



*With complete v.  
J. D. B. S. McKenzie.*

*C. 87*

PROCEEDINGS  
OF THE  
NATURAL HISTORY  
ASSOCIATION  
OF  
MIRAMICHI.



NO. 1.

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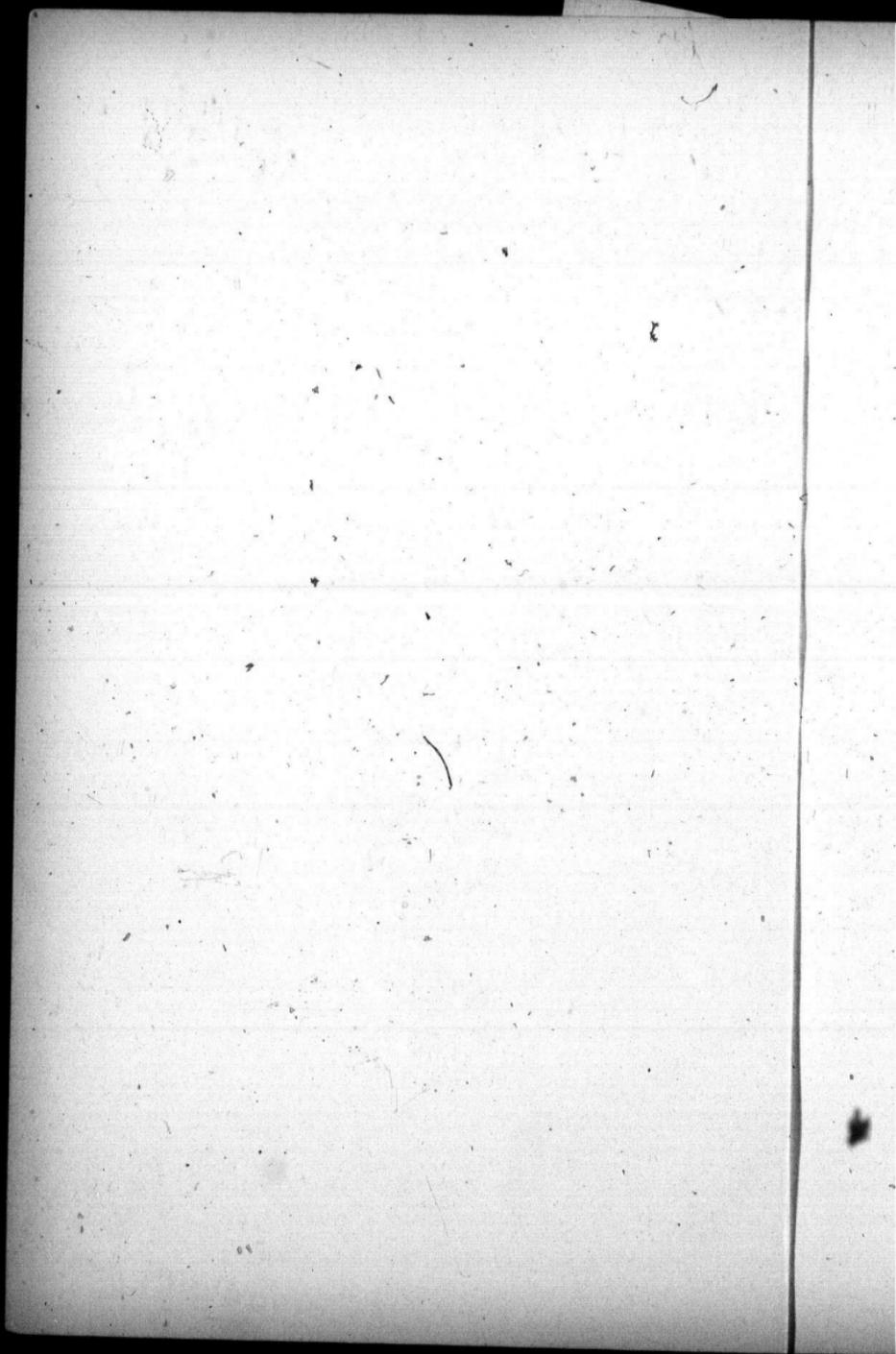
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INTRODUCTION.

With this number of its proceedings the Miramichi Natural History Association makes its debut on the stage of science, and enters on its career among sister institutions. Relying on the generous and fraternal spirit which marks scientific men and inspires a hearty welcome to new labourers in nature's vineyard, it is confident of a warm reception, and would claim also their kind indulgence of the errors and imperfections of the articles laid before them. Conscious of their inexperience and scanty scientific knowledge, but full of the hope born of youth and enthusiasm, its members are looking onward and upward to a higher level, when by time, devotion, and energy they will, in a manner, acquire such a degree of accuracy of observation and vividness of description, as will render their transactions worthy of a place in the library of scientific exchanges. Until that stage is reached, they must continue to rely on the good will and indulgence of the scientific public.

That such an organization has been formed here to study the natural history and physical and biological phenomena of the region is no surprise to students of science in any way acquainted with its rich, interesting and attractive character as a field of research. Some of these features may be briefly alluded to, and

will be seen to belong to the whole region under consideration, namely, the so-called "North Shore," including the four counties, Kent, Northumberland, Gloucester, and Restigouche. (a) It is maritime. (b) It constitutes a large part of the western coast of that great inland sea, the Gulf of St. Lawrence. (c) The insular, peninsular, and boreal character of the surroundings of this sea must stamp the fauna and flora of the region with an immense variety. (d) The winters are almost arctic; the summers, warm temperate, a feature so striking as to cause Jacques Cartier to name the great western arm of this sea the *Baie des Chaleurs*. (e) The bays and coastal waters generally are shallow and sheltered, frequently brackish, and reach a high temperature in summer. (f) Great rivers like the Restigouche and Miramichi sweep from the distant highlands of the interior, and carry into their lower valleys much of the fauna and flora indigenous to their sources. (g) Immense stretches of "primeval forest" cover the interior, which is also studded with lakes, "barrens," and isolated mountains of considerable elevation. (h) It was within the area of greatest erosion during the ice age, and of subsidence and elevation in postglacial times. (i) Its exposed rocks belong principally to the Devonian and Carboniferous periods.

Here then is an array of conditions and characters sufficiently varied and potent to stamp with a surprising diversity the vegetable and animal life of the region, and present the student of nature, present or past, with phenomena worthy of the exercise of his best powers. Nor have its attractions been entirely unheeded, nor its inspiring influence unfelt. Men eminent in science, such as Professor Gill, have here pursued their biological investigations; and the pioneer ichthyologist of the province, Moses H. Perley, enriched his knowledge of fish-lore in this prolific home of the finny tribe. Here Professor Fowler of Queen's College, Kingston, an eminent authority on Botany, grew up and laid the foundation of future success in that branch of science, while Robert Chalmers, F. G. S. A., of the geological staff of Canada, and one of its best authorities on surface geology, acquired, on the slopes of his native hills in Restigouche, the elements and much of the advanced knowledge of that science of which he is such an able exponent. Later, too, the fascinating nature of the

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botany of this region, especially of the Miramichi, won the devotion of Roderick McKenzie, whose "Wild Flowers of the Miramichi" is a tribute to the floral beauties of the "North Shore."

The marine aquatic life of the Gulf of St. Lawrence, especially of the littoral waters of this region, is so varied, the climate and other conditions so marked and complex, the fauna so representative of all the most valuable food-fishes and the forms on which the latter subsist, the waters of such varying depth and temperature, that some point on the "North Shore," perhaps Miscou, would seem to present the conditions most favorable for the successful working of the Biological Station about to be established by the Dominion of Canada.

Having briefly mentioned a few of the characters and points of interest of the region in question, it only remains to add a few words on the objects of the Association. They are principally the following:

*First.* To promote the more thorough study and investigation of its natural history, and publish the same from time to time.

*Second.* To make it an adjunct to popular education, and to encourage the study of natural phenomena and allied matters, by the young.

*Third.* To popularize the subject, and afford opportunities for mutual instruction, through the medium of lectures.

*Fourth.* To establish a museum of natural history objects, including ethnological remains, that would be fully representative of the past and present.

*Fifth.* To investigate subjects of economic importance, such as forestry and fishery matters, with a view to utilizing the knowledge so obtained to the growth and preservation of these industries.

As a reference to the section dealing with the museum and ordinary business of the Association will show, very gratifying progress has been made in the two years of its existence. A large cabinet contains the nucleus of a herbarium, already consisting of over five hundred native plants, determined, mounted, labelled, and arranged in their proper genera and families. The ornithological section of the museum represents over one hundred mounted species, besides many skins. A fair collection

of mammals, fishes, reptiles, insects, and other invertebrates, has been made, and the section of archaeology is beginning to assume such a shape as promises to become soon fairly representative of the prehistoric status of the aborigines of the "North Shore."

In the large membership, regularity of meetings, programme of lectures, and subjects discussed, will be seen further evidence of the lively interest taken in its work, and the degree of popularity it has won.

It is also a pleasant duty to acknowledge the many obligations the Association is under to Prof. Macoum of the Geological Survey, Ottawa. The distinguished botanist has time and again rendered invaluable assistance in determining many specimens of plants for the herbarium, and in other ways shown a kindly interest in the success of the Association. The same must be said of Geo. U. Hay, Ph. B., President of the Natural History Society of New Brunswick, whose donations to the herbarium were many and valuable and whose appearance as a lecturer was greeted by a large audience.

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## THE ANOURA OF NEW BRUNSWICK.

BY PHILIP COX, PH. D.

The absence of a monograph on the Frogs, Toads, and Tree Toads from the natural history literature of the province is the only apology for the appearance of this paper. Beyond recording the occurrence of all the families and species known here, with brief notes on their distribution in the Maritime Provinces and Gaspé peninsula, P. Q., it will be found to contain little else, except observations on their color, size, and rugosity, together with some comparisons intended to illustrate the general influence of climatic conditions. The short summer, long and severe winter, and protracted period of hibernation are here associated with slight differences, such as a more extensive mottling of inferior surfaces, less regularity in size and form of spots deemed specific, and greater roughness of skin;—variations from acknowledged type characters, so marked and general as to suggest a necessary connection between them and environment. However, this divergence is not confined to the Salientia alone, but is well marked among the Urodela, especially the increased mottling of the under parts.

As far as the writer's observation extends, the more aquatic species exhibit the greatest variation, due in a measure, perhaps, to the stock of river systems overlapping and commingling less freely than is the case with terrestrial forms, thus intensifying and rendering more constant any tendency to variation due to local causes.

Of the seven or eight families of the order found in North America, but three are here represented, of which the Ranidæ are the best known, as their size and habits render them easy and attractive objects of study; yet it is by no means certain that all the species and subspecies of the family, actually occurring here, have been detected. Climatic and phylogenetic considerations would seem to render the occurrence of *R. cantabrigensis* Baird very probable; and *R. silvatica* Le Conte presents such an array of constant variations as would justify the addition of another subspecies to the list of the batrachians of North America.

