JAN. 1914

VOL. XXVII, No. 10

THE OTTAWA NATURALIST

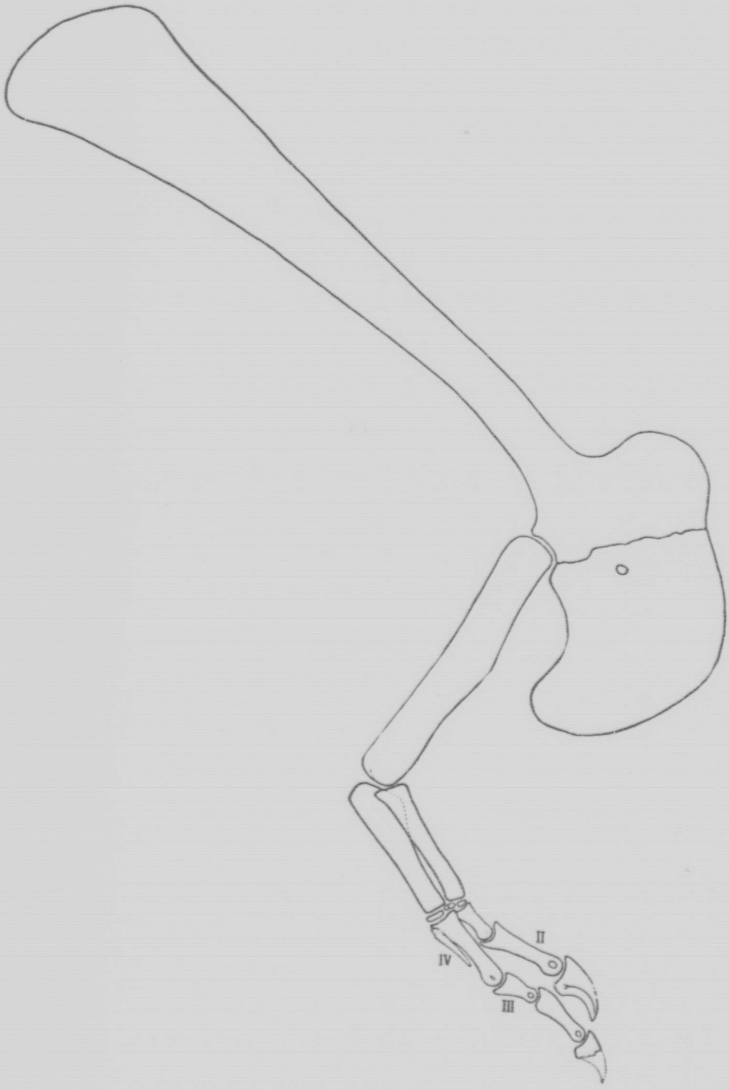
Published by The Ottawa Field-Naturalists' Club.

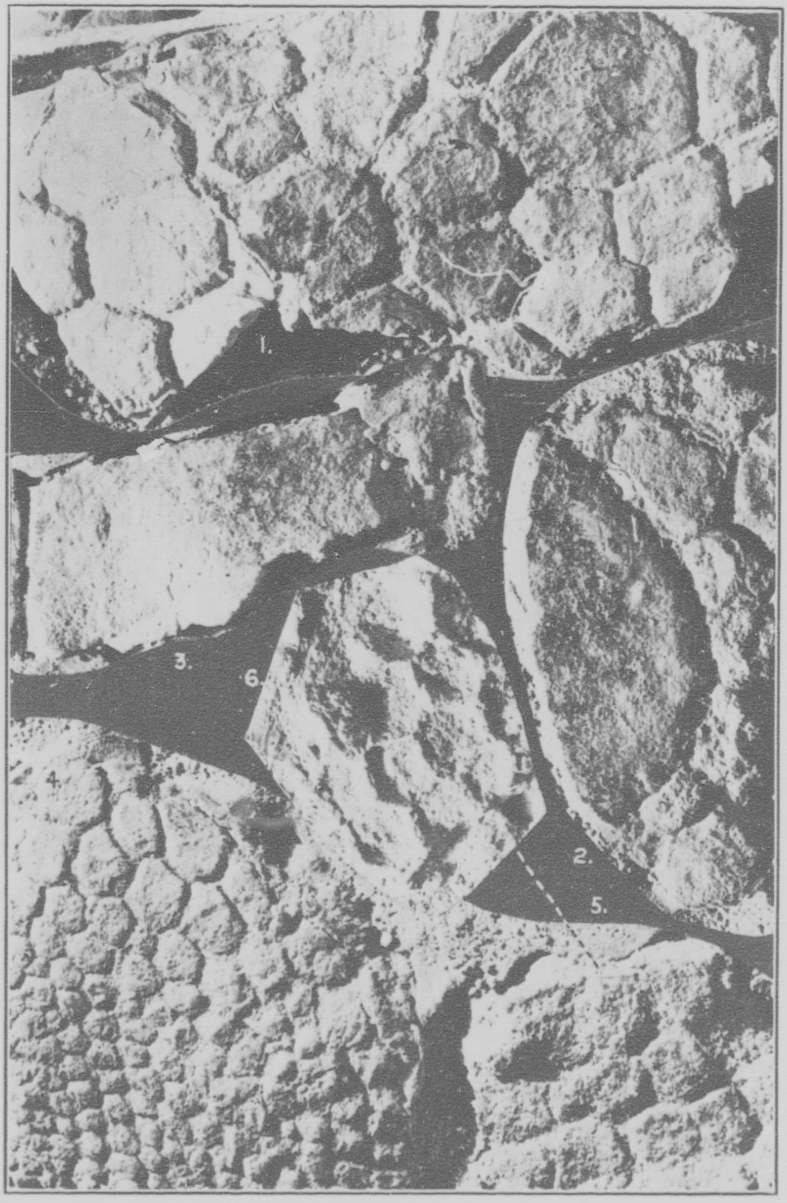
CONTENTS:

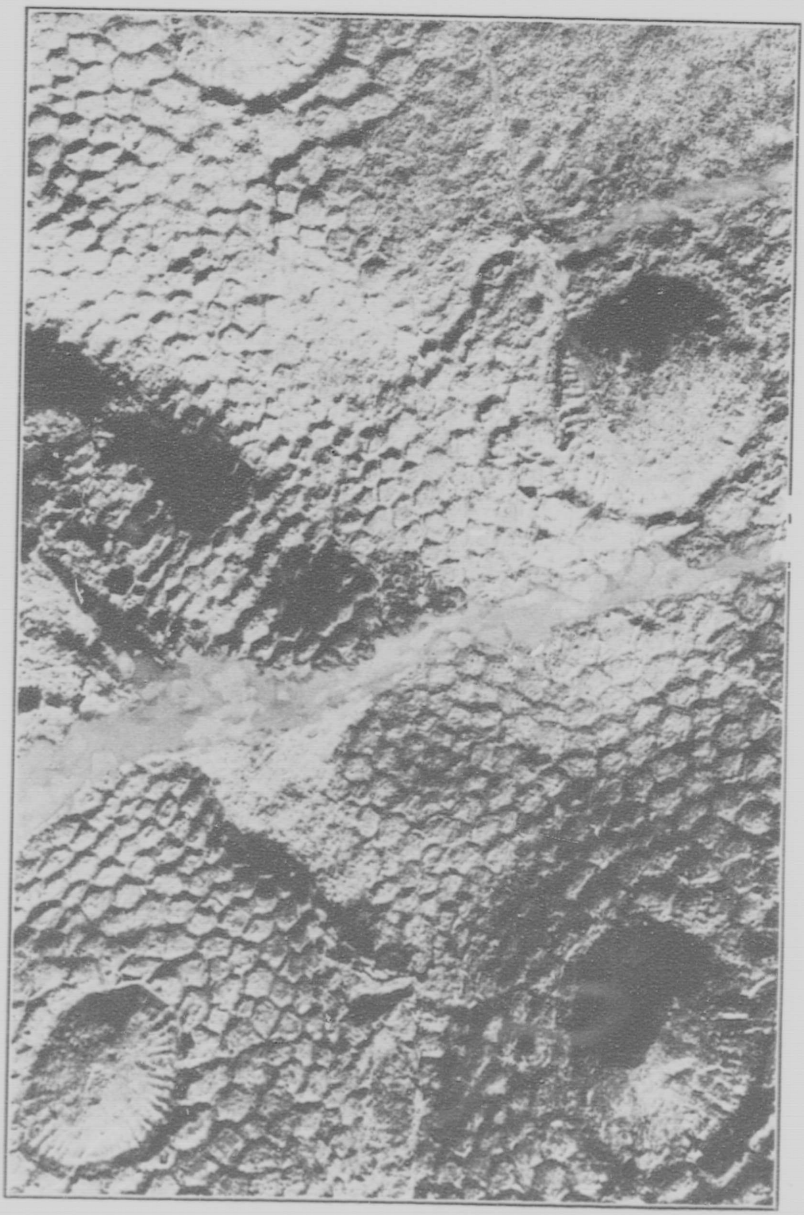
THE ROLLA L. CRAIN CO., LIMITED

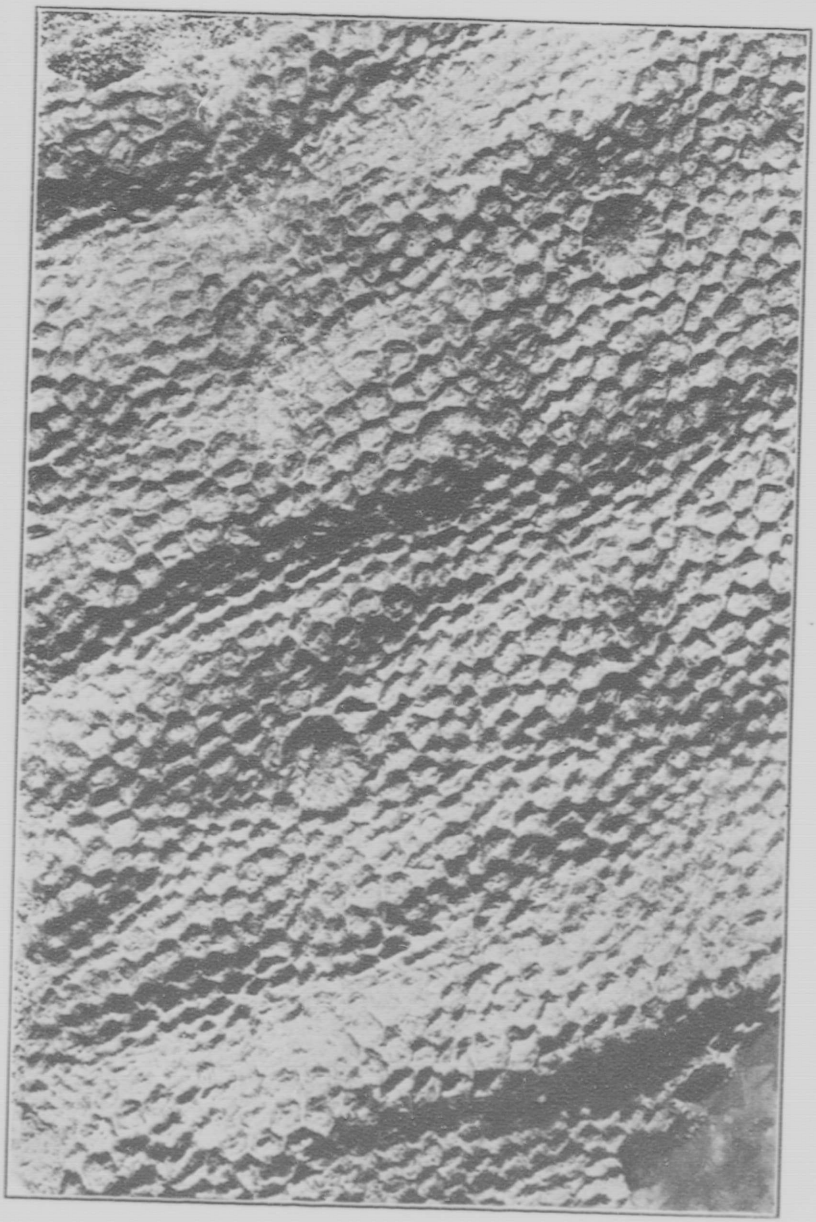
ISSUED Jan. 30, 1914

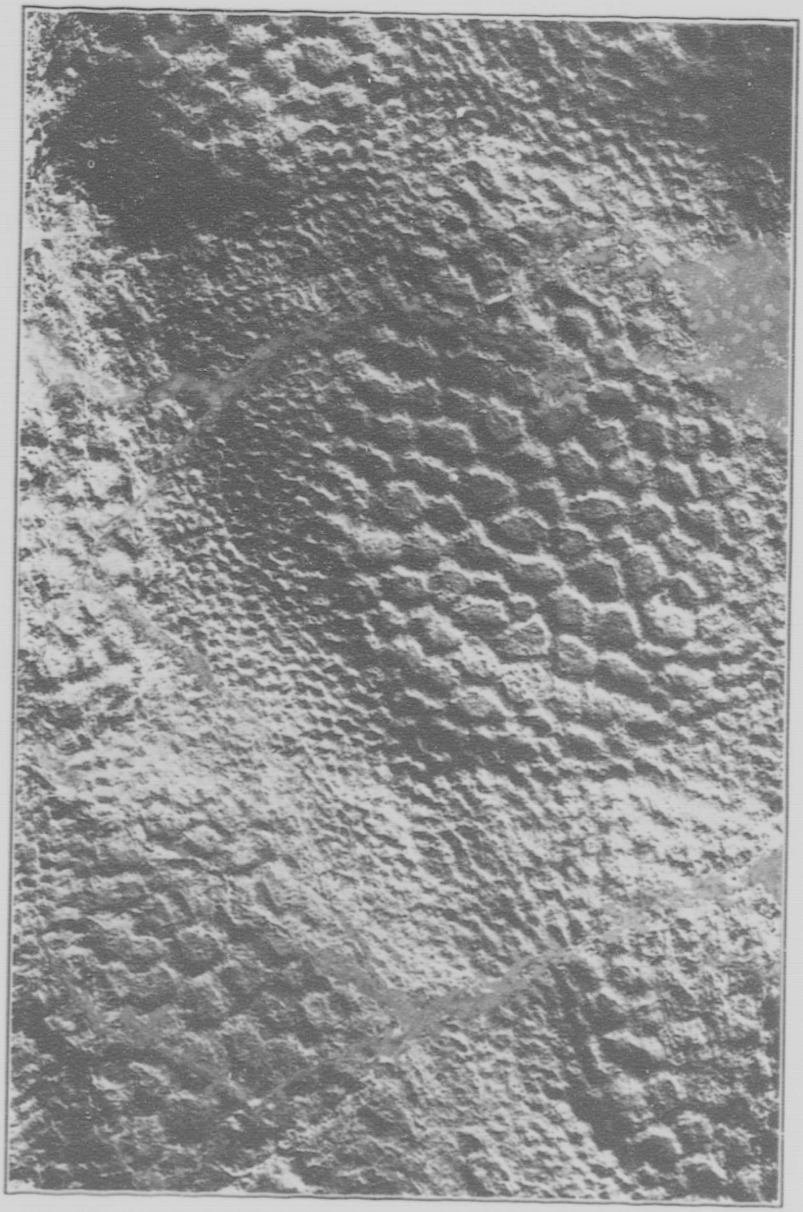
Entered at Ottawa Post Office as second class matter











THE OTTAWA NATURALIST

Vol. XXVII. January, 1914 No. 10

ON THE FORE-LIMB OF A CARNIVOROUS DINOSAUR FROM THE BELLY RIVER FORMATION OF ALBERTA, AND A NEW GENUS OF CERATOPSIA FROM THE SAME HORIZON, WITH REMARKS ON THE INTEGUMENT OF SOME CRETACEOUS HERBIVOROUS DINOSAURS.*

By Lawrence M. Lambe, F.G.S., F.R.S.C., F.G.S.A.
Vertebrate Palæontologist to the Geological Survey of Canada.

An unusually perfect skeleton of a carnivorous dinosaur, lately added to the collections of the Geological Survey, is of special interest on account of the preservation in it of one of the front legs. The specimen comes from the Belly River formation on Red Deer river, Alberta, and forms part of the very large collection of reptilian and other remains made last summer by the vertebrate palæontological party which explored the rich dinosaurian beds below Berry creek.

The structure of the fore-limb in the large carnivorous dinosaurs of the Cretaceous has been to a great extent conjectural. In this new specimen the right limb is preserved and it is hoped that the left one will be revealed as the work of removing the sandstone matrix proceeds.

The first impression received of the fore-limb is its extremely small size.

The arm has been pressed upward so that the humerus lies beside the back border of the blade of the scapula with its front face directed forward and its inner surface outward, its head remaining within the glenoid cavity.

The fore-arm is flexed downward and the manus is closed with the claw-bones uppermost. The ulna and radius lie together, and the digits, of which there are two, are in place. From the regular succession of the phalanges of the digits to each other it is presumed that none of them is missing. The digits are regarded as Nos. II and III, and there is a vestigial metacarpal IV, consisting of a short, slender bone, slightly curved and tapering to its distal end.

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

Metacarpal II is very short, being only about one-half the length of metacarpal III. There are only two phalanges to digit II, an elongated one and a comparatively large, laterally compressed, curved and sharply pointed ungual. In digit III the first phalanx is short, the second long, and the distal one claw-shaped but smaller than that of digit II. In the ungual phalanx of digit II there is a decided claw-groove. The first phalanx of digit II and the first and second of digit III have a deep pit on each side of the distal end. In the corresponding part of the metacarpals there is only a slight irregular depression.

