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NOTICE--EXCURSION No. 3, SEPT. 3rd. See p. 72.

August, 1892

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CONTENTS.

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SOME OF THE PROPERTIES OF WATER.

By Adolph Lehmann, B.S.A.

(*Delivered March 10th, 1892.*)

In addition to being one of the most widely distributed substances known to us, Water is one of the most valuable compounds. Without it life from the highest to the lowest forms would be impossible. Owing to its solvent action it is the carrier of plant life in the soil. It enables transformation and translocation of materials in the tissues of all living bodies, enabling them to grow. It plays a part in the electric currents of the atmosphere, and acts as a most powerful equalizer of the climate of our globe. It is one of the principal factors in the formation of soils; and has at the same time assisted in the production of many of the rock formations. It is a purifier of the atmosphere. In short it may be considered as a balance-wheel of nature.

Having such useful and varied functions to perform, it would doubtless be interesting to study its properties, even if they were the most simple; how much more so is this the case when they are, as we find them, very varied and manifold, giving ample room for study and thought.

Water exists in different forms and locations. In addition to the vast expanse of oceans, lakes and rivers in the Torrid and Temperate Zones, and the plains of ice and snow to the north and south of these, it is present in varying percentages in nearly all organic substances. It can be detected in apparently perfectly dry paper or wood. Hay, straw, and the various grains contain in the neighborhood of 10 per cent. We find it also in some perfectly dry crystals, which without this "water of crystallization," as it is called, would fall into powder. It may be interesting to note that while milk (a liquid) contains about 87 per cent. of water, cucumbers and melons (solids) are made up of 95 per cent. of this compound. The difference is that in the former the solids are largely held in solution, while in the latter they form tissues to enclose the water—as it were a mass of minute sacks, called cells, filled with water. Since it is incompressible it helps to prevent cells from collapsing which, having thin walls, they would otherwise be liable to do. The water in succulent fruits or other parts of the plant therefore makes them firmer rather than otherwise, as is clearly demonstrated when a portion of the water is removed as in fading.

In addition to snow, ice, and ordinary water, an invisible form exists in nature as vapour suspended in the atmosphere, or as steam enclosed in the boilers of our engines.

These three forms of aggregation—solid, liquid and gaseous—have of course the same composition; but, as we know, vary in appearance and properties. They are easily transformed one into the other, and frequently exist in nature in contact with each other. Although easily accomplished this transformation is not so simple as, without reflection, we might suppose. If a thermometer be placed in contact with melting ice, it will always indicate the same temperature no matter what the heat applied to the ice may be, and furthermore, so long as any of it remains in contact with the resultant water, this also does not vary, but remains constantly at the freezing point. Since neither the ice nor the water have increased in temperature the heat applied to them is not indicated by the thermometer, and is hence called *latent heat*. Heat, as we know, can be transformed into force, and in this case it has it has been used to overcome the force which holds the minute particles (called molecules) of which the ice is composed, in their place, preventing them from moving past each other as they do in liquids. The heat necessary to do this work can be measured by applying a definite amount (in the shape of hot water) to a pound of ice. If we were to mix a volume of water at 80°C. (176°F.) with the same weight of ice at its melting point, and could prevent the loss of any heat, we should find that after a time the ice would have disappeared, and two volumes of water at the freezing point would be the result; clearly showing that considerable heat had been rendered latent.

Very frequent use is made of this property of water, as for example in "freezing mixtures." In these the heat required to melt the ice is supplied by the materials to be cooled or frozen. A convenient form is that in which this material (i.e., a can of cream) is imbedded in a mixture of salt and ice. Since salt is very soluble it can cause the ice to melt at a much lower point than it generally does, thereby materially reducing it in temperature. In the construction of the scale for his thermometer Farenheit used the lowest point obtainable by this mixture as the beginning, while both the other makers used the freezing point as their zero.

In the transformation of water into steam a very much greater amount of heat is consumed (about 6½ times as much) than by melting ice. This is illustrated to some extent by the comparatively long time required to vaporize water after it has reached the boiling point. Since the steam generated has the same temperature as the water from which it has been formed, the length of time required to vaporize the latter compared with that necessary to bring it to the ebullition point indicates to some extent the heat rendered latent. If this latent heat in steam did not exist we should be unable to use boiling water, as at present, for the preparation of our food; for as soon as it had reached this point it would immediately vaporize to be almost instantly deposited again as water on the somewhat cooler materials with which it would come in contact.

