NOVEMBER, 1903.
VOL. XVII, No. 8

THE OTTAWA NATURALIST.

Published by the Ottawa Field-Naturalists' Club.

CONTENTS.

(ISSUED NOVEMBER 10, 1903.)

OTTAWA, CANADA.
OTTAWA PRINTING COMPANY (LIMITED).
3 & 5 MOSGROVE ST.

Entered at the Ottawa Post Office as second class matter.

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, NOVEMBER, 1903. No. 8

THE LOWER JAW OF DRYPTOSAURUS INCRASSATUS (COPE).*

LAWRENCE M. LAMBE, F.G.S., F.R.S.C., of the Geological Survey of Canada.

(With three plates.)

The following remarks on the lower jaw of *Dryptosaurus incrassatus* are the partial result of the examination of the remains of two skulls of that species in the collection of the Geological Survey of Canada, and are offered in advance of a more detailed description of the specimens in course of preparation by the writer at the present time.

The two skulls are from the Edmonton series** of the Cretaceous system of the North-West Territory, and were collected by Mr. J. B. Tyrrell and Mr. T. C. Weston in 1884 and 1889 respectively. The first specimen, figure 1, was obtained two miles from the mouth of Knee Hills creek, a tributary of Red Deer river, in the District of Alberta. The second, figure 2, was found on the east bank of Red Deer river, about twenty-one miles above the mouth of Knee Hills creek.

A preliminary description of these specimens by Professor E. D. Cope appeared, in 1892, in the Proceedings of the American Philosophical Society.***

---

* Communicated by permission of the Acting Director of the Geological Survey of Canada.

** Regarded by Tyrrell as comprising the uppermost beds of the Cretaceous system in Alberta. Geological and Natural History Survey of Canada, Annual Report, new series, vol. II, part E, 1886.

*** "On the skull of the Dinosaurian Lælaps incrassatus, Cope." Proc Amer. Philos. Soc., vol. XXX, p. 240.

The skull discovered in 1884, figure 1, is somewhat larger than the one found in 1889, figure 2. In both, the right ramus of the mandible is displaced downward so as to reveal its inner surface. In the 1884 specimen both halves of the mandible are preserved almost in their entirety. The left ramus lies against the lower left half of the cranium so as to conceal its inner surface in the vicinity of the anterior half of the surangular, and the corresponding part of the right ramus is hidden by some of the bones of the palate. In both rami, unfortunately, a considerable part of the lower border is missing below the front part of the surangular. The 1889 specimen consists of the anterior parts of the skull, the lower jaw lying against the palate so that the inner surface of the left ramus and the outer side of the right one is hidden. The left ramus is preserved for about three-fourths of its entire length from the front but the right ramus is broken off at about its mid-length.

In comparing the mandible of *Dryptosaurus incrassatus* with that of the Jurassic *Ceratosaurus nasicornis* of Marsh, it is seen, that the former is deeper, in proportion to its length, than the latter, otherwise the general contour in both species is somewhat similar.

In the Canadian specimens the following elements of the lower jaw are more or less clearly exhibited:—the dentary, the surangular, the angular, the articular and the splenial, with a presplenial. The coronoid is in both specimens either not preserved or is covered by other bones of the skull.

The dentary is a large and robust bone extending backward to beneath the articular cotylus. Its greatest depth is attained at about its mid-length, where it meets the surangular and narrowing rapidly passes backward below that element, overlapping it posteriorly as a thin plate terminating in an acute point, figure 3. On the inner surface the dentary occupies about one-half of the lower depth of the jaw anteriorly, narrowing backward gradually until it passes to the outer surface. In the amount of its backward extension it equals that of the dentary of *Sphenodon* as described by Günther in the Philosophical Transactions of the Royal Society of London in 1868.*

* "Contribution to the Anatomy of Hatteria (Rhynchocephalus, Owen)." Philos. Trans. Royal Soc., vol. 157, p. 595, pl. xxvi, fig. 7.

The surangular is broadly arched above, as seen in side view, and almost completes the remainder of the outer surface of the mandible, the posterior end of the angular being visible inferiorly to a limited extent. The surangular is strengthened exteriorly, near its upper border, by a prominent rounded ridge extending for some distance forward from the articular cotylus into the composition of which this bone enters. It embraces the articular anteriorly and passing beneath it extends as far back as the posterior limit of that element. It is pierced by a large foraminal opening at about one-fourth its length in advance of its back termination and at about its mid-depth; its inner surface in this region is deeply concave (figure 4). Below the foramen the bone becomes gradually thinner, where it is overlapped by the dentary, and is continued forward with a thickness inferiorly of only a few millimetres, although posteriorly and along its upper border it is a strong and robust bone.

