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OCTOBER, 1899.

VOL. XIII, No. 7.

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OTTAWA

NATURALIST.

Published by the Ottawa Field-Naturalists' Club.

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THE OTTAWA NATURALIST.

VOL. XIII.

OTTAWA, OCTOBER, 1899.

No. 7.

PADDLE-NOSED STURGEON IN ONTARIO.

BY PROFESSOR EDWARD E. PRINCE, DOMINION COMMISSIONER OF FISHERIES
OTTAWA.

The late Mr. A. N. Montpetit in his work "Les Poissons d'Eau Douce du Canada," referred to a specimen of the Paddle-nosed Sturgeon (*Polyodon spathula*, Walb.) shown in the Fisheries Museum, Ottawa. "Ai-je besoin de répéter qu'il est unique au Canada," he wrote. "Faut-il vous le décrire? Couleur olive un peu pâle; opercule démesurément allongé en point, atteignant presque les ventrales; la tête, y compris la spatule et les pointes operculaires, presque plus de la moitié de la longueur du corps: la tête seule n'est égale qu' à la cinquième partie." The specimen described is indeed remarkable enough to call for special notice, for the records of the capture of *Polyodon* in Canadian waters are extremely few. I have not been able to obtain information of more than four specimens ever having been secured. About the end of May an Indian captured a fine specimen in Lake Helen, Nepigon River, Lake Superior, and on account of the uncommon interest to naturalists of such an event, I venture to offer a few remarks upon this rare and curious Canadian fish. The mounted specimen in the government collection was obtained over twenty years ago, and I have been informed by a fisherman at Sarnia that a second specimen was procured about the same time. A specimen is also recorded from Lake Erie; but hitherto none have been secured in Lake Superior, and the example recently shipped to Ottawa is of special interest as extending the range of this rare fish westward. It was sent fresh; but on examination its condition was such that it could not be preserved, and even the skeleton, being mainly of cartilage, is difficult to prepare as a museum ex-

hibit. This is the more to be regretted as the specimen was about five feet in length, and much larger than any known to have been before taken in the Dominion. Old fishermen near Point Edward on the Lambton county shore vaguely refer to other specimens of *Polyodon* occurring in Lake Huron; but on the other side of the watershed which bounds the southern margin of our western great lake system, that is, in the basin of the Mississippi River, and in the lakes of the central plateau of the United States, the Paddle-nosed Sturgeon is said to be common. Curiously enough it inhabits the Yang-tse-Kiang and certain Chinese waters; but elsewhere this remarkable fish is unknown. What is the meaning of this sparse distribution in such widely separated localities? Again, why is it so rare in our own lakes, and common in the great river basin to the south? The naturalist's answer is obvious. It is a fish that was once probably widespread in both the old and new worlds. It is indeed a Ganoid, a group of fishes which preceded our existing kinds, and formerly predominated on our planet. Their fossilized remains are familiar to the geologist in the Palæozoic strata. In the ancient world, especially in the Devonian Age, the Ganoid fishes abounded. At the present time the existing species are few, not more than twenty or thirty in all, as compared with 12,000 species of living Teleosteans. Their distribution is erratic and very local. Excepting the common Sturgeons (the family Acipenseridae) the surviving species of Ganoids are amongst the rarest of fishes, and *Polyodon* amongst t' em, is the rarest of all, and in Canada apparently almost extinct. One would expect to find in the case of any tribe of animals which are dying out, that they would survive here and there in isolated areas, and in some such localities would become more and more scarce. These features in the occurrence of an animal are the surest signs of its approaching extinction, and such signs appear in the most marked manner in the case of *Polyodon*. The exceeding rarity of specimens in our waters has called forth the suggestion that those, which are at long intervals captured in our great lakes, are not survivors or descendants of Spatularoids indigenous to Canada; but wanderers that still find means of migrating across the watershed of the Mississippi. It is more probable, however, that a few pairs still

survive, and that the young progeny find their changed environment so unfavorable that most of them perish, hence their rarity.

It is with a pathetic interest that the naturalist examines a fresh specimen of a Canadian *Polyodon*, when the rare opportunity occurs. Its uncouth and indeed grotesque form is largely due to the exaggerated length of the snout which is as long and flat as a canoe paddle. It is said to enable the fish to grub amongst sand and mud and to dislodge small crustaceans, and possibly mollusca, which are supposed to constitute its food. The organ is an enormous and cumbersome one for so simple a purpose, and it is possible that this lengthy nose or rostrum has other uses. It is, of course, a far more formidable organ than the snout of the shovel-nosed sturgeon (*Scaphirhynchus*). It recalls the powerful weapon of the Saw-fish (*Pristis*) and the Sword-fish (*Xiphias*), and differs most markedly from all its Ganoid congeners in its general external form. Of course the Sword-fish is a shark, and the Saw-fish is a Teleostean allied to the Mackerels (*Scomberidae*), both equally distantly separated from *Polyodon*, yet there is a striking resemblance in the flat, elongated, blade-like snout of all three. The anatomist finds, however, that these externally similar structures are very differently formed, and bear no resemblance to each other when their osteology is examined. Thus in *Pristis* the mesethmoid rod which, in such a fish as the haddock, projects from the frontal bone, covering the fore part of the head, is prolonged and flattened, and provided along its lateral edges with twenty or thirty strong teeth. On the other hand, in *Xiphias*, the Sword-fish, the double vomer, which underlies the mesethmoid and roofs over the mouth anteriorly, grows forward, along with the two premaxillary or upper-jaw bones, and the three form the toothed flat beak which is often thirty inches in length. It is the palato-quadrate cartilages in *Polyodon* which are lengthened and shielded by bony maxillary plates which form the long spatulate beak in front of the head in this species. I was struck by the massive rotundity and vertical depth of the body in the Paddle-nosed Sturgeon under consideration. The protruding beak occupied fully one-third of the total length of the fish. Its eyes, small, dull, and in life no doubt expressionless like those of the common Sturgeon, were low down and

