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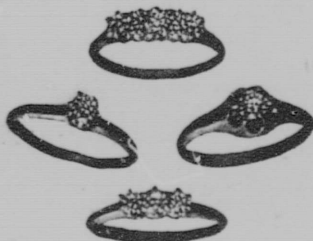
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THE OTTAWA NATURALIST

VOL. XXIII. OTTAWA, NOVEMBER, 1909 No. 8

NEW CONTRIBUTIONS TO CANADIAN BRYOLOGY.

BY N. CONR. KINDBERG, PH.D., UPSALA, SWEDEN.

The collector of the specimens is Professor *John Macoun*, M.A., F.R.S.C., etc., if no other is indicated.

1. *ALSIA CALIFORNICA* (HOOK ET ARN.) SULL.
Vancouver Island 1908, (also by Dr. Jal. Roll (1888).
2. *CLIMACIUM DENDROIDES* (L.) WEB. ET MOHR * *KINDBERGII*
(REN. ET CARD.) GROUT.
Brighton, October, 1888.
3. *CALLIERGON SUBTURGESCENS*.

Allied to the last. Resembles *C. turgescens* (*T. Jensen*) in its julaceous stem, and *C. scorpioides* in its dark brownish color.

Leaves large, broadly oval obtusate obtuse and entire, not decurrent, very densely crowded; only some branch-leaves curved; alar cells large and well-defined, other cells narrow linear; costa generally indistinct. Perichetial leaves long-acuminate subulate and entire. Capsule not large; pedicel about 3 cm. long. Tufts about 10 cm. high. Stem weak. Monoëcious.

In a pool at Laggan at 5,200 feet altitude, Rocky Mountains, Alta., July 25th, 1904. No. 45.

4. *CALLIERGON SUBSARMENTOSUM*.

Stem pinnate, brown below the middle. Leaves golden glossy, not reddish and not distinctly decurrent, long-lanceolate and obtuse; alar cells very large and hyaline, reaching to the costa; other cells linear; costa pale vanishing below (but near) the apex. Branch leaves very small. Capsules not seen. Habit of *C. giganteum*. Allied to *C. sarmentosum*.

In wet earth, Shawnigan Lake, Vancouver Island, B.C., June 18th, 1908.

5. CALLIERGON LONCHOPUS.

Allied to *C. molle*, Dicks. Leaves large, suboval obtusate, often apiculate, denticulate above; not curved, more or less densely crowded; alar cells small and well-defined, other cells narrow linear; costa long and double. Perichetial leaves acute, very short-acuminate, generally entire; costa double very long. Capsule not large, pedicel 3.5 cm. long. Tufts green, decolorate below, about 10 cm. high. Stem weak, dioecious? (Male flowers not seen).

In allied European species the pedicel is only 8-10, rarely 12-15 mm. long.

On Sulphur Mountain at Banff, Alta., September, 1904. Nos. 351 and 355.

6. PLAGIOTHECIUM UNDULATUM * P. SUBNECKEROIDEUM.

Differs in the leaves being less crowded, rather distant, and long-decurrent (as in *P. neckeroideum*); also leaves obtusate, mostly obtuse. Capsules not seen. In *P. undulatum* and *neckeroideum* the leaves are acuminate or at least acute.

On earth, Newcastle Island, Departure Bay, Vancouver Island, B.C., July 10th, 1908. Coll. John Macoun.

7. CAMPTOTHECIUM NITENS VAR. MICROTHECA, KINDB. N. VAR.

Capsule small. Perichetial leaves hyaline, not filiform-pointed. Stem not or (rarely) sparingly tomentose. Resembles the arctic form "atrichum, Kindb." in not often having a tomentose stem.

Collected in a bog along Hunker Creek, near Dawson, Yukon, July 27th, 1902. No. 267.

8. CAMPTOTHECIUM NITENS VAR. LEUCOBASIS, KINDB. N. VAR.

Upper leaves green, lower decolorate (dusky); basal, also the alar cells hyaline. Stem not tomentose.

Collected in a bog by Hunker Creek, near Dawson, Yukon, July, 1902. No. 349.

9. ISOTHECIUM AGGREGATUM (MITTEN) KINDB.

Specimens probably belonging to this species, insufficiently described by Lesq. and James, were found near New Westminster, B.C., by Mr. Albert Hill in 1903 and 1904, com. by Messrs. Brotherus and Cufino. This species differs from the others named by me "*Myura*," in long-decurrent leaves.