The articular is small and compact, roughly triangular in shape, and is scarcely seen except when viewed from above. It forms about two-thirds of the cotylus and is overlapped on its inner side by the angular, which extends nearly as far back as either the surangular or the articular. Its breadth exceeds its antero-posterior diameter.

The cotylus is transverse, strongly bifossate and evidently points to a strictly upward and downward motion of the jaw, as the distal end of the quadrate fits closely into it. The movement of the jaw is, therefore, apparently restricted, and differs from that of *Sphenodon* in which the articulating surface is nearly four times as great antero-posteriorly as the condyle of the quadrate and admitted of a backward motion of the mandible.

The slender bone meeting the surangular below the articular, and embracing the latter element on its inner surface, is regarded as the angular. It passes forward on the inner surface of the ramus in contact with the inferior edge of the posterior extension of the dentary but is, unfortunately, broken in both rami of the 1884 specimen at a point slightly behind the mid-length of the surangular. The break in both halves of the jaw at this point is unfortunate as it is here that the junction of the angular with the splenial would have been looked for. It is probable, however, that

anteriorly the angular increases considerably in depth reaching the coronoid above and the splenial in front.

The broad lamellar bone immediately above the dentary on the inner surface of the ramus (figure 2) is the splenial. It is misplaced in the specimen figured in plate I, and it is seen in section in its proper position in both skulls at the points *e* and *f* in figures 1 and 2 respectively. It is perforated near its anterior end and close to its lower border by a large oval foramen. At a short distance behind this foramen a well marked emargination of the bone occurs, visible in both specimens but shewing more decidedly and to a greater extent in the skull figured in plate I. The outline of this emargination bears a strong resemblance to the anterior end of a second foraminal opening, which if it did exist, may have been partly formed by the angular as in *Crocodilus*.

Continuing forward from the splenial is a narrow presplenial that apparently reaches to, or almost to, the front limit of the dentary.

Above the presplenial the inner alveolar plate of the dentary, of about the same depth as the presplenial, forms the inner wall of the dental chamber and completes the inner anterior surface of the ramus. It meets the splenial posteriorly and narrows rapidly upward, but its relation to the dentary and the splenial, behind the dental series, has not been ascertained. Its upper border is at a lower level than the outer alveolar border of the dentary.

In *Megalosaurus* the bony partitions dividing the alveoli from each other are described* as springing from the inner alveolar wall and projecting outward to the inner surface of the outer wall. The reverse of this seems to be the case in *Dryptosaurus*, in which the principal alveolar grooves are apparently formed on the inner surface of the outer dentary wall with little or no development of grooves in the alveolar plate. In this particular the alveoli of *Dryptosaurus* are somewhat similar in general plan of structure to those of the dental chamber of the mandible of the Cretaceous

* "Notice on the Megalosaurus or great Fossil Lizard of Stonesfield," by the Rev. William Buckland. Trans. Geol. Soc., London, second series, vol. 1, p. 395, pls. XL and XLI, 1824; and "On the Skull of Megalosaurus," by Professor Owen. Quart. Jour. Geol. Soc., London, vol. XXXIX, p. 339, pl. XI, 1883.

species of *Trachodon** (and possibly also of the genera *Monoclonius* and *Triceratops* and their allies), in which the teeth move upward in well defined grooves in the inner surface of the outer wall of the dental chamber, whilst the surface of the inner wall of the chamber is comparatively even and smooth. The partitions between the alveoli in *Dryptosaurus* seem to form part of, and to be continuations or extensions of, the inner surface of the outer dentary wall inward toward the dentary plate with which they are apparently not connected. In the left ramus of the specimen shewn in figure 1, the crowns of all the teeth except the twelfth are broken off close to the alveolar border leaving sections of their bases exposed at this level, so that the exact position of the teeth is definitely determined. In the right ramus of the same specimen, however, seven of the teeth (seen only in the right aspect of the specimen) are preserved intact. In the specimen figured in plate II fourteen teeth of the left ramus are preserved, whilst in advance of the anterior full-sized tooth a small tooth partially protudes at a lower level. This tooth is apparently an additional one in the series and not a successional tooth, making the total number, in the complete dental series, fifteen. It is truncated posteriorly so as to be similar in shape to some of the teeth described by Leidy, under the name *Deinodon horridus*,** as being peculiar in form, and to a tooth referred to by the writer in his description of *Ornithomimus altus**** as being from the anterior portion of the jaw. No successional teeth have been observed in either of the specimens of *Dryptosaurus* from the Edmonton series. The teeth of this species (without reference to such as may be considered to be incisors) are carinated on their anterior and posterior edges, the carinations being minutely serrated, with about ten to twelve denticulations in a space of 5 mm. They are lenticular in section above (figure 7), but in passing downward a

* Contributions to Canadian Palæontology, vol. III (Quarto), part II, "On Vertebrata of the Mid-Cretaceous of the North West Territory," by Henry Fairfield Osborn and Lawrence M. Lambe, pp. 73 and 78. 1902.