close to the root of the paddle-snout. They were placed as in some of the whales just above the angle of the mouth. The mouth was of enormous capacity, toothless and quite underneath the head, far back as in all sturgeons. The gape was enormous so that the lower jaw formed a huge tongue-shaped flap, pointed in front and capable of being very widely opened. Next to the absurd elongated snout and the great capacity of the mouth, the most noticeable feature was the remarkable leathery operculum. In the Sturgeon it is small and insufficient to cover the red gills, but in *Polyodon* it sends back a pointed flap long enough to reach nearly half the length of the body. From this upper flap the hind margin of the operculum gracefully curved down and forward and the flap on each side met below and formed a prominent projecting collar in the jugal or throat region. The skin was, soft slimy and naked, in contrast to the enamelled scales and bony plates which cover the skin in other Ganoid fishes. It resembled the smooth integument of the porpoise: but was of a dark bluish purple colour, varied by pale blue wavy lines passing diagonally and slightly opalescent. The opercular flap is traversed by radiating sinuous mucus canals. The paired fins, pectoral and ventral, occupy the characteristic Ganoid position quite underneath the body. They are powerful, and possess a stout and prominent basal part or peduncle. The great dorsal fin and the equally large anal fin resemble the same members in the Sturgeon: but the basal portion is far more massive and the margin more deeply lunate. The tail is an enormous organ, very deeply forked and the upper lobe is extremely high, and the back bone extends to the tip, a perfect heterocercal caudal fin. All the fins are dusky and leathery like those of a shark.

An anatomical examination would have revealed many interesting features: but it was not possible. It would, for example, have shown the absence of ribs, the persistence of the gristly rod or notochord, whose sheath never becomes segmented. There is, in *Polyodon*, no true backbone. The operculum develops a bony basal part: but it is attached to the suspensorium of the jaws, which is cartilaginous, except at the upper part articulating with the periotic surface of the skull. It is interesting to find that the spiracles which, with one exception, are found on the top of

the head in Ganoids, between the eyes and the gills, possess a few gill-filaments, and have not lost their branchial function. There is no accessory or opercular gill, such as we find in the Sturgeon and *Lepidosteus* on the posterior face of the hyoid arch; but a pseudobranchia distinct from a true opercular gill occurs. In spite of its name *Polyodon* has no teeth. They are present in the young: but disappear as the fish grows. It is said to frequent only the dark and deeper parts of the rivers and lakes where it occurs, and both on account of its structure and habits is a singular type amongst fishes. It has, as already pointed out, many exceptional features distinguishing it from its Ganoid allies, and would never be ranked by an ordinary observer with the Sturgeon, the Bow-fin (*Amia*) or the Bony Pike or Bill-fish (*Lepidosteus*) of our own waters or with the *Polypterus* of the Nile and Senegal, or with the African *Calamoichthys*, from Calabar. To the scientific eye they all belong to one group, one of the most interesting groups in the whole range of Zoology. The Ganoids on the one hand possess features of the Shark tribe (e.g. the many-valved conus arteriosus, the heterocercal tail, and the intestinal valve), while they exhibit features which are equally typical of the Teleosts or Bony Fishes, viz.: free pectinate gills, an operculum, a permanent mesonephros, and the production of small spherical eggs in considerable quantity. They are a generalised type of fishes, and of great antiquity, as geological evidence demonstrates. Hence their morphological and palæontological importance.

SALSOLA KALI TRAGUS.

A few specimens of "Russian Thistle" were found this summer by Mr. W. T. Macoun, the Horticulturist at the Experimental Farm, in a field of Alfalfa sown last year. The Alfalfa seed was purchased in Ottawa, but though the "thistle" has ripened its seed there is no danger of its spreading or becoming the noxious weed it is in the west. It is only on the prairies that it is to be feared.

CONTRIBUTIONS TO CANADIAN BOTANY.

By JAMES M. MACOUN, ASSIST. NATURALIST, GEOL. SURVEY
OF CANADA.

XIII.

ANEMONE RIPARIA, Fernald, Rhodora, vol. 1, p. 51.

This species recently described by Mr. Fernald is represented in our herbarium by a single specimen collected in 1882 at Madeline River, Gaspé, Que., and in 1899 at Woodstock, N.B., by Prof. John Macoun. Mr. Fernald gives as additional Canadian stations Restigouche Co., N.B. (*Fowler*), and Roberval, Lake St. John, Que.

RANUNCULUS ABORTIVUS, L. var. EUCYCLUS, Fernald, Rhodora, vol. 1, p. 52.

Stems more slender than in the type; the branches slender and flexuous; leaves very thin and lucid; the basal generally of two sorts, some orbicular with a narrow or closed sinus, others reniform as in typical *R. abortivus*; flowers, achenes and receptacles as in the species but smaller.

Mr. Fernald records this plant from Lake St. John and Tadousac, Que., but it is not represented among our herbarium specimens of *R. abortivus*. It should be looked for by Canadian collectors.

ISOPYRUM BITERNATUM, T. & G.

Though collected before in S. W. Ontario any records of this species are of interest to botanists. Mr. Leroy J. Boughner writes of specimens sent to the Geological Survey department: "This little plant was first collected by me during an expedition of the Simcoe High School Scientific Society on May 21st, 1897. It grew sparsely in a cool spot near Lynn Valley, a few miles east of Simcoe. It is supposed to have been introduced from Ohio by railways."

HESPERIS MATRONALIS, L.

A garden escape near Victoria, Vancouver Island. (*A. J. Pinco.*) Not recorded west of Ontario *

*The Geological limits given in these contributions refer to Canada only.

LESQUERELLA OCCIDENTALIS, Wat.

Dry slopes Osoyoos Valley, B.C., 1898. (*C. de B. Green.*)
New to Canada.

