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A Monthly Magazine devoted to the Natural Sciences.

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THE OTTAWA NATURALIST.

VOL. IX. OTTAWA, AUGUST, 1895. NO. 5.

*ARGON: A NEWLY DISCOVERED CONSTITUENT OF THE ATMOSPHERE.

By FRANK T. SHUTT, M.A., F.I.C., F.C.S.

Our first knowledge regarding the chemical constitution of the atmosphere may be said to date from Priestley's time. In 1774 this English chemist discovered Oxygen by the experiment, now historical, of heating the red oxide of mercury by means of the sun's rays, collected and focussed by a burning glass. He worked out somewhat its chemical properties and made known its essential characteristic as the great supporter of animal life and of combustion. He termed it "*Dephlogisticated air*," because, as he said, "it is so pure, so free from phlogiston,"—the hypothetical principal of inflammability of an obsolete theory.

Two years previously, Rutherford, Professor of Botany in Edinburgh, had experimented with the residual gas produced by respiration of animals in closed vessels containing air. He found it to contain a gas (carbonic acid) that could be absorbed by caustic potash and further a colourless gas, which could not thus be absorbed, that extinguished the flame of a candle and did not support animal life. This was the discovery of phlogisticated air or Nitrogen.

Scheele, a Sweedish chemist, was, perhaps, the first to recognize clearly that the atmosphere consisted of these two gases. He confirmed the results of Priestley and Rutherford, bringing them together and establishing from them the dual character of the atmosphere.

So far, however, all the work was of a qualitative character. Cavendish, another English chemist (1731-1810), was the one who established by careful, thorough and skilful quanitative work the com-

*Read before the Toronto University Club of Ottawa, May 10th, 1895.

position by weight and by volume of the atmosphere. This was in 1781. It is supposed that Cavendish made no less than 400 analyses of the air. The mean result of his labours was that 100 volumes of air contain 20.83 parts by volume of oxygen.

Since that time Gay-Lussac and Humbolt, Davy, Thomson, Kuppfer and, later by more accurate methods, Regnault, Bunsen, Lewy, Stas, Dumas, Boussingault and others, have carefully analysed the air. Their results serve practically to corroborate those of Cavendish.

It is now well known that the amount of oxygen in normal air varies at different times and in different localities, but the work of all the most careful investigators goes to show that the limit of variation lies within 20.9 and 21.0 volumes of oxygen per 100 of air. Considering this, we may well marvel at the high degree of accuracy of this quantitative work of Cavendish—more especially when we think of the apparatus and methods of his day.

For more than a hundred years then, it has been thought that the atmosphere consisted chiefly of a mixture of the elementary gases, oxygen and nitrogen. We have also for many years recognized as present in the aerial ocean that envelopes our globe, small and variable quantities of carbonic acid [3 to 4 volumes per 10,000] and vapour of water. Under artificial circumstances, traces of sulphuretted hydrogen, ammonia, nitric and other acids, organic matter, etc., are noticed.

We now have to chronicle a further step in our knowledge of the atmosphere's composition.

Lord Rayleigh, the eminent English physicist, and William Ramsay, professor of chemistry at University College, London, at the meeting of the British Association held in Oxford in August last, surprised the world—scientific and lay—by the announcement that they had discovered another atmospheric constituent.

To give you some idea how these scientists came to make the discovery of this constituent—which the weight of the proof indicates to be an element hitherto unknown—I shall make free use of an abstract of a paper read by them before the Royal Society on the 31st of January of the present year. Priestley had discovered oxygen by chance; the present discovery was the result of an elaborate

and careful series of experiment, extending over a period of several years—conducted and repeated on thoroughly scientific lines, by means of physical and chemical methods, the outcome of the combined labours and knowledge of physicists and chemists of the age, which I think we may safely say is the most brilliant, and withal the most accurate that science has ever known.

Lord Rayleigh had previously proved that nitrogen extracted from chemical compounds was about one half per cent. lighter than "atmospheric nitrogen." Thus, the [mean] result for the weights of nitrogen gas in the globe, prepared from the following compounds.—Nitric oxide, nitrous oxide, ammonia nitrite, urea was 2.2990, while that for "atmospheric nitrogen" prepared and purified by the best hitherto known methods was 2.3102. Reduced to standard conditions, their figures give 1 2505 grms of "chemical" nitrogen and 1.2572 grms of "atmospheric" nitrogen per litre. This difference, though small, was quite sufficient to arouse in the mind of Lord Rayleigh the suspicion that "atmospheric nitrogen" was not pure nitrogen.

