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No. 3

1884.

October.

THE

Canadian Science MONTHLY.

DEVOTED TO THE INTERESTS OF

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A. J. PINEO, WOLFVILLE,

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WOLFVILLE, N. S., OCTOBER, 1884.

No. 8.

AMONG THE CRYPTOGAMS.

By Prof. A. H. McKay.

PAPER VI — USES OF LICHENS.

Continued.

Many lichens contain principles which have made them popular in

MEDICINE.

In this department we find some of them used as nutriments, demulcents, febrifuges, astringents, tonic, purgatives or anthelmintics. Some of these properties have undoubtedly existed only in imagination, as for instance the "*pulvis antibyssus*," the celebrated "*pulvis contra rabiem*," or "mad dog powder," long regarded as a most efficacious remedy for Hydrophobia. This was nothing else than the powdered earlike lichen fronds often found growing over moss in the woods, and which was called from this belief *peptigera canina*. These powders had one grand property, if they did not cure, they did not kill. The lichens also furnish us with many

CHEMICAL COMPOUNDS

useful in the arts and sciences, such for instance as *ultramic acid*, *gallic* or *tannic acid*, *lichenine*, *innuline*, and especially such organic acids as *orcellic*, *lecanoric*, *gyrosphoric*, *evernic*, etc., which although themselves colorless, by the joint action of air, water and ammonia produce valuable

PURPLE DYES.

The coloring properties of these compounds made some lichens only a few years ago of very great economical importance. In their commercial form their coloring matters constitute the pigment known as *Orchill*, *Cudbear*, *Litmus*. These have all the same origin, the first being the English, the second the Scotch and the third the Dutch name. The first was manufactured as a liquid or paste, of rich purple color; the second as a crimson, or carmine powder, and the third in small cakes of an indigo-blue color. There is reason to believe that the dye mentioned in Ezekiel, XXVII, 7.—"Blue and purple from the isles of Elishah was that which covered them," and the celebrated "purple of Amorgas" were *Orchill*. Since the discovery of the aniline colors, the manufacture of dyes from lichens is not of the importance it formerly was. The annual value of a species of *Roccella*, or *Orchella*, as it was called, and other dye lichens imported into England, was estimated a few years ago at from \$300,000 to \$400,000. Some of these grew in England itself, but tropical species, from Africa, Asia and South America, and from the Azores and Canaries had been found more productive. The prices varied from \$100 to \$1000, to \$2000 and sometimes nearly to \$5000 per ton. In

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Scotland, the collection of these dye "crottles," as they were called, was quite an important industry and proved of great value to the peasantry of some of the poorer tracts of the country. We have before us now a phial which has been on the shelf for about four years undisturbed. A portion of the thallus of an *Umbilicaria* collected on a rock in the neighborhood of Halifax was at that time put into it with a little ammonia and water. In a short time a rich purple liquid was formed. After a lapse of four years it is a rich purple still, and so deep in color as to make an ink with which this article might be written. Another phial taken from the same rubbish of our laboratory, with a different lichen, contains a brown colored liquid of similar origin. The purple coloring of a lichen can easily be developed by putting it into a phial or test tube with some water and a little ammonia. No matter how impure the ammonia-liquid may be, if the phial be kept for a short time in a warm place and occasionally shaken and exposed to the air, and if the lichen contains any red or purple coloring principles the color soon appears. The experiment is a simple one, and we hope it may be tried. The lichens most likely to give rich colors are those with a crustaceous thallus. The leathery flakes growing in rocky spots such as around Halifax, Bedford, Windsor Junction, Grand Lake, give beautiful purples. A magician could turn clear water into the color of a

purple wine by simply putting into it some clear Ammonia and a flake of black-brown leathery looking umbilicaria. No one can tell without actual trial what color a new species of lichen may give. To examine it for yellow, green or brown, chop it up finely and boil it in water alone. To examine it for reds or purples, add ammonia.

The more we observe this class of plants, the more shall we see, that though in comparison with the vegetable kingdom as a whole, its position is humble and low in the scale, yet it

"Holds a rank

" Important in the plan of Him who framed
This scale of beings; holds a rank which lost
Would break the chain and leave behind a
gap
Which Nature's self would rue.—"

OUR CANADIAN BIRDS.

PAPER IV.

BY ERNEST E. T. SETON.

Closely related to the Family *Turdidae*, which we discussed in Paper III, is the Family *Saxicolidae*, which will now be treated according to the plan already laid out.

Family *Saxicolida*,—Rock-dwellers
(Latin *Saxicola*, rock-inhabiting.)

The Common Bluebird—*Sialia Sialis*.

The Arctic Bluebird—*S. Arctica*.

So far as we are concerned, this is a very small family, for it contains only the genus *Sialia*, the characteristics of which are well shown in the common Bluebird.

It resembles the genus *Turdus* in general form and size, the most tangible points of dissimilarity being the relative length of the tarsus in each. In *Turdus*, the tarsus is longer than the middle toe. In *Sialia*, the tarsus is about equal to the middle toe. This is surely a very trifling difference, to separate the birds so widely.

Briefly then, the genus *Sialia*, may be recognized by the blue coloration and thrush-like tarsus and beak.

The Common Bluebird, — *Sialia sialis* (L. *sialis* = plump.) L 6½. All above, bright blue; breast rusty chestnut; belly, white; ♀ duller. Young shew the adult colors, but are spotted all over.

Nest, of twigs, hay and feathers; in a knot-hole or bird-house.

Eggs, 4 — 6; .8 × .65; pale blue.

Abundant all over E. N. America.

The Arctic Bluebird, — *S. Arctica*. Differs from the last, in color only, being all over of a pale sea-blue; ♀ duller and with drab on the breast.

A rare and beautiful species, found only in Central N. America.

The Bluebird is among the very first of our feathered friends to return from the south. He is truly the harbinger, the 'army herald,' for he is foremost in the van of the bird host, hardly waiting for the spring at all, for in Ontario he comes about the end of February; in Manitoba his time is in April; and in the Maritime Provinces about the end of March.

The manner of his coming is still rather shrouded in mystery;—does he travel with a host of his kin or alone?

Does he come by day, or by night? Often during a space of fine weather, he comes, mysteriously, as usual; but he disappears, as mysteriously, if for a time, it again turns cold; and the questions, 'Where did he hide?' or 'Whither go during those cold days?' have not yet been satisfactorily answered.

Let no reader neglect to record any facts coming to his knowledge, that will cast light on these matters.

For long the Bluebird held undisputed sway over the bird-houses and eave-holes of our cities; his were the gables and chimneys, or at best a few gentle swallows came and offered slight opposition, a month after the Bluebird had again taken possession. But of late years there has been a change. Imagine a scene, if perchance you have never beheld it:— 'The wind is soft in a March morning, when northward the Bluebird comes flying back to his native pole-house, his ancestral home for generations now he thinks to be at rest and gaily alights, and lades the wind with his warbling, musical to the ears of all as the first lisp of new-born spring, ere yet she gains power to speak in the eloquent gushing of the Thrushes, Larks and the Finches. But scarcely has he alighted, when a brown bird emerges from the door and meets him with furious chattering; a number more gather from the neighborhood and they unite in attacking the bright newcomer; and the spring bird, the 'sky-robin,' gentle by nature, but valiant is forced to fight, and barely escapes

by his swiftness, leaving his home to the troublesome sparrows. "

From the east, came the energetic white race to America, and lived there by suffrance at first, till waxing strong, they seized all and their whilom hosts were ousted from their ancient possessions, and are now but a fast dying remnant. And do not we find a precise epitome of this occupation in the history of the English sparrow. A few pairs were brought from the East, and their presence was suffered, until they multiplied and grew strong enough to possess themselves of city after city, driving out the bluebirds and swallows. Where this will end we do not know; we may yet have to take up arms against the intruder; it may be that he is to man, a harmless, or even a beneficial bird; he is certainly very amusing for the energy and vivacity he displays at all times; yet I cannot like the sparrow. I regret his introduction when I see our own birds retreating before him.

