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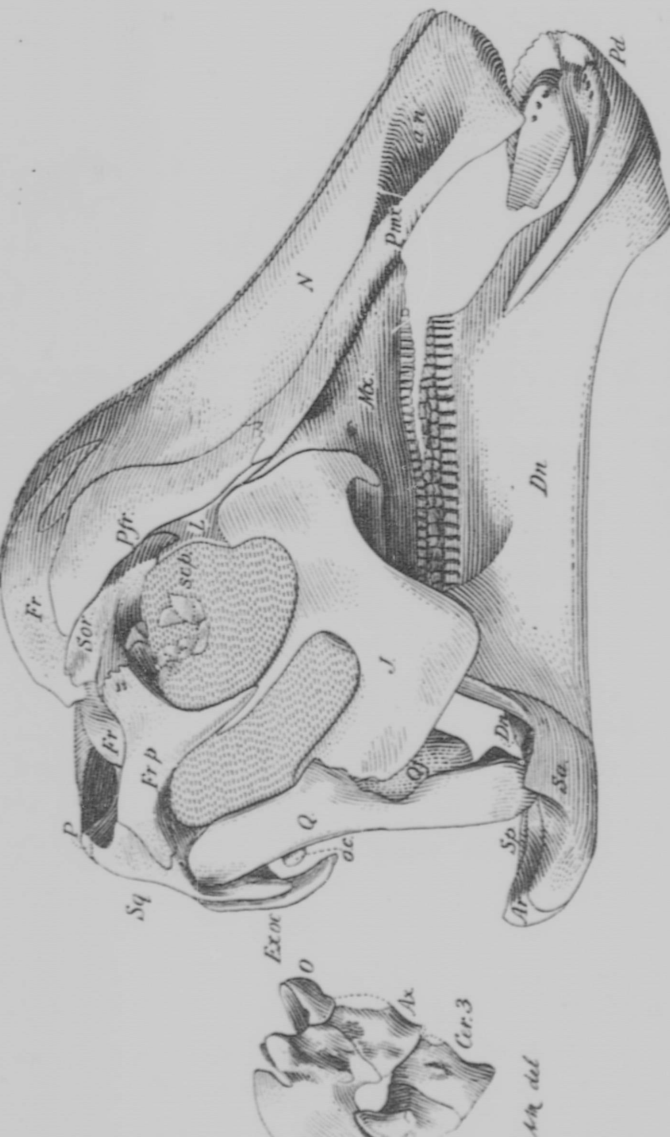
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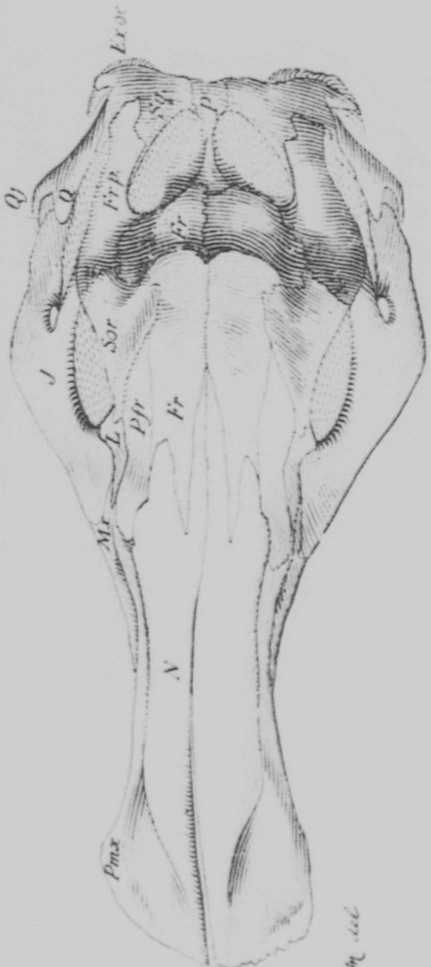
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THE OTTAWA NATURALIST

Vol. XXX. JANUARY, 1917. No. 10.

ON CHENEOSAURUS TOLMANENSIS, A NEW GENUS AND SPECIES OF TRACHODONT DINOSAUR FROM THE EDMONTON CRETACEOUS OF ALBERTA.*

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

The present paper is descriptive of the skull of a trachodont dinosaur of small size included in the Geological Survey vertebrate palæontological collection of 1915 from the Edmonton formation of Red Deer river, Alberta. The skull displays an assemblage of characters which clearly point to its belonging to a type generically distinct from any hitherto described member of the Trachodontidæ. With the skull, and belonging to the same individual, were limb bones, the pelvic arch, not altogether complete, vertebræ, and other parts of the skeleton (field No. 6, cat. No. 2246); a second skull belonging to a much smaller individual, was also obtained (field No. 2, cat. No. 2247) in beds of the same geological age. These remains were discovered by George F. Sternberg, in charge of the field party, about four miles apart in the valley of Red Deer river. The larger skull is from the west side of the river, about five miles above Tolman ferry, in sec. 11, twp. 34, range XXII, at 150 feet above the river level. This locality is roughly twenty-seven miles above the mouth of Three Hills creek, and eight miles west and somewhat north of Rumsey on the line of the Canadian Northern railway. The smaller skull was found farther up stream about one mile north-west of the mouth of Big Valley creek on the west side of the river.

