagelstein (1944) records 285 species from North America and recognizes 33 additional species from other parts of the world. Hagelstein (1936) lists 162 species found on Long Island, New York. Wann and Muenscher (1922) report 92 species from the Cayuga Lake Basin, New York. The above figures serve to emphasize the cosmopolitan nature of the distribution of many Myxomycetes. Most species are common in temperate regions; however, some are limited chiefly to the tropics and others to alpine regions.

* Part I, under this title, The Vascular Plants, (Proc. Roch. Acad. Sci. 9:64–117, 1946) includes a general discussion of Bergen Swamp.

The present list of Myxomycetes of Bergen Swamp in Genesee County, New York, includes 73 species in 25 genera and 11 families. The gatherings of materials upon which this report is based were begun by me in 1917. Many additional species were collected during recent summers. Most of the species were obtained in the moist wooded areas of the swamp; only a few kinds were common in the open areas.

My thanks are due to Miss G. Lister and the late Professor T. H. Macbride for aid in the determination of certain obscure specimens from the earlier collections. Dr. Babette I. Brown assisted with the field collections during the summers of 1945 and 1946.

Specimens of most of the species have been deposited in the mycological herbarium of the Department of Plant Pathology at Cornell University, Ithaca, New York.

ANNOTATED CATALOGUE OF MYXOMYCETES * IN BERGEN SWAMP

Subclass I. — Exosporeae

FAMILY 1. CERATIOMYXACEAE

Ceratiomyxa fruticulosa (Muell.) Macbr. Common chiefly in early summer when extensive areas are white or pinkish with large patches of sporophores; mostly on the under side of decaying logs. This is our only representative with spores produced externally on the sporophore.

Subclass II. — Endosporeae

FAMILY 2. PHYSARACEAE

Badhamia decipiens (Curt.) Berk. On sticks and leaves on wet ground; rare.

Badhamia lilacina (Fries) Rost. On dead leaves and stems in wet sphagnum bog.

Badhamia macrocarpa (Ces.) Rost. On dead wood; infrequent.

Badhamia rubiginosa (Chev.) Rost. On moist mosses; rare.

Craterium leucocephalum (Pers.) Ditm. On dead leaves and sticks, under herbs.

Diachea bulbillosa (Berk. and Br.) Lister. Rare on leaves, twigs and other herbaceous material.

Diachea leucopodia (Bull.) Rost. Local on dead leaves and twigs.

Diderma crustaceum Peck. On herbaceous stems.

Diderma effusum (Schw.) Morgan. On dead leaves, stems and rarely on wood.

Diderma globosum Pers. On dead leaves; rare.

Diderma spumarioides Fries. Forming extensive grayish white crusts on leaves and stalks.

Diderma testaceum (Schrad.) Pers. Local on leaves and mosses in moist shaded thickets.

Fuligo septica (L.) Weber. Forming large gray, yellow or brownish aethalia from 2 to 20 cm. in diameter; common on wood, bark, leaf mold and organic soil.

* The arrangement here follows that used by Lister (1925). For detailed descriptions of species this or the monograph by Hagelstein (1944) or Macbride and Martin (1934) may be consulted.

Leocarpus fragilis (Dickson) Rost. Occasional on dead leaves and stems; rarely on living leaves of *Lycopodium lucidulum.*

Physarella oblonga (Berk. and Curt.) Morgan. On the lower surface of a decaying elm log.

Physarum cinereum (Batsch.) Pers. On dead herbs, groups of sporangia may cover the vegetation over an area 10 to 20 cm. in diameter.

Physarum connatum Lister. On dead stems of aspens.

Physarum contextum Pers. Infrequent on dead leaves.

Physarum flavicomum Berk. On leaves and sticks in wet swampy thickets.

Physarum leucopus Link. On dead leaves in rich woodland.

Physarum nutans Pers. On dry sticks and dead leaves.

Physarum pulcherripes Peck. On decaying moss-covered log.

Physarum rubiginosum Fries. On mosses and bark of logs.

Physarum sinuosum (Bull.) Weinm. On dead leaves and stems.

Physarum virescens Ditm. On dead leaves and twigs.

Physarum viride (Bull.) Pers. Common on decaying logs.

FAMILY 3. DIDYMIACEAE

Didymium Clavus (Alb. and Schw.) Rabenh. On leaves and twigs, chiefly of herbaceous plants.

Didymium difforme (Pers.) Duby. On dead leaves and sticks under herbaceous thickets.

Didymium melanospermum (Pers.) Macbr. On decomposing plant material.

Didymium squamulosum (Alb. and Schw.) Fries. On leaves and stems, mostly of herbs.

Mucilago spongiosa (Leyss.) Morgan. On stems of living and dead herbs; rare.

FAMILY 4. STEMONITACEAE

Comatricha irregularis Rex. On decaying wood.

Comatricha longa Peck. On decaying logs and stumps.

Comatricha nigra (Pers.) Schroet. On dead logs.

Comatricha pulchella (Bab.) Rost. On dead leaves and stems, mostly of herbaceous plants.

Comatricha typhoides (Bull.) Rost. On decaying wood.

Lamproderma arcyrionema Rost. On dead wood; infrequent.

Lamproderma columbinum (Pers.) Rost. Among mosses on logs and stumps; infrequent.

Lamproderma scintillans (Berk. and Br.) Morgan. On dried leaves and sticks.

Lamproderma violaceum (Fries) Rost. On dead leaves and wood.

Stemonitis axifera (Bull.) Macbr. (*S. ferruginea* Ehrenb.) On stumps and logs; sometimes forming extensive clusters of rusty brown sporangia.

Stemonitis fusca Roth. On decaying wood; frequently covering large areas with purplish brown or almost black sporangia.

Stemonitis hyperopta Meylan. On decaying wood; sporangia small, mostly scattered.

Stemonitis pallida Wing. On decaying sticks and logs; usually the small sporangia are scattered.

Stemonitis splendens Rost. On decaying wood; commonly in large colonies.

FAMILY 5. AMAUROCHAETACEAE

Amaurochaete fuliginosa (Sow.) Macbr. A single large aethalium observed in autumn on a white pine stump.

FAMILY 6. CRIBRARIACEAE

Cribraria argillaceae Pers. On decaying sticks.

Cribraria aurantiaca Schrad. On decaying coniferous logs.

Cribraria intricata Schrad. On decayed wood in hemlock woods.

