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VOL. IX, No. 4.

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THE OTTAWA NATURALIST.

VOL. IX. OTTAWA, JULY, 1895. No. 4

CILIA.

By PROFESSOR EDWARD E. PRINCE, Dominion Commissioner of Fisheries, Ottawa.

Anyone who has watched the minute organisms, seen in a drop of pond-water under the microscope, must have been struck by the extremely active motions of many of them. Simple in structure, and destitute of limbs, they rush across at a furious rate, or glide smoothly and swiftly in serpentine fashion, or spin round and round in endless gyrations. How are these astonishing movements produced? They are due to cilia, the simplest and most insignificant of all organs of locomotion. These organs are widespread in the animal kingdom, though, curiously enough the Arthropods, that large class of animals embracing crustaceans, insects, spiders, centipedes, etc., do not possess them, so far as naturalists have been able to ascertain. As a rule they are very small and abundantly scattered, but they may be few and of considerable length, when they are then distinguished as flagella, not cilia. A flagellum and a cilium are, however, structurally and functionally the same. Flagella occur in plants as well as in animals, and the spores of some algae are so active, when swimming about, that they may be readily mistaken for minute infusorian animalculæ. Certain bacilli, too, possess one or more flagella, and like the Monads, the lowliest of all animal organisms, are able to progress with considerable speed. *Noctiluca* is a remarkable flagellate animal, like a small particle of jelly. It swims through the water by means of its lashing flagellum, and it often occurs in such countless myriads at the surface of the sea, that being phosphorescent and able to admit light, the waves are brilliantly illuminated over considerable areas. In contrast to *Noctiluca*, we find that in *Paramœcium*, the commonest of ciliated infusorians, minute cilia occur thickly all over the surface of the body,

and extend even into the funnel-shaped mouth. *Noctiluca* is a good example of a flagellate creature. *Paramœcium* is a type of a ciliated animalcule. In the latter the cilia serve not only to drive the creature about, they carry food into its mouth. They perform this latter function also in the bell shaped *Vorticella*, and in *Stentor*, the trumpet animalcule. These microscopic animals are rooted by a stalk, and the circle of cilia, around the mouth-opening, sweeps in floating particles of food. When *Vorticella* becomes detached the cilia, at once, carry it swiftly about from point to point. Cilia, again, are chiefly food-carriers in those lowly animal forms, the sponges. The substance of a sponge is traversed by channels provided with waving cilia. While carrying in food and aiding nutrition the cilia assist in respiration by maintaining a constant circulation of water. Nutrition and respiration are also accomplished in aquatic mollusca by means of cilia. The river mussels, for example, inhale constant streams of water. These streams are produced by the countless cilia, with which the gills are covered. If a fragment of a gill be torn off the cilia immediately carry it through the water most vigorously. The intestine in these molluscs is also ciliated, and in the pond snails the tentacles and various parts of the body are richly so. Again, among the zoophytes cilia though present are of inferior importance. They stud the crown of tentacles and line the digestive tract, just as they do in certain worms, notably the tube-building species. In such marine annelids as *Terebella*, the gills, cirri, and tentacles, which form a crown around the head of the animal, are ciliated and it has been observed that, when the tube is being built, particles of sand and mud are driven along the tentacles to the protrusible proboscis by means of these cilia. The branchial cilia aid in respiration.

While some worms are non-ciliated, others are so abundantly clothed with them, that the surface of the body exhibits a constant shimmering appearance. Certain ciliated patches subserve sensory functions, such as smell, etc., but the excretory or "segmental" organs, characteristic of the Vermes, always possess a ciliated canal for ensuring the outflow of waste products. The digestive tube also in these creatures is observed to be lined with cilia, in most cases.

Important, however, as cilia are, in adult stages of the animals referred to, they are not of inferior importance to the newly hatched young. Sponges, starfishes, zoophytes, jellyfish, worms, etc., pass through a ciliated larval condition, with rare exceptions, and the cilia as in the active Infusorians aid in progressive locomotion.

