

Bay and the junction of the Cape Cod peninsula with the mainland."⁵⁶

CONCLUSION.

In these days when much stress is quite naturally laid on the economic value of scientific work, it is pleasing to know that archæology, aside from what many may consider its purely academic interest, is also, as I think I have succeeded in demonstrating above, of indirect value from an economic stand-

⁵⁶Forbush, E. W., A History of the Game Birds, Wild Fowl and Shore Birds of Massachusetts and Adjacent States. (Issued by the State Board of Agriculture, 1912), p. 406.

point. There is, of course, a reciprocal dependence of one science on another—archæology depending on zoology for the determination of animal remains and zoology on archæology for useful osteological material.

One of the main points to be remembered is that archæology in order to be truly scientific and most useful to other sciences, should be conducted in a thorough manner by trained, or at least competent, investigators and not by mere collectors of curios or other irresponsible parties, who destroy more useful material than they succeed in preserving.

TYPES OF CANADIAN CARICES.

By THEO. HOLM, CLINTON, MARYLAND, U.S.A.

For nearly thirty years the writer has enjoyed the great privilege of receiving botanical collections from the Canadian Government at Ottawa. These collections, mainly brought together by Professor John Macoun, and his son, Mr. James M. Macoun, represent an immense number of Phanerogams from the Pacific to the Atlantic slope and extending far north to the Arctic regions. Although extremely rich in species of all the natural families known from Canada, these collections, nevertheless, made it evident that one genus appeared to have interested these gentlemen more particularly than most of the others. It so happened that the genus *Carex* has been, and is yet, the favorite one of the Macouns. Naturally the collectors laid special stress on the numerous species of this genus, and it is due to the great experience and skill of these gentlemen that their collections of *Carex* have been more rich in species than similar collections brought together by botanists in general.

As a matter of fact to collect Carices is a most difficult task, at least when the aim is to have the species represented at different stages, typically and less typically developed, and to show the enormous variation exhibited by many of the species. The object of the Macouns was not merely to collect specimens, but individuals in large series of developmental stages. Many new and rare species were discovered, *Carex petricosa* Dew., and *C. Franklinii* Boott, never collected since Drummond, were brought home last year by James M. Macoun in magnificent specimens. Last but not least, the geographical range has been extended year after year and it has been shown that the genus possesses many species in Canada of extremely wide distribution, not a few being circumpolar, and many ascending from the lowlands to the alpine regions

of the Rocky Mountains. And a point of special importance is that great care was taken to consider the variation of the species, which is common to many of these, when inhabiting different localities at different altitudes, and associated with certain species. In this way a broader view has been gained, and the systematist has been guided to appreciate the power of the species to adapt itself to the environment, instead of increasing the already untold number of species supposed to be specifically new, but actually being mere forms or varieties. Many instances illustrating this fact might be mentioned, but we shall confine ourselves to a few. *Carex spectabilis* Dew., was never known before except as the typical plant, described by Dewey, but James M. Macoun gathered the species in Jasper Park, Alberta, at a number of stations, and proved the species to be one of special interest with respect to variation, influenced by the environment. Such very inconspicuous species as *C. scirpoidea* Wormskj., *C. nigricans* C. A. Mey., *C. pratensis* Drej., *C. gynocrates* Wormskj., *C. lejocarpa* C. A. Mey., and a host of others are now known and understood better than ever before through the painstaking studies in the field by John and James M. Macoun. Even the remote districts in Yukon, explored by John Macoun, have proved rich in Carices, of species closely allied to each other of the same alliance as a number of North European species, the *rigida*, *aquatilis* and *acutina* alliance, in Europe so excellently outlined and described by Elias Fries, Laestad, Blytt and others.

To the writer of these pages these collections have been of the same value and interest as to the Macouns, inasmuch as he for many years, has given special attention to the same genus in Europe and

the United States. However, our knowledge of the American element of the genus we owe almost exclusively to the Macouns, through their familiarity with the genus and correct determinations. The liberal gifts of well selected material in connection with, so to speak, a most indefatigable correspondence has enabled us to draw a concise comparison of the Old World and American representations of *Carex*.