The Bufonidæ is likely limited to a single, but very variable,

species, which upon closer study may be found to consist of at least two subspecies.

Of the Hylidæ less is known. Small, shy, and assuming to a large extent the colour of their surroundings, they are difficult to collect, and our knowledge of them is not sufficiently extensive and definite to warrant any conclusion about the number of species actually occurring. Two are fairly well known; and probably a third and exceedingly rare species also occurs.

## BUFONIDÆ

(THE TOADS.)

### *Bufo (lentiginosus) Americanus* Le Conte.

Common Toad.

This is the only representative of the family here, and is regarded by some herpetologists as a subspecies of *B. lentiginosus* proper, a more southern form. The latter varies greatly throughout its range, as many as four subspecies having been described and named, and even here the species exhibits much variation, not confined always to superficial characters such as colour, rugosity, and regularity of marking, but extending to deeper and more structural features, as proportion of parts and development of cranial crests and ridges. In many instances the superciliary ridges converge posteriorly and the approximations are marked by knobs, something after the manner of *B. l. woodhousei* Baird; but as a rule the inward projection of the postorbital ridges is well marked.

Coloration variable, running from almost black to yellowish grey, the former characteristic of specimens from damp localities or dark surfaces.

Reproduction similar to that of frogs, but eggs laid later and in strings instead of masses; tadpoles small and black, and larval period short. Indeed metamorphosis so hastened by lack of water as to point to possibility of development from ova in air alone.

Voice a prolonged sonorous thrill, during breeding season and warm nights all summer.

Uniformly distributed over New Brunswick and all the

maritime provinces, as well as Gaspé peninsula, Québec.

## HYLIDÆ.

(THE TREE-TOADS.)

### *Hyla pickeringii* Storer.

Tree-Toad. Pickering's Toad.

This is the first of the batrachians to announce itself in the spring, when its sharp whistling peep can be heard from every pond, swamp, and marsh in or near a wood. It is also among the last to disappear in autumn, for its note can be discerned late in October after the first heavy frosts. A wary, nimble little creature, hard to collect even during the breeding season, and in early summer found occasionally adhering to the bark of willows and red maples about ponds.

Average size less than one and a half inches in length. Gular sac brownish-purple.

Abundant in New Brunswick, and the other maritime provinces; occurs also in the Gaspé peninsula.

### *Hyla versicolor* Le Conte.

Tree-Toad.

Though early lists of provincial batrachians include this species, and describe it as "common," the writer's experience leads him to believe it very rare. This is unaccountable, for it is very common in the Northern States, where its congener, the last species, is equally abundant, and should therefore be well represented in the zoological province of northern New England and New Brunswick, as far at least as the valley of the St. John. Its note—a thrill, not unlike that of *B. (lentiginosus) Americanus*, but briefer—has been heard in a few places, and always after night.

A specimen collected in Gloucester Co., by Dr. A. C. Smith, Inspector of Leprosy, Tracadie, is the only provincial representative examined by the writer, but, judging from a description, another was found near Fredericton a few years ago.

Larger than the last, with surface more warty and gular sac paler. As the specific name implies, it possesses much of the color-changing power of the chameleon.

Said to occur in Nova Scotia, but not reported from P. E. Island.

## RANIDÆ.

(THE FROGS.)

### *Rana silvatica* Le Conte.

Wood Frog.

This slender and graceful little frog, the smallest of the genus here, frequents forests and bushy covers, but is also found in fields, meadows, and grassy heaths where the type undergoes considerable variation. Body stouter with shorter legs; palmaria greater, dorsal spots larger and lateral ones often fused into a line under the dorso-lateral fold as in *R. cantabrigensis* Baird; coloration dark purple instead of "dead leaf" with greater mottling of the inferior surfaces; an obscure spot above the eye, the two often fused into a transverse interorbital line. Characters so fixed and general as to entitle to subspecific recognition.

Generally distributed throughout the maritime provinces, and the Gaspé peninsula.

### *R. virescens* Kalm.

Green Frog.

This frog varies greatly, but the variation tends in two more or less well marked directions to which subspecific and even specific rank has been assigned by some herpetologists; but, as numerous intermediate forms showing a blending of the characters of both and difficult of reference to either, always occur, it would seem as if the differentiation had not reached the degree of permanence involved in the idea of species. Indeed the characters exhibit such an absence of stability, and the general equilibrium is so easily disturbed, as to suggest the probability of a recent origin, a position which finds some support in the late Prof. E. D. Cope's view of the phylogeny of the frogs of North America. In this respect it is in strong contrast to *R. palustris* Le Conte, a very uniform species.

The Green Frog, then, presents in New Brunswick the following two varieties:

***R. virescens virescens*** Kalm. Characters fairly constant. Muzzle acutish, head entering length of head and body three times; bands on thighs and colour pattern of dorsal and lateral surfaces quite regular; size small, averaging barely three inches. Back-ground of superior surfaces bright green.

Distribution coastwise, in the lower valleys of all rivers; not abundant. Found also in the other two maritime provinces; but is rare on the Gaspé peninsula.

***R. virescens brachycephala*** Cope. A more aberrant form. Muzzle blunter and more truncate; head short, entering length of head and body three and a half times; size large, averaging over three and a half inches in length; limbs and body stout, the latter less depressed. Ground colour of superior surfaces pale green. Pattern less regular, two adjacent spots being frequently fused into one, with an approximation to a third or median row of dorsal spots often present.

Abundant in the inland and western parts of New Brunswick. Roy McLean Vanwart and I did not observe it on P. E. Island, nor the Gaspé peninsula.

### ***R. palustris*** Le Conte.

#### Marsh Frog.

Though the type differs from that of southern New England in some respects, none of the frogs exhibit within our range a stronger and more constant balance of specific characters. The type here has the muzzle less acute; dorsal and lateral spots larger; the bands on the femur fewer and broader; finer and less extensive granulation of the buttocks; and a general tendency to form a vertebral row of spots, thus making three dorsal series instead of two. P. E. Island specimens show more palmaria with white line along edge of upper jaw extending forward to the nostril.

Generally distributed, but never abundant. Often met with on rocky and burnt areas. Roy McLean Vanwart and the writer found it very rare in P. E. Island. Occasional on the Gaspé peninsula. Not reported from Nova Scotia.

*Rana septentrionalis* Baird.

## Mink Frog.

Size small, seldom exceeding two and a half inches in length. Body rather deep and depressed; tympanum large, sometimes equalling that of *R. clamata*; teeth feeble, the two vomerine patches small, approximate, and often fused. Legs rather short, the heel just reaching the pupil; feet well webbed; dorso-lateral folds feebly represented, often wanting. Skin rough above, especially on the sides and posteriorly; below rather smooth.

Coloration, above brownish olive, deepening behind and laterally to brownish purple, often with metallic lustre. Surface broken into large and irregular roundish spots by waving and coalescing lines of greenish yellow, of varying width, but showing no definite pattern. Below whitish with dusky spots and reticulations on the buttocks. Many exhibit the blotching of the throat peculiar to *clamata*, a feature not attributed to more southern specimens. The species, too, seems to average larger here.

This frog is new to maritime province lists. Some time ago the writer, regarding its near affinities and phylogenetic relations with *R. clamata* and *R. catesbiana*, suggested that it was likely to be found "in the western part of the province or the lake region near the Bay of Fundy." ("Batrachia of New Brunswick," Bull. No. 16, Nat. Hist. Soc. of New Brunswick.) He has since collected it at some stations in the valleys of the St. John and Miramichi, and C. F. B. Rowe took specimens from the lake region referred to.

Next to the Bull-frog *R. catesbiana* Shaw, it is perhaps our most aquatic species, being met with in the shore waters of lakes and rivers, never in isolated spring holes like *R. calamata*. Wary, shy, and active, it is difficult to capture; and, when first taken, emits an odor like that of the mink, whence the name. The writer has no knowledge of its breeding habits, nor of the life-history of the larvæ; but as it shows a preference for large bodies of well oxygenated water abounding in food, its habits, in this respect, are likely similar to those of the Spring-frog and Bull-frog, whose tadpoles seldom mature in one season.

It will likely be found not uncommon in all suitable places in the province. Roy McLean Vanwart and the writer did not

observe it on P. E. Island, but the latter found it abundant on the Gaspé peninsula in the summer of 1898, where it largely replaces *R. clamata*. A hardier form than the latter, more active, and possessing properties and instincts which tend to the better preservation of the species, the Mink Frog will likely be found supplanting the latter in the more northern Atlantic coast regions of Canada.

### *Rana fontinalis* Le Conte.

#### The Spring Frog.

The Spring Frog is an aquatic species as suggested by the specific designation. As already stated it evinces a strong tendency to variation and exhibits many diverse types; indeed scarcely two individuals can be found to agree in all respects. Consequently it is difficult to classify; and herpetologists guided simply by a knowledge of local forms and not having access to extensive collections, have frequently mistaken varieties for new species, so that four or five were established and the nomenclature and description of the species greatly muddled. Indeed so different do its members appear that the fixing of a type would seem rather the result of an implied understanding or convention of naturalists than of fixity and predominance of certain specific characters.

The type most frequently met in the province shows a stout thick body with stout strong legs. The colour above varies from brownish olive to dark brown with a few black roundish spots on the back and sides; throat citron yellow with dusky reticulations, and under parts yellowish white. The tympanum or ear drum is large, exceeded only by that of the Bull-frog, and the skin is rough and pustular.

This form predominates in the northern parts of the province, in forest spring, lakes, along streams and rivers, and generally wherever the conditions are suitable. It is no uncommon thing to find it popping up its head in some warm spring in January, with the snow covering the ground to the depth of two or three feet. Indeed the difference between the summer and winter temperature of such boiling springs must be quite insignificant.

Another type, frequently found in the neighbourhood of cool

streams in the southern parts of the province, differ materially from this vigorous pustular form. The body is long and slender, the hind legs also longer and the feet less webbed. General color above olive green with small brown spots, throat and under parts white, sparingly spotted with brown; tympanum smaller.

This variety is more terrestrial, being often found among grass and weeds at considerable distance from water; and, owing to the unusual length of hind legs, is able to make long leaps equalling the Green Frog in this respect. On account, too, of the relatively greater length of the fore limbs its position on land is less prone than is generally the case among frogs. It constitutes the *R. clamitans* of some authors, and seems to have been the one so classed by Daudin in 1802.

Sometimes colonies of black specimens of medium size are met with having an unusual amount of blotching and mottling of the inferior surface of the body and limbs. This form was first described by Professor Agassiz, who collected it about Lake Superior, and named it *R. nigricans*, but later naturalists have, for what seems good reasons, relegated it to the position of a mere variety of *R. fontinalis*.