The rock in which these remains occurred is a hard, very fine sandstone which is removed with difficulty from the bones. Mr. Sternberg has most successfully freed both skulls from their matrix, and has mounted the larger skull for exhibition. This larger skull is

*Communicated with the permission of the Deputy Minister of Mines.

in an excellent state of preservation and is but slightly distorted. The sutures are very distinctly marked defining the exact limits of the various elements. The smaller skull is imperfect in the occipital region but elsewhere most of the sutures are clearly displayed; it is of special value for comparison with the larger specimen.

The larger skull is selected as the type of the new genus for which the name Cheneosaurus (*Gr. Cheneios*) is proposed on account of the supposed resemblance of the specimen, when viewed in profile, to the outline of the head of a goose. The species is named after Tolman ferry and post-office, both of which are not far from where the type was discovered.

CHENEOSAURUS TOLMANENSIS GEN. ET SP. NOV.

Generic and specific characters.—Skull small, high, short, dome-shaped above, and steeply descending in front. Domed prominence formed by frontals, nasals, prefrontals and supraorbitals. Lachrymal small. Nasals broad, covering the narial passages. Narial opening small and placed very far forward. Anterior premaxillary portion broadly expanded and terminating almost squarely in front. Mandible strongly decurved anteriorly. Teeth long and narrow, with marginal papillation at the apex to a varying extent. Orbit broadly ovate. Lateral temporal fossæ long and narrow. Supratemporal fossæ small.

This genus of the Edmonton formation differs from all other known members of the Trachodontidæ in the dome-shaped form of the upper, interorbital surface of the skull, and in the roofing over of the narial passages by the broad nasals, resulting in a diminution of the anterior nares and their limitation to a far advanced position. In no other form is the angle of descent of the facial portion so uniformly steep. Attention is called to the presence in Cheneosaurus of a large supraorbital, a cranial element not hitherto recognized in the Trachodontidæ except doubtfully in the single instance of Gryposaurus (Belly River formation).

The skull of *Cheneosaurus tolmanensis* is broad behind and narrow in front. It is most elevated in the region above the orbits and for a short distance forward, forming a conspicuous rotundity in the upper surface in advance of which it descends narrowly and steeply to the horizontally expanded snout. Behind the apical prominence the remainder of the superior surface is depressed. The mandible is long in comparison with its height and is strongly decurved in front where it ends in a broad predentary. The height of the type skull is less than three-fourths its length, and its maximum breadth is nearly one-half its length. The orbit is moderately large and is situated toward the front of the posterior half of the cranium.

By referring to the two drawings of the type, reproduced herewith, one a right side view, the other from above, the proportions of the different elements of the skull as they appear at the surface can be readily seen.

The dome-shaped prominence of the upper surface is formed by the frontals, prefrontals, nasals and supraorbitals. The frontal contribution is the largest of the four and occupies the greatest part posteriorly and superiorly, the prefrontals reach upward laterally, while the nasals assist anteriorly continuing backward slenderly between the frontals to the highest point of the dome. The supraorbitals contribute to a minor extent laterally behind.

The orbital opening is broadly ovate in outline with the more pointed end downward. It is bounded by the supraorbital, the postfrontal, the jugal, and the lachrymal, the last named element contributing least, and the postfrontal and supraorbital nearly equally to the formation of the rim.

The lateral temporal fossa is more than three times as high as wide and is enclosed in its lower half length by the jugal, and in the upper half by the quadrate, the postfrontal, and, to a slight extent, the squamosal.

The prefrontal is largely developed and is more than three times as long as broad. It lies in advance of the supraorbital and the lachrymal, is in contact above with the frontal, in front with the nasal, and below with the premaxilla which it overlaps.

The lachrymal is small and narrow, its extreme length being three times its maximum breadth. Its narrow upper end underlies the supraorbital while its posterior margin in its entirety enters into the formation of the orbital rim. Inferiorly it is in contact with the jugal and anteriorly with the prefrontal. Infero-anteriorly it is prolonged narrowly downward between the jugal and the prefrontal, the extreme end of the extension lying between the premaxilla and the maxilla.

The jugal does not present any very unusual characteristics. It is in contact with the quadrato-jugal and the quadrate behind, overlapping the former. In front it lies over a large surface of the maxilla, and supero-anteriorly is in contact with the lachrymal for a considerable distance. The end of its upwardly directed process, forming the lower half of the slender postorbital bar, passes behind the process from the postfrontal.

The premaxilla is a large bone broadly expanded horizontally outward in front where with its fellow it forms the edentulous anterior termination of the cranium. Postero-exteriorly it extends upward between the maxilla and the nasal as a long, narrow surface to meet the lower end of the prefrontal which overlaps it. The front border of the premaxilla curves outward and slightly backward from the midline of the skull and is met at an obtuse angle by the outer border descending freely from its contact with the maxilla. The upper surface of the bone is shallowly excavated in advance of the narial opening forming a slightly depressed area exterior to which the lateral angulation curves slightly downward. Anteriorly the thickness of the bone is suddenly increased on the lower surface a short distance back from the front edge. This edge is conspicuously notched by about from ten to twelve grooves which pass inferiorly backward across the thinned marginal area.

