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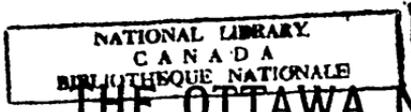
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SOME RECENT ADDITIONS TO THE LABRADOR FLORA.

M. L. FERNALD AND J. D. SORNBORGER.

Two extensive collections, secured during the present decade from the Labrador coast and Hamilton Inlet, have added very materially to our knowledge of that still little explored region. The first of these collections, consisting of about three hundred numbers, was made by members of the Bowdoin College Expedition, which, in 1891, accomplished the difficult ascent of the Hamilton or Grand River and the re-discovery of the mysterious Grand Falls whose location and height were so long known only through vague reports.¹ Owing to the extreme hardships of the trip it was unfortunately impossible to preserve such plants as were collected in the upper valley of the river. A second division of the party, however, collected extensively about Lake Melville and up the coast as far as Hopedale. Many of these plants, sent for determination to the Gray Herbarium by Professor Leslie A. Lee who was in charge of the expedition, are of great geographic interest.

Another collection containing rather more species has been secured by Mr. J. D. Sornborger from various stations on the Labrador coast as far north as Cape Chudleigh. These plants, mostly secured in quantity, were collected largely by Mr Sornborger during the summers of 1892 and 1897, though many valuable specimens have been sent him by the Rev. Adolf Stecker of the Unitas Fratrum, who has collected plants at a season when Labrador is inaccessible, and

¹ For the narrative of this expedition see Packard, *The Labrador Coast*, N. Y., 1891, pp. 507-513.

to whom special acknowledgement is made for these and many other important services. A few specimens from Hebron have been sent by Mrs. Hlawatscheck. These large collections contain nearly three score of species not included in former lists of Labrador plants; and, with the collections of the Bowdoin College Expedition, they furnish so remarkable an addition to our knowledge of that flora as to make desirable the preparation of the following notes.

In the list which follows, no attempt is made to enumerate all the plants of either collection: the larger portion of them, naturally, are well known northern species which have been collected many times in Labrador. The species enumerated are for the most part such as are not credited to Labrador by Mr. James M. Macoun in his "List of plants known to occur on the coast and in the interior of the Labrador Peninsula,"² and such plants are indicated by the asterisk (*) before the name of the species. A few of these species are included in Mr. Macoun's list from the valleys of the Rupert and East Main Rivers and from James Bay, but not from Labrador proper as defined in the eighth report of the Canadian Survey (1895) and its accompanying maps.³ Some of the species, not enumerated in Mr. Macoun's list but here included, have been already noted from Labrador in the contributions from the Herbarium of the Geological Survey of Canada, in the Rev. Arthur C. Waghorne's "Flora of Newfoundland, Labrador, and St. Pierre et Miquelon" or elsewhere. In these cases, however, the former record of the plant is noted. While studying the two collections which are the principal source of these notes occasional Labrador specimens of some of the noteworthy species there represented have been found in the Gray Herbarium, and for the sake of completeness records of these are here included.

² Ann. Rep. Geol. Survey Can., N. S. viii (1895), Part L, App. vi.

³ Thus Labrador, as here understood, is that portion of the Labrador Peninsula lying east of a line drawn directly north from Blanc Sablon to 52° N. lat., thence following the height of land to a point on the mainland-shore nearly south of Port Burwell, Cape Chudleigh.

The list of plants enumerated by Mr. J. M. Macoun from the coast of Labrador was based, according to his introductory note, primarily upon the former list prepared by Professor John Macoun for Packard's Labrador coast. At the time of the preparation of that list, however, much was considered as Labrador which the recent survey includes in Quebec; and many reports, in Packard's work, of plants from "Labrador," were apparently based upon specimens from Caribou Island and other points now included in Quebec. Other reports of species have been based upon Mr. John A. Allen's and some smaller collections from Bonne Espérance, Eskimo Island and other stations west of the present Labrador line. Scattered reports, based upon the collections of Lieut. L. M. Turner on Ungava Bay, have been made of plants as Labrador species, but these, of course, cannot be accepted for Labrador proper. A few species, on the other hand, included in Packard, appear to be reported only indefinitely from Labrador, *i.e.* without definite statement of localities. All such plants as are contained in the Bowdoin and the Sornborger collections and have been recorded only in a general way from Labrador, or collected at stations beyond the recently defined limits of that dependency are here indicated by the † before the name.

The plants enumerated below are of interest not merely as additions to the Labrador flora or as species little known from that peninsula; but many of them are of much broader geographic interest. Ten of them—*Phegopteris polypodioides*, *Iris versicolor*, *Sagina procumbens*, *Nasturtium terrestre*, *Ribes lacustre*, *Pyrus arbutifolia*, var. *melanocarpa*, *Viola Selkirkii*, *Galium tinctorium*, var. *labradoricum*, *Aster longifolius*, var. *villicaulis*, and *Aster puniceus*, var. ———— are here recorded from stations considerably north of their former known limits on our eastern coast.

Some of them, however, *Phegopteris polypodioides*, *Sagina procumbens*, *Nasturtium terrestre*, and *Viola Selkirkii*, for example, are well known even from Arctic sections of Europe, Asia or Western America. On the other hand, six species are

now brought decidedly south of their supposed ranges on the eastern coast. The ranges of *Lychnis affinis*, *Sagina nivalis* and *Braya purpureascens* are extended south from Hudson Straits, of *Crepis nana* from Melville Peninsula, and of *Draba hirta*, var. *arctica* and *Lesquerella arctica* south from Grinnell Land.

Several plants formerly known only from regions much further to the west are now found on the Atlantic coast. *Lathyrus maritimus*, var. *aluticus*, a form apparently common on the Labrador coast, was recently described from the north Pacific coast of America, and *Arnica alpina*, var. *Lessingii*, found by Mr. Sornborger on the mountains at Rama, has been known only from extreme northwestern America and adjacent Asia. *Luzula parviflora*, var. *fastigiata* and *Draba stenoloba* have been unknown east of the Rocky Mountains. *Petasites sagittata* and *Senecio palustris* are apparently unrecorded east of Hudson Bay. *Poa glumaris*, a common grass of the Alaskan shores, has been well known from the mouth of the St. Lawrence, and is now found at Nain, well up the Labrador coast. *Vaccinium ovalifolium*, common in northwestern America, has been known only from Lake Superior and Gaspé Peninsula in the east. The range of *Viola canina*, var. *adunca* is now extended from its almost extra-limital station on the Ottawa to the north coast of Labrador.

Three Greenland species, not generally supposed to occur on the American continent, are represented in these collections—*Polygonum islandicum*, already reported from Rupert river and James Bay, is probably common on the Labrador coast; while *Arenaria uliginosa* and *Potentilla Ranunculus* were found at only one station each.

