

Garnets were found in some of the Granite boulders as well as in the gneissoid strata.

GNEISSOID.

Rocks similar to the Gneissoid rock, *Ironstone*, of N. W. Arm, Halifax, may be applicable to building purposes.

The rocks of the Nictaux Falls are quarried for building stones.

ART. II.—A CONTRIBUTION TOWARDS THE STUDY OF NOVA SCOTIAN MOSSES.—By JOHN SOMMERS, M. D., *Prof. Physiology and Microscopy, &c., in the Halifax Medical College. Examiner in Physiology of University of Halifax, Lecturer on Zoology, &c., to the Institute of Technology, Halifax.*

(Read before the Institute, Dec. 1877.)

THIS paper is presented as one of a series, which, time and opportunity permitting, will be continued until a complete collection of our Moss Flora will be described.

I stated on a previous occasion, as a result of a then superficial observation of the subject, that the study of this class of the Provincial Flora would repay well for any labour expended upon it, inasmuch as it afforded an unexplored field for research. I had at that time but little idea of its extent, or of the profit and pleasure which subsequent experience has proved to be derived from its cultivation.

The study and detection of the minute distinctions which enable us to separate the species and genera of mosses, demands from the observer very careful and laborious microscopic work, without which it is impossible to attain to success.

To one who can snatch but few leisure hours from his more engrossing labours, the task of collecting and arranging the material presented by this class of vegetable growth is an exacting one, many species being so fugaceous that constant alertness is

required to enable him to seize them at the proper time for diagnosis. Some amongst them are winter blooms and consequently more difficult to collect and describe. Besides the mosses, we have yet other orders, such as Hepaticæ, Lichens, Fungi and Algæ, yet awaiting our study, material enough, indeed, to occupy the pages of our Transactions, should they be carefully worked out.

Mosses, though of little apparent interest from an economical standpoint, so far as their direct usefulness to man may be concerned, have, notwithstanding their uses in the economy of nature: they, with others of the lower forms of vegetables, afford a foundation for the higher classes; their nutrition takes but little from the soil, their decay adds much to it. Our morasses and bogs derive a very large proportion of their solid matter from the growth and subsequent decay of successive generations of Sphagni, which serves as a nidus for the growth of conifers, exogens, &c., whose foliage, making additions annually to the vegetable mould, have in time rendered many of them available for the operations of the husbandman.

The granite and gneissoid rocks of our Atlantic coast furnish asylums in every fissure and cranny favorable to the growth of these plants; they serve here to hide the baldness and sterility of those formations, and also combine with the atmospheric influences engaged in pulverizing them, the combined detritus of rock and vegetable affording sufficient soil for the nutrition of shrubs and trees.

By their habit, or mode of growth, mosses also give protection during severe winter frosts, to seeds of plants and the eggs and larvæ of insects.

To the scientific mind they possess a higher and more extended interest, whether regarded from the problem of their structure, growth and reproduction, the beauty and variety of form and color which they present, or that of their origin and position in time among the successive generations of vegetable life that have clothed the earth.

As nature in her proceedings moves from the simple to the more complex, we may be warranted in regarding the mosses as

primary formations in the vegetable order, whatever may be the opinion relative to the seniority of granite or gneiss. We observe that mosses and lichens find thereon a situation favorable to their existence: on the supposition therefore, that there existed a period when our Province presented exclusively such surfaces, we are justified, other things being equal, in concluding that our flora was such as would result from the conditions then existing.

The most striking fact presented in this connection is that of the very close correspondence of our Moss Flora with that of Northern Europe, which is very suggestive of the idea that both continents were at one time connected. Their floras having common origin, though since changed by variation, which has not however extended to these lower forms, they being less affected by it, have a strong tendency to adhere to primordial forms, being influenced by temperature less than by the humidity of their surroundings. Hence it is found that our species are for the most part identical with those of Britain and Northern Europe. It may not be out of place to remark here upon the tendency which many American Naturalists exhibit in trying to separate American from European species, to all appearances identical, applying to the former designations new and strange.

The separation is for the most part an unnatural one, it multiplies genera and species unnecessarily, and increases by a process of artificial refinement the perplexity of a subject already sufficiently perplexing.

It is not at all likely that we have had separate acts of creation for the species of two continents, or that the forces of nature acting upon organic matter had produced national distinctions of this kind: these forces are cosmopolitan, blind and rigid in their action, producing always similar results under similar conditions; light, heat, moisture, are the same everywhere in their action. A granite or slate rock, an iron or copper ore are pretty much the same on both sides of the Atlantic. A herring is still a herring, whether netted in European or American waters, why it should be called *Clupea Harenga* on the one side and *C. Americana* or *Bostoniensis* on the other, is a something which

would puzzle one to explain by any process of scientific reasoning.