We may very briefly at this stage consider the details of one method for the preparation of nitrogen, used in these investigations of Lord Rayleigh and Prof. Ramsay: By the ignition of the metal magnesium in nitrogen, a compound of the two is formed, (magnesium nitride) which on subsequent treatment with water yields ammonia. from the latter by many methods the combined nitrogen may be determined.

As magnesium nitride, nitrogen was extracted from the air, then liberated with water and carefully estimated. The result obtained proved that, prepared in this way, nitrogen - which in the first stages of the method of preparation was part of the atmosphere—was practically identical in physical constants with nitrogen from chemical compounds.

It was, therefore, conjectured that nitrogen separated from the atmosphere by all the methods save the one just quoted, was not pure nitrogen. What then was its impurity? In other words, is there not another gaseous constituent in the atmosphere unknown?

We have now stated briefly the grounds for suspecting a hitherto undiscovered constituent in the air. In a review of this character it is

impossible to give an account of all the experiments these scientists made in order to make sure that the discrepancy in weight already referred to was not due to impurities. Suffice it to say that all possibility of the nitrogen prepared from chemical compounds being a mixture, was shown by varied and careful experiments to be without any foundation.

METHODS OF PREPARATION

Of the elements that combine directly with nitrogen, magnesium was chosen as the best. When nitrogen is passed over this metal in a hard glass tube heated to redness, absorption takes place with incandescence. The authors state that from 7 to 8 litres of nitrogen can be absorbed in a single tube. The nitride so formed is a pale, dirty orange coloured substance. Red hot magnesium therefore was used to absorb or get rid of the nitrogen, while red hot copper was similarly used to combine with the oxygen of the air experimented upon.

The method of Cavendish, by "sparking" nitrogen with oxygen in the presence of an alkaline liquid, was employed by the authors in their earlier experiments. This finally resulted in obtaining a small quantity of residual gas, proportional to the volume of air operated upon, which could not be further oxidised. Its spectrum proved that it was not nitrogen. It was, in fact, the newly discovered element, argon.

The abstract then gives the details of an experiment in which the oxygen of the air under trial was absorbed by red copper. This left a gas of the density of 14.88. This, as the investigators say, while not conclusive, was encouraging. Then by passing backwards and forwards such "atmospheric nitrogen" over red hot magnesium they obtained after 10 days about 1500 c.c. of this heavier gas. This was treated with a large number of chemical absorbents to purify it, and as a result they had 200 c.c. of a gas of the density of 16.1. Still further absorption yielded a gas with a density of 19.09. This on "sparking" with oxygen eliminated the last traces of nitrogen, the remaining gas having 20.0 as its density. This showed, by spectrum analysis, lines not reconcilable with any known element.

The method of atmolysis was then tried. Atmospheric nitrogen, after separation of oxygen by red hot copper, was diffused through a number of tobacco pipe stems. The nitrogen so obtained was denser

than that of atmospheric nitrogen not so treated. This served to corroborate their previous results and conjectures.

The preparation of argon on a large scale is a tedious process. It involves first the separation of the oxygen by red hot copper and the drying by chemicals of th remaining gas. It is then passed several times over magnesium turnings heated to bright redness. For this purpose mercury gas holders and a Sprengel vacuum pump are used. It takes at least two days to effect perfect elimination of the last traces of nitrogen.

The density of this gas argon as calculated from a mixture with oxygen, is 19.7, and on the assumption of its proportional amount in atmospheric nitrogen 20.6. As prepared from Nitride of magnesium, the average density from a number of determinations in 19.90. This gas gave no spectrum of nitrogen in the vacuum tube.

It would avail little for me to give here a minute account of the characteristic lines of the spectrum of argon. Mr. Crookes, whose assistance as an authority on spectrum analysis was asked, has made a careful record of the wave-lengths. Part of the evidence from this work would seem to indicate that argon is a mixture and not an element, since two distinct spectra at different temperatures were noticed. We however, know that the spectrum of certain elements is apt to vary with the temperature and pressure under which the experiment is made. Mr. Crookes concludes "that Lord Rayleigh and Prof. Ramsay have added one, if not two, to the family of elementary bodies"

Argon is about two and a half times as soluble in water as nitrogen. It has been proved that dissolved gases from rain water furnish "nitrogen" considerably heavier than true are nitrogen. This greater solubility of argon has already suggested a method for its preparation.