Some plants, new to Labrador or little known from that region, are of interest as highly local species. *Phleum alpinum*, *Juncus trifidus*, *Cardamine bellidifolia* and *Arenaria ciliata*, var. *humifusa* occur on the higher mountains of New England or adjacent Canada and in Greenland, and by analogy should be expected abundantly in Labrador, where they are apparently of

rare occurrence. In fact, *Cardamine bellidifolia*, found during the past three-fourths of a century at only four stations in British America, may be considered a very rare plant. Another species, *Pleurogyne carinthiaca*, var. *pusilla*, growing in Greenland and at various stations about the mouth of the St. Lawrence, and reported by Pursh from the White Mountains of New Hampshire, is apparently a very rare plant in Labrador, collected by the Bowdoin College party for the first time since Hooker's report of its occurrence there.

Five species not before known from the Labrador coast have been without doubt recently introduced from Europe or the more settled portions of America. These are *Stellaria media*, *Tulaspi arvense*, *Erodium cicutarium*, *Senecio vulgaris*, and *Taraxacum officinale*. *Rumex acetosella* and *Ranunculus repens* should probably also be included in this list. In Packard's "Labrador coast" (449), he quotes from Koch: "The northernmost valleys in which firs grow open into Napartok Bay. North of Napartok Bay (Napartok means fir) [more properly spruce] are found only dwarf willows and birches; mosses and lichens form the principal covering of the ground. . . ." These valleys, opening from the mainland are somewhat sheltered, and it is here that the Eskimo of Hebron secure their fuel and building material. On the more exposed Takatak Island at the mouth of the bay, however, spruce trees attain considerable size. This station, some fifteen miles nearer the open sea than the mainland valleys, is probably the northern limit of trees on the exposed coast of Labrador. North of Napartok Bay, within ten miles of the mouth of Kangerdiuksoak Bay, willows grow to a height of at least eight feet.

In the following list the species already discussed and many others of note are enumerated in the order of Engler and Prantl, and their Labrador stations so far as known are recorded.

*WOODSIA ILVENSIS, R. Br.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (Sornborger, No. 2).

**ASPLENIUM FILIX-FOEMINA*, Bernh.

Webeck Harbor, Aug, 4, 1891 (*Bowdoin College Exped.* No. 215).

**ASPIDIUM SPINULOSUM*, Swartz, var. *DILATATUM*, Hook.

Hopedale, Aug. 6, 1897 (*Sornborger*, No. 140); Red Bay, Chateau Bay, North West River, Webeck, Hopedale, Turner's Bay, July, Aug, 1891 (*Bowdoin College Exped.* Nos. 48, 86, 160, 217, 251, 268). Probably this is the commonest form of the species in Labrador.

**PHEGopteris POLYPODIOIDES*, Fée,

Battie Harbor, July 18, 1891 (*Bowdoin College Exped.* No. 109;) Webeck Harbor, July 22-24, 1892 (*Sornborger*, No. 136).

†*PHEGopteris DRYOPTERIS*, Fée.

Webeck Harbor, Aug. 4, 1891 (*Bowdoin College Exped.* No. 216); July 22-24, 1892 (*Sornborger*, No. 125); Tub Harbor, July, 11, 1892 (*Sornborger*, No. 137 x); Makkovik, Aug. 1896, coll. *Adolf Stecker* (*Sornborger*, No. 138). Reported in Packard's list from Caribou Island, Quebec. (S. R. Butler), Formerly collected at Okak by *Knaus*.

**EQUISETUM VARIEGATUM*, Schleich.

Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 147 y).

**LYCOPODIUM ANNOTINUM*, L., var. *PUNGENS*, Spring.

Common among dwarf spruces in sandy low ground, Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 54); Chateau Bay, July, 14, 1891, Red Bay, July, 2, 1891 (*Bowdoin College Exped.* Nos. 85, 50).

**LYCOPODIUM ALPINUM*, L.

Among spruces, Davis Inlet, Aug, 1, 1892 (*Sornborger*, No. 56.)

**LYCOPODIUM COMPLANATUM*, L.

Among spruces, Davis Inlet, Aug. 1, 1892 (*Sornborger*, No. 56 x).

†*LARIX AMERICANA*, Michx.

Red Bay, July 4, 1892, (*Sornborger*, No. 183) An abundant tree, growing considerably north of Nain. Included with

the two following species in Packard's list only on the authority of Hooker.

**PICEA ALBA*, Link.

Tub Harbor, July 11, 1892 (*Sornborger*, No. 182) See note under *Larix*.

**PICEA NIGRA*, Link.

Chateau Bay, July 14, 1891 (*Bowdoin College Exped.* No. 84). See note under *Larix*.

†*TRIGLOCHIN MARITIMUM*, L.

Mallijak, July 18, 1892 (*Sornborger*, No. 107). Reported by Packard from "coast of Labrador (Dr. Morison)." Formerly collected at Nain by *Lundberg*.

**HIEROCHLOE HOREALIS*, R.S.

Mallijak, Hamilton Inlet, July 18, 1892 (*Sornborger*, No. 250). Formerly reported by Macoun (Cat. Can. Pl. pt. iv. 187) from "Coast of Labrador (*McGill Coll. Herb.*)," but not included in his subsequent list (1895) nor in Packard's "Labrador Coast" (1891).

**PHLEUM ALPINUM*, L.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, No. 283).

CALAMAGROSTIS LANGSDORFFII, Trin.

Hopedale, Aug. 4-6, 1897, Aillik, July 27, 1892 (*Sornborger* Nos. 242, 261). Abundant at Rama before the Eskimo house just above the beach.

**AGROSTIS RUBRA*, L.

Hopedale, Aug. 4-6, 1897, Hebron, July, 1896—coll. *Mrs. Hlawatscheck* (*Sornborger*, Nos. 244, 252).

**POA LAXA*, Hænke.

Rama, Aug. 15, 1892 (*Sornborger*, No. 257).

**POA GLUMARIS*, Trin.

Nain, Aug. 11, 1897 (*Sornborger* No. 239). Collected in 1849 on the southern coast of Labrador by Dr. Storer, and in 1860 by Martin and Bryant; also found on the sea-shore at

Bonne Espérance, Quebec (near the Labrador border), July 26, 1882 (J. A. Allen, No. 24).

*PUCCINELLIA ANGUSTATA, Nash (*P. maritima* var. *minor*, Watson).

Hopedale, Aug. 11, 1891 (*Bowdoin College Exped.* No. 249), abundant on the beach below high water, Aug. 4-6, 1897 (*Sornborger*, No. 237); Nain, Aug. 11, 1897 (*Sornborger*, No. 238). Also collected at Salmon Bay, Quebec (near the Labrador line), July 28, 1882 (J. A. Allen, No. 27).

AGROPYRON VIOLACEUM, Vasey.