Our native mosses verify the above; any text book on British mosses will afford the botanist here sufficient means for diagnosing almost all our species. Allowing some elasticity to the forces influencing the growth and reproduction of plants, we might safely narrow or converge our genera and species with benefit, be more in accordance with nature, and avoid separations from characteristics which are often suspiciously artificial.

As specific descriptions of native species are not attainable, and systematic works on American Bryology rare, or like Sullivan's *Icones*, unattainable by many, I have prepared a description of each species, deeming such to be more useful to workers in the field than a mere enumeration of them. The arrangement of the species, &c., is that which is followed by Berkeley in his work on the *British Mosses*.

FAMILY PLEUROCARPI, Bridel, ORDER, HYPNÆ. BR. &
SCHIMP, MONT.

HYPNUM. radicale.—P. BAUR.

Sporangium, arcuate, oblong, cernuous; lid conical, beak short and sharp, setæ long, leaves spreading more or less cordate, ovate acuminate, nerve not reaching the apex, in moist ground amongst grass; fruiting late in spring, common in this vicinity, (Hx.,) mentioned by Berkeley, (*Brit. Mosses*) as rare in England, being confined to Anglesea and South Wales.

H. CHRYSOPHYLLUM, Bridel.

Sporangium, cylindrical, curved; lid conical, leaves crowded squarrose, secund, ovate, acuminate, entire, nerve half way, stem prostrate, forming golden green patches in vicinity of bogs, and in wet land fruiting in summer—common here.

H. POLYMORPHUM, Hedw.

Sporangium curved, oblong, cernuous, lid conical, leaves crowded, spreading, somewhat secund, ovate, lanceolate, acuminate entire and nerveless, forming yellow patches on granite, very common in this locality, fruiting in spring, more delicate than the above.

H. STELLATUM, Schreb.

Sporangium, oblong, curved, cernuous; varying in size, lid conical acute, stems tufted loosely, branched, leaves entire squarrose, nerveless; cordato ovate, acuminate,—cells at the base loose. Forming tufts, more or less dense, stems sub-erect, larger than the last, of a yellowish green colour, fruiting in summer,—common in marshy localities.

H. PALUSTRE, L.

Sporangium, ovate, cernuous, lid conical; leaves crowded, somewhat secund, spreading, elliptic; concave entire, nerve short; varies in characters of leaves, stem creeping, somewhat branching; branches sub-erect, forming dense tufts of a blackish green, on stones in brooks; fruit in summer,—common in this locality.

H. PULCHELLUM. Dicks.

Sporangium, oblong, sub-cernuous, lid conical, apiculate; leaves crowded, flattened, secund upwards; ovate, lanceolate; entire nerveless; minute forming dense glossy dark green tufts or masses on stumps of trees and decaying timber, in shady woods, branches fastigiate, sub-erect, immersed in a mass of rootlets at the base; fruitstalk arising from the base, fruiting in summer and early autumn. Woods on Peninsula and Dutch Village.

H. SYLVATICUM, L.

Sporangium, subcylindrical, cernuous, lid rostrate; leaves somewhat complanate; ovate, lanceolate, acuminate; entire, two nerved. Stem decumbent, branches few, forms soft deep green patches on roots and boles of trees in damp shady woods; fruiting in autumn. Woods near Bowery Road, Hx.

THUIDIUM. tamarascinum. Br. & Schimp.

Sporangium, oblong, curved, lid rostrate; stem leaves cordate, sulcate acute, branch leaves ovate, lanceolate; all serrate above; papillose, nerved to near the apex, paraphylla numerous; growing in large loose patches in damp woods and by streams and margins of swamps, of a dark deep green colour, stem arched irregularly, tripinnate, fruitstalk red, elongated, a very beautiful moss; abundant everywhere in this locality. In Europe used in manufacture of artificial moss roses and other flowers.

FAM. II.—ACROCARPI.

ORDER.—*Splachnei*. Br. & Schimp.*SPLACHNUM*. *ampullaceum*, L.

Sporangium, oblong, apophysis; large globose or pitcher-shaped, lid conical, leaves oblong, lanceolate; stem short; forming dense matted tufts, rootlets brown; recognised by its pear-shaped, flesh-colored apophysis and lemon-colored sporangium; fruitstalk long. The fructification presents a very beautiful appearance in the recent state.

Woods near Rockhead, the only locality where I have found it, growing on decayed wood that had broken down into a pulverulent mass, fruiting in June.

ORDER.—*Disceliei*. Br. & Schimp.*DISCELIUM*. *nudum*. Brid.