Although the boiling point like the freezing point serves as a standard in the manufacture of thermometers, it is not constant under all circumstances. On the top of mountains it is much lower than at the sea level; in fact so material is this variation that comparatively small differences in altitude can be determined by it. Thus it may be made to partially serve the purpose of a barometer; for, like the height of the mercuric column in that instrument, its height is dependent upon the weight of the atmosphere. That by an increased pressure this point is also increased is often seen in the boilers of steam engines; and that low pressures have the opposite effect is strikingly illustrated by numerous simple experiments. If, for example, a flask containing some water be heated till it is entirely filled by steam and the residual water, and then tightly corked, the water in it can be made to boil by cooling the flask. The steam being condensed the pressure would be reduced and the vapour developed finding less resistance could pass through the water to the surface and cause what is known as boiling. Water contained in a tube enclosing a partial vacuum can reach this stage when heated by the hand.

The temperature at which water, or rather watery solutions, disengage steam, is, in addition to pressure, considerably influenced by the nature and quantity of the materials dissolved. Many gasses reduce and solids increase it. A saturated solution of salt boils at 102°C., and one of calcium chloride at 179°C.

Several other factors have been noticed to influence the boiling point, e.g., the quantity of water used and the material composing the vessel in which it is heated. Single drops of water suspended in other liquids have been heated many degrees above this point before they suddenly transformed into a volume of steam. In a perfectly clean glass vessel, water has been heated to 106°C. before ebullition commenced. Together with the first bubble, however, sufficient steam was generated to reduce the temperature to the normal boiling point. This cause of "bumping" may be overcome by placing a piece of metal in the bottom of the flask.

The value of water as an extinguisher of fire is partially dependent upon the large amount of of heat absorbed when transformed to steam and partially upon the fact that it serves to prevent the oxygen of the atmosphere from coming as readily in contact with the burning material. Combustion of such substances as wood and coal is dependent on their union with oxygen, and this does not take place to such an extent as to cause what is known as burning, unless they are heated to a considerable degree.

Although taking place more quickly when boiling, we know that water can evaporate at any temperature between the boiling and the freezing points, in fact considerably below the latter. Ice will evaporate on a cold winter day as clearly shown by clothes drying at such a time. We might therefore be almost justified in saying that we could boil ice. This term is, however, only applied to liquids, and only when the vapour is formed throughout the mass and rises as bubbles to the surface. When this is not the case we speak of liquids as evaporating and solids as volatilizing. The singing noise sometimes heard in water shortly before it reaches the boiling point is produced by the formation and subsequent collapsing of bubbles of steam.

As in melting ice, the heat rendered latent in vaporization is expended in changing the relation of the molecules to each other. These are much further apart in steam than in water. One volume of the latter would occupy nearly 1700 volumes when converted into the former by boiling, at the ordinary pressure of one atmosphere. If, however, half this weight be removed the steam would occupy double the space. Therefore we say that steam is elastic. But it is not so to an unlimited extent; for if, instead of diminishing, we were to increase the pressure a large portion of the steam would be converted into water. That is to say, the tension of steam at 100°C. or its power to withstand pressure, is equal to one atmosphere (the weight of a column of air from the sea-level to the limit of the atmosphere, equivalent to the weight of a column of mercury of the same diameter 760 mm. high). Steam heated to a higher temperature (as can be done in the boilers of steam engines) can resist a greater force before being converted into water. It is, therefore, able to do some work in addition to resisting the atmosphere. If cooler than 100°C. its tension is less than that necessary to resist the atmosphere; and, therefore, being unable to entirely resist it, the steam must be mixed with the air (in proportion depending on the temperature) if it is to remain uncondensed. The cooler it is, the greater the proportion of air mixed with it must be; or, since the temperature of the steam and the air are the same, we may say the cooler the air the less aqueous vapour it is able to hold.