It might appear that in the highest animals, provided with special limbs for locomotion and with complicated respiratory and digestive organs, there is no necessity for cilia. It is not so. They are often of importance in the Vertebrates, although sometimes they may be found to persist, when the necessity for them has apparently gone. Thus Amphioxus, the lowest of fishes, possesses a ciliated skin, in the young condition. Larval lampreys, too, exhibit delicate hairs upon the external integument, a remnant no doubt of the ciliated condition, though the hairs are now rigid. The usefulness of such cilia and bristles is difficult to discover. Similarly, the cilia which line the gullet in newly-hatched fishes, such as the haddock, have no doubt merely an ancestral meaning. No food passes down the gullet, for the creature is mouthless and subsists by absorbing the contents of the yolk-sac. The cilia soon disappear, though in many Vertebrates, such as the the frog, the mouth, throat, air-passages, stomach, etc., are ciliated through life. Nor are they absent from the highest animals, but even in man, they occur in the nasal passages, the respiratory tubes, certain auditory canals, the secretory ducts in the tongue and many organs, the ovarian passages, and other cavities; but their use now appears mainly to be the expulsion of matters hurtful to the sensitive epithelial surfaces referred to. The central canal in the human spinal cord is lined by ciliated cells in childhood, but these cells are obliterated later. We thus see how important is the part played by these minute and insignificant organs. They are efficient for locomotion, they aid in securing food, they assist in excretion, they act protectively by driving hurtful matters away.

It remains to briefly describe cilia and their mode of action. A cilium is simply a thread like continuation of the protoplasmic cell to which it is attached. Its base, under the highest microscopic powers, differs optically from the tip; but practically the cilium is merely a

thread of undifferentiated protoplasm. From the surface of a cell there may project one to fifty cilia. This surface may appear like a hyaline layer, but it is a false appearance, and is due to the swollen bases of the cilia. Each cilium, indeed, is enlarged at its base, but narrows immediately above. This narrow neck is succeeded by a swollen portion which gradually becomes attenuated towards the tip. They vary in length, those 1-3000th of an inch long being of medium size, some are shorter, others longer. Vigorous lashing movements are characteristic of cilia. The movements are too rapid to be distinctly seen, the vibrations being usually 700 to 800 per minute.

If a fragment of the ciliated lining, say the mucous membrane from the roof of a frog's mouth, be microscopically examined in normal salt solution, the surface shows an unceasing shimmering appearance, comparable to a rapidly waving field of barley. Each cilium, it has been found, is erect and straight. Then it bends rapidly on itself, and, very much more slowly, resumes the straight condition. The force of the vibrations is in one direction, and as successive rows of cilia do not bend simultaneously, but in regular succession, the result is a progressive rythmic undulation. When the cilia are arranged in a circle or crown, as in a Rotifer, say *Melicerta*, the appearance produced is that of a swiftly rotating wheel. Hence the Rotifers have been erroneously called wheel-animalcules.

The vibrations of the cilia continue for some time after death : but, in an injured, feeble, or dying condition, they are abnormally slow, and can then be best observed. Heat (up to 104° F.) increases their vigour, carbonic acid gas arrests them, while under the influence of oxygen, and of induced electrical currents, the vibrations may be repeatedly revived. They are independent of nervous control. They are automatic and as inexplicable as the inherent contractibility of muscle. Ranvier's experiments, indeed, show that the living protoplasm, of which cilia are composed, is essentially the same as that of ordinary protoplasmic cells.

ACETYLENE, THE NEW ILLUMINANT.

By HENRY S. MARSH, A.I.C.,

Assistant Chemist, Central Experimental Farm.

The value of Acetylene as an illuminating gas is perhaps one of the most important questions amongst the many at present being discussed by those concerned in the lighting of our houses and thoroughfares.