VIOLA SUBCORDATA, Greene, Pittonia, vol. 111, page 316.

Open or partly open land, Esquimault, Vancouver Island, 6th June, 1896. Herb. No. 18,708. (*J. R. Anderson.*) A beautiful species nearly related to *V. Howellii*. Known only from the above locality.

VIOLA SUBVESTITA, Greene.

On the cliff below Governor's Bay, Ottawa, Ont., 1899. (*J. M. Macoun.*)

VIOLA SAGITTATA, Ait.

We have no true *V. sagittata* in Canada, at least none of the specimens in our herbarium are referable to that species. All specimens so named are either *V. ovata*, Nutt, or *V. dentata*, Pursh. which may, however, yet prove to be one species.

V. OVATA, Nutt.

V. sagittata, Macoun, Cat. Can. Plants, vol. 1, p. 63 in part.

Our herbarium specimens are from dry fields east of Belleville, Ont. (*John Macoun.*) Near Hamilton, Ont. (*J. M. Dickson.*) Strathroy and woods about London, Ont. (*J. Dearness.*)

V. DENTATA, Pursh.

V. sagittata, Macoun, Cat. Can. Plants, vol. 1, p. 63, in part and vol. 1, p. 492.

Prince Edward Island. (*L. W. Watson.*) Point Pleasant, N. S. (*John Macoun.*) London, Ont. (*Dr. Millman.*) Komoka, Ont. and London, Ont. (*J. Dearness.*) Port Lamboro, Ont. (*J. M. Dickson.*) Though kept separate here it is more than probable that *V. ovata* and *V. dentata* are forms of the same species.

VIOLA SEPTENTRIONALIS, Greene, Pittonia, vol. 111, p. 334, and Ott. Nat., vol. x11, p. 183.

Billings' Bush, S. E. of Billings' Bridge, Ottawa, Ont., 1898. Type locality. Herb. No. 18,561. (*J. M. Macoun.*) St. Catherines, Ont. (*W. C. McCalla.*)

VIOLA MACOUNII, Greene, Pittonia, vol. 111, p. 335 and Ott. Nat. vol. XII, p. 184.

On dry limestone shingle, growing among grass in the shade of cedars, between Rockliffe Road and Governor's Bay, Ottawa, Ont. Type locality. Herb. No. 18,746. (*J. M. Macoun.*) The specimens collected by Prof. Macoun, near Hull, and referred to this species in Ottawa Naturalist, represent a new species not yet described.

VIOLA VENUSTULA, Greene, Pittonia, vol. 111, p. 335, and Ott. Nat. vol. XII, p. 184.

In the wet meadows between the Rockliffe Road and Governor's Bay, Ottawa, Ont. Type locality. Herb. No. 18,565. (*J. M. Macoun.*)

VIOLA CUCULLATA, Ait.

A common violet throughout Eastern Canada. The only species of this group of general distribution.

VIOLA DICKSONII, Greene, Pittonia, vol. IV, p. 65.

V. cuspidata, Ottawa Naturalist, vol. XII, p. 185.

Allied to *V. cuspidata*, but the herbage light-green, the pubescence more sparse and hispidulous, the petaliferous flowers on nearly terete peduncles about equalling the leaves and bibracteolate near the base: sepals lanceolate, either naked or ciliolate: corolla about $\frac{3}{4}$ inch long, of a fine lavender-blue, the paired petals, especially the two uppermost, obovate-rhomboidal, the laterals white at base and strongly bearded with indistinctly clavellate hairs, the keel-petal shorter and narrower than the others, more or less conduplicate or convolute especially at the apex, white at base and purple-veined above the white; summer foliage less broad in proportion to its length than in *V. cuspidata* and more apt to be cucullate: apetalous flowers on short but nearly or altogether hypogeous peduncles.

A very common violet in the vicinity of Ottawa and probably abundant throughout Ontario, Mr. J. M. Dickson having collected it at Hamilton and Mr. Wm. Scott at Niagara-on-the-Lake, Queens- ton, Cartwright and Toronto. Dr. Greene in Pittonia, vol. IV, p.

66, has explained fully the unfortunate circumstances which resulted in the publication of this plant as *V. cuspidata* in my "Notes on Some Ottawa Violets," in the Ottawa Naturalist for January, 1899. I at that time hesitated to publish even six new violets from the *cucullata* aggregate, and though aware that Dr. Greene's description of *V. cuspidata* did not answer well for our plant it seemed preferable to include it in that species rather than describe another species. Ample material collected this year shows that we have in the vicinity of Ottawa at least four additional species of violets in this group, two of which have recently been described by Dr. Greene and are included in this paper.

VIOLA POPULIFOLIA. Greene, Pittonia, vol. III, p. 337, and Ott. Nat., vol. XII, p. 186.

Port Flamboro, Ont. (*J. M. Dickson*.)

VIOLA ELEGANTULA, Greene, Pittonia, vol. IV, p. 66.

Acaulescent and low, the whole plant at the time of petaliferous flowering barely three inches high and the peduncles far exceeding the leaves; rounded and cordate-reniform leaves pale green and slightly succulent, about $\frac{3}{4}$ inch wide, short-petioled and the petioles erect, the margin lightly crenate and all parts wholly glabrous: peduncles obscurely angled, bibracteolate above the middle, the bractlets subulate: sepals lance-linear, obtusish: corolla rather more than half an inch in length, not as broad as long; petals all similar in size and outline, oblong-obovate, obtuse or retuse, light-blue, the lower three with conspicuous violet veins on a white ground at base, the laterals bearing a low and thin tuft of short strongly clavate hairs, or some of them shortened to mere papillæ; two upper petals naked, in full expansion deflected and concealing the calyx: style elongated: late apetalous flowers small, aerial on short horizontal or recurved peduncles.

In depressions in sandy fields at Eastman's Springs, Ont., and east of Beaver Meadow Lake, near Hull, Que., 1899. (*J. M. Macoun*.)

