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## CANADIAN SPHAERIIDAE.

BY THE HON. MR. JUSTICE LATCHFORD.

There are few more fascinating objects of study in natural history than the members of the family of small bivalve mussels known as the *Sphaeriidae*. They abound in the vicinity of Ottawa, and indeed throughout the whole Nearctic region. The drainage area of the Great Lakes, and of their outlet, our own St. Lawrence, may be regarded as the metropolis of the family in North America. Yet, as Dr. Vincent Sterki recently pointed out,<sup>1</sup> the fauna of the Great Lakes themselves is only fragmentarily known; but, so far as known, presents many peculiar forms and possibly species. Still less are we acquainted with the fauna of the vast areas northward, extending from Newfoundland through Labrador and across Canada to the Rocky Mountains. In Prince Edward Island, Mr. C. Ives, of Miscouche, has collected a few species. In the vicinity of Ottawa, in Ontario and Quebec, considerable work was done many years ago by the members of the Ottawa Field-Naturalists' Club, especially by Gilbert Heron, Dr. Fletcher, the Rev. Geo. W. Taylor, and the writer. Officers of the Geological and Natural History Survey, notably Mr. W. McInnes, gathered some material in the waters flowing into Hudson Bay. Little, however, is known of the family as it exists over the far-flung plains of the Canadian West. In Southern British Columbia, Lord found and described two new species,<sup>2</sup> and farther north, and on Vancouver Island, Prof. John Macoun and Mr. Taylor collected in a few localities.

Heron died before reaching the prime of his promising manhood. Fletcher, Taylor and Whiteaves passed away all too soon—not, however, without having accomplished and recorded achievements in various departments of natural science that will long keep their memory green. Of those who were active in the early days of the club in collecting and studying the mollusca of Canada only two remain, Prof. John Macoun and the writer. One is spending the decline of his fruitful life in distant Vancouver Island. The other for ten

months of the year is far removed from his native valley and concerned about matters but little related to natural history. Owing to lack of a leader, Conchology has for some years been dropped from the list of the club's activities. With such wide and productive areas open for original investigation, the want of interest shown is greatly to be regretted. It is not so much to publish a record of work as a member of the club as to arouse fresh interest in others, and to facilitate the collection and study of our most numerous and least known shells that the following observations are submitted. My hope is that some of our younger members may be induced to devote a part of their leisure to what I am sure they will find a delightful diversion, both out of doors and over their cabinets.

The *Sphaeriidae* are small in size, only a few species exceeding half-an-inch in length. As they ordinarily lie buried—though only slightly—in the sand or other material at the bottom of streams, ponds and lakes, they are seldom seen—never, indeed, unless where, in very dry seasons, the water has receded or evaporated, when the shells may sometimes be observed on the exposed surface. But so generally are they distributed that it might almost be said they are to be found—they should certainly be looked for—wherever there is water that is not within the category known to golfers as "casual." Yet mere depressions that contain water for but short periods in any year often yield these and several other fluviatile shells.

To collect in quantity, except under conditions which seldom exist, a dredge of some kind is required. The beginner will find that a common bowl-shaped wire strainer will best serve his purpose. The size I find most useful has twelve meshes to the inch, and is six inches in diameter. I remove the handle and rim, which are too flexible and soon break, and substitute narrow, stiff, hoop-iron; but good results may be obtained without making such a change. The handle must be extended for all but very shallow water by whipping it firmly to a walking cane or light pole. On sifting in water the material raised by the dredge the shells will be

<sup>1</sup>Annals of the Carnegie Museum, Vol. X, 1916, p. 431.

<sup>2</sup>Proc. Zoo. Soc. of London, 1863, p. 69.



found. Each lot should be kept separate and numbered. A brief record under the same number on a field card or in a note book should be made. If the shells are stained they may be cleaned by placing them in a bottle containing sharp sand and soapy water. On no account should an acid be used. By rotating the contents the shells will be cleaned on the outside. Mere drying out then suffices, when the shells are minute; but when large, the animals must be removed after boiling, or rendered innocuous by immersion overnight in a five to one dilution of formalin—by far the more rapid process, as the tying or wrapping of each shell is not then necessary. When thoroughly dried, after treatment with formalin, the largest shells will not gape, or cause offence by their odor, and may be placed in the collector's cabinet.

As he examines his specimens he will observe that they fall naturally into three groups or genera. By far the greater number ordinarily found are minute shells, triangular in outline, very unequilateral, and, with rather sharp terminal beaks. They resemble small peas, and belong to a genus fittingly called *Pisidium*.