The preparation of Acetylene gas by the action of water on the "carbides" has been known for some fifty years, but probably owing to our ignorance of the valuable properties of this gas, or the difficulty in obtaining it pure and in quantity, Acetylene as an illuminant was practically unnoticed until 1892. In that year, Maquenne prepared it by heating together, at a high temperature, barium carbonate, magnesium and charcoal, the resulting product when treated with water yielding the gas Acetylene. In 1893, Travers obtained Acetylene from calcium carbide, prepared by strongly heating together calcium chloride, charcoal and sodium, in a similar manner to that already referred to. The product, calcium carbide, evolves Acetylene when treated with water. (Proc. Chem. Soc., 1893.)

These results, however, while valuable and interesting as scientific records, were of little commercial importance, owing to the expense necessary in obtaining the materials of manufacture.

The possibility of producing Acetylene on a large scale and at a reasonable cost, by the process discovered by Wilson, has within the past year been demonstrated by scientists and experts in both England and America. Mr. T. L. Wilson made his discovery by chance, as is very often the case. While aiming at the attainment of an entirely different object, Mr. Wilson experimenting in his laboratory at Spray, North Carolina, U.S.A. (Jour. Soc. Chem. Industry, Jan. 1895), obtained after one of his fusions, a black, brittle mass, which on being brought into contact with water, rapidly effervesced with evolution of Acetylene. On further investigation, he came to the conclusion that the brittle, black mass was calcium carbide. It had been produced by fusing together finely powdered lime and coke in an electric furnace

with a current of 4,000 to 5,000 ampères. The equation which represents the action of water on this product, is as follows :—

$$CaC_2 + H_2O = C_2H_2 + CaO.$$

Caicium carbide + water = acetylene + calcium oxide.

Calcium carbide (CaC_2) is a dark gray, very brittle, porous-looking substance with a Sp. gr. of 2·22 at 18 degrees Centigrade. It contains 62·5 per cent. of calcium and 37·5 per cent. of carbon. On being brought into contact with water, as above stated, a double decomposition takes place, the calcium of the "carbide" combining with the oxygen of the water to form calcium oxide, or, to speak more correctly, owing to excess of water present, slaked lime; the carbon at the same time uniting with the hydrogen of the water to form Acetylene (C_2H_2), which is readily recognized by its penetrating odour, closely resembling garlic.

Acetylene is a colourless gas having a Specific gravity of 0·91 at normal temperature and pressure: 1 1 volumes of the gas are soluble in one volume of water. The gas when inhaled possesses the same poisonous properties as carbon monoxide, but to a greater extent. Prof. Vivian B. Lewes, of London, England, in a paper read before the Society of Arts, says that, "owing to the intense richness of Acetylene, it can only be consumed in small, flat flame burners, but under these conditions emits a light greater than that given by any other known gas; its illuminating value, calculated to a consumption of 5 cubic feet an hour, being no less than 24^ candles."

It may be liquified (according to Andsell) at a pressure of 21·5 atmospheres at zero centigrade. This property suggested to some the probable use of liquid Acetylene for portable lamps, lighting of railway carriages, etc., since thus a large volume of the gas can be stored in a very small space. It has, however, been pointed out that a sudden shock to the liquid or compressed gas frequently causes decomposition with violence. Hence, this use of Acetylene would probably be attended with danger. The carbide of calcium might be used for the purposes just referred to without any such risk, and consequently has been proposed as a convenient and cheap form to be used where liquid Acetylene would be desirable on the grounds of portability. Specially designed

lamps might be easily constructed for the production of Acetylene directly from the carbide. The latter, for railway work, could be stored in steel cylinders (the same in which oil gas in the Pintsch system at present is compressed), and by a self-adjusting stopcock the water could be brought in contact with the carbide, thus evolving the gas steadily, and illuminating the cars with a white, cool flame. The same principle, with minor alterations in detail, has been suggested with regard to "acetylene lamps" for use where other gas could not be obtained, such as country houses, etc. Such lamps would contain the carbide in the stand or pedestal, and the water simply be allowed to drop on to it. The gas so liberated could be burned from a small steatite "hole" burner. Another novel suggestion is its use for bicycle lamps and for camp lights. However, the chief use of the gas would be in enriching water gas or low grade coal gas, for which, providing its poisonous qualities did not disqualify it, Acetylene would prove of the greatest value.