VIOLA VAGULA, Greene, Pittonia, vol. IV, p. 67.

Larger than the last, with dark green glabrous rather notably fleshy herbage: leaves at time of petaliferous flowering, about an inch in diameter, somewhat deltoid-cordate, the length equalling or surpassing the breadth, the margin lightly crenate: peduncles surpassing the leaves, obscurely angled or semiterete, bibracteolate in about the middle, the rather obtuse bractlets with a few obscure glandular teeth: sepals oblong, obtuse: corolla nearly an inch in diameter, the breadth commonly greater than the length; petals deep violet, at base darkly venulose on a white ground, all obovate-spatulate, obtuse or notched, the odd one especially broad and often obcordate, the pair next to it bearing each a dense tuft of rather long and slender not in the least clavellate hairs: style not prolonged beyond the anthers: apetalous summer flowers aerial, but their peduncles short and more or less horizontal; their capsules short and thick, not dotted.

Throughout the whole extent of the Beaver Meadow, W. of Hull, Que., 1899. (*J. M. Macoun.*) A very beautiful species intermediate between *V. cucullata* and *V. venustula*.

SUBULARIA AQUATICA, L.

In fresh water ponds, Attu island, Aleutian Islands, Behring Sea, Aug. 29th, 1891. (*J. M. Macoun.*) Not before collected in that region.

STELLARIA AQUATICA, Scopoli.

Common at Chelsea, Que.

SPHÆRALCEA MUNROANA, Spach.

Dry clay "benches," Osoyoos Valley, B.C., 1898. (*C. de B. Green.*) New to Canada.

ACER RUBRUM, L.

Little Turtle River, Rainy Lake, Ont., long. 93° W. (*W. McInnis.*) The western limit for this species.

TRIFOLIUM INCARNATUM, L.

Cultivated for fodder and now becoming extensively naturalized in Ontario.

ARACALLUS CAMPESTRIS (DC.) var. JOHANNENSIS, Fernald, Rhodora, vol. 1, p. 88.

The Canadian stations given for this plant by Mr. Fernald are Isle d'Orleans below Quebec. (*Mrs. Shepard, Prof. Brunet.*) Mouth of Madawaska River, N.B. (*G. U. Hay, G. F. Matthew.*) Crevices of ledges, Aroostook Falls, N.B. (*M. L. Fernald.*) Rocky banks, Hero's Rapids, Restigouche River, N.B. (*G. U. Hay.*) Our only herbarium specimens were collected at Aroostook Falls, N.B., by Mr. G. U. Hay, in 1883 and at Woodstock N.B. by Prof. Macoun in 1890.

ARAGALLUS CAUDATUS, Greene, Pittonia, vol. iv, p. 69.

Moose Jaw, Assa., June 26th, 1896, Herb. No. 13,957.* (*John Macoun.*) A very beautiful and distinct species, not at all resembling the common *A. Richardsonii* of the prairies.

ARAGALLUS FOLIOLOSUS, Hook. Fl. Bor. Am., vol. 1., p. 146.
O. foliosa, T. & G. Fl., p. 339.

In describing *O. foliolosa*, Hooker says: "*Capitula late ovata seu subglobosa, ratione plantæ parva, floribus compactis, patentibus, inferioribus reflexis.*" How an acaulescent plant with compact heads—heads "far more compact" than *O. cærulea*—should ever have been referred to *O. deflexa* will probably never be fully explained; that it has no very close affinity with that species is evident. The error doubtless originated in confusing *O. foliolosa* with an apparently acaulescent form of *O. deflexa*, (Proc. Am. Ac. Arts & Sc., vol. xx, p. 4) the "*forma subacaulis*" to which Gray referred *O. foliolosa*. It is indeed probable that in describing *O. foliolosa*, Hooker had before him the flowers of that species and fruiting specimens of the sub-aculescent form of *O. deflexa* which is not uncommon in the region traversed by Richardson and Drummond. Our specimens agree in every particular with his description of *O. foliolosa* until the fruit is reached, the "rather remote, deflexed" legumes, "an inch long" are those of *O. deflexa*, while "compact broadly ovate heads" could not refer to

* These numbers refer to the herbarium of the Geological Survey of Canada.

that species. These fruiting specimens of *O. deflexa* were also probably included in giving the range of *O. foliolosa*.

O. foliolosa is from 4 to 7 inches high, occasionally somewhat decumbent; legumes 3-5 lines long, clothed with black hairs, pendent, but when as in flower forming a compact head; otherwise as described by Hooker. From its habit and range it is evidently a high alpine and northern species.

Our herbarium specimens are from Northern Labrador, Herb. No. 18,668. (*A. P. Low.*) Rocky Mountains. (*John Macoun.*) Arctic North America (*Dr. Richardson.*)

These latter are young flowering specimens and were distributed from the British Museum as *O. foliolosa*.

CASSIA MARILANDICA, L.

Two or three plants near the Thames River, east of Thamesville, Ont., 1892; on flats of Cornwall's Creek, Howard Township, Kent Co.; Aug. 15th, 1892, well established; around the mouth of a government ditch, Tilbury, Ont., 1894. (*J. Dearness.*) New to Canada and perhaps indigenous in S. W. Ontario.

LATHYRUS MARITIMUS, Bigel. var. ALEUTICUS, Greene.

A not rare variety on the Labrador coast and on both sides of Hudson Bay. Described from Alaska where, as on Hudson Bay, it is not mixed with, but in many localities takes the place of *L. maritimus*. The smaller size of the variety is not in my opinion due to habitat as *L. maritimus* of large size is found in equally exposed situations in the same latitudes.

DRYAS INTEGRIFOLIA, Vahl.

Summit of Moose Mt., Elbow River, Rocky Mts. Alt. 7,500 ft. Herb No. 20,001. (*John Macoun.*) Southern limit in Rocky Mountains.

