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## ESKIMO FOOD—HOW IT TASTES TO A WHITE MAN.\*

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How the food of the Eskimo, or, indeed, the food of any race, tribe, or people, tastes, depends largely upon the taste, the natural or acquired habits, or most important of all, the appetite at meal-time. The old proverb that "hunger is the best sauce," loses none of its force in Eskimo-land. Having in my time sampled most of the numerous varieties of Eskimo foods,\*\* sometimes for reasons of diplomacy and sometimes out of politeness to kind hosts, and at other times from a scientific curiosity to test the palatability and food value of them all, I have occasionally thought myself qualified as a northern food expert. Some foods I have considered delicacies on the wilderness trail, but later, when trying the same articles at a well-stocked house or ship, the salt seemed somehow to have "lost its savour," and I came to doubt my competence as an unprejudiced witness.

The palatability and delectability of foods, and probably to a certain extent their digestibility, must be judged in connection with the circumstances under which they are consumed. As an example, after accepting the Eskimo dictum that the large Snowy Owl of the north is an excellent game bird, proven by experience to be almost invariably fat, and with clean, white meat more like that of the domestic fowl than any other Arctic bird, and having one served for a morning short order in a white man's camp, we have been obliged to admit that "boiled owl," except for travellers with exceptionally strong teeth and powerful jaws, is not to be recommended as a breakfast food. The prolonged boiling required for an aged owl makes the bird more suitable for an afternoon tea or a supper dish. However, I never knew anybody who had

tried the Snowy Owl to complain of any ill flavour.

What does the Eskimo eat? The home of the Eskimo is beyond the limits of the cultivation of vegetable foods, and consequently in his native state, he is by compulsion very largely a meat and fish-eater. Normally he eats but a few of the watery, rather tasteless Arctic berries (cloudberries, crowberries, alpine bearberries, and occasionally blueberries and cranberries), digs an occasional mess of stringy wild roots, or plucks a few succulent green leaves of sorrel or scurvy-grass. Meat or fish comprise the standard menu. The Eskimo will eat practically anything that walks, flies, or swims (unless there is some local taboo on a particular species or part of an animal), and the food-list embraces a pretty comprehensive list of the fauna of the region. He may be called an all-around practical naturalist or economic biologist.

The Eskimo as a rule lives well, and though seldom corpulent, as a rule is a robust, plump, and well-nourished individual. He knows nothing of the icy terrors of the frozen North—his country is more bounteously supplied with food than the inland wooded country for hundreds of miles to the southward. The Eskimo gets most of the game animals and fish that the northern Indian gets, and in addition to these, has the seals nearly everywhere (and in some parts walrus and whales) to supply in sufficient abundance the blubber and oil, the fatty, heat-producing elements which every one craves in some form in a cold climate, and for which the northern Indian is usually "starving." In these meatless, wheatless, and other kinds of food conservation days, an Eskimo feast of fat, crackly brown caribou ribs roasted, a stew of mountain sheep mutton, or sweet, juicy, boiled caribou tongues, briskets, or hearts, tenderloin or "back-sinew meat" steaks, or even fried seal livers, are not unpleasant

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\*\*Western Eskimo, from Bering Strait, Alaska, to Bathurst Inlet, N.W.T.

things to recall to memory. As Sir George Back wrote of Indian cookery on one of his extended overland winter trips, good moose meat can hardly be spoiled by any cook's treatment, and the same applies to many other kinds of game as well.

The Eskimo, even less than the white man, dislikes to be rationed, and when he has plenty of food likes to eat heartily, without worrying about a problematical shortage later on. Sometimes he may have to feed caribou-skin robes and sleeping skins to his dogs, or even eat them himself, but a period of shortage usually comes to an end somehow. Native "tanned" skins, merely broken and scraped soft, when boiled soft and tender, probably contain as much nutriment as an equal weight of meat or the gelatinous attachments of the ordinary well-boiled soup-bone, and eating boots or boot-material is not really as bad as it sounds.



Barren Ground Caribou, near Hood River, N.W.T.

On the land, the most important food animal in most districts is the caribou. In a deer-camp there is apt to be little food but caribou-meat ("tu-k-tu"), as all energies are devoted to the caribou chase. Boiling is the most general way of cooking meat, the easiest manner of preparing large quantities, cooked in a fairly uniform and thorough manner, and if you are finicky enough to insist upon it, probably the cleanest way of preparing meat in a native camp. Where meat and fish "straight" (i.e., without other foods) form the steady diet, most people find boiling the least monotonous style of cooking. In this connection, it seems that people with the greatest variety of food to choose from, are more apt to say they are "tired" of a certain article, let us say prunes three times a week or beans twice

a week, than those with a limited choice of food. When one expects whitefish (or caribou) as the *piece de resistance*, or perhaps the whole meal, three or four times a day, it does not usually occur to him to quarrel with it any more than with the thrice daily bread of civilization "The full soul loatheth an honeycomb; but to the hungry soul every bitter thing is sweet."

If the party is large and the pots are small, the meals are often supplemented, prefaced, or finished with a few strips of sun-dried or smoke-dried meat, a side of ribs or a flat shoulder-blade set up to roast beside the coals, and the long marrow-bones cracked for dessert. Sometimes the marrow-bones are roasted, but not often, for to the Eskimo cooking a marrow-bone is like "painting the lily or gilding the rose." In winter a piece of frozen raw meat very often forms a part of the meal.

When the caribou are fat in the late summer and early fall, and the hunters roam over the so-called "Barren Grounds," while the early frosts are tinting the bearberry leaves scarlet, the dwarf willows lemon yellow, and the blueberry leaves purple, and the keen pure air whets the appetite of the heavy-laden packer, the open fire at night and the feasts of juicy caribou-meat that properly go with it, are attractions not to be despised.

On hunting trips, either summer or winter, the Eskimo, expecting to move shortly, tries to get rid of the waste as quickly as possible, using the bulky and bony parts of the animal first. When hunting for ships or white men in general, the natives usually save the saddle (i.e., the pelvis with two hams attached), which parts are more suitable for

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steaks or for roasting in an oven. For themselves, the hams are either fed to the dogs, which must have their share, or cut up for drying. The white man's "choice cuts" are not the Eskimo's or the Indian's favorites, and as a rule are not the first choice of the out-door men who is cooking in the field with primitive appliances.

The caribou (or sheep) heads are cooked very early in the game—split, quartered and boiled with the brains in place, or roasted suspended on a rotating string before the fire. The long leg bones are cracked for their long sticks of sweet marrow (which tastes much like unsalted butter); the ribs, while not carrying very much flesh, are boiled or roasted, and when fat are a luxury; the neck and backbone are boiled, the latter after the long, thick slabs of "back-sinew" meat are removed to make sewing thread, and the tender, stringless meat which remains is fried, frozen solid for eating raw, or dried to make "pounded meat" or pemmican. The solid meat of hams or shoulders is cut up into strips for drying, or in cool weather is cached entire.

In skinning the caribou the back-fat is removed in a great slab (sometimes weighing 40 to 50 pounds) and the kidney and mesenteric fat removed in masses, it being considered the most precious part of the animal. The back-fat of the bull caribou, which may be as much as three inches thick in the fall, may be kept through the winter and sliced up and used for practically all purposes where bacon is useful. Personally I prefer it to bacon.

Under normal conditions, when not spoiled by civilization or market-hunting for white men, the Eskimo methods of hunting and handling food animals would delight the hearts of a Food Conservation board, for practically nothing is wasted. The skin of the caribou is highly prized, and is saved for clothing and bedding. In the field the paunch or stomach is made into a little bag, and the blood saved to thicken the bouillon when the meat is boiled, the sledge-dogs and pack-dogs are fed the offal, and of the remainder of the carcass, little is unused for food except the hoofs. Even the young antlers, when in the "velvet" are eaten after removing the soft skin. In my opinion the conservation methods are carried a trifle too far when they pick out the large grubs of the warble-fly from the skin of the caribou in the spring, and eat them like cherries. The grubs are very watery and absolutely tasteless, but for some reason the Eskimo seems to relish them.

Whenever possible the bones, cast aside after the boiled meat has been scraped or cut off, are saved until a large pile is accumulated. When a sufficiently large pile is collected, or two or three days

before camp is to be moved, a heavy stone hammer is made by lashing a handle to a rock of suitable shape and size, and the women of the camp break up all the bones into small fragments—the vertebrae, ends and joints of the long bones, ribs, and tarsals, metatarsals, carpals, and metacarpals. These bone fragments are placed in a large pot over an open fire, and slowly boiled, stirred, and the grease skimmed off the top, poured into kettles, allowed to harden, and kept in blocks. This bone grease (puinyirk) forms a pure white, hard tallow. The North Alaskan and Mackenzie Eskimo claim that the bones of seven caribou will yield enough tallow to fill one caribou-paunch bag, possibly 25 to 30 pounds. The war-time conservation of grease from stripped and discarded bones is not an entirely new idea of "Teutonic efficiency."

The Eskimo domestic economy is directed rather to utilizing everything, rather than stinting or economizing in amount used. Nothing can be worse than being called stingy, and the best form is to eat everything cooked or set forth for a meal, and when food is plenty meals are not very far apart. The first winter I spent with the Eskimo, I still held an old prejudice, the idea that three meals a day at stated times, were enough for a normal adult under any conditions. On Sundays and stormy days in camp, the Eskimo delighted in eating half a dozen times or more. My refusal to join in all of these fixed and movable feasts caused genuine concern to my good-hearted guide and interpreter. His dietic theory, which he followed religiously, was this: "Spouse we got plenty grub, more better you plenty eat. You plenty eat, bimeby you plenty fat. Maybe winter time, not too much grub, you no fat, plenty hungry, quick mukki (die)." Not being trained to this method of sub-cutaneous hoarding of fats, I was not always able to put away my full share, although as the winter wore on, my aptitude at meals seemed to improve.