But we may still hear the Bluebird's gentle warble, and almost wonder wherein lies its charms, for it is scarcely worthy to be called a song, for it is too soft to be strong, and too sweet to be rich, and yet so soft and sweet, that to every ear it is enchanting. Its pleasing suggestion of innocence is well felt by the enthusiastic John Burroughs, who, with admirable fitting of sound and sense, makes his bird murmur — "*Purity! Purity! Purity!*"

• Another question for students to settle is,-- Do the males arrive before

the females, as with some birds? It has been said that all the bluebird's notes are call-notes. Is he then calling for his mate, when first we see him

"Shifting his light load of song
From post to post along the cheerless fence?"

Having found a help-mate and won her in the usual way, that is, by much battling with his many rivals, and billing with his future bride, he, with her aid, sets about the spring cleaning of the old nest, if perchance it has not yet been required by the prolific sparrows. This is still early in the spring and at this time, although the Bluebird is professedly an insect eater, his proper food is so scarce that he will be found to subsist largely on buds, young catkins and any other soft vegetable growths that may be obtained.

This is one of the birds that were brought before the tribunal of the government Commission. The penalty of outlawry was to be inflicted if it should be proven that this was an injurious bird to agriculture. But the balance of evidence was in his favor.

Dr. Brodie investigated the subject some time ago, and showed that while the Bluebird was chiefly insectivorous, it also lived partly on berries and seeds; while of the insects that it destroys, some are beneficial to man; yet an impartial judge cannot study this bird's life without becoming his friend. One of the largest peach-growers in Georgia has about 500 semi-domesticated Bluebirds in his orchard. He carefully protects them and greatly prizes their services in de-

stroying worms and grubs on his trees, for his observations show a great increase in the yield since he followed the plan of encouraging the Bluebirds.

The nest, whether in an old woodpecker's hole, a knot-hole, or a bird-house, is made chiefly of sticks and grass, and the eggs, like those of the Thrushes, are of a delicate blue.

The male shares the duties of hatching and rearing the young, which, in the nest are fed exclusively with insect food. When they are fully fledged, we are reminded of their kinship to the Thrushes by the spotted plumage which continues until the second month, when they assume the colors of the old ones.

We begin to see here that the genus has many more points of resemblance to, than difference from, the Turdidae; and throughout the families of birds we observe much of the same excessive hairsplitting, so that it appears to me that a reduction of sub-families (perhaps families) to the rank of genera would result in a classification much more nearly in accordance with accepted canons of arrangement in the other kingdoms of nature.

In the Middle States the Bluebird is said to sometimes raise three broods in one season. In Ontario it will often raise two, but I have no evidence to show that in Manitoba more than one brood is hatched each summer.

In September they may be seen, in straggling companies, about the weedy commons, uttering their soft warble still, as they flit about in the chase of

flies and the search for worms. They are evidently travelling now (Sept.) although they do not seem much in earnest about it, nor do they entirely disappear until a month later. They seem to continue this leisurely retreat before the North Wind until at length they are found only in the extreme Southern States and the West India Islands, where as we learn from Wilson, they while away the winter in sunshine, while their native woodlands are sleet-covered, and the land of their birth is in snow.

The next family of birds is the *Sylviidae* — *Sylvias* (Latin *sylva*, woodland.)

The Ruby-crowned Kinglet—*Regulus calendulus*.

The Golden-crowned Kinglet—*Regulus satrapa*.

The Blue-gray Gnatcatcher—*Polioptila caerulea*.

I find it impossible to define this family with conciseness or even to briefly distinguish it from the last. But our purpose will be answered by at once characterizing the two genera.

Regulus—(L. meaning a little king; an allusion to their golden crown.) Tiny, greenish-olive colored birds, about $4\frac{1}{2}$ inches long, with a crown-patch of brilliant scarlet or yellow; tarsus booted; tail slightly forked.

Polioptila—(Gr. *polios* hoary, *ptilon* feather.) Differs from last in bearing no bright or decided colors and in having tarsus scutellate and tail rounded.

The Ruby-crowned Kinglet.—*Regulus calendulus* (*calendulus*, a little

lamp—(alluding to the fiery crest.) L. $4\frac{1}{2}$. Olive-green, shaded into dull whitish below; quill feathers dusky with yellowish edgings; a patch of scarlet on the crown. Sexes alike. Young without the brown patch. Nest and eggs unknown.

The Golden-crowned Kinglet.—*R. satrapa* (*satrap* a prince.) Like the last, but crown-patch yellow with a central spot of scarlet and an outline of black, except behind; outside the black line is one of white; ♀ without the scarlet spot. Young, colored as in *calendulus*, but distinguishable by having over each nostril a tiny bristly feather; the nostrils of *calendulus* being naked.

Nest found by Minot in 1875 was globular in shape, formed of moss and feathers and placed in a low hemlock bough. It contained six young. Audubon also is said to have found the nest and eggs. But they still rank among the greatest of oological prizes as there are no authentic specimens extant in any of our museums.

Found all over N. America.

The Blue-grey Gnatcatcher.—*Polyptila caerulea*. (L. *caerulea*, blue.) L. $4\frac{1}{2}$. Clear ashy blue bluest on the head; whitening below; forehead and line over the eye; black; outer tail feather, white; ♀ without any black on the head.

Nest, in a forked twig; of fibres, thistledown and-cobwebs.

Eggs, 4—6; $.45 \times .6$; pure white, spotted and blotched with reddish, amber and lilac.

Southern States chiefly, but said to occur in Nova Scotia.

One of the smallest of birds, of fairy-like delicacy, a sort of animated gossamer, catching gnats as aforètime. Famed for its silvery song, which is as thin and elfin-like as might be expected from a bird that for the coarser materials of its nest uses thistle-down and for lack of softer lining, must needs be content with the finest silk of spider's spinning.

In this family the Ruby-crown is the bird which I treat biographically, but lack of space will compel me to abbreviate a history, of which, at best, but little is known.

This species is found all over North America, from Guatamala to Greenland, and from Alabama to Alaska. In the beginning of the year, we would find them in their far south winter quarters, but always moving. By the end of March, the main body seems to reach the Middle States; here, according to Prof. Coues, some linger right on into May, but they must be few in number, for I found them abundant in Ontario in April, and in Manitoba they arrive about the middle of May, in full force and in full song. I will quote from my diary an entry referring to the song.—

"May 12th. While hunting through the eastern poplar country to-day, I often heard a certain loud-voiced warbler; its notes may be syllabically suggested, "pie, piee, pi-ee, hup-pi-chi, hup-pi-chi, hup-pi-chi, hup-pi-chi, hup-pi-chi, hup-pi-chi, HUP-PI-CHI, HUP-PI-CHI," commenced very softly, but with continually added power, till the last notes rang out as loud and strong as those

of a canary. I at last succeeded in shooting one of the singers and was surprised to find what a tiny being it was, that gave forth such a volume of sound, for it was the Ruby Crowned Kinglet."

This was my first close acquaintance with the Ruby Crowns, nor have I been able to push it much farther, for in spite of all endeavors I cannot find them here, excepting about mid-May. They, no doubt, go farther north to breed, and it may be that in the fall they return to the south by some other way.

It is not yet known exactly where they breed and so far as I know, their nests and eggs have never been found. If therefore this should meet the eye of some northern student, who thirsts for immortality, let him remember that a talisman that will enable him to gratify his desire, will be found in the cradle of the Ruby-Crowned Kinglet.

It may be well to remark here, that rare nests and eggs do not pass as authentic, unless the bird be shot at the nest, and sent, for identification, to some undoubted authority.

It is rather difficult to identify this bird without shooting it; for being usually above you its most striking part, the crown—is not seen. Yet its peculiar nimbleness and its habits of playing and dashing about the top-most twigs, and of twisting and scrambling about in a Chicadee-like manner, will often cause it to be suspected, if indeed these ways do not entirely distinguish it from some of the true warblers.

Its food consists mainly of flies and other small insects, as might be inferred from the shape of the bill and from the rectal bristles at the corners of the mouth; for the use of these last is to assist in the capture of flies, and we generally find that the extent of a bird's fly-catching propensities, is indicated by the development of these hairs; while from the slender bill, we might safely infer this bird's habit of picking up insects from twigs and crevices.