10. EURHYNCHIUM GLACIALE (BRYOL. EUR.) KINDB., VAR. ANGUSTIFOLIUM, NEW VARIETY.

Leaves narrower, ovate-oblong or ovate-lanceolate; costa short. Otherwise not differing. Pedicels faintly rough.

Fruiting on stones in a brook at Laggan, eastern slope of Rocky Mountains, Alta. Altitude 5,200 feet. June 27th, 1904. No. 152 in part.

11. EURHYNCHIUM GLACIALE * INFRAALPINUM.

Differs. All leaves serrate, less crowded and longer-decurrent. Stem-leaves longer-costate. Perichetial leaves deflexed. Pedicel of capsule very rough. Leaves small. Capsule not seen.

Cape Breton Island, at the base of trees, 1898.

12. EURHYNCHIUM TRACHYPODIUM (FUNCK.) KINDB.

Collected on rocks on Yoho Pass, western slope of Rocky Mountains, B.C. Altitude 5,500 feet. September 2nd, 1904. No. 230.

13. BRACHYTHECIUM PSEUDO-CHLOROPTERUM.

Leaves long-decurrent, recurved below to the middle, serrulate all around, nearly gradually tapering from a subovate base to a rather longish acumen, not or indistinctly striate, nearly crowded *not mamilllose at the back*, suberect when dry; cells small, nearly all rhombic-rhomboidal (as in *Amblystegium*); alar cells large, short subrectangular-quadrate finally *rufescent*; costa subpercurrent or sometimes *short-excurrent*. Tufts loose, decolorate with green branch-tips. Stem sparingly branching, 6-8 cm. high, radiculose at the base, beset below with minute leaves. Dioecious. Capsules not seen.

Resembles in habit *Eurhynchium chloropterum*, C. M. and Kindb., also in the serrulate and punctulate, not large leaves. It has rather the characters of *Brachythecium* than *Eurhynchium* but definite limits between these "genera" are not existing.

In wet ground in the valley of Pipestone Creek, eastern slope of Rocky Mountains, Alta., July 8th, 1904, altitude 6,000 feet. No. 74.

14. BRACHYTHECIUM RIVULARE (BRYOL. EUR.), * B.
COLPOPHYILLOIDES.

Differs from this species in the leaves being narrower and their acumen longer and abruptly tapering to a short twisted point. Capsules and pedicels not seen. It is therefore doubtful that it belongs to *B. rivulare*; but the areolation of the leaves is the same.

On earth in the Yoho Valley, west slope of Rocky Mountains, B.C., altitude 7,000 feet, September 6th, 1904. No. 293.

15. BRACHYTHECIUM CIRRHOSUM (SCHWAEGR) SCHIMPER.

Collected on Southampton Island, Hudson Bay, August 15th, 1904, by Commander A. P. Low. No. 360.

15. HYPNUM (CAMPYLUM) OBSOLETINERVE.

Leaves very small (as in *H. Halleri*) and crowded, falcate but not circinnate, neither striate nor recurved, entire, not decurrent; insertion often yellowish; cells small and narrow. Stem-leaves from ovate-oblong; base abruptly tapering to a shorter acumen; nearly all cells narrow, the angular sometimes suboblong, but special alar cells not defined; costa *simple*, short and mostly obsolete. Branch-leaves smaller with subovate base, nerveless; all cells narrow. Perichetial leaves hyaline, simply but very faintly costate. Tufts dense and not glossy, brownish below, green above. Stem thin, irregularly divided. Diœcious. Capsules not seen.

Resembles in habit *Hypnum depressulum*, C. Muell.

On earth in swampy soil at Laggan, Alta., altitude 5,500 feet, June 28th, 1904. No. 163.

17. HYPNUM KNEIFFII, SCHIMPER, *. MICROPTERUM.

Leaves short-decurrent with a few dilated cells below the insertion, alar cells small or indistinct; other cells narrow linear. Habit of *H. vernicosum*. Otherwise as *H. Kneiffii*. Capsules not seen.

On wet earth, Yoho Valley, west slope of Rocky Mountains, B.C., September, 3rd, 1904. No. 296.

18. PSILOPILUM TSCHUTSCHICUM (C. M.) KINDB.

Capsule narrow subcylindric and slightly curved, finally blackish, longer than in *Psilopilum levigatum* (Wahlenb.) Limpr. Peristome finally fuscous. Spores 0, 020-0, 025 mm. Basal leaf-cells very large.

A common species on clay banks of Hunker and Bonanza Creeks, in July, 1902. In fine fruit late in July on Hunker Creek, Yukon.