Most prevalent in the north, even beyond the Arctic Circle, and at high elevations in the mountainous districts, the genus has proved of special interest to the student of plant geography and of the migration of species during the glacial epoch, to be traced now through the circumpolar element, mingled with types of southern origin. And the vast distribution of the genus has resulted in the production of types utterly unlike each other, when comparing the supposed ancestral with those of more recent origin. The outlining of the genus in natural greges we owe to Elias Fries, Tuckerman and Salomon Drejer, who laid the foundation of demonstrating the natural affinities, instead of following the usual tendency to arrange the species in accordance with superficial characters in a mere analytical way. And, while all other Caricographers considered the "*Indicae*" distinct from "*Vigneae*" and "*Carices genuinae*" Drejer in his excellent work "*Symbolae Caricologicae*" combined these, the "*Indicae*" with the two others; thus the "*Indicae*" may be looked upon as representing evolute types of greges of both *Vigneae* and *Carices genuinae*. Furthermore Drejer demonstrated the probable affinities of the species within the greges, considering the monostachyous as "*formae hebetatae*" passing into the "*centrales*" the typical of the grex, and culminating in some more evolute with some deviating types, the so-called "*desciscentes*." By this logical arrangement the monostachyous species became transferred to various greges, instead of as formerly constituting one most unnatural section with no other feature in common than possessing a single spicate inflorescence, the pistillate, or a spike, the staminate.

Now with respect to Canadian types of the genus, it is interesting to see that of the 39 greges enumerated by the writer¹ only five are absent from Canada; these greges are as follows: *Psyllophorae* (Europe and Azores), *Chionanthae* (Europe), *Leucocephalae* (Virginia), *Echinochlaenae* (Australia), and finally *Podogynae* (Japan).

As regards the greges present the *Microrhynchae*, *Aeorastachyae*, *Echinostachyae* and *Physocarpae*

are the best represented, being rich in species and of very wide distribution.

But of special interest are a number of types represented among the various greges, types of a very characteristic structure. These we will describe briefly in the same order as the respective greges (l.c. p. 453). A tristigmatic *Vigneae*, *C. nardina* Fr., by Boott named *C. Hepburnii* has been collected on mountain summits of Alberta and British Columbia. Some of the *formae hebetatae* of the *Astrostachyae*; *C. gynocrates* Wormskj. and *C. exilis* Dew., have been known as varying from monoecious to dioecious; of these the former confined to Greenland and this continent is undoubtedly most commonly monoecious in the north, judging from the specimens we have examined which were collected in Northern Labrador, British Columbia, Alaska and Greenland; in the last place we found this species probably at its most northern limit Skarvefjaeld on the island of Disco, about 69 N. lat. where it occurred only as monoecious. A still more evolute stage is represented by *C. exilis*, which in Canada occurs as monoecious or dioecious, mono—or plio—stachyous. A gynaeandrous² spike is frequently met with in this species, besides that the female plant may possess several lateral spikes, from one to six, at the base of the terminal. Among the *centrales* of this grex we find *C. stellulata* Good., *C. interior* Bail., *C. sterilis* Willd., widely distributed and clearly demonstrating a natural alliance of true species, although of very close relationship. The very peculiar and rare *C. sychnocephala* Carey of the grex *Sychnocephalae* is also a native of Canada, and only one Old World species is known of this grex, *C. cyperoides* L.; they both are very much alike, showing exactly the same habit. Among the *Xerochlaenae*, *C. macrocephala* Willd., with its dense and remarkably large inflorescence occurs on the coast and islands of Alaska, and this *Carex* is tristigmatic, although a typical member of *Vigneae*. Very peculiar is the Canadian representative of *C. teretiuscula* Good³ with its large and frequently ramified inflorescence. Among the *Athrostachyae*, *C. festiva* is represented by a multitude of forms, and is widely distributed in the mountains; a very interesting alliance is composed of *C. pratensis* Drej., *C. pestasata* Dew.,

²The term gynaeandrous is applied to spikes with both sexes represented, the pistillate flowers being situated above the staminate; the opposite position occurs in androgynous spikes, where the staminate flowers are situated at the apex of the spike, the pistillate at the base. Formerly the term androgynous was used to signify both cases.

³It is very unjust to accept the name *C. diandra* Schrank in place of Goodenough's *C. teretiuscula*, since Schrank's material upon which he established the species was mixed, containing also *C. paradoxa* Willd. and *C. paniculata* L.