When air is completely saturated with vapour, it is said to be at its *dew point.* If subsequently cooled, a portion of the vapour will separate; if heated, it can absorb still more. This we find frequently illustrated in nature. A glass of cold water brought into a warm room frequently condenses a film of water on its surface. During cold weather dew is often deposited from the atmosphere of the warmer room on the windows. Clouds and fogs, which consist of minute drops of water too small to fall to the ground, are produced by a warm current of air laden with moisture coming in contact with a colder one, lowering its temperature below the dew point. That the clouds surrounding the peaks of mountains appear to remain there permanently, notwithstanding that a slight wind may be blowing, is due to the cold atmosphere produced by the ice, snow, or glaciers being confined to narrow limits. The warm air striking these produces a cloud which disappears when the warmer region is again reached; for the drops of water being once more evaporated become invisible like aqueous vapour always is.

The minute drops of water in the clouds, if gathered together into larger ones, replace, by the formation of rain, hail or snow, the evaporation continually taking place at the earth's surface. At the same time it removes some of the moisture from the atmosphere. Thus the variations in temperature, in addition to supplying us with rain and the beneficial results following it, viz., the purifying of the atmosphere from dust and various gasses, returning to the soil the fertilizing materials expended in the atmosphere, and feeding the springs and rivers, and furnishing the higher lying districts with water; they also serve to prevent the air from being at all times at its dew point.

As has been mentioned water has a great power to act as an equalizer of climate. By its evaporation during the day it has a powerfully cooling influence. This is easily observed when comparing the refreshing coolness of a lawn, which is largely due to the moisture evaporated by the grass, with bare streets and sandy plains. In addition to this cooling influence, which is the greater the warmer the day, vapour has a tendency to preserve the heat during the night, as it acts as a mantle or blanket to the earth, preventing the too rapid radiation of the heat absorbed during the day. The rapidity with which the thermometer drops during a clear star-light night, when the vapour has been partially deposited as snow or rain or drifted by the winds to other parts of the globe, is frequently observed when compared with what takes place on cloudy nights.

But the water, as such, acts also as an equalizer of temperature. We find that some materials do not increase in temperature as rapidly as others when exposed to the same source of heat; i.e., some do not vary as easily as others, notwithstanding that they may absorb the same quantity of heat. This is easily seen when comparing the rapidity of increase in temperature of dry sand with that which has been previously moistened; or water with iron or some other metal when exposed to the heat of the sun. The metal and the dry sand become warm much more quickly than the wet sand or the water. Yet, making allowance for the evaporation of water and the quantity of heat reflected from them, the water, though very much colder, will have absorbed the same quantity of heat as the other materials and can again transmit it to cooler bodies. Thus during the day, more especially during the summer months, it absorbs the heat of the sun and liberates it again at night, or during the colder part of the year, at the same time remaining itself comparatively uniform in temperature. Even a small lake frequently protects plants growing on its shores from injury, while those at some distance may be killed by an early autumn frost. The larger the body of water the more marked its equalizing influence will be, and the greater the extent of country benefited by it.

Generally bodies expand with heat and contract with cold. Water is no exception to this rule at the higher temperatures, but when below 4°C. it acts exactly opposite to this law. At this point, therefore, it has its maximum density, i.e., is heavier than at any other temperature. by this property water is still further preserved from variation, for the heaviest portion (that nearest 4°C.) will remain at the bottom where it is protected by the layers overlying it.

A popular impression is that, owing to this peculiarity of water rivers and lakes are prevented from being frozen solid to the bottom in winter. Although, in addition to the high specific heat of water, it doubtless helps to prevent this, the principal cause is to be sought for in the properties of ice. During its formation it expands very considerably and, therefore, occupying more space than the water is lighter than it and floats on the surface. Being a bad conductor of heat it serves as a mantle, retarding very materially the action of the cold atmosphere on the water. That ice occupies more space than water is shown by the fact that when water is allowed to freeze in pipes or other vessels they are very frequently broken by it. The heaving of fence posts and, to some extent, the bad roads in spring are also indications of this property Although doubtless sometimes doing considerable injury this expansion of water when solidifying has been of immense value in the formation of soils.

Ice follows the general law of expanding with heat and contracting with cold. The rolling, thundering noise sometimes heard on large planes of ice, when the temperature is falling is caused by the contraction and subsequent cracking of ice. The fissures being filled with new ice, the plane, on the advent of warmer weather, expands increasing in area. The force with which this takes place is very considerable, as frequently large stones are moved and heavy timbers broken by it.