Early in the fall the Ruby-Crowns begin to return from the vague Lone Land, bringing with them their newly fledged young, which being as yet without the diadem of their kind, have more than once proved stumbling blocks to the student, whose only help in such cases is a careful comparison with the structural details of the old ones, unless he can refer to some more experienced friend for a solution of the difficulty.

WINTER NOTES ON ORNITHOLOGY.

By PROF. C. B. WILSON.

PAPER IV.

ORDER IV.—COLUMBAE, the pigeons. —This order is so well known in, and so well represented by our domestic doves and their allies that it needs only passing comment. In one sub-family, represented by a single isolated American species, but not referable to any established old world group, the hallux or hind toe is not perfectly insistent. This fact, together with other

similar peculiarities in structure and habits, render these so called "Quail-Doves" a remarkable outlying group, tending, as their name implies, towards the Quails of order V.

Pigeons are strong and rapid fliers, which fact man has utilized in his wonted aggrandizing manner. He has trained the Carrier Pigeons to convey messages with greater accuracy, and with little less speed than the electric telegraph, and to places wholly inaccessible by that or any other means excepting by this winged messenger.

CLASS B. *Those Birds in which the hind toe is elevated above the front toes.*

These are the Sand and Water birds which are not particularly fliers, nor yet perchers like the succeeding class, but are rather walkers, runners, scratchers, waders, or swimmers. And yet by the curious law of exception, whose rule is everywhere and all embracing, we find in this class the Wild Goose, whose flight is proverbial the world over for its wondrous speed. Outstripping the storm wind, and vieing even with the lightning's flash, it reaches at times a speed of from 90 to 100 miles an hour. No wonder the bird chooses its haunts so far apart, when it can traverse the intervening space in so short a time.

ORDER V.—GALLINÆ (fowls,) or as some call them, RASORES (Scratchers.) This latter name is derived from a characteristic habit of scratching for their food. All birds of this order are more or less perfectly terrestrial. The leading idea of their structure is

plumpness, which of course means short and stout. This applies to bill, head, body, wings, and tail. But the latter appendage acquires a marvelous development in the peacock, and the head often develops fleshy processes as can be seen in the comb and wattles of our barnyard fowls.

This order is cosmopolitan, and its chief interest centres in its great economic value. The importance of this feature is readily seen when we reflect that all forms of domestic poultry, hens, turkeys, peacocks, guinea fowl, and the like are *Rasores*; as also are all the principal game birds of every land, quail, grouse, pheasants, partridges, etc.

It is an order also unsurpassed in beauty; witness the gorgeous peacock, and the whole family of magnificent Pheasants.

The five orders so far enumerated have been land or air birds, but we must now leave the land and push boldly out to sea, noticing as we pass, those birds that we find in the shallow water along shore.

ORDER VI.—GRALLATORES, (waders,) literally stilt-walkers, from the chief peculiarity of the order, its long, naked, stilt-like legs.

Of these the great Plover-snipe group of shore waders are the smallest, and are the group to which may be attached the connecting links already mentioned.

They perform extensive migrations during which they appear with great regularity. They are the first group we have met that breed to the far north, *i. e.* in Nova Scotia, Newfound-

land, or Labrador, and are for this reason the most interesting. The eggs of this group are wonderfully alike, speckled all over, and of a shape called conoidal, large at one end, small and pointed at the other. So similar are they in the different species, that the eggs of one common bird usually do excellent duty in cabinets for those of all the small waders. In this way one common nest with its four (4) eggs can be manufactured into 4 rare nests, each with a single egg, nor is there enough disparity in size to betray the counterfeit.

These are our most delicate game birds, and exceed all others in savoriness.

The Herons and their allies form a well-marked group, and for this reason are sometimes included in an order by themselves. They stand among the tallest of our birds, their favorite attitude being that of the conventional stork, erect and pensive, in shallow water among reeds and catails, patiently waiting for something eatable to appear.

The tooth-pick style of structure reaches its acme in the American Flamingo, which stands 5 feet tall in his bare feet, and only weighs 6 or 8 lbs. Truly it could be little exaggeration to say that he is all neck and legs.

The shallow water birds have thus been comprehended in a single order. All the rest of the birds are swimmers of various sorts.

ORDER VII. — LAMELLIROSTRES, (plate billed.) This order, the ducks, geese, etc., is named from a peculiari-

ty of their bills, thin plates called lamellae being arranged like teeth along the margin of the bill. Like the Scratchers this order is a familiar one, comprising all kinds of "water-fowl," among which are our domestic ducks, geese, swans, etc. Hence they rival even poultry in economic importance, because they furnish beside very palatable food, exquisite material also for wearing apparel, and the best possible filling for our pillows and beds.

ORDER VIII. — STEGANOPODES, (wholly web-footed.) This is a small but clearly defined group, named from, and easily recognized by, their peculiar feet. The hind toe is connected with the inner toe by a complete web, reaching from tip to tip, which is not found anywhere else among birds. The species of this order are few, not over 50, of which the Cormorants are half, and they are very generally distributed over the world.

ORDER IX. — LONGIPENNES, (long-winged.) The gulls, terns, etc. These birds are distinguished by their long wings, which, when closed, reach beyond the base, and often beyond the tip of the tail. The legs are placed well forward under the centre of gravity, an arrangement very different from that possessed by the following order.

As would be supposed their flight is vigorous, and in their leading traits they are Maritime Raptores, the Birds of Prey of the sea, which analogy finds curious support in their cored bill.

ORDER X. — PYGOPODES, (divers.) Loons, Auks, etc. The name of this order also, which means literally rump-

footed, gives us an insight into their character. They are noted for their powers of diving, being able even to evade the bullet from a rifle, by diving at the flash of the powder.

They too are migratory, and breed in high latitudes. In them the idea of swimming, which has been steadily growing since we left the waders, has reached its culmination. To accomplish this the feet have gradually receded from the centre of gravity, and have got so far back in this order that when on land the birds have to stand erect, if they stand at all, and can walk only in a very awkward waddle, the breast almost, if not quite, touching the ground. Loons are said to occasionally lose their reckoning during migration and alight on the land. As their wings are not large enough to enable them to rise from the land, they then perish miserably, unable either to walk or fly to the water.

Thus our study, which we have said has been tending seaward, has at last reached an order which cannot live anywhere but on the water.

The title which stands at the head of our rambling notes says "Winter Notes," but obviously Winter has long since melted into Spring; Spring has blossomed into Summer, and Summer has ripened into Fall, and now Fall is succeeded by the first snow of another Winter, so the title is only a little too previous after all.

During all this time the birds have been coming and going, building their nests, and rearing their young some of them, while others have only drop-

ped in a moment as they passed by. We can easily assign these to their appropriate places, if we endeavor to remember the characteristics of each of our 10 orders in a single word thus: Order I. *Perchers*, including (a) *singers*, and (b) *clamorers*; II *Waste-basket* order, into which are thrown all birds that cannot find a home anywhere else; III *Robbers*. And as if to illustrate the proximity indicated in the Scripture phrase "As bold as a lion and as gentle as a dove," the next order is IV *Doves*; V *Scratchers*; VI *Waders*; VII to X *Swimmers* of various sorts; VII *Thick-billed*; VIII *Web-footed*, i. e., all webbed; IX *Long-winged*; X *Rump-footed*, or perhaps the simpler word *Divers* is a better one.

Our study has been tending northward also for it is only when we reach the sea-fowl that we find the best representatives of native Nova Scotia bird life.

The past season has disclosed the fact that Nova Scotia is especially favored with the Warblers of Order I. The Hermit Thrush, too, whose vesper song is unrivalled, is one of the most charming summer residents of the Maritime Provinces. In (b) the Canadian Jay or Moose bird is a common species, and, being readily allured by anything that appeals to his stomach, is most frequently seen perhaps, on butchering day among the farmers.

Here too, is that bird of the North, famed in song and story as the bird of ill omen, the Raven, whose hoarse-

croak, a very common bird voice in Nova Scotia, betrays him as certainly no singer, but a clamorer.