Cribraria macrocarpa Schrad. On decaying logs and stumps.

Cribraria purpurea Schrad. On dead wood.

Dictydium cancellatum (Batsch.) Macbr. Common on decaying mostly decorticated wood.

FAMILY 7. TUBULINACEAE

Tubifera ferruginosa (Batsch.) Gmel. On dry dead logs and sticks.

FAMILY 8. RETICULARIACEAE

Dictydiaethalium plumbeum (Schum.) Rost. Forming flat, olive brown or grayish brown aethalia on dry wood; observed but once.

Enteridium Rozeanum (Rost.) Wing. On dead wood; frequent.

Reticularia Lycoperdon Bull. On decaying logs; infrequent.

FAMILY 9. LYCOGALACEAE

Lycogala epidendrum (L.) Fries. Common on dead and decaying wood throughout the growing season. The immature aethalia are pink or pinkish gray; with maturity they become yellowish brown, dark brown or almost black, variable in size but seldom exceeding 12 mm. in diameter.

Lycogala flavo-fuscum (Ehrenb.) Rost. Local on dead knots on a living sugar maple tree; also found on a beech log. Observed only in late summer and early autumn. Aethalia silvery gray, up to 6 cm. in diameter.

FAMILY 10. TRICHIACEAE

Hemitrichia clavata (Pers.) Rost. On decaying logs and stumps; from early spring to late autumn. This is perhaps the most common species in the area.

Hemitrichia Serpula (Scop.) Rost. On dead wood; only two collections have been made. The winding golden yellow to light brown sporangia form a net-like plasmodiocarp.

Hemitrichia Vesparium (Batsch.) Macbr. On decaying wood; frequently the clusters of reddish brown sporangia cover considerable areas of the lower surface of decaying logs. Frequently found in association with *Hemitrichia clavata.*

Trichia contorta (Ditm.) Rost. Abundant on moist decaying logs and stumps.

Trichia decipiens (Pers.) Macbr. On decaying logs.

Trichia favoginea (Batsch.) Pers. On inner bark of logs and trunks, especially on hemlock.

Trichia persimilis Karst. On inner bark of logs and stumps. This species and the preceding may persist even through late winter or to the following spring.

Trichia scabra Rost. On decaying logs.

Trichia varia Pers. On decaying logs and stumps.

FAMILY 11. ARCYRIACEAE

Arcyria cinerea (Bull.) Pers. Common on moist decaying logs and stumps of hardwoods; sporangia light gray, scattered.

Arcyria denudata (L.) Wettst. On decaying hardwoods.

Arcyria incarnata Pers. On dead wood and bark of hardwoods.

Arcyria nutans (Bull.) Grev. On decaying decorticated log.

Arcyria Oerstedtii Rost. Locally abundant on a decaying beech log.

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NOTES ON THE EQUILIBRIUM OF TROPICAL AQUARIUM FISHES AND THEIR PERCEPTION OF COLORS *

H. Lou Gibson, A.P.S.A.
Rochester, N. Y.

While determining lighting angles suitable for photographing various common tropical aquarium fishes, it was noticed that the fishes would orient themselves in such a manner as to make the normally horizontal plane through their eyes become perpendicular to the light beam. Subsequent investigation with a focusing flashlight showed that it was possible to cause the fishes to swim with varying degrees of "roll" or "pitch" in accordance with this tendency, depending on the direction of the ray (Figure 1). In the case of one specimen, a red swordtail, it was possible to make the fish swim upside down.

This suggested a means for testing color perception. Wratten filters, Nos. 25 (red), 58 (green), 47 (blue) and 87 (infrared), were placed in turn over the flashlight. The fishes evidenced, by their tilting, the perception of red, green, and blue, but not infrared. Ultraviolet tests were not made.

The experiments were done under dim room lighting (except for the infrared trials as noted below) and the lighting unit over the tank was turned off. The flashlight was focused on a fish from above and then slowly swung around to various angles to induce the reaction. The infrared investigations were carried out in total darkness. The flashlight was aimed into the tank at an angle. After about a minute a light was turned on and the fishes observed immediately. Any fish in line with the flashlight beam was seen to be still swimming upright, indicating lack of effect from infrared radiation.

Apparently the equilibrium mechanisms of the fishes are associated with the optic centers of the brain. A governing factor is probably the equal intensity received in both eyes from natural overhead lighting when the fishes are swimming normally. This cannot be the only factor, however, because fishes swim upright in the dark and a fish that has lost one eye can also maintain normal equilibrium. The author has also noted the tilting response in a red swordtail that had lost an eye in a battle; this suggests that directional imagery in a single eye causes the effect as much as unequal intensities in both eyes. It might be revealing to compare the optic and other equilibrium centers in the brains of blind cave fishes with those of their normal counterparts.

Another fact that was noted is this: the fishes would respond to the

* Read before the Rochester Academy of Science, February 20, 1947. Contribution No. 1 of the Photography Section.

directional flashlight beam even with the lighting unit over the tank turned on. But the flashlight had to be brought very close to the tank so as to make its illumination stronger on a fish than the overhead light. The experimental method was not sufficiently refined to determine whether the fishes aligned themselves to the flashlight ray or to the resultant of the two illuminations. However, the phenomenon suggests a way to plot the quantitative color response of fishes—that of measuring the intensity of monochromatic sources required to offset a constant white illumination.