Again specimens are found almost similar to *R. clamitans* but with muzzle more sub-acute, the upper surface pale green with much dark marbling and dotted with yellow points after the pattern of some specimens of *R. sylvatica*. It has a dark band on the back of the humerus and covering the elbow, much as in *R. v. brachycephala*. As far as my observation goes *R. clamitans* is alone entitled to the distinctive appellation "clamata" used by some instead of "fontinalis," for I have never noticed the habit among the other varieties.

The wisdom of uniting these apparently different types under one species cannot be expected to meet with general approval. It will likely be dissented from by such as are ready to establish species on minute and merely superficial characters which are so apt to vary according to local environment, and found always susceptible of a serial arrangement, linking the extremes to some more central specific form. When naturalists, as before observed, had not, for purposes of comparison, extensive collections from large areas, but were guided by a knowledge of local types, it was reasonable to regard these forms as entitled to

specific recognition. The case is different at present. An immense amount of material has been collected from nearly the whole of North America, so that herpetologists are able not only to correct early mistakes but shed new light on the development of species. Hence it becomes an easy matter to trace the relation of local varieties and strongly marked species. The recognition of subspecies marks, too, a new departure in natural history, for within a certain range it opens up a wide and interesting field for the investigation of the nature of influences modifying animal life, a study deprived, heretofore, of its chief attraction by the custom of attributing specific fixity to every modification of type, even within narrow and superficial limits.

But it may be asked on what common and unvarying characters is the specific identity of all these forms of the Spring Frog to be based? A few are here indicated. The large, flat, and thickish head; muzzle narrowed and rounded; tympanum larger than the eye; vomerine teeth in roundish and approximated patches between the choanæ, but projecting beyond the line joining their posterior borders; the heel of the extended hind leg never reaching the tip of the snout; the first and second joints of the fourth toe unwebbed; the peculiar bifurcation of the dorso-lateral fold at the tympanum; the dark line from the commissure to the humerus; the yellow blotching of the under jaw; the reticulated yellow throat; the general size, seldom exceeding three and a half inches; the aquatic habit and uniform voice. Many of these characters are structural, fairly constant, and will be found to afford a good basis for the diagnosis and classification of the members of this apparently heterogeneous group. Yet exceptions are not wanting. The so-called *R. clamitans* has a blunt and truncated muzzle, whitish throat, and is somewhat terrestrial in habit; while the vomerine teeth of *R. fontinalis* are, at least in large individuals, more posterior in position.

In the degree and permanence of those characters which serve to differentiate it from the rest, what is above designated *R. clamitans* seems to merit best the distinction of a species. *R. nigricans* appears to owe its dark colour and excessive mottling of the inferior surface to its habitat; at least I have never collected it except in streams with bottoms of black mud or of equally black moss-grown rocks, where it herds with similarly

colored specimens of the Bull-frog, *R. catesbiana* Shaw, whose sombre dress is likely attributable to the same influence. That they are inferior in size and less robust than specimens found in springs and spring brooks is probably the effect of a poorer diet and longer and severer periods of hibernation.

Generally distributed throughout the maritime provinces, including P. E. Island. Uncommon on the Gaspé peninsula, where its congener, *R. septentrionalis*, seems to replace it.

### *Rana catesbiana* Shaw.

#### The Bull-frog.

The Bull-frog is the largest and most aquatic of the Ranidæ found in North America, and is very generally distributed in the province, attaining its greatest size and most vigorous development in the forest lakes of the interior. It was formerly well represented on the lakes and streams tributary to the lower St. John; but has grown quite scarce since the introduction of the Eastern Pickerel, *Esox reticulatus* Le Sueur, which devours it and the Spring Frog to such an extent as to render them even rare where they were a few years ago abundant. It is more gregarious than the Spring Frog. Indeed it is hardly ever found along the shores of large lacustrine areas except in colonies, which affect shallow marshy places where the necessary warmth and food can readily be obtained. Here they attain a large size. In the Little South West Miramichi Lake, in the Squatook Lakes drained by the Madawaska, and from other lacustrine waters, the writer has collected scores of specimens measuring seven inches in length of body and head, and from fifteen to sixteen from tip of muzzle to the toe of extended hind leg. Such examples are dark and pustular, approximating in this manner to *R. clamata*. The body is broad and stout; the limbs short and thick.

It is no uncommon thing to meet with individuals with dorsal parts of a rusty brown colour, or the whole upper surface pale green with small black spots. The latter are probably young.

Being entirely aquatic the Bull-frog necessarily varies much according to locality. Reference has already been made to small black individuals associated with *R. nigricans*, whereas on grassy shores or in shallow water with weedy bottom there is always

more or less washing of green on the head and anterior dorsal parts.

The bellowing notes, whence it derives its name and which lumbermen imitate by the words "more rum," are seldom heard by day; but on warm nights it is very noisy and can be heard a distance of three miles. During cool nights it is silent and on chilly days is seldom seen, as it lies then under pond lily leaves or other floating vegetation.

When held up by the leg for examination, it will often scream most piteously.

The Bull-frog is rarely seen after the first frosts of early autumn, and has gone into winter quarters long before the Green Frog deserts its grassy haunts. But if it be the first to enter upon hibernation, it is also among the first to reappear whenever the conditions are favorable. As a general thing, however, the ice on our lakes breaks up late, so that it spends more than half the year in the dormant condition.

Distribution local. Occurs also in Nova Scotia, but was not found by Roy McL. Vanwart and the writer on P. E. Island; nor by the latter on the Gaspé peninsula.

## TA EPIZOA.

By J. MCGREGOR BAXTER, M. D.

The term epizoa is derived from two Greek words *epi*, upon, and *zoon*, an animal, and is used to represent comparatively minute animals that prey on other larger animals, such as fish, beetles, insects of all kinds, birds, quadrupeds and even man himself, as almost every animal has its own particular parasitic enemy or enemies.

These animals are either true parasites, or are parasitic at certain stages of existence. I think it is generally believed that originally all of these animals led a separate and independent existence, and only by accident, or by stress of circumstances, were led to adopt a true parasitic life, for, if I recollect rightly, I have read somewhere that they all show diminutive and atrophied organs, such as wings, etc., that show they really are degenerated offspring of animals that originally led an independent existence; and indeed this transformation may be partial or almost complete, as the departure from the original natural mode of life is more or less complete.

We find this feature scattered throughout all nature, that organs that are not used nor needed dwindle away till at last they become merely rudimentary, as, for example, birds and insects that inhabit islands in the ocean gradually lose their wings, or at least they become so attenuated as to be useless for the purpose for which they were originally intended.

Let us take, for example, an independent living animal and suppose that by accident, or the dearth of food, it is induced first to attach itself to a larger animal wandering in its vicinity. It finds that by biting or scratching this animal it can derive ready-made and assimilated food at little expended effort on its own part, and you have the initial stage. Then, developed by use, natural selection and the survival of the fittest in the battle for life, you can easily suppose that the organs of such an animal during many generations would become more and more adapted to its selected habit, until you would get the parasite pure and simple, with all organs not absolutely necessary nor much used, diminished or entirely wanting. In fact, we can find animals in all

the different stages from temporary parasitism to the pure parasite. Take, for example, the flea (*Pulex irritans*), the bedbug (*Cimex Lectularia*), and the leach (*Hirudo medicinalis*). These seek their nourishment alone on their hosts for the time being, but can, at least, and generally do, spend the rest of their existence in an independent life, and develop from the egg, and spend their youth and adolescence, independently of their host; and indeed some of this same class of insects may lead an entirely independent existence. And if so, we should look for differences in the organic make-up gradually growing up between members of the same family, namely, between those that lived an entirely independent existence and those that were most attached to the parasitic mode of life.

I speak now only of those parasites that attach themselves temporarily to the surface of the animal upon which they live. Of course in the case of those that infest the internal economy of an animal the difference would evidently be much greater.

In those animals in which parasitism is a long continued heredity, many of the original traits and organs of independent existence have almost or entirely disappeared. I am not well posted in this branch of zoology, but I imagine it would be pretty difficult to make out the original habitat and mode of existence of such old-time sponges as *pediculus capitis*, *P. vestimenti*, *P. Tubescantum* and *Phthirus inguinalis*, for these, as far as I know, have ceased entirely their independent existence, and utilize their host not only for their nourishment but (in contradistinction to the temporary parasite before mentioned) they spend their entire existence, lay their eggs, and bear their young on the surface of the body of their adopted hosts.

Now, what I wanted to speak of more particularly in this article is a family of parasites that are usually classed as temporary parasites, I believe—viz., the family of *Ixodia*, or Ticks.

There are many genera under this family, about twelve. I believe—*Ixodes bovis*, *I. ricinus*, *I. allijictus*, *I. Robisonii* and four or five others under the classification of *I. Americanus*, etc.

I received a number of specimens of the species *Dermacentor Americanus* L., taken from the body of a male caribou killed in the first week of February, 1898. I put them in a glass bottle, and what struck me particularly was their extreme tenacity of

life, for they lived in a stoppered glass bottle, without a particle of nourishment, until the seventh of May, when the last specimen departed for the "happy hunting grounds." They were on the poor caribou in thousands, and must have made his life miserable. When the skin was hung over a clothes-line and beaten the snow was covered with them, and the hair was scratched off the skin in spots by the animal's horns in his efforts to get rid of them.

Regarding another variety, the American wood tick, Meinherr Kalm states they were found in the woods the whole summer through, on bushes and plants growing among the bushes, but more particularly on the fallen leaves of the preceding year; they are so abundant everywhere that if one sits down his clothes and even his body soon get covered with them; for though of slow pace they immediately climb upon his clothing, seeking some naked place on the body on which they instantly fasten themselves by introducing their trunk into the skin. Those who go into the woods barefooted soon get their feet and legs covered with them. They fasten themselves not only on man but also on animals, such as horses and horned cattle, which they frequently kill. They never inhabit meadows or cultivated fields, or cleared land. They pierce the skin in such a subtle manner that the victim does not feel any pain until half their body is sunk in the flesh; it is then that he first feels a strong itching, and afterwards a very severe pain. A hard swelling occurs the size of a pea or larger. It is then very difficult to get rid of the tick, for in endeavouring to draw it out it breaks asunder rather than let go its hold, so that the head and trunk remain in the sore, soon producing inflammation, followed by suppuration, whereby the sore is frequently made deep and dangerous. It is, therefore, by cutting the flesh all around it that we must try to withdraw the tick entire from the spot where it is lodged. Or it is well to make use of a pair of tweezers to draw it out, as M. Kalm states he has done with success. He relates that he has seen horses which had the under side of their bodies and other parts so covered with these ticks, that the point of a knife could scarcely be introduced between them, and from being continually sucked by these parasites, deeply sunk into the flesh, the animals became so enfeebled,

and were tormented so grievously, that they eventually succumbed and died in great misery.