Four carpal bones are preserved between the ulna and radius and the metacarpals, but they are slightly displaced. One is roughly discoidal and larger than the others, which are compressed ovoid in shape. The largest one occurs at the proximal end of metacarpal III, the other three lie together at the distal end of the radius. The ulna and radius are solid except for a small axial area of cancellous bone.

As already mentioned, the elements of the manus follow each other in regular succession and are apparently all in place with none of the phalanges missing. The phalangeal formula revealed is therefore probably the correct one.

The figure accompanying this description shews the relative size of the fore-limb and the scapula with the coracoid. The limb is here shewn in lateral aspect, in a natural position below its articulation with the scapula, and with the digits only slightly curved.

Attention is drawn to the extreme shortness of metacarpal II and the elongation of the penultimate phalanx in each digit. A similar lengthening of the corresponding phalanges is seen in the manus of the small Jurassic *Ornitholestes hermanni*, Osborn,* in which also there are two digits, a vestigial metacarpal IV, and an enlarged ungual phalanx in digit II.

The estimated length of this dinosaur, which, for the present, is referred to the genus Deinodon, is between twenty-eight and thirty feet. Why its front limbs were so diminutive is difficult to explain. That they were of much use in feeding is improbable.

The discoverer of this splendid specimen was Charles Sternberg, Jr., who was one of the vertebrate palæontological field party of 1913.

MEASUREMENTS.	Feet.	Inches.
Length of humerus		12⅝
" " ulna		6¼
" " radius		6⅛
" " metacarpal II		1⅞

* Bull. Am. Mus. Nat. Hist., New York, vol. xix, article xii, pp. 459-464, figs. 2 and 3.

MEASUREMENTS. [Continued]	Feet.	Inches.
Length of metacarpal III		3⅞
" " " IV		2½
" " first phalanx of digit II		3⅞
" " terminal " " " "		3⅛
" " first " " " III		2½
" " second " " " "		3⅛
" " scapula and coracoid together	3	6
Carpal bone with diameter of		0⅞
" " " length "		0⅝
Two carpal bones with length each of		0⅞

PROTOROSAURUS, gen. nov.