Rama, Aug. 20-24, 1897 (*Sornborger* No. 263).

†CAREX SALINA, Wahl.

Rama, July 15—Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, No. 271). Formerly collected by *J. A. Allen* at Fox Harbor (Labrador?), and reported by Packard without definite locality.

*CAREX MARITIMA, Mull.

Mulligan Point, Lake Melville, July 25, 1891 (*Bowdoin College Exped.* No. 132); near Eskimo Island, Hamilton Inlet, July 14, 1892 (*Sornborger*, No. 260).

†CAREX RARIFLORA, Smith.

Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 258); Webeck Harbor, July 22-24, 1892 (*Sornborger*, No. 45). Allen's plant included in Packard's list is from Bonne Espérance, Quebec.

*CAREX GLAREOSA, Wahl.

Rama, Aug. 20-24, 1897 (*Sornborger*, No. 256). Collected at Watsheeshoo, Quebec, July 2, 1882 (*St. Cyr*), and at Cape Chudleigh (*R. Bell*).

*CAREX NARDINA, Fries.

Rama, Aug. 15, 1892 (*Sornborger*, No. 246.)

CAREX CANESCENS, L., var. ALPICOLA, Wahl.

Hopedale, Aug 4-6, 1897, Nain, Aug. 4, 1892 (*Sornborger*, Nos. 259, 269).

*LUZULA PARVIFLORA, Desv., var. FASTIGIATA, Buchenau.

Tub Harbor, July 11, 1892 (*Sornborger*, No. 272). In America not formerly known east of the Rocky Mts.

**JUNCUS BALTICUS*, Willd., var. *LITTORALIS*, Engelm.

Mulligan's Point, Hamilton Inlet, July 25, 1891 (*Bowdoin College Exped.* Nos. 130, 131).

**JUNCUS TRIFIDUS*, L.

On the rocky slope of a mountain, not above 500 m., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 284). Collected by *John A. Allen* at Carroll Cove, lat. 51° 40', Aug. 6, 1882 (No. 75).

†*SMILACINA TRIFOLIA*, Desf.

Battle Harbor, July 18, 1891 (*Bowdoin College Exped.* No. 107); Tub Harbor, July 11, 1892 (*Sornborger*, No. 222). Reported by Packard from Caribou Island, Quebec (*S. R. Butler*.)

†*MAIANTHEMUM CANADENSE*, Desf.

Makkovik, Aug. 1896, coll. *Adolf Stecker* (*Sornborger*, No. 219); North West River, July 27, 1891 (*Bowdoin College Exped.* No. 159). Reported by Packard from Caribou Island, Quebec (*S. R. Butler*).

†*STREPTOPUS AMPLEXIFOLIUS*, DC.

Red Bay, July 12, Indian Harbor, Aug. 2, Hopedale, Aug. 11, 1891 (*Bowdoin College Exped.* Nos. 46, 199, 247); Mallijak, July 18, 1892 (*Sornborger* No. 223). Reported by Packard from Caribou Island, Quebec (*S. R. Butler*).

†*CLINTONIA BOREALIS*, Raf.

Chateau Bay, July 14, Battle Harbor, July 18, Northwest River, July 27, Red Bay, Sept. 6, 7, 1891 (*Bowdoin College Exped.* Nos. 80, 108, 158, 293); Pitts Arm, Henley Harbor, Sept. 24, 1892 (*Sornborger*). Reported by Packard from Caribou island, Quebec (*S. R. Butler*).

**IRIS VERSICOLOR*, L.

Battle Harbor, July 18, 1891 (*Bowdoin College Exped.* No. 106).

†*HABENARIA OBTUSATA*, Rich.

Indian Harbor, Hamilton Inlet, Aug. 2, 1891 (*Bowdoin College Exped.* No. 198). Reported by Packard from Caribou Island, Quebec (*S. R. Butler*).

MYRICA GALE, L.

Tub Harbor, July 11, 1892, Makkovik, Aug., 1896—coll. *Adolf Stecker* (*Sornborger*, Nos. 69, 68); Mulligan Point, Lake Melville, July 25, 1891 (*Bowdoin College Exped.* No. 128).

**SALIX BROWNII*, Bebb.

Low ground, by a brook, Hopedale, Aug. 4-6, 1897, Red Bay, July 4, 1892 (*Sornborger*, Nos. 13, 24); Chateau Bay, July 14, 1891, Indian Harbor, Hamilton Inlet, Aug. 2, 1891, Red Bay, Sept. 7, 1891 (*Bowdoin College Exped.* Nos. 77, 197, 291), Reported by Macoun from "Labrador (*Morrison*)" and "Nachvak and Ford's Harbor, Labrador (*R. Bell*)" (*Cat. Can. Pl.* pt. iii. 444, 445, and pt. v. 356), but included in subsequent lists as *S. arctica*.

†*BETULA GLANDULOSA*, Michx.

Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 80). Formerly collected at Square Island, Aug. 15, 1882 (*J. A. Allen*, No. 71) Reported by Packard on the authority of Hooker from the Labrador coast, and from Caribou Island, Quebec (*S. R. Butler*).

**BETULA NANA*, L., var. *FLABELLIFOLIA*, Hook.

Chateau Bay, July 14, 1891, Battle Harbor, July 18, 1891 (*Bowdoin College Exped.* Nos. 76, 105).

**RUMEX ACETOSELLA*, L.

North West river, July 27, 1891 (*Bowdoin College Exped.* No. 156).

**RUMEX SALICIFOLIUS*, Weinm.

North West river, July 27, 1891 (*Bowdoin College Exped.* No. 155).

**POLYGONUM ISLANDICUM*, Meisner (*P. aziculare*, L., var. *borcale*, Lange).

Abundant about the houses and on refuse heaps in the Eskimo village, Nain, Aug. 4, 1892 (*Sornborger*, No. 81) appearing introduced; Mulligan Point, Lake Melville, July 25, 1891 (*Bowdoin College Exped.* No. 127). Formerly listed by Macoun from Rupert river and the shores of James Bay, but not credited to America by Small in his monograph of the genus.

*LYCHNIS AFFINIS, Wahl.

Rocky banks of a brook, Rama, Aug. 20-24, 1897 (*Sornborger*, No. 36). Not otherwise positively known from Labrador, though formerly reported without locality.

*CERASTIUM TRIGYNUM, Vill.

Rama, Aug. 20-24, 1897 (*Sornborger*, No. 201). Formerly collected near Hopedale (*Kunth*) and at Cape Chudleigh, Aug. 7, 1884 (*R. Bell*).

*CERASTIUM ARVENSE, L.

Rocky banks of a ravine at an elevation of about 300 m., Rama, Aug. 4-6, 1897, and in coarse slaty detritus a little above high-water mark, beside the pool below a water fall, Rama, Aug. 20-24, 1897 (*Sornborger*, Nos. 204, 203). Formerly collected at Hopedale (*Kruth*) and at Ungava Bay, 1884 (*L. M. Turner*, No. 4,840); and reported by Waghorne from stations in southern Labrador.

