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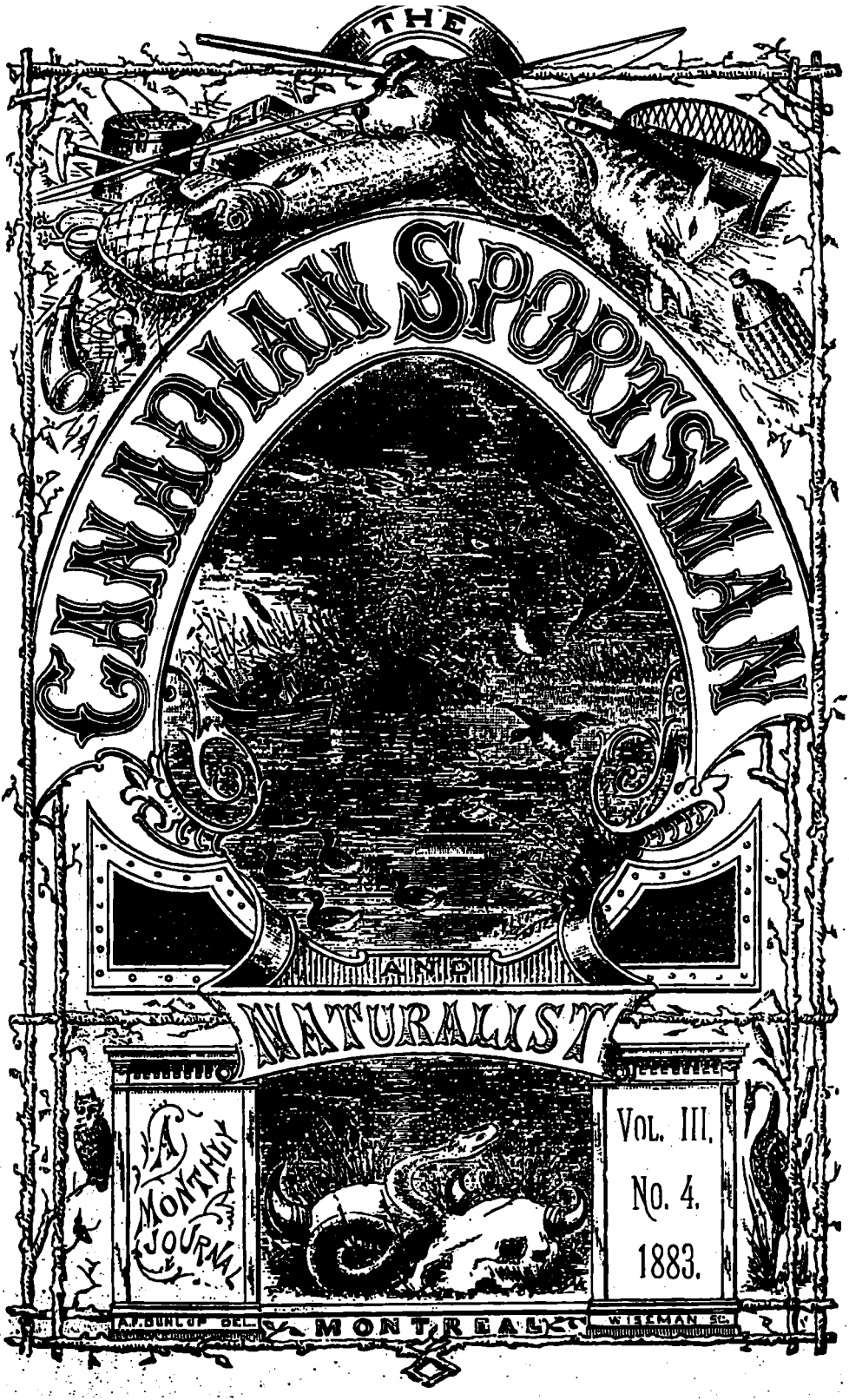
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THE CANADIAN SPORTSMAN AND NATURALIST.

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WILLIAM COUPER, Editor.

OWLS.