Skull large, broadly triangular in superior aspect, with an abbreviated facial portion and a greatly expanded posterior crest ending squarely behind. Coalesced parietals forming a slender frame-work enclosing large subtriangular fontanelles. Squamosals very long and narrow with a scalloped free border. Epoccipitals present. Supraorbital horn-core small, upright. Orbit small. Supratemporal fossæ not greatly developed. Body covered with non-imbricating plate-like, and tubercle-like scales.

This genus is proposed for the reception of the Belly River Cretaceous ceratopsian species originally described by the writer under the name *Monoclonius belli*.

The species was established in 1902* on a large portion of the coalesced parietals discovered by the writer in 1898 in the Belly River formation on Red Deer river, Alberta, below the mouth of Berry creek (Steveville). In the original description the opinion was expressed that the species represented was "probably ancestral to such later forms as *Torosaurus latus* and *T. gladius* of Marsh, from the Laramie of Wyoming." This belief is strengthened by the discovery during the past summer of a skull, with most of the skeleton, of one individual of this species at the type locality. It is now evident that this Belly River form is generically distinct from both Monoclonius, Cope and Ceratops, Marsh, and that its affinites are with Torosaurus, Marsh, to which it apparently leads in a direct line of descent, and from which it differs by well-marked primitive characters

The characters in Protorosaurus which are regarded as primitive in comparison with Torosaurus are its smaller size, the greater relative length of the skull in front of the orbits, the retention of the scalloped free margin in the squamosal, the greater size of the intraparietal fontanelles which have been

* Contributions to Canadian Palæontology, vol. iii (quarto), pl. ii, On vertebrata of the mid-cretaceous of the North-west Territory, 2. New genera and species from the Belly River series, p. 66, pl. xx, figs 1 and 2.

reduced in Torosaurus by a broadening of the parietal framework, and the much smaller supraorbital horn-cores which are upright instead of being curved forward.

The finding of the skull of *Protorosaurus belli* completely does away with any idea as to the specific identity of this species with *Mono clonius canadensis*, Lambe, also from the Belly River Cretaceous of Alberta; a consideration at no time entertained by the writer.

With the skeleton of *P. belli* were found well preserved impressions of the integument.* These impressions seem to refute the hitherto generally accepted idea of the presence in the Ceratopsia of bony scutes such as are found in the Stegosauridæ, notably in *Euoplocephalus* (*Stereocephalus*) *tutus*, Lambe, from the Belly River formation. We now know that the integument of *P. belli* was of the same general character as that of the trachodonts, and probably the other horned dinosaurs were similarly covered.

The natural impressions of the integument of *P. belli* consist of smooth polygonal surfaces, ranging in diameter from about one-eighth of an inch up to one inch and one-eighth, indicative of the presence in the living animal of non-imbricating scales or plates, fitting closely to each other, and having generally five or six sides. The plates themselves are not preserved but they have impressed their shape in the sandstone (moulds) from which natural casts have been made by the matrix replacing the plates.

The larger plates have a flat or very slightly convex surface and are defined by a circumscribing groove. The smaller sized plates have the form of low or flattened tubercles and were apparently present over a large area. The larger plates are assembled and increase in size toward a somewhat central one which is the largest, and which may be polygonal or rounded in outline. There is evidence of polygonal plates at least two inches in diameter and of others with a nearly circular outline equally large. In the larger sized plates the sunken peripheral margin has a crinkled appearance due to the presence of short grooves at right angles to, and ending at the edge of the plate.

The impressions of the plates so far seen are mostly from the trunk region in the neighbourhood of the shoulder where the increase in size seems to be from below upward. Other impressions from lower down on the body are of the small tubercles apparently indicating an absence here of the larger sizes of plates.

The collection of 1913 from the Belly River formation on Red Deer river also includes natural moulds and casts of large

* This specimen, with skin impressions, was discovered by Mr. Charles H. Sternberg, in charge of the Geological Survey vertebrate palæontological expedition of 1913.

areas of the skin of the species described by the writer in 1902,* under the name *Trachodon marginatus*. A figure of the surface markings of a small portion of the skin of this species accompanied the writer's original description, but the new material brings to light with wonderful distinctness features additional to those already known, and discloses a tubercular pattern of surface ornamentation as unique as it is unexpected.

Trachodon marginatus was founded on an admirably preserved maxilla and lower mandibular ramus, with teeth in place having a definite marginal sculpture, and on many bones of one individual with skin impressions. Provisionallyassigned to this species were slender ischia ending distally in a foot-shaped expansion, a pubic bone, a femur, tibiæ and other elements of the skeleton. That the association of the footed-ischium with *T. marginatus* was correct is borne out by the remains of two individuals** collected last summer with which the maxillæ and lower jaw are present in one, and the ischia in both. A comparison of the new material with that on which the species was based entirely establishes the correctness of the writer's original description. It is with one of these specimens of last summer's collection that the skin impressions are preserved. These impressions are from the side in the trunk region, and along the tail. In the former, depressed conical plates or scales, having an oval basal outline, occur at intervals with much smaller, polygonal, tubercle-like, non-imbricating plates filling the interspaces. The conical plates strongly resemble limpets in shape, and are about twice their diameter apart. They reach a size of about one and a half inches in length and one and a quarter inches in breadth, with a height of about five-sixteenths of an inch. The comparatively small, intervening plates resemble the smaller sized plates of *Protorosaurus belli*, and of *Trachodon annectens*, Marsh, as described by Osborn.‡ They range in diameter from about one-eighth up to two-eighths of an inch, an increase in size occurring toward the conical plates round which the largest ones form a ring. A marked feature of the conical scales is a radial crinkling which is most pronounced at the basal circumference and extends about half way up the sloping surface.

In the tail the same scale pattern is continued but in a less striking manner, its component parts being reduced in size. The conical plates are more nearly circular in basal outline, with a diameter of about half an inch, and a proportionately lower relief. They are relatively farther apart than those of the trunk,

* Op. cit., p. 71, pls. iii-x. **Expedition of 1913; found by Mr. Charles H. Sternberg.

‡ Memoirs of Amer. Mus. Nat. Hist., new series, vol. i, pt. ii; Integument of the Iguanodont dinosaur *Trachodon*, pl's. vi and vii.

being about four to six times their diameter distant from each other. The polygonal ones have an average diameter of about three-sixteenths of an inch, and, as in the trunk, a slight increase in size is observed in those near the conical plates. Along the side of the body the conical plates have their long diameter in a fore and aft direction.

The scale patterns above described are probably distinctive of the species, and will no doubt, with the known ones of other Cretaceous herbivorous dinosaurs, prove a reliable aid in specific determination.