ALCHEMILLA VULGARIS, L.

Metis, Que., 1897. (*Mrs. Brodic.*) Not recorded west of Nova Scotia.

ROSA PRATINCOLA, Greene, Pittonia, vol. iv, p. 13.

One of the commonest, if not the most common, roses on the Canadian prairies, extending from Manitoba west to the Rocky

Mountains and north to the Saskatchewan. There is no *R. Arkansasa* in Canada.

ROSA MACOUNII, Greene, Pittonia, vol. iv, p. 10.

R. Woodsii. Macoun, Cat. Can. Plants, vol. 1, p. 521 in part.

Moosejaw, Assa. Herb. No. 12,615, in flower June 17th, 1896; fruit, Herb. No. 10,532, Aug. 13th, 1895; White Mud River, Cypress Hills, Assa., Herb. No. 10,535; Cypress Lake, Assa., Herb. No. 10,534; Spur Creek, Milk River, Assa., Herb. No. 10,533; Canmore, Kananaskis and Banff, Rocky Mountains. (*John Macoun.*) Maligne River, Athabasca River, Alberta, Herb. No. 19,451. (*W. Spreadborough.*) Specimens from nearly all the above localities were named *R. Woodsii* by Crepin, but we have no *R. Woodsii* in Canada.

TOLMIEA MENZIESII, T. & G.

Dawson Harbor, Queen Charlotte Islands, B. C. (*Dr. C. F. Newcombe.*) Cowichan Lake, Vancouver Island. (*J. R. Anderson.*) Not before recorded from Vancouver Island.

HEUCHERA CYLINDRICA, Dougl.

Dawson Harbor, Queen Charlotte Islands, B. C. (*Dr. C. F. Newcombe.*) A new station.

HEUCHERA PARVIFOLIA, Nutt.

Open prairies, Crow's Nest Pass, Rocky Mts. Herb. No. 20,167. (*John Macoun.*) Western limit.

RIBES LEUCODERME, Heller, Bull. Torr. Bot. Club, vol. xxiv, p. 93.

Nearly all our specimens from Southern Alberta referred to *R. oxycanthoides* are this species.

DROSERA LONGIFOLIA, L.

D. Anglica, Huds.; Macoun, Cat. Can. Plants, vol. 1, pp. 165 & 529.

D. intermedia, var. *Americana*, Macoun, Cat. Can. Plants, vol. 1, pp. 166 & 529 in part; Contr. to Can. Bot. Pt. x, p. 273.

Throughout subarctic Canada. Our specimens are from east branch of Hamilton River, Labrador. Herb. No. 4998. (*A. P.*

Low.) Salt Lake, Anticosti, Que.; Lake Huron, Ont.; Porcupine Mts., Man.; Prince Albert, Sask.; Revelstoke, B. C.; Beaver Creek, Selkirk Mts., B. C.; Horne Lake, Vancouver Island. (*John Macoun*.) Tete Jaune Cêche, headwaters of Fraser River, B. C. (*W. Spreadborough*.)

MEGARRHIZA OREGANA, Torr.

Union Bay, Saanich, Vancouver Island, 14th July 1898. (*J. R. Anderson*.) New to Canada.

GALIUM MOLLUGO, L.

St. James' Cemetery, Toronto, Ont., 1897. (*W. Scott*.) Only Ontario station.

APLOPPAPPUS LYALLII, Gray.

Mt. Cheam, Lower Fraser, B. C., 1898. (*J. R. Anderson*.) Western limit.

SOLIDAGO PURSHII, Porter.

S. humilis, Macoun; Cat. Can. Plants, vol. 1, p. 213 in part.

Our only specimens of this species were collected in 1883, at South West Point, Anticosti, Que., by Prof. Macoun. All the other references under *S. humilis* in the Catalogue of Canadian Plants should probably go to *S. decumbens*, Greene.

ASTER ENGELMANNI, Gray.

Brazeau River, North Saskatchewan River, lat. 52° 40', 1898. (*W. Spreadborough*.) Northern limit.

ARNICA PARRYI, Gray.

Headwaters of Fraser River, Yellowhead Pass, Rocky Mountains, 1898. (*W. Spreadborough*.) Northern limit.

ARNICA TOMENTOSA.

Stems clustered, three inches to a span high, simple and generally monocephalus, radical leaves oblanceolate or spatulate, conspicuously 3-nerved, loosely villous or sometimes tomentose; cauline, lanceolate or linear-lanceolate, villous-tomentose: involucre

and peduncle woolly-tomentose ; rays, numerous, short : achenes hirsutulous ; pappus soft, white, barbellate.

Not rare on the eastern slopes of the Rocky Mountains, at high altitudes, between the International Boundary and Lat. 54°. Distributed from the Herbarium of the Geological Survey of Canada, under numbers 11,606, 14,708 and 19,635.

SENECIO ROBINSII, Oakes.

S. aureus. *L. var. lanceolatus*, Oakes ; Macoun, Cat. Can. Plants, vol. 1, p. 265.

A well defined species, easily separable from *S. aureus* and all its varieties. Rare on Cape Breton Island, N. S. The only specimens found by Prof. Macoun in 1898, were at Big Intervale, Margaree, and in woods at Baddeck.

VACCINIUM PENNSYLVANICUM, Lam. var. ANGUSTIFOLIUM, Gray.

Macoun, Cat. Can. Plants, vol. 1, p. 290.

Union Road, Prince Edward Island ; in bogs, Louisburg, Cape Breton Island. (*John Macoun*.) Recent explorations have shown this plant to be widely distributed in Labrador.

PTEROSPORA ANDROMEDA, Nutt.

A new locality for this widely distributed but seldom collected plant is Tête Jaune Cêche, headwaters of Fraser River, Rocky Mountains. (*W. Spreadborough*.)

BARTONIA IODANDRA, Robinson.