Among the Birds of Prey in III, the Goshawk, the great Grey Owl, the giant of his race, and the Snowy Owl, nearly as large, are characteristic species.

In the Scratchers of V, there is one, the aristocrat of his race, and yet withal, a bird of gentle and retired ways. This is the "Spruce Partridge" only he is no partridge at all, any more than he is a pigeon, but is in fine a Grouse, the Canada Grouse, and only extends from Labrador to the south of Nova Scotia.

But it is when we approach the sea, that the fabled South and the Tropic Zone, with all their famed wealth of bird life, must retire to the back ground, whence they can only gaze in stupid amazement at the countless herds of sea-fowl. The waders and swimmers find here a summer paradise and they enjoy it too, frequenting the rocky shores, and bold headlands of the coast, where they breed in myriads, lending a peculiar and indescribable charm to these summer resorts and the pleasure which the presence of feathered companions always inspires in mankind.

NOVA SCOTIAN GEOLOGY.

PAPER IV:

TRURO AND THE REGION ROUND ABOUT.

(Introductory.)

Rev. D. Hensyman, D. C. L.

I propose for a few months to make

the town of Truro a geological centre from which we shall take walks, carriage drives, and railway excursions. The old Normal School will have its place in our imagination, as we shall commence our walks at the opening of this institution and take an occasional ride in old fashioned wagons with single horses, and Hiram Hyde's line of stage coaches. This will bring us to the railway era with interesting geological revelations, excursions and rapid transits. We shall thus have an opportunity of talking over the development of "Nova Scotian Geology" during the course of a quarter of a century. In this period Truro has become one of the best centres for the study of Practical Geology; we will find it so when we shall have finished our proposed walks and travels. Its Normal School with its excellent staff of teachers and its pupil teachers from all parts of the Province seems to be a proper instrumentality for diffusing a special kind of knowledge that can be here acquired, where it is most required and where it will be most advantageous in the promotion of the industries of the Country.

In my last paper I treated of the Archæan Formation, the oldest rocks with which we are acquainted. Now in our walks in Truro, we come to examine the present order of things which I call in our table of Formations, the Cene (Greek Kaine, new.) Walking with our late much lamented friend, Dr. Forester, in the height of his glory, after the successful opening of the Normal School, we examine the

deposits of marsh mud in the creeks of Salmon River, and observe sections in this deposit made by the spade of the farmer when carting away the mud for the fertilization of his fields. They illustrate beautifully the mode in which layer has been formed upon layer in the sedimentary formations of geology, notably the Carboniferous. We also observe the surface of the deposit curiously cracked by the heat of the sun, and may call these sun or shrinkage cracks. The next flow of the tide may cover them with another layer of mud. We may thus have cracks and casts formed similar to those that are often found on Carboniferous strata. Walking along we observe prints of the *Tringa minuta*—the sand piper. These when covered in a similar manner, will make tracks and casts corresponding with reptilian foot-prints also found in the carboniferous formation. Leaves are also found scattered on the surface. These when covered may in future time become fossil leaves, as the ferns of the Carboniferous period have become fossil ferns, to excite the admiration of the beholder.

ILLUSTRATIVE SPECIMENS IN THE PROVINCIAL MUSEUM.

Fossil Rainmarks of the Carboniferous Period.

In the 'Webster Collection' are casts of rain prints in a hard dried stratum of marsh mud from Kentville

'Having alluded to the spots left by rain on the surface of the Carboniferous strata in the Alleghanies, on which quadrupedal foot prints are seen,

I may mention that similar rain-prints are conspicuous in the coal measures of Cape Breton. In the course of 1851, Mr. Brown had the kindness to send me some greenish slates from Sydney, Cape Breton, on which are imprinted very delicate impressions of rain prints, with several worm-tracks such as usually accompany rain marks on the recent mud of the Bay of Fundy."—Lyell's Manual of Geology.

In my collection there is a slab of Carboniferous sandstone with very distinct rain-prints. Another with the track of a reptile, where one of the feet had trodden on a fern-leaf. This is a cast of the tracks, the prints of the toes are beyond the leaf. In other specimens are:—1st. The deep print of a foot when the mud had been soft (cast) 2nd. The marks of the toes where the mud had been dry, with sun cracks (cast). 3rd. Prints of a fore and hind foot with rain prints (casts.) I might multiply examples from other sandstone slabs. These are all from localities which we may yet visit.

A BOTANICAL RAMBLE, ON THE SHORES OF LAKE HURON.

PAPER II.

The road across the plains runs parallel to the lake shore and about a quarter of a mile from it, the old road on the shore being very little used, owing to the heavy sand making travelling difficult. The present road leads across the farms at the junction of the high land with the low, hichw lies between the former and Lake Wawanash commonly called Mud Lake.

Mr. W's. fruit orchard and grounds form a lovely piece of quiet and secluded rural scenery. A few rods north of the road in a hollow is a piece of copse wood about twenty five yards in width stretching right across his farm, and containing a great variety of maple, willow and other trees, with a dense tangle of the red osier dogwood (*Cornus Stolonifera*), button bush (*Cephalanthus Occidentalis*), wild roses and swamp ferns. The road across this copse is built of logs and earth and raised some two or three feet to bring it to a level with the land on either side. The road crosses the Grand Trunk Railway after which we come into the orchard of many acres flanked on either side by long stretches of scrub oak extending half a mile on the east and several miles to the west, and on the farther side, between the orchard and the lake, another belt of oaks of several rods in width forming effectual wind-breaks on all sides. The house is directly in the centre of this orchard which consists of about fifteen hundred apple and pear trees, with strawberries, black and red raspberries and grape vines innumerable. As it is now noon we return with our host from a tour of the farm and partake of his hospitality, after which we all three start for our ramble.

And here I must explain that the plains, so called, are not blank, open space as the name would indicate. The sandy part, about a quarter of a mile in width, is pretty well covered with scrub oak, with openings here and there, in which were growing hazel bush-

es and a few huckleberries. In the Spring each of these openings is one mass of blue from the flowers of the Wild Lupine (*Lupinus perennis*), and yellow from those of the Hairy Puccoon (*Lithospermum hirtum*). In and around the swamp previously mentioned we found five species of solidago, five asters, two or three wild sunflowers, (*Helianthus*), several of the handsome poison sumach, (*Rhus venata*), one splendid specimen, the finest I ever saw and fit to grace the choicest grounds in the country, of the sweet vilburnum or sheep berry (*Viburnum lentago*), the branches bending beneath their load of fruit just changing color. On the sand openings were some fine specimens of the Liatris or button snakeroot with its compact round heads of blazing purple red flowers. Along the ditch edges we found quantities of Brunella vulgaris in very large specimens, with its somewhat pretty violet blue flowers; several fine specimens of Sassafras officinale; and in a clump of bushes the largest specimen of the sow thistle (*Sonchus aberaceus*), I have yet come across, fully seven feet in height, as if trying a race for supremacy with the willows around it.

After crossing a narrow strip of tangled willows, varying in width from one hundred yards to a quarter of a mile, we find ourselves on Lake Wawanash, which is about three miles in length, and from half a mile to two or more in width. Some forty years ago the writer's father paddled over it in a canoe, the water being about six feet in depth. It

remained so until about sixteen years ago, when it was drained into Lake Huron, being just enough above the level of the latter to allow of this being accomplished. Now it is being brought under cultivation, and almost in the centre of the area once occupied by the lake, several houses are seen, and young fruit orchards planted out. A considerable part of the lake (for although the water is now all gone it is still called the lake) is covered with marsh hay, and a goodly number of stacks dot the level plain. Far to the east can be seen the dense green of the cedar swamp, which grows on the eastern border of the lake, while on the south there stretches a heavy belt of timber, and on the north the strip of willows through which we have come.

On the lake we found some handsome plants of the Cardinal flower (*Lobelia cardinalis*), whose very large racemes of intense scarlet can be seen for quite a long distance. The pretty Closed Gentian (*Gentiana Andrewsii*) grows here in considerable quantities. It stands transplanting to the garden and is well worthy of cultivation. Some few plants of the Dodder (*Cuscuta*) were found but being small and somewhat imperfect, I was unable to ascertain the species.