Both sexes were represented on this caribou's body, the one of a coffee brown colour both above and below except a species of shield on the back, about the extent of the thorax, but, the latter and body not being segmented, this estimate is only an approximation. Within the shield and immediately back of the head was a ring coloured brown (the shield was tallow colour) with three fringes of the same colour extending backwards from it nearly to the back of the shield.

These ticks have four legs on each side of the body, each five-jointed, and a sort of four lobed head. The legs end in an attenuated segment terminated with a bulbous extremity covered with a few hairs below and a pear-shaped sharp-pointed nail on the outer or upper side, which is slightly hooked—evidently for prehension. Whole length of the body one fourth of an inch. The other sex same length, slightly broader, underside same uniform coffee colour, back drab with four or six lines of interrupted coffee coloured and slightly linear spots, extending from head to rear of body; other characteristics the same as the last.

Now here is an animal which the books describe as an independently living animal feeding on moss and dry foliage on sunny hillsides, and only occasionally attaching itself to cattle, and gorging itself with blood, then falling off to resume its natural habitat, and is therefore what one would call a temporary parasite. If this be true, it is now assuming the transition stage, and will soon become a bona fide parasite, for there were great numbers of eggs attached to the hairs of the caribou's hide, which showed conclusively that it was about to have a numerous family, which were intended to be educated from the start in the parasitic proclivity. The question arises, are the writers mistaken regarding its habits, or is it in the transition state and about to degenerate into a true parasite?

## DUST.

By R. P. JOYCE.

Dust, like dirt, has been described as matter in the wrong place. Yet when on the threshold of the 20th century the scientific record of the 19th comes to be written, not the least of its achievements will appear to be the discovery of the essential part that this derided form, or deformity, of matter plays in the economy of the universe. Not our atmosphere only but interstellar space also seems to be traversed by masses of dust of more or less impalpable fineness, which, like light, may be called an article of commerce among the spheres. Science is finding out more and more that all systems with their members are not isolated and independent, but related and interdependent, reaching out into the infinite. The earth in its course round the sun and in the course in which the sun moves round some vaster circumference, gathers daily tons of meteoric matter mostly in the form of dust. This dust is found on the perpetual snow of mountains, in the ocean ooze and in the motes of the sunbeam. Even vegetation owes something to this insensible rain of meteoric particles, so that the bread we eat contains within it matter which may have voyaged for countless centuries of time through illimitable space. Thus to nourish our bodies the remotest realms of the universe may have been laid under contribution, and everyone here assimilated particles of matter borne to our earth by shooting stars and meteoric dust. Again and again we are reminded that one touch of nature not only makes the whole world kin but binds the universe in intimate association. In this fact Wordsworth's spiritual idea finds its materialistic complement—

“The soul that rises with us, our life star,  
Hath had elsewhere its setting, and cometh from afar.”

The uses and abuses of dust have been treated from a variety of points of view, so that the literature has grown to be quite considerable. That venerable art philosopher, Ruskin, has given us the “Ethics of the Dust” in a course of inimitable lectures. Who can forget his analysis and parable of an ounce of mud (dust paste) taken from the footpath of an English manufactur-

ing town in which the clay, sand, soot and water, that are its chief constituents, resolve themselves under the power of crystallizing affinity into a sapphire, an opal, a diamond, set in a star of snow.

Tyndall and others have taught us the hygiene of dust, which includes the germ theory of disease that has revolutionized the sciences of surgery and medicine. This paper, however, is concerned with the physics of terrestrial dust and its influence as an essential factor in meteorology, and in making the earth what it is as a place fit for the existence of animal and vegetable life.

The discovery of the undulatory movement of light in straight lines, modified only by the law of reflection and refraction, wiped the slate of previous notions on this subject. The cause of its diffusion required explanation and has been found to be, in the first instance, owing to the presence in the atmosphere of infinite dust particles, the more finely divided in the upper strata and the coarser in the lower. Hence the clear blue of the sky, which would otherwise be a black background on which would appear the sun, like the blinding projected search-light of a warship, the other heavenly bodies in less degree and all visible in day time. Thus we would receive streams of light with black bewildering shadows between. The face of the earth would stand out stark like a lunar landscape. Where there is no atmosphere, there is no dust, and therefore no diffusion of light.

But the light of the sun coming to us and passing into our dust-pervaded air is caught and reflected by each particle, and as the finer particles float higher and are large enough to reflect only the short blue wakes of the spectrum, hence the color of the sky. As the light passes down its rays are caught in turn by coarser particles, just as they may be large enough to reflect the longer waves of the other colors of the spectrum, and diffuse them.

To this vast and vital office of insignificant and hated dust do we owe all the beauties of the morn, the splendor of noon and the glories of sunset; also the ever varying tints of mountain, sea, and landscape. The eye would cease to derive pleasure in its use, were there no dust, for then art would be impossible. More important still, were it not for dust and its effects, vegetable life would be impossible except perhaps in the form of fungi; animal life a query, and common life as we live it intolerable.

Eminent as are the services of dust in the diffusion of light, they are no less important as the only means of diffusion or distribution of rain and all that this involves for a habitable world.

It is known that water in the form of vapor requires to come in contact with a body as a medium of condensation, when it reaches the necessary coolness. In the cooler upper region of the atmosphere water vapor seeks and finds such medium in the ever present dust. The particles become the primary nuclei of minute water globules of small specific gravity that float in masses in the form of clouds carried hither and thither by air currents. Condensation being initiated, the process goes on until final precipitation takes place in the form of showers of rain with all its attendant blessings. Without the nuclei which the dust particles afford for the purpose, the atmosphere would be in a constant state of excessive saturation, and the surface of the earth the only condensing medium; so it is easy to imagine what the disastrous consequences would involve. There would be no fog, no clouds, no rain, no showers, no snow, but copious dews. There would simply be an extremely saturated atmosphere, seeking, when cooling began, something to wet or ice over. Vegetation, the walls of our houses, ourselves, everything, acting as media of condensation, would be dripping spectacles in summer and clad in sheets of ice in winter. The now indispensable umbrella would afford no protection. Our houses might be roofless so far as any shelter they could give from the soaking atmosphere, and it is doubtful whether fire could be discovered and continued under such physical conditions. It is difficult to conceive the type of animal and vegetable life that could exist in an environment so uninviting. Perhaps fish, water-lilies, and Kingsley's water babies may give us some clue. In mountain regions the effects of a pure atmosphere as regards dust would be more disastrous still. Their greater attracting influence as condensing media for the semi-liquid atmosphere would create devastating deluges of water compared with which tropical rains would seem April showers. The mountain sides would be swept of all vegetation and soil into the valleys and thence by tremendous floods and inundations to the sea, and these forever recurring. The present slow, almost insensible,

process of denudation would be accelerated a thousand fold and the earth long since have become a flat planet like Mars, where, it is said, the mountains were worn down ages ago, until now the highest elevations are only a few hundred feet above the general plain and throw no shadows.

Such, in brief, are some of the ends that dust serves in the economy of nature and the fearful consequences to all forms of life were it banished from space. We may learn from this that no fact in nature is insignificant, but has its relative value like a cypher in a number, which is essential to the same. In the action and reaction of things an equilibrium is maintained and a marvellous system of equity or compensation upheld, that must strike the most superficial observer with wonder, and the thoughtful with the reality of the conclusion that, in the last analysis, mind moves matter for present and remote purposes, and that blind chance, or the fortuitous clashing of atoms, has not the potency and power to evolve anything upon which we may reckon without being put into a state of intellectual confusion, against which we are taught to pray lest we be finally worse confounded.

## OUR WINTER BIRDS.

By J. MCGREGOR BAXTER, M. D.

There is considerable difference, in different localities, even although these may be in close proximity, in the birds that are to be found there, and for that reason I thought it might not be amiss to give a short account of some of the most common ones to be found in this immediate locality during the winter.

When one comes to consider the length and extreme severity of our winters it surprises one to find that any birds can be found sufficiently hardy to survive the paucity of food, the terrible storms, the depths of snow, and the severe frosts which they are every winter so sure of encountering. Still, if our winters were just a little shorter and a little less severe perhaps we might have a few more of them give up their migratory habits and stay over with us. I remember that, in the winter of 1890, one solitary robin remained in the trees about the garden of the Bowser House, and I watched him carefully every day to see how he would weather it. On the 20th of January we had a terrible snowstorm and I concluded that I would see him no more. But I had mistaken his staying powers, for he came out the next day, looking rather thoughtful, melancholy, and a little bedraggled, but still he seemed determined that, if he had made a miscalculation in staying over, it was too late to rectify it, and that he would see it out "on that line if it took him all winter." Well, he did his best, the brave little fellow, but we had another terrible snowstorm on Feb. 20th, and I saw him no more.

Our aquatic birds, as a rule, move further south, or out towards the open ocean, so that we rarely see any during the winter in this locality, as the river is frozen from two to four feet deep for forty miles down. But some winters, when smelts are plentiful, you may see numbers of herring gulls flying about or collected around the holes cut in the ice, feeding upon refuse fish left there, and I once found a dovekie (*Mergulus alle*) frozen into a thin sheet of ice that had formed over a little pool of water that had collected in a hollow in the main river ice.

The Curores almost all betake themselves also to milder regions, but we have the Canada grouse or spruce partridge

(*Tetrao Canadensis*) and the ruffed grouse (*Bonasa umbellus*), which remain with us all winter. These birds are well protected by a dense coat of feathers, and frequent dense forests, and they also have a habit of darting down from a tree and dashing themselves into the snow for a considerable distance and remaining there during extremely cold weather for the sake of the warmth, as the snow falls lightly down after them, closing the aperture of entrance, and the warmth of their bodies thaws a little chamber around them and the heat generated does not escape. I have been told by lumbermen that when they take out a lunch which they do not wish to get frozen they dash it into the snow in the same manner and it will not freeze; but if they take extra pains to pat the snow down around it, it will freeze solid. The partridge probably made this discovery before them. If, however, it comes on to rain a little and then freezes suddenly after, so as to form a crust, sometimes the partridges are unable to get out again.

The most of our winter birds belong to the sub-class Aves Areee, or inessores, and are mostly to be found as denizens of the deep woods or forests.

Among the Falcondæ we have the goshawk (*Astur atricapillus*), and the sharpshinned hawk (*Accipiter fuscus*). The goshawk is a large, powerful and handsome hawk of a dark slate colour, with a black crown. It is not very common but is a venturesome hunter, and a story is told of a farmer who was going to have a chicken pie, who, having cut off the head of a chicken, saw a goshawk fly down and take the struggling chicken and fly up into a tree and proceed to take his dinner off it, but as the farmer had a loaded gun in the house that dinner was never finished. Another goshawk chased a hen right into a house, where an old man and a girl were sitting, and seized it; but he bade "farewell to hope when he entered there," for he never came out.