The nasal bones are contiguous along the midline of the cranium throughout their length, except possibly at their extreme anterior end. They are broad for the most part and curve downward outwardly to meet the premaxilla and the prefrontal. They arch over the nasal passages and their openings which latter are placed far forward. In advance of the openings the nasals continue narrowly forward for a short distance over the premaxillæ on either side of the midline, but the exact outline of their anterior ending is obscured. Posteriorly they appear to bifurcate, the exterior branch overlapping the frontal while the interior one continues, much attenuated, on the inner side of the frontal to the summit of the dome-shaped superior surface. This surface bifurcation of the nasal is not a division in reality, as the bone underlies the narrow front termination of the frontal.

A notable feature in the skull of Cheneosaurus is the presence of a large supraorbital bone which enters into the formation of the orbital rim almost to the same extent as the postfrontal. This bone is roughly subtriangular in shape and is in contact posteriorly with the post-frontal and frontal, superiorly with the frontal, and anteriorly with the prefrontal. Its lower edge for the most part forms the antero-superior portion of the curve of the orbital rim. Infero-anteriorly it extends narrowly downward and overlaps the upper end of the lachrymal.

The postfrontal has a somewhat larger surface area than the supraorbital and meets it anteriorly in a zigzagged suture. Posteriorly it overlaps the squamosal extensively. Superiorly its posterior half-length bounds the supratemporal fossa externally at the front, while the remainder of its upper half-length joins the frontal in a jagged suture.

The frontal is larger than the prefrontal, and is of an irregular shape. It is in sutural contact with the nasal, the prefrontal, the supraorbital, the postfrontal and the parietal. For nearly the whole of its anterior half-length it is separated from its fellow along the mid-line by the narrow backward extension of the nasals. It forms the greater part of the dome-shaped elevation of the cranium rising from behind, and descending on the anterior slope its forwardly directed attenuation overlaps the nasal. For a short distance forward from its junction with the parietal, equal to about one-fifth of its total length, its surface is lower than the part that rises into the dome-shaped prominence and is defined from it by an overhanging transverse fold of bone. This posterior area of the frontal is much depressed in its outer breadth but rises convexly inward to the mid-line. The suture between the pair is conspicuously zigzagged.

The supratemporal fossa is small, narrowly oval, and about twice as long as wide, and passes downward into the lateral temporal fossa. The two openings are close together posteriorly but toward the front they diverge from each other. They are bounded by the frontal, postfrontal, squamosal, and parietal, each of the four elements participating to an almost equal extent.

The squamosal runs forward beneath the postfrontal to a point in line with the anterior end of the supratemporal fossa. Intero-posteriorly it meets the parietal in a short jagged suture. Postero-inferiorly it is deeply cupped to receive the upper end of the quadrate, and sends downward a slender process which is applied to the paroccipital (exoccipital) alar extension in the usual way.

The occipital condyle is tripartite, the two exoccipitals and the basioccipital entering into its formation to an equal extent, with the bases of the exoccipital pair forming the upturned ends of the curved, U-shaped condylar surface.

The exoccipital in assisting in the formation of the condyle, bounds the foramen magnum laterally. A paroccipital process of large size supports the pendent extension of the squamosal from behind and passes freely downward beyond it.

The parietal bounds the supratemporal fossa on its inner side, and intero-anteriorly along the greater part of its sutural junction with the frontal. Postero-laterally it unites with the squamosal. Within the supratemporal fossate area the pair rise to each other at the median line together forming a narrow longitudinal ridge separating the openings.

The maxilla appears externally in contact principally with the premaxilla and the jugal. Superiorly it passes for a short distance between the jugal and the lowermost portion of the downward extension of the lachrymal.

The dentary supports a high and robust coronoid process, and is in contact posteriorly with the surangular to the extent usual in the Trachodontidæ. Its anterior edentulous portion is strongly decurved.

The teeth are of the general trachodont type, with the well known mode of vertical succession and replacement. They are best preserved in the right dentary where the inner enamelled surface is seen to be long and narrow, with a high median keel and raised margins. In this dentary the second tooth from the front has marginal papillations near the tip resembling the dental border sculpture of the small Belly River trachodont described from a maxilla under the name *Trachodon altidens* by the writer in 1902* The larger teeth toward the centre

*Contr. to Can. Palaeont., vol. III (quarto), p. 76, pl. IV, figs. 2, 3 and 4.

of the dental magazine appear to have their margins smooth or with only a slight indication of papillæ near the top. In the broadest part of the dental grinding surfaces there are generally two functional teeth in a transverse direction. The estimated number of teeth in the dentary in each vertical series near the midlength of the dental magazine is about three. There are about thirty-five vertical rows of teeth in the maxilla and thirty-three in the dentary. The above small Belly River form with long, narrow teeth may prove to be ancestral to Cheneosaurus.

The predentary was missing in the type skull but has been restored, as figured, principally from the smaller skull, in which this bone was preserved. As in the premaxillæ the front margin is coarsely notched, indicating the probable presence in life of a firmly attached, strong, horny covering to the beak-like termination of the jaws.