The skin impression of a third Cretaceous herbivorous dinosaur, shewn in plate XVII accompanying this paper, is part of a large area of epidermal markings, from above the hip, preserved with an almost complete skeleton of a trachodont obtained by the vertebrate palæontological expedition of 1912 from the Edmonton formation on Red Deer river, and now exhibited as a panel mount in the museum of the Geological Survey. This specimen was thought to be referable to *Trachodon marginatus* of the Belly River formation and was provisionally assigned to that species. As the scale pattern of the integument of *T. marginatus* is now definitely known and proves to be quite different from that of the Edmonton specimen it is clear that the latter is not referable to *T. marginatus*. It is now known with certainty that *T. marginatus* had a footed-ischium but unfortunately in the Edmonton specimen the distal ends of the ischia are not preserved.

The epidermal markings found with the Edmonton specimen and already briefly described in a paper* by the writer, are natural moulds and casts of non-imbricating scales of which some are larger than others. The larger ones are flat or slightly convex, polygonal in outline, and average about a quarter of an inch in diameter; they are aggregated in irregularly oval clusters from two to three inches in greater diameter, and about three-quarters of an inch apart. Between the clusters are minute, tubercle-like scales averaging about one-tenth of an inch in diameter and forming the general ground-work of the pattern.

This scale pattern is of the same general character as that of *Trachodon annectens* (Marsh), as described and figured by Osborn‡ in a specimen from upper Cretaceous beds in Converse county, Wyoming, U.S.A., but is more pronounced; the oval clusters of plate-like scales are larger, and the scales composing them have a greater average diameter. The small sized tubercle-like scales are much the same as in the Wyoming specimen.

* The Ottawa Naturalist, May, 1913. The manus in a specimen of Trachodon from the Edmonton formation of Alberta.

‡ Op. cit.

EXPLANATION OF PLATES.

PLATE XIII.—Right fore-limb of carnivorous dinosaur; one-eighth the natural size.

PLATE XIV.—Fig. 1. Natural cast of integument of *Protorosaurus belli* shewing large, polygonal, plate-like scales; natural size.

Fig. 2. Cast of large scale with a rounded outline; natural size.

Fig. 3. Cast of large scale probably polygonal in outline; natural size.

Fig. 4. Cast shewing transition from small tubercle-like scales to larger polygonal ones; natural size.

Fig. 5. Cast of polygonal scales; natural size.

Fig. 6. Mould of the same; natural size.

PLATE XV.—Natural mould of integument of *Trachodon marginatus* from the side of the body; natural size.

PLATE XVI.—Natural mould of integument of the same individual from the side of the tail; natural size.

PLATE XVII.—Skin impression (mould) of trachodon from the Edmonton formation; natural size.

MEETING OF THE ENTOMOLOGICAL BRANCH.

Held at the home of Mr. Arthur Gibson, January 8th, 1913. Present: Rev. Dr. Fyles, W. H. Harrington, J. M. Swaine, V. Kitto, Bro. Germain, Bro. Martial, G. Beaulieu, N. Criddle, A. Halkett, F. W. L. Sladen, J. W. Baldwin, J. I. Beaulne, J. R. Fryer, E. H. Strickland and A. Gibson.

Dr. Fyles gave a charming account of his first visit to Gomin Swamp (near Quebec City), over fifty years ago, in search of the interesting butterfly *Œneis jutta*, a swamp-loving species. He also described the life-history of the insect. In a small case specimens of the adults were exhibited as well as specimens of *Œneis macounii* and *O. kaindin*. This latter is given varietal rank in Dyar's List of N. A. Lepidoptera. Attention was called to the large number of forms placed in this list under *norna*. Mr. Gibson spoke of his first experience with *O. jutta* at the Mer Bleue, near Ottawa, mentioning the habit of the butterfly of resting on dead branches and trunks of trees, where it is protected considerably owing to the resemblance of the under side of its wings to the bark.

By holding plates XV, XVI and XVII upside down the concave surfaces appear convex, giving a vivid representation of the scale pattern as it was in the living animal.

Mr. Harrington showed twigs of oak from Meach Lake, Que., from which he had reared the cerambycid, *Elaphidion parallelum*. The larva tunnels the twigs for several inches and pupates therein, finally emerging through the base of a broken twig. This beetle is a close relative of the well known Oak Twig Pruner, *Elaphidion villosum*, which was quite injurious to oaks on the St. Lawrence Island Parks in 1912 and 1913. The well known habit of these larvæ in girdling the twigs, causing them to drop and owing to which injury they are broken during wind storms, was discussed.

Mr. Swaine exhibited specimens and work of Ambrosia-beetles collected by him the past summer in British Columbia, and briefly discussed the habits of the genus *Gnathotrichus*, and of a new species of the genus *Platypus* from the West Coast. Tunnels of *G. sulcatus* Lec. were shown from Western Hemlock. Their black tunnels, about the size of a pencil lead, penetrate the wood for about six inches, and give off lateral branches parallel with the wood surface. Along the sides of the tunnels egg-niches are cut, in which eggs are laid. The grubs enlarge the niches to a length slightly greater than their own when mature, and pupate therein with the head towards the tunnel. These short larval tunnels are known as larval or pupal cradles. After transformation the young adults enter the egg-tunnel, and after remaining a longer or shorter time in the tunnels or in the cradles, they emerge in early summer through the entrance tunnel cut by the parent beetles to attack fresh logs and stumps or dying trees. The chief food of the larvæ, and an important food of the adults, is a species of fungus which grows in a dense glistening layer on the tunnel walls. Mr. Swaine has recently worked out the life-history of several of these interesting and little known fungi. The fungus is carried by the beetles to new tunnels and rapidly spreads over the fresh wood of the tunnel sides and upon the walls of the larval cradles. The fungus stains the walls of the tunnels black for several millimetres. The habits of the species of *Platypus* are somewhat similar to the above, but the eggs are deposited free in the tunnels.

Mr. Criddle spoke upon certain phases of his investigations into the habits and life-histories of the various species of June Beetles (*Lachnosterna*) which he had been studying as a field officer of the Division of Entomology. He related how the different species were often quite local in distribution owing to each having preferences in matters of soil and moisture as breeding places. Thus, *L. dubia* was taken in all its stages within an area of a few feet and the duration of its life cycle probably discovered in a single day. He also spoke upon the hibernating habits of the larvæ, instancing how some species remained

within a foot or two of the surface while one, viz., *L. rugosa*, was found at depths varying from 47 to 91 inches. Mention was also made of the remarkable manner in which skunks sought out the larvæ for food, thus doing much good. An interesting discussion followed on the habits and food of skunks in general.