Two beautiful specimens of the rare cinereous owl were sent to me in March. One was a female shot at St. Remi, the other a male, secured in the neighbourhood of Huntingdon, Que. Two owlets of this species were procured about three years ago, from a nest found in a tree in the new settlement of Ponsonby, a wild region not far from Montreal. From these facts, it is evident that the great cinereous owl is becoming more resident in the woodlands of Quebec. Formerly it was considered a visitor during winter, like the snowy owl, coming from the lands inhabited by the leming. Although it is only of late years that this owl was discovered in the latitude of Quebec during summer, we have no authentic knowledge of its habits during the nesting season. Why is this powerful bird so rare, while the barred owl, a smaller species, is generally abundant? The young of the latter were found on the ground in a forest near Quebec, and the adult birds are common in our woodlands at all seasons. There appears to be a great difference regarding the positions whereon a few of our owls make their nests. Mr. W. G. A. Brodie says "that the long-eared owl and the snowy owl nest on the low trees in Manitoba," while we have been informed by other observers that the latter species deposits its eggs in a nest on the ground. The information that the snowy owl constructs its nest on trees in Manitoba is new and interesting to us, as it was formerly supposed to return to the far north to bring forth its young. The Great North-west is, however, becoming settled by intelligent observers of nature, and in a few years we will doubtless obtain a clear and correct record of its *fauna* and *flora*. The barred owl is probably the only American species having dark eyes. Why is the bird thus an exception in its class? The other owls possess bright yellow eyes, and they have also the power of dilating and contracting their black pupils to suit the glare of light in which they may be placed. Generally speaking the yellow-eyed owls are not so common (at least in the eastern portions of Canada) as the dark-eyed species. Those possessing the yellow iris may possibly range over a larger extent of territory, while the barred owl may be more local in its *habitats*. The great Virginian owl is not in any way a common species, especially near the habitations of man; the same may be said of the hawk, Tengmalm's, saw-whet, the long and short-eared owls which have a yellow iris to their eyes. These birds generally gloar and stare at a person when approached in day-light. We would be pleased to have the opinions of ornithological students regarding the above questions, with remarks on the peculiarities which may have been noticed in the economy of owls—for instance—stratagem or modes by which they procure their food; giving also statements regarding the correct use of the black-bordered transparent membrane so conspicuously connected with their eyes.—C.

NOTES ON THE NATURAL HISTORY OF MANITOBA.

BY W. G. A. BRODIE.

(Read before the Natural History Society of Toronto.)

One of our characteristic rodents is the "Sand Rat," northern pocket gopher, the *Thomomys talpoides*, Rich.; it is about the length of a house rat but heavier and of a more clumsy build; usually the color is dirty grey varying to nearly black. The cheek pouches open on the outside of the mouth, are hairy inside and will hold a handful of grain. The ears are short, placed in the centre of a dark patch and the sense of hearing is acute. The incisors are large and sharp, the molars sharp around the edges. The legs are short and the toes have long claws and they are good diggers. They are strictly nocturnal in their habits but this is of little value in the struggle for existence for their nocturnal enemies are many—owls, coyotes, foxes and badgers. Another is the northern chipmunk or *Tamias asiaticus*, Gmel; it is common in all wooded sections, is very variable but easily distinguished from its near congener in Ontario the *Tamias striatus*, Linn. The ground squirrel, *Spermophilus Richardsoni*, Sabine,