About thirteen sclerotic plates are wholly or partially preserved in the upper part of the orbital opening. The ring in which these plates occurred in life is clearly indicated but its symmetry is destroyed and the full number of plates may not be represented.

With the skull are figured the odontoid process, the axis, and the third cervical vertebra which were found in place. The remaining parts of the atlas were missing.

Measurements of the type skull of Cheneosaurus tolmanensis.

	Mm.
Length of cranium from anterior end of premaxillæ to occipital condyle	445
Length of cranium from anterior end of premaxillæ to posterior border of exoccipital process	477
Height of skull, as mounted, from lower surface of dentary vertically upward to highest point of upper surface	308
Distance from lowermost portion of jugal to highest point of superior surface of skull	276
Distance from grinding surface of maxillary teeth to highest point of skull	229
Anterior premaxillary breadth from midline of skull to outer angulation (half breadth of snout)	97
Length of quadrate (slightly restored at lower end)	190
Extreme length of mandible (predentary restored, articular restored)	473
Length of dentary	358
Depth of dentary, at about midlength of mandible, from outer alveolar border to lower edge	64
Maximum breadth of predentary (restored)	151
Maximum height of orbit	99

Maximum width of same	79
Length of lateral temporal fossa	140
Width of same at midlength	42
Length of supratemporal fossa	64
Width (transverse) of same	30
Length of maxillary dental grinding surface	175
Enamelled surface of tooth, about to become functional, in fourteenth vertical row from the front, in right dentary:	
Length	32
Breadth	7

The figures of the two accompanying plates are from drawings by Mr. Arthur Miles.

EXPLANATION OF PLATES.

Plate VI.—Right lateral aspect of skull (type) of Cheneosaurus tolmanensis; one-fourth the natural size. To bring the vertebrae clearly into view they are represented two and a half inches back of their proper position.

Plate VII.—Superior aspect of the same skull; one-fourth the natural size.

Abbreviations.—Ar, articular; Ax, axis; Cer. 3, third cervical vertebra; Dn, dentary; Ex. oc., exoccipital; Fr, frontal; Fr. p., postfrontal; J, jugal; L, lachrymal; Mx, maxillary; N, nasal; O, odontoid process; P, parietal; Pd, predentary; P.fr., prefrontal; Pmx, premaxillary; Q, quadrate; Qj, quadrato-jugal; Sa, surangular; Sor, supraorbital; Sp, splenial; Sq, squamosal; a.n., anterior nares; o.c., occipital condyle; sc.p., sclerotic plates.

BIRDS OF LAKE ONIGAMIS REGION, QUE., AND ALGONQUIN PARK, ONT.

BY JOHN M. COOPER, WASHINGTON, D.C.

INTRODUCTORY REMARKS.

The following two lists of birds were received by the undersigned from the Rev. John M. Cooper. As they apply to districts from which we have little exact information, I requested and received permission from the author to publish them.

Mr. Cooper informed me that in neither locality were specimens taken, and while the species are undoubtedly correct the sub-specific designations rest only upon the probabilities of known geographical distribution. It is refreshing to find an observer who realizes the difficulties of sub-specific identification and the advisability of making such an explanation.

The list at the end of the Onigamis list of birds that were expected but not seen is also a feature worthy of being repeated in other such work.

P. A. TAVERNER.

BIRDS OBSERVED IN LAKE ONIGAMIS REGION AND UPPER ST. MAURICE RIVER, QUEBEC, BETWEEN 48° AND 49° N. LAT. AND 73° 45′ AND 75° 30′ W. LONG., JUNE 9-22, 1916.

Loon, *Gavia immer* Brunn.; not common.
Herring Gull, *Larus argentatus* Pont.; common.
Black Duck, *Anas rubripes* Brewst.; common.
Great Blue Heron, *Ardea herodias herodias* Linn.; rare.
Spotted Sandpiper, *Actitis macularia* Linn.; common.
American Osprey, *Pandion haliaëtus carolinensis* Gmel.; not common.
Great Horned Owl, *Bubo virginianus virginianus* Gmel.; common.
Kingfisher, *Ceryle alcyon* Linn.; common on St. Maurice River.
Yellow-bellied Sapsucker, *Sphyrapicus varius varius* Linn.; common.
Northern Flicker, *Colaptes auratus luteus* Bangs; common.
Night Hawk, *Chordeiles virginianus virginianus* Gmel.; common.
Olive-sided Flycatcher, *Nuttallornis borealis* Swains.; common.
Least Flycatcher, *Empidonax minimus* W. M. & S. F. Baird; common.
Canada Jay, *Perisoreus canadensis canadensis* Linn.; common.
Northern Raven, *Corvus corax principalis* Ridgw.; common.
Crow, *Corvus brachyrhynchos brachyrhynchos* Brehm.; not common.
White-throated Sparrow *Zonotrichia albicollis* Gmel.; abundant.
Slate-colored Junco, *Junco hyemalis hyemalis* Linn.; common.
Song Sparrow, *Melospiza melodia melodia* Wils.; common.
Tree Sparrow, *Iridoprochne bicolor* Vieill.; abundant.
Red-eyed Vireo, *Vireosylva olivacea* Linn.; abundant.
Nashville Warbler, *Vermivora rubricapilla rubricapilla* Wils.; not seen, but heard distinctly at close range near Lake Asawewasenan; am reasonably certain of identification, being quite familiar with its distinctive song.
Yellow Warbler, *Dendroica aestiva aestiva* Gmel.; abundant especially along St. Maurice River.
Myrtle Warbler, *Dendroica coronata* Linn.; common.
Black-throated Green Warbler, *Dendroica virens* Gmel.; common.
Oven Bird, *Seiurus aurocapillus* Linn.; not common.
Water Thrush, *Seiurus noveboracensis noveboracensis* Gmel.; not common in lake region, abundant along river.
Redstart, *Setophaga ruticilla* Linn.; common.
Winter Wren, *Nannus hiemalis hiemalis* Vieill.; not common.
Red-breasted Nuthatch, *Sitta canadensis* Linn.; common.
Olive-backed Thrush, *Hylocichla ustulata swainsoni* Tschudi; abundant.
Hermit Thrush, *Hylocichla guttata pallasi* Cab.; not common.
Robin, *Planesticus migratorius migratorius* Linn.; not common.
Merganser, *Mergus* was common, but not seen at close enough range to tell whether *americanus* or *serrator*. Several other species

