

small bird was hidden somewhere among their tops. Suddenly he came into full view, and the morning sun flashed upon the gorgeous orange throat patch of the Blackburnian Warbler. A meeting with this animate gem is about worth a journey to the north woods.

Farther up the road by a clump of hackmatacks we were stopped one day by a low sweet song resembling that of the Purple Finch, but more Robin-like. Investigation revealed our old red-coated friend of the white winter landscape, the Pine Grosbeak. 'Tis true the books tell us he breeds in the far north; but here in the cool Nova Scotia woods we met him and his sober-colored mate, and day after day we listened to his dreamy love song.

By the green alder thicket near the brook we paused to hear the ringing cadence of the Veery; while farther on, where the road wound by open pasture lands, the mellow golden notes of the Hermit Thrush vied with the clear sweet whistle of the White-throat.

But now the chill nights of late summer were

beginning to weave white mist veils over the sleeping bosom of the lake. The clematis and fire-weed were donning their soft down, and in the open the roadsides were becoming gorgeous in golden-rod and aster. The Warblers and Vireos had ceased their songs of love and were joining the ranks of Chickadees, Kinglets and Sparrows. Already faint voices floating down from the starlit sky told that the great southward movement had begun.

For us, too, came the parting from our summer home, and thoughtfully we looked into that last evening's camp fire. The lake lay like a mirror. Three Black Ducks, circling over the islands, settled above our camp, and swimming down by us left long ripples in its glassy surface. A Blue Heron arose from his fishing in the cove above and flapped lazily away toward the setting sun. Gradually the red in the sky and lake changed to gray; and as the stars came out one by one all was still, save the voice of the distant river and deep, deep bass of the old green frog down among his pickerel weeds.

MYXOMYCETES OF THE LAKE NIPIGON DISTRICT

By F. B. ADAMSTONE, B.A.

DURING July and August of the past-summer (1921), while engaged in limnobiological research on Lake Nipigon the writer spent odd moments making a collection of Myxomycetes or slime molds in the surrounding district.

The region about Lake Nipigon is a very rugged hilly country, most of which is quite densely wooded. Among the hills there are numerous small lakes and streams. The forest is composed largely of balsam, spruce, poplar and birch. It is the last of these, in the form of old stumps and rotting logs, which seems to be the favorite substratum for Myxomycetes, but almost any organic material will serve the purpose. No specimens of slime molds were seen until after the middle of July when the prolonged hot weather was interrupted by rainstorms. Thereafter, when rambling through the woods turning over logs and examining stumps, one was almost certain to come upon some, either in the gelatinous plasmodial stage, or in the form of delicate lacy fruiting bodies. The extraordinary life history of these organisms makes them particularly interesting from a biological point of view.

When the ripe fruiting body is shaken or disturbed, a minute cloud of dust-like particles floats away from it. This consists of the spores of

the Myxomycete. Should the spores fall upon a suitable medium, they germinate, and from each a small naked droplet of protoplasm escapes. These droplets are usually provided with one or more delicate cilia, by the motions of which they are propelled about in the liquids of the substratum. By growth and subsequent division, a whole host of similar droplets is formed. Eventually a time comes when these fuse in pairs, then the pairs coalesce so that a large jelly-like mass of protoplasm results. The plasmodium, as this structure is called, resembles an enormous amœba, not only in its appearance, but also in its streaming movements and in the manner in which it ingests food material. It is very sensitive to external stimuli at this stage, and usually avoids strong light, living beneath logs or other forest débris. Finally a time comes when its sensitiveness to light disappears, and it comes out into the open sunlight, sometimes being seen as a brightly coloured, gelatinous substance on the side of a stump. At this stage peculiar processes go on within the plasmodium, and as a result small masses of protoplasm are heaped up as rounded globules. The fruiting bodies or sporangia are ultimately formed from these little heaps of protoplasm.

Among the forms collected there are three general types of sporangia which are easily recog-

nized. Nearly all of them, however, are quite minute and occur in small patches on the substratum. On this account, they may easily be overlooked unless careful search is made for them. One of the types of fruiting body most commonly encountered is a delicate, plume-like sporangium of lacy texture, supported by a fine stalk. Another is a very small globular spore case held upright on a fine stalk, while the third is a sessile, globular body which may range in size from less than a millimeter to several centimeters in diameter.