and the gopher, *Spermophilus tridecimlineatus* Mitchell, are very numerous and the prairie is everywhere riddled with their burrows. The pretty jumping mouse *Zapus Hudsonius*, Coues, is common wherever there is brush-wood. We have several species of Arvicola. *Arvicola riparius*, Ord. *A. riparius*, var. *borealis*, Rich. *Arvicola xanthognathus*, Leach, and some undetermined forms. They abound everywhere except on sandy plains, and supply an abundance of food for diurnal birds of prey. The flying squirrel, *Sciuropterus volucella*, Pallas, or rather *S. volucella*, var. *Hudsonius*, Gmelin, is common in wooded sections; they differ very little from Muskoka specimens, except that the fur is longer and denser. We also have the red squirrel, *Sciurus Hudsonius*, Pallas, where there is large timber; they do not differ very much from those you find down the glen in St. James' Cemetery. The northern hare, *Lepus Americanus*, Exl., var. *Americanus* is also common, preferring wooded sections to open prairie. The western porcupine, *Erethizon dorsatus*, Linn. var. *epixanthus*, is often found on open prairie a long distance from this. As a check on the increase of these plant eating animals we have a number of carnivorous species, the coyote, *Canis latrans*, Say, common everywhere; the timber wolf, *Canis lupus*, Linn., found in wooded sections; the red fox, *Vulpes vulgaris*, Flem., of which there are several varieties; the badger, *Taxidea Americanus*, Bodd., a fierce and greedy foe, also several species of the Mustelidæ. The wild cat *Lynx rufus*, Raf., is occasionally seen but they are small and not at all formidable. The moose, *Alce Americanus*, Jard., the cariboo, *Rangifer caribou*, And., the elk, *Cervus Canadensis*, Exl.; the red deer, *Cariacus Virginianus*, Gray.; the jumping deer, *Cervus macrotis*, Say., are all more or less common. The bear *Ursus Americanus*, Pallas, is represented by the usual varieties, black, brown and cinnamon. From Cypress Hills and along the rockies, to far up into the Peace River section is the haunt of the grizzly and whoever desires a skull must hunt for it there. This country seems particularly favorable to birds. I have seen nearly all the birds I knew in Ontario and many that are not found there, or only as occasional visitors. One reason for the abundance of species here is, I think, that in their spring migrations northward they keep in the valley of the Mississippi and being hemmed on the east by the great lakes and on the west by the Rocky Mountains they have an uninterrupted course to Manitoba and the North-west. The security they have enjoyed for ages, during the breeding season is no doubt a great attraction, and accounts for the wonderful abundance of individuals, and the vast tracts of land—not fit for settlement—will afford cover for the most timid for years to come. The advantages here of studying bird life, of collecting specimens is quite to be envied; indeed so many birds build here that last summer, I am sure, I could have collected a waggon load of eggs of many species. As a general rule, the trees here are small, and nests easily got at. I have seen dozens of nests of the common buzzard *Buteo Swainsoni*, Bon., within easy reach from the ground in oak shrubs and poplar thickets. The nests of the brown thrush, *Harporynchus rufus*, Cab., are especially numerous in all low thickets and just as up the Don or down the railway track from Toronto, the male bird sits on the topmost branch and pours out his cheering love song with vigor and variety. The veery, *Turdus fuscescens*, Bd., the wood thrush, *Turdus mustelinus*, Bd., and the robin *Turdus migratorius*, L., are all very common, the robins especially so; they sometimes remain until quite late in the fall. I got a specimen last October after snow had fallen. Warblers, kinglets and wrens abound and their nests are seen everywhere, when the leaves are off the trees. The ruby crowned kinglet, *Regulus calendula*, L., is quite common and in early spring when the azure bloom of the sand flower covers the prairie and its fragrance fills the air, when halt opened leaves deck trees in the freshest green, the cheery musical song of this pretty little bird is heard as it darts among the willow blossoms. The chickadee, *Parus atricapillus*, L., remains here during the winter, and I have noticed with this as well as other birds that winter here, that the plumage is ample, soft and downy and that when it is cold they erect their feathers—apparently without effort—so as to appear much enlarged, presenting a greater depth of feather and of course a better protection from cold. The nuthatch, *Sitta Carolinensis*, Gmelin; the house wren, *Troglodytes aedon*, Vieil.; the longbilled marsh wren, *Cistothorus palustris*, Wilson, are common; the last around marshes and sloughs and in early morning, its peculiar note may be detected amid the chorus of red-winged black birds, the discordant laughing of mud hens, the trumpeting of the whooping crane, over