19. POLYTRICHUM APICULATUM.

Differs from our allied species in the minutely apiculate lid of the capsule. Leaves rigid, short-acuminate acute, nearly plane below the middle; apical cells of lamellæ papillate, awn red and rough. Perichetial leaves hyaline; costa brown. Capsule narrow 4-angled with distinct apophysis; pedicel 3-5 cm. long. Stem simple, scarcely 1 cm. high.

Along Molar Creek, eastern slope of Rocky Mountains, Alta., altitude 6,500 feet, July 8th, 1904. No. 96.

20. FISSIDENS OSMUNDOIDES, VAR. OBLIQUUS.

Capsule asymmetric; pedicel 6-8 mm. Leaves generally opaque. Stem without rhizoids.

Growing on old stumps and earth and roots where floods

occur in spring. On old stumps at Sicamous, B.C., July 3rd, 1889 Placed under *F. osmundoides* in Part VI. On dead cedar roots Island Lake and on earth at White Trout Lake, Algonquin Park, July, 1900; on roots and earth by Lake Deschênes, above Britannia, October 27th, 1900. These specimens were named *F. Garberi* in Part VII, p. 204. On an old stump at Hull, Que., October 27th, 1907.

21. *FISSIDENS BUSHII*, CARD. ET THER.

Owen Sound, Ont., 6th Sept., 1890. New to Canada.

22. *FISSIDENS RUFULUS*, LINDB.

On rocks by a small waterfall in a brook near the Biological Station, Departure Bay, Vancouver Island, July 3rd, 1908. New to Canada.

23. *FISSIDENS (CONOMITRIUM) JULIANUS* (SAVI), VAR. *AMERICANUS*.

Leaves tapering to an acute, often subulate acumen.

Ontario, Hastings Co., Canadian Musci, n. 54 ("Conomitrium Hallianum," not so, named by me).

24. *TETRAPLODON URCEOLATUS* (BRID.) BRUCH. & SCHIMP.

* *T. SUBMNIOIDES*, NEW SUBSPECIES.

Capsule small rufescent, scarcely reaching above the tufts; its neck scarcely longer; annulus none; pedicel thick yellowish, about 6-8 mm. long, not exerted. Leaves entire oval-oblong, often long-acuminate; costa strong, excurrent in a long point; as in *T. mnioides*. Tufts somewhat lax.

In the true European *T. urceolatus* the leaves are oval and obtusate, abruptly narrowed to a shortish point; costa not distinctly percurrent, capsule blackish-brown; pedicel nearly in its whole length exerted above the very compact tufts.

Although the habit of the present plant is very much different from European specimens, the characters are scarcely sufficient to distinguish it as a proper species. It needs also further observation.

Collected in Labrador in 1891 by the late Rev. A. C. Waghorne.

25. *TETRAPLODON MNIOIDES* (L. FIL.) BR. & SCH * *BREWERI*
(HEDW.)

It seems to be a subspecies of *T. mnioides*; its leaves are narrower with a very long-excurrent costa. The tufts are not always "loose" (Limpr.)

Collected on Hunker Creek, Yukon (No. 141), barren and loosely tufted; also (No. 143) fruiting and densely tufted: both in July, 1902. Coll. John Macoun.

26. *TETRAPLODON MNIOIDES* * BREWERI, VAR. *BREVICOLLIS*.
Differs in the capsule (as in *T. urceolatus* [Brid.] Br. & Sch.) not being shorter than the neck.
Collected on Bonanza Creek, Yukon, July 18th, 1902.
Coll. John Macoun. No. 144b(?)
27. *DICRANUM SUBSCOPARIUM*.
Agrees with *D. scoparium* in its leaves being canaliculate and broadly acuminate, thin cells narrow with large pores, costa not excurrent, perichetial leaves short-aristate, capsule curved; differs in having a sulcate capsule, also in its leaves being more strongly dentate; costa not distinctly bilamellate.
The leaves are undulate, nitid, golden yellow or bright green and nearly straight.
On earth in woods at Laggan, Rocky Mountains, Alta., at an altitude of 5,200 feet, June 28th, 1904. Nos. 55 and 181.
28. *DICRANUM STENODICTYON*, KINDB.
Collected on Bonanza Creek, Yukon, 1902. The habit of these specimens does not differ from that of the other species of *Dicranum*, as stated in the first description.
29. *DICRANUM PERICHÆTIALE*, KINDB.
British Columbia. J. M. Macoun.
30. *DICRANOWEISIA ROELLII*, KINDB., VAR. *ATERRIMA*.
Differs in the tufts being black when dry, as in *D. crispula* var. *atrata*.
On rocks, 7,000 feet altitude, at Lake O'Hara, Rocky Mountains, B.C., August 9th, 1904.
31. *SELIGERIA SUBCAMPYLOPODA*, NEW VARIETY.
Leaves entire sublinear, mostly long and acute; costa generally percurrent, rarely short-excurrent. Perichetial leaves obtuse, very much broader and shorter. Capsule (generally broadly) piriform; pedicel long, arcuate when moist. Tufts dense, about 0.5 cm. high.
On rocks at the head of Lake Louise, altitude 6,000 feet, Rocky Mountains, Alta., September 13th, 1904. No. 7.
32. *GRIMMIA ELATIOR*, BRUCH. * *RUFESCENS*.
Agrees with *G. elatior* in the leaves and their costa being papillose, nearly all the leaf-cells (except the lower basal) sinuous; leaves large, nearly appressed when dry.
Differs in leaves being rufescent, often recurved all around, with longer and more numerous papillæ, and a short, strongly dentate-papillose hairpoint.