Holyrood, Newfoundland. (*Robinson & Schrenk*.) Grand Lake, Newfoundland. (*A. Waghorne*.) These records in Botanical Gazette, vol. xxvi, p. 47. In a bog six miles from Half Way House, Cape Breton Island, N. S., Aug. 5th, 1898. Herb. No. 19,857. (*John Macoun*.)

VERBENA STRICTA, Vent.

Along the Grand Trunk Railway embankment at Stamford, Ont., 1898. (*R. Cameron*.) St. David's, Ont., 1898. (*W. Scott*.) New to Canada.

VERBASCUM BLATTARIA, L.

Roadsides, Mira Bay, Cape Breton Island, N. S. (*John Macoun.*) Not recorded east of Ontario. These specimens are the subspecies *V. virgatum*, with very glandular shortly decurrent upper leaves, and pedicels shorter than the calyx.

PEDICULARIS CAPITATA, Adams.

Moose Mountain, Elbow River, Rocky Mountains, alt. 7,000 ft., 1897. Herb. No. 19,916. (*John Macoun.*) Mountains near Lac Brulé, Athabasca River, Alta. Herb. No. 19,917, 1898. (*W. Spreadborough.*) Not before recorded from Rocky Mountains, or south of the Arctic Circle in Canada.

PLANTAGO ERIOPODA, Turr. var. CYLINDRICA,

Maligne River, Athabasca River, Alberta, July 6th, 1898. Herb. No. 20,073. (*W. Spreadborough.*) A span high, leaves and scape pubescent, spike $\frac{3}{4}$ -1 $\frac{1}{4}$ inch long, cylindrical. This is probably *P. lanceolata*, var. *B.*, Hook, Fl., vol. ii, p. 123, and very likely a good species.

MYRICA CAROLINENSIS, Mill,

M. cerifera, Macoun, Cat. Can. Plants, vol. 1, p. 435.

Common on Prince Edward Island, Cape Breton Island and in parts of Nova Scotia and New Brunswick. *M. cerifera* is not found north of Maryland, U. S.

LARIX LYALLI, Parlal.

Between Kootanie Lake and the St. Mary's River watershed, B. C., at altitudes between 6,500 to 7,000 feet, or a little more, 1898. (*Samuel S. Fowler.*) Western limit.

LILIUM COLUMBIANUM, Hanson.

Tete Jaune Cache, headwaters of Fraser River, Rocky Mountains, 1898. (*W. Spreadborough.*) Northern and eastern limit.

LYSICHITON KAMTSCHATCENSE, Schott.

Wet woods near Canoe River, western slope of Rocky Mountains in Lat. 53°. 1889. (*W. Spreadborough.*) Eastern and, in that part of Canada, northern limit.

SCRIPUS RUFUS, (Huds.) Schrad.

Marshes on summit of Smoky Mountain, Cape Breton Island, N. S., 1898. (*John Macoun.*) Not before recorded from Nova Scotia.

SCIRPUS SUBTERMINALIS, Torr.

In Fresh-water Pond, North Ingonish, and summit of Smoky Mountain, Cape Breton Island, N. S., 1898. (*John Macoun.*) Not recorded from Nova Scotia.

CAREX COSTELLATA, Britt.

Edge of willow thickets near St. Catherines, Ont., 1898. (*W. C. McCalla.*) The only Canadian specimens we have seen.

CAREX CRAWEI, Dewey.

Damp meadows, Baddeck, (Herb. No. 20,810), and Smoky Mountain, (Herb. No. 20,811), Cape Creton Island, N. S., 1898. (*John Macoun.*) Not before recorded from Nova Scotia.

ERAGROSTIS CAPILLARIS, Nees.

A weed in a peach orchard, near St. Catherines, Ont., 1898. (*W. C. McCalla.*) New to Canada.

GLYCERIA VILLOIDEA, Fries.

Near Prince George's Sound, Hudson Strait, 1897. (*Dr. R. Bell.*) Very abundant on saline mud, St. Paul Island, Behring Sea. (*J. M. Macoun.*) Not before recorded except from Greenland.

ASPIDIUM OREOPTERIS, Swartz.

Shawnigan Lake, Vancouver Island, August, 1897. (*J. R. Anderson.*) One of our rarest ferns and not before collected on Vancouver Island.

ASPIDIUM ACULEATUM Swartz. Var. SCOPULINUM, D. C. Eaton.

Amongst rocks near the sea, Texada Island, Gulf of Georgia, B. C., Aug. 1897. (*J. R. Anderson.*) Not before found in Canada west of Province of Quebec, but collected in Washington, U. S.

WOODWARDIA RADICANS, Smith. Var. AMERICANUM, Hook.

Rich soil amongst hummocks, Texada Island, Gulf of Georgia, Aug. B. C. 1897. (*J. R. Anderson.*) New to Canada.

NOTES ON A STROMATOPOROID FROM THE HUDSON
RIVER FORMATION OF ONTARIO.

BY LAWRENCE M. LAMBE, F. G. S.

LABECHIA HURONENSIS, Billings, sp.

Stenopora Huronensis, Billings, 1865, Pal. Fossils, vol. 1, p. 185.

Tetradium Huronense, Foord (in parte). 1883. Contr. to Can. Cambro-Sil., micro-pal., p. 25, pl. vii, figs. 1, 1a.

Labechia ohioensis, Nicholson, 1885, Mon. Brit. Strom. p. 32, footnote and pl. II, figs. 1 and 2.

Labechia montifera, Ulrich. 1886. Contr. to Am. Pal., vol. 1, p. 33, pl. II, figs. 9, 9a.

Labechia ohioensis, Nicholson, 1886. Ann. and Mag. Nat. Hist. p. 13.

There are in the Museum of the Geological Survey a number of specimens of a *Labechia*, from Cape Smyth, Lake Huron, collected by Doctor R. Bell in 1859. These specimens were described by Mr. Billings in 1865 in the Palæozoic Fossils, vol. 1, under the name *Stenopora Huronensis*.