¹Greges Caricum (Studies in the Cyperaceae) American Journal of Science, Vol. XVI, 1903, p. 445.

C. adusta Boott, and *C. liddonii* Boott, besides *C. aenea* Fernald, all of which have been collected in Canada, and at a number of remote stations. Even the monotypical grex *Microcephalae* with *C. capitata* L. occurs in Yukon and Alaska, extending eastward to Alberta, Hudson Bay and Greenland.

Among the *Carices genuinae* the *Melananthae* is one of the most interesting greges; the *formae hebetatae* with their sessile spikes, and the terminal being gynæcandrous resemble certain *Vigneae* (*C. alpina* Sw.), and a corresponding distribution of the sexes occurs in several species of the *centrales*; *C. atrata* L. and its allies. In Canada *C. alpina* Sw.⁴ is known from the higher mountains; *C. atrata* L., the typical plant, has been collected at several stations by James M. Macoun, notably in the mountains of Alberta, Jasper Park, but a near ally of this, *C. ovata* Rudge (*C. atratiformis* Britton) is much more frequent especially on the Atlantic coast, nevertheless it is absent from Greenland, where it is replaced by the typical *C. atrata*. The very evolute type *C. Mertensii* Presc., in which the numerous spikes are gynæcandrous, is known from the western districts, British Columbia and Alaska. A very singular type of this grex is *C. Parryana* Dew.; it may occur as dioecious, with a single spike; which, however, seems constantly to be pistillate; or the culm is terminated by a gynæcandrous seldom purely staminate or pistillate spike, while there may also be one to four lateral spikes which are purely pistillate. *Carex Parryana* was described from specimens collected by Dr. Richardson at Hudson Bay, but has since been reported as abundant in the northern part of the prairie region, extending from Portage la Prairie to near the Athabasca river. From the mountains of Alberta, Jasper Park, James M. Macoun brought home a splendid series of *C. spectabilis* Dew., illustrating the various forms under which it appears, when inhabiting different altitudes, and stations with environment of varied nature. These interesting forms together with the typical plant have, so far, only been observed in Washington, Mt. Paddo, where they were discovered by Mr. Wilhelm Suksdorf. A species of somewhat remarkable habit is *C. microchaeta* nob., which John

Macoun collected in Yukon; in this species the culm is phyllopodic, otherwise the plant resembles somewhat *C. Tolmiei* Boott, and *C. spectabilis* Dew., but is, however, of a much more robust habit.

Passing to the *Microrhynchae*, Canada is very rich in species of this grex, and several of these are of abundant occurrence; *Carex stricta* Lam., *vulgaris* Fr., *acutina* Bail., *variabilis* Bail., and *lenticularis* Michx., are perhaps the best known. Typical *C. vulgaris* Fr., is known from Alaska, British Columbia and from the eastern provinces, but the variety *lipocarpa*, nob., is much more frequent, and readily to be distinguished by the narrow leaves and the early deciduous perigynia; this variety abounds on Vancouver Island, in British Columbia and Yukon at various elevations. The variety *stolonifera* Hoppe has been collected in Labrador. Another and quite striking variety is *limnophila* nob., which resembles *C. rufo* Drej., the culm being low, curved and the spikes contiguous with the terminal occasionally gynæcandrous. It has been found on St. Paul Island, Bering Sea, and on a nunatak in Columbia glacier, Prince William's Sound; still another variety *hydrophila* nob., from Yukon is a very slender plant, with long stolons clothed with shining, purplish brown scale-like leaves, the spikes are peduncled, cylindric, dense-flowered and erect; finally the variety *strictaeformis* Bail. occurs in Nova Scotia; it is of caespitose habit, quite tall and slender with the sessile spikes remote and subtended by short bracts. In other words *C. vulgaris* shows in Canada the same ability to vary as is the case with the European plant, but, in several respects it varies in a different way. For instance the long stipitate, strongly nerved perigynium is not represented in the European plant, nor is the perigynium early deciduous as is the case with our common variety *lipocarpa*.