The Eskimo is popularly supposed to gorge tremendously, but except in a few individual cases, his enormous eating capacity is more apparent than real. Any man, red, white, or brown, living on meat or fish "straight" will consume a much greater weight and bulk than one living on a mixed civilized diet, a more properly balanced ration. An average soldier's ration is not much over 3½ pounds daily (approximately one pound of meat, one of bread, and the other pound and a half vegetables, beans, sugar, etc.) The Hudson Bay Company's ration for a labourer on straight meat was eight or ten pounds per day. Sir John Franklin speaks of his men suffering hardship on account of short rations at Fort Enterprise with only five pounds of fresh meat (caribou or moose) per day per man.

The average white man doing the same kind of work as an Eskimo under the same conditions will eat about the same amount, grease included. The white man starting on straight meat or fish will not eat as much for the first few days, and does not crave as much. Presumably the human system for some of the elements draws on the reserves stored up in the body. Later, he has to eat much greater quantities of meat or fish to supply the proper amount of those elements which are found in but small amounts in meat and fish.

The Eskimo is naturally gregarious, and particularly in his eating habits, prefers to practice a limited form of communism. Individuals may lay up food stores, and feel a just pride in having food in plenty to set before their friends and guests from afar, and a man's social standing is largely dependent upon his ability as a hunter and his con-

one within hearing flocks over with teacup in hand. Indeed, the watchful and forehanded ones begin to gather as soon as the smoke of the cooking-fire has been ascending about the proper length of time. With twenty or thirty persons sitting down in the circle, the average cooking-pot can only supply a very small "war-time portion" of fish to each person. A cup of tea is drunk, a pipe smoked, and the crowds drift away, to spend a short time mending fish-nets, or working at some handiwork before the shout goes up to go somewhere else for another little snack. My experience at this sort of life was that one hardly ever got enough to eat at the meals, and had to splice out with an occasional half-dried fish from the drying-racks or stages.

The Eskimo of story is often pictured as eating tallow candles and guzzling seal-oil. These stories may be true, but in the course of several years among



Eskimo skinning a Bearded Seal, *Erignathus barbatus*; Franklin Bay, N.W.T.

sequent ability to give more. The native "gentleman of the old school" finds his highest delight in seeing his friends eat at his table, or rather dine on the floor of his iglu or tupek, and in camps where food is abundant life seems to be one continual round of eating.

Taking Herschel Island in summer as an example, we find large numbers of families camped on the beach waiting for the trading ships, and in the meantime living largely on fish from their nets. The consumption of food in almost continuous communistic feasting appears on the face of things to be prodigious. Eating is irregular as to hours, but every housewife is supposed to boil a kettleful of fish, a mess of seal-meat, or a few old-squaws or eider-ducks every few hours, and generally also a pot of tea. When the meal is ready, some member of the family sings out "Niakokseragut!" and every-

the Eskimos I saw but one Eskimo drink seal-oil, and that was only a small amount after several months on a very short ration of fat. The Eskimo likes to dip a piece of dry lean meat or fish into seal-oil or whale-oil, and pour a little oil over roots or berries. Sometimes he eats a piece of blubber. White men as a rule take their portion of fatty food in other ways. The Eskimo uses little fat in cookery, while the white man fries much of his meat, flapjacks, and eggs, consumes much bacon and butter, uses fat for shortening cakes and pastry, and any housewife knows what an amount of lard-oil of the hog is used in cooking a panful of luscious doughnuts. The Eskimo with his seal-oil on dry-fish or berries, and the civilized man with a taste for butter on bread or rich oily cream of the cow on his strawberries, are both following out the same fundamental principles of human diet.



People as a rule are prone to consider the food, clothing, and social customs of foreigners or outlanders as "outlandish." Many Eskimos like to eat their fish rather "high," and in many cases are practically compelled to, as in cases where the main fishery is made shortly before the freeze-up, too late in the season for drying, and too early to freeze them at once. Such fish are usually eaten after freezing hard, and the tainted odour or flavour is barely perceptible if eaten frozen. From the Eskimo standpoint the fish is really improved, as the flesh is more flaky and tender than when absolutely fresh. Some white people allow game to hang for some time for the same reason. An Eskimo who had served on whaling ships and was familiar with the odouriferous Limberger and other varieties of cheese, once said me: "White man plenty eat *tipi* (rotten, stinking) cheese; what's the matter him no eat *tipi* fish?"

ice in the fall freezes as the cold increases and the sweeping blizzards of winter drift this salty snow over the land, so that snow from some distance inland will often have a perceptibly salty taste. Probably seal-meat may contain a certain amount of salt, and undoubtedly absorbs a little in the cookery, as all flesh meat absorbs salt when there is salt in the water. Salt water fish, on the other hand, may be boiled in briny sea-water, without absorbing any noticeable taste of salt.

In the fall, after the caribou have been grazing along the sea-coast, or licking the ground at salt-licks or alkaline spots inland, the meat has a noticeable salty flavour. Different parts of the animal seem to differ strikingly in saltiness. The lower joints of the legs when boiled in water, impart a strong beef-tea or bouillon flavour, and as practically demonstrated to me by a Great Bear Indian, when fresh deer-legs were boiled for supper,



Eskimo's fish-drying place, Fishing Lake, Dolphin and Union Strait.

The primitive Eskimo, so far as I know, never used salt as an article of food, and indeed with a carnivorous diet, salt does not seem to be necessary. I have gone for several months without having any salt, and never suffered any inconvenience, although I never got beyond a certain desire for it when I happened to think about it. When living on cereals, flour, rice, oatmeal, cornmeal, etc., much more salt seems to be necessary, and the civilized Eskimo wants it as much as the white man does. The carnivorous animals do not care for salt, while the herbivores go long distances to the coast or to salt-licks.

In the winter time the Eskimo living on the sea-coast certainly gets a goodly amount of salt into his system from the melted snow and ice-water he drinks. The salt slush which forms on top of sea

and more of the same kind of fresh meat boiled in the same liquid for breakfast, the resulting bouillon was almost too salty to drink. So the straight caribou-eater does not suffer from lack of salt. Indeed, when very much salt is used with the meat diet, a feeling of discomfort is felt after eating heartily of salted fresh meat, probably due to the salt sterilizing and retarding the digestive ferments.

The Eskimo eats about the same birds that the white man does, as the water-fowl all migrate to more temperate climes in winter. The geese and ducks are the most important, and are familiar to the white man's palate. The sea-ducks, eiders, auks, murrets, and puffins of the western Arctic, are apt to have a more or less fishy taste, but on the whole, most birds are edible. None but the larger birds are hunted to any extent, though the small

boys practicing archery occasionally knock over a longspur or a snow bunting, or a tiny shore bird, which go into the pot indiscriminately to gratify the pride of the juvenile hunter rather than as any great contribution to the food supply. The Eskimo cook usually boils birds, this being the most satisfactory method of treating sea-birds. Their custom of removing the entrails and boiling them in the pot with the rest of the bird is not inviting to a fastidious appetite, although I have been gravely informed by a sophisticated native that it is "all the same macaroni." Ptarmigan in general are grateful to the civilized taste, but a delicacy that is not so attractive is a ptarmigan intestine filled with bitter young willow buds, dropped for a minute into boiling water till it swells up like a wienerwurst, and eaten hot. The Arctic "salad," which seems to be favoured more in winter, when no vegetable food has been seen for months, is the first stomach or rumen of the caribou when it happens to be filled with freshly-chewed reindeer-moss or *Cladonia* lichens. This is frozen whole and sliced off very thin, the gastric juice supplying the acid, and a liberal mixture of seal-oil the salad dressing. The caribou stomach is seldom eaten except when filled with the succulent reindeer-moss, and when it contains woody grass-fibre is usually discarded. This food may properly be classed as "pre-digested," and under certain extenuating circumstances, such as a trail appetite, a long siege of one-course rations of meat, anything "different" may have some attractions, but few white men venture to experiment with it. The two almost omnipresent species—*Pediculus capitis* and *P. vesimenti* (the *Komuk* of the Eskimo or "coctic" of current literature) are very commonly eaten, not so much for flavour or food value, I imagine, as a convenient means of disposing of these elusive parasites.

The fish of the Arctic are not very many in number of species, but are numerous as to individuals, and practically all of them are good, well-flavoured, and of firm flesh like most fish of cold waters,—various species of whitefish, salmon trout, lake trout, pike, grayling, herring, smelt, loche, connies, etc. As long as the fish are fresh, it matters little whether they are boiled, or spitted on a stick and roasted before the fire. Most Eskimos, however, will persist in boiling fish with the scales on, which makes eating rather unpleasant. Many are eaten sun-dried or smoked, without salting, and if dried quickly in suitable weather, are very good.

One thing which surprised me was the extensive eating of raw, frozen fish, and still more, how quickly the habit is picked up. I have never been able to endure a cooked fish unless it is well done, without a trace of rawness, but I ate my first piece

of raw, frozen fish with relish, and thought that they generally tasted like raw oysters, and fully as palatable.

The frozen fish, like sticks of stovewood, are brought into the warm house just long enough to soften the skin, then the skin is cut around the gills, and down the middle of the back, a corner loosened and the skin ripped off by a simple pull. The flesh is then cut away in chunks of "eating size," or eaten like corn on the cob, the skeletal portion of the fish being thrown away like the corn-cob. For an outdoor lunch on a cold winter day, a frozen fish does not appeal to me—I always felt chilled inside and outside for an hour afterward. Frozen fish-roe is also relished by the Eskimo, and is very nourishing: the Eskimo say it "makes you warm inside." Seal or whale-oil is eaten with frozen fish as preferred, but fall "connies" or salmon-bellies are rich enough without.