present were observed or heard but not distinctly enough for unmistakable identification. I hope to renew observations in the same region this coming June.

None of the following birds were seen or heard:

Whip-poor-will, *Antrostomus vociferus* Wils.
Chimney Swift, *Chaetura pelagica* Linn.
Barred Owl, *Strix varia* Barton.
Goldfinch, *Astragalinus tristis* Linn.
Catbird, *Dumetella carolinensis* Linn.
Brown Creeper, *Certhia familiaris americana* Bonap.
Chickadee, *Penthestes atricapillus* Linn.
Veery, *Hylocichla fuscescens* Steph.

BIRDS OBSERVED IN ALGONQUIN PARK, ONTARIO, JUNE 2-19, 1908-14.

Loon, *Gavia immer* Brunn.; abundant; nests often, once June 10, 1911, at Tea Lake; young not out by June 19 of any of above years.

Herring Gull, *Larus argentatus* Pont.; abundant; nests often, usually on little rocky islets; young June 13, 1914.

Common Tern, *Sterna hirundo* Linn.; one seen on Lake Opeongo; seen at fairly close range, grayish underparts clearly observed.

Black Duck, *Anas rubripes* Brewst.; common; nests several times.

Bittern, *Botaurus lentiginosus* Montag.; not common.

Great Blue Heron, *Ardea herodias herodias* Linn.; common; heronry observed at Magnetewan Lake, 12 nests in 4 tall pines, probably 30-50 feet above ground; there are said to be other heronries near Potter Lake and on Maggie's Lake.

Spotted Sandpiper, *Actitis macularia* Linn.; common; nests; young observed June 19, 1914.

Canada Spruce Partridge, *Canachites canadensis canace* Linn.; fairly common; young seen June 11, 1913, near Phillips Lake.

Canada Ruffed Grouse, *Bonasa umbellus* (presumably *togata*) Linn.; common.

Broad-winged Hawk, *Buteo platypterus* Vieill.; common.

Bald Eagle, *Haliaetus leucocephalus* Linn.; distinctly seen at close range at Clear Lake.

Sparrow Hawk, *Falco sparverius sparverius* Linn.; fairly common.

Osprey, *Pandion haliaëtus carolinensis* Gmel.; common; nests seen several times, always in large dead trees, at top about 40 feet from ground.

Barred Owl, *Strix varia varia* Barton; abundant.

Saw-whet Owl, *Cryptoglaux acadica acadica* Gmel.; fairly common; not seen but heard at times; identification rests partly on guide who without any suggestive questions on my part told me he had the previous year searched for, caught and learned the name of bird; we heard the oft repeated sort of whistle quite distinctly on several occasions.

Belted Kingfisher, *Ceryle alcyon* Linn.; common; nests.

Hairy Woodpecker, *Dryobates villosus* (presumably *villosus*) Linn.; common; nests.

Downy Woodpecker, *Dryobates pubescens* (presumably *medianus*) Swains.; not common.

Arctic Three-toed Woodpecker, *Picoides arcticus* Swains.; fairly common; am fairly but not absolutely certain of identification; usually observed under somewhat imperfect light conditions; was told on good authority that both *arcticus* and *americanus* are in Park.

Yellow-bellied Sapsucker, *Sphyrapicus varius varius* Linn.; common.

Northern Pileated Woodpecker, *Phloeotomus pileatus* (presumably *abieticola*) Bangs; fairly common.

Northern Flicker, *Colaptes auratus luteus* Bangs; common; nests.

Whip-poor-will, *Antrostomus vociferus vociferus* Wils.; locally abundant.

Night-hawk, *Chordeiles virginianus virginianus* Gmel.; common.

Chimney Swift, *Chaetura pelagica* Linn.; abundant.

Ruby-throated Hummingbird, *Archilochus colubris* Linn.; fairly common.

Kingbird, *Tyrannus tyrannus* Linn.; abundant; nests seen were in majority of cases (5 out of 7) on tops of dead stumps, 2½-5 feet up from water level.