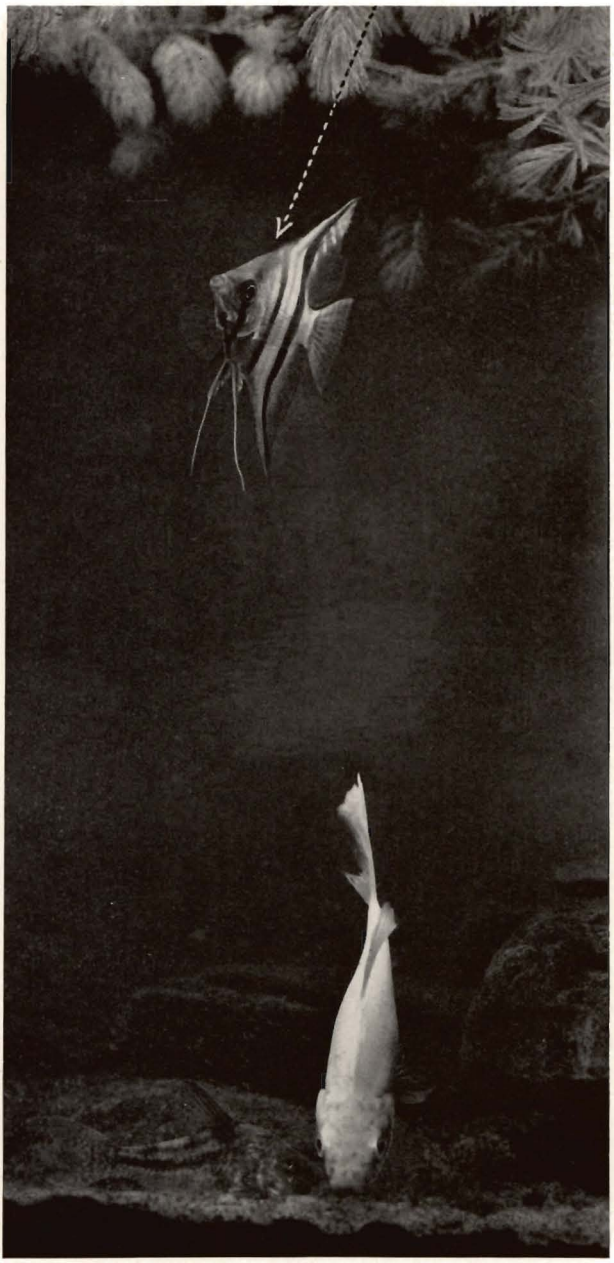

FIGURE 1—Photoflash record of angel fish tilting into beam of light from flashlight. Dotted line shows direction of ray. Note that goldfish at bottom was not in beam and, therefore not influenced by it. (Courtesy of the Journal of the Biological Photographic Association.)

NEWS AND NOTES

The last NEWS AND NOTES were published in the PROCEEDINGS in Volume 8, No. 4, September 10, 1942. To bring the record up to date, the program and activities of the Academy and its Sections since then are reviewed in this issue.

The growth of the Academy's membership during recent years has been substantial. This growth, together with expansion of its activities through the increased number and variety of its working sections, provides ample evidence that the Academy is now playing a role of increasing importance in the scientific life of the community.

Tabulated data of the Academy's enrollment at intervals through the years bring out two interesting points—the low ebb in the mid-thirties, and the present highest peak in membership in the nearly 70 years of the Academy's existence.

January 1,	1890	172
"	1907	53
"	1910	63
"	1915	79
"	1920	179
"	1925	143
"	1930	89
"	1935	48
"	1940	107
"	1945	181
"	1946	365
"	1947	383
April 1,	1948	460

Active drives for membership under the Chairmanship of Mr. David E. Jensen (Chairman of the Committee on Sections and Membership), and for contributions to the Fairchild Memorial Fund, under the direction of Mrs. Harold L. Alling, were initiated on October 16, 1947. It soon became apparent, however, that any effort to augment the Academy's membership should be a perpetual rather than an annual enterprise. Therefore, the membership drive, originally scheduled to end on October 31, 1947, has been extended indefinitely to serve as a continuing stimulus for promoting the activities of the Academy. The drive so far has resulted in the addition of more than 100 new members, including 5 Life Members, though the net gain in membership to April 1, 1948 was 77 members as a result of normal annual loss through death and resignations, and the elimination of the names of individuals who had not paid dues during the past 3 years. Most of the loss in the latter category was due to the moving of former members to other communities. However, more than 50 members do, in fact, live outside Rochester, mostly in nearby communities, with 7 members outside of New York State.

The formation of new working sections within the past 4 years has been a most effective factor in the growth of the Academy. In 1942, there were but 3 active sections: Botany, Minerology, and Research. The latter became inactive in 1943. Since 1942, the Rochester Astronomy Club and the Genesee Ornithological Society became affiliated as Sections of the Academy, and Sections for Photography, Weather Science (Meteorology), Entomology, Physical Anthropology, and a second Section for Botany have been established—a total of 9 Sections in all. A summary of their activities is presented on pages 147 to 153.

The officers of the Academy from 1943 to 1947 inclusive were as follows: President, Prof. Floyd C. Fairbanks (1943–1945); Prof. Sherman C. Bishop (1946–1947); Vice-President, Dr. Dean L. Gamble (1943–1945); Dr. Gordon M. Mead (1945–1946);

Dr. Robert L. Roudabush (1947); Secretary, Milroy N. Stewart; Treasurer, George Wendt (1943–1944); William S. Cornwell (1945–1947); Assistant Treasurer, William S. Cornwell (1943–1944); Corresponding Secretary, Mrs. David E. Jensen (1945–1947).

Elected Councillors were as follows: William S. Cornwell (1943); W. L. G. Edson (1943–1944); Prof. Sherman C. Bishop (1943–1944); Dr. Gordon M. Meade (1943–1944); Melissa E. Bingeman (1943–1945); Dr. F. W. C. Meyer (1943–1945); Dr. Arthur C. Parker (1943–1945); E. G. Foster (1943–1947); Dr. Dean L. Gamble (1945–1947); Dr. Robert L. Roudabush (1945–1947); Paul Davis (1946–1947); Mrs. Harold L. Alling (1946–1947); and Clarence W. Carroll (1946–1947).

THE FAIRCHILD MEMORIAL FUND

On June 25, 1946, the capital funds of the Academy were given the name, Fairchild Memorial Fund, in honor of the late Professor Herman Le Roy Fairchild, President of the Academy for 12 years (1889–1901) and for many years, until his death in 1942, Patron of the Academy. The earnings of this Fund may be used at the discretion of the Council to defray publication expenses, or any other suitable academic purpose. The Publication Account of the Academy is part of this Fund and into it are paid $1.00 of the annual dues of each active member, not less than half of payments for Life Membership, all voluntary contributions, the earnings from investments, and the receipts from the sale of publications. From time to time surpluses over and above current publication needs are permanently invested in bonds considered suitable as security for trust funds. These investments are recommended to the Council by the Finance Committee of which Mr. George Wendt is Chairman. On January 16, 1948, the invested portion of this Fund totaled $5,853.00. It is hoped that the Fund may be rapidly augmented by contributions from individuals and from industrial and other organizations so that the income from the Fund will eventually be sufficient for basic publication needs and permit the granting of scholarships or prizes to stimulate and reward individual research and other contributions to science.

