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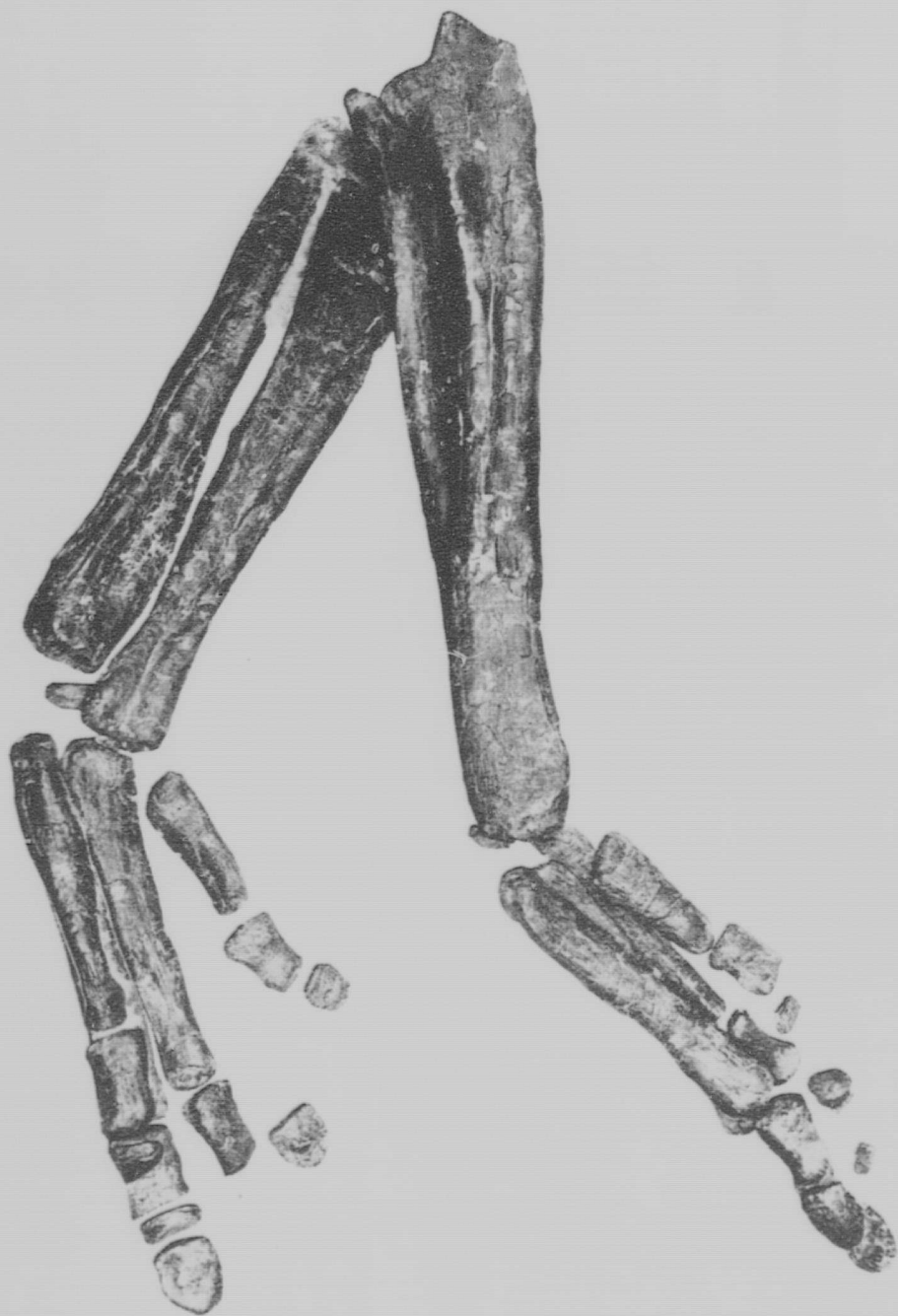
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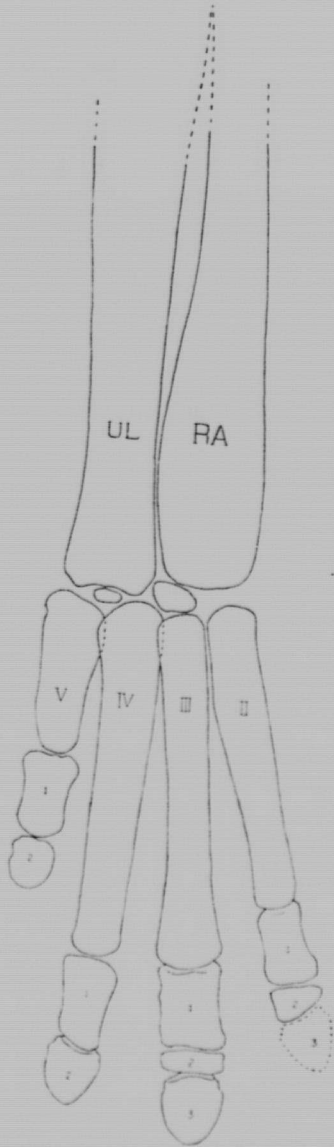