Phoebe, *Sayornis phoebe* Lath.; uncommon, several seen, one at Cedar Lake.

Olive-sided Flycatcher, *Nuttallornis borealis* Swains.; abundant.

Wood Pewee, *Myiochanes virens* Linn.; common.

Least Flycatcher, *Empidonax minimus* W. M. and S. F. Baird; common; nest.

Blue Jay, *Cyanocitta cristata cristata* Linn.; common.

Canada Jay, *Perisoreus canadensis* Linn.; common; young about full size in early June.

Northern Raven, *Corvus corax principalis* Ridgw.; not common.

Crow, *Corvus brachyrhynchos brachyrhynchos* Brehm; uncommon.

Red-winged Blackbird, *Agelaius phoeniceus phoeniceus* Linn.; abundant.

Bronzed Grackle, *Quiscalus quiscula aeneus* Ridgw.; abundant.

Purple Finch, *Carpodacus purpureus purpureus* Gmel.; common.

Goldfinch, *Astragalinus tristis tristis* Linn.; common.

Vesper Sparrow, *Pooecetes gramineus gramineus* Gmel.; common in clearings.

White-throated Sparrow, *Zonotrichia albicollis* Gmel.; abundant.

Chipping Sparrow, *Spizella passerina passerina* Bech.; common in clearings.

Slate-colored Junco, *Junco hyemalis hyemalis* Linn.; common.

Song Sparrow, *Melospiza melodia melodia* Wils.; abundant; nests.

Swamp Sparrow, *Melospiza georgiana* Lath.; common.

Rose-breasted Grosbeak, *Zamelodia ludoviciana* Linn.; rare; seen only once, at Victoria Lake.

Indigo Bunting, *Passerina cyanea* Linn.; rare; seen and heard only once, at Victoria Lake.

Scarlet Tanager, *Piranga erythromelas* Vieill.; common in all parts of Park, including the extreme northern part around Tea Lake.

Barn Swallow, *Hirundo erythrogaster* Bodd.; common; nests.

Tree Swallow, *Iridoprocne bicolor* Vieill.; abundant; nests.

Bank Swallow, *Riparia riparia* Linn.; uncommon; seen at Manitou Lake.

Cedar Waxwing, *Bombycilla cedrorum* Vieill.; common.

Red-eyed Vireo, *Vireosylva olivacea* Linn.; abundant.

Blue-headed Vireo, *Lanivireo solitarius solitarius* Wils.; fairly common.

Black and White Warbler *Mniotilta varia* Linn.; common.

Nashville Warbler, *Vermivora rubricapilla rubricapilla* Wils.; abundant, in second growth chiefly.

Northern Parula Warbler, *Compsothlypis americana usneae* Brewst.; common, even in northern and northwestern part of Park.

Yellow Warbler, *Dendroica aestiva aestiva* Gmel.; rare, seen and heard only once, at Cache Lake.

Black-throated Blue Warbler, *Dendroica caerulescens caerulescens* Gmel.; common.

Myrtle Warbler, *Dendroica coronata* Linn.; abundant; nests.

Magnolia Warbler, *Dendroica magnolia* Wils.; common.

Chestnut-sided Warbler, *Dendroica pensylvanica* Linn.; common, especially in second growth.

Blackburnian Warbler, *Dendroica fusca* Mull.; common in northern part as well as in southern part.

Blackthroated Green Warbler, *Dendroica virens* Gmel.; common.

Pine Warbler, *Dendroica vigorsi* Aud.; rare, seen only once, at Proulx Lake; grayish yellow underparts, grayish neck and head, tail feathers tipped with white and two white wing bars seen well; song (rather sharp-cut trill) heard distinctly; am reasonably certain of identification.

Oven-bird, *Seiurus aurocapillus* Linn.; common, especially among maple.

Water Thrush, *Seiurus noveboracensis noveboracensis* Gmel.; common.

Mourning Warbler, *Oporornis philadelphia* Wils.; common.

Maryland Yellow Throat, *Geothlypis trichas trichas* Linn.; common.

Canada Warbler, *Wilsonia canadensis* Linn.; common.

Redstart, *Setophaga ruticilla* Linn.; abundant.

Catbird, *Dumetella carolinensis* Linn.; rare; observed only twice, once at Opeongo Lake, and once at Island Lake.

Brown Thrasher, *Toxostoma rufum* Linn.; rare; one observed in Park at Joe Lake and two on outskirts of Park near South River and Egan Estate.

House Wren, *Troglodytes aëdon aëdon* Vieill.; common.

Winter Wren, *Nannus hiemalis hiemalis* Vieill.; abundant.

Brown Creeper, *Certhia familiaris americana* Bonap.; not common; nest seen once, at Canoe Lake, in bark of large dead hemlock in floodwater about three feet up from water level; at distance of about five yards heard its rather melodious song, a clear high-pitched whistle of five distinct notes, and first and third long, the other three short.

Red-breasted Nuthatch, *Sitta canadensis* Linn.; common.

Chickadee, *Penthestes atricapillus atricapillus* Linn.; common.

Golden-crowned Kinglet, *Regulus satrapa satrapa* Licht.; rare; seen only once, at Merchant's to White Trout Lake portage.