It is possible that the capsules, when such are found, can give better characters.

Collected on the shore of Baffin Land, west of Greenland, August 18th, 1904, by Commander A. P. Low. No. 329.

33. GRIMMIA GRANDIS.

Leaves *smooth*, carinate and ovate-lanceolate acuminate acute, wholly recurved at one side, neither crisped nor appressed when dry; the lower very small; cells not sinuous, nearly all short subquadrate, the alar short-rectangular, costa smooth; hairpoint faintly rough often longish. Tufts loose, in the upper part green, fuscous below. Stem to 5 cm. high, much branching, naked below. Capsules and flowers not seen.

Differs from *G. elatior* in the leaves being smooth, etc.; in *G. elata*, Kindb., resembling in habit, lower leaf-cells are very long and linear.

On rocks at the head of Lake Louise, eastern slope of Rocky Mountains, Alta., altitude 6,000 feet, September 13th, 1904. No. 17.

34. GRIMMIA (PSEUDO-RACOMITRIUM) ELATA.

Leaves quite smooth (not papillose as in *G. elatior*), ovate lanceolate acuminate-acute, carinate, recurved below to the middle on both sides, neither appressed nor crisped when dry; upper cells quadrate not sinuous, middle suboblong faintly (or not) sinuous, basal long-rectangular, alar wider but generally short-rectangular and often hyaline in several rows; costa smooth; hair-point long and denticulate. Capsule (old) oblong, not or scarcely exerted. Dioecious. Plants robust, 3 cm. high loosely tufted (but cohering), brownish with green branch-tips. Habit of *Grimmia elatior*.

On rocks along Hunker Creek, Yukon, July 26th, 1902. No. 108.

35. GRIMMIA OVATÆFORMIS.

Agrees with *G. ovata*, Weber & Mohr. Tufts low and compact; capsule small and smooth with straight pedicel; leaves recurved, not large, nearly appressed when dry, the upper narrow with long hairpoint.

Differs in nearly all leaf-cells very sinuous, the alar long-rectangular; calyptra cucullate; dioecious.

G. attenuata, C. M. & Kindb., resembles it in leaf-cells, but differs in having larger leaves and also looser and higher tufts.

On rocks at the head of Lake Louise, eastern slope of Rocky Mountains, Alta., altitude 6,000 feet, September 13th, 1904. No. 19.

(To be continued)

DISCOURSES UPON THE LEPIDOPTERA.
II. FAMILIARITY WITH LOCAL FORMS.

BY F. H. WOLLY-DOD, MILLARVILLE, ALTA.

Errors in naming, omitting such as are the result of carelessness, are principally due, as the late Dr. Johnson would bluntly have expressed it, to "sheer ignorance." To put it more mildly and explicitly, they are the result of unfamiliarity with species.

On the North American continent, very few species of lepidoptera have ever been carefully bred from known parents. Consequently, reliance has had to be made for separation of species upon close observation of the insects in the perfect or winged state,—the *imagines*, that being the correct plural of the word *imago*. It goes without saying that considerable experience is absolutely necessary before deductions of any value can be drawn from appearances. A good foundation of experience is having bred sundry very variable species from the egg, and observed first hand the possibilities and limits of variation in different genera. For not only different species, but, in a general sense, different genera also, vary in different ways. For instance, quite a distinct phase of variation may be expected in a *Mamestra*, from that prevailing in a *Cucullia*; and an *Euxoa* is apt to vary to an infinitely greater degree than say, an *Acronycta*. Next in value of experience gained by breeding, is a study of long series of known variable species from known localities.

