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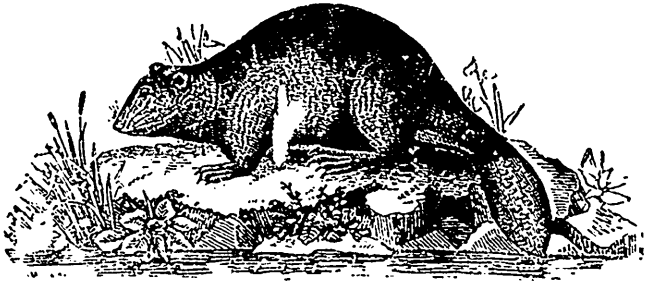
ANNUAL MEETING, MARCH 20th, 4.15 P.M.

February and March, 1894.

THE OTTAWA NATURALIST

VOLUME VII. No. 11 and 12.



THE BEAVER (*Castor Canadensis*, Kuhl).

CONTENTS.

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FOLLOWING A PLANET.

By A. McGill, B. Sc., B.A.

(Read January 9th, 1894.)

It is by no means a difficult thing for anyone who will take the trouble to observe the heavens, say for half an hour each night on the consecutive clear nights of any month in the year, to assure himself that the stars which shine there maintain, with reference to each other, the same position in the sky, night after night. Perhaps the simplest and consequently the best observation to begin with, will be the recognition of the Great Dipper, not itself a complete constellation, but a very conspicuous group of seven stars in Ursa Major. So many people are familiar with the 'Dipper' that any one not himself able to identify it, will find no trouble in getting some friend to point it out for him. The stars are so arranged with reference to each other, that four of them are placed at the corners of a somewhat irregular rectangle the bowl of the Dipper - while the remaining three extend outwards from one of the corners of the rectangle, nearly parallel to its long axis, and represent the handle. The middle one of these three is not exactly in line with the other two, so that the handle is slightly bent. It may be incidently mentioned here that this particular star is double, and is a very beautiful object as seen by a small telescope. A very short distance above it is a somewhat smaller star, visible to the naked eye - and popularly known as *Jack*, astride of the pole of the cart, when, what I have called the *Dipper*, is imagined as *Charles' Wain*, a very common name in some parts of England, for this group of stars.

Nothing can be more instructive or convincing to a beginner in star-gazing, than the continuous watching through one whole night—preferably a summer night, in our latitude—of this star group. If this be done it will be found that when the long axis of the Dipper is parallel to the horizon, a position which it is certain to take some time during the period of vigil, then the handle will be extended to the left hand side (west) of the observer, if the Dipper is *right side up*; or to his right hand side, (eastward) if the Dipper is *upside down*. It is in this latter position that it will be seen at twelve o'clock these nights, (middle of

February.) As the hours pass it will be noticed that while the stars hold the fixed positions stated in regard to each other, the position of the group as a whole changes with reference to the horizon. Three hours after the handle was pointed eastwards, it will be found directed upwards, and three hours later will point westwards. If, at the times of noting the position of the Dipper, a more or less general observation of the brighter and more remarkable of the other star groups has been made, it will be an easy matter to convince ourself that every star in the sky has been describing a circle, larger or smaller westwards, the circles described being smaller and smaller towards the north—until the eye is compelled to notice one particular star, which alone, of all the bright stars in the sky, maintains a fixed position no matter how long the vigil be kept up. This star will be found in the very same place night after night throughout the year, as well as hour after hour for any particular night. It marks one of the polar points of an axis, about which the celestial sphere revolves, and it is the *pole star*. It may be easily seen that a line joining the stars in the *front* of the Dipper, if produced, will pass nearly through the position of the pole star, and hence these stars are often called the *pointers*.

It is necessary to any intelligent conception of the stellar movements, that the phenomena just described be fully apprehended; but it is to another set of star groups that I wish to-night to ask your attention. Thus far we are supposed to have been directing our eyes northward. Let us turn our backs as exactly as we can to the position of the pole star, and so placed, look upwards and forwards. We are looking in the plane of our meridian, and if we look directly up to the zenith, we locate in the line of vision, a point on the celestial meridian just as far from the pole star (in circular degrees) as our angular distance from the pole of the earth—which for Ottawa is practically the same as our latitude, about 45°.