Wood Thrush, *Hylocichla mustelina* Gmel.; not common; never seen, but heard pretty clearly on several occasions; once when heard a half-breed at Manitou Lake with whom I was talking at the time told me the bird had a 'red head.'

Veery, *Hylocichla fuscescens fuscescens* Steph.; fairly common.

Olive-backed Thrush, *Hylocichla ustulata swainsoni* Tschudi; abundant; nests.

Hermit Thrush, *Hylocichla guttata pallasi* Cab.; faily common.

Robin, *Planesticus migratorius migratorius* Linn.; not common; nest.

Bluebird, *Sialia sialis sialis* Linn.; uncommon.

1. Mr. Bartlett, the Park Superintendent, has in his office a specimen of the Golden Eagle, *Aquila chrysaëtos*; the bird took wolf poison near Tea Lake (Big Tea in n. part of Park) the winter of 1908-9.

2. Mr. Waters, one of the older rangers, and a man who knows the Algonquin birds perhaps better than any one else, told me that the Great Horned Owl, *Bubo virginianus virginianus* Gmel. is found in the Park.

3. Dr. Claghorne, a former forest ranger, told me that he had seen the Baltimore Oriole, *Icterus galbula* Linn., near Cache Lake in the spring of 1911 and had found the Cliff Swallow, *Petrochelidon lunifrons lunifrons* Say, on the Madawaska River.

4. The Alder Flycatcher, *Empidonax traillii alnorum*, and the Yellow-bellied Flycatcher, *E. flaviventris*, probably both breed in the Park, but I have never been sufficiently sure of their songs and would not feel safe in identifying them in the bush.

5. *Mergus*, common, but whether *americanus* or *serrator* am uncertain. Oddly enough have never observed a male in the Park, though the female was seen nearly every day.

6. A grebe with young seen once; presumably Pied-billed Grebe *Podilymbus podiceps,* but male was not observed, so could not be sure of identification.

7. I have noted in above list cases where nests have been found; judging from the dates when birds themselves were observed, it is most likely that all the birds in the list nest in the Park.

NOTES ON THE FEEDING HABITS OF TWO SALAMANDERS IN CAPTIVITY.

BY CHARLES M. STERNBERG, GEOLOGICAL SURVEY, OTTAWA.

While attending an excursion of the Ottawa Field-Naturalists' Club to Cache Bay, on the Ottawa River, about two miles above Hull, P.Q., on May 13 last, the writer was fortunate enough to capture two salamanders, *Amblystoma punctatum* (the spotted salamander), and *Amblystoma Jeffersonianum,* as well as a newt,*Diemictylus viridescens.* The habits of the salamanders have since been observed. They were all placed together in a box, with a screen netting on the top, and with damp earth, moss, and rotten wood in one corner. Under this they crept and have since remained, (with the exception of the newt) apparently much at home.

The newt refused to eat from the first and died in July, but the salamanders readily ate earth and other worms, crickets, house flies, and other soft insects. They refused however to eat small grasshoppers, spiders, and insects with hard wing covers, such as the Lady Birds and other small beetles. Dead worms left in the box were not eaten, but on one occasion a small strip of fresh pork, moved to imitate the action of a live worm, proved sufficiently attractive to one of them. Like many of the lower forms of vertebrates, salamanders can live without food for several weeks with apparently no discomfort; then they make up for lost time by gorging themselves. This was proven on one occasion when, after being without food for about five weeks, each ate three angle worms before they were satisfied. They began by catching a worm near one end and then by a succession of quick snaps taking a fresh hold, each time about one-fourth of an inch ahead, they gradually swallowed it. These movements were very rapid but the interval between bites varied and sometimes they waited as long as half a minute before continuing. On one occasion the two salamanders took hold of opposite ends of a very large angle worm and began to devour it, each being apparently ignorant of the other's action until they approached each other near the middle of the worm; then each pulled and jerked but could not loosen each other's hold. Neither had they strength enough in their jaws to sever the worm with their teeth. When about half an inch apart, after much backward jerking and pulling, the smaller one,(*A. Jeffersonianum*) suddenly rolled over three times in an effort, no doubt, to twist the worm in two. Not succeeding in this it made a second attempt, rolling over only twice this time, but still without success. These turns were always made to the right and very rapidly. (The alligator resorts to the same practice, but its movements are relatively slow). The second attempt having failed the smaller salamander loosened its hold and the larger one took possession of the worm, even the portion which the smaller one had already swallowed. At another time the smaller one was offered one end of a worm, which it took while the writer held the other end firmly. When it had swallowed nearly the entire worm it pulled and jerked, trying very hard to break or tear it in two. Failing to do this it rolled over and over as it had done on the previous occasion, though a greater number of times, and with such rapidity that the turns could not be counted. In this attempt it was successful.

Both captives have continued to grow, the larger one (*A. punctatum*) having increased from four inches in length, when collected, to five and one-eighth inches at the present time (Jan. 1917), and the other from about three inches to four inches.

CONCERNING SOME ONTARIO CRAYFISHES.

BY A. G. HUNTSMAN, B.A., M.B.
Biol. Dept., University of Toronto.
Curator of the Atlantic Biological Station, St. Andrews, N.B.