** Trans. Amer. Philos. Soc. Extinct Vertebrata from the Judith River and Great Lignite Formations of Nebraska, by Joseph Leidy. 1860, p. 144, plate 9, figs. 37-40.

*** Contributions to Canadian Palæontology. 1902, pp. 53, pl. XIV.

flattening of the anterior and posterior borders takes place and becomes more pronounced near the base of the crown, a slight flattening of the sides of the teeth also becoming more decided in the lower portion of the crown. The anterior carina passes gradually to the inner side of the crown whilst the posterior one is well over toward the outer side for the greater part of its length. The posterior keel extends downward for the whole length of the crown but the anterior one stops at about one-fourth the height of the crown from its base.

The anterior part of the external surface of the dentary of the smaller specimen is rough, and exhibits a number of small foramina, near its lower front margin, with others in a line at some distance below and parallel to the alveolar border. In the larger specimen a few openings of corresponding size are also apparent near the anterior lower border of the dentary but the general surface of the bone is smoother. In this specimen also a somewhat obscure row of shallow depressions extends upward and backward in an oblique curve (above *e* in figure 1) across the dentary at about its mid-length. This feature is suggested in the dentary of the smaller specimen, but it is too indistinct to be spoken of with certainty. The front portion of the surangular is striated as shewn in figure 1.

MEASUREMENTS.

Of larger specimen, collected in 1884 (plate I).

	MM.
Extreme length of left ramus of mandible	970
Greatest depth of same (approx.)	227
Length of dentary	905
Depth of dentary at its mid-length, at *a*, figure 1 (approx.)	185
Thickness of ramus at mid-height anteriorly, at *b*, figure 1A	52
Length of surangular above	490
Thickness of surangular through the ridge near its upper border, at *c*, figure 1	33
Thickness of surangular above the ridge, at *c*	23
" " below " "	14
Height of surangular foramen	38
Width of posterior portion of angular near its distal end, figure 4	50
Width of same at *g*, figure 4	30
Thickness of same at *g*	23
Transverse diameter of articular cotylus	112
Thickness of ramus from upper surface of cotylus, at its mid-length, to lower surface of dentary	4

Combined thickness of dentary and surangular at *h*, figure 3	10
Length of crown of fifth tooth of right ramus	54
Breadth of base of crown of same	28
Thickness of ,, ,,	18

Of smaller specimen, collected in 1889 (plate II).

Length of dentary, above, to its junction with the surangular	380
Depth of dentary at its junction with the surangular	160
Length of angular foramen	50
Length of crown of sixth tooth	38
Breadth of crown of same at base	18
Length of crown of seventh tooth	55
Breadth of crown of same at base	21
Length of crown of eighth tooth	46
Breadth of crown of same at base	21
Length of splenial foramen	52

EXPLANATION OF PLATES OF FIGURES ILLUSTRATING THE MANDIBLE OF *Dryptosaurus incrassatus* (COPE).

PLATE I.

Figure 1. Mandible of the larger of the two specimens, as seen from the left; two-fifteenths, or slightly more than one-eighth, the natural size.

Figure 1A. Section of left ramus of same, through the sixth tooth from the front; similarly reduced.

PLATE II.

Figure 2. Side view of mandible of specimen collected in 1889; one-sixth natural size.

Figure 3. Exterior aspect of posterior end of left ramus of mandible shewn in plate I; one-fourth natural size.

Figure 4. Interior view of same; similarly reduced.

PLATE III.

Figure 5. Exterior of left ramus.

Figure 6. Interior of the same.

Figure 7. Outlines of transverse sections of a tooth; the upper section is taken at about one-third the height of the crown below its apex; the middle section from a little below the mid-height of the crown; the lowest section from near the base of the crown; in the figures the upper side corresponds with the outer surface of the tooth and the portions on the right to the anterior border of the crown.

---

d, dentary; *ang.*, angular; *art.*, articular; *sur.*, surangular; *sp.*, splenial; *psp.*, presplenial; *cor.*, coronoid.

SECOND AUTUMN SUB-EXCURSION.

