

WATER-ROLLED WEED-BALLS.—BY A. H. MACKAY, LL. D.,  
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(Read 21st May, 1906.)

In February, 1906, I received a letter and a "sea-ball" from the teacher at Upper Kingsburg, Lunenburg county, a school section in the north-eastern angle formed by the river LaHave and the coast. The pupils were described as "fairly burdened with curiosity" about the strange things cast up by the sea on this sandy beach on the Atlantic. The west bank of the great LaHave, running at right angles into the ocean until it reaches Gaff Point, where it is submerged to rise further out in the far-famed Ironbound Island, protects this bit of shore from the full force of the south-westers.

The teacher, Miss Mary L. H. Bowers, describes the natural history of this beach in terms of the folk-lore of the coast as follows:—

"For years back, the weeds cast upon these shores were of the larger kinds, such as Rockweed, Irish Moss, and Kelp or Laminaria. Sea urchins were the pest of the lobster fishing. About three years ago the sea cast up such immense numbers that the whole coast was abundantly supplied with fertilizers for the farms. This wholesale destruction of animal and vegetable life was looked upon as something which could not be explained. Since then, however, the lobster fisherman believes that the sea bottom shows fewer clean spots of sand, and a great increase of the finer thread-branched sea-weeds. Last year great quantities of red sea-weeds have been thrown ashore; and now, this winter, these 'sea-balls,' as they are called, are being cast up, and the people declare it to be a new thing. Some take them to be the nests of shell fish. In proof, as many as 400 minute shells, taken to be the young of clams, have been counted out of the centre of one of these balls. But then the most of them have few or no shells within them. I have seen perhaps two hundred balls on a short strip of beach, of various sizes, and in different stages of perfection, specimens of which I am sending you."

These "sea-balls" are photogravured on the accompanying plate, with a scale which allows them to be exactly measured.

The last one in the third horizontal row is cut in two, but shows nothing in the centre different from the rest of the ball.

These specimens varied from spheres about five inches in diameter to one and a half inches. Some were elongated. The one on the right, in the upper row, has a frond of *Laminaria digitata* Lamx. passing through the centre of the ball in its longest direction, and has in addition at its opposite polar extremities, *Dictyosiphon feniculaceus* Grev. growing on a fragment of a waterworn clam shell, and other similar filamentous branching algæ, not worn off, as they are in the compact equatorial region. A little more rolling in water over the sand, or by the wind over the dry beach, would likely soon wear off the appendages down to a compact spheroid.

Some of the balls contain the roots of one of the larger seaweeds within them, one a mass of *Corallina officinalis* L. Others contain embedded in them, various red sea-weeds, and even masses of marine sponges. But they appear to be built up mostly of the filamentous and fine branching olive brown algæ, such as *Dictyosiphon*, *Desmarestia*, *Ectocarpus*, *Chordaria* and *Chorda*, with specimens of nearly every other local species of seaweed, including material to which they were attached when growing, or with which they might become entangled when massing into balls.

Their structure in the different forms examined suggest their formation from light ridges of algæ left by the retreating tide on the flat sandy shallows. Under the sun the weeds curl and lock into masses which, when moved over the sand by alternate tides and winds, occasionally produce very round balls. It would appear that the filamentous and fine branching olive-brown algæ are more brittle than many of the red species which are often found like the larger olive algæ, extending beyond the general contour of the rolling ball.

Mr. Harry Piers, curator of the Provincial Museum, has received a similar ball, collected by Mr. J. Perrin, from the

sandy beach on MacNab's Island at the mouth of Halifax Harbor, where others were noted, and also a specimen from a fresh-water lake near New Ross, Lunenburg county.

Mr. P. B. Lantz, of New Ross, Lunenburg county, has found them in a fresh-water lake near the head of Gold River, and in Indian Lake in New Germany. The people think they are nests made by the water newts found in these lakes—probably the aquatic stage of *Diemyctylus viridescens* Rafinesque—just because these two objects are the two mysterious things found together in the same place. The fresh-water balls are spoken of as the nests of the newts or as burr-balls, the former suggested by the prooffess, popular hypothesis referred to, the latter by their appearance.

