rings on the shores of Gilmore Pond were sufficiently clear to demonstrate that this annular mode of growth was not merely a theory, but a distinct tendency.

In other localities, where I have collected *Lycopodium inundatum*, it grew in peat moss, and there no rings were observed. This, however, is not surprising. The surface of a peat bog, covered with undershrubs and tussocks would offer no such opportunity for regular development as an open sandy beach. It is hoped that persons, who find *Lycopodium inundatum* during coming seasons, will report any similar ring formations which they may observe in other localities.

One more circumstance of interest may be mentioned regarding the rings on Gilmore Pond, and that is that they were never quite circular, but when of regular growth at all, were always broadly elliptical. Furthermore, the ellipses were in nearly all cases so situated that their longest axes were parallel with the margin of the pond. This relation appeared to obtain at different places upon the curved shore and be quite independent of the points of the compass. The most natural inference is that the Lycopodium, in the manner of many other littoral plants, tends rather to develop *along* the shore in a region of tolerably uniform moisture, than toward or from the water, which would bring it into wetter or drier ground. It is true, the rings were found at very different distances from the water, varying, indeed, from six to thirty meters.

[Since the above was in type, we have received from the publishers (Messrs. Ginn & Co.) Prof. W. J. Beal's attractive little volume, *Seed Dispersal*. On page 5 of this work — which is popular in style, well arranged, and excellently illustrated Prof. Beal describes some "fairy-rings" formed by *Monarda didyma*, the bee-balm, and refers to similar tendencies toward annular development in several other flowering plants. — ED.]

NOTES ON CALOSTOMA.

HOLLIS WEBSTER.

A RATHER common, though unfamiliar fungus of our woods, one that is sure to excite the curiosity of anybody who happens on it for the first time, is the slimy red puff-ball, *Calostoma cinnabarinum* Desv. It grows by brooks and by paths where the ground is springy, appearing first as a pale brownish yellow gelatinous lump, from which the

outer coating of jelly soon falls away and exposes a tough dry ball as big as a hickory nut, bright red and with a pretty star-shaped beak or mouth at the top. From this beak a pinch will force a little cloud of yellow dust, the spores. Examination of plants in various stages will show that with the gelatinous coat there falls away, also the outer tough layer (exoperidium) of the puff-ball. Beginning at the base, this layer splits into strips and fragments which curl up inwards and drop to the ground. Below, from the base of the puff-ball, extends a swollen cylindrical mass of coarsely interwoven gelatinous strands, which form a firm elastic footstalk, that is sometimes almost completely buried, but often thrust forth from the ground for two inches or more.

This fungus naturally attracted the attention of some of the early botanists, particularly of Persoon and Desvaux, the latter of whom in 1809 established for it a new genus named from the peculiar structure of the radiately slit valvular mouth. *Calostoma*, which means *Pretty-mouth*, was Persoon's appropriate (specific) name. The further history of the treatment of the plant at the hands of botanists, of the variety of names applied to it, and of the way in which it has been for years confounded with a similar but rarer species described from Carolina specimens in 1822 by Schweinitz, under the name of *Mitremyces lutescens*, is clearly outlined in a paper by C. E. Burnap, in the Botanical Gazette for March, 1897.

At the end of this paper, Burnap gives descriptions and figures, based on a reëxamination of specimens of the American forms, and clearly shows the existence of three distinct American species, viz.: *Calostoma cinnabarinum* Desv., *C. lutescens* (Schwein.) Burnap, and *C. Ravenelii* (Berk.) Massee.

Recent examination of a number of good specimens of the first of these species, and of two specimens of the second, lately added to the herbarium of the Boston Mycological Club, have furnished the following notes.

C. cinnabarinum Desv. The color of the endoperidium and of the inner surface of the exoperidium in the specimens at hand, is a bright, though earthy, brick red; hence Burnap's description of the exoperidium as "ochraceous, often slightly vermilion" seems applicable to old, faded, or rain-washed specimens rather than to fresh plants, from which, under good weather conditions, the outer coating has just fallen away. In such plants the color is intense, and persists strongly even after drying. There seems, however, to be some variability, and

it is possible that the exoperidium may under certain conditions carry away with it more of the intermediate red layer than usual.[1]

The description of the footstalk as "reddish brown" is again quite true of dried specimens, but in the fresh plant, when the strands are swollen with moisture, the color is a pale watery yellowish or greenish yellow.