In many parts of the Eskimo country, the seals form almost as important a part of the food supply as the caribou. West of the Mackenzie, seal-hunting is not quite as important as formerly, but seals are still hunted for skins to make water-boots and other footwear everywhere. Among the Copper Eskimo, from Dolphin and Union Straits and eastward, the seal is still more important, and practically the whole population eat little else from the first of December until May, during which period the people move out on the ice and live in snow-houses on the sealing grounds. In spite of the scarcity of fuel, the seal-meat is usually eaten cooked, boiled in stone pots over blubber-lamps, for fortunately the seal has such an abundance of blubber that there is plenty to cook the meat as well as heat the habitations fairly comfortably. Indeed, in many winter sealing camps more blubber is brought in than can be used in proportion to the meat from the chase, and large slabs are thrown away. Towards spring, the surplus blubber is saved, and preserved in seal-skin bags for the next autumn.

Seal-meat contains a great deal of blood, and has a very dark colour, and the older animals generally have a rather fishy taste, so that very few white men acquire a real liking for it, at least enough to eat it when there is any other kind of meat around. The young seals have tender meat with scarcely any ill flavour, and the liver of most seals is very fine, equal to the best calves' liver, but occasionally an old specimen of the common Rough Seal (*Phoca hispida*) has such a strong, pungent odour, as if soaked in coal-oil or gasoline, that even an Eskimo dislikes to eat it.

I think that most Eskimos at heart prefer their own native foods, although they like to have certain white man's foods in the house and on their tables.

to show that they are as high-toned as other folks. Some things, like tea, and sugar when possible, they like to have, but even when plentifully supplied with "outside" rations, they like to get a chance at a meal of raw fish, muktok (whale "blackskin"), seal-meat, or boiled fish-heads. And I must confess that prepared under the limitations of the Eskimo household, without good stoves or baking ovens, in comparison with badly-cooked baking-powder bread, half-baked beans, and salt beef or pork of the usual Arctic Ocean trade quality, that the "aipanni" (old-time) rations and methods were not so bad after all.

Coming back to our text, we can say that a white person looking over the Eskimo menu, fresh from the infinite variety of civilization with articles of food from all lands, or even from the comparatively slender choice of ship's grub, would probably consider the Eskimo as poverty-stricken and starving on his limited stock of food units. Some might even go so far as to consider his meals repulsive or degrading,—our own fathers and grandfathers not being accustomed to eating seal and whale, for geographical reasons, or certain other animals from ancient tradition. The savage, however, not having been informed of his own sad and pitiful state, or not comprehending it, lives on in greasy and happy abundance for the most part.

Contentment with our food and surroundings is largely a matter of temperament and digestion. The unspoiled savage is usually blessed with an equable temper, a contented disposition, and the digestion of an ostrich. It is one of the compensations of life that as conditions become harder and more strenuous, and food scarcer, that the zest in eating increases. "The sleep of a labouring man is sweet, whether he eat little or much, but the abundance of the rich will not suffer him to sleep." The vacation camper and the soldier in active training come to relish plain food without fancy accessories and refinements, and the sojourner in Eskimo land, having separated himself from the "flesh-pots of Egypt," or rather the fruits and vegetables of the temperate climes, as a rule comes to enjoy most of the foods of the country. The scarcer they are the more enjoyable they seem at the time. Personally, I have found "living on the country" (where the country was at all kind) was more appetizing and healthful than the monotonous beans, beans, bacon, and more or less doubtful bread of the old "sour-dough." That applies to the gastronomic standpoint, but from the standpoint of practicality and efficiency, the white man, like the native who lives on the country, finds that accomplishing that feat leaves little time for other work.

## THE LOCATION OF TOWNS AND VILLAGES IN THE OTTAWA VALLEY.

By J. KEELE, OTTAWA.

### INTRODUCTION.

The location of the towns and villages in the Ottawa valley was not determined by chance or by the whim of individuals, but was generally decided by some prime necessity of the early settlers. The chief necessity after habitations were erected, land cleared and crops grown, was a mill for gristing purposes. The most convenient falls or rapids on the nearest stream was made available for this purpose, and a mill was erected there, generally by private enterprise. As everyone came to the mill, it would be good business to place a general store in its vicinity, also a blacksmith shop. Here then was the nucleus of a village, a town, or perhaps a city. The city of Ottawa, as we shall see later, had this origin. Another prime necessity of early settlement was transportation, in which many stretches of navigable waterways on the Ottawa and its tributaries were utilized to their fullest extent, so that several villages and towns had their starting point in the wharf, storehouse and stopping place which marked the point of transfer from road to water transport.

The village of Aylmer, Que., is an example of origin from a transfer point on such a route.

To a lesser extent convergence of highways have been starting points for towns, but for the most part they have never grown beyond the small groups of dwellings and a single store, with perhaps a church, now known as so and so corners. The village of Shawville, in Pontiac County, Que., may be taken as an example of location at convergence of highways.

The needs of the surrounding farming community, the character of the land, the lumber industry, fur trading and the railways all contributed to the growth of those early centres of population. These influences will be discussed later.

The following notes refer more particularly to that portion of the valley between the city of Ottawa and the town of Pembroke, which includes portions of Carleton, Lanark, and Renfrew counties on the Ontario side of the river, and Pontiac and Wright counties in the Province of Quebec.

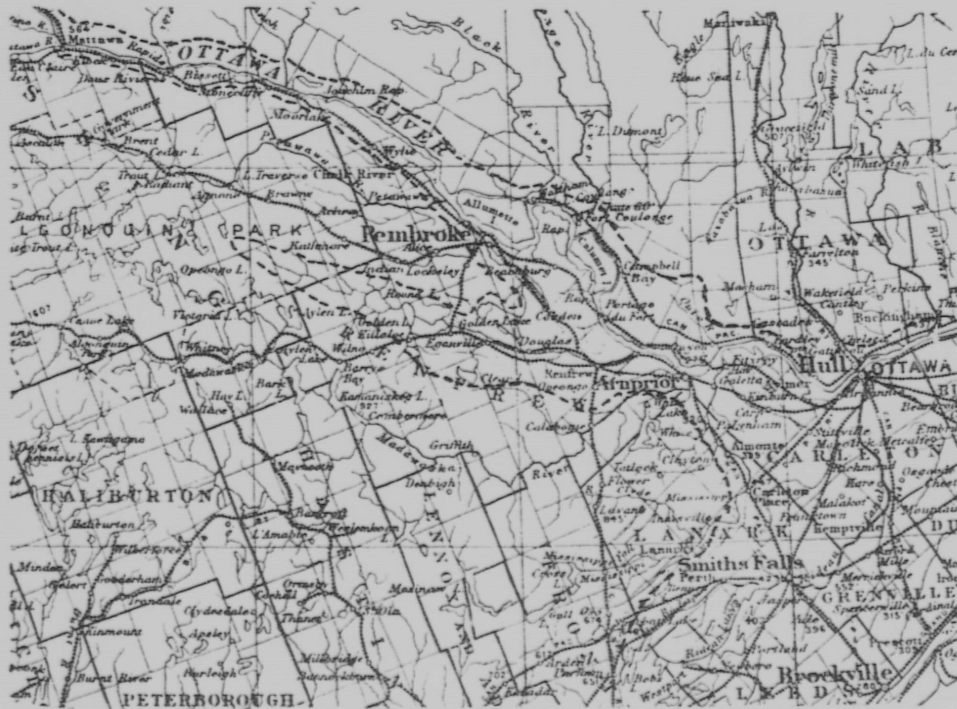
This slight sketch is submitted to the readers of THE OTTAWA NATURALIST as a study in geography. We start with the hypotheses that every city, town and village in the Ottawa valley began at a waterfall, or on an old transportation route and gradually developed according to certain influences which may or may not be connected with geography.

#### PHYSICAL GEOGRAPHY AND GEOLOGY.

The Ottawa valley is a wide depression extending in a northwesterly direction. It is bordered by a generally well defined escarpment of Archean rocks mostly granite gneisses. The river flows down this depression through a series of long narrow quiet

Archean upland merges into the valley plain on a gentle grade with no well marked escarpment. The abrupt transition from the valley plain to the upland is probably seen to best advantage between Kingsmere and Eardley beginning a few miles northwest of the city of Ottawa. The valley wall is here about 700 feet high and forms a marked contrast to the Ontario boundary on the opposite side of the valley between Carleton Place and Perth where it is merely a gently sloping ridge about 100 feet above the inner edge of the plain.

The great upland of which these escarpments are features is often referred to in various literature as



MAP OF A PORTION OF THE OTTAWA VALLEY.

The heavy dotted lines indicate approximately the escarpments bounding the valley plains. Nearly all the towns and villages and the bulk of the population in the region shown by the map are included in the area between the dotted lines.

water reaches, called lakes, which are connected by much narrower and shorter stretches of rapids or falls. The river forms the boundary between the provinces of Ontario and Quebec.

The elevation of the river is 127 feet above sea level at Ottawa and 364 feet at Pembroke, the distance between these points being about 90 miles.

The escarpment on the Quebec side of the river rises in places to a height of 1000 feet above the river levels, and often presents a wall-like aspect, but on the Ontario side it is not so abrupt, especially in the southern portion of the valley, where the

the Laurentian mountains or the Laurentian plateau. Geologists often call it the Archean upland because it is composed wholly of rocks which as far as they know are the oldest in the world, and they usually stand at a higher elevation than the Paleozoic rocks which form a fringe around their southern and northern edges.