Measure off as well as you can towards the South, and in the line of the meridian, a second distance equal to this, and you are looking at a point in the equinoctial or celestial equator. The stars at this point are seen to describe the largest circle in their movement from the eastern to the western horizon. A particular interest attaches to the making

of this observation at, or about, the 21st of March, and again at the 22nd of September. At these times you not only look at a point of the equinoctial, but at a point of the ecliptic, for at these dates the two circles cut each other. and in the interval the ecliptic or circle in the heavens which the Sun describes in his annual progress, passes north of the equinoctial, while from September to March the Sun's path is south of the equinoctial. Now, it will be evident on a moment's thought that since the stars cannot be seen while the Sun is in the sky, we need not hope to see the point of intersection of ecliptic and equinoctial, (except by looking at the Sun himself,) while the Sun is at that node. But, if we will look at our meridian as already described at midnight on the 21st March, we shall see there the place which the Sun will occupy on the 22nd of the following September; and if we choose that date in September for a similar observation, we shall see the so-called, *Vernal* equinox; and although no bright stars are situated at the region in question, a little careful scrutiny will enable us to fix in our memory a pretty numerous group of small stars—the constellation *Pisces*. Had the observation been made in March, we should have found a very brilliant star (Spica) in the constellation Virgo then in the meridian. This constellation marks the position of the Autumnal equinox, and the position of the Sun in September, from which date until March following, his path is south of the celestial equator.

Astronomers have marked off in twelve groups the stars lying along the Sun's path, and within a zone extending about 8 degrees on each side of the line of his motion. These so called zodiacal constellations are for the most part very easy of identification but I can scarcely recommend the two which mark the Equinoctial points as the first which should be located, although as I have already remarked, they possess a very special interest to the astronomer. They happen to be less well defined by brilliant stars than most of the others; and at this time of the year Taurus, Gemini and Leo are no doubt the most readily fixed in the memory. The small groups Pleiades and Hyades in Taurus can never be forgotten by any one who has once recognized them. While Aldebaran is a large red star forming one extremity of the V group known as Hyades. Leo is well marked by a sickle, in the handle of

which is the star Regulus, of the first magnitude. In summer nights the zodiacal constellations Scorpio and Sagittarius are very remarkable and beautiful. But perhaps the easiest way to note the position of the zodiacal constellations is to watch the progress of the Moon from night to night during any lunation. She describes, with sufficient accuracy for such purposes as this, the same path as the Sun, and in one thirteenth part of the Sun's period ; so that while the Sun takes about 30 days to pass from one of the zodiacal constellations to the next, the Moon covers the same space in little more than two days. If then the Moon's place in the zodiac be known when first she is seen (at the new), she will mark out the next constellation of the zodiac (eastwards) in about 55 hours from that time. Her brightness, especially at the full, makes it difficult to recognize the detail of the constellation in which she is situate ; but the constellations east and west of this one may be easily and satisfactorily examined.

Once the observer has made himself well acquainted with the belt in the heavens known as the zodiac, he will find no difficulty in assuring himself that the Moon is not the only celestial sphere which traverses this path. At different hours of the night and at different times of the year he will see the planets Jupiter, Saturn or Mars as very brilliant stars—differing only by the steadiness of their light from the other bright stars—in one or other part of the zodiac. At the present time Jupiter is the most brillant star in the sky, and is in the constellation Taurus, a little south of the Pleiades. But Jupiter, Saturn and Mars may easily be distinguished from the true stars by the fact that they change their places with regard to these. It is on this account that they are named *Planets* (wanderers), and it is a peculiarity of their movement to which I would specially ask your attention to-night. Speaking broadly, any of these planets will be seen to travel over the same course as the Moon, that is from west to east, among the zodiacal constellations—but, of course, with much greater slowness. If we could view the Earth's motion in the zodiac from the Sun as our station of observation, (and though this cannot be done in fact, it may easily be done with the aid of imagination), we should see the Earth complete the circle from Virgo, in March, to Leo, in the following February ; in

other words the Earth requires twelve months to pass across the faces of the twelve zodiacal constellations as seen from the Sun. If now from our heliocentric position we watch the journey of Jupiter around the same course, we should have to wait 11.86 years to see the course completed,—or while the Earth passes from one constellation to the next in a month, Jupiter takes about a year to travel over the same arc. This is partly due to the fact that his orbital velocity in miles per unit of time is to that of the Earth as 4 to 9, and partly to the much greater length of his orbit, which is a circle having a radius about five times that of the Earth's orbital radius. But, although the rates of motion would be very different, the directions would be the same : from Libra to Scopio ; from Scorpio to Sagittarius, and so on eastward, just as in the case of the Moon. If now, still occupying the Sun's place, we were to watch the progress of both planets, it is evident that we should see the Earth make the complete circuit of the zodiac nearly twelve times while Jupiter made the journey once. And further, we should see the Earth pass Jupiter's place, say in Aries, in a particular year, while in the following year our planet would pass Jupiter in Taurus, and the next year in Gemini, and so on. Now Jupiter, as actually seen from the earth, does not journey regularly eastward, but appears, during a part of each year to retrograde, going from the east towards the west in the zodiac. The olden astronomy figured his path, as well as the paths of the other planets, as circles with loops on the circumference. These loops—or Epicycles—are twelve in the case of Jupiter ; and it is by no means difficult to understand how they explain the planet's peculiar and complicated motion, as seen from the earth. When, however, we adopt the Copernican theory which looks on the Sun as the centre of the planetry system, the explanation becomes still simpler. The best way to do this is to draw on a large sheet of paper two concentric circles of radii 1 and 5 respectively. These circles represent the orbits of our Earth and Jupiter, and their common centre is the Sun's place. Divide each circle into twelve equal arcs. The points of division will represent on the smaller circle the Earth's place at intervals of one month, and on the larger circle, Jupiter's place at intervals of one year. Subdivide any one of the arcs (of 30°) of the larger circle into 12 divis-