*STELLARIA MEDIA, Cyrill.

Hopedale, Aug. 11, 1891 (*Bowdoin College Exped.* No. 219).

*STELLARIA LONGIPES, Goldie, var. LAETA, Watson.

Hopedale, Aug. 11, 1891 (*Bowdoin College Exped.* No. 221). Also reported from L'anse au Loup and Pack's Harbor by the Rev. A. C. Waghorne.

*ARENARIA CILIATA, L., var. HUMIFUSA, Hornem.

Individuals isolated, growing on a slope of moist slaty detritus immediately below a field of snow, at an elevation of about 500 m., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 126). Not formerly known in eastern America nearer than Lake Mistassini and the Gaspé mountains.

ARENARIA VERNA, L.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, No. 209).

*ARENARIA VERNA, L., var. HIRTA, Watson.

Rama, July 15 Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, No. 208); Aug. 20-24, 1897 (*Sornborger*, No. 286).

*ARENARIA ULIGINOSA, Schleich.

On slaty detritus, Rama, alt. 300 m., Aug. 20-24, 1897 (*Sornborger*, No. 150). Its first collection on the American continent. For further discussion and figure see B. L. Robinson, *Bot. Gaz.* xxv. 167, t. 13, f. 6.

*SAGINA PROCUMBENS, L.

Near sea-level, in moist detritus partially denuded by a mountain stream, Hebron, Sept. 12, 1897 (*Sornborger*, No. 207). Not definitely known before north of Newfoundland.

*SAGINA NIVALIS, Fries,

With the latter (*S. procumbens*), Hebron, Sept. 12, 1897 (*Sornborger*, No. 207 x). Collected by *A. P. Low* along the Ungava River in 1896. Otherwise known in America only from Alaska and the higher Rocky Mountains.

*THALICTRUM ALPINUM, L.

Ekortarsuk, Cape Chudleigh, Aug. 20-30, 1896 (*Rev. C. Schmitt*). Formerly collected at Cape Chudleigh by *R. Bell*.

*RANUNCULUS REPENS, L.

Square Island Harbor, Sept. 3, 1891 (*Bowdoin College Exped. Nos. 277, 278*).

*DRABA STENOLOBA, Ledeb.

On a slope of moist slaty detritus immediately below a field of snow, at an elevation of about 500 m., Rama, Aug. 20-24, 1897 (*Sornborger*, Nos. 61, 175). Not previously recorded east of the Rocky Mountains of British America.

*DRABA HIRTA, L., var. ARCTICA, Watson.

Rama, July 15-Aug 20, 1894, coll. *Adolf Stecker* (*Sornborger*, No. 212). In America formerly known only from Grinnell Land where it was collected by *Licut. A. W. Greeley*.

*DRABA ALPINA, L.

Ekortarsuk, Cape Chudleigh, Aug. 20-30, 1896 (*C. Schmitt*). Formerly collected at Cape Chudleigh by *R. Bell*, Aug. 6, 1884.

*DRABA NIVALIS, Lilj.

Ekortarsuk, Cape Chudleigh, Aug. 20-30, 1896 (*C. Schmitt*). Formerly collected at Okak by members of the *Unitas Fratrum*.

*LESQUERELLA ARCTICA, Watson.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (Sornborger, No. 59). Not formerly reported nearer than Greely's station in Grinnell Land.

*THLASPI ARVENSE, L.

Chateau Bay, July 14, 1891 (*Bowdoin College Exped.* No. 52). Reported by Waghorne from about houses, Capstan Island and Pixware River.

*BRAYA PURPURASCENS, Bunge.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (Sornborger No. 60). Formerly collected on Hudson Straits by *R. Bell*.

COCHLEARIA ANGLICA, L.

Shores of a small island, Seal Islands, Sandwich Bay, July 6, 1892 (*Sornborger*, No. 169). Collected by *Martin* on Caribou Island, Quebec, in 1860, and by *Allen*, in the crevices of rocks, Bonne Espérance and Peroquet Island, Quebec (near the Labrador boundary), July, 1882 (Nos. 58, 57). Also reported by Waghorne from "Partly Modiste and L'anse au Clair."

*NASTURTIIUM TERRESTRE, R. Br.

North West River, July 27, 1891 (*Bowdoin College Exped.* No. 133).

*CARDAMINE BELLIDIFOLIA, L.

Individuals isolated, on a slope of moist slaty detritus immediately below a field of snow, at an elevation of about 500 m., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 174); Ekortiar-suk, Cape Chudleigh, Aug. 20-30, 1896 (*Rev. C. Schmitt*). Formerly collected by members of the *Unitas Fratrum* at Okak, but previously recorded in British America only from the early collections of Richardson and Drummond, and from two very limited stations in the Selkirk and Rocky Mountains.

DROSERIA INTERMEDIA, Hayne, var. AMERICANA, DC.

Square Island Harbor, Sept. 3, 1891 (*Bowdoin College Exped.* No. 279).

**SAXIFRAGA STELLARIS*, L., var. *COMOSA*, Poir.

Webeck Harbor, July 22-24, 1893 (*Sornborger*, No. 188). Formerly collected at Okak by members of the *Unitas Fratrum*, and on moist cliffs, Whale Island, Chateau, Aug. 11, 1882 (*J. A. Allen*, No. 46).

**RIBES LACUSTRE*, Poir.

Red Bay, July 12, 1891 (*Bowdoin College Exped.* No. 30). Reported by Waghorne from L'anse au Clair and L'anse au Mort.

RUBUS STRIGOSUS, Michx.

Mallijak, Hamilton Inlet, July 18, 1892 (*Sornborger*, No. 223). Collected in southern Labrador in 1849 by Dr. Storer. Reported by Macoun (*Cat. Can. Pl. pt. i.* 130) from "Coast of Labrador (*McGill Coll. Herb.*)," but not included in his subsequent list.

DRYAS OCTOPETALA, L., var. *INTEGRIFOLIA*, C. & S.

Rocky ridge at about 100 m. alt., Rama, Aug. 20-24, 1897 (*Sornborger* No. 48). This is apparently the plant of the Labrador coast and Anticosti, reported at various times as *D. octopetala*. Pursh collected it on Anticosti as he did also *D. Drummondii* (see specimens in *Gray Herb.*), but there is little to show that true *D. octopetala* grows on this coast.

**POTENTILLA NANA*, Willd.

Ekortiarasuk, Cape Chudleigh, Aug. 20-30, 1896 (*Rev. C. Schmitt*). Reported by Rydberg from Labrador (coll. *Kohlmeister*).