We have not as yet any precise data as to the cost of calcium carbide, although some authorities have stated its price at about $15 to $20 per ton, and experiments carried out on a practical working scale have shown that one ton of the carbide yields on the mere addition of water between 10,000 and 11,000 cubic feet of Acetylene. At the same time, about 1,500 pounds of lime are produced, a material of some value in gas works.

A consideration of the marvellous illuminating power of this gas together with its simple and cheap production, leaves very little doubt but that its manufacture bids fair to become a very formidable rival of the foremost gas enrichment processes now in practice.

OTTAWA PHYLLOPODS.

By ANDREW HALKETT.

Two years ago, when examining a shallow pool near New Edinburgh, I saw some transparent little creatures actively swimming about. Were they the larvæ of some insect? I caught a number of specimens and on placing them in a glass jar and observing their structure and movements, set about determining what they were, as they were quite new

to me. Probably few Ottawa naturalists have had the opportunity of studying these wonderful little creatures, and I venture, therefore, to present a few notes on their structure and peculiarities.

They are crustaceans, of the order Phyllopoda, sub order Branchiopoda. The body, which is of a glassy transparency, is about half an inch long, the head being very distinct, though there is no line of demarcation between the thorax and abdomen. The eyes, antennæ, limbs, heart and forked tail, when examined through the microscope, are very beautiful. They are typical Entomostraca, for the body is divided up into segments. The anterior antennæ are short and delicate and difficult to distinguish. In the male the head is large, broad, and the posterior antennæ are converted into claspers, having the base very thick and massive, while the tip is knobbed or rather hooked. The eyes are very remarkable and quite unlike any other crustacean, so low in zoological position. Carl Gegenbaur, in his "Elements of Comparative Anatomy," draws special attention to the unusually interesting character of the eyes. The Entomostraca, as a rule, possess very simple eye spots, but in the Phyllopods, as Gegenbaur states, "we meet with a facetting of the inner surface of the cuticle covering the eye, the facets corresponding to the crystalline cones." The German anatomist further points out "by their power of movement, and their position immediately below the chitinous carapace the eyes of the Branchiopoda form an intermediate step towards those in which the chitinous carapace takes a more direct share in forming the optic organ." Further, the position of the eye, on a stalk-like process (in *Artemia* and *Branchipus*) presents a point of affinity to the higher crustaceans, such as lobsters, crabs, etc., which possess projecting stalked eyes.

The last segments of the body form a long slender tail, the terminal fork being exquisite in appearance, for under the microscope it is like burnished gold, and studded with innumerable glassy hairs. In front of the tail, the body is furnished with a large number of limbs, so modified as to perform the double function of locomotion and respiration. They are virtually gill feet. The heart is a long tube, made up of a series of chambers, and, as is usual in Arthropods, it is dorsal. The circulation of the blood, driven by this pulsating heart tube in the