ions, and each of them will represent Jupiter's place at monthly intervals. Starting with any one of the positions of the Earth as January, name the next one February, the next March, and so on, in the direction from right to left, or the reverse way that the hands of a clock travel over its face. Do the same for the monthly places of Jupiter, and finally connect by straight lines the points of the same name in the two circles. The point on the smaller circle represents the station of the observer for that month, and the point on the larger circle is Jupiter's actual place for the same month. The line joining these points is the line of vision, and if it be prolonged beyond the larger circle to a considerable distance the farther the better - an arc may be drawn there which will represent a portion of the region of the stars, an arc of the ecliptic. On extending all the lines to this arc in the order of the months, it will be found that they intersect and retrograde exactly as does the planet when followed by actual observation in the heavens; and the more accurately that the diagram is drawn to scale, the more exactly will the figures explain Jupiter's actual motion. Nothing can be more interesting or more instructive to a beginner, than the combination of actual observation of the planet, with a geometrical plotting of the motions on paper in this way.

NOTICE TO MEMBERS.

This number makes eleven issues of the NATURALIST and completes the Volume of 178 pages, besides the 24 pages of Flora Ottawaensis issued during the year.

The ANNUAL MEETING will be held in the Normal School on Tuesday, March 20th, at 4 15 p.m. and in the interest of the Club a large attendance is desired. Those who have not paid their subscriptions for the year will kindly forward the same to the Treasurer without delay

GEOLOGY.

Edited by H. M. Ami, M.A.

THE GEOLOGICAL SOCIETY OF AMERICA.—The fifth annual meeting of the Geological Society of America was held in Boston last December, 26th, 27th and 28th, under the auspices of the Boston Society of Natural History and of the Geological Department at Harvard University, Cambridge, Mass.

Principal Sir William Dawson, Emeritus Principal of McGill University, presided at the sessions for the greater part of the time, and was relieved by Prof. T. C. Chamberlain, of Chicago University, the new president-elect. Amongst the other Canadians present were: Mr. W. McInnes, Dr. F. D. Adams and Dr. H. M. Ami. Among the fellows recently elected are Messrs. T. C. Weston and E. D. Ingall, A.R.S.M., of the Geological Survey staff. A brief outline of the results of the meeting will be prepared for a future issue of the NATURALIST.

MR. TYRRELL'S JOURNEY.—Mr. J. B. Tyrrell, of the Geological Survey staff, has just returned from his extended trip to the Western Extremity of Chesterfield Inlet. During his journey, Mr. Tyrrell and his staff endured many hardships but finally reached Fort Churchill on the Western Coast of Hudson's Bay where they were hospitably treated. Thence the party travelled southward until Selkirk and the C.P.R line was struck, arriving home in Ottawa the second week in January—having completed a circuitous route embracing some 4,600 miles. About 800 miles of that distance were by previously unexplored rivers, lakes and rocky land, the home of the barren ground caribou.

MR. LOW'S TRIP TO UNGAVA BAY.—News has reached the director and other officers of the Geological Survey from Mr. A. P. Low, B A. Sc., who left Ottawa last April, 1883, and crossed the Labrador Peninsula to Ungava Bay. From thence Mr. Low crossed to Hamilton Inlet on the East Coast where he will winter. In the spring he will retrace his steps and return to Ottawa in the fall of this year.

BOTANY.

Edited by W. Scott, B.A

PELLÆA DENSA, *Hooker.*—In looking over some ferns and plants collected by me on the Guelph Dolomites of Durham, County Grey, Ontario, in 1883, I chanced to observe a fern which had not hitherto been noticed by me with care and which turns out to be interesting. Having taken it to Prof. Macoun for identification, he immediately recognised the same to be a specimen of *Pellæa densa*, Hook.

This note is intended merely to place on record the discovery of this little "cliff-brake" in the Province of Ontario. I found it at Durham near the saw-mill dam on the Little Saugeen River, in September, 1883, growing in the crevises and nooks of the Guelph dolomites there exposed.