The second autumn sub-excursion of the Club was made to Blueberry Point, near Aylmer, Que., on Saturday, Oct. 3. Between thirty and forty persons attended. Leaving the city by electric car at 2.20 p.m., the Point was reached shortly before three o'clock. The whole party went at once to the lake shore and there divided, part remaining near the water in order to examine the rocks of the Chazy formation, and to collect shells, many kinds of which were found in a small stream. The other part of the company resorted to the woods to study the trees and herbaceous plants and to search for insects. It was a delightful autumn afternoon, and the woods presented a beautiful appearance. The autumn tints of the maples, sumachs, white ashes, and oaks, were at their very best, and presented a gorgeous spectacle. The Red Maple is the commonest species at Blueberry Point, but the Silver Maple and the Sugar Maple also occur there abundantly. Fine large trees of the Silver Maple growing near the lake offered good subjects for comparison with the Red Maple. Nearly all the different kinds of evergreens which occur near Ottawa, are to be found at this spot, and these also afforded good material for study. Blueberry Point is one of the few places in the Ottawa district where the Banksian or Northern Scrub Pine is found, and quite a number of these trees were seen within two hundred yards of the car track, growing with the White and Red Pines. Among the herbaceous plants of interest found during the afternoon, mention may be made of the Closed Gentian (*Gentiana Andrewsii*) with its large purple flowers, which was collected near the lake shore, together with the Hairy Germander (*Teucrium occidentale*, A. Gray), the Small Scull-cap (*Scutellaria parvula*, Mx.) with its curious seeds, the Yellow Water-Crowfoot (*Ranunculus delphinifolius*, Torr.) in flower and seed, and on the mud near a little stream the Water Starwort (*Callitriche palustris*, L.) was found. Up in the woods beneath the pines, *Viola subviscosa*, Greene, and *V. cardaminefolia*, Greene, rewarded a diligent search. At 4.45 p.m. the party re-assembled, and the specimens collected by the excursionists were examined by the Leaders and named for those who wished to have them identified. The President made a few remarks, congratulating those present on the success

of the outing, and invited anyone present who wished for information to ask questions, when they would be answered by the Leaders. In reply to a question, Dr. Fletcher pointed out the botanical differences between the Blue Beech (*Carpinus Caroliniana*, Walt.), and its near relative the Iron-wood or Hop Hornbeam (*Ostrya Virginiana* [Mill.] Willd.). He then referred to some of the specimens collected during the afternoon, and drew attention specially to the Trailing Arbutus, which was shown with its fully formed flower buds, even then ready to expand and give forth their delicious perfume with the first warm breath of next spring. He spoke also of some of the common reptiles, and gave interesting facts about their useful lives, illustrating his remarks at the same time by showing some fine living specimens of Pickering's Tree Toad and the Leopard Frog. While pointing out the beauties of a large specimen of the latter, and the value of his livery of gold, bronze, black, and green for protective purposes, the frog, apparently not relishing the notoriety he was getting, or in an excess of modest confusion when the eyes of about thirty young ladies were directed towards his points of beauty, sprang wildly forth from the demonstrator's hands in an effort to escape. He was, however, soon captured by one of the active young ladies and brought back again to be further studied. When finished with, he was given his liberty, and showed his appreciation by quickly disappearing into the grass. Before closing, Dr. Fletcher spoke of the advantages to be derived from such outings as we were then enjoying, and the special value of our club to all lovers of nature, claiming that it was not organized nor conducted for scientific students only, but provided an easy road with a wide-open door, inviting and encouraging all those who wanted to know more about nature and the common objects about them, to come in and learn more. They would thus become happier men and women, and more useful citizens.

A large proportion of the excursionists consisted of Normal School students, and among others who were present were the First Vice-President, the Secretary and the Treasurer of the Club, and Dr. J. F. Whiteaves, Leader in Conchology, who during the afternoon kindly pointed out many things of interest in the rocks,

and also showed what a large variety of fresh-water shells could be collected in a small area by those who knew how to look for them, and Miss Matthews and Miss McQuesten, both members of the Council.

W. T. M.

BOOK NOTICE.

THE ORTHOPTERA OF INDIANA.

By W. S. Blatchley, State Geologist, Indianapolis, Ind., from the 27th Annual Report of the Department of Geology and Natural Resources of Indiana, 1902. 8vo., pp. 348.

We are glad indeed to welcome this last work of Prof. Blatchley's which has just appeared. It is practically a popular manual of the Orthoptera of Indiana and the adjoining States, written in the plainest language, and with full explanations of all necessary technical terms. The author has been very happy in presenting his favorite subject, which he has studied for many years, in a succinct, intelligible manner, a fact which will doubtless render his book a useful manual for many students of this interesting order of insects in other parts of North America. The author has prepared his work for beginners and for others who have no particular knowledge of insects, and, as is not always the case, he begins at the beginning of his subject. In the first chapter, on the external anatomy of a locust, he points out the difference between insects and other animals, and then describes fully the different parts of a locust and their functions. A useful division of this chapter treats of the enemies of locusts, some kinds of which frequently do work of inestimable value in controlling outbreaks of certain species which occasionally become destructively abundant. A plea is made for the protection of some of the birds which do good service in this way, but are seldom recognized as friends, such as hawks, blackbirds, crows, bluejays, bluebirds and prairie chickens.