back, can be watched through the microscope. A number of specimens were seen to be provided with a pouch immediately behind the limbs. These were females. This pouch is continually swayed about from side to side, and contains opaque, globular eggs. From these eggs minute creatures, like small mites, emerge in the nauplius or larval condition. As the shallow pools inhabited by these creatures are liable to dry up, the eggs which drop to the bottom possess amazing vitality. They can endure heat and dryness for long periods; but the young hatch out immediately the ponds are filled by a rainfall. I have reason to know this, for the pond from which I obtained the Phyllopods in 1893 was, soon after, dried up. I waited patiently for a year and again visited the spot, but could obtain none. The pond was dried up, and if any Phyllopods had hatched out they had wholly disappeared. On Good Friday, this year, I went to the place and found the water cold and icy, so that there were few forms of life visible, and no sign of the beautiful creatures I was looking for. Eight days later, however, I went again. It was evening and the water was warm. They had now appeared in abundance, and were swimming about in shoals, like tiny minnows. They dart away when startled just as a fish does, but soon tire and are readily captured. Several visits to the pond enabled me to take a great number, sufficient for purposes of study; but the pond soon dried up, and no more were to be had. They glide about in a vessel of water and are never for a moment still. If noticed closely, they are seen to swim back downward with the numerous feet turned towards the surface of the water. No creatures could be imagined more active, delicate and graceful in their movements. Their structure and peculiar habits of life and development are of the highest interest, and they appear to be extremely local in their occurrence.

A closely related species is *Artemia* the Brine Shrimp which lives in saline waters such as Great Salt Lake. Packard tells us that a Russian naturalist found by experiment that it was possible to convert the Brine Shrimp *Artemia* into the fresh-water *Branchipus* by reducing the salty character of the water. This experiment has been much questioned, and it must be granted that such an alleged conversion of one species into another is astonishing. At any rate Phyllopods in their habits and breeding are unquestionably most remarkable creatures.

In conclusion I wish to express my indebtedness to Professor Prince Dominion Commissioner of Fisheries, for suggestions in making these notes upon this interesting crustacean.

NOTES, REVIEWS, AND COMMENTS.

RECENT GEOLOGICAL PUBLICATIONS.

1. TAYLOR, FRANK B.—*Niagara and the Great Lakes*, Amer. J. Sc. and Arts, Vol. XLIX., 3rd Ser., No. 292, New Haven, April 1895, pp. 249 270.
2. BEECHER, CHAS E.—*Structure and Appendages of Trinucleus*, ibid. pp. 307-311, Pl. III.
3. CHALMERS, ROBERT.—*On the Glacial Lake St. Lawrence of Professor Warren Upham's*, ibid., pp. 273-275.
4. WRIGHT, G. FREDERICK.—*Observations upon the Glacial Phenomena of Newfoundland, Labrador and Southern Greenland*, ibid., pp. 86-94.
5. WILLIAMS, H. S.—*On the Recurrence of Devonian Fossils in Strata of Carboniferous Age*, ibid., pp. 94-101.
6. COLEMAN, A. P., PH. D., etc.—*Intholite from Elzevir*, Ontario, Amer. J. Sc. and Arts, Vol. XLVIII., 3rd Ser., No. 286, New Haven, Oct. 1894, pp. 281-283.
7. DANA, JAMES D. *Manual of Geology*, 4th edition, New York, 1895. 1,088 pages; contains 1,574 illustrations besides two geological maps.
8. HOFFMANN, G. C.—*Chemical Contributions*, etc. Geological Survey of Canada, Part Annual Report V., Ottawa, 1895. Contains a large amount of valuable information on the geological resources of all the Provinces of Canada and especially of British Columbia.

Entomology.—UNUSUAL ABUNDANCE OF MELOID LARVÆ.—On Saturday afternoon, June 8th, near the steps leading down to the Canoe Club House at Rockliffe Park, my attention was caught by a number of small bees which were busy upon the blue flowers of a Cynoglossum. These bees belonged to a common species, *Halictus discus*, which is black, with white bands upon the abdomen, and somewhat fulvous pubescence on the legs and thorax. The individuals which had attracted my attention, however, had apparently a bright rufescent or orange thorax, and I recognized immediately that they were carrying, albeit unwillingly, numerous little larvæ, which are known as triunguins, the first stage in the life of blister-beetles. Continuing my stroll along the river road eastward, I found that around every plant in bloom, and especially around the abundant clumps of raspberry, the swarming bees carried their load of the little active larvæ. The bee