The following notes on the geographical distribution of this plant may be found in Macoun's "Catalogue of Canadian Plants," Part V.

Acrogens, p. 261. "A rock species, confined so far as known to the provinces of Quebec and British Columbia, where it is rare. Found by Prof. Allen on Mount Albert, Shickshock Mountains, Gaspé, Que., in 1881, growing exposed to the sun on the steep walls of ravines, at 2000 to 3000 feet elevation. (*Eaton.*) Abundant on cliffs along the Fraser River above Yale and within the Cascade Mountains; notably at Chinaman's Bluff, on rocks, Sicamous, Shuswap Lake; and summit of Mount Finlayson, Vancouver Island, B.C. (Macoun.) Mount Finlayson, Vancouver Island, B.C. (Anderson.)"

From the above it can be readily seen that so far as known *Pellæa densa* has been found in Gaspé, Quebec and in British Columbia, two extreme points of the Dominion of Canada, and therefore it seemed an interesting fact to record this species from an intermediate station in Ontario. The habitat in Ontario is similar to that in other places.

H. M. Ami.

ENTOMOLOGY.

Edited by JAMES FLETCHER, F.R.S.C.

Corydalis cornutus. Several times last summer this insect was sent in by members for information as to its name and habits. This is not surprising, as it is one of the most striking in our insect fauna, and yet from its crepuscular habit of flight, but seldom observed. It is as remarkable and interesting in its earlier stages, as when it assumes the adult, or winged form. The larva passes its life in the water, and is a common inhabitant of our rivers, being quite abundant for instance in the Rideau. In this stage it lives nearly three years, and when fully grown is a dirty brown "crawler," with a squarish head armed with strong jaws. In addition to six legs, it has several tapering appendages on each side, which gives it some resemblance to much dreaded centipedes. It breathes during its aquatic existence, by means of tuft-like gills placed at the base of the lateral appendages. About June (of its third year) it becomes tired of its submarine life, and seeks change of scene, and may then be found under stones or drift wood, sometimes at quite a distance from the water. Forming a shallow cell it pupates, and about the first of July spreads its ample wings in heavy flight over the surface of the stream in which it erstwhile crept. The expanded wings measure almost six inches from tip to tip, but the heavy body of the insect causes it to be a feeble and awkward flier. The body of the adult much resembles that of the larva, but the male developes an enormous pair of horn-shaped mandibles, which give him a very formidable appearance. This species belongs to the Neuroptera, and is allied to our dragon-flies, as may be readily seen by examining the many veined wings. The larva is considered by fishermen to be an excellent bait, and has received in the United States a variety of names, among which the following are taken from Insect Life :—Dobsons, Crawlers, Amly, Conniption Bugs, Clipper, Water Grampus, Goggle Goy, Bogart, Crock, Hell Devils, Flip Flaps, Alligators, Ho Jack, Snake Doctor, Dragon and Hell Diver.—The adult is also known as the Hellgramite Fly.

W. H. H.

BOOK NOTICES.

Le Naturaliste Canadien—Vol. xxi, No. 1.—Chicoutimi.

We warmly welcome again to our table the monthly magazine founded by the Abbé Provancher, and by him continued for many years despite numerous difficulties and discouragements. Henceforth it will be published by his pupil and co-laborer, Abbé Victor-A. Huard, of Chicoutimi, a gentleman of well-known scientific attainments. The Naturaliste Canadien is the only scientific journal published in the French language on this continent, and therefore appeals to a large body of our people, who are not reached by other scientific publications. We sincerely trust, therefore, that it may receive a hearty support from all those who desire to see the truths and beauties of science brought before fresh audiences. All branches of Natural History will be discussed and an elementary treatise on Zoology has been commenced with separate pagination. The editor proposes also to continue the Faune Entomologique of his predecessor as opportunity permits. Ed.

The Biological Review of Ontario. Vol. 1, No. 1.

This is a new quarterly of sixteen pages, published by an apparently newly formed society; The Biological Society of Ontario. It contains several interesting articles on birds and insects. The necessity of this publication is however, not apparent, as any of the articles contained in it could have been contributed to existing publications such as the Ottawa Naturalist, and the Canadian Entomologist. There does not seem a demand at present for an addition to the scientific publications of Canada. It would be much better for all workers to unite in supporting those already firmly established. Local societies for the study of natural history can be made very useful in bringing workers together, and in fostering an interest in the carrying on of useful investigations, but in the majority of cases the labor and expense necessary to issue special publications might be more profitably employed. Ed.

Annual Meeting on Tuesday, March 20th, at 4.15 p.m.

CONTENTS.

SUMMARY

— OF —

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*, shall not be more than 1500 feet in length, nor more than 600 feet in breadth. A location for mining *Iron*, 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 1892.