C. aquatilis Wahlenb., has been reported from a number of stations in Canada, and it is sometimes accompanied by some closely allied species, in Yukon by *C. sphacelata* nob., and *C. chionophila* nob.; in the Arctic regions it is replaced by *C. stans* Drej. While *Carex rigida* Good. is common in the Arctic regions, it has also been reported from some of the higher mountains in British Columbia, and the variety *Bigelovii* (Torr.) Tuckerm., is known from the Hudson Bay region. Two allies of *C. rigida*: *C. consimilis* nob., and *C. cyclocarpa* nob., are natives of Yukon; in the former the orbicular perigynium is sharply denticulate along the upper part of the margins, but the habit reminds one of *C. hyperborea* Drej.; in *C. cyclocarpa* the perigynium is turgid of a dark brownish green color

⁴The name *C. alpina* Sw. has been replaced by *C. Halleri* Gunn., in Gray's New Manual of Botany, because Schinz and Theilung have adopted this name (Bull. d'herb. Boissier, Vol. 7, 1907). However Gunner did only "pro tempore" propose this species, and without his name as author. After his death his herbarium was examined, and as stated by several Swedish authors, Gunner's material contained not only *C. alpina*, but also *C. Norvegica*, thus the name *Halleri* became invalidated. No other authors have, so far, called the species *C. Halleri*, and surely the old masters knew they had some good reason for ignoring this name.

with purplish spots above, and the caespitose habit reminds one of *C. caespitosa* L., but it lacks the aphyllopodic structure of this species.

Allied to *C. acutina* Bail. is *C. limnocharis* nob. from Yukon, a species with long, slender, pistillate spikes of reddish brown color, in habit much like the European *C. prolixa* Fr. Furthermore there are two very characteristic species bearing a strong resemblance to the European *C. acuta* L., *C. Sitchensis* Presc., known from Alaska, and *C. dives* nob., from the Chilliwack Valley and Vancouver Island, British Columbia. And, if we compare the European representations of these alliances, the *aquatilis*, *rigida* and *acuta*, we meet with analogous types corresponding with those of this continent.

The large grex *Aeorastachyae* is also well exemplified in Canada, and several of the species are also well known from the northern parts of Europe, viz. *Carex subspathacea* Wormskj., *C. salina* Wahlenb., *C. cryptocarpa* C. A. Mey., *C. maritima* L., *C. Magellanica* Lam.⁵ *C. limosa* L., *C. rariflora* Sm., and *C. stygia* Fr. Of these *C. subspathacea*, *rariflora* and *stygia* extend to the Arctic regions.

But especially characteristic of this continent are *C. macrochaeta* C. A. Mey., *C. nesophila* nob., *C. aperta* Boott, *C. crinita* Lam., and *C. magnifica* Dew. A somewhat peculiar habit is exhibited by *C. nesophila*; the culm is phyllopodic and the spikes resemble those of *C. salina*, while the structure of perigynium corresponds with that of *C. macrochaeta*. This interesting species was detected by James M. Macoun on St. Paul Island, Bering Sea, and since then it has also been collected on Popoff Island by Mr. Trevor Kincaid.

Although exceedingly frequent on the Alaskan coast and the islands, *C. macrochaeta* shows but

⁵With respect to *C. Magellanica* Lam., this species has been excluded from the North American flora, and in the recently published, Gray's New Manual of Botany it has been replaced by *C. paupercula* Michx on the strength of the diagnosis of Lamarck calling for a species with androgynous spikes, as pointed out by M. L. Fernald (*Rhodora*, Vol. 8, 1906, p. 73). And Mr. Fernald having examined 633 inflorescences and finding that in 600 of these the terminal spike was purely staminate, and only more or less androgynous in the remaining 33, this author reaches the remarkable conclusion that the North American species is distinct from Lamarck's, which was collected on the shores of the Straits of Magellan. The fact is, however, that Lamarck (*Encyclop.* 3, p. 385, n. 25) described his species "spicis androgynis," meaning that all the spikes, the terminal as well as the lateral, had staminate flowers at the base thus beneath the pistillate flowers. In *C. Magellanica* the spikes are, thus, gynaeceandrous, i.e., pistillate at the top, staminate at the base and exactly this disposition of the sexes occurs in the North American and European representations of *C. Magellanica*. The main point, that the lateral spikes are constantly gynaeceandrous has escaped the attention of Mr. Fernald, although Boott, Schkuhr and nearly all other caricographers have described and figured the species correctly. The fact, that the terminal spike is frequently purely staminate is of no importance.

slight variation. The terminal spike is usually wholly staminate, but we found, however, a few specimens from Unalaska in which this was either androgynous or gynaeceandrous or even entirely pistillate. In the variety *emarginata* nob., the scales are prominently emarginate with a seta four times as long as the body of the scale.