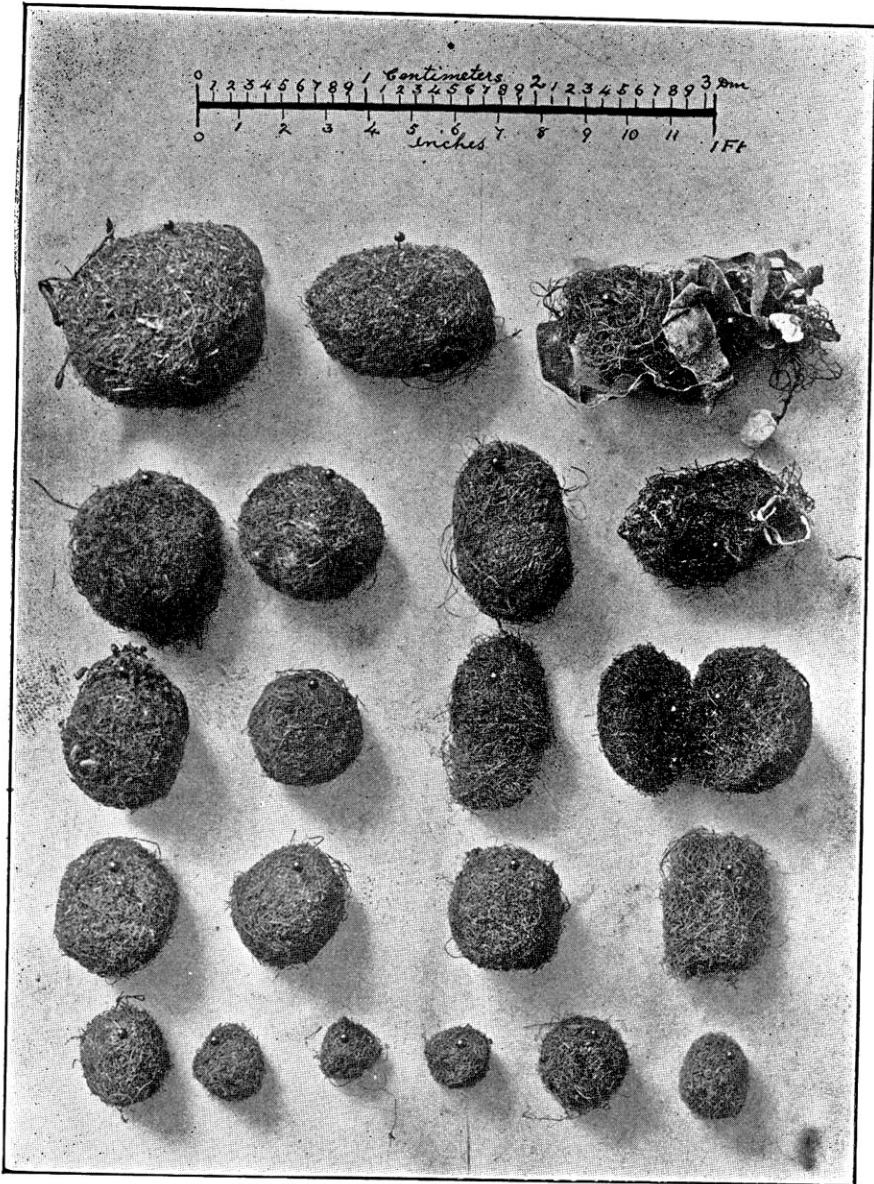
Professor W. F. Ganong read, 3rd May, 1904, a paper "On Vegetable-, or Burr-, Balls from Little Kedron Lake, N. B.," which is published on page 304, vol. v., part iii., no. xxiii., of the *Bulletin of the Natural History Society of New Brunswick* with a photogravure of two balls, one from Lake Kedron and the other from Sandy Pond in Lincoln, Massachusetts. The former was found in a sandy cove of the lake, open to no wind except from the south-east. The cove is surrounded with fir and spruce, whose leaves fall into the water. The balls are composed chiefly of these leaves, including other vegetable matter, such as small twigs, etc., all interlocked together. The latter, from Flint's or Sandy Pond, was composed mainly of the tangled stems and leaves of the Duck grass (*Eriocaulou septangulare*) which was growing in the lake. Thoreau, in chapter ix of his *Walden*, describes this phenomenon in the identical lake in the following words:

"I used to admire the ripple marks on the sandy bottom at the north end of this pond, made firm and hard to the feet of the wader by the pressure of the water, and the rushes which grew in Indian file, in waving lines, corresponding to these marks, rank behind rank, as if the waves had planted them. There also I have found, in considerable quantities, curious balls, composed apparently of fine grass or roots, of pipewort, perhaps, from half an inch to four inches in diameter, and perfectly spherical.

These wash back and forth in shallow water on a sandy bottom, and are sometimes cast on the shore. They are either solid grass, or have a little sand in the middle. At first you would say that they were formed by the action of the waves, like a pebble; yet the smallest are made of equally coarse materials, half an inch long, and they are produced only at one season of the year. Moreover, the waves, I suspect, do not so much construct as wear down a material which has already acquired consistency. They preserve their form when dry for an indefinite period."

Professor Ganong wrote, August 1904, in the *Educational Review* of Saint John, New Brunswick; and 8th April, 1904, in *Science* of New York; asking for references to similar observations; but he obtained at that time only one additional reference to a locality—"a lake in Idaho."

The observations of Miss Bowers on the Atlantic coast near the mouth of the LaHave, and the specimen reported from MacNab's Island, extend our knowledge of the formation to marine waters—even to oceanic beaches. The spheroidal, and even cylindrical, masses point clearly to the action of the water as the main cause. The deposition of a mass of eggs on a roll of such algæ would be one condition to agglutinate into a nucleus a mass which might later contain young marine life within the centre of the future ball. Roots of algæ and other entangling forms are often conspicuous as nuclei. But often the whole mass appears to be composed of the more attenuated olive-brown algæ. Although an addition has been made to our knowledge, there are still wanting more definite demonstrations of the exact manner in which these ball forms are originated as well as rounded. The phenomenon must also be occurring more widely than hitherto observed. What has been observed so far suggests as an appropriate title for them: "Water-rolled Weed balls."



WATER-ROLLED WEED-BALLS, SEA-BALLS, BURR-BALLS, OR VEGETABLE-BALLS,  
Collected near Upper Kingsburg, Lunenburg County, Nova Scotia.

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(To illustrate paper by Dr. MacKay.)