head, his long legs stretched out behind, as he wings his way to some favorite fishing ground. The shore lark, *Eremophila alpestris*, Baird., and the long-spur, *Plectrophanes lapponicus*, L., come very early in spring and remain until late in winter, but it cannot be said that they remain with us all winter, and I would here make the broad statement that all our birds are more or less migratory; that they all leave their breeding places and move southward as winter sets in, and that the birds found here in the winter breed north of us. The neat and substantial nests of the summer warbler, *Dendroica aestiva*, B. D., are found everywhere in willow scrub; the nests of the superb little redstart, *Setophaga ruticilla*, L., are also common. Last spring we shot a fine specimen of the butcher bird, *Collurio borealis*, Vieil., and laid it with some other birds on the top of the shanty; very soon we heard a noise and on going out saw a butcher bird tearing his dead relative to pieces. I found a nest of this species in a dense spruce tree last spring. The white-winged crossbill, *Loxia leucoptera*, Gmel.; the pine grosbeak, *Pinicola enucleator*, L. and the red-poll linnet, *Egiothus linarius*, L., are found here summer and winter; in winter, in small flocks, feeding on the ends of trees and shrubs, the hipps of the wild rose being the staple. A flock of about two hundred and fifty snow buntings, *Plectrophanes nivalis*, L., has been around the town for some days and they have done some damage to bags of grain laying about the station, pecking holes in them and feeding on the contents. The savanna sparrow, *Passerculus savanna*, Bon., the bay-winged bunting, *Coccites grami neus*, Gm., the sharp-tailed finch, *Ammodorus caudacutus*, Gm.; the song sparrow, *Melospiza melodia*, Wils., and the snow bird, *Junco hyemalis*, L., all nest in the bluffs and on the open prairie. Here also is the towhee bunting, *Pipilo erythrophthalmus*, L., with his clerical coat, white vest, bright red eyes and sweet little matin song, they nest on the ground in tangled thickets or near brush heaps. That queer family, the Icteridæ is well represented here; of the sixteen species found in North America, I have already seen nine, and all very common. There is no uniformity in their architectural abilities. The orioles build in trees, the most complicated and strongest nests, in fact are the best nest builders of all our birds; the rusty grackle, meadow lark and bobolink build on the ground a very poor but well concealed nest, while the cow bird does not build at all, declining even the duties of housekeeping. They also differ very much in plumage; the oriole, crow blackbird, *Quiscalus purpureus*, Bart.; yellow-headed blackbird, *H. xanthocephalus icterocephalus*, Bon., and the meadow lark are very beautiful; the cow bird, *Molothrus ater*, Bodd., and the rusty grackle, *Scolecophagus ferrugineus*, Gm., very plain. Again the oriole, *Icterus Baltimore*, L., meadow lark, *Sturnella magna*, L., and the bobolink, *Dolichonyx oryzivorus*, L., are all more or less musical, while the rusty grackle, red-winged blackbird, *Agelaeus phoeniceus*, L., and the cow bird make the most discordant skreekings. Again the bobolink and the meadow lark have hard, sharp pointed, woodpecker like tails, while in the oriole the tail is soft and square at the end. Altogether the Icteridæ are a motly lot and well worth attention and study. The common crow, *Corvus Americanus*, L., and the raven, *Corvus corax*, L. are common, so is the blue jay, *Cyanurus cristatus*, L., and the Canada jay, *Perisoreus Canadensis*, L., is common in every bluff. The king bird, *Tyrannus Carolinensis*, L., is here in full force chasing and annoying hawks as usual, and every summer night, thousands of whippoorwills, *Antrostomus vociferus*, Wils. contend with each other as to which can make the loudest and most rippling complaint. The night hawk, *Chordeiles Virginianus*, Gm., is also very common and I found a great many nests—or rather lots of eggs—for they make no attempt at nest building but lay in exposed places on the open prairie. The common kingfisher, *Ceryle alcyon*, L., is common along all our rivers and small streams, nesting as in Ontario. Of woodpeckers we have the hairy, *Picus villosus*, L., the downy, *Picus pubescens*, L., the black backed, *Picoides arcticus*, Sw., and the golden winged, *Colaptes auratus*, L., the three species first mentioned are found here all winter; the last leaves early in fall; they are very common; every dead stub is pierced with half a dozen of their nesting holes. The great horned owl, *Bubo Virginianus*, Gm., the long eared owl, *Otus vulgaris*, L., and the snowy owl, *Nyctale nivea*, L., are all very common, nesting in small trees, wherever found. The peregrine falcon, *Falco communis*, Gen., the most fierce and daring of all our hawks, is very common, nesting in bluffs and is the terror of the poultry yards. The sparrow hawk, *Falco sparverius*, is very common, nesting in woodpeckers old holes. The broad winged buzzard, *Buteo Pennsylvanicus*, Wils.;

the rough legged buzzard, *Archibuteo lagopus*, Brunn. abound everywhere. The turkey buzzard, *Cathartes aura*, L., is not uncommon but as yet I have no proof that they nest here. One of our characteristic birds is the prairie chicken or sharp tailed grouse, *Pediœcetes phasianellus*, Baird.; it is abundant all over the prairie, builds on the ground by the edges of bluffs and lays about twenty rather small eggs; the ruffed grouse, *Bonasa umbellus*, L., is also common in the bluffs and nests just as in Ontario. The killdeer plover, *Ægialites vociferus*, L., the least sandpiper, *Tringa minutilla*, Vieil., the snipe, *Gallinago Wilsoni*, Temm.; the woodcock, *Philohela minor*, Gray, are all quite common. The large and fine godwit, *Limosa Hudsonica*, Lath., is common, also the upland plover or guafe, *Actiturus Bartramius*, Vieil., is very common, building in clumps of grass, and laying about five large spotted eggs. The two cranes—the sand hill, *Grus Canadensis*, L., and the whooping, *Grus Americana*, L., are common and their nests are often found. Wild geese are very numerous in spring and fall but usually breed further north. This is par excellence the country for wild ducks, they are more numerous here than robins are in Ontario. I have found the mallard, dusky duck, pintail, gadwall, widgeon, green-winged teal, blue-winged teal, shoveller, wood duck, red head, canvas back, bufflehead, long-tailed duck, goosander, hooded merganser, all breeding here. The mallard and the teals are the most common and their nests are frequent along the margin of ponds, and in midsummer flocks of young ducks are seen disporting themselves in every pond. The white pelican, *Pelecanus trachyrhynchus*, Lath. is often seen and breeds around Shoal Lake and other localities to the north. I noticed a species of tern, *Hydrochelidon lariformis?* L., very common about ponds, hovering over the water and occasionally darting down and coming up with a water lizard. They make a great row when their nests are approached, flying around one's head and nearly striking. It is enough to scare one to see it coming swiftly through the air direct for one's face, with its mouth wide open and deafening one with its most unearthly screaming.