In the collection made at Lake Nipigon there are representatives of twenty-nine species, two of which have not previously been reported as occurring in Canada. The identification of these specimens was very kindly undertaken by Miss M. E. Currie, M.A., of the Department of Botany, University of Toronto, and the writer is also indebted to her for extensive notes relating to each species. The names of the species collected, together with short descriptions, as suggested by Miss Currie, are given below:

1. *Arcyria incarnata* Pers.

Six specimens of this form were obtained, ranging in colour from the typical dark reddish-brown to a pale flesh pink. The capillitium of these specimens is of delicate lacy texture and is attached to a small cup—the whole resembling a small red plume.

2. *Arcyria nutans* Grev. (Fig. 1).

Yellow coloured feathery aggregations of the fruiting bodies of this species were obtained on four occasions. The capillitium is superficially much like the preceding and resembles it closely except for the yellow colour.

3. *Badhamia decipiens* Berk.

This species has not previously been reported for Canada although Macbride in his *North American Slime Molds* records it for New England. The specimen has small, sessile, subglobose fruiting bodies which are sometimes plasmodiocarpous or evenly distributed in grayish yellow masses over the substratum. The capillitium consists of large, orange branching lime knots connected by thin hyaline threads or sometimes by typical coarse, lime-filled threads. The spores are pale violet-brown, minutely spiculate, and slightly paler and smoother on one side.

4. *Badhamia utricularis* Berk.

The sporangia of this species are globular, bluish-coloured bodies attached to the substratum by means of fine, straw-coloured stalks. The clusters of fruiting bodies have the appearance of bunches of grapes recumbent on the substratum since the stalks are not strong enough to support the sporangia.

5. *Badhamia panicea* Rost. (Fig. 3).

Macbride reports this species as purely a western form and this is the first report of it for Canada. The sporangia are gregarious, sessile, subglobose bodies 6-8 mm. in diameter and of a blue-gray colour. The spores are a violet gray colour, slightly paler on one side and minutely spiculate; but more smooth and more violet in colour than *Badhamia follicola*. The peridium is transparent and thickly dotted with minute clusters of white lime granules.

6. *Ceratiomyxa fruticulosa* Macbr.

The sporophores are very small unbranched white bodies, and, since they occur in clusters, look very much like a mold or fungus growth.

7. *Comatricha typhoides* Rost.

The stalked, plumose sporangia have a brown colour overcast with a silvery sheen, which is due to the remnants of the peridia.

8. *Craterium leucocephalum* Ditm.

Small groups of minute, goblet-shaped, brownish sporangia characteristic of this species were found on dead balsam leaves. The brown colour is often strongly masked by white.

9. *Dictydium cancellatum* Macbr.

The collection of this species is typical having minute, globular brownish-red fruiting bodies supported by short, slender stalks.

10. *Diderma spumarioides* Fr.

The typical sporangia, in this case, are small, globular, sessile bodies of a gray colour. Instead of the usual substratum of birch bark this specimen fruited on a poplar leaf and the sporangia covered both sides.

11. *Fuligo septica* Gmel.

Two collections were made. One, about 1 cm. in diameter, has a pale yellow lime crust over the surface of the fruiting body with large yellow lime knots; the other, 3 cm. in diameter, has a white lime crust with large yellow lime knots. When the spores have been partly shaken out the surface has a peculiar fluffy appearance, which resembles, in miniature, the remains of a wasp's nest.

12. *Leocarpus fragilis* Rost.

The sporangia are brownish, short-stalked, obovoid structures. The peridium forms a rather solid crust over the surface of the sporangium.

13. *Lycogala epidendrum* Fr.

Large globular fruiting bodies of a brownish colour are characteristic of this species and are easily recognized because of their size and commonness.

14. *Mucilago spongiosa* Morg.