The Ottawa valley is more or less plain-like in the southern part and has a width of about 28 miles in an east-west direction between the escarpment near Ottawa to that at Almonte. At Arnprior the width of the valley is about 18 miles. Above this



point the continuity of the plain is broken by many ridges of igneous rocks isolated from the main escarpment, such as the ridge north of the town of Renfrew.

The principal tributary streams to the Ottawa on the Ontario side are the Rideau, Mississippi, Madawaska, Bonnechere and Petewawa and on the Quebec side are the Gatineau, Coulonge and Black rivers. All these rivers except the Rideau have their source in the Laurentian upland and descend over generally steep gradients with mostly insignificant valleys in the general upland with the exception of the Bonnechere valley which is almost as large as the Ottawa valley above Renfrew.

The prevailing rocks of the region are granite gneisses with which are associated some minor areas of crystalline limestones, schists, gabbro, etc. These rocks are of Archean origin and they form the escarpments and the vast upland behind them to the exclusion of all others. It is probable that the entire valley bottom was at one time floored with layers of later rocks, such as sandstones, shales, limestones and dolomites. These rocks have been so much worn down by various agencies of erosion, that only patches of them remain, and the old floor of Archean rocks on which they were laid down now forms the bed rock over large areas of the valley.

The bed rock is concealed over the greater portion of the valley plain by a sheet of unconsolidated material consisting of varying thickness of sand, gravel, and clay. These materials are either directly glacial deposits or are the results of the glaciation of the region.

In glacial times the region appears to have been covered with an ice sheet of considerable thickness such as covers Greenland and the Antarctic continent at present. The weight of this ice appears to have depressed the land surface to such an extent that the sea was able to flow into the Ottawa valley when the ice finally melted. Conditions were then similar to what they are now in the St. Lawrence below Quebec. In other words the marine estuary reached up to about the military camp at Petawawa at the close of glacial times. As the land rose when relieved of its immense burden of ice the sea margin gradually withdrew to succeeding lower land levels until it came to its present position in the St. Lawrence valley. The sediments which were accumulated in this narrow sea are now the most valuable asset which the Ottawa valley possesses as they are the bases of the agricultural wealth of the region. Furthermore there is probably no other region in the world where a recently drained sea bottom is available for human inspection and use on such a scale as the one now in view in the St. Lawrence and Ottawa valleys. It is a source of never failing profit to the farmer if he uses it aright and a source of

never failing interest to the field naturalist. This belt of stoneless marine clay has had much to do with the growth of towns and villages located on it.

The great mounds, ridges, or sheets of sand, gravel or stony clay were also contributed by the ice sheet either during its advance or retreat.

Some of this material is covered by the marine clay but a great deal of it is exposed. Many of these sand and gravel heaps are moraines, being the results of drainage from the margins of the melting ice. These morainal ridges or mounds are generally striking topographic features in the valley plain. They have their economic uses, as the sand and gravel for building purposes and road making are drawn from this source. A striking instance is the Rideau moraine which extends from Ottawa to Prescott, and if the Ottawa-Prescott road is ever built, doubtless most of the materials for its construction will be furnished by the boulders, sand and gravels of this moraine.

#### AGRICULTURE AND FORESTS.

The agricultural possibilities of the region are rather rigorously defined by the geology. The greater part of the rugged uplands beyond the escarpments that border the Ottawa valley are underlain by granite gneiss and covered with only a thin layer of stony drift or not at all. These areas are absolute forest land and should never have been cleared for cultivation. The lesser areas underlain by crystalline limestone are generally depressions on account of the relative softness of these rocks to the granite gneisses which form the ridges surrounding the depressions. These limestone areas are covered with sandy loam which is capable of cultivation. So closely does agriculture follow the limestone bands in the Laurentian upland that it would be almost possible for a geologist to map these bands by mapping the cultivated areas, as the farmer follows them up just as a miner follows ore shoots. At certain points in the upland there are glacial morainic ridges generally composed of sand and gravel with smooth outlines which are almost sure to be cleared and cultivated. This light sandy soil becomes unproductive after four or five years of cultivation, unless well manured, and even then does not produce good crops unless during unusually wet seasons, so that it is doubtful if it is economy to try and cultivate these sand ridges instead of leaving them in forest.

Farms are constantly being abandoned or several abandoned farms are fenced into one pasturing ground or ranch for raising cattle.

Conditions such as these tend to sparseness of population and inhibit the growth of any large towns within the Laurentian plateau.

The valley of the Ottawa below the 500 foot level is for the most part covered with a heavy



mantle of drift so that over large areas no bed rock at all is exposed. The soils vary according to the underlying drift deposits, which vary from very sandy porous soils to those of the heavy, sticky, stoneless, marine clays which are so retentive of moisture. As a general rule the clay soils occur in the flat plain-like areas and the sandy and gravelly soils in the ridges and rolling country. A typical illustration of this occurs in the farming district west of Amprior where the flat clay plain is bordered by sand and gravel ridges. All of the level areas, however, are not clay plains but are underlain by flat-lying dolomites with only a thin layer of sandy soil. There are many such areas of thin soils in the southern portion of Lanark and Carleton counties.

Wherever any large area of forests occur in the Ottawa valley the reason that they are left in timber and not cultivated is either that they are situated on land in which the bed rock is too near the surface, or they are on land which cannot be drained, or on land which is so sandy that it would be practically barren under cultivation. In other words, forested areas exist only on lands which are fit for nothing else. On the other hand it is true that many patches of land where cultivation is attempted is only adapted to timber.

The stoneless clay areas are the most sought after and are the most productive. The clay occurs in patches at various places in the valley up to about 5 miles north of the town of Pembroke, where it is replaced by the sands of the Petewawa area, and the sand and gravels continue up to Mattawa, a distance of 100 miles above Pembroke. It is worth noting that there is neither a town nor a village in the latter portion of the Ottawa valley.

#### INDIAN OCCUPATION.

The first explorers into the Ottawa valley tell us little or nothing about how the Indian lived and moved and had his being. If it were not for the patient work of the modern archeologists and anthropologists we would still know very little about what kind of clothes they wore, the food they ate, the weapons and tools they used, how the women made their pottery and baskets or the hosts of things we would like to know about a primitive people.

Among the meagre accounts we learn that there was a village at Hochelaga (Montreal) and another on Allumette island on the Ottawa, but no trace of the latter has been discovered.

Through the efforts of archeologists we now know of the sites of several prehistoric Iroquoian villages in Grenville and Dundas counties which border on the St. Lawrence river. The best known of these is at Roebuck, near Spencerville, which was explored by Mr. W. J. Wintenberg. These village sites are situated from 2 to 10 miles away from the banks of the St. Lawrence and very often not near

any large stream. We do not know all the requirements of the Indians in selecting their village sites but slightly elevated sandy spots with openings in the forest in which to grow grains were among them.

Possibly they were selected with a view to seclusion from the attacks of the more unsettled and hostile tribes who frequented the main waterways.

There has been very little archeological work done in the Ottawa valley between Ottawa and Pembroke or on the tributary streams and consequently we have much to learn about the Indian occupation, except that they used the main river in journeying up or down the valley. It looked as if the Indians never left the Ottawa valley, and indeed why should they, as there was an abundance of game and fish there to supply the wants of the few people that inhabited it. They went into the highland probably for two reasons, either to escape the attentions of hostile tribes or to hunt beaver.

We hear a great deal about the importance of fats these days, but consider how little fat the prehistoric Indians in the Ottawa valley were accustomed to. For the greater part of the year there is not a particle of fat on any of the deer family or the bears. The beavers are fat when other animals are lean, they are highly prized by the Indians everywhere for their flesh and skins, and so they will make extraordinary journeys in pursuit of them if they happen to be scarce in their accustomed hunting grounds.

Indians never go up rough rivers if they can avoid them, consequently we find little or no trace of them along such rivers as the Gatineau, Madawaska, Coulange or Petewawa rivers, but numerous relics have been found along streams which furnish good canoe routes such as the Lievre, Rideau, Mississippi and Bonnechere.

In the portion of the Ottawa valley we are considering, only one prehistoric Indian village is as yet known. It is situated on the north shore of Mud lake, an expansion of the Bonnechere river between Eganville and Golden lake. This site was discovered by Mr. Wintenberg, who examined a portion of the valley of the Bonnechere during the summer of 1917 at the suggestion of the writer. The village when excavated will probably turn out to be the largest Algonquin site so far known to archeologists.

This site had undoubted advantages for a people who earned their living by hunting and fishing. It was connected to Doré lake to the north by a trail about 4 miles in length and to Clear lake about 8 miles to the south. The Bonnechere river is an easy canoe route, and the valley as a whole must have been a great game country in former times.

It may be, however, that the Indians had few villages or fixed places of residence in this region,

but they had certain routes of travel and definite camping places which were inhabited according to the season, or the kind of game they were hunting. A temporary camping site of this kind was discovered by the writer at the mouth of Brennan creek on Golden lake. At this site a number of old hearths were found on the high sandy ground overlooking the lake, and a few fragments of pottery were found in the wave cut bank. There were also numerous fragments of quartz from pegmatite dikes which the Indians had tried to chip into arrow points.

As there was no copper or suitable stone for tools and weapons in this region the Indians were dependent on trade with outside sources for these necessary supplies. The flint which was so largely used for arrow points, spear heads, scrapers, and skinning knives, came either from Welland county on Lake Erie or from Flint Ridge, Ohio. The schist or slate used for axes, hammers, or wedges was probably the Huronian slates which occur on the west side of Lake Temiscaming, although Mr. David Boyle, the late Provincial Archeologist, stated that slate suitable for tools was found on the Rideau lakes, but this statement has not been verified to the writer's knowledge. The copper undoubtedly came from the Lake Superior region, but weapons made from it appear to have been comparatively rare, and only possessed by the chiefs or profiteers of the tribes.