In old plants gathered after a rain on November 21, 1898, the footstalks were 7-8 cm. long, and 3½ to 4½ cm. wide at the thickest part, narrowing abruptly below the peridium and at the dark, somewhat root-like base. The strands were rarely less than 2 mm. in diameter (except just below the peridium) and often 4-5 mm. They were much branched and anastomosed. After drying (in hot air) the footstalks shrank to the following dimensions: length 4½-5 cm., width 1½-2 cm., diameter of strands ½-3 mm.; and the color changed to a dull red brown. A comparison of these figures is interesting in connection with the description of the next species about which little seems to be known in a fresh state.

The spores, important for the identification of the species, are elliptic-oblong, echinulate or punctate, pale yellow, 17–22 x 8–9 μ (18 x 8–10 μ, Burnap). The plant occurs (about Boston) from July to November.

Calostoma lutescens (Schwein.) Burnap. Burnap's notes on this species were based on two specimens in the Curtis Herbarium. Two specimens, collected in November, 1898, by the Rev. Paul Whitehead, near Richmond, Va., furnish a few additional notes.

The general color of the whole plant (dry) is a pale greenish yellow. About the base of the endoperidium is a stiff collar, rather imperfect but still conspicuous, formed of spreading, somewhat revolute, irregular teeth, basal fragments of the exoperidium which remain attached. Some indication of this collar may be seen in Burnap's drawing (pl. xix, fig. 1), but he makes no mention of it. If it should be found to be characteristic it would offer another means of distinguishing this from the last species, for it seems to indicate that the exoperidium here splits from above, instead of from below. The foot-

[1] Desvaux (Jour. de Bot. 2: pp. 94–95, quoted by Massee in his monograph on the genus Ann. Bot. 2: 5, p. 38) remarks as follows: "This plant sometimes loses its color, when it has been dried carelessly, because its color, which is only superficial and does not penetrate the substance of the outer layer of the peridium, consists of a sort of red pruinosity that easily comes off."

stalks are 10–12 cm. long, and 2 cm. wide. One of them tapers upward to the peridium, the other is about as thick there as anywhere. Both are irregularly cylindrical masses of interlaced anastomosing strands, and taper gradually at the base to a blunt tip. They are much larger and longer than those of the preceding species, and show no trace of red or brown color. The diameter of the separate strands (on the exterior of the bundle) is rarely more than 1 mm., and generally less. The spores are pale yellow, globose, verrucose; diam. 7–10 μ.

Records of the early stages and fresh condition of this plant are much to be desired. It has been reported from Alabama, West Virginia and Virginia; but there seems no good reason why it should not be sought in New England, and further notes upon it will be welcomed.

The following key to the American species may be of use: —

Spores *round*, *verrucose*, plant yellowish, . . . *C. lutescens.*

Spores *elliptic-oblong*, *echinulate*, peridium red or reddish, . . . *C. cinnabarinum.*

Spores *elliptic-oblong*, *smooth*, exoperidium persistent in the form of scales all over the yellowish endoperidium. . . *C. Ravenelii.*

NOTES ON THE BRYOPHYTE FLORA OF MAINE. — I.

J. Franklin Collins.

Maine has probably been more neglected by the bryologist than any other New England state. So far as I am able to ascertain only two lists of the bryophytes of any portion of the state have ever been published, and those were both of Mt. Desert and the adjacent islands.[1] The region covered by these lists constitutes only about one third of one per cent. of the area of the whole state.

During the last three seasons, several members of the Josselyn Botanical Society of Maine, have devoted a portion of their time to collecting bryophytes. As this material is gradually being overhauled and determined, it seems advisable to publish an occasional local list, particularly when the localities represented are more or less widely separated, or when interesting additions are to be recorded, thus forming a basis for future work of this nature in each of the regions. It is especially desired that specimens of species not included in these lists be forwarded to the writer.

[1] T. G. White in Asa Gray Bulletin, 1: 2 (No. 1) 1893 and 2: 44 (No. 7), 1894; Rand and Redfield in "Flora of Mt. Desert" (1894).

Webster, Hollis. 1899. "NOTES ON CALOSTOMA." *Rhodora* 1, 30–33.

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