REVISION OF CONSTITUTION AND BY-LAWS

After more than a year's thoughtful consideration, with hard work by the Council and a special committee headed by Milroy N. Stewart, a revised Constitution and a new set of By-Laws were presented for the approval of the Academy's membership in 1946. By February 1, 1947 all amendments were in effect.

The principal change in the Constitution was the reduction in size of the unwieldy Council so that it now consists of the five constitutional officers, six elected councillors, and the chairman of each section. Previously, the recorder of each section was also a member.

In the By-Laws, the status of the various classes of membership has been clarified, and the duties of the various officers redefined. A radical change was made in the election procedure. The By-Laws now provide for balloting by mail on a number of candidates to be nominated several months before election. The officers chosen in January will take office in June.

The agreements with the University of Rochester pertaining to its use and care of the Academy's library and herbarium have been published as appendices to the By-Laws.

THE GENERAL LECTURE PROGRAM

The Academy holds regular meetings on the third Thursday of each month from October through May. The following is a summary of the meetings from October, 1942 through December, 1947. For economy of space, the speaker and the title of his

address are given. Only the Fairchild Memorial Lectures, presented every other year, will be described in detail. Unless otherwise stated the speaker was affiliated with some Rochester institution and the meetings were held in the Rochester Museum of Arts and Sciences.

October 15, 1942. J. Franklin Bonner: Natural Vegetation Studies in Monroe County.

November 19, 1942. Dr. Gordon M. Meade: Diseases of Wild Birds.

December 7, 1942. Dr. Clyde Fisher, Director of the Hayden Planetarium: Meteors.

January 21, 1943. T. Lyle Keith: Kodachrome Photographs of New York State Wild Flowers.

February 11, 1943. Prof. Sherman C. Bishop: Spiders and Spiderwebs.

March 18, 1943. Dr. Don R. Charles: Inheritance of Size.

May 1, 1943. Dr. Ralph Linton, Department of Anthropology, Columbia University, in a joint meeting with Morgan Chapter, New York State Archeological Society: How Civilizations Grow.

October 21, 1943. Dr. Ralph Evans: Visual Processes and Color Photography. (Sponsored by the Photography Section.)

November 18, 1943. Herbert Mermagen: Demonstration of 1,000,000-volt X-ray apparatus at the Industrial X-ray Laboratory of the University of Rochester.

December 3, 1943. Prof. Bart Bok, Harvard University: The Milky Way. (Sponsored by the Astronomy Section).

January 20, 1944. Dr. Elliot E. Stauffer: Orchids and Associated Bog Flora of the Northeastern States. (Sponsored by the Botany Section).

February 17, 1944. First Fairchild Memorial Lecture. Prof. J. Edward Hoffmeister: The Nature of the Ocean Bottom. (Sponsored by the Mineralogy Section).

Around each continent is a terrace, extending out some 200 miles. This usually consists of a gently sloping shelf with a more abrupt slope at its outer edge. Many canyons of great depth—perhaps 5,000 feet—are cut in this slope. They often do not line up with existing river mouths and their cause is the subject of much discussion. Many believe that they were cut when the sea level was several thousand feet lower than at present.

In the center of the Atlantic Ocean there is a great ridge running North and South nearly its entire length. It is called the "Dolphin" ridge. The deepest parts of the seas on the other hand are in the Pacific Ocean—35,000 feet near the Philippine Islands.

The material found on the continental shelves is erosional sediment, with blue mud on the slopes farthest from dry land. Beyond these slopes are oozes derived from diatoms, radiolarians, and similar marine organisms. In the deeps of the seas there is a red clay containing volcanic ash.

It is deduced from cores of material obtained from the ocean bottom that there have been alternating eras of warmth with an abundance of life in the sea, and eras when glaciers pushed down from the North and halted the deposition of debris from animal life. In comparatively recent times there have been active volcanoes in the Atlantic area.

March 16, 1944. Dr. Robert Galambos: How Bats Fly by Night.

April 20, 1944. Donald Hines and Lt. Fred Bryan: Demonstration of Methods of Blood Collection and Transfusion.

May 18, 1944. A demonstration of the animals at the Rochester Seneca Park Zoo. Fred Strassle, Curator, described the larger animals. Prof. Sherman C. Bishop displayed and discussed the turtles. Dr. Hobart Smith exhibited a coati-mundi. William S. Cornwell discussed the various primates.

October 10, 1944. Dr. Charles C. Abbott, retired Secretary of the Smithsonian Institution: Solar Radiation and the Weather. Joint Meeting with the American Optical Society.

November 14, 1944. Dr. E. F. Phillips, Department of Entomology, Cornell University: The Life of the Honeybee.

November 28, 1944. Lt. E. F. Carpenter, Director of Steward Observatory, Tucson, Arizona: Properties of Double and Multiple Galaxies. (Sponsored by the Astronomy Section).

January 25, 1945. Walter Schoonmaker, New York State Museum: Wild Life Photography. (Sponsored by the Photography Section).

February 15, 1945. Dr. George B. Cressey, Syracuse University: Report from Asia.

March 15, 1945. Dr. Arthur C. Parker: The Story of the Genesee.

April 14, 1945. Dr. Wilton Krogman, Department of Anatomy, University of Chicago: The Physical Anthropologist as a Crime Detective. Joint meeting with the Morgan Chapter, New York State Archeological Association.

May 17, 1945. Prof. J. Edward Hoffmeister: Landing Problems in the Pacific. A reception in honor of Professor Floyd C. Fairbanks, President of the Academy, followed the lecture.

October 18, 1945. Hal Harrison, Tarentum, Pa.: Kodachrome Photographs of Wild Birds and Flowers, Joint Meeting with the Burroughs Audubon Society and the Hawkeye Camera Club. (Sponsored by the Photography Section.)

November 15, 1945. Dr. Kenneth Hickman: The Romance of Vitamin E.

December 4, 1945. Dr. Gerhard Dessauer: Nuclear Physics. Strong Auditorium, River Campus, University of Rochester.

January 17, 1946. Dr. Paul B. Sears, Department of Botany, Oberlin College: Fossil Pollen and the Climatic Record. (Sponsored by the Botany Section).

February 1, 1946. Prof. Arthur Allen: Nesting Birds. Joint meeting with the Rochester Garden Center. Strong Auditorium, River Campus, University of Rochester.

February 21, 1946. Prof. George P. Berry: Viruses.

March 21, 1946. Emil Raab: Rochester's Climate. (Sponsored by the Weather Science Section).