Sporangium, globose, cernuous, lid conical, somewhat acute, veil split on one side, leaves few, imbricated lanceolate entire reddish, small, leaves few, insignificant, growing on clayey soil, fruiting in early spring, woods on the peninsula common.

ORDER.—*Funarici*. Br. & Schimp.*FUNARIA*. *hygrometrica*. Hedw.

Common in soil fertilized by decomposed wood, &c.

ORDER. *Meesiei*. Br. & Schimp.*AMBLYODON*. *dealbatus*. P. Beauv.

Sporangium subpyriform incurved suberect, mouth small oblique, peristome double, apophysis swollen, leaves spathulate, minutely toothed, pale green, sporangium and fruitstalk, golden brown; forms loose clusters not matted like other mosses, found in one locality only, viz., recent cutting on the Sambro road, near Marling's Hill, made for the purpose of levelling or grading, the plant was growing upon the recently exposed boulder clay on the margins of little pools of water. Fruit in August.

ORDER.—*Bryci*. Br. & Schimp.*MXIUM*. *affine*. Bland.

Sporangium ovate oblong, lid convex apiculate, fruitstalks aggregated, upper leaves rosulate bristled, border toothed, swampy woods under hardwood trees. The Gore near Shubenacadie, August.

ORDER.—*Buxbaumiei*. Webb & Mohr.

DIPHYSCIUM. foliosum. W. & M.

Sporangium slipper shaped, buried in the leaves, nearly sessile veil, mitriform, lid conical, acuminate, leaves spreading acute, nerve reaching the apex, perichaetial leaves divided into jointed cilia nerves excurrent. Plant about one-fourth of an inch in height, in broad patches more or less scattered, on shady banks, fruiting in summer. Young Beech Grove, George Deal's farm, Dutch Village.

ORD.—*ORTHOTRICHIEL.* Br. & Schimp.

ULOTA.—Drummondii. Brid.

Sporangium oblong, exserted striate, lid acicular, leaves linear lanceolate, ovate at the base; forming little tufts of a yellowish green colour on the trunks and branches of trees. Common.

ORD.—*Dicranci,* Mont.

DICRANUM. majus. Turn.

Sporangium cernuous, olive brown, beak long, fruitstalks, pale aggregated, leaves long, falcato secund, subulate from a lanceolate base, tips of leaves and nerves toothed, forming deep green tufted and tall patches in woods; fruiting in summer. Common everywhere.

D. PALUSTRE. Lapyt.

Sporangium cernuous, turgid neck, strumous leaves, undulated, transversely linear, tips of leaves toothed, fruiting in summer, habit like the above, but a smaller and more delicate, fruitstalk, solitary. Common.

D. SCOPARIUM. Hedw.

Very common in woods and on exposed banks. Fruiting through the summer.

DICRANELLA. crispa. Schimp.

Sporangium erect, striate lid, long beaked leaves, subulate, toothed at the tip, stems very short. Common in moist places. Fruit in autumn.

D. HETEROMALLA. Schimp.

Sporangium elongated, obovate, gibbous, fruitstalk yellow, leaves entire, channelled, forms deep green silky patches on banks. Common. Fruit in summer and autumn.

D. SUBULATA. Schimp.

Sporangium gibbous, ovate, cernuous lid, long beaked, leaves lanceolate at the base, secund falcate, stems short forming loose tufts on the soil. Fruit in autumn. Common in all localities.

ORDER.—SPHAGNEL. Mont.

SPHAGNUM. Squarrosum. Pal.

Leaves ovate, acuminate, squarrose, grass green above, branchlets horizontal and deflexed, pores large, growing in bogs, forming dense and extensive patches, in some places solitary, oftener mixed with other species; fruiting in summer. (Pennant, Halifax Co.)

ART. III.—THE EAST INDIAN HERBARIUM OF KING'S COLLEGE, WINDSOR. BY PROF. HOW, D. C. L., WITH INTRODUCTION BY GEORGE LAWSON, Ph. D., LL. D., *Dalhousie College, Halifax.*

(Read January 14, 1878.)

Prof. Lawson's Introduction.

BEFORE reading Professor How's paper, I desire to ask permission of the Institute to offer a few prefatory observations. The collection of Indian Plants in King's College consists of 168 specimens. It is not a large one by any means, when we reflect upon the richness of the Indian Flora, and the immense territory which it occupies. But it is a collection of very great interest to botanists. Its chief source of value has to be pointed out to those not already intimate with Indian Botany. This collection, formed about the close of the eighteenth century, leads us back to the early history of Botany in India, but its interest is not merely of the dusty antiquarian kind. Nomenclature has always been regarded by systematic botanists as practically the most important department of their science, of which classification is the framework, and in no other de-