There were evidently two routes of communication between the Ottawa valley and Lake Huron, one being by way of the Mattawa river, Lake Nipissing and the French river to the Georgian bay, which is recorded in history. The other route followed the Bonnechere river to Round lake, going from thence up the Sherwood river with a short portage to Barry's bay on the Madawaska waters. The York branch of the Madawaska, a comparatively easy canoe route was followed westward to the head waters of the Trent river. From Balsam lake on the Trent waters a portage was made to Lake Simcoe from which the Severn river leads to Georgian bay. The latter route was traced by the aid of archeology alone.

A considerable diversion was made by the Indians in travelling up the Ottawa in order to avoid the long detour and rough water stretches between Lake des Chats and Allumette lake. This side route followed a chain of small lakes and streams in Renfrew county and was more direct. Practically the same route was followed later by the lumbermen and white settlers, and the village of Cobden at the foot of Madawaska lake is the result of this early travel.

#### EARLY SETTLEMENT.

The first settler into the region we are considering was Mr. Philemon Wright, of Woburn, Massachusetts. He explored the St. Lawrence and Ottawa

valleys between Quebec and Ottawa during the years 1796 and 1798, and selected the township of Hull as the most desirable location for settlement in the region. He accordingly left Woburn on the second of February, 1800, with 25 men and an outfit of horses, cattle, sleighs, tools and provisions. He reached the foot of the Long Sault Rapids\* on February 13, the end of settlement and roads at that period. From this point the outfit had to break their own roads through the deep snow so that it took them six days more to reach the township of Hull. A grist mill and saw mill were built in 1802 on the Chaudiere falls which Mr. Wright called Columbia falls. In 1811 three large well equipped farms had been established, the Columbia, Britannia, and Gatenoë, with areas of 800, 700, and 800 acres respectively.

The details relating to this settlement are given in a paper by Mr. Wright before the Committee on Crown Lands and published in the Tenth Report, 1824. The paper gives the year's events of the growth of the settlement and covers a period of 23 years. It is worth while quoting his reasons for selecting the site. After a description of the Chaudiere falls he goes on to say: "The mill sites upon these falls, exceed every thing a person can have an idea of, one hundred mills, might be placed there without the smallest injury to each other with perfect safety. I have two mills at this place, which are doing business for persons who reside near 100 miles up and down the river. These falls are composed of remarkably fine limestone. I have no doubt but lime could be made here at half the expense required in any other place—I generally make large quantities every year, and it will be found to be of the greatest advantage for agricultural purposes. No place affords such quantities of valuable building stones as this place, and at the same time so easy to be obtained, as it lies upon the surface of the earth. There is also a remarkably fine bed of iron rock ore within four miles of this place, lying on the height of a declivity and in strata not more than 18 inches under the surface of the earth; and the time is not far distant when this iron ore will become valuable and of the greatest advantage to the interior part of the country, as we have already made use of some and find it of the best quality. Finding this place to be the most advantageous for making a place of deposit for my general concerns, owing to the easy access to the water communication up and down the river, and the stoppage by reason of the portage, I thought to expend considerable money in clearing land and building, knowing its local situation could not be rivalled by any, having two large rivers emptying

\*The rapids between Grenville and Carillon on the Ottawa river.

into the Ottawa near this place, the Gateno from the north and the Rideau from the south, and generally a good surrounding country. All these things were flattering even to overcome the disagreeable sensation of thinking that I was 120 miles from all business, and 80 miles from any settlement; however, I was determined to use every exertion that lay in my power, with a full hope and expectation that at some future period, it would become a second Montreal; such was then my opinion and is now, from convincing proofs from twenty years' experience. Since that time I have commenced clearing and building, and have also laid down the site of a village fit for business, which has answered my expectations in every respect."

There were several organized settlements directed into this region at a later date, and some of the sites may have been as deliberately chosen as the above with regard to water power. It is probable, however, that most of the locations were chosen with regard to suitable farming land first and the site for the mills decided on later.

In 1806, Mr. Wright sent the first raft of logs from Hull township to Quebec and we read elsewhere that lumbering on the Bonnechere river was begun in the year 1820. It is probable that much of the early settlement followed in the wake of lumbering operations, as the settlers in the outlying districts were able to sell grain and pork to the lumberman, who was in fact their only customer. Skilled labour, such as coopers, millwrights, blacksmiths, and wagon-makers, was in much demand both by the lumber companies and the farmers.

We find many instances of settlers taking up land within the borders of the Laurentian plateau in preference to the valley plain lands, because the bottom lands were either too wet or the forest growth was so heavy that much labour and time had to be expended before a crop was sown and harvested. On the other hand the upland contained patches of thinly-wooded, light soils, on which with very little expenditure of labour a crop of potatoes could be grown during the first season of occupation.

While the upland farm provided an immediate support for a settler and his family he generally found before many years had passed that it would be wise to secure land in the valley plain if possible. The necessity for this change became apparent when the light soils of the upland became exhausted unless replenished with stable manure which, however, was not always available in sufficient quantity, and also because of a certain degree of isolation, which was inevitable owing to the rugged character of the land. Hence the farmer often acquired clay land in the valley plain adjacent to the upland, and making this the mainstay for his support, turned his upland farm into a pasture and wood lot for fuel.

The construction of colonization roads over the valley plain gave access to those lands which were not accessible from the rivers and gradually the process of clearing, draining and cultivation was accomplished over the whole area.

Whatever prosperity and growth the towns achieved since the first settlers began cultivation have been due almost entirely to the productiveness of the land and the variety of products which could be raised upon it. Lumbering, railways, industries, and mining have contributed their share but the fundamental cause of prosperity was and still is agriculture.

#### MINING.

Although mining of various minerals has been carried on for the last 70 years in portions of the Ottawa valley we cannot point to any town or village which has grown up in the neighbourhood of an ore body and supported wholly by mining such as the towns of Cobalt, Timmins, and Sudbury in Northern Ontario. One very evident reason is that so far there has not been an ore body of the right kind of sufficiently large dimensions to ensure the building of a mining town in its vicinity.

Iron mining never fulfilled its early promise to become one of the permanent industries of the region, and although there are several bodies of iron ore in Pontiac, Lanark and Renfrew counties, they are not commercial ores from the present day point of view. These ores, however, constitute a reserve for the future when economic conditions permit of their treatment for use.

The village of Bristol Mines in Pontiac County, Quebec, is an example of the beginnings of a centre due to mining development, but it never attained to any size and is now practically deserted.

Pyrite and molybdenite are the principal metallic minerals mined now in the Ottawa valley. The occurrence and exploitation of the large deposit of the latter mineral in the vicinity of the village of Quyon, in Pontiac county, has recently caused a considerable influx of business to that point. The non-metallic minerals have been the most important sources of revenue in this region. These include graphite, mica, phosphate, feldspar and limestone as the principal ones, with celestite, barite and fluorite as minor occurrences.

Mining is generally a costly business when compared with agriculture, and much money is expended in hardware and other equipment and for labour among the communities where it is carried on. It gives employment to the farming population of the upland districts during their spare time especially in the winter, when they formerly depended on lumbering operations as a source of wages.

(To be continued)

# THE GENUS VESPA IN CANADA.

## KEY TO THE SPECIES.

By F. W. L. SLADEN, APIARIST, DOMINION EXPERIMENTAL FARMS, OTTAWA.

The wasps of Canada, the word "wasp" being used in its strictest sense to include only the genus "Vespa," fall into four groups:—the *Norvegica* Group, the *Carolina* Group, the *Vulgaris* Group, and the *Rufa* Group.

Four new forms are described in this paper, but how far they run into existing forms only extensive collecting and especially the taking of nests will show. In several cases, there is a dark northern form closely related to a yellow southern form.

1. Eyes not nearly reaching to mandibles, sagittae not fused together at the tip (*Norvegica* group) 2  
Eyes touching or nearly touching mandibles...6

### NORVEGICA GROUP.

2. Large species (female length about 21 mm.), maculations white, not yellow, flagellum testaceous beneath, segments 1 and 2 entirely black.  
male 2061, female 2060, *maculata* L.

N. S. to B. C. Makes aerial nest, constructing entrance tube when first workers are maturing. This is the well-known "Black hornet."

Regular size (female length about 17 mm.), segments 1 and 2 nearly always striped more or less .....3

3. Markings yellow .....4  
Markings white .....5

4. Yellow band on segment 1 wider, interrupted or almost so in middle, small black spot or spots on clypeus, antennae testaceous beneath, inner angle of stipes rectangular or acute, its hair shorter and denser.

male 2064, female 2063, *diabolica* Sauss.

Very common, N.S. to B.C., to 5000 ft. in southern B.C.

Yellow band on segment 1 narrow, uninterrupted, clypeus divided by a black line, widened in middle, male antennae black beneath, inner angle of stipes obtuse, its hair longer and less dense.

male 2186, female 2187, *norvegicoides* n. sp.

N.S. to B.C. Near to *diabolica* and the European species *norvegica* L.

5. No red spots on segment 2, stipes black, inner side strongly angled and margined with moderate amount of pale hair.

male 2065, female 2062, *arctica* Rohw.

(=*borcalis* Lewis)

N.S. to B.C., not common. Only males and females known. Parasitic in nests of *V. diabolica*.

Segment 2 with lateral red spot, stipes pale, slender, inner side not angled, clothed with dense yellow hair.

male 2077, neuter, *albida* n.sp.

Alaska.

### CAROLINA GROUP.

6. Dorsum with two (or four) longitudinal yellow stipes; female abdomen ochreous and black, neuter yellow and black.

female 4015, *carolina* Sauss.