Their principal food consists of poultry, ducks, grouse, hares, squirrels and other rodents. The sharpshinned hawk we have also here during the winter, and last winter one domesticated himself in a barn in town where a lot of English sparrows had also taken shelter, and, killing a few each day, he had converted them all except two into hawk when he was killed himself by

an incipient Nimrod in the shape of a boy armed with a pitchfork.

It is quite common. Its food consists of young poultry and wild birds, and among these of course some of our most useful ones, but, to his credit be it said, he is particularly fond of that nuisance, the English sparrow, and it is to him particularly that we must look to rid us of the pest, and so in the mean time it would be wise to refrain from killing him till that work is accomplished. He destroys also quite a number of insects of various kinds, but he will come right into town to enquire if any one has seen any sparrows about.

Of the Strigidæ we have during the winter the snowy owl (*Nyctea nivea*), the great horned owl (*Bubo Virginianus*), the barred owl (*Syrnium nebulosum*), the hawk owl (*Surnia Hudsonit*), the screech owl (*Scops Asio*), the short eared owl (*Brachyotus palustris*), and the saw whet owl (*Nyctale Acadica*). These, of course, being birds of prey, live upon whatever animals they can find and overcome—partridges, other small birds, rabbits, mice, etc.

The snowy owl is only an occasional visitor, but is not very infrequently shot down about the mouth of the river and at Bay du Vin. It seems to be driven down this way only by lack of food, and will take grouse, hares, mice and even offal sometimes when hard pressed. I believe its flesh is eaten by the Esquimaux. The great horned owl is comparatively common. It is a great enemy to poultry, and feeds on ducks, grouse, hares, mice, hawks, crows and other owls. It is strong and rapacious, and will make no mean adversary to man himself.

The barred owl is also common but is duller and slower in its motions, and is not so bold and rapacious. He is not quite so aspiring in his choice, but otherwise his food is about the same.

The hawk owl is fairly common, and its food is grouse, hares, mice, grasshoppers and other insects. It is diurnal in its habits, and breeds, I believe, further north.

The screech owl is not very common here, but is to be found. It is nocturnal in its habits, and its food consists of birds, reptiles, batrachians, fish, crustacea and insects.

The short eared owl is fairly common, and is both diurnal and nocturnal in its habits. Its food consists of birds, mice and insects.

The saw whet is common. Its habits are nocturnal, and its

principal food mice and insects, and it is therefore a very useful bird. I believe it breeds here, although I have never found a nest, but it seems to be here all the year round.

Among the Picidæ, or woodpeckers, we have the log cock or military woodpecker (*Hylotomus pileatus*), the black backed woodpecker (*Picoides Arcticus*), the banded back woodpecker (*P. Americanus*), the hairy woodpecker (*Picus villosus*), and the downy (*P. pubescens*).

The log cock is an artist in his way. With his strong bill and muscular neck and body he deals such powerful blows that he can be heard long before he is seen, and it seems to me that I walked half a mile on one occasion after hearing one before I saw him. I found him slicing off bark as you would take it off with a drawshave. He would pound, then listen, then pound again, then listen, and many a time I have wished for his skill and acuteness in auscultation and percussion in a doubtful chest affection. One can understand how he operates when all insect life is in vigorous activity, but in winter when it is dormant or inactive, how is it? Is he clairvoyant? To be sure he is not entirely dependent upon insects for food, for he does not disdain berries, fruit, beech nuts, and even, they say, acorns.

The black-backed woodpecker has the peculiarity of having only three toes. It is rather rare here, or else it retreats into the dense forest, remote from human habitations, and is therefore less often seen than the hairy and downy woodpeckers. Its food consists of wood worms, and larvæ and eggs of insects, dug from crevices in the bark of small sized trees. It nests here, and generally for that purpose selects an easily worked, soft-wooded tree, such as poplar, leaning over if possible, and it drills for its nest on the under side, making the entrance just large enough to admit its body, but enlarging afterwards, and going down ten or twelve inches, lining its nest with fine chips, and laying from three to five white eggs.

The banded backed woodpecker is even rarer here than the last mentioned and slightly smaller. It is also a three-toed variety. It is an arctic species, comes here in November, and leaves in early spring generally, although it has been found nesting in this Province. Its food seems to be about the same as the black back.

The hairy and downy woodpeckers are so much alike in their appearance, habits, food, etc., that they may be considered together. They differ very little in any of these respects, and are also, perhaps, equally numerous. Their food, as per examination of a large number of stomachs in Nova Scotia, New Brunswick and the North Eastern States, consists of from 68 to 70 per cent animal food, 20 to 25 vegetable, 1 mineral, in both cases. The animal food consisted of ants, beetles, bugs, flies, caterpillars, grasshoppers, spiders, myriopods, etc. There is one peculiarity that appears common to all the woodpeckers here, and that is that if there come one or two sharp, cold, very frosty days you will never see a woodpecker at all. They appear to remain in their nests. But if there comes a change, and a warm day or two, they are out again ready for business.

Among the Corvidæ we may mention the crow (*Corvus Americanus*), the bluejay (*Cyanurus Cristatus*) and the ubiquitous Canadian jay, whisky jack, moose bird, etc. (*Perisoreus Canadensis*). The crow may, or may not, be considered as one of our winter birds, for although I myself have never seen a specimen here from the final setting in of winter until the middle of March, except in the winter of 1896, it is contended by the lumbermen in general that they stay in the deep woods all winter. (Since writing the above the writer has seen a crow on the ice in front of Chatham, on the river, January 6th, 1899, and he seemed quite lively and happy.) This bird, although it destroys the eggs and young of many of our insect-destroying birds, does not do nearly as much damage to the farmers' crops and chickens as he gets the credit of. It is also charged with pulling sprouting corn, and even destroying corn in the milk stage. It really does all of these things, but in comparatively small amounts, while the good it does in destroying noxious insects and vermin far more than counterbalances the evil. In fact, its injurious propensities need hardly be mentioned, supplying only three per cent of its food, even in the United States, according to a report of the Department of Agriculture, and the destruction of birds and eggs formed one per cent of its annual food, whereas grasshoppers, May beetles, cut worms, mice, moles, shrews, rabbits, molluscs, etc., constituted the balance.

The bluejay is one of our most brilliant birds as regards

plumage. In the winter he loves to be on the border of clearings, near dense woods, apparently wishing to vary his surroundings, according to the weather, for on fine days he can take to the open, and even come about the houses of the settlers to see what he can pick up, and if the weather is unpropitious he can "seek the seclusion which the forest grants." He is a greater depredator than the crow in regard to the eggs and young of other birds, and coolly goes about his murderous work even in the very presence of the grief-stricken parents. According to U. S. Agricultural Reports twenty-five per cent of its food is animal and seventy-five vegetable. The animal food consists of the young of birds, eggs, noxious insects, and useful insects, as far as agriculture is concerned. The animal food naturally rises to its highest point in August, when insect life is most abundant.

The Canada jay. This eccentric little bunch of feathers (for it is little more) is abundant everywhere in our forests, and you have only to kindle a fire any time to tell how many of them are within a mile's radius. It is very fond of animal food, which it carries off and stores up for future use, and thus if not watched it will cause an immense amount of that kind of food to mysteriously disappear. He is an amusing little thief, and many are the traps that are laid for him around the lumber camps, where he is a constant winter resident.

Of the Fringillidæ we have the pine grosbeak (*Pinicola enucleator*), the red crossbill (*Curvirostra Americana*), the white-winged crossbill (*C. leucoptera*), the redpoll linnet (*Ægiolthus Linarius*), the mealy redpoll (*A. exillipes*), the pine linnet (*Chrysomitris pinus*), the snow-bunting (*Plectrophanes nivalis*), and the Lapland longspur (*Plectrophanes Laponicus*).

These, with the exception of the snow bunting and Lapland longspur, live in the depths of the forest, and they all go further north in summer as a rule, but the grosbeak nests here occasionally, and the red crossbill and the pine linnet often.

The pine grosbeak is sometimes called the "winter robin," but of course is no robin at all. He is quite a brilliant looking bird, and not at all timid. Its favorite food is the seed of the mountain oak berry (*Pyrus Americanus*). They disappear about the first week of April from this locality, but are said to sometimes breed in the valley of the Restigouche. The red crossbill

is abundant in our deep forests during the winter, and he comes out to civilization during the summer, for he often nests here. Its principal food is seeds of plants and trees, cones of spruce and fir, buds, with occasional insect cocoons. They are lively, chatty little fellows, and do not appear to mind the cold in the least. The peculiarly constructed bill acts on the principle of a double wedge, and is admirably adapted for stripping the cones of their leaves. They generally go in flocks and frequent forests of scrub pines.

The white-winged crossbill is of a more brilliant plumage, but is rarer than its cousin, the red crossbill. Its food and habitat are about the same, but it does not breed here as a rule, as it seems to be a bird of more northern range.

The redpoll is about the size of the sparrow. They arrive here from the north in October, in flocks of several hundreds, at which time they frequent the low woods skirting pastures, streams and lakes. They live then on the seeds of alder, low birch and cedar. They are quiet generally while feeding, and rather timid in the autumn, but less so in the spring. They retire further into the woods as winter comes on, and break up into smaller flocks, but collect again in March and leave in April.

The mealy redpoll resembles the other very much in its habits, and is regarded by some as a mere variety of that bird.

The pine linnnet is frequently found in company with the redpolls, and shares many of their habits. It often comes into villages in August and September, and feeds on the seeds of dandelions and thistles. They often gather about lumber camps during the winter. They often summer here. Their song is melodious and resembles that of the goldfinch.

The snow-bunting affects more the open country and the shores of rivers and lakes. They are erratic in their habits, and you may see great numbers of them for a few days, and then none at all for some time. They come about the last of October, and leave in April. They are of a brown colour, when they first arrive, but change to their beautiful winter plumage as the season advances. They appear to love the stormy and tempestuous weather. They live on the seeds of weeds and grasses and pass the night under the shelter of cliffs or banks, perched on dead branches or projecting sticks. They always appear to be fat,

and a snowbird pie is considered a great dainty. They have been found as late as the 28th of May (that is, a straggling bird) near Newcastle.

The Lapland longspur associates with the snow-bunting, and its habits and food are about the same. An odd snowbird (*Juncco Hyemalis*) winters here, but I do not think it is a common bird in this locality.