Now, the value of deductions drawn from such a source, depends, of course, very largely upon the conception, or "eye" of the person making the observations. For even with the same amount of experience and material for deductions, some people are known to possess a much better eye for associations than others. It is not a question of keenness of vision, but a fact that some are better able to take in and make due allowances for the general impression conveyed from colour, etc., without being misled by resemblances. The idea is perhaps poorly expressed, but it is undeniable that though "an eye for a species" can be cultivated, it cannot be acquired where it does not naturally exist. The late Mr. A. R. Grote, when it is considered what scant material he had from which to make deductions on North American forms, must be admitted to have had an excellent eye for a species. The same cannot, unfortunately, be said of Mr. Francis Walker, curator of the British Museum of Natural History in the fifties and sixties. Nor can the two men be compared in the amount of care they took in comparison.

But to return to the basis for deductions. Observations of

the insects in a state of nature, living, in their environment, their manner and hours of flight, their preference for certain foods, their attitude when at rest, and, by no means least in importance, their dates of appearance, are all valuable points to be observed and noted in the forming of specific associations. Long series should be studied, and, bearing all the above points in view, the variation noted, every capture of each successive season examined for fresh phases of variation and specimens sought for at all time to fill in apparent gaps in the varietal gradient. Aim should also be made, not only at uniting dissimilar, but dividing similar forms. For, as already pointed out, neither does dissimilarity always indicate distinctness, nor resemblance uniting of species. Though the most expert will not always succeed in thus successfully associating every specimen that comes to hand, it is astonishing how familiar one having a good eye may become in time with the general facies of different but confusingly variable species. It may happen that he has grouped several forms as probable varieties for years. At last, either by accident, by personal observation, or by having differences pointed out by another person, characters considered specific are noticed, separation of the series made, and though difficulties may occur for a while, in course of time, with more familiarity with the distinguishing points and extent of variation in the different series, the differences may seem so obvious to his eye that he will wonder how he could ever have confused them. This may truly be called becoming familiar with a species in one locality. Yet an attempt to point out differences in two very similar forms—or they may be very dissimilar to his own eye,—to another man, however good a judgment or wide an experience he may possess, in such a way as to equally convince him of two species, especially by the submission to him of a few odd specimens only, may fail completely, owing to the lack in that other man of *familiarity* with the species, or with its form in that locality at any rate. The eye of the latter man is not accustomed to the slight, and possibly to the former, indefinable differences, which to him may seem, if noticeable at all, varietal.

Too much reliance should not be placed upon the opinion given upon local forms by experts not actually familiar with the form in that particular locality. "Professor Brown called a specimen I sent him by this name, and he has a wide experience, and is generally accepted as the leading authority on this group." Precisely! But unfortunately Prof. Brown does not happen to be familiar with the form as it occurs in that locality, and is quite likely to have been misled into entirely wrong associations by the specimen, or it may have been the few odd specimens submitted to him. Dr. Jones is after all just as much of a

specialist in that particular family, and he called the same thing by quite a different name last year. In fact, Mr. Robinson, who was here only last week, gave the species yet a third name, claiming, from information based on careful notes and personal inspection of the type of that species, that the form was perfectly typical. By-the-way, that same Mr. Robinson wrote a day or two later cancelling his self-chosen name, and saying that he had this time found the real thing in another collection! The truth is that, like Prof. Brown, neither Dr. Jones or Mr. Robinson, however wide experience, good eye, or knowledge of types they may possess, are not, nay cannot be, *familiar* with that particular species, or at any rate in that particular locality, and, assuming that they have taken the trouble to examine the thing closely, have been misled by general resemblances, or have entirely different conceptions of the probable range of variation in that district. You, the collector on the spot, have the best chance of associating or separating allied forms occurring in your own district, and if Messrs. Brown, Jones or Robinson have given you the same name to what you feel convinced are different species, or vice versa, it lies with you, if you will, to assist them, by a few notes or otherwise, into seeing the error of their ways. Recollect, however, that until things have been bred and carefully studied in different stages in different districts and probably even then, differences of opinion are sure to occur in some cases, particularly as, of many species, it is impossible to exactly match in every particular, two specimens in several hundred.

CONTRIBUTIONS FROM THE HERBARIUM OF THE
GEOLOGICAL SURVEY.

BY JAMES M. MACOUN.

CALOCHORTUS LYALLII, Baker.

This beautiful little species was found growing in abundance on an open hilltop at an altitude of 3,500 ft. near the Similkameen River, B.C., June 14th, 1905. No. 70,212. (*J. M. Macoun*). New to Canada.