Twining around the willow bushes which skirt the edge of the lake, is the wild bean (*Apivia tuberosa*). Being the first I had seen I was delighted with its pretty, scented, violet brown purplish flowers. With my trowel I dug some of the tuberous roots for home planting. Under the dissecting

lens the arrangement of the parts of the flower show wondrous beauty and will repay a careful dissection.

The common Snake Head (*Chelone glabra*) is found in small numbers, and a variety of other flowers, some of great beauty, and which through pressure of work I have not yet been able to classify. As we approach the west end of the lake, the ground becomes quite spongy sinking three or four inches under our feet at every step, and covered more or less with wild rose bushes, which circumstance makes travelling somewhat difficult. Here we find several plants of the Lady's Slipper (*Cypripedium*) which of course has long since been out of flower. I secure some roots of this and then on again.

From our first start on the lake we have been on the lookout for the Pitcher Plant or Huntsman's Cup (*Sarracenia purpurea*) which we knew had been found growing here. As this spongy ground is just the place where it is found we spread out and searched carefully for it and are at last rewarded for our labor, Mr. W. crying out—"Here it is!" We at once go to him and there are two plants, the first I have ever seen in their native home. It is a most singular plant with its pitcher-like leaves which, despite the drought that has been continuous for some weeks, are filled with water containing numerous drowned insects. After going a short distance farther on we found several more. As the sun is declining we turn our steps northwards towards the road, to gain which

we have to cross a piece of burned tamarac swamp, anything but a pleasant task; but used to such things in our rambles we do not hesitate.

When within a few rods of the road we find a spot some few yards in extent, bearing a number of the Grass of Parnassus (*Parnassia Caroliniana*), which is a handsome plant bearing a solitary white flower on a moderately tall stalk having one stem leaf ovate with a clasping base, and a cluster of leaves at the root. On the damp and low lying sand we find some of the St. John's Wort, (*Hypericum Canadense*) which produce a good number of deep yellow flowers. But for fear of wearying your readers I must hasten to a close.

Once more on the road which is a good one, with portfolio filled with floral treasures for the herbarium, pockets full of roots, and arms full of lady's slippers and pitcher plants, we are not long in reaching our starting place, where we once more partake of the hospitality of our friends. After such an appetizing walk, it may be assumed that we did ample justice to the excellent spread our hostess had waiting our return.

Bidding my friends good bye, I start for home, just as the sun is disappearing in the west and casting a halo of light over wood and field. Returning by the same road by which I went, I have a fine view of the fire as it rages in the woods of Frog Town, logs and stumps one mass of flame and tall trees burning to the very top, filling the air with smoke which hangs overhead like a

funeral pall. Aside from its destructiveness there is a grandeur and sublimity about a bush fire that makes such a scene thoroughly enjoyable. I reach home at nine, having spent a most pleasant day in nature's store house, which those given to kindred pursuits will most appreciate.

JOHN MORRISON, Jr.

Oban, Ontario.

PLANTS AND ANIMALS.

THE DIFFERENCE BETWEEN THEM.

[Forest and Stream]

The student of nature has to deal with some problems which seem to become more difficult of solution as the amount of knowledge bearing upon them is increased, or he may find, as frequently happens, that increased knowledge serves to show the incorrectness of a solution already arrived at. Both these statements may be made concerning the problem of drawing the line between the vegetable and animal kingdoms. A century ago this was thought to be a very easy matter, and all the living organisms known in that day were given a place in the one kingdom or the other, with very little doubt as to the correctness of the classification. But later observers have found that the standards of classification used by their predecessors were in some cases wrong, and quite a number of organisms relegated by them to one kingdom are now known by more scientific standards to belong to the other. But while the naturalists of to-day have thus shown the errors of those who lived before them, they have by no

means been able to solve the problem for themselves. The difficulties have become greater and greater, as, by the aid of better instruments of discovery and observation, new organisms have been brought to light. Indeed, it has been proposed by one of our ablest zoologists to form an intermediate kingdom in which may be placed all organisms of a doubtful character.

To a casual observer it might seem remarkable that this should be so difficult a matter. And it is true, that, in the case of the higher members of the two kingdoms, it is very easy to point out their difference. Take a horse and a tree, for example. One would hardly think of making a comparison between them, they are so unlike. In size and form, the first characteristics to strike the eye, there is no resemblance whatever. It might next be observed that the one moves about at will, has the power of locomotion, while the other remains fixed in one place. Then the horse is possessed with the organs of sense—can see, hear, feel, taste and smell, and has the power of performing other functions connected with the possession of a nervous system, thinking, remembering, etc.—while the tree is incapable of performing any of these functions. Again, the animal is provided with an internal cavity for the reception and digestion of solid food, while the food of the plant is wholly fluid or gaseous and is not received into an internal cavity. These are differences which are apparent to the most casual observer.

There are others which might be enumerated, such as differences in the chemical constituents of their bodies, differences in the food by which they are nourished, etc., but these we may pass as being beyond the reach of easy observation. But when we descend to the lower forms of life we cannot separate them by any of these distinctions. In the matter of size and form we find that many of the lower plants, either in the earlier stages of their existence or when grown up, are exactly similar in these respects to some of the lower animals. Some of the infusorians, for example, that is animals produced by placing some animal or vegetable substance in water and allowing it to stand for a day or two, very closely resemble some of the plants in the class *Algae*. The yeast plant is exactly like some of the forms of *Bacteria* in having a simple globular shape. Then there are many animals so plant-like in appearance as to be always popularly regarded as vegetables. This is the case with many of the hydroids which are often gathered and pressed as sea mosses by seaside visitors.

As regards the power of locomotion, the microscope has shown that it is by no means confined to the animal kingdom. Before the invention of this instrument no instances of voluntary movements were known in plants except the well-known facts that flowers open to the sun and close at the approach of night, that the leaves of sensitive plants droop when irritated and a few other phenomena of like nature; and now we know of many plants

which have the power, either when young or throughout life, of making movements apparently as voluntary and independent as those exhibited by the lower animals. In most cases these movements are brought about by means of little vibrating hairs called cilia, with which the whole or a part of the surface of the body is furnished. The protococcus, a plant which may commonly be found in the mud that collects in roof-gutters, in one stage of its existence possesses this kind of motile power. On the other hand there are many animals which do not have the power of locomotion, but spend their lives fixed to some solid object. This is the case with the corals and sea anemones, the latter often being spoken of as 'sea flowers.' Thus it is seen that no absolute distinction can be drawn between animals and plants on the ground of the presence or absence of independent locomotive power.

The presence of a nervous system cannot be made a basis of division, for very many of the lower animals are entirely devoid of nerve tissue. And we have no reason for believing that these creatures, being unprovided with a central nervous system, are possessed with any of the five senses, seeing, hearing, etc. It does seem, indeed, that they have a sense of touch, for they seem to be conscious of contact with other bodies, and the fact that they are able to distinguish between substances which are fit for food and those which are not, might argue the presence of something like a sense of

taste. But at all events, to the best of our knowledge they do not possess sense organs of a nature at all similar to those of the higher animals, and whatever reasons we have for believing them capable of touch or taste apply to some plants equally as well.

Neither does the possession of a body cavity form a dividing line between the two kingdoms, for many of the lower animals have no internal cavity and take in their food by surface organs just as plants do.

Thus we see that none of those differences so readily observed between the higher plants and animals serve as a means of separating the lower forms.

There are some other tests of a more delicate character than the above, but quite as interesting. If we examine plants and animals as to their chemical composition, we shall find that there are some decided though not universal differences. As a general rule, plants exhibit a decided predominance of what are known to chemists as "ternary compounds," that is compounds composed of three elements, carbon, hydrogen and oxygen. In animals on the other hand, the fourth element, nitrogen, is present. Still, in both kingdoms both nitrogenous and non-nitrogenous compounds are found, and it is only in the proportion that these bear to one another that animals differ from plants. The most characteristic of all compounds in plants is the one known as cellulose, a substance very similar to starch. In general, the presence of an

external covering of cellulose in any organism raises a strong presumption as to its vegetable nature. Still cellulose is not confined to plants. The outer covering of the so-called sea squirts (*Tunicata*) contains a large quantity of cellulose, and it has been found to be present in other lower forms. Another highly characteristic vegetable product is chlorophyll, the green coloring matter of plants. This was for a long time thought to be a certain test, but like the others there are a few cases in which it does not apply. On the one hand the *Hydra viridis*, an undoubted animal, contains chlorophyll, and on the other hand the yeast plant is devoid of it.