already mentioned was the most abundant and also the most generally infested; there did not seem to be an individual exempted. Several other species, however, had more or less adherents, those most conspicuous being *Prosopis affinis* and *Ceratina dupla*. Several infested individuals of a small wasp—*Odynerus albophaleratus*—were also observed. On the other hand, some species of bees seemed to be exempt. Honey-bees—*Apis mellifica*—were very numerous about the raspberries, but I could not find that one of these carried a larva, and this was also the case with the large *Andrena nivalis*, which was abundant. A careful examination of the flowering plants disclosed only a few of the larvæ crawling about the blossoms, but the number carried by the bees was quite extraordinary. The larva lurks upon the blossom until a bee visits it, and then crawling actively upon the unfortunate pilferer of sweets, clings firmly to its thorax. It is a slender little thing, orange-red in colour, except the black eyes, and somewhat pediculus-like in shape. The legs are long and provided with long claws, and these enable the larva to obtain a firm hold upon the hairs with which the bees are more or less clothed, and it is then transported to the cells constructed by the host for its own future brood, and therein finding suitable provision, lives as a parasite, and undergoes interesting changes before it appears as a beetle, the name of which I cannot give, for, although I have often taken them, my knowledge of these larvæ is too scanty for a determination of the species. The larvæ, as stated, attach themselves about the thorax of the bee, and so numerous were they upon this occasion that they seriously embarrassed the flight of their unwilling hosts. Numerous bees could be seen dropping upon the foliage and endeavoring to comb off with their legs the undesired swarm, but in vain, so tightly did the intruders cling. Above and below they clustered, at the base of the wings and among the legs, clinging to the hairs of the bee or to one another. My estimate of the number carried by each individual of *Halictus discus* was between 40 and 50, and to verify this I collected four individuals not more conspicuously burdened than their neighbors. One of these I have pinned in my collection with the swarm upon it, and the remaining three were found to carry 165 larvæ, or an average of 55 for each bee. When we take into account the hundreds, indeed I may say thousands, of these bees which were similarly infested, we will get some idea of the immense number of the larvæ which had developed in the limited area examined.

W. H. H.

EREBIA DISCOIDALIS, Kirby.—Some years ago a few specimens of this very rare arctic butterfly were taken at Sudbury, Ont., by Mr. J. D. Evans, on 12th May. Ever since that time the leaders of the Entomological branch have made great efforts to obtain eggs of this species so as to breed the larvæ through their different stages, to record the life history, and to describe the appearance of the young caterpillars. Although known to occur in comparative abundance at Calgary, N. W. T., no one could succeed in getting the eggs until this season, when Mr. T. N. Willing, the Provincial Secretary of the Botanical Society of Canada for the Northwest Territories, and one of our members, succeeded in obtaining eggs which he sent to Ottawa. The eggs were laid on May 10th and hatched on the 29th. The small caterpillars fed readily on lawn grass, *Poa pratensis*, and several kinds of fine leaved sedges, *Carices*, and are now growing rapidly; the first moult was passed on June 7th and the second on the 18th. The young larvæ were 2½ millemeters in length when first hatched, 5 mm. after first moult and 9 mm. after 2nd moult. The general appearance of these little caterpillars may be thus described: Slender caterpillars, whitish in colour, with a dark brown stripe down the middle of the back and three lateral stripes along each side. The uppermost of these is broken up into separate elongated blotches, and the lowest has on its lower margin the small black spiracles. Below these is a wide, yellowish white, conspicuous stripe; the lower surface is mottled thickly with reddish brown, and bears a narrow white stripe along the sides, lying just above the bases of the legs. After the first moult the colour is darker and the skin has many more bristles than in the first stage: after the second moult the body is so much darker that the general colour would be described as brown.