The grayish sporgonia are grouped in stalked, grape-like clusters arising from the white hypothallus. The lime crust, which is usually present, has disappeared. The æthallium is 8 cm. long and

is spread out over a stick. Froth-like masses of the mold frequently encircle stalks of grass or herbs at a short distance from the ground, the whole having the appearance of the frothy material of the spittle bugs seen on meadow grass in summer.

15. *Physarum compressum* Alb. & Schw.

In the single specimen obtained, the pale gray, subglobose sporangia occur closely crowded together on the substratum, or, in some cases, intermixed with plasmodiocarps, and a few are scattered singly. There are rounded and angular sparkling lime knots connected by thin hyaline threads. The spores are spiculate and slightly paler on one side.

16. *Physarum globuliferum* Pers.

A large specimen was found on a birch stump. The sporangia were of a mauve colour and each consisted of a small, globular spore case supported by a fine stalk. The size of the patch of sporangia was so extensive in this case that the side of the stump on which it appeared had a mauve colour

17. *Physarum viride* Pers.

The small gathering shows some sporangia with short dark stalks, and some sessile. The peridium is a golden yellow and the capillitium consists of a network of hyaline threads connecting slender, pisiform, orange lime knots. The spores are nearly smooth, 10 microns in diameter.

This gathering is peculiar in that the sporangia are not like the typical form, that is, they are neither nodding on slender black tapering stalks nor are they symmetrically lenticular or subglobose

18. *Physarum viride* Pers. Var. *aurantium* Lister.

The typical globular gray sporangia, nodding on a fine stalk, are present in this specimen.

19. *Physarum polycephalum* Schwein (Fig. 2.)

This species is characterized by small, grayish lobed sporangia supported by a slender stalk. In the specimen obtained there are sporangia which are lenticular in shape as well as the characteristic type. The capillitium is made up of hyaline threads connecting deep yellow lime knots.

20. *Stemonitis herbatica* Peck.

Three specimens were obtained and these illustrate well its great variability. The sporangia are plume-like networks of brown capillitium supported by fine stalks. One of the specimens has a cluster of ferruginous sporangia 7-8 mm. in height and the spores are almost smooth. Another has fruits 7-8 mm. high, but these are fuscous in colour and the spores are slightly more violet and are roughened with minute warts. In the

third collection the fruits are 4-6 mm. high and the spores and capillitium are typical. The capillitium of each consists of a dense intermediate network ending in a small-meshed superficial net. Specimens of this species were the first slime molds observed. They appeared on a stump in the form of small, round, white bodies which might have been mistaken for the eggs of some insect. During the night the white bodies elongated, their colour changed from white to dark brown and they transformed into the beautiful delicate fruiting body typical of this species.

21. *Stemonitis ferruginea* Ehrenb.

The representative of this species is rather poor but the sporangia are the typical short brownish ones of the plumose kind.

22. *Stemonitis fusca* Roth.

This gathering is composed of a cluster of dark brown plumose sporangia 4 mm. high. The spores are 8 microns in diameter and their surfaces are reticulate.

23. *Stemonitis splendens* Rost. (tentatively).

In this specimen the sporangia consist of long brown plumose bodies supported by a fine stalk.

24. *Trichia decipiens* Macbr.

The collections of this species have dark brownish globular sporangia supported by a fine stalk. The coloration is peculiar, yellow to yellowish-brown being more typical. The elaters are a deep yellow colour and are very similar to some species of *Trichia botrytis*.

25. *Trichia favoginea* Pers.

In this species the sporangia are characteristically bright yellow sessile bodies of elongate oval form.

26. *Trichia persimilis* Karst.

A small mass of densely-crowded, ochre-coloured sporangia make up this collection. The spores are covered with coarse, angular, pitted, wart-like structures which give them an irregular outline.

27. *Trichia varia* Pers.

This specimen was immature when collected and has not the ochre hue of ripe fructifications. The elaters are typical, having two loosely wound spirals, but the spores are thin-walled and irregular in shape.

28. *Tubifera ferruginosa* Gmel.

A typical flat, brownish æthelium 2.5 x 1 cm. was collected. The surface of the cushion-shaped mass of sporangia presents a honeycomb-like appearance where the tips of the sporangia are broken off.