Mr. Sladen exhibited twelve species of wasps of the genus *Odynerus* taken in the Ottawa district and described the habits of *O. spinipes*, a European species. It provisions its cell with small green caterpillars. The egg is attached to the roof of the cell by a thread so that it is not disturbed by the wriggling victims. He also showed a parasitic bee, *Coelioxys rufitarsus*, with its host, *Megachile latimanus*, a leaf-cutter bee, and explained how, according to Graenicher, the parasite pierces the leaves lining the cell of the *Megachile* by means of its conical sharp-pointed abdomen, and inserts its egg. The *Coelioxys* larva is at first provided with enormous mandibles with which it kills the *Megachile* larva, but after the first moult the mandibles are of the small size found in other bee larvæ, and thence forward it feeds entirely on the pollen that the *Megachile* has provided. Mr. Harrington remarked that in Ottawa, as in England, *Megachile* is very fond of cutting circles out of the leaves of the garden rose to line its cells. It also often chooses maple leaves. He had noticed that if the surroundings of a solitary bee's or wasp's nest were disarranged the insect could not find its way in. It seemed to have committed to memory every detail; this was done by circling round the spot many times. Mr. Sladen said that queen bumble bees he had got to lay eggs in captivity, when allowed to fly, never returned, though they marked the spot carefully, and he believed they lost the power to learn the position of their nest as soon as they began to lay.

Mr. Strickland spoke upon the subject of parasites in *Simulium* larvæ. After briefly describing the acquatic habits and structure of the early stages of the Black fly, and pointing out the interest that is centred upon this fly as the possible carrier of the human disease Pellagra, he gave an account of the parasites he had found infecting their larvæ in the streams in the vicinity of Boston, U.S. These consisted of a worm and various protozoa, all of which were fatal to their larval host, and occurred in sufficient numbers to be of considerable economic value. The worm is a species of *Mermis* that inhabits the abdominal region of the body cavity, where it lives coiled up and almost motionless absorbing the body fluids of its host, till the latter is full grown. It then ruptures the skin and escapes, killing the larva in the process. When the worm only is present it is 3 cm. long, or about three times the length of its host. As many as 12 were found in one larva, in which case they all

remained small. The most interesting effect of this parasite is that it stops all growth of the external adult organs (legs, wings, etc.) in the larva. In a normal larva these organs are well developed at the time of maturity and are readily seen through the transparent skin of the thoracic region. The parasitised larva grows to an abnormal size, as if at the expense of these organs. The protozoan parasites, with the exception of one, belong to the genus *Glugea* and are closely related to the Pébrine disease of silkworms. Several species were present in different larvæ. All of them form large masses of parasitic material in the body cavity, which, at maturity, are resolved into innumerable minute spores, which spread the disease in the water upon the death of the host. The other protozoan proved to be a *Gregarine* that formed a vast number of small cysts in the body cavity, from which, later, motile "spores" escaped.

Mr. Beaulieu, who is working on a monograph of Canadian Elateridæ, showed a collection in which there were representatives of the 25 genera found in our fauna. He also exhibited a specimen each of two new species, *Limonius venablesi* Wck., and *Corymbitis weidtii* Ang. The following figures, showing the distribution of the species of this interesting family, were given: Known species in the world fauna, about 5,500; American species, about 2,260; American species north of Mexico, about 500; Canadian species, about 190. Described genera, world fauna, 285; American genera, 129; American genera north of Mexico, 47; Canadian genera, 25.

Mr. Gibson exhibited his collection of Canadian arctiid moths of the genus *Apantesis*. These were shown in five large cases. Attention was directed to certain of the species which had been reared from the egg. In some of the series larvæ in all stages were present, and with many species adult larvæ and pupæ. These moths, known popularly as "tiger moths," are very beautiful insects. The larvæ are clothed with dense clusters of hairs, usually black or reddish. In spring they may often be found under pieces of board, etc., along railway tracks. Species which occur in the Ottawa district are *virgo*, *virgunculu*, *parthenice*, *arge*, *celia*, *figurata*, *nais* and *vittata*.

Other interesting exhibits which were brought to the meeting were: by Bro German, specimens of *Saperda concolor* and its work, and a hymenopterous parasite reared therefrom; also a rare beetle, *Carabus nemoralis*, taken at Montreal. This is supposed to be a European species, but Mr. Beaulieu stated that Dr. Lapouge, the French authority in the genus *Carabus*, considered that this was not the true *nemoralis*; by Mr. Kitto, a collection of Cerambycidæ and Elateridæ, taken in the Ottawa district, some interesting species were represented; by Mr.

Halkett, ants' nests from Germany, specimens of *Calosoma sycophanta*, and the Blind Worm, *Anguis fragilis*, also from Europe. A. G.

NOTE ON THE AMERICAN MAGPIE (*Pica pica hudsonica*).

This bird appears to be rare north of the 53rd degree of latitude in central Alberta, and even 50 miles south of that line it is not by any means common. I have never seen it north of Camrose, nor does Mr. Spreadborough mention having seen it in his travels north from Edmonton down the Athabasca or McKenzie Rivers. On the west side of the mountains along the coast it is found as far north as the Arctic Circle. During the past twenty-two years I have only seen it three times, as follows: one near the Big Bend of the Red Deer River in December, 1894; two near Wolf Creek, north of Lacombe, in October, 1912, and one on September 28th, 1913, six miles west of Camrose, near Bittern Lake. I have known of several colonies breeding on the Knee Hill Creek, about 30 miles east of Olds, and I believe this to be the northern limit for nesting.

F. L. FARLEY, CAMROSE, ALTA.

THE FOLLOWING BOOKS, WHICH WILL BE OF INTEREST TO MANY MEMBERS OF THE CLUB, HAVE RECENTLY BEEN PLACED ON THE SHELVES OF THE CARNEGIE PUBLIC LIBRARY.

Earth Features and Their Meaning, by W. H. Hobbs. An introduction to Geology. (Ample treatment, of interest to those who care to be able to read, in the landscape, the history of the vicissitudes which the region under observation has undergone).

Influences of Geographic Environment, by E. C. Semple. (Amplified presentation of Ratzel's theories that geographic conditions are the chief factor in the physical, intellectual and social development of man."

Climate—Considered Especially in Relation to Man, by R. D. Ward.

The Wanderings of Animals, by Hans Gadow. (Sketch of the distribution of the animals over the earth's surface. Cambridge Manual Series).

The Earth—Its Shape, Size, Weight and Spin, by J. H. Poynting.

The Non-Metallic Minerals, Their Occurrence and Uses, by G. P. Merrill. (Important work on minerals of value other than as ores of metals).

Natural Philosophy, by W. Ostwald. (Brief survey of the

sciences, their general import and unification of present knowledge concerning them. A general introduction to science and to one view of philosophy).