SPHERALCEA MUNROANA, (Dougl.) Spach.

Malvastrum Munroanum, Macoun, Cat. Can. Pl. I: 87.

Prof. Macoun wrote 27 years ago: "To be looked for along the southern boundary of British Columbia." This beautiful plant may have been found by other collectors, but it has not been reported to us from Canada. It grows in immense clumps

about half a mile west of Osoyoos Lake, B.C., where it was collected by the writer, June 17th, 1905. Herb. No. 73,168. Its brick-red flowers are quite unlike those of any other Canadian plant, except *Malvastrum coccineum*, in color.

PYROLA ELLIPTICA, Nutt.

Shuswap Lake, B.C. No. 15,792. 1889. (*John Macoun*).
Ranaka Creek, Port Heney, B.C. (*A. J. Hill*). Chilliwack River, B.C. No. 72,458. (*W. Spreadborough*). Not recorded in Canada west of the Selkirk Mts. Apparently a rare species in British Columbia as it was not found by the writer during five seasons' work in that province.

VACCINIUM ALASKÆNSIS, Howell.

Along the Hope trail near Lake House, Skagit River, one bush was found in 1905. Herb. No. 72,467. (*J. M. Macoun*). Not uncommon near Ucluelet, Vancouver Island, in 1909. (*Macoun and Fraser*). Resembling *V. ovalifolium*, but well characterized by its black fruit on erect pedicels.

HYDROPHYLLUM ALBIFRONS, Heller.

H. occidentale, var. *Fendleri*, Macoun, Cat. Can. Pl. V: 343.
A not uncommon species in the Coast Range at an altitude of 4,000-5,000 ft. Our specimens are from Spence Bridge, B.C. Herb. No. 16,241; Chilliwack Lake, B.C., Herb. No. 54,325; Skagit River, B.C., Herb. No. 76,745. (*J. M. Macoun*).

PEDICULARIS GRÆNLANDICA, Retz. var. *SURRECTA*, (Benth.) Piper.

Easily distinguished from *P. Grænlandica* by its long coiled beaks. Though its distribution is given by Piper "British Columbia and Saskatchewan to California and New Mexico," none of our specimens east of British Columbia seem to be this variety. It is represented in the herbarium of the Geological Survey by specimens from Tulameen River, B.C. Herb. No. 17,646. (*Dawson*). Chilliwack Lake, B.C., alt. 5,000 ft. Herb. No. 54,489. (*J. M. Macoun*). Chilliwack Lake, B.C., alt. 5,500 ft. Herb. No. 76,773. (*W. Spreadborough*).

PENSTEMON RICHARDSONII, Dougl.

A few leaves of this species were collected along the Similkameen River, B.C., June 9th, 1905. Herb. No. 76,763. (*J. M. Macoun*). Not before recorded from Canada.

PENSTEMON PRIUNOSUS, Dougl.

Dry ground, Similkameen River, B.C. Herb. No. 76,815. (*J. M. Macoun*). Not before recorded from Canada.

PENSTEMON PINETORUM, Piper.

P. ovatus, Macoun, Cat. Can. Pl. II, p. 355.

Elk River, Rocky Mountains. Herb. No. 17,723. (*G. M. Dawson*). Only known Canadian station.

PENSTEMON OVATUS, Dougl.

A common plant in the valleys of the Chilliwack and Skagit Rivers in 1901 and 1905. Herb. Nos. 76,812-813-814. (*J. M. Macoun*). Previous Canadian records go to other species.

ORTHOCARPUS PUSILLUS, Benth.

Douglas, B.C., April 29th, 1906. Herb. No. 76,832. (*W. Spreadborough*). Not before recorded from British Columbia mainland.

PLANTAGO ELONGATA, Pursh.

P. pusilla, Macoun, Cat. Can. Pl. Vol. I: p. 394.

Mr. E. L. Morris in a recent revision of the *Plantago* section to which this species belongs has shown that all Canadian specimens are *P. elongata*. Known in Canada only from the drier parts of southern Saskatchewan and Alberta.

GRINDELIA PERENNIS, A. Nels.

G. squarrosa of Canadian botanists, in part.

From Manitoba to Alberta and northward to the Peace River. Our specimens of *G. squarrosa*, from which *G. perennis* separated by its narrow, almost entire leaves, are all from Manitoba or southern Saskatchewan.

MYOSOTIS LAXA, Lehm.