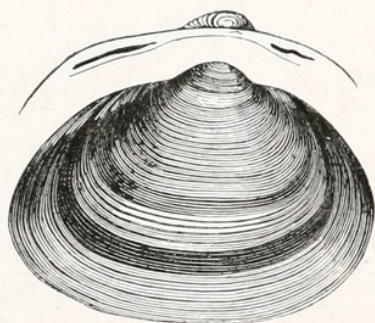


Fig. 1

*Sphaerium sulcatum*  $\times 1\frac{1}{2}$ .<sup>3</sup>

Other shells will be noticed which are larger, less inflated, though never exceeding half an inch in length; and usually more delicate and fragile. They bear little caps on the beaks, separated from the aftergrowth by a distinct furrow, and form the genus known as *Musculium*.

Still larger shells, often adorned with distinct color bands, denoting periods of arrested development, and others of no greater size than some *Musculia*, but of heavier texture, and as a rule more deeply striated, bear *Sphaerium* as their generic name. The term was devised by Scopoli, an Italian naturalist and chemist in 1777. It has priority to *Cyclas* (Brugaiere, 1789); and *Sphaeriidae*, according to the laws of modern zoological nomenclature has replaced *Cycladidae* as the proper designation of the family to which the little mussels belong.

1. *SPHAERIUM SULCAIUM* Lamarck, the largest of the genus in the species most commonly observed in the vicinity of Ottawa. It was described in 1818 by the famous French naturalist in his "*Animaux sans Vertèbres*," from specimens obtained in Lake Champlain. In the same year Thomas Say described the shell in the American edition of Nicholson's Encyclopedia as *Cyclas similis*, and Say's name may have priority. However, the Lamarckian name is more generally adopted, and is that used in the Club's lists.

*S. sulcatum* is the largest of the genus. It is oval in outline; distinctly, rather than deeply, striate; and, when adult, is usually banded with concentric dark lines, marking periods of arrested development such as occur every winter. The body color is of varying shades of grey or brown. Young shells are almost white.

But one other species, restricted in Canada, so far as known, to a single locality near Ottawa, approaches this in size. All bivalves found elsewhere that are about three-quarters of an inch in length, and have not the corrugated beaks which indicate membership in the family of our large mussels, or *Unionidae*, may safely be named *Sphaerium sulcatum*.

This species is found in many places within the city limits. It is common in the Rideau river, especially on the muddy bottom of the reach above the islands at Billings' Bridge. In the canal, after the water has been let out, it may be easily collected on the shoal near the right bank west of the Bronson avenue bridge, and anywhere above Hartwell's locks. Very large and perfect shells were obtainable at one time in the bay at the east end of the small lake below the outlet of Meach lake; but owing to accumulations of sawdust and bark the locality is now barren of this shell, though it still produces sparingly the most remarkable specimens I have ever seen anywhere of *Anodonta cataracta* Say (= *fluvialis* Dillw.) and, in addition, *Lymnaea megasoma*, and the shell called *Physa lordi* in our lists.

In the Laurentides, north of Meach lake, *S. sulcatum* abounds, as in Gauvreau lake and its outlet, near Ste. Cecile de Masham, and in the brook flowing past the orchid swamp still farther north, so well known to members of the botanical branch of the Club, and now, alas! to many others. What a day that was, nearly thirty years ago, when, after visiting the brook and its outlet, Fletcher, Harrington and the writer were the first naturalists to discover the sequestered glades where the shy wood nymphs, then literally in thousands, swayed to one another in virgin grace and loveliness! Whoever studies shells should have a mind receptive to the

<sup>3</sup>For this and the other figures in the text I am under the greatest obligation to my friend Dr. Bryant Walker of Detroit, Mich.



delightful impressions that may be derived from flowers and birds, and the many strange four and six-footed creatures that he will encounter on his rambles in places seldom frequented by man.

A very fine form of *S. sulcatum* occurs on the Scott Graham farm in Nepean, now called Britannia Highlands. In dry seasons the narrow bottom of the stream lying about halfway between Carling Avenue and the Grand Trunk railway is exposed for some distance west of the boundary of the Shouldis farm. The shell may then be easily found in considerable numbers. At other times collecting is slow and difficult, even though the collector is equipped with a good dredge, and—what are indispensable in such localities—rubber boots. This stream is again productive near its outlet into the Ottawa below the Deschênes rapids.

conditions of environment. In fact nothing is so wonderful in nature as the adherence to type of every organized being properly regarded as a species. More interest is, however, manifested in departures from the normal than in persistence of type, just as variant races of men, like the giant Patagonians and pygmy Papuans, commonly attract more attention than races of ordinary stature. Variations from the usual form of *S. sulcatum* are few and limited. One is found in Bond lake, near Toronto. Another, which is well marked and constant, occurs in Masham, north of Ottawa, and, notably, in Lake Gorman, near Brudenell, in the county of Renfrew, at an elevation of about eleven hundred feet above sea level.