A bibliography gives the titles of the chief works or papers in which important information regarding the habits and life histories of locusts can be found. Those wishing for fuller information, are referred to Dr. Scudder's Index to North

American Orthoptera, which includes every known reference to each species up to the close of 1900. "A Descriptive Catalogue of the Orthoptera known to occur in Indiana" treats in a systematic manner of every species which has ever been found in the state. Excellent tables enable the student easily to refer a species, first to one of the two large sub-orders Saltatoria or non-Saltatoria, and then to one of the seven families included within these two sub-orders. The former, Saltatoria, embraces the *Acrididæ* or true locusts, the *Locustidæ*, or Long-horned Grass-hoppers and Katydids, and the *Gryllidæ* or Crickets. The non-Saltatoria includes the *Forficulidæ*, or Earwigs, the *Blattidæ*, or Cockroaches, the *Mantidæ* and the *Phasmidæ*, or Stick Insects.

There are no less than 148 species described in this little book in full detail, and among these we find a large proportion of our Canadian Orthoptera. Fourteen species of the number have been described by Prof. Blatchley himself, and six of these are new species described in this work for the first time. A short article treats of "the Life Zones of Indiana," as illustrated by the Orthoptera of the State, and the book concludes with a good glossary of terms and a full index. The illustrations are numerous and good. As a frontispiece, the beautiful coloured plate of the pink variety of *Amblycorphyra oblongifolia* on a head of *Solidago sempervirens* is used. This plate first appeared in "Entomological News" for May, 1901. J. F.

A WEED WORTH GROWING.

(Matricaria inodora, L.*)*

During the autumn of 1902 I had the good fortune to spend a few weeks on that gem of the sea, Prince Edward Island, and was particularly struck with the showy appearance of the above-named Mayweed, which grows as a way-side weed in Summerside and Charlottetown, as well as in many other parts of the Island away from the towns. Thinking, from the size of the flowers, that the plant might be worthy of a trial as a garden flower, I gathered some of the seed and sowed it last spring. On my return to Ottawa in the middle of August, I found a patch of plants 3 feet across and 2 feet high, covered with large flowers, several of them measuring over 2 inches across. From that time

till to-day (30th October), the flowers have been produced in profusion and have been much admired by all who have seen them among cut flowers. The foliage is like that of the ordinary Fetid May-weed (*Anthemis Cotula*), being 2-3-pinnately cut up into filiform lobes, of a rich dark green, but without unpleasant odour. This plant is called in England, whence probably it was introduced into Canada, Scentless Camomile or Corn Mayweed. It is an annual and its merits horticulturally are the profusion and continuous production of the showy flowers and the lateness in the season at which they may be found. Geraniums, Phloxes, and even the wild Mayweed, have all now been destroyed by frost, but this Scentless Camomile still holds its head up bravely.

J. FLETCHER.

SOME INTRODUCED PLANTS.

Linaria minor, Desf.—In Macoun's Catalogue, Part II, p. 353, there is a single record of this plant from St. John, N.B. During the past summer I have received specimens from Miss Ada Gardhouse, of Highfield, Ont., and also from Mr. F. J. A. Morris, of Trinity College School, Port Hope, Ont., who writes: "It grows profusely on the Grand Trunk Railway track, for a space of two or three miles east of Port Hope Station, and has been found by me for three years now. It blooms from the 1st of June in daily increasing quantities throughout the summer."

Teucrium Scorodonia, L.—Another introduced plant which has occurred in sufficient abundance to have attracted attention as a possible crop pest is the Germander Sage, which was sent in by Mr. G. Beaudoin, of Ste. Cécile de Whitton, Que., who had found one patch on his land.

SOIREES.—The programme for the winter meetings is now being prepared, and the chairman of the soiree committee (Mr. W. H. Harrington) will be pleased to receive from members of the Club the titles of any papers they may wish to present. When papers are to be illustrated by specimens it will be well to notify the committee of that fact, so that suitable arrangements may be made.

NATURE STUDY—No. VII.

IT IS THE SPIRIT WHICH GIVES IT EFFECT.

G. U. HAY, D. Sc., Editor "Educational Review," St. John, N.B.

So many children leave school at the age of ten or twelve, or even earlier, that it is important to have a well devised plan of nature-study for the elementary schools. Every healthy child is an observer of his surroundings. Before he enters school at all, he is familiar with a great number of material objects, and his questions show that he has thought about them. How important it is then to cultivate this attitude of the child toward his surroundings, lead him to acquire the habits of a naturalist, to find joys, as he grows older, in the country lanes and meadows —joys often denied to those who have superior mental equipment but who have not "eyes to see." Happy are the children who have parents and teachers intelligent, sympathetic and enthusiastic, who will enter with zest into the child's happy world, and will illustrate the lessons in reading and arithmetic, geography, history and drawing, by materials drawn from the child's own environment and resources.