**POTENTILLA RANUNCULUS*, Lange.

Rocky banks of a mountain brook, alt. 300 m., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 24 x). Its first collection on the American continent.

**PYRUS ARBUTIFOLIA*, L. f., var. *MELANOCARPA*, Hooker.

Webeck Harbor, July 22-24, 1892 (*Sornborger*).

**PYRUS SAMBUCIFOLIA*, C. & S.

Aillik, July 27, 1892 (*Sornborger*, No. 123).

**LATHYRUS MARITIMUS*, Bigelow, var. *ALEUTICUS*, Greene, in White, Bull. Torr. Cl. xxi. 450.

Growing in the sandy delta of a small river, with *Oxytropis campestris*, DC., var. *caerulea*, Koch and *Astragalus alpinus*, L., at a distance of 150 m., from high water and some 6 m., above it, Nain, Aug. 11, 1897 (*Sornborger*, No. 220). *L. maritimus*, Bigelow, was not found on this delta, but undoubtedly occurs on the beaches near Nain. Chateau Bay, July 14, 1891, Battle Harbor, July 18, 1891, Hopedale, Aug. 11, 1891 (*Bowdoin College Exped.* Nos. 58, 92, 223). Formerly collected at Dumplin Harbor, July, 1864 (*B. Pickman Mann*). Probably a common plant.

**ERODIUM CICUTARIUM*, L' Her.

Beside paths in sandy soil near gardens, Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 148). Apparently introduced.

**VIOLA SELKIRKII*, Pursh.

Beside a mountain brook at slight elevation, Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker*, (*Sornborger* No. 101.) Reported by the Rev. A. C. Waghorne from Battle Harbor.

VIOLA PALUSTRIS, L.

Webeck Harbor, July 20-22, 1892 (*Sornborger*, No. 102). Reported by Waghorne from Battle Harbor and formerly collected, with no definite record of locality, by *Dr. Bryant*.

**VIOLA CANINA*, L., var. *ADUNCA*, Gray.

By a brook, Rama, Aug. 15, 1892 (*Sornborger*, No. 104x). Not formerly known east of the Ottawa River.

**EPILOBIUM HORNEMANNI*, Reichenb.

Mallijak, Hamilton Inlet, July 18, 1892 (*Sornborger*, Nos. 91, 95); Makkovik, Aug. 1896, coll. *Adolf Stecker*, Rama, July, 15-Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, Nos. 92, 90). Formerly collected by members of the Unitas Fratrum at Okak and reported by Waghorne from a number of points on the southern coast.

EPILOBIUM ANAGALLIDIFOLIUM, Lam.

Growing in compact bunches, on a slope of moist slaty detritus immediately below a field of snow, at an elevation of about 500 m., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 46).

EPILOBIUM LINEARE, Muhl., var. OLIGANTHUM, Trelease.

Indian Harbor, Hamilton Inlet, Aug. 2, 1891 (*Bowdoin College Exped. No. 182*); Hebron, Sept. 12, 1897, in moist ground with *Sphagnum*, Makkvik, Aug., 1896, coll. *Adolf Stecker* (Sornborger Nos. 47, 93).

*VACCINIUM OVALIFOLIUM, Smith.

Red Bay, July 12, 1891 (*Bowdoin College Exped. No. 294*); Pitts Arm, Henley Harbor, Sept. 24, 1892 (*Sornborger*). Collected by *J. A. Allen* at Chateau, Aug. 8, 1882, also on Mt. Albert, Gaspé. Recently found by *Rev. A. C. Waghorne* in Newfoundland, White Bay, Sept. 1891.

CHIIOGENES SERPYLLIFOLIA, Salisb.

Chateau, July 14, 1891 (*Bowdoin College Exped. No. 67*). Reported by Packard, on the authority of Hooker, from the Labrador coast.

†PRIMULA EGALIKSENSIS, Hornem.

Battle Harbor, July 18, 1891 (*Bowdoin College Exped. No. 103*). Formerly reported from northern Labrador, but Lieut. Turner's specimens, upon which this report was based, are from Ungava Bay.

PLEUROGYNE CARINTHIACA, Griseb., var. PUSILIA, Gray.

Eskimo Island, Hamilton Inlet, Aug. 26, 1891, Square Island Harbor, Sept. 3, 1891 (*Bowdoin College Exped. Nos. 276, 283*). A rare plant, previously known in Labrador only from Hooker's report, though well-known from Anticosti, Rivière-du-Loup, and other points near the mouth of the St. Lawrence.

*HALENIA BRENTONIANA, Griseb.

Red Bay, Sept. 6 and 7, 1891 (*Bowdoin College Exped. No. 290*).

EUPHRASIA LATIFOLIA, Pursh.

Makkvik, Aug., 1896, coll. *Adolf Stecker* (Sornborger, No. 28); Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 82).

*GALIUM TINCORIUM, L., var. LABRADORICUM, Wiegand.

In *Sphagnum* near a brook, Hebron, Sept. 12, 1897 (*Sornborger*, No. 180). Based in part upon a Labrador specimen collected by Dr. Storer.

VIBURNUM PAUCIFLORUM, Pylaie.

Red Bay, July 12, Webeck, Aug. 4, 1891 (*Bowdoin College Exped.* Nos. 34, 204). Red Bay, July 4, 1892, Makkovik, Aug., 1896 (*Sornborger*, Nos. 41, 40). Formerly collected at Okak (*Herb. J. Gay*). Reported by Packard from Caribou Island, Quebec, (*S. R. Butler*).

*ASTER LONGIFOLIUS Lam., var. VILICAULIS, Gray.

Makkovik, Aug., 1896, coll. *Adolf Stecker* (Sornborger No. 163). Not formerly known north of the St. John and Restigouche Valleys in New Brunswick.

*ASTER PUNICEUS, L., var. OLIGOCEPHALUS, Fernald, n. var.