In another variety *macrochlaena*, nob., the plant is very robust with four short and heavy pistillate spikes, the perigynium is very large and longer than the simply mucronate scale; it was collected on St. Paul Island, Bering Sea, by James M. Macoun. These varieties agree, however with the typical plant with respect to the culms being constantly aphyllopodic.

Among the *Cenchrocarpae* we meet with the interesting little species *C. bicolor* All., reported from Alaska, Yukon and British Columbia, besides from Labrador; it occurs also in Greenland, and on the Alps in South Europe. Much more frequent is *C. aurea* Nutt, and among the desciscentes we meet with *C. granularis* Muhl., *C. pallescens* L. and the very local *C. Torreyi*, Tuckerm.

From a morphological viewpoint the *Lejochlaenae* constitute one of the most interesting greges with their monopodial shoots and aphyllopodic culms. They are mostly sylvan types of light green color, and the more or less drooping spikes give them a very graceful aspect. Nearly all the American members are represented in Canada, and while *C. Hendersonii* Bail. is a western type the others are mainly eastern. We meet here with the *laxiflora* alliance, as well as with some *desciscentes*: *C. grisea* Wahlenb., *C. oligocarpa* Schk., *C. conoidea* Schk., and *C. glaucodea* Tuckerm.

The *Dactylostachyae* are much less common, and altogether poorly represented on this continent; Canada, however, is the home of the beautiful little species *C. concinna* R. Br., *C. pedunculata* Muehl. and *C. Richardsonii*, R. Br.

Some few species of the small grex *Microcarpae* are represented in Canada, viz: *C. gracillima* Schw., and *C. formosa* Dew. Characteristic of the *Athrochlaenae* is the scales being deciduous of the perigynia being prominently stipitate and reflexed at maturity. It is a very small grex containing only two species, *C. pyrenaica* Wahlenb., and *C. nigricans* C. A. Mey. Both are found in Canada and the geographical name of the former certainly proves very unfortunate, inasmuch as the species occurs also in New Zealand. A grex closely allied to the *Athrochlaenae* is that of the *Stenocarpae* so far as concerns the structure of the perigynium, being attenuated at both ends, relatively narrow, and the generally dark colored spikes. It is a grex

of very peculiar geographic distribution since two of the *formae hebetatae*: *C. lejocarpa* C. A. Mey., and *C. circinata* C. A. Mey., are known only from Alaska and Oregon, besides some few stations on the coast of British Columbia. The *formae centrales* on the other hand, are mostly natives of the European Alps and the Himalayas, some very few occurring in Canada, viz: *C. petricosa* Dew., and *C. Franklinii* Boott., furthermore *C. Lemmonii* Boott (*C. ablata* Bail.) occurs at several stations in Canada, Washington, Montana and California. Among the *formae desciscentes* is the circumpolar *C. misandra* R. Br., which occurs in the Rocky Mountains of Colorado extending northward through the Canadian provinces.

Nearly all the American members of the *Sphaeridiophorae* have been collected in Canada, and among the *hebetatae* *C. scirpoidea* Michx., with the variety *stenochlaena* nob., is quite extensively distributed. The Greenland *C. deflexa* Hornem., occurs in Canada, but is generally confounded with *C. Rossii* Boott.; however, these two species are easily distinguished, since the culms of *C. Rossii* are aphyllopodic, those of *C. deflexa*, on the other hand, phyllopodic.

The rather large and coarse species of the *Trichocarpace* are in Canada represented by *C. riparia* Curt., var. *lacustris* Willd., *C. trichocarpa* Muhl., with the var. *aristata* (R. Br.) Bail., *C. filiformis* L., *C. lanuginosa* Michx., and the very characteristic *C. Houghtonii* Torr. These species are, however, of a very ordinary structure, but readily distinguished by the perigynium being of a brownish or dark green color, more or less turgid, pubescent and attenuated into a bidentate beak with the sharp teeth spreading.