J. F.

Ornithology.—A NEW BIRD FOR EASTERN ONTARIO.—Mr. F. A. Saunders reports the appearance of a Dickcissel, *Spiza americana*, at the Central Experimental Farm.

Previous to this, the only record of this species for Canada was made at the most southerly point of the Dominion,—Point Pelee, Lake Erie. The presence of so distinguished a Southerner in Ottawa being

worthy of a mark of special attention from the local students of bird life, visits to the farm were made, on Mr. Saunders invitation, by Mr. W. A. D Lees and the writer, both of whom obtained very satisfactory interviews at close quarters. The bird is a male in fine plumage : the sulphur-yellow breast, black throat patch and white chin are well marked, as well as the ashy tracts on the sides of the head. Mr. Saunders has seen it daily since 15th June, always haunting the same locality on the farm, an area of not more than three acres, and singing almost all day long. He has not been able, so far, to find either mate or nest, though once or twice a bird has been seen which he hoped might prove to be the female dickcissel, but which would not permit him to come near enough for identification.

In the hope that they may be nesting it has been thought best not to "collect" the male bird. They will be protected on the Experimental Farm, and possibly may return another year.

Since the above observation was made Mr. W. E Saunders of London, Ont., who was the first to discover the dickcissel at Point Pelee in 1884, writes that he has seen several of the species this season in the County of Middlesex. A. G. K.

The Air at Ottawa.—Mr. F. T. Shutt, F.I.C., President of the O.F.N.Club and Mr. Anthony McGill have sent the OTTAWA NATURALIST a copy of their recent paper entitled : "*Some Observations on the quality of air at Ottawa.*"* In this paper the authors give some of the results obtained by them in the work they undertook at the instance of the Department of Public Works to examine the air of the House of Commons Chamber at Ottawa. The methods employed are described, and the results appear in the form of estimations of the carbonic acid present in the air on Parliament Hill. The authors say :—"It will be seen that the quantity (of carbonic acid) varied from 3·0682 volumes per 10,000 on the 11th June to 3·7177 per 10,000 on 13th June." The experiments were made in 1892 and the presence of CO_2 was estimated by Pettenkofer's Process. The mean amount of carbonic acid gas (omitting the first estimation made) is 3·5918 volumes per 10,000 Compared with results obtained in other cities the quality of the air on Parliament Hill is excellent.—H.M.A.

*Trans. Royal Society of Canada, Vol. XII, Sec. III, 1894.

EXCURSIONS.

Excursion No. 2, Galetta.—Weather of the bright, exhilarating order; a large gathering of enthusiastic naturalists, and a region rich in scenery and varied in the natural products, all combined to make the excursion to Galetta on the 15th of June one of the most enjoyable in the history of the Club's outings.

About 140 excursionists gathered at Elgin street station at 1.45 in the afternoon, from whence they were taken by the Parry Sound railway to Galetta, some 35 miles distant. The train slowed up at McDougall's and Graham's Crossings, where the numbers were swelled by the addition of parties from the Experimental Farm and Richmond Road.

The railway passes through some of the finest agricultural districts of Carleton County, now "in verdure clad" with the green of the meadows and grain fields.

The village of Galetta is reached in an hour. Here the party is met and cordially welcomed by Mr. G. C. Whyte, a brother of the well-known enthusiast in botany, Mr. R. B. Whyte, at whose recommendation the locality at Galetta was chosen. The town hall was kindly placed at our disposal, and was used as a storing room for wraps and lunch baskets.

The next move was to collect forces, designate leaders for the various branches, and begin the serious business of the afternoon. It was at this time that the unavoidable absence of such well appreciated and willing leaders as Mr. Fletcher, Drs. Ami and Ells, was felt and deeply regretted.

President Shutt then explained the geography of the district and asked Messrs. Whyte and Craig to lead in the search for botanical specimens: while Prof. Prince, Messrs. Halkett, Whiteaves and Ferrier represented the zoological and geological sections.