To Professor Olszewski, of Cracow, was first assigned the task of determining argon's physical constants. His results are that it has a lower critical point and a lower boiling point than oxygen. He has liquefied it and, further, solidified it to white crystals. At ordinary temperature it is a colourless, odouriess gas.

The ratio of its specific heat, the result of a number of experiments, calculated from the velocity of sound in it, is 1.66. That for diatomic gases varies from 1.29 to 1.42. From the fact now recorded it appears to be

a gas in which all the energy is translational; in other words, its molecule consists of one atom, and in this respect resembles mercury gas at a high temperature.

All attempts—and they have been many—to combine argon with other elements have failed. Conditions have been altered, but with the same result. It, therefore, well deserves the name given it, which is derived from the Greek and means inert. So far, its inertness is without a parallel in chemical science. I ought to mention that within the last month, M. Berthelot has announced that he has by means of the silent electric discharge got argon to combine with several organic bodies. Details of these results are promised at an early date.

Avogadro's hypothesis demands that the density of a gas should be half its molecular weight. The density of argon is 20 [approximately], its molecular weight must therefore be 40. The physical data go to show that it is monatomic, *i.e.* the atom and the molecule are identical, hence its atomic weight, if it be an element, is 40. The definite physical constants obtained by Olszewski certainly go to prove its elementary nature.

Finally, is there a place for a new element of such atomic weight in Mendeleef's periodic system? It does not appear so. The question, therefore, arises, whether the periodic classification of the elements that of late years has received no such attention from chemists, is altogether a complete and accurate one. May there not be elements that do not find a place there? Further work will no doubt throw light on this important matter.

Argon has been sought for in mineral and vegetable matter, but so far in vain. The atmosphere, of which it constitutes about one one hundred and twenty fifth part by volume, appears to be its only habitat.

It is altogether too early to ask regarding the commercial or utilitarian value of this discovery. I have no doubt that ere long we shall know of the part—perhaps a very important part—that it plays in the economy of nature and probably in the arts and manufactures of the day. This discovery undoubtedly marks the highest achievement in the chemistry of the times, but it must not be forgotten that a very large part of the work was plotted and successfully carried out by one who occupies a first place among the advanced physicists of the day.

A MORNING AMONG MOOSE.

By Prof. Edward E. Prince,

Dominion Commissioner of Fisheries, Ottawa.

Some months ago, when on an official tour in New Brunswick, a very unusual opportunity offered itself of seeing a small herd of Moose under conditions resembling in many respects those characteristic of the wild state.

Everybody is familiar with the magnificent head of our largest native mammal, and the imposing palmate horns are a common ornament about our houses and hotels; but there are comparatively few people who have ever beheld a living moose, and fewer still who have seen this noble animal in his native haunts. It was with no ordinary pleasure that, quite unexpectedly, I found myself one morning with a few hours at liberty, and was thus enabled in company with a friend, to take a drive of four or five miles with the view of seeing the moose. We reached the small tract of forest country where, we had been informed, the moose were located, and having found the owner, he most willingly volunteered to show us his splendid captives. The personage in question was a quaint character—a veritable Robinson Crusoe in appearance and habits of life.

From his log hut he led us along a tangled forest path, through an extensive wooded area covering some hundreds of acres securely fenced in. We soon saw signs of moose. All the young shoots of certain trees had been nibbled off, or rather had been sharply nipped off, as if by a sharp, clean bite. In some places hardly a young leaf or terminal bud could be seen. The moose, as is well known, prefers above all things the young green tender sprigs on the branches of certain trees. We also noticed on the path at several points dung traces, quite unlike those of the cow, horse or sheep, being in fact olive brown ovoid bodies, not unlike nut megs in shape and size. The trees now became thicker and the foliage more dense, and our guide warned us to walk more slowly and carefully, and to avoid treading on dead dry branches. Though partly domesticated the moose, we were informed, never wholly