NESTS OF THE WILD MALLARD IN ST. CLAIR FLATS.

There are evidently several species of duck which reside and nest in the St. Clair Flats. Nests of some of these species have been so far discovered. I have remarked a peculiarity in the building seasons which seems common to all wild ducks, especially when the male and female are swimming off in front of my boat, that the female is always the first to give signs of alarm, the male never takes wing first, but waits until his mate has started. The mallard is very noisy during its nesting season, and this is remarkable for some time before she commences incubation. The drake and duck are then restless, flying from place to place about the vicinity of the nest; both will then quack loudly while on the wing. I found two nests of the mallard (*Anas boschas*) last season. The first nest was discovered on May 23, 1882. I was in a canoe rounding a point of St. Ann's Island, when I heard a splashing of water behind where I passed, caused by a female *boschas*, acting in a strange way, as if wounded, making off from the nest, by partly swimming and attempting to fly, until about forty yards distant, she took wing and flew a few hundred yards, alighting in a pond. I thought if that duck has a nest in this locality, she has certainly exposed her treasure by her unnecessary mummery. I then forced the canoe into the grass, and on stepping out to search, found its nest in a thick bunch of grass, which almost encircled and covered it so closely as to completely hide the eggs. The nest was on the highest part of the point, which was about twelve feet wide. The structure was not bulky, being constructed principally of fine dead grass. The lower portion was wet, and the eggs (nine in number) were not more than two inches above the water. The eggs are bluish drab; they were neatly hidden in the nest with soft down and fine dry grass. Average size 1¾ x 2¼ inches. Incubation was advanced, but by making a ¼ inch hole, and with the use of an embryo hook and scissors they were saved for my cabinet. The second set of mallard eggs were obtained on the 5th of June, by Mr. Keays and myself from a nest found on Walpole Island, which is separated from St. Ann's Island, by Johnson's channel, one of the mouths of the River St. Clair. The place chosen was higher and dryer than that in which the former one was found, being situated about thirty yards from the channel. That morning's oological search with the use of the boat was successful, but in the afternoon, Mr. Keays was on shore hunting among the long grass, when a female mallard flew up a short distance from where he stood. After looking about a short time, the nest containing

three eggs was found. We concluded to leave it for a week in order to obtain a full set. Seven days later, on returning, we found only six, which were slightly incubated. The construction of this nest was similar to the former.

JOHN ALFRED MORDEN.

Hyde Park, Ont.

CHALCID PARASITES IN LARVÆ OF LAVERNA GLEDITSCHIELLA.

V. T. Chambers in "Canadian Entomologist," vol. ix, p. 233, says—"*Laverna gleditschiella* is much subject to the attacks of hymenopterous parasites in its larval condition. Yet it is difficult to understand how this is possible under the conditions of its larval life. I have never been able to understand how the larvæ gets *to the pith* without leaving some trace of its path from the outside of the stem. The egg must be deposited on the outside of the stem, because the ovipositor of the female is too soft to be able to penetrate the bark and wood to the pith. It would seem that the eggs of the little chalcid parasite must be deposited on the microscopic larva of the moth as soon as it emerges from the egg, and before it has eaten its way into the branch, because it is impossible to understand how it can be done afterwards, as these little parasites are themselves so small that two of them placed end to end would not extend from the outer surface of the back of the twig to the central pith, and their ovipositors are very short and not exerted."

In elucidation of this problem, I am of opinion that the egg of the parasite is not laid upon the lepidopterous larvæ, but on (or in close contiguity to) the egg of the future host, and the eggs hatching simultaneously, or possibly those of the parasite a little in advance, the larva of the hymenopterous parasite attach themselves to the body of their victim, into which they immediately make their way and are carried into the pith inside the body of the lepidopterous larva. In no other way can I conceive it possible for Chalcid parasites to infest the bodies of internal feeding larvæ of such small dimensions as those of the micro-lepidoptera. RICHARD SHIELD.

Montreal, April, 1883.

"CAUSES OF RARITY IN SOME SPECIES OF INSECTS."