The Ways of Planets, by M. E. Martin. (Discusses in a simple, informal manner the origin, position and characteristics of the various planets).

The Solar System—A Study of Recent Observations, by C. L. Poor. ("Not too obstruse, thoroughly entertaining and timely"—Nation).

Darwinism and Human Life, by J. A. Thomson. ("Authoritative, interesting and easily comprehended statement of the history and present status of evolution"—A.L.A.)

The Origin and Nature of Life, by B. Moore. (Home University Series. Clear and concise statement of the problem from the chemical point of view"—A.L.A.)

College Zoology, by R. W. Hegner. (An excellent text designed for beginning college students).

Agriculture, by W. Somerville. (Makes the results of laboratory work at the university accessible to the practical farmer).

MEETINGS OF THE BOTANICAL BRANCH.

December 6th, 1913, at the home of Mr. R. B. Whyte, the following members being present: R. B. Whyte, Dr. M. O. Malte, G. H. Clark, L. H. Newman, J. M. Macoun, N. Criddle, W. T. Macoun, C. J. Tulley, A. E. Attwood and J. R. Fryer.

In response to the call for botanical specimens from members Mr. Criddle exhibited an interesting specimen of the genus *Neslia* (Ball Mustard) and one of the genus *Setaria* (Foxtail Grass), on the latter of which was an abnormal foliaceous development of the bracts. Mr. Newman exhibited a sample of wheat which took the world's prize at Tulsa, Oklahoma, in October, 1913. Mr. W. T. Macoun showed a couple of Peli nuts which were characterized by an exceedingly hard shell. They were somewhat larger than ordinary nutmegs and more angular in shape.

Dr. M. O. Malte spoke on "Some Results of the Summer's Work in Botany" and dealt especially with the species *Mentha*, *Viola* and *Juncus*. Specimens of true *Mentha arvensis* L., collected by him in Nova Scotia, were shown and the statement made that on account of the characters of the calyx the true *M. arvensis* L. can scarcely be grouped with other Canadian species of *Mentha* now regarded as varieties of it. Dr. Malte was of the opinion that the Menthas which now are called *M. arvensis* L., var. *canadensis* (L), Briquet, and var. *lanata* Piper, are specifically distinct from *M. arvensis*, and furthermore,

that the difference between *canadensis* and *lanata* are so great that both deserve specific rank. The latter supposition was borne out by Mr. J. M. Macoun, who stated that in British Columbia, where both are frequently growing together, the differentiating characters seem to be perfectly constant.

Dr. Malte also exhibited specimens of *Viola rostrata* Pursh, from Chats Falls, Ont., collected by Mr. J. M. Macoun and himself last spring, and explained that this was the second time the species had been found in the Ottawa district. It was growing with *V. conspersa* Rchb. Perfectly typical hybrids representing the combination *V. conspersa* x *rostrata*, found among the parents, were shown. They were intermediate in all respects as to morphological characters and had over 90% of the pollen undeveloped and unfit for fertilization. The speaker further exhibited a number of species of *Juncus* primarily with the object of demonstrating the ease with which many plant species which to the unexperienced student may seem difficult and puzzling, can be identified. With the use of a Zeiss binocular microscope, kindly placed at the Club's disposal by the Topley Company, characters on the seed only, sufficient for the correct identification of such species as *J. articulatus* L. *J. brevicaudatus* (Engelm) Fernald, *J. canadensis* J. Gay, etc., were explained. In this connection a completely sterile form, collected at Bridgetown, N.S., was exhibited. This form was found to represent the combination *J. articulatus* x *canadensis*.

Mr. Uhlemann, a visitor, spoke briefly on the Zeiss binocular microscope, stating that this instrument is probably one of the best of its kind in the world.

J. R. F.

December 20th, 1913, at the home of Mr. J. M. Macoun, the following members being present: W. T. Macoun, L. H. Newman, Geo. H. Clark, N. Criddle, Mr. Honeyman, Dr. Malte, Dr. Blackadar, A. Eastham, T. W. Dwight, A. E. Attwood, R. B. Whyte, J. M. Macoun, C. J. Tulley and J. R. Fryer.

Mr. C. J. Tulley and Dr. Malte were the speakers for the evening. Mr. Tulley first reviewed the evolutionary steps in reproductive processes in some of the lower plant forms. Commencing with the unicellular plant forms, the speaker briefly compared their cytological features with those of the simplest animal form, Amoeba, and explained that the reproductive method in unicellular plants is one of continuous cell multiplication, one individual becoming two by cell division. This method of reproduction was designated *Cell Division*, as distinguished from the other two methods, *Asexual* and *Sexual*. In plants

somewhat higher than the simplest of unicellular forms the reproductive method is slightly different. The products of cell division are dissimilar, certain daughter cells being specialized for reproductive purposes. These reproductive cells are called *spores*, and in cases where they are similar one to the others, the method of reproduction is known as the *Asexual method*. In forms still higher, some algae, for example, another method of reproduction is suggested. The spores produced are similar in appearance, but do not develop directly into new individuals. They first unite in pairs, forming in each case of union, a *zygote*, which develops into an adult individual. This method of reproduction is known as the *Sexual method*, and where the uniting cells are similar the fusing process is known as *Conjugation* or *Isogamy*. In other forms the fusing cells are dissimilar, in which case the type of sexual reproduction employed is termed *Heterogamy*. In such cases the gametangia (organs bearing the gametes) are also differentiated.

Mr. Tully referred especially to *Ulothrix*, an organism which bears two kinds of spores. One kind has two cilia on each spore, the other kind has four. The smaller two-ciliated spores unite in pairs, resulting in the development of a new filament. The speaker believed these similar gametes to be the beginning of the sexes.

These methods were illustrated by microscopic specimens, those of Spirogyra and Vaucheria being especially fine.

Mr. Tully then briefly described a method of preparing microscopic sections. Hard stems are first soaked in a mixture of glycerine, plus 95 per cent. alcohol, to soften the tissue for sectioning; tender stems are soaked in water and softer plant tissue, such as leaves, in a mixture of chromic acid, plus glacial acetic acid, plus water. The specimen is then cut with a microtome and the sections dropped into a little wire gauze basket, which may be immersed with the sections into the stain. The stains used are *methyl violet*, which brings out the ligneous tissues, and *congo red*, which colors the softer tissues. *Eosin* may also be used for the softer parts. After staining the sections are washed in water and then in alcohol. This method was beautifully illustrated by some sections of stems taken from Mr. Tulley's own collection.