April 18, 1946. Dr. John Q. Stewart, Princeton University: Solar Eclipses. (Sponsored by the Astonomy Section).

May 16, 1946. The Second Fairchild Memorial Lecture. Professor O. D. Von Engelen, Department of Geology, Cornell University: The Finger Lakes, East; the Finger Lakes, West. (Sponsored by the Mineralogy Section).

There have been two theories about the origin of these lakes. The one to which Prof. Fairchild adhered was proposed by Prof. Playfair; it maintains the supremacy of rivers as valley-makers. The second, proposed by Prof. Davis and followed by Gilbert, Tarr and the speaker, emphasizes the erosional power of glaciers and maintains that they were competent to have produced the Finger Lake valleys. Prof. Von Engeln proposed to reconcile these views.

Whereas it was Prof. Fairchild's opinion that the deep channels which now contain the Finger Lakes were once the valleys of north-flowing rivers, tributary to the Ontarian River, which was the predecessor of Lake Ontario and that they were merely scoured out by the glacier, it is Prof. Von Engeln's belief that these were only small streams before the coming of the ice and that deepening to their present level was accomplished by the glacier.

In support of his opinion, Prof. Von Engeln presented the following considerations: (1) The runoff would not have supported so many large parallel rivers as close together as is called for by Prof. Fairchild's theory of North-Flowing rivers throughout New York State, especially those flowing through the Cayuga and Seneca Valleys. (2) The dendritic pattern of drainage of the upper Delaware and Susquehanna is that which is characteristic of the southern side of the original divide and not greatly affected by the ice. (3) Rivers flowing north from this divide cut deeper and faster than those flowing south because they could cut across the ends of up-tilted strata and did not have many folds of contorted strata to contend with. (4) The ice, pushing into funnel-shaped valleys opening to the north, was accelerated as it progressed and its abrasive power was increased; this sufficed to make the valleys deeper at their southern ends. (5) "Hanging Valleys", which are a problem to a river-origin theory, are a natural corollary to the glacier-origin theory, for they denote the presence of secondary glaciers at the side of the main ice sheet. (6) "Through" valleys can be accounted for by overflow of water impounded ahead of the advancing ice and by the action of the glacier in deepening such valleys.

Prof. Von Engeln believes that the western lakes—Conesus, Hemlock, Canadice, Honeoye, Keuka and Canandaigua were not deeply excavated by the ice because the original divide here swung to the north, whereas to the east the glacier worked under more favorable conditions with the result that much wider and deeper valleys were there created. He estimates that the maximum ice thickness was about 3,000 feet.

There was a dramatic conclusion to the lecture when, during the subsequent question period, an individual in the employ of one of the public utility companies reported data obtained by drilling for natural gas at various points in the area under consideration. He stated that drillings just north of Geneva showed that the rock level at the bottom of the valley filling there was by no means low enough to check with the demands of Prof. Fairchild's theory of north-flowing rivers, it being only about 250 feet.

October 11 1946. Charles E. Mohr, Philadelphia Academy of Natural Sciences: Photographing Nature. Joint meeting with Burroughs Audubon Nature Club and the Hawkeye Camera Club. (Sponsored by the Photography Section.)

November 21, 1946. Dr. Ben V. Meed, Associate Director of the Royal Ontario Museum of Toronto, Canada: Mineral Collecting in the Maritime Provinces. (Sponsored by Mineralogy Section).

December 19, 1946. Dr. Walter Roberts: The Solar Corona. (Sponsored by the Astronomy Section).

January 16, 1947. Dr. George M. Sutton, Department of Zoology, University of Michigan, Ann Arbor: Birds of Northeastern Mexico. (Sponsored by the Ornithology Section).

February 20, 1947. Original Papers and Demonstrations. (1) Dr. Gordon Meade and Fred Hall: The 1945–46 Snowy Owl Invasion of New York State; (2) Dr. Robert Bugbee: Parasitic Insects of Rose Galls; (3) Clarence Carroll: Beekeeping; (4) H. L. Gibson: Behavior Response of Tropical Fish to Directional Lighting; Color Changes in Goldbug; (5) William S. Cornwell: Hybrid Primates.

March 20, 1947. Dr. F. C. Steward: Hunting Valonia in the Dry Tortugas (Sponsored by the Botany Section).

April 17, 1947. Original Papers and Demonstrations. (1) Dr. W. F. Jenks: Ore Deposition in Southern Peru; (2) Paul W. Stevens: Giacobini-Zinner Comet seen October 9, 1946; (3) Dr. Robert L. Roudabush: Making Bio-plastics.

May 15, 1947. Dr. Elliott Maynard: Entomology—Hobby, Profession and Science. (Sponsored by the Entomology Section).

October 16, 1947. Dr. Edward T. Boardman: Photographic Records of a Naturalist (Sponsored by the Photography Section).

November 20, 1947. Prof. Sherman C. Bishop: The Lives of the Salamanders.

December 18, 1947. Dr. Carl C. Gartlein, Cornell University: The Aurora Borealis (Sponsored by the Astronomy Section).

"EXCURSIONS IN SCIENCE"

Junior Science

Early in 1946 the Academy was instrumental in organizing the scientific groups of Rochester to aid young people in their understanding of science, its recent advances, and the opportunities which scientific work offers as a vocation. The outcome of the planning was a program called "Excursions in Science." Students and teachers of Monroe County High Schools were all invited to attend the monthly meetings which were held at various places.

The first meeting included a program on optics, in which the Bausch and Lomb Optical Company, the Optical Society of America, and the Rochester Museum of Arts and Sciences cooperated.

Mr. Arthur Schoen, at the second meeting, discussed the electronic microscope and its application to science and industry.

The third program, conducted by Mr. Robert Titus, included the history of the microscope and some modern industrial applications of microscopic methods to trace production difficulties, especially in the manufacture of photographic film.

The Rochester Technical Section of the Photograhic Society of America furnished as a speaker for the fourth meeting Mr. Adrian Terlouw who discussed the vocational opportunities in the field of photography.

Plastics, at present a popular subject, were discussed and demonstrated by Mr. Gordon Hiatt in a program sponsored by the Rochester Section of the American Chemical Society.

"Excursions in Science" is still in a period of development, but in its first year the programs have been well attended and have met with the approval of those participating.