loses the fear produced by unexpected sounds, and moves off in alarm on hearing the cracking of dry branches in the distance, or other warning noises. We were further warned that if we suddenly came upon one of the huge "pets" of which we were in quest, it was advisable to dodge immediately behind a tree. "Always keep a tree between you and the moose," said our guide, for the instinctive habit of suddenly striking out with his ponderous fore-foot is never got rid of. So powerful is the stroke of the sharp cloven hoof that, like the slash of a sabre, its effect is almost always fatal, as many a hunter has found to his cost. As we advanced slowly and noiselessly our guide called in a soothing tone, "Coom," "Coom," "Coom," just as a dairy maid calls her favourite calf, and ere long signalled to us to stop. Then our guide putting up his hand pointed to a small clear space in the midst of large trees. Lo! under the leafy roof we could just distinguish two large brown masses on the ground. There were a couple of moose demurely chewing the cud in this shady retreat! The colour of the hide, a dark chocolate, so perfectly harmonized with the shadows and tree trunks around, that the outlines of the two animals could be discerned only with difficulty. Both had their heads turned away from us, and the back alone was visible, much of the body being hidden by the intervening undergrowth. The explanation of the peculiar position in which moose rest during the day is easy. The back is always turned towards the direction whence the wind blows. As the wind changes the moose change their position. On this occasion the wind was from the north, and we were moving south, so that a very slight wind blew towards them from us. The moose is endowed with a sense of smell so acute, that anything approaching from the windward side is at once detected by them without the aid of eyes or ears. The head being turned in the opposite direction, the eyes and ears are thus able to detect any approaching danger from that quarter. Such is the universal habit of the moose. He detects danger by scent in one direction, by sight and sound in the other direction. With his back turned towards the wind the moose is able to detect danger from whatever quarter it comes. This was soon demonstrated, for, as we came nearer, one of them rose quickly and turned round in our direction, eyeing us sullenly. He was a magnifi-

cent animal with widespreading antlers and a height at the shoulders of at least seven feet. His stout limbs of a pale ochre colour, like the trunks of young trees, his sides deep brown, like faded foliage in shadow, his head and back much paler and glistening as if frosted, resembling a mass of leaves with the light glancing across them. We were able to view at eight or ten yards distance this kingly quadruped, always remembering the precaution to keep within reach of a stout cedar or beech. There was no difficulty in noting the peculiar features of the living moose so utterly unlike the crude and unshapely stuffed skins which we usually see. The short deep body, the monstrous towering shoulders surmounted by a bushy erect mane, the thick abbreviated neck, the long and ponderous head, and, above all, the gracefully curved snout, with pendulous upper lip, almost as mobile as the elephant's trunk, all combined to give a peculiar weird grandeur to the animal. It is impossible in a museum specimen to produce certain graceful features in this uncouth giant. Thus the soft roundness of the ears is always lost, and the elegant curve of the slit like nostrils it is impossible to preserve after death. The strange, somewhat "lack lustre" eye, to adopt Shakespeare's expression, is ludicrously small for so large a creature. It is, it must be admitted, a wicked eye, very unlike the large liquid eye in most of the deer tribe, nor has it the benignant intelligence of that organ which we see in the elephant, or the inoffensive inquiring look of the whale's eye, as viewed at half a dozen yards' distance from a fishing boat: but it resembles rather the suspicious ill natured eye of the bull or the rhinoceros. The eye in fact is dull, dark, and with hardly any indication of white. From the throat of the bull hung the elegant tail like "bell," a bushy appendage, which reaches its full development only when the creature is adult. The huge trumpet-like ears are extremely bushy, similar to the condition of the brown bear, and as mobile and rapid in movement as the ears of a horse.

The living moose combines many of the general features of the horse, the deer, and the pig. Indeed the young calf-moose is strikingly pig-like in appearance, on account of the long snout, the large pointed ears, small eyes and sloping back.

Our guide assured us that he had captured, when practically full grown, the splendid bull-moose which we had the privilege of seeing, and had brought it from the wild Quebec country, north of the Lower St. Lawrence to New Brunswick on a rudely constructed raft—a marvellous instance of a hunter's skill, perseverence and success.

Taking a stout maple branch in his right hand he walked up to his colossal pets, holding out a piece of turnip as a dainty bribe, and uttering his cry "Coom." "Coom." The cow moose rose and readily took the piece offered, but the bull was more reserved and only after much persuasion condescended to accept a fragment of the turnip, leisurely stretching out his head and seizing the piece with his elastic lips after the manner of a horse.