Point Pelee, Ont. (Taverner).

Dorsum entirely black, or (in *occidentalis* only) with two small spots, markings yellow or white .....7

Hairs on segment 1 pale, sagittae fused together at tip, forming a spoon with slender stem.

(*Vulgaris* group) ...8

Hairs on segment 1 black, sagittae fused together, forming a subtruncate club.

(*Rufa* group) ...9

### VULGARIS GROUP.

8. Scape yellow in front in female and neuter; male has the surface of segment 7 concave, saggital piece not armed with thorns, slightly emarginate at tip, inner tooth of stipes truncate.

male 4016, female 2069, *occidentalis* Cr.

Lethbridge, Alta., to Victoria, B.C.

Scape entirely black in female and neuter; male has a transverse declivity on segment 7, a long thorn on either side of base of terminal swelling of saggital piece, inner tooth of stipes pointed.

male 2188, neuter 2071, *communis* Sauss. 8a.

Common in eastern Canada. Makes underground nest.

- 8a. More extensively black. Clypeus with black line. Pronotal yellow stripe narrower, black spots on abdominal segments fused into the wider basal bands.

female 2070, var. *communis* Sauss.

More northern range. Probably only a melanic variety.

More extensively yellow. Clypeus with small black spots, pronotal stripe wider. Black spots on abdominal segments free from the narrower basal bands.

female 2170 var. *flavida* n.n.

(=*pennsylvanica* of authors)

More southern range.



NOTE—The only western male of *communis* in the Canadian National Collection is from Aweme, Man. (Criddle) and has the surface of segment 7 as in *occidentalis*. This suggests a possible gradation between the two forms.

RUFIA GROUP.

9. *Tibiae bearing long erect black hair*, those on hind tibiae almost as long as tibial spurs; angles on margin of clypeus more pointed than in *acadica*; tarsi somewhat larger and thicker, especially those of the fore legs; black on abdomen never extensive enough to enclose yellow spots except on segment 1, segment 2 with a narrow black basal band widened in centre and then spreading sideways.

female 2075, *austriaca* Pz.

Ottawa, Chelsea, Que., mid-June; Winnipeg, mid-July; Kaslo, B.C., mid-July. This species is parasitic in nests of *V. rufa* L. in Europe. Only males and females are known.

*Tibiae practically destitute of long erect black hair*, but sometimes a few short sub-decumbent black hairs on basal part of the joint.....10

10. *Smaller* (female length 14 mm., male length about 12 mm.) *Darker*. Clypeus flattened, anterior angles not specially prominent, *clypeus bearing a longitudinal black line* extending from near apex to base, widened apically. Lateral yellow stripe on prothorax narrow, parallel sided. *Segments 2 to 5 each typically with a broad black band which in the female contains a small yellow spot near the apical margin on either side*. These spots occasionally reddish or absent. On segments 3 to 5 the black band is widened to receive the spots which may not be completely enclosed at the sides. In the neuter, spots are present rarely on second segment only, and these are reddish, and second ventral segment occasionally has a red lateral spot. Hair denser and longer especially on

clypeus and segment 1, which is only slightly narrower than segment 2. Stipes dark, the apical portion narrower and more membranous.

male 4012, female 2072 *acadica* n. sp.

Nova Scotia, (not rare); Painsec, N.B.; Ottawa; Kaslo, B.C.; Victoria, B.C. Near to *vidua* and the European species *rufa*. Makes aerial nest.

*Larger* (female 17 mm., male length 14 mm.)

Clypeus more convex. Anterior angles more prominent. *Clypeus with only 3 small black spots* near apex. *Yellow areas on prothorax and abdomen wider*. Hair, especially on clypeus and basal segment, more scanty and shorter. Segments 3 to 5 each have narrower basal black bands which in the female and neuter are angularly produced backwards in centre, with a line or black spot on either side, which on segment 2 or 3 is usually enlarged and fused into the angular production.....11

11. Segment 2 with a broad black band covering about eight-ninths of the segment in the middle. Yellow markings on thorax slightly paler than those on abdomen (? effect of cyanide). Prothorax stripe parallel sided. Stipes testaceous, the apical appendage wider and less membranous.

male 2076, female 2073, *vidua* Sauss.

Female, Port Rowan and Simcoe, Ont. (G. S. Spencer); neuter, Chatham, Ont. (F. W. L. S.); male, Toronto.

Segment 2 with the black area only slightly more extensive than on segment 3. Tint of yellow uniform. Prothoracic stripe subtriangular, nearly as wide as long in female.

female 4013, neuter 4014, *atropilosa* n. sp.

One female Lethbridge, Alta. (F. W. L. S.); many workers, Vernon, B.C.; Keremeos, B.C.; Okanagan Landing, B.C. (F. W. L. S.)





## THE LOTUS LILY OF SAINT WILLIAMS.

BY ARTHUR HERBERT RICHARDSON,  
NORFOLK FOREST STATION, SAINT WILLIAMS, ONTARIO.

It was August the twenty-fourth of the present year that I first made the acquaintance of this rare plant. I had waited purposely until I knew the flowers would be open to the sun in order that I might have a first and lasting memory picture of the blossoms at their best.

The bed occupies a part of Long Point Bay, Lake Erie, a few hundred feet west of where the village road of Saint Williams descends the cliff to the beach, and is about ten acres in extent.

The Lotus Lily, *Nelumbo lutea*, (Willd.) Pers. is a native of America and not introduced as some have thought. And one may well wonder how a plant of such rare occurrence has acquired so many different names, for it is known in different parts of the United States as: Sacred Bean, Yellow Nelumbo, Water Chinquapin, American Lotus or Nelumbo, Great Yellow Water Lily, Wankapin or Yankapin, Duck-acorn and Rattle-or Water-nut.

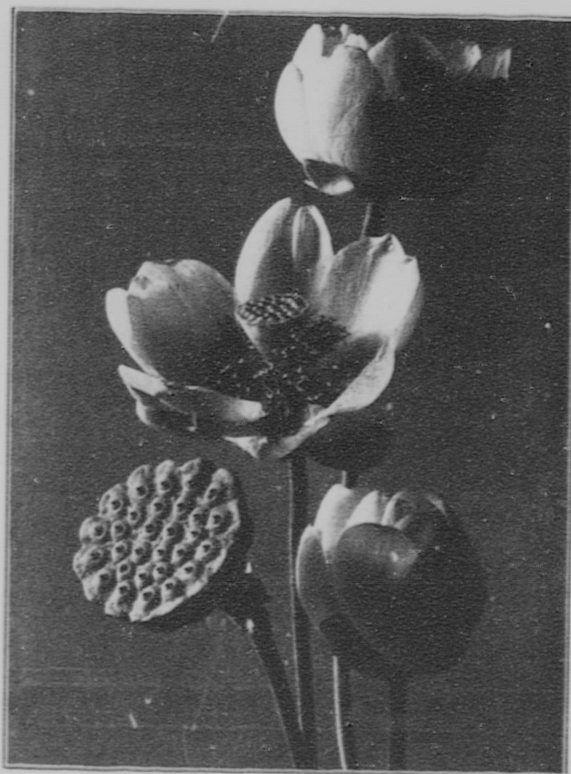
The flowers are pale yellow in color and vary from five to ten inches in width. Before they open, the buds are the shape and size formed by the two hands placed slightly curved so that the wrists and finger-tips meet. The leaves vary in size from three to four inches to two feet in diameter. They are nearly orbicular and often have the centre slightly depressed or cupped. Unlike the flowers of the Sweet Scented Water Lily or the Yellow Pond Lily which float on the surface of the water, the flowers of the Lotus Lily stand high above the surface. Occasionally too, the leaves do likewise, but the majority of them float on the surface of the water in the same manner as the leaves of the other two lilies but are easily distinguished from these by the absence of a deeply-cordate cleft at the base.

The fruit is an inverted cone which dries when ripe, enclosing the hard seeds in little cavities. Because of the rattling sound made by them, the plant has received (in some localities), the name of Rattle-nut.

From the information I have been able to gather about this plant, its occurrence in Canada seems to be very uncommon.

Gray's Manual of Botany includes Lake Erie and Lake Ontario in a general way as its range but mentions no specific place. Britton and Brown's Flora does not mention it from Canada at all. Macoun's Catalogue of Canadian Plants 1883, reports it in the Detroit River and near the mouth of the Welland Canal. Dodge's Catalogue of the Flora of Point Pelee, mentions only the Ohio shore, and Spotton, in compiling his Ontario Botany, either did not know of its existence, or did not consider its occurrence common enough to mention. From the foregoing, therefore, one may well conclude that unless the plants in the Detroit River and the Welland Canal mentioned by Macoun in 1883 are still there, Saint Williams, as far as is known, is the only place in Canada where the Lotus Lily grows.

The bed of plants at Saint Williams is in a sheltered place and unless something extraordinary happens there is little fear of its being exterminated. Someone has erected a wire fence a few hundred feet in length along the shore side of the bed, whether for protection or not I am unable to say. When I visited the place in August, there were hundreds of lilies in flower. No one—except a fifteen-inch snapping turtle, which made a pass at my bare ankle—prevented me from taking all I wanted.



THE LOTUS FLOWER.

(Photo by F. A. Taverner; from The Canada Year Book, 1915.)

## ORIOLE INSTINCT.

By J. A. MUNRO, OKANAGAN LANDING, B.C.

Mr. Taverner's note in the May issue, describing the nest built by a pair of young orioles, recalls an experience with a nesting pair of the Bullock's Oriole, in the summer of 1911. As in the case of the pair Mr. Taverner had under observation, the male was a bird of the previous year and it was taken for granted that the female was also.