29. *Tubifera stipitata* Macbr.

This species is much like the last except that the sporangia are stalked and the cluster thus raised from the substratum.

A LIST OF SHELLS FROM GODERICH, ONTARIO.

BY BRYANT WALKER

IN the summer of 1921 Mr. A. W. Andrews, the well-known coleopterist of Detroit, Mich., spent his vacation at Goderich and very kindly collected for me such shells as he came across while in the field.

The list, although not large, is of interest as it includes at least one form not hitherto recognized in Canada and extends the range of several others very considerably towards the west and seems worthy of preservation as a local list.

Polygyra albolabris (Say).

Ten fully matured specimens are all rather thin and noticeably greenish in tinge. They vary in height from 16 to 21.20mm. with an average of 18.18 mm. and in diameter from 23.75 to 29 mm. with an average of 26.7 mm. The axial index varies from .641 to .859 with an average of .684.

A comparison of the average shell of this series with the average shells from the Upper and Lower Peninsulas of Michigan and the Charity Islands, Lake Huron, (Walker, Occ. Pap., Mus. Zool., Univ. Mich., No. 7, 1915, p. 2) may be made as follows:—

Locality	Height	Diameter	Axial Index
Upper Peninsula	17.02	25.81	.654
Lower Peninsula	18.10	27.10	.677
Charity Islands	18.51	26.33	.704
Goderich	18.18	26.70	.684

This shows the Goderich shells to be larger in diameter than those from the Upper Peninsula and the Charity Islands and smaller than those from the Lower Peninsula; but higher than those from the Upper and Lower Peninsulas and lower than those from the Charity Islands.

Polygyra thyroidus (Say).

Rather small, varying from 21 to 22 mm. in diameter and like the preceding species decidedly tinged with green.

Polygyra tridentata (Say).

Rather small, varying from 12 to 14 mm. in diameter and quite depressed.

Polygyra monodon (Rack).

“ “ *fraterna* (Say).

Pyramidula alternata (Say).

“ “ *cronkheitei anthonyi* Pils.

“ “ *catskillensis* Pils.

So far as I can ascertain this is the first record for this form in Canada.

Helicodiscus parallelus (Say).

Mesomphix inornata (Say).

This seems to be the first Canadian record for this species west of Ottawa. In the United States it ranges from New York southwest through Ohio, into southern Indiana. The supposed records from Michigan are either unauthenticated or fraudulent.

Zonitoides minuscula (Binn).

“ *arborea* (Say).

Vitrea hammomis (Strom.).

“ *binneyana* (Mse.).

“ *lamellidens* Pils.

This rare (in the north) species has hitherto been recorded in Canada only from Ottawa (Walker, *Ottawa Naturalist*, XIV, 1900, p. 90). Mr. Andrews' discovery extends its range very considerably to the west.

Vitrea ferrea (Mse.).

“ *indentata* (Say.).

Euconulus fulvus (Dr.).

Circinaria concava (Say).

Vallonia excentrica Sterki.

Gastrocopta armifera (Say.).

“ *tappaniana* (C.B. Ads.).

“ *contracta* (Say.).

Succinea ovalis Say.

Cochlicopa lubrica (Mull.).

Carychium exile H. C. Lea.

Lymnæa humilis modicella Say.

“ sp.?

A single, very small specimen, probably immature, with a broadly reflected columella that I cannot place.

Planorbis parvus Say.

Physa sayii warreniana Lea.

I think that this is the first record for this form in Canada.

Goniobasis livescens (Mke.).

Pomatopsis lapidaria (Say.).

Amnicola sp.?

A single specimen of a small species that I have been unable to identify satisfactorily.

Sphærium striatinum (Lam.).

Mr. Andrews reports that he saw no signs of there being any *Unionidæ* in the river at Goderich.

Mr. Justice Latchford states in reference to Dr Walker's paper that he has not had a favourable opportunity to collect shells on his official visits to Goderich, but that once while walking there near the mouths of the Maitland he picked up a living *anodonta* which he thought to be the variety of



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