The crayfish or 'crab' as it is often wrongly called, is abundant in nearly all our waters, but there is comparatively little known concerning the species occurring in Canada and their distribution. As they are used regularly for teaching purposes in our higher schools and are easily captured and preserved, specimens and data as to distribution could readily be collected by anyone interested.

There are considerable difficulties in the matter of identification, owing to the specific differences being slight and often inconspicuous. Those desirous of studying this group of animals I would refer to the works of Faxon (A Revision of the Astacidae. Mem. Mus. Comp. Zool. Harv., vol. X, No. 4, 1885) and Ortmann (Proceed. Amer. Phil. Soc., vol. XLIV, p. 91, 1905)* for keys for the determination of the species.

*Also "The Fresh-water Malacostraca of Ontario" in Contr. Canad. Biol., Suppl. 47th Ann. Rep. Dep. Marine and Fisher., Fisheries Branch. 1915.

I shall be very glad to receive any information concerning our crayfishes or to assist anyone in the identification of specimens. Whenever possible, specimens should be kept, together with records of the locality and habits.

All our crayfishes east of the Rocky Mountains belong to the genus *Cambarus,* and we have at least eight species. The most interesting ones are those that dig out burrows for themselves in the mud. The material excavated is usually left at the opening of the hole as a 'chimney' of mud, which may be several inches in height. These 'chimneys' are frequently seen in low ground or on the banks of streams.

Recently I took occasion to investigate some of these burrows that are quite abundant in the clay banks of the Twenty-Mile Creek, near Tintern, in the Niagara Peninsula. The species that inhabits these burrows proved to be *C. immunis,* which has not previously been recorded from Canada. It is abundant in Ohio, southern Michigan, and farther south and west. The present record places it in the drainage area of Lake Ontario.

All the specimens very evidently belonged to *C. immunis,* but without exception they showed the presence of small lateral rostral spines, which are only occasionally found in this species. In this respect they agree with Faxon's variety *spinirostris.* The excavation at the base of the movable finger of the large claw was not invariably present, being absent on one or other side in three specimens (two males and one female). This species is most easily recognized by the condition of the first pair of abdominal legs of the male. The two branches of each leg are long and slender and curved so as to form at least one quarter of a circle.

The banks of the stream, where the burrows were situated, were of a stiff blue clay. I believe that the stream never becomes wholly dry. There is not then the same necessity for the crayfish to burrow, as in the case of those inhabiting swamps and pools that become dry in the summer months. Ponds and ditches of this sort are given as the usual habitat of this species.*

None of the burrows showed well-formed chimneys when I examined the spot (September). They had apparently been destroyed by passing animals or by the weather. The burrows were not built in any regular fashion, but varied greatly. Each had either one or several openings. The openings were sometimes all on the bank above water, at other times some above and some below, and apparently, sometimes all below. The level of the water varies during the season and at times all the openings would probably be exposed.

The length of the burrows varied from half a foot to several feet. Sometimes they were nearly straight, but usually they were quite

*See Harris, Amer. Natural., vol. 35, p. 187.

tortuous. Their direction varied from horizontal or slightly upward to vertically downward.

I was not able in any case to demonstrate a special shelf on which the animal rested, although the end of the burrow or of one of the side branches might be enlarged into a chamber.

Sometimes the crayfish was easily caught without digging out the entire burrow. If the entrance were opened out, and the open hand placed in it in the muddy water, the crayfish usually came up into my hand in a few minutes.

The irregularity in the burrows is doubtless due to the burrows having been constructed in different seasons and at times of different water levels. Separate burrows would frequently become connected into one, thus giving more than one opening. The variation shown in the direction of the burrow would be caused by local differences in the nature of the bank, the presence of stones and other hard materials.

Burrows in the bed of a small stream running into the Credit River near Port Credit, were found to contain the large species, *C. bartonii robustus*. In this case also, there was no regularity in the mode of construction. The majority of the openings were in the middle of the bed of the stream and under water. This species does not ordinarily burrow, but is to be found underneath large stones. The scarcity of stones and the small size of the stream (drying up at times?) doubtless forced the crayfish to burrow.

BIRD NOTES.

Occurrence of the Ring-necked Pheasant in the vicinity of Montreal.

At Dumouchel's taxidermy shop, on October 10, I saw a male Ring-necked Pheasant in the flesh, which had been shot at Ormstown, on October 8, by Mr. Dionne. Another bird seen at the same time, concerning which I could obtain no data, was probably shot in the vicinity of Montreal. The necks of both birds were distinctly ringed with white. These are the first records I know of for this locality.

Birds Affected by Artificial Light.

St. Lambert has recently acquired a new system of street lighting which makes the streets much brighter than formerly. About 9 p.m. on November 2, I heard a commotion in a maple tree and discovered two European Sparrows amongst the foliage. I watched them for several minutes, moving about and chirping quite naturally in the brilliant glare of a neighboring lamp, with no apparent intention to retire. It is well illustrated, in the 'gay white ways' of cities, how man has been induced to turn night into day, but this is the first instance I have noticed amongst day-feeding birds. Perhaps it is natural that the adaptive 'sparrow' should be the first to adopt this bad habit.

L. McI. Terrill, St. Lambert, Que.

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