The following groups have representatives on the central committee which is sponsoring "Excursions in Science:" American Chemical Society, Burrough's Audubon Society, Optical Society of America, Photographic Society of America, Rochester Academy of Science, Rochester Chamber of Commerce, Rochester Engineering Society, Rochester High Schools, Rochester Institute of Technology, Rochester Junior Chamber of Commerce, Rochester Museum of Arts and Sciences, Rochester Park Bureau and the University of Rochester.

THE SECTIONS *

Botany A

During the 4 year period—1943–1947—the Section's officers were Dr. Grace A. B. Carter, *Chairman,* and Mrs. Josephine Z. Edson, *Recorder.* The regular meeting place was the Academy's room, Eastman Building, Prince Street Campus, University of Rochester, first and third Monday of each month.

1943—The emphasis was study of herbarium specimens from the Academy Herbarium and from the herbariums of various members. Orchids, trilliums and ferns from the Milton S. Baxter collection were examined as were also sheets from the herbarium of the Burroughs-Audubon Nature Club. Material was presented on the use of goldenrod in the manufacture of rubber, and studies were conducted on local wild grasses.

1944—The Section held a few short-distance field trips and continued its study of the Baxter collection of orchids and ferns. Several interesting specimens were brought in by members for special study including an unusual grass, *Elymus virginicus,* var. *hirsutiglumis* from North Bloomfield, N. Y. by Mr. Warren A. Matthews, and a herbarium specimen of the Heart-leaved Golden Alexander, *Zizie cordata* by Mrs. Edson. This specimen was collected at Honeoye Lake, Ontario County, the only known station for the plant in this locality.

1945—Several plants new to Monroe County were listed by the Section: *Salix candida* var. *denudata; Cyperus erythrorhizos; Carex molesta; Carex Billingsii; Polygala verticillata* var. *isocycla; Panicum lanuginosum* var. *Lindheimeri; Panicum sphaerocarpon; Aspidium Thelypteris* var. *pubescens; Ambrosia trifida; Sporobolus vaginiflorus; Aster puniceus* var. *lucidulus.* Many introduced plants found included: *Linaria Dalmatica; Linaria Macedonica; Symphoricarpos racemosus* var. *laevigatus; Oxybanthus floribundus; Centaurea Jacea; Carduus acenthoides; Alliaria officinalis; Digitalis lutea; Sanguisorba minor.* Several stations were also reported for plants not seen for several years. As a result of careful study by Miss Lillian Chadsey the goldenrod, always accepted here as *Solidago caesia,* seems now to be *S. c.* var. *axillaris.*

The Section lost by death, October 12, 1945, Mr. Fred S. Boughton, throughout all the latter years of his life a faithful and enthusiastic member.

1946—A study was made of hickories (*Carya*), Blackberries (*Burus*) and Currants (*Ribes*) and a portion of one meeting was devoted to a discussion of poison ivy

* EDITOR'S NOTE: To conserve space, only the general subject matter in the programs of the Sections are listed, except where the presentation was by an invited guest outside the Section. With some Sections this procedure also avoids the frequent repetition of the name of members.

(*Rhus toxicodendron*), its characteristics, and the prevention and cure of its effects. Several new or interesting plants were reported: *Euphorbia Esula; Sedum Telephium; Solidago graminifolia* var. *Nuttallii; Ilex verticillata.* During the growing season fresh plants were collected and studied while during the fall and winter twigs and shrubs were brought in and identified by means of twig keys. A plant survey of Monroe County was planned.

1947—At the invitation of Dr. F. C. Stewart, The Section held the first meeting of each month at the Herbarium Room, River Campus. Particular study was made of *Epiloliums, Oenotheras, Pinaceae,* and *Polypodiaceae.* Mr. Matthews reported the following plants: *Carya varia; Scirpus planifolius; Antennaria fallax; Samolus floribundus; Aster Acuminatus.* Mrs. George Reed reported Strawberry raspberry (*Rubus illecebrosus*) and Red Dead Nettle (*Lamium purpureum*) from Honeoye. Mr. and Mrs. Edson reported new stations for Cardinal Flower (*Lobelia cardinalis*) and Bottle Gentian (*Gentiana andrewsii*) in the elm swamp on Brook Road.

Mineralogy

Between 1943 and 1947 the Section had the following officers: Chairman—Robert C. Vance (1943–1946), Charles W. Foster (1947); Recorder—David E. Jensen (1943–1946), Walter H. Wright (1947); Treasurer—George R. Costich (1943, 1946, 1947), Albert Marble (1944, 1945); Chairman of Committee on Mineral Locations in Monroe County—Edwin G. Foster (1943–1945), David E. Jensen (1946–1947); Chairman of Program Committee—Charles W. Foster (1943–1946), John McMasters (1947). The regular meetings are held the second Thursday of each month (October–May) at the Rochester Museum of Arts and Sciences.

1943—The 9 meetings featured programs devoted to quartz; calcite; minerals and money; micromounts; the geology of Irondequoit Bay; and the minerals of Italy, Brazil and Mexico. The collection of Monroe County minerals and the Geologic map of Monroe County assembled by the Committee on Mineral Locations was housed in the Museum and were placed on display in the Geology alcove. The Section became affiliated with Rocks and Minerals Association.

1944—There were 8 meetings with programs devoted to nickel mining; the mineral resources of Arizona; fluorescence; new developments in strategic war materials; mica and its applications; lead mining in Missouri; the origin of the Earth and its age; the new Dana system of Mineralogy; diamonds and volcanic activity. The collection of local minerals housed in the Museum were catalogued and indexed.

1945—The principle activity was the 8 regular meetings the programs of which included discussions on quartz geodes; geologic faulting; water, minerals formed by water; factors in determining the values of fine mineral specimens; an introduction to mineralogic literature; the hardness and tenacity of minerals; the cleavage parting and fracture of minerals; some famous mineral localities; and a symposium on opals.

1946—The programs of the 8 meetings considered the specific gravity of minerals; uranium minerals and the atomic bomb; luster, color, and color streak; physical properties of minerals depending upon light; Devonian fossils and fossil-collecting in Livingston County; fluorescence; the geology of the Gouverneur Region, a visit to the mineral collection of Mr. and Mrs. H. B. Hanley; garnets and their varieties; mineral nomenclature; pseudomorphs or the masquerading of minerals. On May 18 members collected fossils in the vicinity of York under the leadership of Milroy N. Stewart and visited the talc, zinc and iron mines of St. Lawrence County on June 15

and 16 and the mineral collection of Ward's Natural Science Establishment on September 29.