The interesting paper on this subject by Mr. Bowles, in the last number of the *Canadian Sportsman and Naturalist*, offers to entomologists some valuable ideas for consideration, and draws attention to several points in connection with our insect fauna which should be carefully investigated. *Chionobas jutta* was mentioned as becoming rare in the vicinity of Quebec through the draining of the swampy tract in which its food plants grew. Near this city there is but one habitat so far discovered for *Melitea phaeton*, and this of a very limited area. Should it be cleared and drained, as has been partly done already, this beautiful species would disappear from our local fauna. Thus in the case of species having restricted habitats, we can trace the cause of their disappearance, and similar causes will account for the gradual extinction of many species having a wider range. As the forests and marshes are cleared, many varieties of food plants are partly or wholy exterminated, while the insects have now added to the list of their enemies. Thus with a scarcity of appropriate food and with additional foes to encounter, they are sooner or later numbered with the things that are no more. The unusual abundance of parasites in any year, or series of years, might in the case of a rare species lead to its extinction, but this would, probably seldom occur over an extended area. Immense numbers of *Vanessa antiopa* were destroyed last season by small ichneumons, but in the case of this common butterfly the result can be but to check it for a year or so. The effect of different seasons upon insect life has, as Mr. Bowles remarks, not yet been thoroughly studied, and the difficulties of doing so are very great, owing to the enormous diversity of species, and that what is one's meat is another's poison. I think we may safely predict, however, that after the cold, steady winter which we have had, with its abundance of snow covering the ground continually, we will have an unusual number of insects during the approaching season, and our collectors would do well to record whether such proves to be the case. The conditions appear to me to have been very favorable, for a large proportion of our species at least. I have not noticed any migratory habits in our species of butterflies and am unable to say whether they have much part in causing an abundance or scarcity of local lepidoptera. *Vanessa J. album* is rare here I imagine, for only one specimen has been captured in six years. The theory of species having originated with a certain vital impetus, which in some has already, and

in others is now almost exhausted is particularly worthy of attention, whatever its value. We know that innumerable species have become extinct in past ages, and have been followed by those which now furnish our collectors with their favorite occupation. We further know that within the memory of man many species, as for instance among birds the great auk and the dodo, have vanished, while others are even now crossing the threshold. Variations in climatic conditions, with consequent alteration of habitats, must account for the vast majority of changes in the terrestrial fauna. What percentage, if any, can be ascribed to an inherent lack of specific vitality appears to be a problem offering but little prospect of solution. Not being a lepidopterist I can merely offer a suggestion, or rather I will put a few queries, as to the sterility of the autumn-emerging females of the Sphingidæ, a characteristic of some of our own species as well as of the European ones mentioned. Can we consider these autumn specimens as immature individuals, which, under exceptional conditions, attain the perfect form without a corresponding perfection of the generative organs? Had they the necessary vitality and ability to exist during the winter, and until the spring individuals (sexually mature) emerge, would the *ova* become developed? Does the appearance of such specimens after a hot and prolonged summer indicate descent from species which in more southern localities, or under different conditions of temperature in their present range, were double-brooded? A writer in "Science Gossip" some time ago recorded the occurence in North India of species which are also taken in England, and stated that species which are single-brooded in the latter place are double-brooded in India, and also appear in great and often astonishing abundance. Among them is *Sphinx convolvuli*, which apparently is only a visitant of the British Isles, where it appears to be incapable of continuing the species owing to unfavorable climatic conditions. The last point brought forward in Mr. Bowles' instructive paper is the tendency of imported insects to supplant in some instances our native species and to cause them to become rarer. This is often due to the energetic measures taken to suppress the new comers, and which tend equally to thin out the native species which, although they have similar habits, are not so prolific or destructive as to rouse agriculturists to take up arms against them. The precautions taken against *Pieris rapæ* are equally effective against *Pieris oleracea*, and have doubtless tendered to its decrease in the districts invaded by the foreigner.

W. Hague Harrington.

Ottawa, 5th April, 1883.

CAUSES OF RARITY IN SOME SPECIES OF INSECTS.

I have been much interested in an article by G. J. Bowles in *The Canadian Sportsman and Naturalist* for March, 1883, bearing the above title and although I can offer little towards the elucidation of the subject, yet I may attempt a few suggestions and facts which may not be uninteresting. For a convenience and purpose, I class them under the following heads:—

1. Drainage and cultivation.
2. Variations of seasons.
3. Migrations.
4. Holding over.
5. Occasional visitants.

1. The drainage and cultivation of land by destroying or causing a scarcity in the natural food plant or plants of any particular insect must of necessity make the species rare in that district, ultimately leading to their extinction, but on the other hand, cultivation may have the effect not only of producing other species in that district, but of almost changing its *fauna*. This according to Mr. Bowles' statement, is now in progress in the Comin swamp near Quebec, in the case of *C. jutta*, and the same effect is remarkable in the Lincolnshire and Cambridgeshire fens (England). In Yaxley fen and Whittlesea mere, where some years ago, *Papilio machaon* used to be taken in abundance and *Zygæna arundinis* commonly, but through the drainage and cultivation of the fens, those insects are now becoming scarce, while *Chrysophanes virgaureæ* and *C. dispar* have completely died out. On the other hand, cultivation and drainage have changed the fen *flora*, producing an insect *fauna* entirely dissimilar to their predecessors.