Our guide patted the creature familiarly, and seemed to take no such precautions as would be necessary for a stranger to take. It is true he was cautious in approaching the bull at first: but the animal was clearly semi-domesticated. When the cow rose, the absence of horns and of the bell, and the meagre character of the upright mane took away from her appearance. Her size too is rather smaller, and the ears appear, if anything, larger and more prominent: but the absence of horns may account for that. She lacks the impressive grandeur of the bull. Soon a small calf moose, about as large as a 12-hands pony, appeared in response to repeated calls. It was about a year old and appeared quite tame, pushing its huge nose under the armpits of its master, and exhibiting signs of affection. The lips are far less pendulous and mobile in the calf. A further walk of a quarter of a mile enabled us to see another cow, whose ears were crumpled and shorn at the tip. This animal when newly captured, and tied about the neck, head and ears with ropes, had been frost-bitten, and had lost the tips of the last-named organs. Finally a fifth moose was seen, a calf born in captivity, and so tame as to jump over a fence at the command of its master. It was a surprise to see a heavy, uncouth, almost unwieldy, animal such as this, take a fence four or five feet high with greater lightness and ease than a hunter Our guide not being pleased with his juvenile pet's performance, administered one or two blows with his cudgel, whereupon the creature cried in a sharp, ill-natured manner,

not unlike the cry of a horse in pain or anger, but less loud and strong. Indeed the sound was ludicrously weak and shrill for a quadruped of such large dimensions. This feeble, ill-natured cry resembled strongly the weak cry of the monstrous rhinocerous, the voice of which is so ill-proportioned to the animal's size.

It was interesting to note that our departure was watched with the utmost keenness and suspicion by the moose. They followed us with ears and eyes, turning round when necessary to observe our movements as we hurried away. It was an impressive spectacle to see in the distance the two massive captives standing in their leafy retreat, the pale grey horns of the bull rising majestically amongst the branches.

Cases of tame moose are familiar enough in Canada, but it is a rare experience, except to the hunter, to see a herd of moose under conditions so resembling the wild state. One gained some notion of their appearance in the forest. One sad reflection only could not be avoided, arising from the probability that in spite of laudable steps to preserve these noble monarchs of our Canadian forests, the cruelty and barbarity of man is almost certain ere long to exterminate them. Not merely pot-hunters, who slay the helpless mother moose just before and after bearing her young, but professed sportsmen, have no mercy. Their relentless efforts may ere long deprive our Dominion of the moose in our forests as they have already robbed us of the royal buffalo on our prairies, unless severe and righteous measures be effectively carried out.

LIST OF NATIVE TREES AND SHRUBS GROWING AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, JULY, 1895.

By W. T. MACOUN.

Interesting and numerous as are the species and varieties of trees and shrubs from foreign countries now growing at the Central Experimental Farm, which by their beauty and peculiarities of form, leaf, flower and fruit attract so much attention from visitors, it must be a satisfaction to Canadians to know that a large number of our native trees and shrubs play no small part in the pleasing effect produced by the tasteful grouping of the various species and varieties on the ornamental grounds. In the arboretum many of our native trees and shrubs may now be studied with much profit by those interested in botany and while more species are yet to be added, the local botanist will see at the Farm many that are not to be found in the Ottawa district.

It was thought that a list of the native trees and shrubs growing at the Central Experimental Farm, in cultivation or otherwise, would prove of some value to the members of the Ottawa Field Naturalists' Club, and the accompanying list is herewith submitted

The classification is according to Prof. Macoun's "Catalogue of Canadian Plants." The distribution of each species is given; whether it is a tree or shrub, its hardiness at Ottawa; and when ornamental mention is made of the fact. A few woody climbers are also included

There will be found in the list the names of 178 species and varieties.

I. RANUNCULACEÆ.—Crowfoot Family.

1. CLEMATIS, Linn. (Virgin's Bower.)

(1.) C. VERTICILLARIS, DC. Whorl-leaved Clematis.

Que.; Ont.; Man.; N.W.T.; B.C.

Woody climber; hardy; flowers ornamental.

(2.) C. VIRGINIANA, Linn. Virginian Clematis.

N.S.; N.B.; Que.; Ont.; Man.

Woody climber, hardy; flowers ornamental.

(3.) C. LIGUSTICIFOLIA, Nutt.
N.W.T. ; B.C.
Woody climber ; hardy ; flowers ornamental

II. MAGNOLIACEÆ Magnolia Family.

17 LIRIODENDRON, Linn. (Tulip Tree)
(78). L. TULIPIFERA, Linn. Whitewood.
Western Ontario.
Large tree ; semi hardy ; leaves and flowers ornamental.

18. MAGNOLIA, Linn. (Magnolia.)
(79.) M. ACUMINATA, Linn. Cucumber Tree.
Western Ontario.
Large tree ; semi-hardy ; leaves and flowers ornamental.