Dr. Sterki thinks it entitled to rank as a variety and calls it *palmatum*.<sup>4</sup> He describes it as smaller

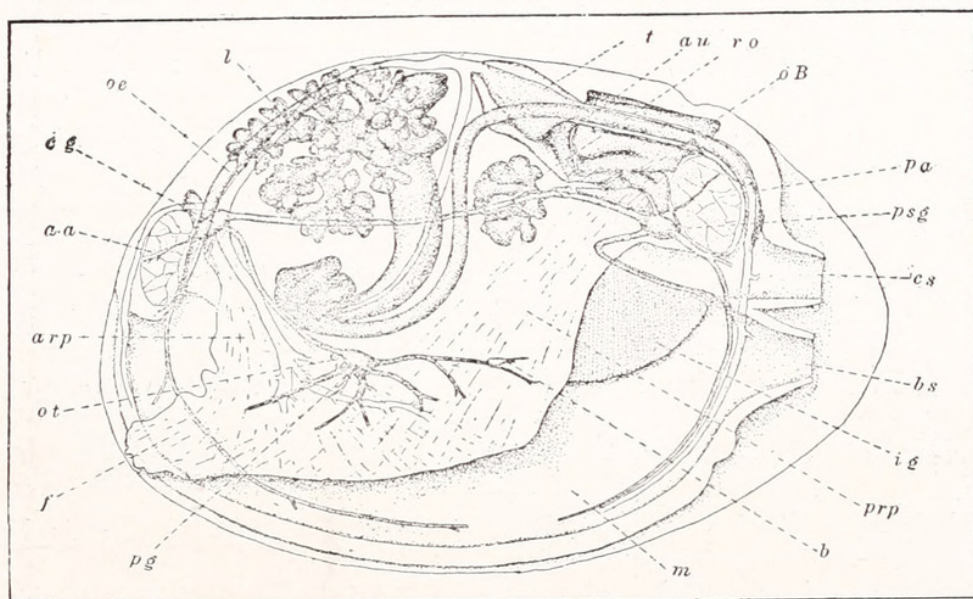


Fig. 2.

a.a.—Anterior adductor muscle.  
a.p.—Ant. retractor-pedis muscle.  
ar.—Auricle.  
b.—Byssal gland rudiment.  
bs.—Branchial siphon.  
cg.—Cerebral ganglion.  
cs.—Cloacal siphon.  
f.—Foot.  
ig.—Inner gill.  
l.—Liver.

m.—Mantle.  
ob.—Organ of Bojanns.  
oe.—Oesophagus.  
ot.—Otocyst.  
pa.—Posterior adductor muscle.  
pg.—Pedal ganglion.  
prp.—Post retractor-pedis muscle.  
psg.—Parieto-splanchnic ganglion.  
ro.—Reproductive organs.  
t.—Male follicle.

Fair specimens are obtainable in shallow water at Graham Bay station, at the intersection of the Richmond road and the Grand Trunk railway. A few miles farther to the southwest the shell is common in the creek north of Stittville; but nowhere have I found it in such numbers as in the stream about a hundred yards west of Ste. Justine station, in the county of Vaudreuil. In either place the shell may be readily collected in large numbers by means of a dredge with a quarter-inch mesh, such as is afforded by a kitchen utensil in common use.

As *S. sulcatum* is a true species, with an objective existence not depending on the opinion or whim of any systematist, it does not vary greatly in its characteristic features throughout the vast area over which it is disseminated, though it is occasionally modified in appearance by different

than the common or typical *sulcatum*, more inequipartite, the beaks being markedly anterior; less inflated, especially flattened over the lower part of the valves, more truncate anteriorly and posteriorly, inferior margin less curved; beaks narrower and little elevated; surface striae slighter; shell and hinge slighter.

In Lake Gorman the shell is quite abundant buried about an inch in the sand of the bay near the boathouse on the Rockingham road.

The animal of the variety *palmatum* has not been described. It is probably not distinguishable from the normal form represented in the following illustration, which may be regarded as typical of the anatomy of all the genus:

<sup>4</sup>Preliminary Catalogue of N. A. Sphaeriidea, An. Carg. Mus., Vol. X (1916), p. 432.