A form of *Aster puniceus*, which it has been impossible to place with satisfaction, is the plant familiar to botanists who have collected in Tuckerman's Ravine and Oakes Gulf in the White Mountains of New Hampshire. This White Mountain form has long been known only from that region, but the Bowdoin College party brought back fine specimens from Labrador, though somewhat taller than those from the better-known alpine stations. Plants apparently referable to the same form have more recently been collected on the north shore of Lake Superior by G. S. Miller, Jr., and last September on hills at Bay of Islands, Newfoundland, by the Rev. A. C. Wag-horne. The plant may be expected, then, to have a much broader range than we yet know. In the outer foliaceous bracts of the involucre this northern and alpine plant differs from other forms of *A. puniceus*, but this character is inconstant; and many heads have the involucre seemingly identical with that of true *A. puniceus*, showing the plant to be an extreme form of that species rather than a distinct specific type. The plant may be characterized as follows:

Stems from 2.5 to 7 dm. high (reduced in alpine specimens), more or less pubescent above, glabrate below: leaves from lanceolate to oblong-lanceolate, with conspicuously clasping bases, entire or sparingly appressed-serrate, glabrous or somewhat scabrous above, glabrous beneath or sparingly pubescent on the broad midrib: branches of the inflorescence shorter than

the leaves, bearing few or single large heads (in some alpine specimens the solitary terminal heads sessile): heads often subtended by leafy bracts, and with the outer involucre bracts generally broad and foliaceous.—LABRADOR, Red Bay, Sept. 7, 1891 (*Bowdoin College Exped.* No. 288): NEWFOUNDLAND, hills, Coal river, Bay of Islands, Sept. 14, 1898 (*A. C. Waghorne*): ONTARIO, Peninsula Harbor, Sept. 16, 1896 (*G. S. Miller, jr.*): NEW HAMPSHIRE, in the White Mountains near Crystal cascade, entrance to Glen road, July 18, 1891 (*G. G. Kennedy*); near the Half-way-House, Mt. Washington, Aug. 3, 1898 (*Mrs. E. H. Terry*); Tuckerman's Ravine, Aug. 20, 1898 (*W. W. Eggleston*); Oakes Gulf (*Edwin Faxon, E. F. Williams et al.*).

*ANTENNARIA HYPERBOREA, Don.

Rama, July 15. Aug. 20. 1894, coll. *Adolf Stecker* (*Sornborger*, No. 155). Formerly collected in Labrador by *Kohlmeister*, and at Okak by members of the *Unitas Fratrum*.

*ARTEMISIA BOREALIS, Pall., var. WORMSKIOLDII, Besser.

Rocky ledges at about 200 m. alt., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 62).

*PETASITES SAGITTATA, Gray.

Maktovik, Aug., 1896, coll. *Adolf Stecker* (*Sornborger*, No. 85).

*ARNICA ALPINA, Olin, var. LESSINGII, Torr. & Gray.

Banks of a mountain brook, about 100 m. above high water, Rama, Aug. 20-24, 1897 (*Sornborger*, No. 157). Previously recorded only from the northwest coast of America and adjacent Asia.

*SENECIO VULGARIS, L.

Beside paths, in moist ground, Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 162).

*SENECIO PALUSTRIS, Hook.

Battle Harbor, July 18, 1891, Indian Harbor, Hamilton Inlet, Aug. 2, 1891, Houlton Harbor, Aug. 19, 1891 (*Bowdoin College Exped.* Nos. 295, 188, 261).

HIERACIUM VULGATUM, Fries.

Rama, 1898, coll. *Adolf Stecker*.

*CREPIS NANA, Richardson.

Found only in a small outcrop of slate having a vertical cleavage, at about 200 m. above sea-level, covering an area of only 3 square metres, on the side of a mountain, Rama, Aug. 20-24, 1897 (*Sornborger*, No. 86). In British America previously known only from the early collections of Richardson, Parry, and Drummond "on the Copper-mine River" (Richardson in Franklin, 1st. Journ. ed. 2. 1823, App. vii. 757); "Repulse Bay, Five Hawser Bay and Lyon Inlet" (Parry, 2nd. Voyage, 1825, App. 397); "on the slaty debris of the Rocky Mountains (*Drummond*)" (Macoun, Cat. Can. Pl. pt. ii. 274).

*TARAXACUM OFFICINALE, Weber.

On the beach just above high water, at a fall where water casks are frequently filled by the fishermen, Rama, Aug. 20-24, 1897 (*Sornborger*, No. 64). Possibly introduced. Reported from Battle Harbor by Waghorne.

NOTES ON FRESH-WATER POLYZOA.

By WALTER S. ODELL.

The term Polyzoa or Bryozoa embraces a very large number of microscopic animals mostly marine, but to a smaller extent found in fresh water. It is only with the fresh-water species we have to deal in this paper. The question will be asked what are Polyzoa? They are a class of molluscoidea including minute animals, which by budding form compound colonies." Bryozoa is the name applied to the same class by many zoologists.

Polyzoa are so called from the fact that the animals which constitute them live together in colonies in large numbers. They are not all microscopic. Most of them are readily distinguished with the naked eye, but require a pocket lens or a microscope to reveal further details. They vary much

n size, from that of a pea, to several feet in diameter [a specimen measuring one foot in diameter was found in Patterson's Creek just above Elgin St. bridge.] Each individual of a colony is called a Polypide. It is a very beautiful object under the microscope, most delicate in structure and transparent. Whenever disturbed the polypide retracts quickly into its case or cœnocerum. Altogether it forms one of the most interesting classes of objects formed in fresh water.

Fresh-water Polyzoa are very generally distributed in the ponds and slow-moving streams, and lake shores above Ottawa, and the wonder is that their beauty has not long ago been found out. No systematic study of the Fresh-water Polyzoa has as yet been made in this district.

Dr A. C. Stokes in his "Aquatic Microscopy" p. 237 makes the following statement. "Their beauty is so exquisite, so delicate, so refined in its comeliness and grace, that no description could be too extravagant when applied to the charming little creatures. Nature was never in a better mood than when she began the development of the Polyzoa, so she fashioned them with care."

Seven genera of Fresh-water Polyzoa have been found and described in the United States of America, as follows:—

Plumatella, Fredericella, Paludicella, Cristatella, Pectinatella, Urnatella, Lophopus.

In America, Lophopus has only been recorded from two localities having been found in California, and at Trenton, N. J.

Polyzoa are usually found attached to some submerged object, a piece of board, weed, stump or stone. An exception to this is the species referred to, Cristatella, which moves more or less slowly from place to place.

Young zooids after leaving the egg swim freely for a short time, and then become attached to some object, to which they then adhere till death. Certain forms prefer the sunlight while others are only found in shady places and others still, thrive on the under or dark side of sticks, boards or stones.

Description of species found at Ottawa.

(1) PLUMATELLA REPENS, L.

The colonies of *Plumatella* are formed of sheaths or coverings called *cœnœcia* which the polypides secrete, and appear as brownish tubes branching like tiny trees or seaweeds, extending over a surface measuring sometimes several square feet. There are two modes of attachment in these colonies: (*a*) where the lower portion of the stem is fixed and the remainder of the branch floats freely: (*b*) when the whole branch is closely adherent or creeping on the submerged object.

At the extremity of each branch a polypide protrudes, exposing the lophophore or plume-like organ (hence the name *Plumatella*). The polypides quickly retreat on the slightest alarm or disturbance, and remain in their sheaths until quite satisfied that the cause is removed.