IV. MENISPERMACEÆ—Moonseed Family.

20. MENISPERMUM, Linn. (Moonseed)
(81). M. CANADENSE, Linn. Canadian Moonseed.
Que. ; Ont. ; Man.
Woody climber ; hardy.

V. BERBERIDACEÆ Barberry Family.

21. BERBERIS, Linn. (Barberry.)
(84). B. AQUIFOLIUM, Pursh. Oregon Grape.
B.C.
Low shrub ; semi-hardy.

XIX. HYPERICACEÆ—St. John's Wort Family.

97. HYPERICUM, Linn. (St. John's Wort.)
(344). H. KALMIANUM, Linn. Shrubby St. John's Wort.
Ontario.
Low shrub ; hardy ; flowers ornamental.

XXI. TILIACEÆ—Linden Family.

105. TILIA, Linn. (Basswood. Linden.)
(366). T. AMERICANA, Linn. Basswood.
Que. ; Ont. ; Man.
Large tree ; hardy.

XXIV. RUTACEÆ Rue Family.

112. XANTHOXYLUM, Colden. (Prickly Ash.)
(392.) X. AMERICANUM, Mill. Northern Prickly Ash.
Que.; Ont.
Tall shrub; hardy

113. PTELEA, Linn. (Hop Tree.)
(393.) P. TRIFOLIATA, Linn. Shrubby Trefoil.
Western Ontario.
Tall shrub; hardy.

XXV. ILICINEÆ Holly Family.

115. ILEX, Linn. (Holly.)
(395.) I. VERTICILLATA, Gray
N.S.; Que.; Ont.
Shrub; hardy; fruit ornamental.

XXVI CELASTRACEÆ Staff-tree Family.

117. CELASTRUS, Linn. (Staff tree.)
(379) C. SCANDENS, Linn. Wax-work Bitter-sweet
Climbing shrub; hardy; fruit ornamental.

118. EUONYMUS, Tourn. (Spindle-Tree.)
(399.) E. ATROPURPUREUS, Jacq. Burning Bush.
Ontario.
Tall Shrub; hardy; fruit ornamental.

XXVII. RHAMNACEÆ. Buckthorn Family.

120. CEANOTHUS, Linn. (New Jersey Tea.)
(401.) C. AMERICANUS, Linn.
Ontario.
Low shrub; hardy.

121. RHAMNUS, Tourn. (Buckthorn.)
(405.) R. ALNIFOLIA, L'Her.
N.B.; Que.; Ont.; Man.; N.W.T.
Low shrub; hardy.

XXVIII. VITACEÆ—Vine Family.

122. VITIS, Tourn. (Grape.)

(408.) V. LABRUSCA, Linn. Northern Fox Grape.
Western Ontario.
Climbing shrub; hardy.

(409.) V. CORDIFOLIA, Lam. Frost Grape.
N.S.; Que.; Ont.; Man.
Climbing shrub; hardy.

123. AMPELOPSIS, Michx. (Virginian Creeper.)

(411.) A. QUINQUEFOLIA, Michx.
Que.; Ont.; Man.
Climbing shrub; hardy; leaves ornamental.

XXIX. SAPINDACEÆ—Soapberry Family.

124. STAPHYLEA, Linn. (Bladder Nut.)

(412.) S. TRIFOLIA, Linn. American Bladder Nut.
Que.; Ont.
Tall shrub: hardy.

125. ACER, Tourn. (Maple.)

(414.) A. PENNSYLVANICUM, Linn. Striped Maple.
N.S.; N.B.; Que.: Ont.
Small tree; hardy.

(415.) A. SPICATUM, Lam. Mountain Maple.
N.S; N.B; Que.: Ont.: Man.
Tall shrub: hardy.

(417.) A. CIRCINATUM Pursh. Vine Maple.
B.C.
Tall shrub or small tree, semi-hardy.

(418.) A. GLABRUM, Torrey.
B.C.
Tall shrub; hardy.

(419.) A. SACCHARUM, Wang. Sugar Maple.
N.S.; N.B.; Que.; Ont.
Large tree: hardy; leaves ornamental in Autumn.

NOTES, REVIEWS AND COMMENTS.

*CHAPMAN'S HANDBOOK OF BIRDS OF EASTERN NORTH AMERICA.