Dr. Malte then said a few words on fixing and staining vegetable tissue. He referred to the fact that nuclei in life are irregular in shape, having ramifications which extend not only to the cell wall, but pass through it, thus establishing direct communication between the cell and its neighbors. Dr. Malte suggested the possibility of these nuclear ramifications being responsible for the conveyance of stimuli which pass from one

tissue to another in the leaf of *Mimosa* (Sensitive Plant) when this leaf responds by its phenomenal movement to the touch of a foreign object. He stated that under the ordinary method of fixing, these ramifications are dissolved by the alcohol and the nucleus is represented in a spherical form quite different from its shape in natural life. To overcome this difficulty and fix nuclei as in their natural state, Dr. Malte gave the following method: Treat the specimen from 10 seconds to 1½ minutes in fumes of *Osmic acid* (10 per cent.); then a few minutes in 10, 20, 30, 40, 50 per cent. alcohol respectively. Keep in 60 per cent. alcohol 24 hours and then proceed to absolute alcohol as usual.

J. R. F.

January 3rd, 1914, at the home of Mr. G. H. Clark, the following members being present: G. H. Clark, R. B. Whyte, W. T. Macoun, J. M. Macoun, A. Eastham, J. Dickson, E. D. Eddy, H. A. Honeyman, J. H. Grisdale, T. W. Dwight, L. H. Newman, N. Criddle, A. E. Attwood, J. R. Fryer.

Mr. G. H. Clark led in a discussion of the clay belt of New Ontario. A large number of interesting photographs, showing the character of the country along the right of way of the National Transcontinental Railway, which had been made available for the evening by Mr. D. MacPherson, of the National Transcontinental Railway Commission Staff, and also a collection of photographs showing progress in clearing and cropping in the Temiskaming district and north, which had been loaned by G. A. Galbraith, district representative for agriculture of New Liskeard, proved to be of special interest. Mr. Clark, in company with the Director of the Dominion Experimental Farms, spent ten days traversing the clay belt along the new railway lines. Of the 275 miles covered, from Abitibi westward, only 14 per cent. was considered as useless for agriculture. An additional 26 per cent. was relatively flat, covered with black spruce and poorly drained naturally. The balance, 60 per cent., as viewed along the right of way, was rated 21 per cent. excellent, 39 good, from the viewpoint of the settler. Limitations as to kinds of crops, because of the northerly climate, formed a considerable part of the discussion. It was thought that the information at present available was not to be considered reliable, and that as the forest is cleared away the length of the season will be much extended, as was the case in Old Ontario. Particular mention was made of the luxurious growth of grasses and clovers, as seen under agricultural conditions in the few settled localities near Cochrane and south, and around the construction camps to the west.

Mr. Honeyman, who had visited Hearst, in New Ontario, spoke briefly on the climatic conditions of that district, with special reference to late spring and early fall frosts, and listed the following plants which he found growing there: Spruce, balsam, white birch, cedar, poplar, mountain ash, gooseberry, blueberry, dogwood, clintonia, anemone, buttercup, great willow-herb, labrador tea, pitcher plant, yellow pond lily, ferns and botrychium.

Mr. J. M. Macoun exhibited some English walnuts which had been produced by a Canadian grown tree. Members of the Club tested these nuts and found them to differ but little from the regular English walnut.

J. R. F.

BIRD NOTES FROM AWEME, MANITOBA.

An interesting instance of how lack of snow is largely instrumental in retarding the migratory movements of certain birds was brought prominently to our notice during the present winter, the details of which seem worthy of record.

The Lapland Longspur (*Calcarius Lapponicus*) is an early migrant, as well as a late one. In autumn its movements depend largely upon weather conditions, particularly snow, but, as a rule, it leaves us in Manitoba early in November. In 1913, all had left Aweme by November 16th, but soon after that date the weather turned mild again, causing the small amount of snow to vanish, thus exposing many seeds to view. On December 3rd, Longspurs began to arrive from the south in small flocks of from 15 to 20, and by the 17th were on the fields in hundreds, singing and flying about as if it were springtime. They remained common until the 24th, at which date the temperature dropped to 19 below zero, preceded by a light fall of snow, causing many of the birds to depart. A number remained, however, until the end of the year. On January 1st and 2nd, 1914, nearly 3 inches of snow fell, causing the last Longspur to depart.

This, I believe, constitutes a record for lateness of that species in Manitoba; at all events it does so in our parts. It also suggests that snow covering the food supply, possibly supplemented by cold, is the chief factor in driving the species south.

STUART CRIDDLE.

The Ottawa Field-Naturalists' Club.

Patron:

HIS ROYAL HIGHNESS, THE DUKE OF CONNAUGHT,
GOVERNOR-GENERAL OF CANADA.

Council 1913-1914

President:

Mr. L. H. Newman, *B.S.A.*

Vice-Presidents:

Mr. Arthur Gibson. Mr. Harlan I. Smith.

Secretary:

Mr. E. D. Eddy, *B.S.A.*
(Seed Branch, Dept. of Agriculture)

Treasurer:

Mr. W. T. Macoun.
(Experimental Farm)

Editor:

Mr. Arthur Gibson.
(Experimental Farm)

Librarian:

Mr. A. E. Currie.
(149 Henderson Ave.)

Mr. J. W. Gibson, *M.A.*
Dr. C. Gordon Hewitt.
Mr. J. J. Carter.
Mr. Andrew Halkett.
Dr. M. O. Malte.
Mr. J. R. Dymond, *B.A.*
Miss A. L. Matthews.
Mrs. W. D. Oakely.

Standing Committees of Council:

Publications: Dr. C. G. Hewitt, A. Gibson, A. E. Currie, W. T. Macoun, H. I. Smith, E. D. Eddy.

Excursions: J. J. Carter, A. Halkett, J. W. Gibson, J. R. Dymond, Dr. M. O. Malte, Miss A. L. Matthews, Mrs. W. D. Oakely.

Lectures: H. I. Smith, Dr. C. G. Hewitt, J. W. Gibson, J. R. Dymond, Miss A. L. Matthews, Mrs. W. D. Oakely.

Leaders at Excursions:

Archæology: T. W. E. Sowter, J. Ballantyne, H. I. Smith.

Botany: W. T. Macoun, J. M. Macoun, T. E. Clarke, H. T. Gussow, Dr. M. O. Malte, J. W. Eastham, J. R. Dymond.

Entomology: A. Gibson, W. H. Harrington, Dr. C. G. Hewitt, J. M. Swaine.

Geology: W. J. Wilson, H. M. Ami, T. W. E. Sowter, W. A. Johnston.

Ornithology: A. G. Kingston, P. A. Taverner, Miss M. B. Williams, *B.A.*

Zoology: Prof. E. E. Prince, E. E. Lemieux, E. A. LeSueur, S. E. O'Brien, C. H. Young.

Auditors:

J. Ballantyne, E. C. Wight.

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