2. Climatic influences on the variations of seasons no doub have a very great deal to do with the relative scarcity or abundance of insects, not so much, I am inclined to think, as to the warmth or coolness of the previous summer, as to the duration and regularity of the winter temperature. In seasons when the ground is covered with snow (as in the past winter) and as a consequence the temperature

has been almost equable, we may take it as a pretty sure guarantee that when spring commences and rouses the insect world, it will receive no check and those *pupæ* and *larvæ* which have lain all winter inactive, will, on awaking from their torpor, find vegetation ready to receive them. But on the contrary, an intermittent winter season; a succession of frosts and thaws is fatal in a great degree to Lepidopterous *larvæ* and *pupæ*; by alternate freezing and thawing, a species of fermentation is induced causing muscadine in the *larvæ* and rottenness in the *pupæ*, while exposing them at the same time to the attacks of mice, chipmunks and other enemies. These causes combined with their natural enemies such as ICHNEUMONIDÆ, CHALCIDIDÆ and TACHINIDÆ attacking the *larvæ*, must result in a corresponding scarcity.

3. Migrations of insects are as well known and established facts in entomology as those of birds in ornithology, but the reasons for them are not so clear. In birds it is usually for the purposes of breeding or the physical necessity of a climate more congenial to their habits, and the migration is total and not partial, except in the case of stragglers who from weakness or wounds, have been compelled to remain behind. Except in the case of the locust (*Locusta migratoria*) I do not know of any species of European insect periodically migratory. *Vanessa* (*Pyrameis*) *cardui* is probably the only Lepidopterous insect that has been met with far out at sea, and evidently with a settled purpose to reach some given point; but partial migrations from one part of the country to another are frequent and usually occur at the height of the season when the last brood has left the *chrysalis*, or, if the species is single brooded, almost as soon as it emerges. When I was at Fray Bentos del Uruguay, South America, in February, 1859, the branches of small trees for scores of yards were defoliated and the clustered *larvæ* of a species of Vanessa allied to *V. urticæ* were bearing them down with their weight. They were as thick on the bare stems as bees in swarming time—in clusters of two or three feet in length—I believe that within the distance of a dozen yards, I could have collected eight or ten bushels of *larvæ*. But in two or three days, they had all left the trees, and in about a fortnight afterwards the insects could have been caught by thousands. They were flying in hundreds, rising in the air and settling like flocks of pigeons, but in a week afterwards, fifty could not have been taken in the same locality, where before they appeared so abundant. Where had they gone to? Migrated evidently and dispersed themselves over the country. These Vanessæ were bred on the spot, but it is no uncommon thing to meet with small swarms or knots of butterflies evidently not feeding, but congregated for some other purpose, invariably occupying an isolated piece of bare earth or rock, and this usually on a warm, cloudy day.

W. H. Edwards, "Canadian Entomologist" vol. x, p. 140 says:—

"I have seen very few Papilionidæ of any species this season up to date, except *ajax*, which has been abundant as ever, but of *turnus*, usually exceedingly plenty in spring, I have seen scarcely half a dozen examples. No *troilus* and few *philenor*. So *Colias philodice* and all Pierids have been remarkable for their absence; but butterflies from hybernating *larvæ*, or hybernating imagos, in contrast with those from hybernating *chrysalids* have been abundant—Melitæa, Argynnis Vanessæ and Satyrids. On 2nd June, 1877, I rode for several miles along a creek not far from where I live and Papilios swarmed. Passing a flat rock by the side of the creek, a space on it, which I computed as not less than four feet square, was studded with Papilios as thick as they could stand; when they rose it was like a cloud; nine-tenths of these were *turnus*. Allowing one square inch to each butterfly, and this is ample, there were upwards of 2 000 butterflies in that mass, and I passed lesser groups with every mile as I rode; so that the total absence of the species this year is remarkable. It would seem possible that the extreme mildness of last winter allowed of the existence or activity of enemies (insect probably) who sought out and destroyed the *chrysalids*, but why *ajax* should have escaped is beyond my conjecture."