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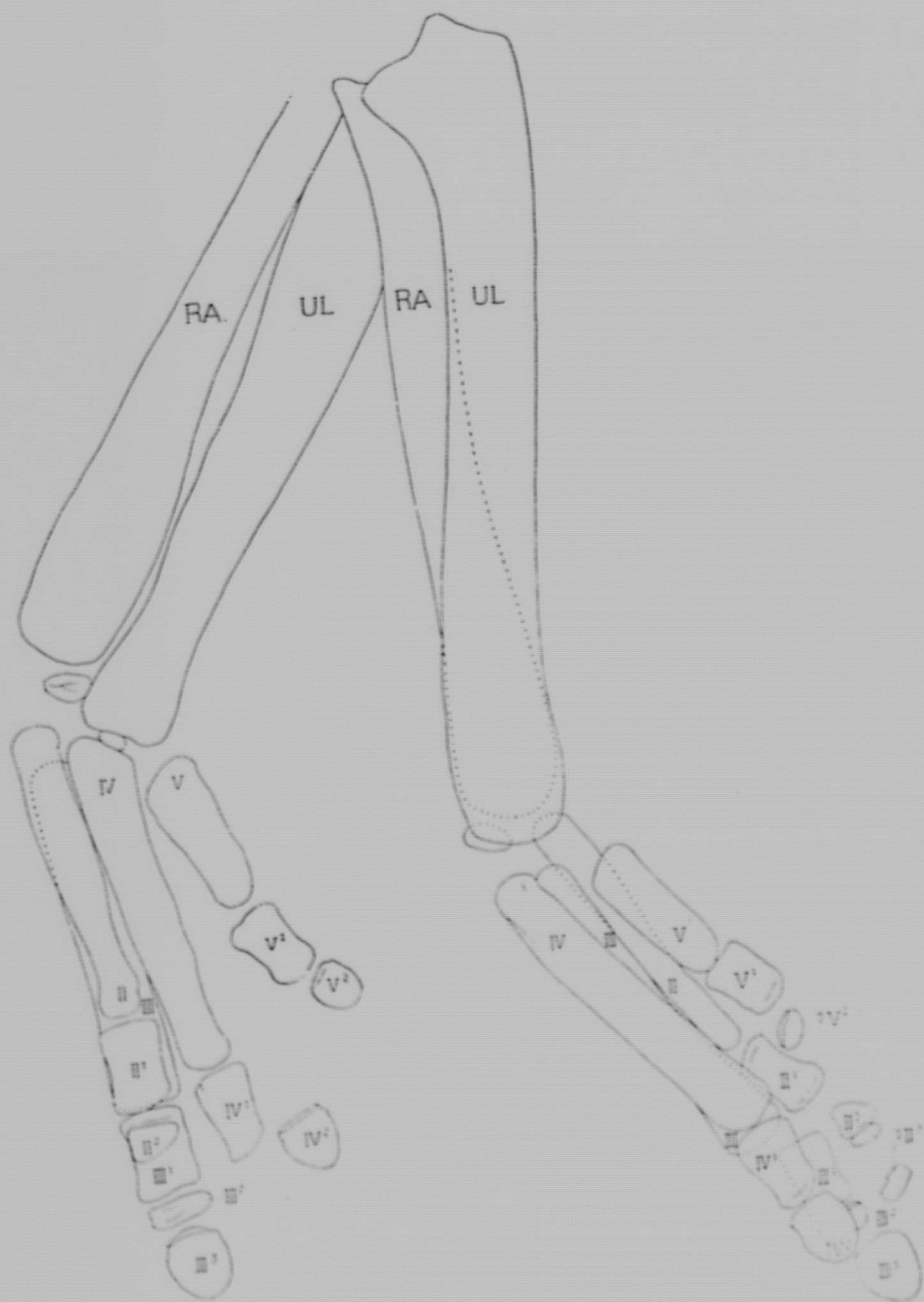
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## THE MANUS IN A SPECIMEN OF TRACHODON FROM THE EDMONTON FORMATION OF ALBERTA.\*