Of the Laniidæ we have the great northern shrike or butcher bird (*Collurio Borealis*), as an occasional visitor, or rather they are rare. He comes here in October, and goes north in April. His colour is blueish ash, whitish below, with a black bar running through the eye. It has a bill midway between the seed-eater and the hawk, and its food corresponds, for it consists of insects, crickets, mice and birds. It carries consternation among those little imported nuisances, the English sparrows. It has a habit of impaling its victims on thorns on a tree, and leaving them there, hence its name. By the way, the English sparrow (*Passer domesticus*), one of the Fringillidæ, is also a winter resident, a quarrelsome, noisy, dirty little rascal, that eats everything except what he was brought over here to eat (viz., insects), fights with all the "old families," just as if he belonged here, and when he can find no other mischief to do, tears the leaves off the apple and other trees just for pure deviltry. The butcher bird and the sharpshinned hawk, however, have caught on to him.

The brown creeper (*Certhia familiaris*), was seen at Bartibogue as late as December 20th, in 1891. but the fall and early winter were mild and open.

Of the Sittidæ we have the red-billed nut hatch (*Sitta Canadensis*). It is a restless, lively, chatty little fellow, and is found in twos and threes among the chickadees very often. They are insectivorous and examine the trees, commencing below and working spirally upwards, and seem to confine their attention to the main trunk and large branches, while the chickadees examine the smaller branches.

The chickadee is also a winter resident as well as a summer bird here. We have two varieties of them, viz., the black-capped chickadee or titmouse (*Parus atricapillus*), and the brown-capped (*P. Hudsonius*). They are tireless insect hunters, and therefore among our most useful birds. It has been said that one

pair will eat 500,000 caterpillars in a year. The brown-cap appears to keep more to the deep woods. The golden-crowned kinglet (*Regulus Satrapa*) is another of our winter birds, and is often found in company with the chickadees.

This list of our winter birds is by no means exhaustive, but may be interesting to some of our amateur ornithologists. Much more might have been said in regard to their habits, etc., but it would have made the article too lengthy for this bulletin.

## A PRELIMINARY LIST OF THE MOTHS OF MIRAMICHI WITH NOTES THEREON.

By J. D. B. F. MACKENZIE.

As the climate is largely insular, owing to the influence of the bay waters, and the nights cooler than further inland, the moths like the butterflies are not numerous represented here. They appear, too, as a rule, later in the spring and early summer, and very few species can ever be said to be abundant.

Occasionally, and for unknown reasons, a new, or very rare, form arrives in swarms, as if carried beyond the limit of its usual habitat. Its rarity or entire absence the following year shows a lack of ability to withstand the effects of our climate, and the accidental character of its occurrence the previous season.

This list is not complete even for the limited area collected over, and is published rather as a beginning in one of the most interesting and practically useful departments of natural history, with the hope that it may stimulate students and local collectors.

### BOMBYCIDÆ.

*Spilosoma virginica*,  
*Actias luna*,  
*Leucarcia Acræa*.

*Datana ministra*,  
*Telea polyphemus*,

### NOCTUÆ.

*Apatella morula*,  
*Agrotis haruspica*,  
*Agrotis ptychrous*,  
*Mamestra nimbosa*,  
*Mamestra olivacea*,  
*Hadena devastatrix*,  
*Hypa xylinoides*,  
*Eucirrædia pampina*,  
*Cucullia intermedia*,

*Apatella Americana*,  
*Agrotis subgothica*,  
*Agrotis venerabilis*.  
*Mamestra latex*,  
*Mamestra renigera*.  
*Hadena arctica*,  
*Heliophila commoides*.  
*Scoliopteryx libatrix*,  
*Plusia bimaculata*.

*Plusia ampla*,  
*Citocala ultronia*,

*Citocala antinympba*.  
*Hypana scabra*.

### GEOMETRIDÆ.

*Ennomos alni-ria*,  
*Angerona crocataria*,

*Metrocampa margaritata*,  
*Cleora pelucidaria*.

A swarm of the very pretty moth, *Cleora pelucidaria* Packard, appeared here on the evening of Sept. 29th, thousands of them covering windows, sides of houses and fences. It has never been reported from this section before—at least I can find no account of its being so, and as I was in doubt whether it was *C. pulchraria* or *C. pelucidaria*, I submitted it to excellent authority, who pronounced it the latter. Careful comparison afterward confirms it. Although put down by some authorities as a form or variety of *C. pulchraria*, it differs from the latter in many respects. Packard, contrasting it with *C. pulchraria*, describes it as follows: "Rather larger and more dusky, smoky-pellucid, palpi dark, thorax and body pale, mouse-coloured. Wings of the same hue. Inner line not so much curved, and outer line much as usual, but with the three teeth a little larger and less even. The lines are duller, and do not contrast so much with the rest of the wings as in the ordinary form. Fringes mouse-coloured, with faint dark checks. Beneath as above, but more uniformly mouse-coloured, with outer line as on the fore wings very faint and no markings on the hind wings, or with the outer line indistinct, but common to both wings."

Is *Adimonia rufosanguinia* Say migratory? On May 27th I found my choke-cherry trees (*Prunus virginiana*) swarming with *Adimonia rufosanguinia* in the adult state, hundreds of them rapidly devouring the leaves. Two days previously I went carefully over all my trees, hunting for anything in the entomological line, and there was an entire absence of the larvæ of this insect. I made enquiries among my acquaintances and found several whose choke-cherry trees were infected with them, but could not find anyone who had ever seen the insect in this locality before. The question arises, Whence came they? It confined its ravages to the choke-cherry trees with one exception—I once found it on the

Sweet Pea. Although a large patch of the latter was within three feet of some of my trees, I failed to find a single specimen on them. I can find only a very meagre description of the insect in any of the books I have at hand, and fail to find any account of its life history. Packard describes the larva of the *Gal-eruca*, as follows: "When about to transform it fastens itself by its tail to the surface of the leaf." Two days before the insect appeared on my trees there were certainly no larvæ on the leaves, and to all appearances it appeared in a swarm in one night. Paris green or hellebore appeared to have little or no effect on them. A number put under glasses seemed to thrive in the dry Paris green, and at the end of three days were as lively as ever. Picking them off by hand was the only remedy. Two or three days sufficed to rid the trees of them, and no more appearing gives one the impression that they must have flown from a distance.

I am indebted to J. Alston Moffatt, Esq., Curator of the Entomological Society of Ontario, for valuable information in reference to the above.

## SOME MODERN ROCK-BUILDING.

By F. A. DIXON, M. A., PRINCIPAL SACKVILLE HIGH SCHOOL.

When one takes a survey of the rock foundations of the earth's crust, he is so impressed with their structure,—a process so slow in its operation that time as measured by years or by the life of man is too short to mark any perceptible progress in the work,—that he is at first rather apt to assume the work as complete than to look for evidence of present rock-building.

But rocks are being constructed now just as truly as at any previous time in the earth's history. Streams overflowing their banks in time of freshet leave a thin layer of sediment behind to add to the depth of the intervale. Rivers carry down to their lower courses and into bays and seas material washed from the land, which material, down in the calm depths remote from our observation, is deposited to become compressed in the course of ages into solid rock.

But the marshes at the head of the Bay of Fundy afford an instance of rock-building of the present, at once unique in its character and affording unexampled opportunity for observation. Here the material is carried from the bay inland up the rivers, and is deposited on banks and other areas overflowed at high water. The retreat of the tide permits examination of each layer of deposit before the next is made, while at any time, except that of high water, numbers of layers can be cut through with the spade and an outcrop is then exposed.

Nature's apparent eccentricity in thus carrying material from lower to higher levels is the result of the excessive rise of tide that here occurs, and which in turn is the result of the shape and position of the Bay of Fundy.

The extreme difference between low and high water levels differs in different parts of the bay. It has been much exaggerated, and a rise of 60 feet of tide is commonly believed. This height is greater by several feet than that actually occurring. At the head of Cumberland Basin, the greatest difference of level is about 46 feet. In the Tantram River, at the I. C. R., only a few miles from the basin, the rise of tide is 35 feet, and a few miles further up the same river, at the highway bridge at Upper Sackville, the rise is 24 feet.

The familiar explanation of the phenomenal tides of the bay being correct, viz., that, during the rise of the tide, as the Nova Scotia and New Brunswick shores approach each other, the waters become crowded and therefore increase in vertical height, the surface of the water at high tide is not a level but a slope from the head to the mouth of the bay; and, as the same conditions apply up the tidal streams, a continuous high water slope then exists from the highest tidal point in the rivers to the mouth of the bay.

The existence of this high water slope is proved and illustrated at a point in the Tantramar River known as Rampasture Neck. Here the river makes a beautiful serpentine, doubling back on itself so as to form a peninsula with a narrow isthmus. The isthmus is overflowed at spring tides. When it is being overflowed by the rising tide the water comes on from the up stream side, where it is from one to two feet higher than on the down stream side. The distance around the peninsula being about three miles, the high water surface shows here a slope of about 4 inches to the mile, or 4 feet in 12 miles. Hence it is plain that the higher we ascend the tidal streams the greater is the height of the tide, or, in other words, the further from the earth's centre is the high water surface. At the same time, as we leave the bay and ascend the rivers, the less is the difference between the high and low water surfaces, owing to the upward slope of the bottom of the streams being greater than that of the high water slope.

The tides of the Bay of Fundy are not only phenomenal in height but also in the difference of height between spring and neap tides. The spring tides occur of course at the periods of new and full moon. But new moon tides are not the same in height as those occurring at the previous or next full moon. Whichever of these phases occurs more nearly at the time of the moon's perigee brings the highest tides of the month. And the more nearly the phase and perigee approach each other the higher will be that set of tides. It is then that for several successive tides the water is from one to six feet higher than the marsh level, and would overflow the marsh except for the protecting dykes. At the alternate period of spring tides the water barely rises as high as the marsh level. At all other tides, the

least rise of which occurs at the moon's quarters, known as neap tides, the water begins its retreat while still several feet below the marsh level.

As a result of the great rise of tide the currents in the rivers and half-emptied bay are of great swiftness. Here, too, is a large quantity of quicksand,—sands which the waters have gained possession of as a result of the pulverizing power of the waves and other agencies on the rocks of the bay shore. These sands are continually being carried to and fro by the flowing and ebbing tide. By the resulting attrition the sands are still further pulverized into an almost impalpable detritus. With this detritus the water becomes charged and gains its chocolate colour, and the further we ascend the tidal streams the more heavily is the water charged.

At high water during the period of spring tides large areas are overflowed by the muddy waters, and during the short interval, while the water is at rest, a large part of the detritus settles and is deposited, forming one layer of alluvium. It is in this way that the whole of these alluvial marshes have been made. One layer of alluvium is in thickness from an inch down. The total depth of alluvium varies from the thinnest layer at the head of the tide to 40 feet at the mouths of some of the rivers.

There are reasons to believe that the lower layers of the deeper alluvium were deposited on subsiding upland soil. In one locality near a channel were found stumps of beech, pine and other upland trees many feet below the marsh and tidal levels. In many places are found roots of trees which could not live subject to overflow by salt water.