M. palustris, Macoun, Cat. Can. Pl. Vol. I: p. 340 in part.

Piper in his Flora of the State of Washington credits this species to Oregon and Washington. but it is remarkable that a plant so common on the Pacific coast should have for so long remain unrecorded. No British Columbia records have been made. Our specimens are from: Ladner's Landing, Fraser River, B.C., No. 17,136. (*Jas. Fletcher*). New Westminster, B.C., No. 692, and Lulu Island, Fraser River, B.C., No. 17,135. (*John Macoun*). Lake House, Skagit River, B.C., No. 76,760. (*J. M. Macoun*). Chilliwack River, B.C., No. 76,759, and Douglas, B.C., on the coast, No. 76,758. (*Wm. Spreadborough*). Prof. Macoun also reports having found this plant on both the east and west coasts of Vancouver Island.

ABRONIA UMBELLATA, Lam.

Abundant along the sea-shore at Pachena Bay, west coast of Vancouver Island. Collected Sept. 10th, 1909, by Mr. George Fraser. This is the first Canadian record for this species, the specimens collected by Dr. Fletcher and recorded, Macoun, Cat. Can. Pl. Vol. I: p. 395, as *A. umbellata* being the next species.

ABRONIA LATIFOLIA, Esch.

Found by many collectors in the vicinity of Victoria, Vancouver Island. Very fine specimens of this species were collected on the west coast of Vancouver Island at Long Beach, north of Ucluelet by Mr. Wm. Spreadborough in 1909. Roots were found which in their dried state are three inches in diameter, they were nearly six inches in diameter when collected.

BIRD MIGRATION, 1908.
OBSERVATIONS MADE ON SABLE ISLAND, NOVA SCOTIA.
By R. S. BOUTEILLIER.

	When first seen.	Number seen.
Semipalmated Plover.....	April 17	2 or 3.
Robin.....	" 20	about 12.
White-throated Sparrow.....	" 22	several.
Tern.....	" 25	several.
Piping Plover.....	May 10	2.
Least Sandpiper.....	" 14	2.
Roseate Tern.....	" 14	2.
Swallow.....	" 14	a few.
Martin.....	" 14	a few.
House Sparrow.....	" 21	2.
Phalarope.....	" 22	about 20.
Black-throated Green Warbler...	" 25	1.
Black-poll'd Warbler.....	" 25	1.
Maryland Yellow-throat.....	" 25	1.
Blackbird.....	June 2	1.
Greater Yellowleg.....	July 8	2.
Pectoral Sandpiper.....	" 22	1.
White-rumped Sandpiper.....	" 24	30.
Black-bellied Plover.....	Aug. 16	3.
Golden Plover.....	" 20	several.
Yellow-rumped Warbler.....	" 15	2 or 3.
Black-throated Blue Warbler....	" 16	1.
Least Tern.....	" 16	several.
Blue-winged Teal.....	" 19	2.
Pine Grosbeak.....	" 19	1.
Sora Rail.....	" 19	1.
Pipet.....	" 19	several.
Blackbird.....	" 19	1.

Nuthatch.....	Aug.	19	1.
House Wren.....	"	19	1.
Pied-billed Grebe.....	Oct.	4	1.
American Bittern.....	"	4	1.
Snow Bunting.....	"	4	several.
Black and White Warbler.....	"	4	1.
Flicker.....	"	8	1.
Yellow-bellied Sapsucker.....	"	9	1.
Fox Sparrow.....	"	9	several.
American Hawk Owl.....	"	9	1.
Wilson's Thrush.....	"	22	in numbers.
Great Blue Heron.....	"	28	1.
American Goldeneye.....	"	28	several.
Ring-billed Gull.....	Nov.	3	1.
Northern Shrike.....	"	4	1.
Brant.....	"	7	1.
Baldpate.....	"	7	4.
Bufflehead.....	"	7	several.
Scoop Duck.....	Dec.	1	in numbers.
Snowy Owl.....	"	15	2.

ANT ROADS.

BY CHARLES MACNAMARA, ARNPRIOR, ONT.

Ant roads are probably not uncommon in this country, but as they are generally hidden by the grass, and sometimes run underground for considerable distances, they are not often noticed except by those looking expressly for them. Tropical insects, we are told, build paths six inches wide on which a man can easily walk. Our native ants cannot boast of any such elaborate works as these, but they nevertheless construct what are doubtless for them very important highways.