By LAWRENCE M. LAMBE, F.G.S., F.R.S.C., Vertebrate  
Palæontologist, Geological Survey, Ottawa, Canada.

The present paper has particular reference to the osteology of the front feet, or hands, of a specimen of *Trachodon* discovered last summer in the Edmonton formation (upper Cretaceous) of Red Deer river, Alberta, by the Geological Survey vertebrate palæontological field party under Charles H. Sternberg. This specimen is now being mounted in high relief preparatory to being placed on exhibition in the museum of the Geological Survey, Ottawa.

The skeleton of this *Trachodon* is almost complete from the front margin of the snout to the sixth caudal vertebra, but the remainder of the tail is missing. This defect, however, can be remedied to a great extent in mounting the specimen as fortunately a large portion of the tail of another individual of similar size was found at the same locality and can be used to take the place of the missing vertebræ.

This skeleton was found on its right side with the head bent downward, the front legs stretched out, and the long hind legs drawn up. Although it has been subjected to considerable pressure, the effect of which is apparent, there has been remarkably little displacement of any of the bones. The specimen is being mounted in the exact position in which it was discovered. The rock is a sandy clay, mostly soft and easily cut away, but a tenacious layer of clay iron-stone coats some parts of the skeleton and is removed with difficulty. The bones have undergone a varying amount of silicification and are in parts considerably fractured.

A clear and sharp impression of the tuberculated skin is preserved to the left of the mid-line of the back, above the sacrum, for a distance of about four feet. Large polygonal tubercles,

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\* Communicated with the permission of the Director of the Geological Survey.

averaging about  $\frac{1}{4}$  of an inch in diameter, are here seen to form oval shaped clusters, from 2 to 3 inches in maximum diameter, surrounded by small tubercles, about  $\frac{1}{16}$  of an inch in average diameter, occupying the intervening spaces, which are about  $\frac{1}{4}$  of an inch across.

Of particular interest is the lattice-like arrangement of the ossified tendons in three tiers, or layers, on each side of the neural spines of the back. These rod shaped tendons have been known to occur in *Trachodon*, but in no specimen, so far as the writer is aware, has their exact disposition been revealed and described. In the Red Deer river specimen of last summer's collection some of the tendons are seen to fork, or bifurcate, and their arrangement in a triple series is shewn in a very clear and perfect manner. A somewhat similar disposition of ossified tendons, in a double series, in the back and tail has been suggested in published descriptions of *Iguanodon* and *Camptosaurus*.

The Red Deer river specimen is in an excellent state of preservation as a whole, and is one of the most complete of the skeletons of *Trachodon* mounted in the museums of this continent. As it is unusual to find the front feet with most of the bones represented, and but little disturbed, a short description of them is here given. It is proposed to publish, at a later date, particulars regarding the shape and position in this skeleton of the ossified tendons, and of such other structural characters of interest as further study of the osteology of the individual may bring to light.