The marsh deposits began then as soon as the areas now covered with alluvium were low enough to be overflowed. As the subsidence continued the depth of deposit increased. These deposits in some cases have been sufficient to check the upward flow of tidal waters in river valleys and allow the subsiding areas above to receive a fresh water or lake deposit. An interesting instance of this is the area in the basin of the River Missiquash, now under the control of the Missiquash Marsh Improvement Company. Most of this area until very lately has been, as far back as popular records go, covered with fresh water, forming a series of lakes joined into one large one in times of freshet. When

the fresh water is drained off a thickness of from one to two feet of lake deposit is found, but under this several feet of pure "quicksand mud." The tide had once flowed freely over this area, but was checked by its own deposits; leaving a basin above to become lake.

Occasionally on the banks of streams, in the deeper deposits, are to be seen layers of "blue" mud alternating with "red." The blue mud owes its colour and chemical change to the iron compounds of the red alluvium, brought about by the decay of vegetable material in the presence of much moisture. This process still goes on in places. The commonest vegetation so decaying are the roots and leaves of a species of sedge which does not flourish on the highest marsh levels. These levels, before being dyked, are usually bald, or covered meagrely with samphire, rosemary, or other scanty vegetation. Sedge makes a more luxuriant growth on areas more frequently overflowed, or in levels slightly basin-like, where the alluvium is always completely saturated with tidal waters. It is in such conditions that red alluvium becomes blue.

From the alternate red and blue layers outcropping on river banks we are enabled to read the character that each layer bore when it occupied the surface. Thus then during a continuing subsidence have the deeper deposits of alluvium on the lower courses of rivers been made.

Besides these there are areas, many thousands of acres, about the upper course of the Tantramar, where rock-building,—or more properly, as the agriculturist would think, soil-building,—has been and is now going on. Here nature is aided in her efforts and directed by the hand of man. These areas were originally shallow lake where the Indian and the pioneer hunted the goose and brant, and where later the sportsman sought the haunts of the mallard.

Early in the present century lived a farmer in the neighborhood, Toler Thompson by name, who studied the tides of the Tantramar. As a result of his observations he began to connect these lake areas with the tidal waters. The fresh water flowed out, and the tidal water flowed in at high water, laden with its riches of salt alluvium. The lake vegetation,—moss, etc.—was killed by the salt and soon settled and became buried under suc-

cessive layers of marsh mud, which, in the course of time, enriched the lake areas with a firm and fruitful soil. The work involved much expense because of the extensive trenches to be dug by hand, but it has been exceedingly profitable.

The Missiquash Marsh Improvement Co. is engaged in a work of this character in the valley of the Missiquash, having got possession of several thousand acres of lake area. This company is applying modern methods, using a steam excavator for the larger ditches.

Interesting as this process principally is from an economic standpoint, yet interesting it must be to the scientist, affording an example, and perhaps the only one of its kind, of modern rock-building in which man and nature cooperate.

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## NOTES BIOLOGICAL AND ARCHEOLOGICAL.

### HYPERGENESIS.

A gentleman living near Chatham has a very prolific cow, as the following birth record shows :

1892, 1, her first; '94, 3, still-born; '95, 1, still-born; '96, 5, still-born; '97, 4, all alive but dying within a week. There was nothing unusual in her family history. J. McG. B.

### ACAUDATE FOWLS.

There is in Chatham a breed of such. They were brought from Halifax, Nova Scotia, fifty years ago, and differ in no other respect from ordinary barn-yard fowls. The spinal column ends at the sacrum, the last vertebra of which is opisthocelous, and the uropygial gland and rectrices are wanting. The characteristic seems to persist strongly, and assert itself among crosses, some of which may show two rectrices, the outer on each side. J. McG. B.

### RARE WINTER VISITORS.

Several Juncos or Snow-birds, *Junco hiemalis* L., were seen from time to time at Bushville, near Chatham, during the winter of 1896-7. The season had not been a severe one. It is the only occurrence of the kind known to the writer.

Feb. 11th, 1899, Mr. James Pallen saw Wilson's Snipe, *Gallinago delicata*, by the side of White's Brook, a few miles from Chatham. The bird seemed active and strong, and was feeding over a muddy spot from which the snow had melted. The winter had been severe, and snow was covering the ground to the depth of two feet or more.

### AN INTERESTING RELIC.

Among ruins of an old French post on Miscou Island, Glou. Co., which tradition ascribes to Nicolas Denys, was found, some years ago, a bronze vase, date 1601. Though somewhat injured by fire, the relic is well preserved. It is now among the curios of the family of the late Alex. McDougall, Esq., of Oak Point, Miramichi.

**FIRST REPORT OF THE COUNCIL OF THE  
NATURAL HISTORY ASSOCIATION OF  
MIRAMICHI.**

**MEMBERSHIP.**

Honorary Member,	1
Members,	35
Associate Members,	40
Corresponding Members,	8
Total,	84

The Association suffered a great loss in the death of Rev'd Dr. McKay, whose scholarship and eloquence, combined with his energy and devotion, made him a valuable member. We regret also to chronicle the death of a young and esteemed associate member, Miss Sarah Curran, whose genial and kindly manner endeared her to all.

**FINANCIAL STANDING.**

Fees collected,	\$ 89.50
Provincial grant,	100.00
	\$189.50
Expenditures,	165.12
Balance on hand,	\$24.38

**MUSEUM.**

The nucleus of a museum has been formed, and reference to the reports of the various curators and list of donations, will show how rapidly it is growing. It may be referred to under the following heads :

### *Botany.*

The committee on Botany report that upwards of 500 plants have been mounted, labelled, and arranged in genus and family covers, and that plant-mounting is being continued. They also report that a fine cabinet for the herbarium has been ordered.

### *Ornithology.*

The curators of this department have shown much activity and zeal in the task assigned them. The mounted birds already number a hundred, and fresh accessions are being made from time to time. Owing, however, to the lack of cabinet space, the collecting of nests and eggs cannot be encouraged at present, but we hope to be able to provide, in the near future, for this necessary adjunct of an ornithological collection.

### *Mammology.*

The curators report their actions, too, hampered by lack of cabinet space, so that the large mammals of the province have not been added to the museum. About twenty-six specimens of the smaller species and a number of skins and crania are represented, and form an attractive feature of the general collection.

### *Ichthyology.*

This department represents well the smaller and fresh-water fishes, and in this respect is the most complete in the Maritime Provinces of Canada, consisting of over one hundred and twenty alcoholic specimens. It also contains some rare marine fishes in spirits, besides a few of the larger ones mounted.

### *Herpetology.*

The curators report about forty alcoholic specimens of reptilia; and already steps have been taken to enlarge the collection so as to make it representative of the whole reptilian fauna of the Dominion of Canada.

### *Invertebrate Zoology.*

In this section excellent work has been done. The entomological cabinet shows over 1500 specimens, and many molluscs and marine articulata have been collected, but owing to lack of room no systematic arrangement of the material has yet been made.

### *Archæology.*

A fair beginning has been made in this department. About twenty-five prehistoric stone implements, a number of interesting relics of early French occupation, and a few old curiosities have been brought together; but as this part of the province is rich in remains of the Stone Age, this section of the museum is expected to grow rapidly.

### LECTURES AND ESSAYS.

Since organization Feb. 2nd, 1897, to the present, the following meetings were held, and discourses delivered:

- 1897.
- Feb. 9. The Skeleton of the Bird. J. McG. Baxter, M. D.
- Feb. 16. Digestion of Birds. J. McG. Baxter, M. D.
- Feb. 23. Nature and Economy of Cryptogams. J. McG. Baxter, M. D.
- Mar. 2. Fossil and Wingless Birds. Dr. Cox.
- Mar. 9. Feathers. J. McG. Baxter, M. D.
- Mar. 16. Devonian Fishes. Dr. Cox.
- Mar. 23. Modern Cartilaginous Fishes. Dr. Cox.
- Mar. 30. Embryonic Development and Growth of Bony Fishes. Dr. Cox.
- April 6. Importance of Study of Insect Life. J. D. B. F. Mackenzie.
- April 13. Moths. J. D. B. F. Mackenzie.
- April 27. Animal Intelligence, Instinct or Reason, Which? J. McG. Baxter.
- May 4. Classification of Fishes. Dr. Cox.

- May 11. Insects Beneficial and Injurious to Vegetation. J. D. B. F. Mackenzie.
- Nov. 9. The Ice Age in Miramichi. Dr. Cox.
- Dec. 13. Dependence of Man on the Lower Animals. J. McG. Baxter, M. D.
- 1898.
- Jan. 18. The Earth's Crust. Rev'd Dr. McKay.
- Jan. 25. Courtship and Marriage of Birds. J. McG. Baxter, M. D.
- Feb. 8. Evolution of the Bird. J. McG. Baxter, M. D.
- Feb. 22. Portage Island, its Formation and Flora. Dr. Cox.
- Mar. 1. Is Man Indigenous? R. P. B. Joyce.
- Mar. 8. Interesting Freaks and Habits of the Bull-frog. Dr. Cox.
- Mar. 15. The Mammal, its Place in Nature. Dr. Cox.
- Mar. 22. Classification of Birds. J. McG. Baxter, M. D.
- April 5. The Carnivora of N. B. Dr. Cox.
- April 19. Ants and Spiders. J. D. B. F. Mackenzie.
- April 26. Insect Pests and the Remedies. J. D. B. F. Mackenzie.
- May 3. The Deer Family in N. B. Dr. Cox.
- May 10. The Rodentia of N. B. Dr. Cox.
- May 17. Flora of the Restigouche. G. U. Hay, Ph. B.
- June 3. Formation of the Bay of Fundy Marshes. F. A. Dixon, A. B.

Two outings were made by the Association, one to the valley of the Bartholomew, the other to French Fort Cove, where interesting researches were carried on, and collections made. The anniversary of the organization of the Association was duly celebrated in a special manner, followed by a conversazione, that of Feb., 1899, being a grand success. Too much credit cannot be given the committees and associate members for the ability and untiring energy they displayed in arranging and carrying out so successfully all details of the programme. The Council also desire to acknowledge the many obligations they are under to the press for the free insertion of notices and reports of the transactions of the Association.

PHILIP COX, Secretary.