"The body of the polypide* is a transparent membraneous sac with a lophophore (horse-shoe shaped in this genus), on which are arranged the tentacles. Each tentacle is capable of independent motion, is ciliated on both sides, and is the only means the polypide has of receiving impressions. The mouth is at the fore end, the rest of the body being concealed in a brown sheath or *cœnœcium*. The mouth has on one border a tongue-like organ called the *Epistome*, which can close the opening, and prevent the escape of food. Extending from the mouth to the stomach is the *œsophagus*. The stomach is a widened tube, conspicuous by its contents. It is suspended in the hollow body, and is bathed by a colorless fluid which fills the body cavity and extends to the hollow tentacles. The stomach is followed by a tubular intestine which curves forward, opening on the lophophore." The polypide has no heart nor circulatory system. The body has a beautifully developed muscular system, which enables it to move freely and rapidly. One set of muscles everts the body, another set is used in expanding the various tentacles of the lophophore; and another set supports the body

* Dr. A. C. Stokes in "Aquatic Microscopy" p. 242.

while the lophophore is thus expanded. Another set of muscles assist in closing the opening of the cœnocœcium, when the body is withdrawn ; or are attached to the stomach, which assist that organ in its functions.

Plumatella repens feeds on infusoria and small algæ which are drawn into the mouth by the currents created by the cilia attached to the tentacles. These cilia have an upward movement on one side of the tentacles and a downward one on the other.

Reproduction occurs in two modes : (a) by budding, (b) by statoblasts or winter eggs. Reproduction by budding merely increases the number of individuals in each colony, whilst reproduction by statoblasts assists in forming new colonies.

Statoblasts are flattened discs, round or oval, formed within the body, and escape after the death of the polypide when the whole colony disintegrates. Statoblasts are dark brown in colour and have an outer ring called the *Annulus*, formed of hexagonal cells. Others have barbed hooks along the margin. Statoblasts are excellent criteria for distinguishing one genus from another, or the different species of each genus.

Locality and habitat. Abundant on logs, sticks, stones in Patterson's Creek and in pits at Odell's Brick Works where the largest colony observed was found on a piece of board five feet long and ten inches wide entirely covering the under surface with innumerable colonies of this species. August 1898.

FREDERICELLA REGINA, Leidy.

This species is found growing with the preceding, which, it resembles somewhat in appearance. It is dendritic in form, of a light brown color, and usually attached by the trunk, the branches being mostly free. It covers a smaller area than *Plumatella* and is readily distinguished from it by its characteristic circular or oval lophophore, that of the former being horse-shoe-shaped. The tentacles are few in number, generally nineteen, and arranged on the crest in a single row. Contrary to the statement made by Hyatt and other workers on Polyzoa, *Fredricella regina* found at Ottawa was found in nearly every

case in the sunlight instead of in the shade, attached to submerged or floating weeds. The statoflasts of *Fredericella* are distinguished from those of all others in having no annulus. In shape they are veiniform, and are destitute of spines.

Locality and habitat. Very common in the Rideau River above Hog's Back in a small bay west side of the locks, attached to stems of *Myriophyllum spicatum*; also in Patterson's Creek near Elgin street bridge on *Heteranthera*. Also obtained during the winter on stems of *Anacharis Canadensis* from clay pits in Odell's Brick Works, Ottawa East, July, 1898.

PALUDICELLA EHRENBERGII, Van Beneden.

"These colonies may always be distinguished from all other tube-making Polyzoa by their jointed appearance, each cell being club-shaped. The colonies are irregularly branched and are built up of a single row of cells placed end to end, the narrow end or handle of the club being attached to the broad end of the cell immediately behind it. The opening through which the polypide protrudes its circular lophophore is at one side of the broad end of each cell and near the top."* No statoblasts of *Paludicella* have been discovered; reproduction is effected by budding. Unlike other genera of Fresh-water Polyzoa, it has Hibernacula or winter quarters for the resting buds, which correspond with the statoblasts of other genera. "At the approach of spring the bud becomes covered with a horny sheath, thus preserving it till the following spring." The bud then splits vertically after which the young is developed in the usual way.† The tentacles of this genus are sixteen.

Locality and habitat. This is by far the rarest form of Fresh Water Polyzoa found at Ottawa. Three colonies were obtained on stones only. In the little rapids above Billings' Bridge, Rideau River; also at Hurdmans Bridge, same stream; and in the shallow above the rapids at the Canadian Pacific Ry., bridge, Rideau River, Aug. 1898.

*Dr. A. C. Stockes "Aquatic Microscopy" p. 249.

†"Ponds and Rock Pools" p. 132. Scherren Hy.

CRISTATELLA IDÆ, Leidy.

Colonies of this genus are oval in shape, flat on the under side and convex on the upper side, with the polypides in rows all around, except along the centre of adult specimens, where statoblasts are to be seen. Individuals of this genus after emerging from the statoblast, form a small lump or mass of jelly semi-transparent in colour, and usually pear-shaped. In the adult form it is not unlike a hairy caterpillar, owing to the presence of numerous buds which proceed from the ectoderm. By budding, the colony grows rapidly in length (but not in breadth) till it reaches a length of two or three inches, when it measures a quarter of an inch in breadth. A specimen found in the Rideau canal on a sunken barge measured four inches in length.

This form differs from all others in two particulars, (a) in having powers of locomotion; (b) in preferring sunlight during life. *Cristatella* moves very slowly, covering a length of about one inch per day. By carefully marking off certain spaces on the object on which it rests, the distance travelled can easily be ascertained. The polypide of this species has many points of resemblance to *Plumatella*. The tentacles are about eighty in number. The statoblasts of *Cristatella* consist of rounded flattened discs, which have the margin covered with two rows of doubly barbed hooks resembling anchors.

Locality and habitat. Occurs on stones at little rapids on Rideau River above Billings' Bridge; also on stones at Hurdman's Bridge, Rideau River; in Patterson's Creek, Ottawa, between the Bank street and Elgin street bridges on blades of submerged grass; also on beam of a sunken barge on Rideau canal at Bronson's wharf. October 1898.

PECTINATELLA MAGNIFICA Leidy.

"The reproductive and vital energies of the group reach their climax in the voluptuous beauty and endless multiplication of the cœnœcia in *Pectinatella*."* "The colonies of this class

*Hyatt "Observations on Polyzoa" p. 12.

are surrounded by a thick jelly-like material, from which the polypides protrude, and into which they retreat. These jelly-masses are usually colourless and semi-transparent, or tinged a pale red. They are to be found adherent to sticks or any water-soaked object, and vary in size from half an inch to several feet in diameter." "The jelly is formed by the polypides, and is in reality a collection of protective cells or chambers, the huge masses often being the result of the increase in the numbers of the polypides inhabiting them A single polypide begins the cluster, it becomes two by a process of budding, the bud finally becoming another polypide, secreting more jelly, budding in its turn, so that the community may in the end contain numberless members. The colour of the polypides is usually a pale red or flesh tint,"* "and being in countless profusion in the jelly-mass, are crowded together and become compressed into irregular hexagons in outline." The lophophore is horseshoe-shaped, having from sixty to eighty tentacles. Towards the end of summer the polypides mature and die, leaving the statoblasts adhering to the surface of the jelly-mass. These statoblasts are often in such large numbers as to be conspicuous to the eye. They have a single row of barbed hooks, averaging fifteen in number, proceeding from the outer edge of the annulus. Mature statoblasts of *Pectinatella* and *Cristatella* while in the body of the polypide, are inclosed in a transparent matrix or yolk. Some statoblasts of *P. magnifica* collected from the Rideau canal in September, '98, hatched in an aquarium, in March, 1899, but only lived two weeks.