In one of his papers in the "Contributions to Canadian Cambro-Silurian Micro-palæontology," Mr. A. H. Foord states that having made a microscopical examination of *Stenopora Huronensis*, Bill., he finds that it belongs to the genus *Tetradium*. Mr. Foord gives an amended description of this species as he understands it, but unfortunately includes in it two distinct forms, under the name *Tetradium Huronense*. The specimens represented on plate VII, fig. 1, of Foord's paper consists of a *Labechia*, the minute structure of which is well preserved, incrusting a small mass of *Tetradium fibratum*, Safford. The original of figure 1a is a small portion only of a large mass of the *Labechia* measuring nearly $5\frac{1}{2}$ inches across. These specimens figured by Foord were those used by Billings in describing *Stenopora Huronensis* and are still in the museum of the Survey. The structure is clearly shown on polished surfaces in both specimens proving beyond doubt that

the fossils belong to the genus *Labechia*, incrusting, in the first instance, and massive in the second.

Dr. Nicholson's description of *Labechia ohioensis* is based upon specimens obtained by him at Waynesville, Ohio, and the Cape Smyth specimens of *Stenopora Huronensis*, Bill., collected by Dr. R. Bell* in 1859. Dr. Nicholson states that in the Cape Smyth specimens the structure is much better preserved than in those from Ohio. He also mentions (p. 14, Ann. and Mag. Nat. Hist.) that Mr. Foord had drawn his attention to the fact that "some of the appearances which he describes as characterizing *Tetradium huronense*, Bill., sp. are really due to the fact that the specimens of this coral which he examined were covered with a crust of *Labechia ohioensis*."

The same specimens are thus seen to have been used for the description of *Stenopora Huronensis*, Bill., *Tetradium Huronense*, Foord, and *Labechia ohioensis*, Nich., with, in the case of *ohioensis* the addition of the Waynesville specimens, so that these names are synonymous.

The writer is of the opinion with Dr. Nicholson, that Professor Ulrich's *L. montifera* (op. cit.) is specifically the same as *L. ohioensis* judging from the figure preceding the description of the former and from the two figures of its structure which are stated to have been made from microscopical drawings of a specimen from Waynesville, Ohio.

It would seem therefore that Nicholson's and Ulrich's species are identical with Billings's species. As the fossils described by Billings are not referable to the genus *Stenopora*, Lonsdale, but to *Labechia*, Milne-Edwards and Haime, they should be known by the name *Labechia Huronensis*, Bill.

* In Dr. Nicholson's description of *L. ohioensis*, (Ann. and Mag. Nat. Hist. p. 145.) Mr. A. H. Foord is incorrectly stated to have been the collector of the Cape Smyth specimens.

ENTOMOLOGY.

WORM-SNAKES AND SNAKE-WORMS.

Upon rare occasions and at long intervals, the field-naturalist in his rambles comes across a strange grayish old-rope-like object lying on the ground but moving forward very slowly and bearing a remarkable resemblance to some strange kind of snake. These are known as "worm-snakes" and are made up of myriads of the grayish or leaden-coloured larvæ called "snake-worms" which are the maggots of certain gnats belonging to the genus *Sciara*. These gnats are superficially somewhat like mosquitoes but have much more conspicuous antennæ, and have also the important difference of habit that they do not bite. The maggots of several kinds of these gnats have gregarious habits and some may be found in dense masses under the bark of trees. When full-grown the snake-worms are about $\frac{3}{8}$ of an inch long and a little thicker than an ordinary pin, of a dirty white colour, tapering slightly to each end and with a tiny black shining head. When about to change to the pupa state, they congregate in vast numbers, form processions and migrate, sometimes long distances, in search of a suitable place to complete their transformations.

The following interesting account of one of these curious migrations is written by our correspondent, Mr. T. N. Willing, of Sylvan Glade, Olds, Alberta: "While at Prince Albert on the 20th of July last, my attention was called to a very strange sight. At first glance it appeared like a snake about five feet long, which tapered from the head to the tail and moved slowly along the ground. Upon closer examination this rope-like object proved to be composed of a vast number of whitish larvæ, of which I am sending you some samples in alcohol. These larvæ had moved in a body about 30 feet from where their trail was first seen, issuing from underneath a wood pile. They all kept together in the form of a snake, the head being about half an inch thick, one and a half inches wide, and two inches long. From this head the body tapered from one inch wide down to a single larva. Upon drawing a stick across the body of this snake of worms, so as to scatter them, they immediately closed up again and completed the continuity of the mass. I enquired the next day what had become of

this curious object and was told that the larvæ had been killed by covering them with salt."

There are accounts of these curious aggregations of larvæ in many American and European publications (*e. g. Insect Life*, iv, p. 215). In Europe, worm-snakes have been recorded which were 4 or 5 inches wide and from 10 to 12 feet long. Most of the American accounts (which may perhaps seem strange to some!) describe as a rule worm-snakes much more moderate in proportions, viz. from 3 to 6 feet in length by from 1 to 3 inches wide. Upon one occasion only have I seen one of these worm-snakes. This was some miles from Népigon, north of Lake Superior, in the month of August. The snake was about 4 feet long, about an inch wide and with a large expansion about one third of the length from the head. I had no convenience at the time to preserve the larvæ alive so as to identify the species. It is probable that several species of *Sciara* have this strange habit but I am not aware that anyone has ever reared to maturity and published the name of the American species. Unfortunately most people who have the opportunity, like those who put salt on the larvæ seen by Mr. Willing, are much more likely to practise the stupid habit of destroying everything they do not quite understand instead of trying to learn a little more about it.