1947—The Section held 8 meetings and 4 field trips. The former featured talks and demonstrations on the enhancement of mineral specimens; gold prospecting in northwest Ontario; crystallography and the making of X1 models; tourmaline; fluorescence and phosphorescence; lapidary activities. June 14 the Section visited Ward's Natural Science Establishment to study type minerals of Ontario. On July 4–6 the Section held a joint expedition with the Walker Mineralogy Club of Toronto and did extensive collecting at various mine dumps and locations around Bancroft and Madoc, Ontario, Canada. Several members spent the day on August 9 with Mr. Charles Foster hunting septaria on his property at Canandaigua Lake. The Genesee Feldspar Plant on Boxart Street, Rochester was visited by the Section on September 13.

Photography

The section was first organized on February 24, 1943. The officers from 1943 to 1947 have been as follows: Chairman—H. Lou Gibson (1943–1945), Charles S. Foster (1946); John J. Beiter (1947); Recorder—Mrs. David E. Jensen (1943–1945); Treasurer—Ann Slater (1944–1945); Recorder and Treasurer—John J. Beiter (1946), Barbara Ann White (1947), Chairman, Program Committee—C. S. Foster (1943–1946), H. Lou Gibson (1947). Meetings are held the fourth Thursday each month, except in the Summer, at the Rochester Museum of Arts and Sciences.

1943—There were 8 meetings of the Section with the program featuring discussions and demonstrations on the technic of close-up photography; penetrating natural camouflage with photographic contrasts; artistic requirements of scientific photography (Mr. Walter Meyers, noted pictorialist as guest critic); a report on the Fifth International Salon of Nature Photography at Buffalo; a demonstration of lighting; a field trip to Irondequoit Bay; an exhibit at the Gas and Electric Company; and other subjects.

1944—The first meeting was held jointly with the Rochester Aquarium Society and featured a demonstration on photographing live tropical fish in color. This was followed by meetings devoted to subjects that included the use of colored backgrounds for medical photography; photographing hummingbirds; a motion picture on beekeeping; the use of photography in the Psychology Department; and photographing wild flowers in color.

1945—The meetings during this year featured the following: demonstration of depth of field; superior commercial photographs; medical photography; the color photography of Rochester's Parks; composition in nature photography; the use of Kodachrome nature slides in religious presentation. A picnic supper was held July 1 at the home of Mr. and Mrs. Jensen to honor Miss Ann Slater then leaving for Turkey to teach general science.

1946—The lecture programs and work sessions included presentations and discussions of color photography of flowers and other nature subjects; illustrated nature lectures available to camera clubs and similar groups; problems in color photography; depth of field; photographing insects; and beekeeping

1947—This year's meetings saw the return of some previously discussed subjects as well as new ones and included color photography of flowers and shrubs in the Rochester Parks; photography of wild flowers; methods for lighting specimens; bee-

keeping; focal length of lenses; time lapse cinematography; movies of the 1945 solar eclipse; and a motion picture on the West.

Astronomy

This Section was organized with 22 members on May 31, 1945. Mr. Paul Stevens was elected Chairman and Mr. Merlin L. Groff, recorder, respectively. It was decided to hold regular meetings the first Friday of the month from October through May.

1945—There were 3 lectures on the subjects of optical lenses and prisms, photography of the sun and moon, and eclipses of the sun and moon. Two observation sessions were also held to observe the 3-cornered conjunction of the moon, Mars and Saturn on Oct. 26 and Nov. 23 and one session to observe the total eclipse of the moon on Dec. 18.

1946—Messrs. Stevens and Groff continued as officers. There were 6 regular meetings with discussions of the Giacobini-Zinner meteorite shower, the portrait eclipse of the sun (Nov. 23), clouds in motion; photography of the sun and radio (a review of lecture before Rochester Technical Section of the Photographic Society of America by Dr. Donald Menzee), and variable stars. Observational meetings were held to note the seasonal status of the heavens and the portrait eclipse of the sun. Prof. John Evans of the University of Rochester discussed the atmosphere of the sun at the Jan. 4 meeting.

1947—Mr. Mark C. Caulkins became Chairman and Mr. E. M. Root was elected recorder at the May meeting. Presentations by members at regular meetings included discussion of the satellites of Jupiter, the apparent coincidence of the conjunction of Jupiter and the sun at the times of the sun's eclipse cycles, celestial navigation, and the astronomical experiences of an instructor in the army's training program in England. Invited lecturers spoke at 3 regular meetings: Feb. 8—Mr. W. F. Swann, Eastman Kodak Co., sun spots and the aurora borealis; Mar. 7—Mr. H. W. Southgate, Rochester Democrat and Chronicle, random thoughts on stars; May 2—Dr. Henry E. Paul, Norwich, N. Y., development of the Schmidt camera. There were 4 observational meetings.

Weather Science

The organization meeting of this Section was held September 20, 1945 in the Rochester Museum of Arts and Sciences. Mr. Emil A. P. Raab was elected chairman and Mr. Oscar Westgate as recorder. During 1945 and 1946 meetings were held the first and third Thursdays at Anderson Hall, Prince Street Campus. Subsequently, during 1947, the Section met on the first Thursday of each month from October through May.

1945—The lecture series included discussions of the circulation of the air, clouds, radiosonics, weather maps, secondary circulation of air, and reviews of the books, "Snow Crystals" by Bentley and "Storm" by Stewart.

1946—Continuing the lecture series, the topics presented were as follows: solar radiation, insulation and its effects, fog, specialized forecasts, radar and weather, weather proverbs. Mr. H. R. Condit showed color movies of clouds in motion. An exhibit of meterological instruments was prepared by and a discussion of the manufacture, testing and calibrating of thermometers, barometers and similar apparatus

was presented by Milroy N. Stewart. The Section visited the Rochester Weather Bureau on two occasions. Mrs. Dorothy Warren was recorder.

1947—The Section's activities featured a joint meeting with the Astronomy Section; the topics discussed were the aurora and sun spots. Other lecture topics during the year included weather and industry and weather observations in the Army and Navy weather services. Mr. Raab asked that he be relieved as chairman. This request was accepted reluctantly and John Williams was elected in his place, with Mrs. Warren as recorder. Mr. Raab was elected as permanent honorary chairman.

Ornithology

The Genesee Ornithological Section became the Ornithology Section on March 21, 1946. Officers through 1947 were: Dr. Gordon M. Meade, president; Fred Raetz, vice-president; Albert Bussewitz, secretary; and Leo Tanghe, treasurer, the president and secretary functioning as chairman and recorder, respectively, of the Section.