## DONATIONS TO THE MUSEUM AND LIBRARY.

- 1500 North American Insects, classified and labelled. J. D. B. F. Mackenzie.
- 100 Miramichi plants, mounted. Dr. Cox.
- Petrified Tree-fern, Bordeaux Quarries, Restigouche. D. Ferguson.
- 2 specimens of Branching Coral. J. D. B. F. Mackenzie.
- 75 mounted birds. Dr. Cox.
- Harlequin Duck, *Histrionicus histrionicus* L.; American Merganser, *Merganser Americanus* Cass.; Red-breasted Merganser, *M. serrator* L.; American Scoter, *Oidemia Americana* Sev.; Scurf Scoter, *O. perspicillata* Linn. Mr. and Mrs. Geo. Watt.
- Eider, *Somateria molissima* Linn; Great Horned Owl, *Bubo virginianus* Gmel. George Dean.
- A collection of shells from Portage Island, Miramichi Bay. Dr. Cox.
- Some American silk-producing moths and their cocoons. Prof. Brahm, Bangor, Maine.
- Bald Eagle, *Haliaeetus leucocephalus* L., Joseph Simpson.
- American Osprey, *Pandion haliaetus* L., Dr. Baxter.
- 2 Fossil Fishes, specimens cannel coal, Albert Co. A. Rowan, St. John.
- A number of plants from Restigouche valley. G. U. Hay, A. M.
- Purple Grackle, *Quiscalus xeneus* Ridg. Joseph Tweedie.
- Salamanders and the Tailless Batracians of New Brunswick (alcoholic specimens). Dr. Cox.
- Monster lobster claw from Neguac. A. Cassidy.
- Algae and shells from the Gulf Shore. Capt. Asa Walls.
- Tooth of Sperm Whale. John Sinclair.
- Red-throated Loon, *Urinator lumme* Gunn. J. Morgan Ruddock.
- Pine Grosbeak, *Piticola enucleator* Linn. Inspector G. W. Mersereau.
- Black-backed Gull, *Larus marinus* Linn. F. Jenkins.
- Foolish Guillemot, *Uria troile* Linn. W. C. Stothart.
- Shrew-mole, *Blarina talpoides*, E. J. Cox, Maugerville.
- A number of plants from Derby, Miramichi. J. J. Clark.
- Bald Eagle (young), *H. leucocephalus* Linn, Domestic Duck. Douglas Haviland.
- A tailless fowl (Vide notes biological and archæological). W. Salter.

- 120 specimens of the Fresh-water Fishes of N. B. (alcoholic).  
Dr. Cox.
- A mounted Sturgeon, *Acipenser oxyrrhynchus* Mitch. W.S. Loggie.
- Ghost Fish, *Cryptacanthodes maculatus* Storer. A. G. Williston.
- Pike Fish, *Siphostoma fuscum* Storer. Frank Loggie.
- Greenland Sculpin, *Cottus grænelandicus* Cuv. A. G. Williston.
- Alligator Fish, *Aspidophorides monopterygius* Bloch. F. Loggie.
- Fresh-water Fishes of Gaspé, P. Q. (alcoholic). Dr. Cox.
- Horseshoe Crab, *Limulus*. Charles Whitehead.
- 3 specimens ditto. Andrew Brown.
- 2 mounted heads of Albatross. Harry Haviland.
- A specimen of Idleweiss (Alps). Miss I. Haviland.
- A number of Miramichi plants. Jas. McIntosh.
- Under jaw of Walrus from Miscou Island, N. B., and tusk from  
Alaska. A. C. Smith, M. D.
- Polished agate. Frank Pallen.
- Fiji Island war spear, bows, and arrows. J. D. B. F. Mackenzie.
- Back-bone of Shark. F. E. Danville.
- 7 mounted mammals of N. B., 25 skins and crania of mice, shrews,  
moles, ermine, etc., and 25 bird skins. Dr. Cox.
- Barred Owl, *Strix nebulosa* Forst. J. L. Stewart.
- Rana cantabrigensis* Baird, James Bay, Canada, through exchange  
with National Museum, Washington. Dr. Cox.
- Horned Toad, *Phrynosoma cornutum* Wym., Scorpion, and Mason  
Spider. McD. Snowball, Cal.
- Amblystoma punctatum* L., Great Spotted Salamander. Byron  
Keating.
- Back-bone of Harbour Seal. Miss Laura Morrison.
- Stone chisel, Porto Bello, Sunbury Co. Ed. J. Cox, Manguerville.
- Lump-fish, *Cyclopterus lumpus* L. J. D. B. F. Mackenzie.
- A collection of stone implements from the rivers St. John, Mir-  
amichi, and Restigouche. Dr. Cox.
- Canadian Plants by Prof. Macoun (5 vols.). Dr. Dawson.
- Wild Flowers of Miramichi by Roderick McKenzie. The Author.
- Bull. No. XIV of the Nat. Hist. Soc. of N. B., and Economic  
Mollusca of Acadia by Dr. Ganong. Dr. Cox.

## REPORT OF THE BOTANICAL COMMITTEE.

A good deal of activity has been shown since the organization of the Association in investigating the flora of the "North Shore," which has resulted not only in adding several hundred specimens to the herbarium, but bringing to the notice of botanists several plants new to the province, as well as extending the known range of a great many others.

These will be found arranged under their respective heads in the following catalogue :

### PLANTS NEW TO THE PROVINCE.

- Lepidium intermedium* Gray. Wild Peppergrass. Chatham and Bay du Vin. Dr. Cox.  
*Spergularia borealis* Robinson. Portage Island, July, '97. Cox.  
*Spergularia salina*, var. *macrocarpa*. Portage Island. Has a marked range. Cox.  
*Comandra umbellata*, Nutt. Islands Miramichi Bay. Cox.  
*Hieracium pilosella*. Loch Lomond Road, St. John, and Charlo, Restigouche. Cox.  
*H. pilosella*, var. *peletorianum*. Charlo, Rest. Cox.  
*H. cladanthum*. Campbellton and along I. C. R. through Rest. Co. Cox.  
*Artemisia annua*. Roadside, Chatham. Cox.  
*Matricaria discoidea*. D.C. Wild Chamomile. Grammar School grounds, Chatham. An immigrant from Oregon. Cox.  
*Chenopodium Bonus Henricus* L. Good King Henry. Streets, Chatham. Cox.

### PLANTS WHOSE RANGE HAS BEEN EXTENDED.

- Viola canina* L. Red Bank, L. S. W. Miramichi. Cox.  
*Erodium cicutarium* L'Her. N. W. Miramichi. Cox.  
*Trifolium arvense* L. Neighbourhood of Chatham and Nelson. J. J. Clarke.  
*Draba incana* L var. *arabisans*. Wharves, Chatham. Cox.  
*Apios tuberosa* Moench. L. S. W. Miramichi. Clarke.  
*Lobelia Dortmanni* L. L. S. W. Miramichi Lake. Cox.

- Euphorbia Cyparissias* L. Bartholomew River. James McIntosh.  
Beaubair's Island, Clarke.
- Liparis Loeselii* Richardson. Dalhousie Junction, Rest. Cox.
- Polygonatum biflorum* Ell. Indiantown, Mir. Barnaby River.  
Renous River. McIntosh. Clarke.
- Ambrosia artemisiifolia* L. Hogweed. Chatham. Cox.
- Trillium erectum* L. Doaktown, fide. Miss Ethel Mersereau.
- Cypripedium spectabile* Swartz. Mill Cove. Cox. Renous River.  
Clarke.
- Ranunculus multifidus* Pursh. Eel River, Rest. Cox.
- Amphicarpæa monoica* Nutt. Barnaby River. Burton Flett. L.  
S. W. Mir. Clarke.
- Arnica mollis* Hook. L. S. W. Mir. Clarke.
- Vaccinium caespitosum* Michx. Mouth of Sevogle River. Cox.
- Veronica Buxbaumii* Tenore. Eel River, Rest. Cox.
- Nepeta Glechoma* Benth. Common in villages and towns, Mira-  
michi.
- Lysimachia thyrsiflora* L. Restigouche and Portage Island, Mira-  
michi Bay. Cox.
- Listera cordata* R. Brown. L. S. W. Mir. Cox.
- Solanum nigrum* L. River bank, Chatham. Flett.
- Epilobium Hornemanni* Reichenb. North West Miramichi. Cox.
- Empetrum nigrum* L. Bay du Vin. Cox.
- Senebiera coronopus* D. C. Ballast wharves, Chatham. Cox.
- Erysimum cheiranthoides* L. Wharves, Chatham. Cox.
- Brassica alba* Gray. Wharves, Chatham. Cox.
- Stellaria graminea* L. Along Canada Eastern Railway near Chat-  
ham. Cox.
- Echinosperrum lappula* L. Chatham. Cox.
- Ligusticum scoticum* L. Shores of Miramichi Bay. Cox.
- Drosera longifolia*. Derby Lake. Clarke. Barrens about Napan  
Lake and L. S. W. Mir. Jas. McIntosh.
- Chenopodium capitatum* L. Chatham. Eel River, Rest. Cox.
- Mercurialis annua* L. Newcastle ballast wharf, Cox.
- Aspidium fragrans* Swartz. Rockheads, Mir. Cox.
- Dentaria diphylla* L. Blackville. McIntosh.
- Spergularia rubra* Presl. Derby. Clarke.
- Rhus toxicodendron* L. Blackville. McIntosh. L. S. W. Mira-  
michi. Clarke.

- Desmodium Canadense* D. C. Hero's Falls, Rest. Cox.  
*Medicago lupulina* L. Common in Miramichi towns and villages.  
*Melilotus officinalis* Willd. Wharves, Chatham. Cox.  
*Parnassia Caroliniana* Michx. L. S. W. Miramichi. Clarke.  
*Sanicula Marylandica* L. Derby. Clarke.  
*Osmorrhiza longistylis* D. C. Derby. Clarke.  
*Cryptotaenia Canadensis* D. C. Derby. Clarke.  
*Aralia trifolia* Decsne and Planch. Derby. Clarke. L. S. W.  
 Miramichi. Cox.  
*Cichorium intybus* L. Found in hay-fields along Miramichi  
 River. Clarke.  
*Campanula aparinoides* Pursh. Nelson. Clarke.  
*Andromeda polifolia* L. L. S. W. Mir. Cox. Derby. Clarke.  
*Gentiana Andrewsii* Griseb. Blackville. McIntosh. L. S. W.  
 Mir. Clarke.  
*Cuscuta gronovii* Willd. Blackville. McIntosh.  
*Epiphegus Virginiana*. Bart. Moorfields. McIntosh.  
*Utricularia cornuta* Michx. L. S. W. Mir. Cox.  
*U. intermedia* Hayne. Derby. Clarke.  
*Phryma Leptostachya* L. Derby. Clarke.  
*Humulus lupula* L. Naturalized on L. S. W. Mir. Clarke.  
*Juglans cinerea* L. L. S. W. Mir. Clarke.  
*Arethusa bulbosa* L. Derby and Blackville. McIntosh. Chat-  
 ham. Cox.  
*Allium schenoprasum* L. Nelson. Clarke. Blissfield. G. W.  
 Mersereau.

JAMES MCINTOSH,  
 Chairman of Botanical Committee.

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