This assembling of butterflies in particular spots in large numbers, rising simultaneously into the air when disturbed, and settling in the same place, is the normal action of butterflies just on the eve of migration, and the total absence of *Papilio turnus* the following year is the natural result of such migrations, no *ova* having been deposited previous to departure, thus those parts of the country to which these swarms had migrated would have a corresponding increase in numbers. In the summer of 1857, a great number of the Purple Emperor (*Apatura iris*) visited England. They swarmed in the streets and suburban gardens round London; they might be seen drinking in the puddles in the streets, and hovering over flowers in the gardens; they were evidently tired and starved, and so far from a twelve foot pole with a net at the end being required to dethrone his majesty from his lordly oak, he could be knocked down with a hat, and boys were vending them all crushed and broken for what they would fetch.

Where did they come from? *A. iris* is not a common insect at any time, even in its favorite haunts. Evidently they were strangers—emigrants—they had crossed the sea from their far off home in Germany, to be knocked to pieces in London streets—*sic transit gloria mundi*.

4. Holding over or retardation of development is one of those curious phases of insect economy which has never been satisfactorily accounted for. It is a well known fact among English Entomologists that the Death's-head moth (*Acherontia atropos*) is very apt to remain two or three years in the *pupa* state, therefore they subject them to heat in order to hasten their development. But even with this help, some of them will still remain in *pupa* for one or two years. At a meeting of the Entomological Club of the American Association for the Advancement of Science 1876. "Canadian Entomologist," v. viii p.p. 182-183.

"Dr. Morris asked if any of the gentlemen present who were in the habit of raising *larvæ*, had made observations in reference to the length of time the development of the perfect insect may be retarded. He stated that three or four years since he had placed a number of cocoons of *S. cynthia* on a shelf in his house, and that after lying there all that time, some of them had this year produced the perfect insect. Dr. Hagen referred to an instance related by Kirby and Spence (7th Edit. p. 121.) where a beetle (*Buprestis splendula*) was ascertained to have existed in the wood of a pine table more than twenty years."

At p. p. 138-139 vol. ix., Canadian Entomologist, J. A. Moffatt writes:—

"On the 24th September, 1875, I took a great many large caterpillars of a reddish buff colour, with a dark dorsal stripe, feeding on the willow. They soon went down to the soil and spun themselves up in hard brown cocoons, when I put them away for the winter. In the spring of 1876, I brought them to the heat, and after waiting some time and nothing appearing, I opened one of them and found the caterpillar alive and as fresh in colour as when it first spun up. In this condition they continued until the fall, when I again put them away for the winter. In the spring of 1877, I again examined them and found them fresh and with signs of life, but as the season advanced, I opened some of them and found them dead, and the remainder having assumed a shrivelled look, I laid them aside as hopeless. On the 17th June, my attention was attracted by a scratching noise, which I found came from these cocoons which were now reduced in number to six. On lifting, I found one of them rattling and shaking with great vigour; I returned it to the box and waited three days; when nothing appearing, I broke it open and a fully developed fly walked out in a very feeble condition, its length was 1 inch; expanse 1¾ inch; head, thorax and legs black; antennæ and feet yellow; abdomen brown. A yellowish spot between thorax and abdomen; wings light smoky."

From the foregoing, it may be deduced that although a certain number of *larvæ* may be subject to the same conditions, yet that the result will not be the same individually; as seemingly each has its own constitution and measure of vital impetus, and no external conditions (short of accident or actual destruction) will cause divergence therefrom; and in this we see a wise provision of nature, as, if all the brood of these large and conspicuous insects were to emerge at one time, their chances of extermination would be much increased. But by a portion holding over and only a sufficient number being developed to continue the species, without becoming unduly conspicuous, a reserve is maintained for any eventuality. It is remarkable that this peculiar property is only possessed in a marked degree by the Sphingidæ and Bombycidæ.

5. Occasional visitants are those which by force of winds are blown upon our shores. Instance that magnificent insect (*Chærocampa nerii*) which has been taken in England at long intervals, and its *larva* at still longer; but from the fact of its having been taken in both the *larva* and *imago* states, it must rank as a British insect. There is no doubt that it flies across the channel, as it is always taken on the south or south-east coast. As the French variety of the common goldfinch, (*Fringilla carduelis*) in the spring and fall, flies across the channel to the same coast to feed and returns on the same day, there can be no reason why so large and strong winged an insect as *C. nerii* should not accomplish the same journey, especially when attracted by light; but it must always remain a rare insect; its natural food-plant (*Nerium oleander*) being well nigh unattainable, although it will feed on the vine. Having now brought this article to a close so far as my data and space will permit, I must leave it in the hands of others to furnish their quota of information on this abstruse subject; being a firm believer in the Caxtonian aphorism—That every man of sound brain, whom you meet, knows something worth knowing better than yourself.

RICHARD SHIELD.

Montreal, April, 1883.

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