The test which, upon the whole, is the best means of determining whether a living organism is a plant or an animal is the nature of their food, and the products which are formed out of the food within the body. Plants subsist entirely upon dead, or inorganic substances, such as water, carbonic acid and ammonia; and they have the power of making out of these true organic substances, such as starch, cellulose, sugar, etc. Plants, therefore, take as food very simple bodies and manufacture them into much more complex substances. In the process of digestion they break up carbonic acid into the two elements of which it is composed, carbon and oxygen, keeping the carbon and setting free the oxygen. Animals on the other hand, have no power of living on dead or inorganic substances; they have no power of converting them into the complex or-

ganic substances of which their bodies are composed. On the contrary, they require to be supplied with ready-made organic compounds if their life is to be sustained. These they get in the first place from plants, and therefore animals are dependent upon plants for food, either directly or indirectly. Animals, therefore, differ from plants in requiring as food complex organic bodies which in digestion, they reduce to very much simpler inorganic bodies. While plants, then, are the great manufacturers in nature, animals are the great consumers. Another distinction arising from the nature of their food in that while plants decompose carbonic acid, keeping the carbon and setting free the oxygen, animals absorb oxygen and give out carbonic acid, so that their reaction upon the atmosphere is the reverse of that of plants.

It was long thought that these distinctions with reference to the nature of their food were sufficient to separate the two kingdoms; but it is now known that these rules, like all the others, have some exceptions. There are some fungi which, in the matter of food are animals; that is to say, they cannot live upon inorganic materials alone, but require ready-made products for their support. Again, recent discoveries have rendered it not unlikely that some of the lower animals have the power of acting as plants and of manufacturing organic compounds out of inorganic materials.

The present status of the question may be defined as follows: No per-

fect rule is known by which animals can be separated from plants, and recent discoveries point to the conclusion that there is no dividing line between the two kingdoms, but that they merge into each other. S.

John Hopkins University, Oct. 16, '84

THE ENGLISH SPARROW.

The fate of the European house sparrow, *Passer domesticus*, more widely known as the English sparrow, hangs in the balance. He has been in the hands of a committee of the American Union of Ornithologists, and this committee laid its report before the session at the American Museum of Natural History. The sparrow was entirely unrepresented on the committee, and the friends of the birds claim that the verdict of such a jury should be set aside. At any rate the sparrow may congratulate himself upon putting the committee to considerable trouble and expense. The report was presented by Dr. Holder of the American Museum of Natural History in a paper called "The Eligibility of the English Sparrow." He said the question was of enormous importance. Thousands of circulars asking for information on this question had been distributed, and answers had been received from all parts of the country, from California to Canada. Philadelphia was the centre of agitation against the sparrow, being almost solidly opposed to the bird.

The sparrow was introduced into Eastern cities in 1850. In ten years

it had spread through New England. Letters from South Atlantic States and the interior of Southern States state that the sparrow has not been seen there yet. From all the evidence in its possession the committee concludes that wherever the sparrow is found at a distance from thickly populated centres it has been involuntarily introduced. Upon its arrival in America the sparrow gained a reputation as an insect eater. It was considered the deadly foe of the measuring worm. The weight of the evidence in Dr. Holder's opinion, was that the sparrow was a nuisance, that its capacity for destruction was immense and that if it ever became as numerous in the west as it is in the east, the grain crops would suffer beyond calculation.

The report contained some contradictory evidence. Dr. Cooper of California wrote that "it is never seen to attack other birds, though it sometimes occupies their nests, thus crowding them out." Another wrote: "It is a canker-worm eater." Mr. Brewster wrote: "Markedly, repeatedly and with appalling rapidity, they are killing and driving away our native birds." Nicholas Pike of Brooklyn wrote: "Think it does not molest or drive away other birds, or injure fruit or shade trees. It eats spiders and larvæ of most insects and ichneumon flies. I know this from observation and dissection." Mr. Stewart of Havensack wrote: "I saw them destroy a crop of wheat." An English farmer wrote that sparrows ate a third of his crop of wheat.

One of the most alarming features of the case, Dr. Holder thought, was the rapidity with which sparrows increased. A sparrow will have six broods in a season, four or five in a brood.

"What do you mean by a season?" inquired Dr. Coues. "A year?"

"Warm weather," replied Dr. Holder. "The birds take a vacation during the winter."

"Some of our correspondents" continued Dr. Holder, "think some plan for killing them should be devised." He read a few of the plans suggested. In Philadelphia an attempt was made to deplete them by using them at shooting matches instead of pigeons, but this scheme fell through, as the average Philadelphia wing shot found it a difficult matter to hit a pigeon, and the sparrows took the matter in the light of a joke. Huge flocks of them made it a point to roost in the neighborhood of a pigeon match in order to see the fun. A western divine wrote that he had given the matter of sparrow extermination deep thought. It ought to be done with as little cruelty as possible, and he felt satisfied that a wholesale slaughter of a painless character could be accomplished with the aid of a steam fire engine. The committee was not in favor of advocating this scheme without a trial.

In Australia they tried poison. It killed a lot of sparrows. It also killed a lot of poultry and other valuable stock.

The committee felt satisfied that the sparrow should go, that there is no

room for it here and that the legislature of the various states should be requested to take the necessary steps for its extermination. At present it is protected by law in New York, Ohio, Vermont, Massachusetts, New Hampshire, New Jersey, the District of Columbia, Maine, Rhode Island, and Canada.

Dr. Holder said that the committee would like an extension of time to finish its report. The report as read was adopted; and it was then recommitted to the committee, which was given the power to finish it and to discharge itself with the unanimous thanks of the Union.—*Science Record*.

HISTORICAL.

OBSERVATORY HILL, H. M. DOCKYARD.

This very interesting glacial deposit has been removed, giving place to an extensive level flat which is intended for the enlargement of the drill ground. A considerable part of it was taken away by Vice-Admiral McClintock to fill up the old pond in the Dockyard. This operation afforded an admirable opportunity for the study of a representative glacial deposit. The removal of the remainder by the Intercolonial Railway authorities was for the filling of an extensive area at the deep sea terminus. Part of this area was granted by the Imperial Government, being a portion of the Dockyard. The quantity of enormous quartzite boulders scattered throughout the Hill from top to bottom was very large, necessitating constant and dangerous blasting and making the process of removal a dangerous

one. Among the quartzite boulders and in the coarse clay and sand which constituted the mass, there were abundance of Syenites, Diorites, Granites and Gneisses from the Archæan rocks of the Cobequid mountains and numerous Amygdaloid and Basaltic boulders from Blomidon and Partridge Island. I frequently visited the scene of operations, making a *memorial collection* for the Museum. The work of the removal was a formidable one. The panting of the powerful locomotive in its ascent of the steep incline with its heavy freight was frightful. The powers of nature performed the great work of transportation, doubtless, with infinitely greater ease and quietness.

I saw the last of it fall on Tuesday, Nov. 25, at 10 minutes before 4 o'clock, p.m., Railway time, when the obscured part of H.M. S. Northampton, which lay on the opposite side preparing for her departure for Bermuda, became visible.

D. HONEYMAN.

New Jersey people are excited over the reported discovery of the crater of an extinct volcano in the mountains near Orange, and the newspapers inform us that hundreds of visitors daily crowd around the interesting spot. The genuineness of the discovery is asserted upon the authority of State Geologist Cooke and other scientific men. The prevailing geological structure of that part of the Blue Ridge Range admits, however, of caves, and what are commonly called "sink-holes;" and if it were not for the corroboration of Professor Cooke, who enjoys a distinguish-

ed reputation in his department of science, the report would not be so readily believed as it is. The New England Society, comprising many of the foremost citizens of Orange, are arranging to obtain possession of the property on which this wonder is situated. Of course it will soon be settled whether it is really what the local scientists have taken it to be, or whether it is the more common "crater," as a Hibernian would call it, known as a humbug.—*Popular Science News.*

RAISING FERNS FROM SPORES.