As the melting point of ice is always the same under ordinary conditions, so the freezing point remains constant under similar conditions. But if water be subjected to pressure or kept entirely undisturbed it can be cooled considerably below the temperature at which it generally solidifies. A like result is said to follow if it be exposed in fine capillary tubes. As soon as the pressure is removed or the water disturbed, ice forms very rapidly, the water at the same time increasing in temperature till the point at which it generally freezes is reached. The heat then manifested, by an increase of temperature was up to that time latent in the water. A very interesting experiment to show that pressure affects the freezing of water was made by filling a cannon ball (shell) with water, closing the opening and exposing it to a low temperature. After a time the pressure produced by the formation of ice was sufficient to break the ball. The pressure being relieved the water froze so quickly that the portion of it which had been forced out had not time to drop to the ground but formed a well defined, sharp ridge of ice.

A factor influencing the freezing of watery solutions is the nature and quantity of the material dissolved. If these be gaseous the water will generally freeze more readily, therefore, water which has boiled requires a lower temperature than that from which some of the gases have not been driven off by boiling. On the other hand solids held in solution lower the freezing point. Since the sap of plants consists of a watery solution of principally solid materials separated by the cell walls into narrow channels or small drops—both factors retarding freezing—we may look in this direction for the explanation of the fact that some herbaceous plants can withstand several degrees of frost without injury.

Remembering that water is only a simple inorganic compound, and reflecting upon its many properties and varied functions, not only in nature but also in the arts, how it is made use of in the steam engine, the hydraulic press, and the water wheel; in the laundry and the kitchen—its effects in the lakes and rivers—how it has excavated monstrous caves and deep ravines— its aid to commerce and its important offices in the soil and the atmosphere, in plants and in our own bodies—and then, when we notice how every property it possesses seems specially designed to make this globe more perfect and to assist in the working of the laws of nature, I am convinced that those who reflect on these things must all feel a desire to study these laws more thoroughly.

EXCURSION TO CASSELMAN.

No. 2.—1892.

The second excursion of the season took place on the 9th inst., and, as advertised in our last issue, the *rendez-vous* was Casselman.

Notwithstanding threatening skies and occasional showers, about twenty-five members and their friends assembled at the Canada Atlantic Railway Station and, nothing daunted, boarded the 2.15 p.m. train. An hour's pleasant ride brought the party to their destination, where by the courtesy of the railway officials a car was side-tracked for the accommodation of the excursionists. As it came on to rain shortly after our arrival, this kindness of the C. A. R. was much appreciated by many of the ladies who determined to make the car their head-quarters.

Despite the shower and braving the mosquitoes, the rest of our party, headed by the energetic Vice-President, Mr. F. T. Shutt, struck down to the river bank. At first the walk along the valley of the winding stream was easy and pleasant and as many a picturesque vista of meandering river and forest-clad banks opened out to view it was very much enjoyed. But soon, alas, the way became more slippery, the underbrush thicker, the mosquitoes more numerous, and some of us, wet and irritated by the myriad attacks of our winged foes, succumbed—gave up further scientific pursuit and returned to the ladies and the car. Those who kept on, however, were well rewarded by the collection of a large number of plants in flower (49) and some magnificent and beautiful ferns—specimens of the *Onoclea Struthiopteris* over six feet in height being obtained.

The exploring party returned from their expedition with keen appetites and enjoyed their tea in the country thoroughly.

The Acting President, Mr. Shutt, spoke for a short time of the beauty of the locality and the pleasures always to be found in attending the Club excursions. Although the party was small, owing to the weather, he felt sure that all had spent a pleasant and instructive afternoon. He suggested that as so few were present it might be better to dispense with addresses upon many of the branches of Natural History. The locality was a rich one in all the different lines of study and on the present occasion they had with them Mr. J. F. Whiteaves and Mr. F. R. Latchford, both distinguished conchologists. He learned, however, that no species of particular interest had been secured. On a previous occasion Mr, Latchford had found here the only Ottawa specimens of *Helix dentifera*. Most of the collections of the day had been plants, and he therefore invited Mr. Whyte, the Botanical leader, to speak of some of the more interesting species.