Of greater interest is the grex *Hymenochlaenae*. Here we meet with some *formae hebetatae*: *C. Steudelii* Kunth, *C. Willdenowii* Schk., and *C. Bachii* Boott, of which the flowerbearing culms are ramified in exactly the same manner as in the *Indicae*, the *Vigneastrae* of Tuckerman.⁶ The more evolute types resemble, on the other hand, *Carices genuinae* in general, but they are mostly light green, with the spikes long-peduncled and drooping. The best known are, for instance, *C. arctata* Boott, *C. debilis* Michx., *C. longirostris* Torr., *C. flexilis* Rudge, *C. capillaris* L., *C. assiniboinensis* W. Boott, and the singular, very conspicuous, *C. amplifolia* Boott. The presence of these species in Canada thus illustrate the fact of the morphological structure of the flower bearing stem being identical with that of certain members of the highly developed

Indicae, as pointed out above, in *C. Willdenowii* for instance. In passing to the *Spirostachyae*, only a few are known from this continent, and some few of these from Canada, viz: *C. Oederi* Retz., *C. flava* L., *C. squarrosa* L., and the very rare *C. fulva* Good., the last of which being less rare in Europe.

As representing the most evolute of the greges we have the *Echinostachyae*, *Physocarpace* and *Rhynchophorae*. In these the perigynium is thin, membranaceous and inflated. In the *Echinostachyae* the pistillate spikes are peduncled, drooping and squarrose at maturity, the beak of the perigynium is quite distinct bidentate.

Two small monostachyous species: *C. microglochyn* Wahlenb., and *C. pauciflora* Lightf., represent *formae hebetatae*, and both occur in Canada. Among the *formae centrales* we meet with the very slender *C. subulata* Michx., and the much more conspicuous *C. pseudocyperus* L., *C. Schweinitzii* Dew., *C. hystericina* Muehl., and *C. rotorsae* Schweinnitz, all well known in Canada, with the exception of *C. Schweinitzii*, which is very rare.

Characteristic of the *Physocarpace* is the perigynium having a very short, mostly emarginate beak, and the pistillate spikes not being squarrose, moreover the scale of the pistillate flower is lanceolate, acuminate, but lacks the mucro or arista of the two other greges. It is an interesting grex, and widely distributed in Canada, but several of the species are, sometimes, difficult to identify, especially those with the dark colored perigynia, for instance: *C. pulla* Good., *C. physocarpa* Presl., *C. compacta* R. Br., and *C. rotundata* Wahlenb. They are very graceful species with the shining, dark brown spikes frequently peduncled and drooping. Of a more robust habit and with the spikes of a lighter color are *C. utriculata* Boott., occurring in numberless forms throughout Canada, furthermore *C. vesicaria* L., *C. oligosperma* Michx., and a few others.

Finally the grex *Rhynchophorae* characterized by the large, erect or ascending perigynia, much inflated, strongly nerved and terminated by a prominent, bidentate beak. The species are tall, and of the same habit as those of the two former greges and like these they are inhabitants of borders of ponds, creeks and wet swamps. The grex begins with some *formae hebetatae*, *C. Michauxiana* Boeckl., and *C. folliculata* L., passing from these into *C. intumescens* Rudge, and *C. Grayii* Carey, of a similar but much more robust habit, while the more ordinary forms, such as *C. lupulina* Muehl., *C. lurida* Wahlenb., *C. Tuckermannii* Boott, and *C. monile* Tuckm., may be considered as the most

⁶Holm, Theo., Studies in the Cyperaceae, XIII *Carex Willdenowii* and its allies (Am. Jour. of Sc., Vol. X, July, 1900, p. 33).

evolute of this grex. In Canada the grex is thus well represented, and only a very few American species are absent.

Considered altogether the genus *Carex* in Canada is rich in types, some being confined to this continent, others being known also from Eurasia. The arctic element Canada shares mostly with Europe, and as stated above several species are circumpolar, and it deserves attention that many of these Canadian *Carices* represent alliances analogous to those of the old world, exemplified by types of a corresponding habit and general aspect.