In the charming story of "En Glad Gut" (A Happy Boy) by Björnson, the famous dramatist and novelist of Norway, Oyvind, the hero of the story, is shown at home in the world of nature around him. "His mother came out and sat down by his side. He wanted to hear stories of what was far away. So she told him how once everything could talk: the mountain talked to the stream, and the stream to the river, the river to the sea and the sea to the sky. But then he asked if the sky did not talk to anyone. And the sky talked to the clouds, the clouds to the trees, and the trees to the grass, the grass to the flies, the flies to the animals, the animals to the children, the children to the grown up people; and so it went on until it had gone round; and no one could tell where it had begun. Oyvind looked at the mountain, the trees, the sky, and had never really seen them before."

And "the mountain talked to the stream." Now what did the mountain say to the stream, any curious boy or girl will ask? Did it not say: I have pushed my cool head into the misty clouds, and gathered around it the drops of moisture which give

you your joyous life—gurgling over with happiness. And the stream babbles its story to the river,—but let Tennyson's "Brook" or our own Geo. Frederick Scott's "Why Hurry, Little River" tell us that delightful story. And the river moves on with calm and easy motion and gives up—no, it only lends—its waters to the sea. And the sea says: Have I not enough and to spare? I will call up the bright god of day, and this very night when he comes down to bathe and refresh himself in my depths, we will think over a plan to pay back those givers who have poured their tribute without stint into my broad bosom; and the clouds alone shall be let into the secret. And the clouds, blushing all over with joy and pride at the importance of their secret, said: To-morrow morning we will put on our wings and call the winds to help us, and we will fill up the founts of those streams away off on the mountain side, and we will make fresher the green grass and the leaves of the forest. And the leaves in a flutter of delight will whisper the secret to the mossy ground beneath them. And the moss will hoard up the crystal drops in cool retreats of forest and ravine, and yield them slowly to thirsty streams in the parching drought of summer.

And so the stories might be multiplied, and the "fairy tales of science" with their generous substratum of scientific truth might nourish many a boy and girl and give a joy and perennial freshness to their whole lives. And this, I take it, is one of the great objects of nature-study—to develop a habit of mind which only comes by training—the habit of discerning the beautiful as well as the useful in the world, to distinguish the true from the false, to cultivate a reverence for the God that is behind nature and man.

"I hate botany! I hate the study of animals!" I have heard children say more than once. Perhaps we might find a reason if we step into certain school-rooms and see some of the antiquated methods that still prevail in teaching about plants and animals; to study the structure only and the names, and then fling the wilted remains of the plants into the waste-basket; or to make collection of twenty-five or fifty plants of the neighbourhood, mounted and labelled:—all very well if the study of botany does begin and end here. The study of the life of the plant, its

habits, how it overcomes obstacles, how and where it thrives best, what it yields, how it takes substances from the earth and air, and converts them into food, these appeal more strongly to the active and enquiring child than making flowers into hay—dry work for a young naturalist. A mounted specimen of a bird, or a limp and lifeless body handed round in a class, may explain some details of structure. But is this all? The happy bounding flight, the joyous song, the services of birds to man, the sacredness of life, kindness to animals—are not these of more importance than structure and names? The lack of intelligent interest in plants and animals on the part of most young persons is due to the way in which the subject is presented to them in school.

Do teachers realize how fascinating it would be for their pupils to measure the distances along the roads which they walk over every day, to know the common wild flowers, trees, birds, and small animals by the wayside? To know the heights of the hills, the length of streams, the areas of fields and lakes near by. To have a portion of the school or home garden to tend and study the conditions of plant growth, along with bird and insect life? To be interested in the little animals that live in the fields and woods, and to have domestic animals to take care of daily? In these and a hundred other pursuits the enthusiastic teacher may lead the way, and stimulate and direct young people to make investigations. The children should be told as little as possible and be encouraged to find out as much as possible for themselves. It is wonderful how much may be accomplished by giving a boy or girl a start.

A friend of mine who is interested in the stars was staying at a house in the country for a week. She taught one of the boys of the family the positions of a few of the constellations, the planets in view, and some double stars; lent him a map of the heavens and a book on astronomy. The boy was an apt pupil, and the summer and winter skies have since been to him and many of his young friends the source of untold interest, opening a new world and sweetening hours of toil.

There is no need that country life should be monotonous. The fall of the leaves in autumn, the winter's sleep of plants under nature's protective garment, the ever-new awakening in

spring of bulb and seed and bud, the outburst of joyous song from our genial companions the birds, the insects, transformed and emerging from their concealment, are fresh miracles every season to the lover of God and nature. Every huge boulder rises like an interrogation point from the landscape, every rounded and polished stone carried down by the mountain rivulet, or resting on the shore of the restless ocean, is a page of history unrolled for him who will but read and think. Every forest tree, characteristic in shape, texture and foliage, springing from its tiny seed, has had a history of struggle and triumph over obstacles.