Since its affiliation with the Academy, the Genesee Ornithological Society has continued to promote its original purpose as expressed in its constitution: "to further the scientific study of birds, to promote conservation of wild life, and to give encouragement and assistance to persons who desire to extend their knowledge of birds."

Meetings are held on the second Wednesday of each month, except July and August, in the Rochester Museum of Arts and Sciences. Programs are varied to suit the seasons. They provide for reports of observations by members and general informal exchange of experiences and information, and include talks and papers on ornithological subjects by members as well as by authorities from outside the membership. Outstanding speakers heard by the Society since its affiliation with the Academy of Science have been W. Stephen Thomas on "The Birds of Northern Chili;" William Dilger on "Birds of India and Burma;" Fred T. Hall on "Birding in Bermuda;" Dirck Benson of the New York State Conservation Commission on "Ducks of Western New York;" Dr. Robert Bugbee on "Bird-Insect Relationships;" Dr. Edward T. Boardman on "Birds of the Marsh." Dick Bird of Regina, Saskatchewan, showed his outstanding color motion picture, "Birds of the Canadian Prairie," at the February, 1947 meeting, and in the fall of 1947 Mr. Bird's second appearance in Rochester was at an open meeting in the Rochester Museum, sponsored by the Society.

Aside from its regular meetings, the Society's activities include at least one field trip each month, an Annual Spring Bird Census in May, the annual Christmas Census in December, in cooperation with the National Association of Audubon Societies, and a Breeding Bird Census which records all breeding and nesting data observed by members in the area during the season.

The 1946 Spring Census, held on May 17, recorded a total of 165 species seen in the one day, and for the 1947 Census, held on May 16, observers turned in a total of 168 species. The 1946 Christmas Census, made on December 22, yielded a total of 63 species, including a number whose winter presence in this area is exceptionally unusual, such as the Northern Yellowthroat, Blackburnian Warbler, Myrtle Warbler, Greater and Hoary Redpolls. The 1947 Christmas Census, taken on December 21, yielded 68 species and revealed an interesting comparative scarcity both of the northern finches and wintering warblers which also was characteristic of the 1946 count.

The Breeding Bird Census, which endeavors to establish positive records of all birds nesting in Monroe County, was initiated in 1946 and during that season 73 species were observed actually nesting. Thirty-three additional species were assumed to have bred in the area on such circumstantial evidence as the presence of singing males throughout the breeding season, and observation of fully fledged young of the year.

The 1947 count yielded a total of 73 species nesting, of which 67 species were observed actually at the nest or feeding the young. These observations raised the total of species actually seen nesting in the area to 84 during the two-year period.

Careful records are kept of all observations. This work is in charge of a statistical committee, Allan Klonick, chairman, and is entrusted with the careful compilation and correlation of these records in such manner as to be of greatest value in the extension of our knowledge of the avifauna of the area.

A complete checklist of the birds of Monroe County has been compiled by Ambrose Secker and it is expected that this will be published within a short time. In January, 1948 the Society began publication of a bi-monthly official organ called The Goshawk, under the editorship of Albert Bussewitz; the first two issues are now in circulation. Furnished free to members of the Society, it endeavors to cover all happenings of interest to local bird students. It is available to non-members at $1.00 a year.

Entomology

After an interim of more than 6 years, a group of Academy members interested in entomology met in the Academy's room, Eastman Building, Prince Street Campus, University of Rochester on April 8, 1946 and voted to re-organize an Entomology Section. Dr. R. E. Bugbee was elected Chairman, and Frank C. Fletcher, Recorder. On April 23, Mrs. John Spence was elected Treasurer, and William L. Downs, Curator. An assessment of 50 cents per quarter year for purchase of equipment was agreed upon. It was decided to hold meetings twice monthly and to conduct field trips. In November, 1947 Dr. Edward T. Boardman was elected Chairman and Elisabeth Keiper, Recorder.

During 1946 and 1947, the program sessions were interspersed with work sessions at which insects were identified and mounted. The programs included discussions by members on the making of insect collections, the orders of insects, garden insects and their control, dragonflies, galls and gall-making insects, wasps, primitive insects, and mosquitoes and disease. Guest speakers and their topics were Dr. Curt Stern on "The Role of Insects, especially Drosophila, in Genetic Research," and A. Gordon Dye on "The Life of the Hive." The discussion of primitive insects by Mr. Downs especially emphasized the collembola to which he has devoted eight years study. The presentation of wasps and their habits by Mr. Ross Phillips features his very noteworthy collection of pastel drawings of various species. These were later exhibited at the Rochester Museum of Arts and Sciences.

The Section also sponsored on November 25, 1947, a public showing of the 16 mm. colored motion picture on the life cycle of the Japanese beetle and methods of control produced by New York State. Field trips were conducted to Ward's Natural Science Establishment, Mendon Ponds Park and Bergen Swamp.

Botany B

The section was formally organized on January 15, 1947 at a meeting held in the Eastman Building, Prince Street Campus, University of Rochester. The organization was the culmination of a series of informal meetings during the war years largely under the leadership of Dr. Richard Goodwin. Particularly notable among these meetings was a field trip to the oak openings near Rush, N. Y. The officers elected were Dr. Robert Erickson, *Chairman,* and Dr. Robert E. Stauffer, *Recorder.* Regular section meetings are held the third Wednesday of each month, except during the summer months, at the Eastman Building.

The lecture program of the section included discussions of the floral elements of the Ozark Mountains; an ecologic study of South Haven Peninsula near Bournemouth, England; epiphytic flora of New York State; broadleaf deciduous forests of the Pacific Northwest; mint plants and their use in flavoring oils; plants and plant associations of Pemaquid Point nad Mount Desert Island, Maine. Members undertook to keep phenological records for Monroe County. Two field trips were held (1) to Sullivan's Woods on May 17, and (2) to Limerock on June 7.

Physical Anthropology

This latest Section held its organization meeting December 19, 1947 at the Rochester Museum of Arts and Sciences. However, it did not become formally associated with the Academy until February 10, 1948, hence its activities will not be reported until the next issue of News and Notes. Its meetings are held the fourth Friday of each month (September–May) at the University of Rochester School of Medicine and Dentistry.

ROCHESTER ACADEMY OF SCIENCE

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(corrected to June 1, 1948)

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