Mr. Robert B. Whyte spoke with his usual ease of the many floral treasnres that had been observed or collected by members of the party. About fifty different plants had been found and specimens were shown of the following: Willow-leaved Meadow-sweet (*Spiræa salicifolia*), Twin-berry (*Mitchella repens*), the Loosestrifes (*Lysimachia stricta* and *L. ciliata*), the Moonseed (*Menispermum Canadense*). This last was used as an illustration of the beauty of many of our native climbing plants and their value as ornaments to our dwellings. The Evening Primrose (*Œnothera biennis*) in like manner served to introduce the subject of night-flowering plants. The three wild Raspberries (*Rubus strigosus*, *R. odoratus* and *R. Canadensis*) were used as a text for remarks concerning fruits, and their structure was compared with the Apple, the Plum, and the Strawberry, all of which belong to the same large order the *Rosaceæ*. The Gooseberries, wild and cultivated, were also treated of, as well as some of the ornamental members of the Heath family as *Kalmia angustifolia* and the Round-leaved Winter-green, (*Pyrola rotundifolia*). When speaking of the White Meadow Rue (*Thalictrum Cornuti*) the fertilization of plants received attention, and the seeds of Avens (*Geum strictum*) and the Traveller's Joy (*Clematis Virginiana*) showed the manner in which the distribution of plants was secured. When Mr. Whyte had finished his interesting discourse it was time to return home, and Ottawa was reached at 8.30 p m. Although the weather prevented many from going and those who did venture from enjoying themselves as much as they might otherwise have done, the excursion was by no means an unsuccessful one, and no regrets were heard from the returning party.

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BOOK NOTICES.

MANUAL OF INSTRUCTIONS FOR COLLECTING AND PRESERVING INSECTS, by C. V. Riley, M.A., Ph.D., United States Entomologist.

We have just received a copy of the above named work which will be gladly welcomed by a large number of students of nature. There is, perhaps, no enquiry which is more frequently made by amateur naturalists than, "Where can I get the best directions for collecting and preserving insects?"

And there is also, now, since Economic Entomology has become recognized as so important a factor in agricultural pursuits, a constant demand from farmers and gardeners for information as to the best means of collecting for study or for forwarding to specialists for identification any insects which may be found attacking their crops, or concerning which they may wish for enlightenment as to their habits. Prof. Riley has provided in this volume a most complete answer to these demands Great skill has been shown in selecting from so vast a subject those details only which the author's great knowledge and experience enabled him to judge, were essentials.

This work, which is a pamphlet of 149 pages, excellently well printed and profusely illustrated with figures of the very first order, many of which have been prepared especially for it, is issued by the Smithsonian Institution, as Part F of Bulletin of the United States National Museum, No. 39.

A concise classification of true insects gives in a few pages an excellent summary of the science of Entomology, which is so well illustrated that any tyro will with ease recognize the order to which such specimens as he may find belong.

The different apparatus and means of collecting and killing insects are then dwelt upon at length with special directions for each order.

Under the heading Entomotaxy the preparation, labelling and care of specimens, with the necessary apparatus, cabinets and materials, are treated. Special attention is given to cabinets and their arrangement, and under Museum Pests, Mould, etc., much valuable advice is given which could be gained only by the experience of many years of constant work.

The rearing of insects from the egg is the next snbject. Here we find full instructions for carrying on successfully this fascinating work.

The directions for packing and transmitting insects are short but complete, and it would be well if many that are not merely amateurs would read them carefully and carry them out.

A useful appendix to this manual is a list of text books and other entomological works, with suggestions as to the best way to obtain them.

The publication of this book must, we believe, be followed by a largely increased interest in the study of insect life, as we feel strongly that the chief reason why so few young people, both boys and girls, on this continent have not had their eyes opened to the charms of this branch of Natural History, to say nothing of its usefulness, is the want of such a help as Prof. Riley has now provided in this concise, complete, and plainly written manual.

THE ORTHOCERATIDÆ OF THE TRENTON LIMESTONE OF THE WINNIPEG BASIN, by J. F. Whiteaves, (Trans. Roy. Soc. Can., Vol. IX, Section IV., pp. 77-90, 1892.)

This paper as the author indicates "consists of a critical and systematic list of the *Orthoceratidæ* at present in the Museum of the Geological Survey of Canada from the formation and region indicated it its title, with descriptions of such species as appear to be new." The specimens were obtained, for the most part, by officers of the Geological Survey of Canada: Dr. Bell, Messrs. Tyrrell, Weston, Dowling, Lambe and also by a number of gentlemen interested, e.g., Messrs. Donald Gunn and A. McCharles, the last mentioned having sent unusually fine specimens in 1884.