The prime object of the roads is to make some food supply easily accessible, generally to reach some shrub or tree infested by aphides, of whose sweet excretion the ants are very fond. Such are the objective points of a couple of these roads in the vicinity of Arnprior, built by an ant which Mr. Arthur Gibson tells me is the *Campanotus pennsylvanicus*. The roads, which are situated in a level open field edged by small pines and spruce, look like tiny well-worn paths. They are about three-eighths of an inch wide, and are sunken about half an inch into the soil. One is some 85 ft. and the other about 110 ft. long, and they run parallel to each other about 140 ft. apart. There are numerous

small "jogs" and turns in them, and they cannot be said to be the shortest distance between two points, but their general direction is straight enough from the nests to the aphid colonies. They are quite smooth and free from blades of grass or other obstructions, but they are not very easy to trace as the long grass conceals them, and occasionally they disappear entirely in a tunnel a few inches long. In fine weather traffic on them is very active, and numerous parties of workers are continually running to and fro.

Before I regretfully tore one up in tracing it to the nest, thirteen feet of the longer road mentioned above was entirely subterranean, being tunnelled at a depth of about an inch under the sod. My brutal devastation of their work at first caused great excitement among the ants, but before I had left the ravaged scene, the workers had begun repairs in the most philosophic manner, and when I revisited the spot a week or two later, the road was all clear and smooth again. Indeed, their determination to "keep the line clear" seems to be as strong as it is in the most zealous railway superintendent. When traffic is brisk, a pinch of earth placed across the road as a barrier creates a great commotion. There is a tumultuous running back and forth and a climbing over the barrier and around it. But presently a single worker, who has recovered her equanimity sooner than the rest, is seen dislodging particles of the encumbering earth with her jaws and depositing them in the grass at the edge of the road. After a little she is joined by others, and in a comparatively short space of time the obstruction is removed and the road is clear again. Any cricket or grasshopper that blunders on to the highway is promptly attacked and quietly driven off by the menacing jaws of the ants.

THE NITROGEN COMPOUNDS IN RAIN AND SNOW.

Our readers may remember that we presented in the issue for October, 1908, an account of the interesting work carried on by the Chemical Division of the Dominion Experimental Farms in the determination of the fertilizing value of rain and snow. It was there stated that from the analysis of each fall of rain and snow it had been calculated that during the year ending February, 1908, 4.323 lbs. of nitrogen had been furnished to the soil per acre, and of this approximately 75 per cent. had been present in rain and 25 per cent. in the snow.

Reference to the data obtained for the year ending February 28th, 1909, shows that in certain important respects the results differ markedly from those of the preceding year. Thus, the amount of nitrogen (present as free ammonia, albuminoid ammonia and nitrates) washed out of the atmosphere and furnished to the soil per acre, during the twelve months, was 8.364 lbs.—practically twice the quantity reported the year 1907-08. An examination of the monthly precipitations shows that the rain for September, October and November was unusually rich in ammonia. The explanation of this extraordinary abnormal richness of the rain last autumn may be given in the words of the Chief Chemist, Mr. Frank T. Shutt, M.A.: "A very severe drought prevailed during August, September and the first three weeks in October, 1908, the rainfall being considerably below the average for these months. This excessive dryness of the weather allowed the bush fires, which are not unusual at this time of the year, to spread and gain very considerable headway. Fires were common, not only in the district known as the Ottawa Valley, but also over large territories in Ontario and Quebec and the northern part of New York State. These fires raged almost continually, the rainfalls being very light for many weeks, so that for two months, more or less, the atmosphere was heavily charged with smoke. Hundreds of acres of forest were burnt and thousands of dollars worth of timber destroyed. So dense was the smoke at times that for several days together at Ottawa it was difficult to see clearly for many yards, and the irritation to the eyes and mucous membrane of the nose and throat was excessive. Not until the heavy rain of the 24th and 25th of October was the atmosphere again cleared. This smoke naturally contained large proportions of ammonia as a product of combustion and hence the scanty precipitations that occurred during these weeks were exceptionally rich in that constituent. To this cause then we attribute the exceptional and phenomenally high results recorded for the year."

The detailed discussion of the results, appearing in the forthcoming report of the Chemist, will, we are assured, bring out several other interesting points regarding the amount and composition of the year's rain and snow.

NEW MEMBERS.

The following gentlemen have recently been elected ordinary members of the Ottawa Field-Naturalists' Club: Mr. Chas. H. Bennett, Ottawa; Mr. W. H. Bell, Nepigon, Ont.; Prof. S. Blair, Macdonald College, Quebec.; Mr. L. B. Brown, Toronto; Mr. H. C. Duff, Norwood, Ont.; Mr. H. T. Gussow, Ottawa; Dr. C. Gordon Hewitt, Ottawa; Dr. Julius Klotz, Lanark, Ont.

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