Need I say more? The excellent papers already given in THE OTTAWA NATURALIST have shown in the clearest and most intelligent way how teachers may make use of their opportunities. The thoughtful and earnest teacher, reading these, will be directed to the book of nature which, though it lies ever open, is perpetually sealed to him or her who has not "eyes to see." To the young or inexperienced teacher may I say: The children will be eager to meet you half way. Do not be ashamed to say: "I do not know;" but "let us put our wits together and find out" will be the magical password into nature's secrets and into the heart of the child. If you have any difficulty that you cannot overcome from your own knowledge and from books, you will find the writers of these papers just as willing to help you as they were to write for your benefit. That is the way they would like to pay the debt of gratitude which they owe to the unselfish naturalists who have helped them.

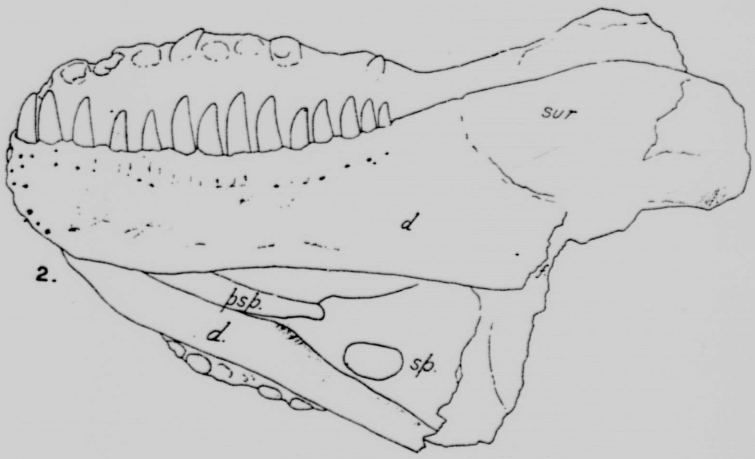
WHAT IS NATURE-STUDY?

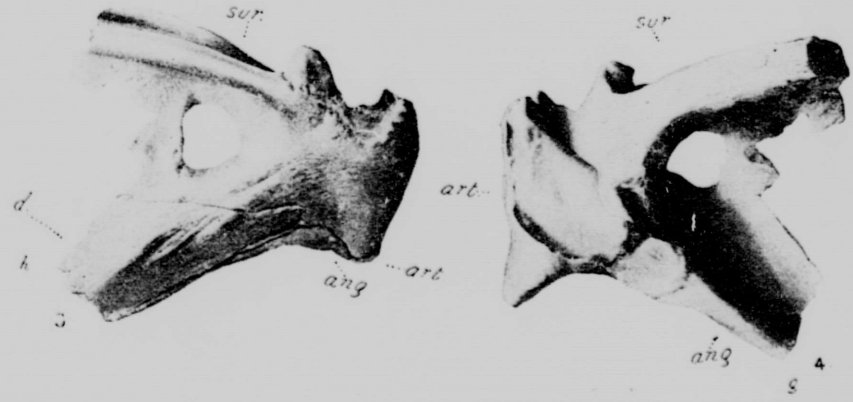
Nature-Study is a method rather than a subject. It better expresses the spirit by which one becomes acquainted with the common things about him than its definite content or subject matter. It is not getting information about nature from books, or lectures, or conversations with others; but it is rather a certain attitude of mind towards all the phenomena of nature. The end being development rather than mere knowledge, the teacher of Nature-Study thinks of the effect of his work upon his pupils rather than of the content of the subject he is dealing with; he considers *how* his pupils know rather than *what* they know.

WM. SCOTT.