If supply may be taken as an index of demand, the large number of books upon ornithology which have appeared within the last few years furnishes an encouraging proof of a growing desire for closer acquaintance with bird life, both on the part of the nature-lover and of the scientific student. Probably no book that has appeared for a long period is so well fitted to satisfy the needs of both these classes as the one whose title has just been quoted. Accuracy and fullness of description, covering all external characters, including every phase of of seasonal and sexual plumage in each species, have been attained without an undue use of technical language; and these specific descriptions alternate throughout the body of the work with delightful sketches of the habits of each bird. Many of the life-histories are from such well known writers as Mrs. Olive Thorne Miller, Miss Florence Merriam, William Brewster, Ernest E. Thompson, Bradford Torrey, etc.

The author is by profession a closet naturalist, but his chapter on "The Study of Birds out of Doors" can only have been written by one who is a lover, as well as a student, of birds, and whose acquaintance with them must have begun at a period when professional methods and closet work were as yet matters of the future. Still the curator of the museum comes to the surface in the following recommendation: "If you would name birds without a gun, by all means first visit a museum and with text-book in hand study those species which you have previouly found [by reference to the nearest local list] are to be looked for near your home. This preliminary introduction will serve to ripen your acquaintance in the field." One field student can remember how a preliminary acquaintance with a row of mounted birds standing "at attention' on the shelf of a museum has only served to deaden the

* Handbook of Birds of Eastern North America—with Keys to the Species and Descriptions of their Plumages, Nests and Eggs, their Distribution and Migrations, &c. &c. &c. By Frank M. Chapman, Assistant Curator of the Department of Mammalogy and Ornithology in the American Museum of Natural History, New York City, &c. New York: D. Appleton & Company, 1895. 12 mo., xiv. + 421 pp.

interest that would otherwise have been felt in their living relatives. On the otherhand, an illusive song, a few unsatisfying glimpses through the leaves or over the distant tree-tops can awaken a keenness of hunting instinct that, following its object through thicket and marsh and stumbling over two or three false identifications, will end in a knowledge, born of deep friendship between man and bird, that can be come at in no other way. Such a plan may be too slow for this end of the century, but its results have a staying power about them *Afterwards* when inspecting the museum specimens, the student will know what points he should study most carefully: and whenever that song is heard again the leaves grow greener and the air fresher and other things come back to mind that to miss would be loss indeed.

Among the most valuable features in the book are the Keys. They are not, as is too often the case with natural history keys, so extremely analytic and complicated that the student can only establish the identity of the specimen at the risk of losing his own. There is a short systematic Key to the Orders and Families, and under each family a Key to the Species In the latter all systematic arrangement, in the scientific sense, is abandoned. The author's motto is: If the Keys will identify they will have accomplished their purpose. For example, the Finch family is divided into three groups:

I Under parts with red

II. Under parts with no red and without distinct streaks.

III Under parts without red and with numerous streaks.

Each of these groups is again divided by other prominent color markings, until at the third sub-division the several species are reached. This plan will be found an excellent one for field identification, and by checking results with the accurate descriptions in the body of the work, all danger of error may be avoided For some of the larger families, as the Finches and the Warbles, there is also a Field Key to the Adult Males in Breeding Plumage.

Though not too large to be carried in the pocket, the work is a gem of the art of bookmaking. In addition to upwards of 100 cuts of bills, feet, etc., scattered through the text, there is a colored frontispiece, "Bob-white," a Color Chart, and 18 full page plates in "half-

tone." The Color Chart is somewhat disappointing; what should be the brighter colors are altogether wanting in brightness. The half-tone plates, however, are all that can be desired. The Clapper Rail, Spotted Sandpiper and Young, Least Flycatcher and Phœbe, Meadowlark, and Wood and Wilson's Thrushes seem almost alive.

A. G. K.

Archæology.--NOTES ON THE ANTIQUITIES OF LAKE DESCHENES.

Along the shores of Lake Deschênes are many points of Archæological interest, and it is in the hope that some of the members of the Field Naturalists' Club may devote their time to a more special investigation of this branch of scientific research that I now call attention to some of them.

It is needless to say that the Ottawa River, of which this lake is an expansion, was, during the French régime, the great highway between the region of the great lakes and the French settlements on the St. Lawrence. Indians and "coureurs de bois" engaged in the fur trade, as well as governors of Canada, either in voyages of discovery or expeditions against their Indian enemies, traversed the waters of this river. It was at times, also, the objective point of war parties of hostile Iroquois, who, after the subjugation of their Huron kinsmen, carried the tomahawk, in a war of extermination, far into the wilds to the north of the Ottawa.