J. FLETCHER.

Among the latest contributions to the Herbarium of the Normal School is a very beautiful collection of 100 mounted Botanical specimens illustrating the flora of the Rocky Mountains in the vicinity of Banff, presented to the herbarium by Dr. Jas. Fletcher. The Normal School herbarium already contains a fine series of the plants of the vicinity of Ottawa, and this latest contribution not only adds greatly to the value of the herbarium, but these western plants will enable students to compare eastern with western forms in the same genera.

S. B. S.

REVIEWS.

"REMINISCENCES AMONG THE ROCKS : In Connection with the Geological Survey of Canada"; by Thomas C. Weston, F. G. S. A., Toronto, Warwick Bros. and Rutter, 1899.

The above is the title of a very neat and attractive little volume written by one of the few survivors of the early and pioneer days of geological research in Canada, and also a member of our club of many years standing. Mr. Weston's work brought him in contact with many interesting places and personalities throughout the Dominion. The plain, unconventional way in which he has presented the numerous amusing anecdotes as well as attractive records of scientific work, selected from a pile of official note-books kept by him during the thirty-seven years of his connection with that branch of the Canadian service, commends the volume to the reading public as one of special interest. Whilst disclaiming all literary skill, the author describes many an amusing incident such as are but seldom recorded or described from a geologist's standpoint, but which are nevertheless full of interest and merriment. The brief biographical sketches of Sir Wm. Logan, Dr. T. Stenny Hunt, E. Billings, Alex. Murray, Scott Barlow, E. Hartley, Horace Smith, and many others, including "Michael" and many other characters met by Mr. Weston during his very extensive travels, lend that peculiar personal charm to the volume which always attaches to reminiscences.

The book is of special value to the working geologist and palaeontologist who desires to know the best type localities for obtaining suites of fossils with which to illustrate the fauna and flora of the sedimentary formations of Canada. Mr. Weston has, perhaps more than any other officer of the Geological Survey of Canada, contributed to the vast number of specimens now contained in the National Museum at Ottawa, and the notes he has given us in systematic and chronological order, from the time he first joined the Survey under Sir Wm. Logan, until his recent superannuation, will be read with much interest. We commend this volume to all members of the Ottawa Field Naturalists' Club.

H. M. A.

CENTRAL EXPERIMENTAL FARM ; REPORT OF THE ENTOMOLOGIST AND BOTANIST, 1898. (James Fletcher, LL. D., F.R.S.C.)

This very interesting and valuable contribution to the Annual Report on Experimental Farms, includes pages 167 to 219, of that publication, and is illustrated by 25 figures. It furnishes a very comprehensive review of the more important insect enemies of the past year, and contains also Mr. Fixter's report on the Apiary. The insects are dealt with under the heading of the several crops chiefly injured by them, and the various chapters contain many original observations on the species discussed. The absence of Dr. Fletcher during two months of the summer, while enabling him to do valuable work by lecturing at so many farmers' meetings in Manitoba, the Northwest Territories and British Columbia, must necessarily have lessened his opportunities for completing some of his investigations.

CEREALS.—The worst pests of the grain crops were the Midge, Hessian Fly, Wheat-stem Maggot, American Frit-fly, Grain Aphis, Joint-worms (*Isosoma*) and Cut-worms. In Southern Manitoba there was considerable damage caused by the Rocky Mountain Locust. Several districts were visited by Dr. Fletcher, who recommends ploughing under the eggs, and also the use of poisoned bran, which has been found so useful in destroying cut-worms. **VEGETABLES and ROOT CROPS** seemed to have suffered less than in previous years, but the Black Army-worm was destructive in some districts, and cut-worms, as usual, occasioned a considerable damage. Among other pests are the Pea Moth, Pea and Bean Weevils, Carrot Rust-fly, Turnip Aphis, Root Maggots, White Grubs and Wire-worms.

FRUITS.—This important crop was in general a good one, and was not especially injured by insects. Many of the fruits, including plums and peaches, were attacked, however, by various blights and other fungous diseases. The most noticeable insects were the Apple Fruit-miner and the Plum-Moth (or Lesser Apple-worm) in British Columbia, and the Tent Caterpillars generally. The Plum Curculio and the Green Fruit-worms (*Xylina*) and Apple Aphis caused considerable loss in some sections. One of the most interesting appearances was that of a hitherto rare beetle (*Xylocrus Agassizii*, Lec.) in Victoria, infesting the roots of

gooseberry bushes. Dr. Fletcher describes this insect very fully under the name of the Black Gooseberry-borer, and gives excellent illustrations of its different stages and of its work. It will be remembered that the drawings from which these figures were made were exhibited at one of the Club Soirées. The most important insect, however, and one which has received very marked attention in this province, is the San José Scale, which, in spite of the vigorous action taken by the Ontario Department of Agriculture, has continued to extend its area of infestation. A very instructive chapter on spraying concludes the report, which is a most valuable addition to those previously published by the author. Now that the Chemist and his laboratory have been provided with a new building, there will undoubtedly be more room allotted to the entomologist and with increased assistance, he will be in a better position to carry on investigations which are of such practical importance, not only to the agricultural class, but to the entire community, which subsists upon the products which reward the labours of the farmer. When the crops are lessened or deteriorated through insect depredations, the welfare of the whole country must correspondingly suffer. Hence the necessity for investigating such depredations and of devising simple and efficient remedies for checking them—W.H.H.

WINTER SOIRÉES.

The Soirée Committee will meet during the present week for the purpose of preparing the lecture programme for the winter months. Arrangements have been made for several interesting papers but as the members of the committee cannot personally call upon all the members of the club, they ask that those who have prepared papers, or are willing to do so, communicate their titles to some member of the committee at as early a date as possible.

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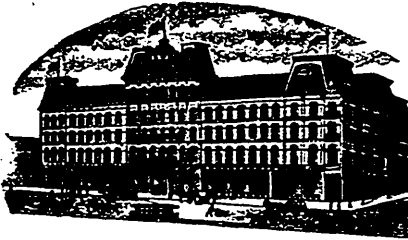
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