Locality and habitat. On a submerged stump in Patterson's Creek (Rideau canal) near Elgin street bridge. Sept. 1898.

*Stockes "Aquatic Microscopy," pp. 238-240.

REVIEWS.

THE GOLD MEASURES OF NOVA SCOTIA AND DEEP MINING, by E. R. Faribault, B. A. Sc., Geol Survey of Canada.— 11 pp. with two maps and a number of illustrative sections. Paper read before the Canadian Mining Institute, March, 1899. In this very valuable addition to the literature of Economic Geology Mr. Faribault presents in a most concise and readable form his conclusions as to the mode of occurrence of gold in Nova Scotia. Dealing first with the extent of the gold measures, Mr. Faribault estimates that they cover 5,000 square miles. They consist of an upper or state group, two miles in thickness and a lower or quartzite group, 3 miles in thickness and are probably of lower cambrian age. Since their deposition on a sea floor they have been very uniformly folded into a series of anticlines and synclines roughly parallel with the coast line. The auriferous quartz veins have been deposited at the summit of these anticlines and along certain lines on either side of and parallel to the axes and their deposition has been due to the loosening and opening up of the strata along the planes of sedimentation. Though the original bedding in these rocks is masked by a uniform cleavage subsequently developed, Mr. Faribault has been able, by close structural work in the field, to fix accurately the anticlines and twenty-one domes or cross undulations affecting the anticlines and defining the occurrence of payable reefs. Although granitic intrusions are common they have occurred subsequent to the filling of the gold veins and in no way affect their richness. Mr. Faribault's theories as to the position and extent of the pay steaks and his advice as to the lines along which deep mining should be prosecuted must be of the greatest value to the practical miner, and his comparison of the Nova Scotia district with that of Bendigo, Australia in the matter of deep mining is most instructive and encouraging. The paper altogether is most valuable and exemplifies in the clearest manner the necessity of good structural work, carried out in a scientific way, in the development of a mining district.

WACHSMUTH AND SPRINGER'S MONOGRAPH ON CRINOIDS.

In his delightful review* of Wachsmuth and Springer's monograph on Crinoids" Prof. F. A. Bather proposes that for all crinoids, pinnulate or non-pinnulate, in connection with the successive series of brachials, the following terms be used, urging that all writers on crinoids should agree in this matter. They are as follows: Primibrachs (I Br.); Secundibrachs (II Br.); Tertibrachs (III Br.); Quartibrachs (IV Br.). It is to be hoped that the above terms will be employed by future writers of descriptions of crinoids. The concession made by Prof Bather in this matter not only deserves commendation but tends to establish uniformity in terminology. Prof. Bather further discusses the morphological part of the Monograph, the quinquepartite character of stems of the larger number of Lower Palæozoic crinoidea, the cirri of Palæozoic crinoids, radials and compound radials, basals and infra basals, the course of the axial nerve cords in certain crinoids and the "Law of Wachsmuth and Springer" as interpreted and proposed by Prof. Bather. the fusion of basals as well as notes on the corms, ovals and tubes.

The last notice of Prof. Bather deals with the System Camerata to which is appended an obituary notice of Prof. Wachsmuth with the Bibliography of that writer.

GEOLOGICA BIBLIOGRAPHIA.

The Geological Survey of Belgium has recently issued a series of very important volumes entitled *Bibliographia Geologica*. These volumes are prepared according to the approved decimal classification of Melvil Dewey and form part 549-559 of the *Bibliographia Universalis* of Dr. G. Simoens. Michel Mourlon of Brussels, director of the Geological Survey of Belgium, has charge of the *Bibliographia Geologica* and it is a work of paramount importance to working geologists. The volumes contain about 400 pages each and give some 6,000 titles of publications in geology, palæontology, mineralogy and pre-historic archaeology. These may be obtained, Mons. Mourlon writes, from Hayez, 112, Louvain street, Brussels, Belgium.

*F. A. Bather, in Geol. Mag. New Series, Dec. IV, Vol. V, London, Eng., 1898.

JUN 1 3 1895

PALÆONTOLOGICAL NOTES.

The following is a brief enumeration of the leading palæontological notes and references bearing on Canada, and contained in the "*Summary report of the Geological Survey department for 1898*" by the Director, Dr. Dawson.

- (a) On mammoth and musk-ox remains from the "Saskatchewan" gold-bearing gravels of the Edmonton district, Alberta, by Dr. G. M. Dawson, pp. 19 and 20.
- (b) List of fossil organic remains from the "altered gray slates with shaly bands" from six miles west of Canterbury station along the St. Andrews and Woodstock branch of the Canadian Pacific Railway. Silurian species recognised by Dr. H. M. Ami, p. 137.
- (c) Silurian fossils recorded from Burnt Island, Manitoulin Island, Lake Huron the nearest outcrop of fossiliferous limestone to the Duck Islands, by H. M. Ami, p. 179.
- (d) Notes on general results obtained from a palæontological survey of numerous outcrops in the counties of Colchester, Cumberland, Pictou, Antigonish, Kings and Hauts in Nova Scotia, by H. M. Ami, pp. 180-182.
- (e) Reptilian remains from the Belly river and Laramie formations of the North West Territories of Canada, by Mr. L. M. Lamb, pp. 184-190.

H. M. AMI.

Ottawa June, 1899.

CLUB EXCURSION.

The first general excursion of the club was to Chelsea on June 3rd; between 250 and 300 members and their friends were in attendance. The leaders present were: Geology, Mr. W. J. Wilson; Botany, Mr. D. A. Campbell and Mr. J. M. Macoun; Entomology, Dr. Jas. Fletcher; Conchology, Mr. F. R. Latchford; Ornithology, Miss Harmer and Mr. W. T. Macoun; Zoology, Prof. Macoun, Mr. A. Halkett and Mr. W. S. Odell. The president's prize--Miss Lounsberry's "A Guide to the Wild Flowers"--for the largest collection of plants was won by Miss Kingston, while Miss D. Fletcher secured the Club's prize--Mrs. Parson's "How to Know Ferns"--for the greatest number of named species. Addresses were delivered at the close of the afternoon by Prof. Macoun, Dr. Fletcher and Mr. Halkett.