Some of the descendants of the Indians and voyageurs who took part in these stirring scenes, connected with the pioneer days of New France, are now living in Aylmer and vicinity, and it would be well to secure from them the traditions and stories attaching to points of local interest before the present generation passes away.

On the Ontario shore of the lake, at Raymond's point opposite Aylmer, is the site of an old Indian workshop where flint weapons have been fabricated. My attention was first called to it, some time ago, by Jacob Smith of the Interior Department, its discoverer. Mr. Smith shewed the writer some flint arrow heads, and a spear head of the same material, which he had discovered at this place.

Narcisse Noël of Aylmer, in company with the writer, also found some imperfect arrow-heads at this place, which appear to have been rejected by the ancient workmen. For about 100 yards along the shore, between high and low water mark, the rocks are littered with chips and shreds of black flint, which are also washed out of the gravel at high water mark after heavy rains. These flints resemble those found in great abundance in the Trenton limestone at Hull, from which place it is just possible they may have been taken. It is said that these flint chips have also been found on Snake Island a short distance from here, so that this locality seems to offer opportunities to the archaeologist that should not be overlooked.

Some years ago a quantity of human bones was found buried in the sand on the Light-house Island just above Aylmer, which the late Dr. C. M Church, to whom tney were presented, regarded as typical of the North American Indian.

A short time ago, at Pointe a la Bataille about 10 miles above Aylmer on the Ontario shore of the lake, Joseph Leclaire of Aylmer discovered a large "cache" of bullets. As Mr. Leclaire bought home nearly half a bagfull without exhausting the find, it does not appear credible that so large a quantity of ammunition could have been "cached" by hunters; but, judging from the name of the place, one inclines rather to the supposition that this store had some connection, in the past, with the movements of war parties, either white or Indian, operating along the lake.

An interesting tradition, told by the old "voyageurs" now living in Aylmer, is associated with Lapoté's and Sand Points lying respectively to the east and west of Sand Bay at the mouth of Constance Creek about 15 miles above Aylmer. The tradition is as follows:— Many years ago, during the French règime, a party of "coureurs de bois" were encamped at the former point; while Sand Point to the west of the bay was occuied by a superior force of Indians, probably a war party of hostile Iroquois. An encounter was imminent and it remained to be seen which party would circumvent the other. The French fur traders, whose daring and brilliant exploits at this period are a matter of history, were not to be taken by surprise. Leaving their camp fires

burning on the high rocky shore at Lapoté's Point, to deceive their wily enemies, the little band of intrepid Frenchmen traversed the forest to the east of the bay, forded Constance Creek, passed beneath the shadow of the pine groves on the sand hills to the north of the bay and fell suddenly on the Indian camp on Sand Point. The encounter was sharp and terrific and resulted in the utter defeat and route of the Indians.

Wm. Baillie, of Aylmer, informed the writer that a great many bones are scattered over this point: and Mr. Montgomery, who recently lived in the vicinity, stated that his two sons discovered, at this place, an almost perfect human skeleton. Mr. Baillie also states that some years ago, on the eastern shore of the bay, a number of copper kettles, of ancient design, were unearthed. These facts would seem to corroborate, to some extent, the above tradition and invite a closer investigation of the subject. The weird Indian legends of prolonged conflicts with Wendigoes, supposed to have inhabited the sand dunes of Sand Point, should also be collected before the generation of old men, now retaining them, have passed away.

The old Indian portage at the Chats should also be a point of great interest to the archæologist. The remains of old bullets, badly decayed, have been found by the writer in the crevices of the rocks at this place, strongly suggestive of the times when these "carrying places" were disputed, foot by foot, by hostile war parties. An old copper coin and other ancient works of art, found on the lake shore at Aylmer, as well as an iron tomahawk of peculiar design discovered by S. H. Edey some two miles inland from this place, are matters of interest.

Finally, I might say that members of the Field Naturalists' Club who wish to make a careful examination of places alluded to in the above will soon be in a position to do so. Capt. Davis will shortly have a steamboat running between Britannia and the Quyon, which will enable us to make any of these places the objective point of an excursion of the club. Traditions and folk-lore stories associated with Lake Deschenes should then be collected and recorded before the hand of time has placed them beyond our reach.

T. W. EDWIN SOWTER.

Aylmer, Que.,
July 29th, 1895.

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