It is commonly regarded as no easy thing to raise ferns from the spores, but an English gardener gives the following direction for doing it: Procure a good sized bell-glass, and an earthenware pan without any holes for drainage. Prepare a number of small pots, all filled for sowing; place them on the ground; water them well with boiling water to destroy all animal and vegetable life, and allow them to get perfectly cold; use a fine rose. Then taking each small pot separately, sow the spores on the surface, and label them; do this with the whole number, then place them in the pan under the bell-glass. This had better be done in a room, so that nothing foreign can grow inside. Having arranged the pots, and placed the glass over them, which should fit down upon the pan with ease, take a clean sponge, and tearing it up, pack the pieces round the outside of the glass, and touching the inner side of the pan all round. Water

it with cold boiled water, so that the sponge is saturated. Do this whenever required, and always use water that has been boiled. At the end of six weeks or so the prothallus will perhaps appear, certainly in a week or two more; perhaps from unseen circumstances not for three months. Slowly these will begin to show themselves as young ferns, and most interesting it is to watch the results. As the ferns are gradually increasing in size, pass a small piece of slate under the edge of the bell-glass to admit air, and do this by very careful degrees, allowing more and more air to reach them. Never water overhead until the seedlings are acclimatized, and have perfect form as ferns; and even then water at the edge of the pots. In due time carefully prick out, and the task so interesting to watch is performed.—*Popular Science News.*

may be seen by placing a crystal on a printed page, when two images of the letters will be seen.

Satin spar is a variety possessing a fibrous structure resembling satin. It usually occurs in veins running through other rocks. It takes a fine polish and is used for jewelry and other ornaments, although it does not wear well on account of its softness. *Chalk* is a form of this mineral produced from the shells of a minute animal called the Rhizopod. Vast deposits occur in many parts of the world, as in England and France, being sufficient in some cases to form mountains. The mineral is easily recognized by its white lustreless appearance and its softness. *Rock Milk* resembles chalk but is much softer. It is precipitated from water, holding lime in solution. In regions where the soil contains much lime the water is impregnated with the mineral, it being held in solution by carbonic acid in the water. When this water is exposed to the air the carbonic acid escapes and the carbonate of lime is deposited. When the water drips from the top of caverns the mineral is deposited in the form of icicles which are called *Stalactites*; at the bottom where the water strikes, cones are built up which are called stalagmites. Some of the finest deposits of this kind are seen in Lurey cave in Virginia.

When the water runs over irregular surfaces as moss, twigs, etc., it forms a cellular mass called *Calcareous tufa*. This generally has a gray or brown color. The massive, impure

Mineralogy.

PAPER V.

CALCITE (Calcium Carbonate.)

Calcite occurs in a great variety of forms and colors. It crystalizes very perfectly in the rhombohedral system, but produces many modifications of it. When the crystals are long and pointed, with six sides it is called *dog tooth spar*. The purest transparent variety is called *Iceland spar*, because first brought from Iceland. This is remarkable for double refraction, which

varieties of calcite are called *Limestone*. They occur in vast beds or veins. The colors are various running from light yellow and gray to black. Limestone is one of the most important building stones in nearly every country, having been used for this purpose from the earliest times. When burned carbonic acid escapes and the common quick lime is formed which is so much used for making mortar, etc.

Marble is a compact fine grained limestone which will take a high polish. The colors are various, some times being arranged in irregular veins and blotches. The most highly valued is the pure white, which is used for statuary. Black marble owes its color to carbonaceous matter.

Limestone owes its origin almost entirely to the accumulation and wear of shells, corals and other calcareous remains of sea animals. In many cases the form of the shells etc., can be easily seen in the stone. In fact the limestones of the world are among the best books from which the geologist reads the history of the animal life of past ages. Marble was formed from limestone by a more or less complete metamorphic action.

All the varieties of calcite may be distinguished by their brisk effervescence with acids, and by the ease with which they are scratched with a knife. The crystallized varieties possess very easy and distinct cleavage.

CRITICAL NOTES.

BY MONTAGUE CHAMBERLAIN.

Every Canadian who is at all interested in the study of our birds, must find a source of gratification in the ornithological papers which appear in the columns of this journal, giving the marked evidence, as they most assuredly do, of an increased attention to this branch of Natural History, and an increased intimacy with the literature and technicalities of the subject; for, though we must blush to own it, yet candor compels us to admit that we are very far behind our American cousins in this study, and, indeed the individuals on this side the border, who are not in absolute ignorance of all but a few familiar species of our birds are extremely few. This should not be, and the CANADIAN SCIENCE MONTHLY deserves much credit for its efforts to remedy the defect.

The head of this Department in the Postal College evince much enthusiasm in his work, and a wide knowledge of the several divisions of the science, yet it may be questioned if he has not gone the wrong way to work to gain the attention and win the following of the uninitiated, by presenting at the outset, an array of the most repellant and uninteresting portion of the study and dry technicalities which might better have been left for the concluding lessons, it being obvious that there is little to be gained by attempting to teach the classification of the higher groups to one who knows nothing of the species.

This is a common mistake with teachers of science, and through this method these studies have lost many an otherwise enthusiastic adherent; and laymen generally have been led to consider that these technicalities are the all-important parts of a science and have been repelled from a study of it by the repulsive looking names and phrases offered them by way of introduction. If teachers would begin with lessons on the birds and their habits, when students desire to arrange in systematic order the species with which they have become acquainted, the need of these technicalities, as conveniences, will impart an interest to them, and dispel much of their apparent repulsiveness.

There is a statement in the article on the Thrush family too glaringly erroneous to stand unchallenged; for these papers are of no value whatever if not correct; they must not be misleading to those whom they are designed to instruct.

Moreover in days gone by Canadian ornithologists have gained, and most deservedly, a reputation for being unreliable and of writing little which was worthy of attention; and the present generation should strive to redeem themselves from this charge, which will require exceptional care to accomplish.

In his article on the Thrushes Mr. Seton embraces the Wood Thrush among those species which he says are common throughout Canada. Now unquestionably, the Wood Thrush is

common in southern Ontario, and is found in the Province of Quebec from Montreal west and south; but it has not been taken in the north-eastern districts of Quebec nor in any of the Maritime Provinces, hence to state that it is common throughout Canada is misleading.

It is not pleasant to think one runs the chance of being considered a grumbler but I feel constrained to point out what appears to be an error in Professor Wilson's article in this magazine for March, 1884. I refer to his recommendation of Samuel's 'Birds of New England' as a standard text-book. This work on a whole is *not reliable*, and should not be placed in the hands of a beginner. There is a great deal in it that is authentic, and of the very best, especially the lengthened quotations from Baird and Wilson; but mingled with these are so many mischievous blunders that the book is dangerous to any but a well-informed student.

The other books mentioned by Professor Wilson are the best standard works now in use, but he failed to give title of the book which is generally considered the very best text-book for young students. I refer to "New England Bird-life," edited by Dr. Elliott Coues and published by Lee & Shepard. In the two handy volumes in which this work is issued, the beginner may obtain at a small cost all he is likely to make use of for, at least two years. After he has become thoroughly acquainted with all this book

can teach him of the birds of his neighborhood and has the field experience which should accompany the theory ; when he can describe the change of plumage of each species, can recognize their songs, their calls and alarm notes ; when he has marked the dates of their arrival and departure, and knows where each locates its nest, and in what manner, and of what material it is constructed,—after he has gained all this knowledge, should he desire to trace the geographical distribution of these species, and study the birds of the entire continent, then he should turn to these larger works.

Coues' 'Key to North American Birds' is almost invaluable to a student, and Baird, Brewer and Ridgeway's 'History of North American Birds' is undoubtedly the best standard work yet published, though unfortunately, so expensive as to be out of the reach of the average student.

THE ART OF SEEING.