In this paper Mr. Whiteaves departs from the classification of *Cephalopoda* by Karl Zittel and considers the genera *Actinoceras* and *Sactoceras* as distinct from *Orthoceras*, and *Poterioceras* from *Gomphoceras*. The characters of the specimens examined by Mr. Whiteaves and the grounds upon which that author separates these genera are in our estimation valuable and valid.

The following is a list of the species described and figured (for the most part) in this important paper :

1. Endoceras annulatum, Hall, var.
2. " subannulatum, Whitfield.
3. " crassisiphonatum, N. Sp.
4. Orthoceras Simpsoni, Billings.
5. " semiplanatum, N. Sp.
6. " Selkirkense, N. Sp.
7. " Winnipegense, N. Sp.
8. Actinoceras Richardsoni, Stokes.
9. " Bigsbyi, Bronn.
10. " Allumettense, Billings.
11. Sactoceras Canadense, N. Sp.
12. Gonioceras Lambii, N. Sp.
13. Poterioceras nobile, Whiteaves.
14. " apertum, Whiteaves.
15. " gracile, N. Sp.

It is interesting to note the wide geographical distribution of *Actinoceras Bigsbyi*, Bronn, and of *A. Allumettense*. These two species are well known in the Ottawa region, where there are many Cephalopods of considerable interest which deserve careful study and examination.

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A BOOK FOR BOYS.

We are much pleased to announce that Mr. S. H. Scudder, the well known author of an extensive work on the "Butterflies of the Northern United States and Canada," has now in preparation a Manual for Boys, upon the same subject as his great work. A most noticeable difference between boys and girls in Europe and on this continent is that, in the former nearly every child has some hobby—some pleasant and in most cases improving, but at any rate all-satisfying occupation—to keep it out of mischief. To children Nature offers great charms. There is not a single large school where some of the boys do not study Natural History. The masters, well knowing the value of these pursuits not only on account of their great use in education as preparing the mind for careful and accurate methods of thought and observation ; but also as inducing healthy exercise and out-door occupation, do everything to encourage scholars to investigate Nature. In Great Britain, in France, in Germany, there are good, cheap, illustrated works upon insects. Many an Entomologist who has afterwards risen to eminence owes his distinction to having had his attention drawn to the study of insects either by a schoolfellow or from having been presented with one of these books. We have absolutely no work upon the many beautiful Butterflies which frequent our Canadian woods, prairies and mountains. Such a volume for Canada and the Northern States as "Coleman's British Butterflies" would be an inestimable boon to many—not only the young, who would be charmed with the many treasures which they would find they had everywhere around them ; but also to fathers and mothers and aunts and uncles who are so often at a loss to find suitable presents for children. Mr. Scudder's name alone is a guarantee that the work will be well done.

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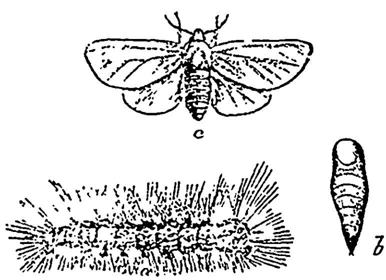
THE FALL WEB-WORM (*Hyphantria cunea.*)

By J. Fletcher.



In the above figure are shown the caterpillar, chrysalis and perfect insect of the Fall Web-Worm, one of the greatest pests to our shade and fruit trees. The moth, which in the northern form, as it occurs at Ottawa, is pure white with gray antennæ or feelers; its front thighs are yellow and the feet dark. Further to the south the moths are frequently ornamented with many black spots, but I have never seen this form in Canada. At the present time, many of our shade trees are rendered unsightly by the nests of the social caterpillars of this insect and this note is inserted to request the members of the O. F. N. C. to set a good example by destroying them whenever they observe the nests, and requesting others to do the same on every opportunity. As yet the webs are not very large, but they will be rapidly increased in size by the caterpillars as they grow to maturity, and unless removed will remain through the winter as a disfigurement to the trees and a disgrace to the community.