So far as concerns the greges we have seen that Canada is the home of certain ancestral types, *formae hebetatae*, which are absent from Europe,

in other words several of the greges are more amply represented here by possessing these types in connection with the *centrales*, and passing gradually into some more or less deviating: *desciscentes*.

The presence in Canada of such characteristic species as those of the *Lejochlaenae*, mostly sylvan types of rare morphological structure, and of southern origin, indicates the enormously wide distribution of the genus on this continent, and its ability to adapt itself to the environment, far north and far south. And the alpine flora with its arctic species intermingled with endemic or more southern types is a tangible proof of the foundation of the theory relating to the history of the arctic flora during the glacial epoch.

HUNTING THE BARREN GROUND GRIZZLY ON THE SHORES OF THE ARCTIC.

BY H. F. J. LAMBART, OTTAWA.

One specimen of the Alaska Boundary Grizzly, *Ursus internationalis* Merriam,* a new bear of the Barren Grizzly group, was secured in July, 1912, when engaged on the survey of the 141st meridian. This was the year in which the meridian was completed through to the shores of the Arctic Ocean. Not more than two other specimens were seen by the Canadian and American parties during the summer although signs of the bear were constantly met with.

This one specimen was secured by mere chance. One of our camps was situated in a sheltered valley which later was found to be a favorite haunt as evidenced by the quantity of hair found in the gum of the small spruce against which he was accustomed to rub. This sheltered ravine was at the head of a small stream in which there was a luxuriant shrub growth, consisting of "buck brush" with some small scattered spruce, and was hemmed in by rolling high barren ridges. The elevation of the floor of the valley was about 2,000 feet above sea level and was situated just a little on the

Canadian side of the boundary and inland from the Arctic Ocean 45 miles.

The immediate district may be described as being under the lee of the British mountains, which parallel the coast at a distance of about 25 miles and reach an altitude of 6000 feet at the boundary; the mountains are deeply furrowed, the ridges being bare and open with little vegetation.

The burrows of the Arctic Ground Squirrel, *Citellus parryi* (Richardson), are sadly rooted out throughout the district casting suspicion on our friend the bear.

The floor of the river valleys are, generally speaking, heavily brushed as also the sheltered sides of the valley, and small patches of the small Arctic spruce in these localities are frequent.

I have definitely proved to my own satisfaction that the Brown and Grizzly bears prey upon the sheep (*Ovis dalli*) at the southern end of the boundary where they are found in large numbers, but here at the northern end where the sheep are very

*Alaska Boundary Grizzly. *Ursus internationalis* Merriam, Proc. Biol. Soc. Washington, xxvii, pp. 177-178, August 13, 1914.

Type locality—Alaska—Yukon Boundary, about 50 miles south of Arctic coast (lat. 69° 00' 30").

Type Specimen—No. 1763 ad., Ottawa Museum. Killed July 3, 1912, by Frederick Lambart, of Canadian Boundary Survey.

Range—Region bordering Arctic coast along international boundary, and doubtless adjacent mountains, between the coast and the Yukon—Porcupine; limits unknown.

Characters—Size medium or rather large; affinities doubtful. Color a peculiar pale yellowish brown. Head strongly arched; muzzle and frontal region broad. Large lower premolar strictly conical, without heel, as in the brown bears.

Cranial characters—Skull of medium size, massive, strongly arched and dished, highest over

anterior part of braincase; frontal shield broad, very short pointed posteriorly sulcate medially and swollen over orbits; postorbitals bluntly rounded, strongly decurved, not widely projecting; fronto-nasal region strongly dished; rostrum large and broad; sagittal crest long but feebly developed; zygomatic subtriangular, not widely outstanding, and not much expanded vertically; palate and post-palatal shelf rather broad; notch moderate. Teeth rather small for size of skull; heel of last upper molar small and obliquely truncate on outer side; large lower premolar strictly of brown-bear type—a single cone without heel, sulcus, or posterior cusplets; first lower molar broad and somewhat sinuous; middle lower molar narrow and short posteriorly.

Skull measurements.—Adult male (type): Basal length, 309; occipito-nasal length, 293, palatal length, 169, zygomatic breadth, 203.5, interorbital breadth, 82.





Holm, Theodor. 1919. "Types of Canadian Carices." *The Canadian field-naturalist* 33(4), 72–77. <https://doi.org/10.5962/p.337898>.

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