The foot is capable of great extension as may be observed if living shells are placed in a glass bowl or aquarium. Cilia in the bronchial siphon, and along the inner and outer gills and mantle, induce currents which bring diatoms and other minute organisms contained in the water into contact with the labial palpi, whence they pass into the stomach to be in part elaborated for the preservation and growth of the individual and the propagation of its kind, and in part rejected through the excurrent or cloacal siphon.

Unlike the *Unionidae* in which each individual is dioecious, that is, either a male or a female, as is the case also with our native oyster (*O. virginica*, Gmelin), though not, strange to say, with its European relative (*O. edulis*, Linn.), *S. sulcatum*, like all other species of the *Sphaeriidae*, is monoecious, or produces both sperm and ova within the same shell. However, it is not hermaphroditic in the way that many, if not all, pond and other snails are hermaphroditic. In their case, while each animal is perfectly bisexual, the conjunction of two individuals is requisite for fertilization. In the *Sphaeriidae*, on the other hand, the process of fertilization is similar to that which takes place within the closed keel of the pea blossom and other legumes. Cross

fertilization is impossible naturally, and could not be induced artificially were another Mendel to arise. The reproductive organs are located behind the stomach, and consist of racemose glands, the anterior of which produces sperm, and the posterior ova. A common genital duct leads in the cloacal chambers of the inner gills, where the young reach before birth, in the case of this species, a length of seven or eight millimeters, or nearly half that of the father-mother.<sup>5</sup> If living shells are left for a day or two in water that is warmer or colder than that of their usual habitat, they will, ordinarily, be found to have produced a large number of nepionic young. These should be separately boxed and labelled with the name of the parent and will be found very useful when the collector is trying to identify shells which are no larger when aged than some *Sphaeria* are at birth.

(To be continued)

<sup>5</sup>The reproduction and growth of *S. sulcatum* are treated at length by Ralph J. Gilmour in *The Nautilus*, Vol. 31 (1917), pp. 16-28.

Note.—It is my intention to place in the Museum of the Geological and Natural History Survey at Ottawa specimens of the forms and varieties of *S. sulcatum*, and of the species mentioned in the continuation of this paper, of which I possess duplicates.

## FIELD STUDY OF LIFE-HISTORIES OF CANADIAN MAMMALS.<sup>1</sup>

BY RUDOLPH MARTIN ANDERSON, BIOLOGICAL DIVISION, GEOLOGICAL SURVEY, OTTAWA.

A recent and timely publication of the United States Department of Agriculture<sup>2</sup> calls attention to the gaps in our knowledge of the habits of many of the commoner species of mammals. The study of birds has been developed so extensively in a popular way in recent years through the Audubon Society movement, local bird clubs, and nature studies in the public schools, as well as technically by the scientific ornithologists, that the objects and methods of bird study have become fairly well known throughout the country, and the economic importance and aesthetic and sentimental value of bird life are becoming matters of common knowledge.

The study of mammals, though not less important in many ways, has not been developed so broadly or systematically. The study of the comparative anatomy and physiology of the major mammalian groups, through their closer relation

to the human subject, has received close attention, but the relations of species to one another and to their environment, and their life-histories, are undoubtedly less well known than the like relations of birds. It is true that the horse, cow, sheep, pig, and a few other mammals have been domesticated, but few attempts have been made to domesticate other species except in a sporadic way. A rather extensive but scattered literature has been developed concerning the deer, elk, moose, bison, antelope, and other large game animals, which are of interest to the sportsman. Unfortunately, this in many cases consists principally of the lore of hunting field and methods of capture, and what may be termed their more intimate history has been neglected until many of the species have been exterminated over most of their former ranges, and it is forever too late to obtain complete data in regard to these animals' relations to their primitive condition. Where efforts have been made, often too late, to conserve a remnant of these animals, to replenish the game of the sportsman, add to the food supply, or for other practical or sentimental reasons, it is found that there is a lamentable lack

<sup>1</sup>Published by permission of the Geological Survey, Ottawa, Canada.

<sup>2</sup>Suggestions for Field Studies of Mammalian Life-Histories. By Walter P. Taylor, Assistant Biologist. September, 1919. U.S. Department of Agriculture. Department Circular 59. Contribution from the Bureau of Biological Survey, E. W. Nelson, Chief; pp. 1-8.





Latchford, F. R. 1919. "Canadian Sphaeriidae." *The Canadian field-naturalist* 33(5), 83–86. <https://doi.org/10.5962/p.337906>.

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