The principal exploring grounds lay along the banks of the Mississippi, a tributary of the Ottawa, and in the vicinity of Chats Lake.

It may be interesting to note here that Galetta is situated on a spur of the same Laurentian formation which crosses the Ottawa River at the Chats Falls. This ridge of gneiss crops out prominently at

Galetta and adds much to the variety and beauty of the scenery by causing a series of interesting falls at the point of intersection by the Mississippi. The power furnished by these falls is utilized to operate grist and woolen mills in the village; the long lines of comfortable looking frieze displayed upon the stretchers testified to activity in business.

It may hardly be taken for granted that all the excursionists were true field naturalists, and therefore came solely to pry into nature's secrets. From the happy appearance of many interesting groups of from two to a dozen persons who were not communing with nature it is safe to say that secrets of another order were made, interchanged and investigated during the afternoon. However that may be, it was a well satisfied party which gathered at six o'clock at the call of the President in Whyte's beautiful grove 'neath "the murmuring pines and the hemlocks"—in fact to hear an account of the different "finds" by the leaders of the different sections.

It was much to be regretted that Geology and Entomology were not represented owing to absence or modesty on the part of the leaders.

Prof. Prince, Dominion Commissioner of Fisheries, spoke interestingly regarding some specimens which he had succeeded in capturing. In the Botanical section an interesting collection was exhibited by Messrs. Whyte and Craig.

Among the specimens collected were good representations of the Wild Orange Red Lily, *L. Philadelphicum*, which Mr Whyte recommended for garden cultivation, and the Carolina or thornless rose, *R. Carolina*. Flowering branches of *Potentilla fruticosa*, shrubby five finger, were also shown and described by Mr. Whyte as a most desirable shrub and one whose beauty was enhanced by cultivation.

This region seemed to be particularly rich in climbing plants. as Mr. Craig extolled the merits of four useful and ornamental species, mentioning Virginia creeper, *Ampelopsis quinquefolia*; Climbing Bitter Sweet, *Celastrus scandens*; Moonseed, *Menispermum Canadense*; and Climbing Bindweed, *Polygonum cilinode*. Several honeysuckles were shown in fruit and in flower, the most beautiful at that time being

the Hairy honeysuckle *L. hirsuta*, Eaton. This was covered with its charming orange yellow colored flowers, making it most attractive. Others exhibited were the native Wolf Willow, *Elaagnus*, of the Northwest in fruit, and Saskatoon, *Amelanchier*, in addition to representations of our best conifers.

President Shutt added some interesting remarks on the role of the Leguminosae in agriculture, and congratulated the club on its successful outing. Mr. Sinclair, B.A., of the Normal School also spoke felicitously of the benefit of such excursions. A number of members of the Ottawa Camera Club who were of the party succeeded in getting several interesting views of the Mississippi Falls.

The 8.30 train brought to Ottawa a cheerful and thoroughly satisfied party of excursionists, each with a strong desire to say "Rah !" for Galetta.

J. C.

July and August Excursions.—Owing to the absence from town of a number of the officers and members of the O. F. N. Club, it has been decided not to hold any field day during July.

It is probable that the August NATURALIST will contain an announcement of one, to take place about the middle of that month.

THE LATE PROFESSOR HUXLEY.

British Science has lost one of its foremost leaders by the death of Professor Huxley. He was recognized the world over as the greatest of modern biologists and he was not only a profound original discoverer he was also one of the best popular expounders of science. His contributions to science were of a voluminous and varied character, and in the field of Comparative Anatomy his work was especially brilliant and successful As a lecturer he had but one rival, viz. : the late Professor Tyndall, and the interesting circumstance may be recalled at this time, that both these scientists were, in the course of their career, candidates for Professorships in one of our Canadian Universities (Toronto). British Science may look with just pride upon the achievements of the late Professor Huxley.—E. E. P.

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