The writer was camped under a group of quaking-aspens on the shore of Okanagan lake and in one of these trees the orioles had started building. The branch to which the nest was fastened was an upright one, half an inch in diameter, close to the top of the tree and some twenty feet from the ground. Attention was drawn to the partly constructed nest, by the efforts of one of the birds to draw out a linen thread from a bath-towel, hung over a wooden railing near the nesting tree. With the end of the thread held in the bill and with feet braced against the railing, the bird tugged and worried at the thread until it became loose; then with one decisive jerk, flew with it to the nest. This was repeated several times; an inexhaustible mine of building material had been found.

Having often read of the oriole's instinctive rejection of colored string for nesting material, it was thought to be a good opportunity for experiment along this line. Accordingly an assortment of various colored yarns, white, pale blue, red, black and pink were cut into convenient lengths and placed in a row on the bath towel. In a few minutes the female returned to the towel-rack and finding this loose material, a new treasure-trove on top of her linen mine, made no attempt to pick out more threads as long as the white yarn was available. The colored yarns were not touched and when the supply of white was exhausted, the towel again came in for attention. The reputation of the species for sagacity seemed to be established.

She worked most industriously, taking, on an average, five minutes to weave into the nest a piece of yarn twelve inches in length and a minute or a little longer to return and select another piece. Before alighting on the towel-rack she always gave the characteristic harsh call-note.

The female did most of the building; indeed it was not certain that the male performed any of the work; their similarity, and the fact that they did not appear together, made it difficult to recognize the sexes.

Anxious to discover if this instinctive selection of neutral-colored material would operate under more complicated conditions, the colored yarns were collected and to each of them was knotted a piece of white yarn of the same length and they were placed again on the towel rack, with the white portion uppermost. Without hesitation she began carrying off the pieces, with the white portion held in her bill; the white half was woven into the nest and the colored half allowed to hang from the outside.

Oriole instinct was at a discount now, and I became bolder in my experiments. Selecting some soft thick yarns, in red, green and black and, when fluffed out, of the diameter of a pencil, I tied these in twelve inch lengths to short pieces of fine white yarn. These were taken as quickly as the last; the short ends of white woven into the fabric of the nest and the larger colored portion allowed to hang from the outside. It was amusing to see the bird fly into the tree with a long brilliant streamer trailing behind.

The nest was now ablaze with color, long gaudy strands hung from all points, six to ten inches below the bottom. To add to the color-scheme I tore into strips, a necktie of a particularly violent pattern in red and green, and tied on the usual piece of white yarn. The bird was now utterly demoralised and did not balk at this singular adornment. Several pieces were added to the upper part of the nest.

The polychromatic structure was now completed; the eggs were laid and the nestlings raised without mishap, while the decorations waved in the breeze to the wonder of the passerby and perhaps the confusion of marauding, egg-hunting crows.

A closer examination of the nest after the young had flown, revealed the fact that it was of unusually poor workmanship, loosely made from various kinds of string, through which was woven, the white yarn; the slight lining was of black horsehair; no roots or other fibrous material had been used.

## GERMAN BIOLOGY.

By P. A. TAVERNER.

It may seem out of place to use the pages of a scientific journal for the expression of international recrimination, especially during the heat and prejudice of war; but one phase of the Hun's hunnishness is a direct challenge to modern biology and should have a biological answer.

The position of the German scientist is something as follows: Nature evolves to higher planes through struggles between competing forms and the consequent triumph of the strong through the relentless elimination of the less fit. Man is an animal and war is as much a biological necessity for his development as it is for that of the lower creation. Therefore, for the future benefit of the human race, weak powers must give way to more virile expanding ones, permitting them to sow the earth with the seed of a superior race and culture. Political might is thus right, weakness the greatest wrong, and forbearance towards the weak enervating sentimentality and the betrayal of the human race.

The reasoning is characteristically Teutonic in its blind confidence in its own logic. Other schools of thought on reaching so monstrous a conclusion would pause and retrace their mental steps to see where they had departed from the direct path of truth to land in this unthinkable quagmire. Not so the German. To him the laws are immutable and if the result shocks our senses it is our standards that require revision. They point to their premises and to the conclusion, never doubting for a moment the reasoning between.

The deductions are admirably direct and clear to the German intellect but here as elsewhere the Teuton neglected to consider the human element. He can handle ohms and watts and foot-pounds admirably, but whenever he has attempted to estimate the strictly human equation he has lamentably failed. In this case he failed to perceive that biological laws apply only to the biological (the physical) side of man; that man is of dual nature and moral development is as necessary to his well being as is his body. Man may be an animal but he has developed something that no other animal possesses. He has a moral sense and whether you call this "soul" or merely "community instinct" it is an absolute necessity to his communal existence. Without it, civilization, and the power over nature obtained through mutual assistance and confidence,

could not persist. Biological evolution of the physical body may produce the super-beast, never the super-man; that can only be the result of a concurrent and equal development of the moral being, and the two are diametrically opposed to each other, one being the result of absolute selfishness, the other of unselfishness.

It would thus seem that we have only discovered the pathway to advancement to find that we cannot use the knowledge to our own improvement and the way is barred against us. There are many truths we can see without being able to consciously profit by them. It is undeniably better that one should suffer rather than many, yet we cannot allow any justification for cannibalism. Old age is a drag upon the body politic. It consumes and can not produce, but we cannot therefore advocate the killing of our grand-parents. These things are against public policy and however apparent their advantage in certain directions, they would cause incalculably greater racial harm through the consequent deadening of sensibilities and destruction of mutual confidence.

These are the things that German science failed to perceive. That however admirable natural laws are in themselves there are certain of them that we cannot consciously take advantage of. The great compensation to this, however, is the fact that biological laws work in spite of us. We have not developed our physical being consciously so far, nor need we in the future; Nature will take care of that without our assistance. Our moral development on the contrary is in our own keeping, if we look after that side of our nature, Nature will do her duty with the rest. In our bolstering up the weak and caring for the dependent it may appear that we are working at cross purposes with our own physical good, but

"Though the mills of the gods grind slow  
they grind exceeding fine"

and the evolution of the morally as well as the physically fit is continuing. War at times is a good thing, but only after every possible effort to avoid it. It is eliminating the morally unfit now that their pernicious doctrines may not contaminate the world and cause devolution, in place of evolution.

Nov. 5, 1918.

## NOTES AND OBSERVATIONS.

EXCURSION OF THE VANCOUVER NATURAL HISTORY SOCIETY.—On Saturday, August 31, and Sunday, September 1, the members of the Vancouver Natural History Society held their annual excursion for the study of the local alpine flora, the slopes and valleys of Grouse and Dam mountains being the objectives.

The season was so far advanced that many of the plants found in previous years were past flowering and were in fruit.

During the evening of the first day the members had an opportunity of becoming familiar with quite a number of different trees, as for instance the Sitka spruce of so much value at the present time for aeroplane work, red alder, Sitka alder, dogwood, wild cherry, giant cedar, white pine, douglas fir, hemlock, yew tree in fruit, besides a number of willows and shrubs constituting the undergrowth of the forest.

Next morning by 8.30 the party was on the trail again. On account of the rather open nature of the mountain along the bluffs, there were numerous specimens found, including ferns, saxifrages, pentstemons and other rock-loving plants. The plateau was reached about 11 a.m. Here the vegetation was of an entirely different character; instead of a covering of salal was a covering of red and white false heathers, some belated specimens of both were found in flower. The underbrush was composed of white rhododendron, copper bush, two or three species of large, luscious blueberries like grapes, and mountain ash with beautiful clusters of coral-red fruits in a background of dull green.

Proceeding by the lake and over the peak of Grouse, the members continued to the slopes of Dam mountain, where they found further alpine or sub-alpine specimens, including the marsh marigold, false hellebore (a poisonous plant), mountain flea-bane, arnica, grass of Parnassus, with its beautiful white flowers, Alpine speedwell often called forget-me-not, and the Sitka valerian, but one of the most interesting was a little moss-like flowering plant, *Hippuris montana*, or mountain mare's tail, which is recorded as found on flats along Glacier Creek in the Selkirks, and also in Strathcona Park, Vancouver Island. The plant is so small that individual specimens are readily overlooked, but there are several large patches on both Grouse and Dam mountains.

Lunch and rest was enjoyed on the summit of Dam mountain, from which an extensive view of the surrounding country was obtained, from Mt. Baker, with its glacier-covered northern slopes to the mountains of Vancouver Island, and the mountainous country to the north.

After lunch a number of the more seasoned climbers ascended Goat mountain and were rewarded by the discovery of Tolmie's saxifrage, *Saxifrage Tolmiei*, a small fleshy leaved species usually found in regions of glaciers and perpetual snow. This year, however, the snow was practically all gone, there being only a small patch at the base of Crown mountain.

Numerous birds, butterflies and other insects were observed during the outing.—J. D.

TRANSFORMATIONS.—Bide-a-Wee Island, Blue Sea Lake, Que., July, 1918.—One morning lately at breakfast, in our open-air dining-room, we heard a slight thud on the ground. We went to see the cause. Various were the explanations of the strange looking object we found. One was: "A dragon-fly has a beetle." Another: "A bug has a darning needle." It took some time to grasp the true explanation, so swift were the contortions of the mystery. It was a large, splendid dragon-fly struggling to emerge from a small, repulsive-looking black case, which shortly before had been a dragon-fly nymph. How was it possible for that large, great, gorgeous creature, with its gauzy, shimmering wings, and brilliant black-green-gold body, to be enclosed in that small blackish object? After emerging, it rested on a branch of a tree for some hours, then after a few short trials it flew off strongly, into the nearby woods.

