

exposed, and can be studied under every condition of disturbance. The lowest of the measures passed over are those of Long Point, then come the East Bay limestones. The exposures from Cape Auguille to the Barasois Rivers fill the interval between the Gravels and Kippens Brook. The gypsums of Codroy, Barasois and Kippens form an important horizon. Above this come the sections of the rivers and Mr. Murray's coal fields of Indian Brook, which may be represented by the imperfect exposures of coal measures fourteen miles from the mouth of the Barasois River.

Although the deposits of coal have not yet equalled the expectations of investigators, the presence of iron and lead in unusually large deposits, together with the indications of other minerals, marks this Bay as the future scene of extensive mining operations. The summer is clear of fog, and the winter ice lasts only from January to April, so that St. George's Bay has a material advantage over many places lying further to the south.

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ART. IV.—ON CANADIAN SPECIES OF RUBI AND THEIR GEOGRAPHICAL DISTRIBUTION. BY GEORGE LAWSON, PH. D., LL. D., *Dalhousie College*.

(Read January 12, 1874.)

(ABSTRACT.)

RUBUS was described as a genus of plants belonging to the natural order *Rosaceæ*, an order which embraces about a thousand species and a countless number of varieties of artificial origin. An unusually large number of these plants are natives of temperate countries in the northern hemisphere. *Rosaceæ* has furnished our gardens with numerous ornamental plants, such as the hawthorns, pyrus, roses, sweet briars, almonds, spiræas, potentillas, amelanchier, geums, &c., whilst our orchards are indebted to the order for the varieties of apple and pear, cherry, plum, peach, quince, and many others. To the botanist some groups of the *Rosaceæ* have a specially vexing interest, on account of their proneness

to vary in the wild state, and the consequent difficulty of determining what are really distinct permanent species as distinguished from varieties. This is particularly the case with regard to the European *Rubi fruticosi*, many of the long recognized species of which are so closely related that some of our best botanists now rank upwards of twenty forms, too well marked and too constant to be mere varieties, as so many "sub-species," under the specific type of *Rubus fruticosus*. The European Raspberry, *R. Idæus*, stands out from them all, a solitary, isolated species, that has no intimate relation to any of them, and no tendency to vary in their direction. In fact the relatives and derivatives of this species are to be sought for out of Europe. It is known to be spread over the whole north of Europe and Asia, even so far as to Mandschuria and Japan, but to be absent from the American Continent. Here we have its representative so called species, *R. strigosus*, our common raspberry, while this and other Canadian species have their representatives in Eastern Asia. As the result of a most elaborate investigation, Mr. F. W. C. Areschoug has arrived at the conclusion that the European raspberry, as well as the North American forms most closely related to it, grew primitively in Japan and adjacent countries. (*Botaniska Notiser*, 1872, and *Journal of Botany*, 1873.)

The remarkable similarity between the flora of Eastern North America and that of Eastern North Asia, has been prominently brought under notice by Professor Asa Gray long before its true significance, or the questions which it suggested were fully appreciated by botanists. His views are that our present vegetation in Eastern America, or its proximate ancestry, occupied the arctic or sub-arctic regions in Pliocene times; that plants of the same stocks and kindred, forming a nearly uniform flora round the arctic zone, (as uniform perhaps as our present arctic flora), made their forced migration southward upon widely different longitudes, and receded more or less as the climate grew warmer, and different associations of plants thus established themselves in regions suited to them, but not in any other. In the light of Professor Gray's theory, and the special results obtained by Mr. Areschoug, Professor Lawson described in detail the various species of *Rubus* inhabiting the

Dominion, tracing their range on both sides of the Continent, and also in Asia and Europe, and pointing out the structural modifications which they presented. He regarded *R. occidentalis*, *R. intermedius*, *R. Idæus*, with *Leesii* and its other European forms, and *R. strigosus*, as well as all their sub-species or subordinate forms, as forms of one specific type, distinct form, and not necessarily related in origin, but only in some points of structure, to the other members of Areschoug's North American type.

Details were given to show that *R. villosus* was probably a Southern species, whilst *Canadensis* was more Northern. *R. triflorus* is more intimately related to the European *saxatilis* than is generally believed by botanists. *R. flaccidus* appears, from its observed constancy in Nova Scotia, to be entitled to rank as a sub-species of *R. hispidus*, which seems to have been originally a mountain species, rather than an arctic one.

*R. Chamæmorus*, although an Arctic plant, and, in Europe, confined to the mountains of the North, abounds at the sea level in Nova Scotia, producing the berries sold in the Markets under the name of "Bake Apple." It was stated that the present range of many so called Arctic plants in Europe could not be regarded as coincident with their primeval range. A long period of civilization had driven out many swamp plants, which now only exist in the sheltered recesses of the Northern Mountains, just as, year by year, on the American Continent, the same or similar species are slowly meeting with the same fate;—these are the outpost remnants that speak of a wider and more Southern distribution in former times.

The effects of forest fires, of animal agencies, of railways, of lumbering, mining and agricultural operations, in extending the distribution of some of Rubi, and circumscribing that of others, were also referred to.

Specimens of the Canadian species were shown and described, also specimens from various parts of Europe and Asia for comparison, showing the gradations from the thickly felted species of tropical India to the delicate membranous leaves of those growing in the Arctic regions and on the Scandinavian Mountains.