The eggs are laid upon the leaves of a great many different kinds of shrubs and trees in July, in clusters which are composed of a large number of greenish white eggs and are more or less hidden by a loose covering formed by the female of her own scales. The eggs soon hatch and the young caterpillars at once begin to spin a protecting web. They are pale yellow at first, with black heads and two rows of black spots along the body, and are covered with slender hairs. When small they eat only the upper surface of the leaves, skeletonizing them. They grow rapidly and enlarge the web as they develop. They remain almost entirely in their tent and will destroy the foliage of a large-sized branch in a short time. When full-grown they are about an inch in length and vary greatly in their markings. Some specimens are pale yellowish, whilst others are of a deep gray. The head is black and there is a broad dark stripe down the back. Along each side is a yellow spotted stripe. The body is covered with long soft hairs which vary in colour, and whice arise from a number of small black or orange tubercles. When almost full-grown they give up their social habits and scatter in all directions to continue their depredations. They pass the winter in the chrysalis state within slight cocoons which they spin either amongst fallen leaves, in crevices of bark, or a short distance beneath the surface of the soil, where they remain until the following summer.

The webs from the very first are conspicuous objects and from the social habits of the caterpillars a whole colony is easily destroyed by cutting off the nest and trampling it under foot. To take this small trouble in order to protect our shade trees from one of their worst enemies is what I am asking our members to do.

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A. A. A. S.

The next Annual Meeting of the American Association for the Advancement of Science and the Associated Societies, will be held this year at Rochester, N.Y., beginning on August 17th and ending about August 24th. The proximity of Rochester should induce many of our members to take this opportunity of meeting the uumerous men of note who always attend the A. A. A. S. meetings.

EXCURSION III.

TO LA PÊCHE ON THE GATINEAU.

The Third Excursion of the Club will most probably be held on Saturday, September 3rd, to LA PÊCHE, on the Gatineau Valley Railway. The great success of the first excursion up the Gatineau, added to the fact that a large number of members who have asked for another expedition by the Gatineau Valley Road, have induced the Council to arrange for another outing as soon as possible. Definite arrangements cannot yet be made as to the prices of the tickets. These will probably be about 50 cents for adults. The larger the number that attend, the smaller will be the price. There is no desire to make any profit on the Club excursions, all that is wanted is to cover the necessary expenses. An effort is always made to get as large an attendance as possible so as to popularise the Club and its objects, which are to bring together for a pleasant day in the country those interested in the various branches of Natural History, and to take every opportunity of inducing more to study the things of beauty which surround them on every side. Arrangements are always made to give members of the Club an advantage in the prices of the tickets; but the excursions are open to all without exception. The Council trusts that every member will help to make this excursion a succes and endeavour to attend and induce others to do so also. Definite notice of the prices of the tickets and of the times of the trains will be given in the September OTTAWA NATURALIST, which our readers are respectfully requested to consult. Every notice of an excursion which is made by circular costs, for printing and postage, about $4 which has to be made up by charging a higher rate for the tickets. If, therefore, members will look for NOTICES on the top outside cover of the monthly magazine they will see at a glance if there is to be an excursion, and inside on the last page will be found the full particulars. In this way the expense of the circulars will be obviated and the price of the tickets will be reduced.

SUMMARY

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Canadian Mining Regulations.

NOTICE.

THE following is a summary of the Regulations with respect to the manner of recording claims for *Mineral Lands*, other than Coal Lands, and the conditions governing the purchase of the same.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining a mining location for the same, but no mining location shall be granted until actual discovery has been made of the vein, lode or deposit of mineral or metal within the limits of the location of claim.

A location for mining, except for *Iron* or *Petroleum*, shall not be more than 1500 feet in length, nor more than 600 feet in breadth. A location for mining *Iron* or *Petroleum* shall not exceed 160 acres in area.

On discovering a mineral deposit any person may obtain a mining location, upon marking out his location on the ground, in accordance with the regulations in that behalf, and filing with the Agent of Dominion Lands for the district, within sixty days from discovery, an affidavit in form prescribed by Mining Regulations, and paying at the same time an office fee of five dollars, which will entitle the person so recording his claim to enter into possession of the location applied for.

At any time before the expiration of five years from the date of recording his claim, the claimant may, upon filing proof with the Local Agent that he has expended $500.00 in actual mining operations on the claim, by paying to the Local Agent therefor $5 per acre cash and a further sum of $50 to cover the cost of survey, obtain a patent for said claim as provided in the said Mining Regulations.

Copies of the Regulations may be obtained upon application to the Department of the Interior.

A. M. BURGESS,
Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR,
Ottawa, Canada, December 19th, 1887.