In everyday life it is much more important to be an accurate observer than a mere book-learner. I have frequently seen the latter made to blush for her deficiencies by the most unlearned, says a correspondent in an English contemporary, for in a contest between eyes and no eyes, eyes have generally the best of it. Nature has given us such an inexhaustible store of interest that those who go through life "without seeing" lose much of the zest of it. The savage, who necessarily depends upon his keen eye and quick ear, cultivates those faculties in an extraordinary de-

gree ; for does he not see indications and hear sounds which to an unpracticed observer would be unintelligible? So also with all persons who live near the heart of nature. The English shepherd, while perhaps ignorant of the very formation of the alphabet stores up a fund of interesting knowledge, derived entirely from observation.

He can give simple, interesting astronomical facts which might astonish a scientist, as well as trustworthy information on natural history and even botany. His pursuits lead him to study nature in all its varied phases; it is in this way that he can tell you that the arrival of the swallow may be expected on the 11th of April and not later than the 14th. He will tell you the best time for noticing the flight of birds, and that nearly every bird has a different manner of flying, and that each has wings adapted to its different habits ; for instance those like the swallow, who catch their food while in the air, have long pointed wings, while rounded, short wings, are only for birds who have slow and short flight. He will also tell you how the tiny pimpernel warns him to house his lambs by closing tightly its petals on the slightest indication of rain ; and thousands of other simple facts which to a student of nature are most interesting.

Thus, one may possess everything in the way of scholarship, but if he or she have that alone, those who are unlearned but observing will often make them feel very small. I would therefore urge my readers to cultivate the

art of seeing and observing ; there is nothing like seeing things for ourselves. Our ideas become fresher, more natural, and more in unison with latter day taste when they are formed from observation. Nature's book is the one wherein we find the richest the most varied, and the most inexhaustible subjects for thought. Whole pages of lessons may be learned from the very stones we walk on, and the most insignificant of God's creation possesses an interest unknown to those who go through life without "seeing."
 —*Scientific American.*

One impulse from a vernal wood
 May teach you more of man,
 Of moral evil and of good,
 Than all the sages can.

—*Wordsworth.*

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OUR readers will please remember, that we are always glad to receive original contributions to our columns.

We publish with pleasure the communication appearing in another column suggesting the publication of names of members of the C. P. C. and the formation of local clubs. We heartily approve of the latter and should be glad to do the former if thought desirable. Let us have expression of opinion from other members.

BEFORE the next number of the MONTHLY appears we shall have ready for circulation the announcements of the C. P. C. We expected to have this ready whole months ago but the delay has been owing to the same cause that retards the publication of the MONTHLY. Copies for distribution will be sent to every member of the College. Should more be desired they can be obtained by addressing us a postal card.

Correspondence.

What is the Natural History of the snow flea? Also of a rough caterpillar, ends red and middle black, found on the snow (travelling) in March?

JOHN MOSER.

DIORITE-PORPHYRY.

I have just examined a fine section of a Diorite-porphry boulder prepared by Rev. Father Kavanagh, S. T., Quebec. He made it from a boulder picked up at Point Pleasant, in a section of glacial drift; it came from the Cobequid Mountains. The ground mass is composed of Plagioclase (Oligoclase) and amphibole with numerous grains of magnetite. Its crystals are beautifully pleochroic banded and lined. In the crystals are included grains of magnetite. The dichroism of the hornblende is very distinct. This associated with the trichroism of small twin crystals of oligoclase throughout makes the ground mass appear very beautiful with the turning of the polarizer. The opacite is seen in the microscope by reflected light to be magnetite. D. HONEYMAN.

Prov. Museum, Nov. 25.

A Late Northern Record of the Hermit Thrush, *Turdus Pallasi*

On the 14th of November, 1884, Mr. Napoleon A. Comeau shot a Hermit Thrush at his home at Godbout on the north shore of the St. Lawrence, near the Gulf.

C. HART MERRIAM.

OBAN, ONT., Oct. 23rd, 1884

A. J. PINEO,—

Dear Sir.—I am more strongly impressed the more I think of it, with the good which I feel satisfied the C. P. College is going to do to its members. Anthony Trollope once said the hardest thing in the world for a

man to do was to think, and I believe he was about right, for to think well requires some training, else the brain refuses to obey the calls made upon it, and wanders away on every trifle much the same as a lazy boy lets every trifle draw him from his duty.

By pursuing the course of study laid down by an efficient staff of Directors, many of us who are debarred from taking a college course, are enabled thus to pursue a series of scientific studies which not only awakens within the student a desire to wrest from nature some of her many secrets, but also gives to the mind that much to be desired training, which will teach it to think in a given line, and also to observe the curious things in nature, so that we may truly find—

“Tongues in the trees, books in the running brooks,
Sermons in stones, and good in everything.”

I consider it the duty of every member to study how the interests of our Club may be furthered and made more efficient towards the end for which it was organized. Every member I trust is a subscriber to your valuable journal, the C. S. Monthly, and any who are not certainly ought to be, for it is clear, terse and earnest in its devotion to the interests of the College. Now Mr. Editor, I have thought that if you would give through the columns of the Monthly a complete list of the names and post office addresses of the members of the College, it would serve a double purpose:—First, by knowing in our im-

mediate vicinity, who are fellow members, we would be able to unite ourselves into local clubs with similar interests, and instead of going on our field excursions alone we could unite on given days in different places, and the collections thus made of the flora and fauna of any neighborhood, would form a valuable addition to the scientific knowledge of the country; it would likewise promote a healthy rivalry among the members, and thus be an instrument for promoting scientific knowledge which sooner or later would be a power making itself felt all over the land.

Second. The names, addresses etc., of all club members given in one or two numbers of the MONTHLY, would prove valuable for many reasons, among which I may mention a few. A better and speedier way of making exchanges than now in use. On writing to any person in a locality from which specimens were wanted if the individual addressed should not be able to himself exchange in that branch he would know some one in the local club who could do so and thus facilitate the work. Or if a member was going to any place, an entire stranger, on scientific work intent, he would thus have some one to refer to who could direct him to the best field for operations, in whatever branch he wanted to work, and as kindred work makes all the world akin, I am satisfied any member of our association would receive a hearty greeting from his brother members wherever he might go.

Enough for this time, however, and trusting that my suggestions may be of some value to the Club, I will close by wishing success to it and the C. S. MONTHLY.

Respectfully,

JOHN MORRISON

The works of God are fair for naught,
Unless are eyes in seeing,
See hidden in the thing the thought,
That animates its being.

Contemporary Journals.

SCIENCE. Nov. 14. Importance of Chemistry in biology and medicine; Navigation of the Nile; A Mussleman propaganda.—Nov. 21. Marriage law in savagery; Late news from the north-west; The flora of the higher Alps.—Nov. 28. The 'pororoca,' or bore of the Amazon; Exploration of Putnam River Alaska. New England Orchids.

PROBLEMS OF NATURE.—Nov. 1. Origin of species, Chap. VII. The Milliporidae, The 'comma shaped bacillus,' alleged to be the origin of cholera.

NATURALIST'S WORLD.—Nov. The house-fly. Notes on the distribution of the land and fresh-water molluscs in Sussex. One of nature's balance weights, Lowly forms of life

FUILLE DE JEUNES NATURALISTS, Nov.—Anatomie d'une chenille de papillon diurne, Le monde des fourmis.

CANADIAN ENTOMOLOGIST.—Oct.—Meeting of the Entomological Club of Am. Assn. for advancement of science (continued.) Coleoptera in Sept. on Brigantine Beach, N. J. The Melshimer family and the Melshimer collection. Notes on mallophaga epedicleadae.

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A description of bric-a-brac hunting in England and France, by Mrs. Lucy C. Lillie, sketches of Italian life, by Mrs. Launt Thompson, an account of the Pioneers of Tennessee, by "Edmund Kirke," an article on the Premier of Canada (Sir John Macdonald), a narrative of the experiences of a Steerage Passenger to and from Liverpool, by Thomas Wharton, an article on Queen Anne, or Free Classic Architecture, by George C. Mason, jr., and a comedy or private theatricals, by James Payn, will be published in early numbers together with the usual variety of short stories and articles of general interest by popular writers.

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