Bide-a-Wee Island, Blue Sea Lake, Que., July, 1917.—One morning this summer, while we were out on the water, suddenly we noticed its surface was almost covered with what looked like dead minnows. Mrs. Wisewoman explained that there had probably been a disease that had attacked the baby fishes, and their lifeless bodies had risen to the top. Next evening at sunset we were again on the water. That time we suddenly noticed that there was life in the thought-to-be dead little bodies. The surface was fairly quivering with motion. Out of these bodies shad-flies were struggling to emerge. Some came out gaily after a few convulsive efforts. Others had to try again and again, each time sinking back into the water, but at last they rose triumphant.

As we looked at the gauzy wings quivering and sparkling in the sunset rays and then down at the old, forlorn, shrivelled-up cases, we marvelled again over the wonder of Nature's creation.—M. E. C.

One of the results of the European war was a great shortage of dyes because the German supply was cut off. In 1917, the United States made enough to supply 75 per cent of their needs, and of



some colors were able to export a surplus to the amount of nearly \$4,000,000. In keeping up with this modern progress, the Philadelphia Commercial Museum has added to its extensive exhibit of coal tar products a series of seventy dyes "made in America". To the same exhibit has been added a collection of 67 specimens of synthetic flavors and perfumes. It is very interesting to the visitor to learn that perfumes such as rose, heliotrope, and lily of the valley; and flavors such as grape, apple, peach, and apricot, may all come from a lump of soft coal instead of from the flowers and fruits.

ANOTHER RECORD OF THE ROUGH-WINGED SWALLOW NEAR OTTAWA, ONT.—Prior to 1917, when the writer found two pairs of nesting birds eight miles above Ottawa on the Rideau river\*, the Rough-winged swallow had apparently not been observed in eastern Ontario.

On June 5, 1918, the above-mentioned locality was again visited and, though others may have been overlooked, only one nesting site was observed, from which a female bird, nest and six eggs were collected, to be used as material in the preparation of an habitat exhibition group in the Victoria Memorial Museum. No feathers had been used in the construction of the nest, but a few dry poplar leaves had been introduced and also, for some unaccountable reason, several bits of fresh cow dung, which were found adhering to the comparatively fresh eggs.

In 1906, the nearest known breeding ground of the Rough-winged swallow extended along the southern shore of Lake Ontario, therefore the Ottawa records point to the probability that the species has either crossed Lake Ontario and extended its breeding range down the Rideau valley or has ranged around one or both ends of the lake and along the north shore to the Rideau waterway.

This species is reported to become common in localities where a few years before it was unknown, so no doubt future records of the Rough-winged swallow on the Canadian shore of Lake Ontario will verify one or more of the above stated suppositions.

CLYDE L. PATCH, OTTAWA, ONT.

AN EPISODE WITH THE VIRGINIA RAIL.\*\*—Difficulties are a stimulus to the bird student, just as they are to students in other lines, but while difficulties with many birds may be almost welcome, adding zest to the study, when it comes to the dwellers in the marshes, they are an exasperation, as there is usually so little hope of fathoming them. It is, therefore, the more incumbent on the favored person who has an enlightenment with any particular species, that he shall declare his luck to the world, hence this note.

\*The Ottawa Naturalist, June-July, 1917.

\*\*Read before the Melbourn Ornithological Club.

On August 5, 1918, the writer was at one end of a crosscut saw, which was making quite a noise, though not one that was commensurate with the efforts applied at each end, and we heard, over the rasping of the saw, *cwa-ah, cwaah, cwaah*, several times repeated. The tone resembled that of the Black Duck, but more harsh and grating. The remark was made that such a noise might be made by a Florida Gallinule, but there would be no use in hunting it as a marsh bird is not a thing to be hunted in any active manner, the only successful method being to keep out of the way, and to be more or less still. So the sawing went on, and the noise was soon repeated. This kept on until some boys who were loafing around the waters' edge called out that there was a strange bird in a tuft of grass beside the pond. In a moment it was seen to be a Virginia Rail, and it soon proved itself to be the author of the strange sounds, by repeating them. Its mate approached it, and a response came across the 20 feet of water to the east, in the form of a shrill, high pitched whistling note, and very soon the author of this latter note, a jet black, downy young, about the size of a Catbird, swam across the open water, defying all dangers to get to its parent. It was followed by three others, and there were three or four more, whose courage was not equal to the task, and they remained on the east side of the water. But the four that crossed, swam and ran boldly after the parents, who now varied their calls with a *kik, kik, kik*, pitched very high, though it was several tones lower than the shrill piping of the young. The parents now led the young west into the long grass and were lost to sight, but at intervals through the day, came vocal reminders that the Rails had not left the premises, and about 5 p.m. the calls began to come from the vicinity of the crossing, and soon a bird (female?) appeared and crossed to the east side, followed as before by four young. Shrill pipings greeted her approach and doubtless she picked up the whole of those that were troubled with cold feet at the time of the morning adventure. My companion circled around ahead of them, and the mother bird led her brood within an arm's length to the stationary man who acted like a stump, and all vanished into the quiet swamp. On following days, these sounds were repeated, but the authors were no longer a matter of surmise, and no sounds were thought to come from the Sora Rail, which may not be breeding at the pond this year.

It should be added that the tone of the calls by the young resembled the squeaking of a door hinge, and the vocal sound was *Kee-a*, the final syllable being very short, while in the case of the old birds, the first syllable was so short as to be inaudible at any considerable distance.

W. E. SAUNDERS, LONDON, ONT.



## BOOK NOTICES.

IN AUDUBON'S LABRADOR,\* By Chas. W. Townsend, Houghton Mifflin Co., 1918, pp. 354+xii, \$2.50 net. This charmingly written book after a resume of Audubon's famous Labrador expedition in 1833 describes the route taken by Dr. C. W. Townsend, ornithologist, and H. St. John, botanist, in following in the wake of Audubon, on a coasting schooner in 1915, under the auspices of the Geological Survey. Aside from the light it throws upon the work of the Father of American Ornithology on this romantic coast, it contains much interesting comment upon the country, its inhabitants, resources and wild life. Powerful pleas are made for the protection of the eider ducks to preserve them from threatened extinction and the conservation of other neglected resources of this barren country. Advance publication of the matter on the eider has already appeared in the *Auk*, for January, 1914, and a similar article by the same author was published in the Seventh Annual Report of the Commission of Conservation of Canada, in 1916. Dr. Townsend has pointed out the necessity for the protection of wild life on this coast; the late international migratory bird convention has furnished the federal government with a further incentive and the means for doing so. It is to be hoped that determined steps will be taken in this direction before it is too late.

In the *Auk*, for July, is a paper of importance to Canadian ornithology.

FURTHER NOTES AND OBSERVATIONS ON THE BIRDS OF HATLEY, STANSTEAD COUNTY, QUEBEC, 1916-1917; by H. Mousley, pp. 289-310. This is a further contribution to a similar paper by the same author published in the *Auk*, in 1916, and brings it up to the above date. It adds 41 species to those then listed bringing the number noted in

\*Reviewed by W. S., *Auk*, XXXV, No. 5, July, 1918, p. 367.

the locality to 163, and establishes 15 more of them as breeders. To a copiously annotated list is added an interesting account of the conditions exhibited by the seasons under treatment, the changes and variations in bird life, and pertinent generalities. The annotations contain a great store of life-history, distributional and other data. It is a valuable addition to our ornithological knowledge of eastern Canada.

FORTY-EIGHTH ANNUAL REPORT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, 1917. Published by the Ontario Department of Agriculture, 1918. This report of 127 pages appeared recently. It contains valuable articles of special interest to Canadian students of insect life. Among the more important contributions the following may be mentioned: "The Apple and Thorn Skeletonizer," by Dr. E. P. Felt, State Entomologist of New York; "Some Notodontian Larvæ," by Rev. Dr. J. A. Corcoran, Montreal; "The Problem of Mosquito Control," by Dr. T. J. Headlee, State Entomologist of New Jersey; "The Black Cherry Aphis," by Mr. W. A. Ross, Vineland Station, Ont.; "A Comedy of Errors," by Mr. F. J. A. Morris, Peterborough, Ont.; "Transcanadian Spiders," by Mr. J. H. Emerton, Boston, Mass.; "Dusting versus Spraying to Control Fruit Tree Insects and Fungous Diseases," by Prof. L. Caesar, Guelph, Ont.; "The Ecology of Insects," by Prof. W. Lochhead, Macdonald College, Que.; "Effect of Stable and Horn Fly Attacks on Milk Production," by Mr. A. W. Baker, Guelph, Ont.; "Potato Stem-borer and Zebra Caterpillar," by Prof. W. H. Brittain, Truro, N.S.; "The Entomological Record for 1917," by Mr. Arthur Gibson, Ottawa. This latter paper of 24 pages gives a large number of new distributional records from the various provinces.

## OBITUARY NOTICE.

CHARLES K. DODGE.

Canada lost one of her best botanists when Mr. Charles K. Dodge died recently at Ann Arbor, Mich., for although living at Port Huron, Mich., much of his field work in botany was done in Canada. His botanical work is an unanswerable reply to those who think that busy men have no time for scientific work. For many years a U.S. Customs official, every holiday and every spare hour during the summer months were spent in collecting and studying plants, the country on both sides of the St. Clair river giving him a rich field for study close

to his home. In recent years his holidays were spent working in conjunction with the Michigan Biological Survey. No other botanist knew the flora of Michigan as he did and certainly no Canadian botanist has given the same study to the adjacent parts of Ontario. Mr. Dodge published many notes and papers on his work in Ontario the most important being an "Annotated List of Flowering Plants and Ferns of Point Pelee, Ont., and Neighbouring Districts," published by the Geological Survey of Canada as Memoir No. 54.—J. M. M.