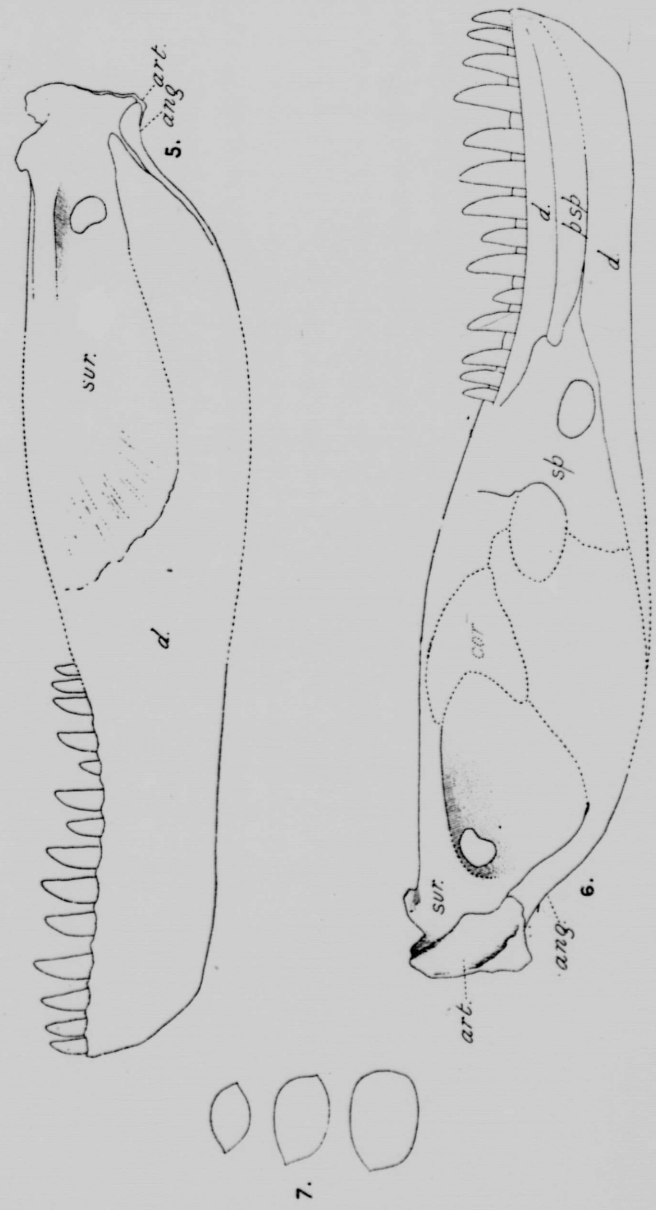
Normal School, Toronto.

Dryptosaurus incrassatus, (Cope).





Dryptosaurus incrassatus. (Cope)



Dryptosaurus incrassatus, (Cope)

THE OTTAWA FIELD-NATURALISTS' CLUB, 1903-1904.

Patron:

THE RIGHT HONOURABLE EARL OF MINTO
GOVERNOR-GENERAL OF CANADA.

President:

W. T. Macoun.

Vice-Presidents:

A. E. Attwood, M.A., Andrew Halkett.

Librarian:

S. B. Sinclair, B.A., Ph.D.

Secretary:

W. J. Wilson, Ph. B.
(Geological Survey Dept.)

Treasurer:

A. Gibson.
(Central Experimental Farm.)

Committee:

Dr. Jas. Fletcher.
Mr. W. H. Harrington.
Mr. F. T. Shutt.
Miss M. McK. Scott.
Miss A. Matthews.
Miss R. B. McQuesten.

Auditors:

J. Ballantyne, R. B. Whyte.

Standing Committees of Council:

Publishing: J. Fletcher, Miss M. McKay Scott, F. T. Shutt, W. J. Wilson, A. E. Attwood.
Excursions: S. B. Sinclair, Andrew Halkett, W. J. Wilson, A. Gibson, Miss Ruby B. McQuesten, Miss Annie L. Matthews.
Soirées: W. H. Harrington, J. Fletcher, A. E. Attwood, Andrew Halkett, Miss M. McKay Scott, Miss Ruby B. McQuesten.

Leaders:

Geology: H. M. Ami, W. J. Wilson, O. E. LeRoy.
Botany: J. M. Macoun, C. Guillet, D. A Campbell, A. E. Attwood, S. B Sinclair.
Entomology: J. Fletcher, W. H. Harrington, C. H. Young, A. Gibson.
Conchology: J. F. Whiteaves, R. Bell, F. R. Latchford, J. Fletcher.
Ornithology: John Macoun, A. G. Kingston, C. Guillet, Miss G. Harmer.
Zoology: E. E. Prince, Andrew Halkett, W. S. Odell.
Archæology: T. W. E. Sowter, J. Ballantyne.

THE OTTAWA NATURALIST.

Acting Editor:

J. A. Guignard, Central Experimental Farm.

Associate Editors:

DR. R. W. ELLS, Geological Survey of Canada.—Department of *Geology.*
DR. J. F. WHITEAVES, Geological Survey of Canada.—Dept. of *Palæontology*
MR. O. E. LEROY, Geological Survey of Canada.—Dept. of *Petrography.*
DR. JAS. FLETCHER, Central Experimental Farm.—*Botany and Nature Study.*
HON. F. R. LATCHFORD.—Department of *Conchology.*
MR. W. H. HARRINGTON, Post Office Department.—Dept. of *Entomology.*
MR. W. T. MACOUN, Central Experimental Farm.—Dept. of *Ornithology.*
PROF. E. E. PRINCE, Commissioner of Fisheries for Canada.—Dept. of *Zoology.*

Membership Fee to O.F.N.C.'s with "Ottawa Naturalist," $1.00 per annum.