Of the four digits in the manus all the phalanges are represented with the exception of the terminal one of digit II. As digits III, IV and V ended distally in a hoof (or nail) carrying bone it is probable that digit II, the inner finger, bore a terminal hoof-phalanx also.

The phalangeal formula presented by this specimen is as follows:—

Digit II.	Three phalanges, the terminal one presumably a hoof-bone.
Digit III.	Three phalanges, the terminal one a hoof-bone.
Digit IV.	Two " " " "
Digit V.	" " " "

This formula differs materially from the one given by Mr. Barnum Brown in a paper entitled "The Osteology of the Manus in the Family *Trachodontidae*\*" and descriptive of the fore foot of a specimen of *Trachodon annectens* (Marsh) in the American Museum of Natural History, Cat. No. 5060, from the Lance

\* Bull. Am. Mus. Nat. Hist., vol. xxxi, art. x, pp. 105-107, fig. 1. New York, U.S.A., May 28th, 1912.



formation of Converse County, Wyoming, U.S.A., a specimen remarkable for the completeness of the skin impression which has been made the subject of a recent memoir by Professor Henry Fairfield Osborn.\*\*

The phalangeal formula of the fore foot of this specimen of *Trachodon annectens* is given by Mr. Brown as being—

Digit II.....	with three phalanges, the third a hoof.
Digit III.....	" " " " " "
Digit IV.....	" " " no hoof.
Digit V.....	" " " " "

It is thus evident that this formula, as interpreted by Mr. Brown, is not applicable to the family Trachodontidæ as a whole.

In the Red Deer river Trachodon from the Edmonton beds the fore feet were in the position indicated in plates I and III. In removing the rock particular care has been taken to keep each bone in the exact position in which it was found, so that any observer of the mounted skeleton, or any reader of this paper, with the aid of the illustrations provided, would be in a position to interpret for himself the phalangeal formula presented. This policy of nondisturbance of the bones has been carried out in the preparation and mounting of the entire skeleton.

In both hands the metacarpals II, III and IV are grouped together in close contact, whilst the fifth metacarpal lies somewhat apart.

In the right manus the dorsal surface of digit II, and the palmar surface of the other three digits are presented to view. Owing to the pressure to which the specimen has been subjected digits IV and V have been brought to the same level as digit III. Digit II is at a higher level, directly over and pressed down on digit III.

In the left manus the palmar surface of digits II and III, and the dorsal surface of digits IV and V are uppermost. Digits II and III lie in the same horizontal plane whilst digits IV and V are at a higher level, digit IV resting on digit III.

The right ulna and radius are seen from behind, and the left ulna and radius obliquely from without and behind.

The ulna and radius in each arm, and some of the metacarpals and phalanges, shew the effect of vertical compression, to a varying extent, in an exaggerated breadth. This distortion is given in the accompanying figures, but is probably most clearly expressed in plate III, reproduced from a photograph.

\*\* Memoirs Am. Mus. Nat. Hist., new series, vol. I, part II. Integument of the Iguanodont Dinosaur Trachodon, pp. 33-54, plates V-X, with seventeen text figures. New York, 1912.

Regarding the fore feet as webbed and adapted for swimming, the digits were most probably capable of being spread laterally to some extent, probably more than is indicated in the figure forming plate II, which is intended to represent the hand in a moderately quiescent state.

As shewn in plates I and III, the metacarpals II, III and IV of both hands are parallel to each other and pressed together, with metacarpals II and IV brought round metacarpal III toward each other; the result probably of the contraction of the skin after the death of the animal and not indicative of the proper position of these bones when the creature was alive. Mr. Brown, in figure 1 of his paper, already cited, representing the "Manus of Trachodon correctly assembled" places metacarpals II, III and IV in this position of close contact which is not, in the writer's opinion, the true position of these bones in a fore foot capable of being used with much effect in swimming.

In the Red Deer river specimen the different bones of the digits are distinctive in shape and can be recognized in each hand. Metacarpals III and IV are of about equal length. Metacarpal II is considerably shorter, and metacarpal V is less than half as long as Nos. III and IV. The distal end of metacarpal III is enlarged, but in the other metacarpals the proximal end is the larger, the difference in size between the two ends being not so great in metacarpal II. The articulating surfaces of these bones are evenly rounded.

Plates I and III shew accurately the relative position of the bones of the hands to each other as found.

Digit V has two phalanges, of which the terminal one is smaller than that of digits III and IV. It has a more rounded outline, but, as in the others, is thick proximally and thin toward the distal margin. This terminal bone is well preserved in the right hand, is in position, and is in all respects a typically shaped hoof-bone. In the left hand a fragment regarded as the proximal end of the corresponding bone of digit V is shewn slightly in advance of the first phalanx.

The hoof-bone of digit IV of the right hand was found slightly out of place, as indicated in plates I and III. The corresponding bone in the left hand was missing and has been restored in plaster.

The three phalanges of digit III of the left hand are preserved and were found practically in place as shewn. The second phalanx of digit III of the right hand was missing and has been restored from the left hand, the restoration being placed in the sacpe found between the first and third phalanges.

The only bone not represented in either of the hands is the terminal phalanx of digit II, which is shewn in dotted outline in plate II, as a true hoof-bone on the assumption that, as the other three digits bore flattened hoof-bones, it is probable that the moderately long digit II had a terminal phalanx of this nature also. Two fragments found lying near and in front of the second phalanx of digit II of the left hand may be part of the missing hoof-bone in this hand, but it was not found possible to identify them as such.

The second phalanx of digit II is a distinctly triangular bone and is preserved in both hands, where it occurs with its pointed side directed inward. A similarly shaped bone is described and figured by Mr. Brown as occurring in the manus of *Trachodon annectens* as the second phalanx of digit IV with its narrow side pointing outward.

A carpal bone is preserved in each hand, in the same position, viz., at the ulnar side of the end of the radius. In addition, a smaller carpal bone was found in the right hand, at the middle of the end of the ulna, but a corresponding second carpal was not found in the left hand.

The teeth of the *Trachodon* from the Edmonton formation, whose fore feet are described above, agree in size, shape and marginal sculpture with those of *Trachodon marginatus*, Lambe\*, from the lower horizon of the Belly River formation, whose beds are exposed a few miles farther down Red Deer river to the south-east. As the marginal sculpture of the teeth is one of the principal specific characters of *T. marginatus* the specimen from the Edmonton formation is regarded as belonging to the species from the Belly River formation until evidence is obtained to prove that a specific difference exists between them.

#### EXPLANATION OF PLATES.

PLATE I—The fore feet of the specimen of *Trachodon* from the Edmonton formation of Red Deer river, Alberta, Cat. No. 8399, shewing the bones in the position in which they were found. One-sixth the natural size.

PLATE II—The right fore foot of the same specimen, dorsal aspect, with the bones in, what is considered to be, their natural position. One-sixth the natural size.

PLATE III—Reproduction from a photograph of the fore feet, of the same specimen, as mounted. One-sixth the natural size.

\* Contributions to Canadian Palæontology, vol. III (quarto), part II, 1902. New genera and species from the Belly River series.

A FURTHER NOTE ON CRYPTOLITHUS VERSUS  
TRINUCLEUS.

BY PERCY E. RAYMOND.

Judging from the protests which I have received since the publication of my note on "Some Changes in the Names of the Genera of Trilobites" in the February number of the NATURALIST, there is a deep and universal feeling against giving up the familiar name *Trinucleus*. It is readily admitted by all that the name *Trinucleus* has no standing, but it has existed so long and has become so familiar, that the general opinion seems to be that it would be unwise to give it up now. It is interesting to note how this same feeling has come down through the literature. It will be remembered that *Cryptolithus* was described in 1832 by Green<sup>1</sup>, who gave a recognizable description and figure. In describing *Trinucleus* in 1839, Murchison<sup>2</sup> cites *Cryptolithus* as a synonym of the *Trinucleus*, Lhwyd, 1698, but after his generic description he adds: "Seeing that these distinctions, as above defined, prevail in several species of Trilobites, I have formed them into a new genus under an old name assigned to one species of an animal of this kind of Lhwyd."

In this same year, Emmrich<sup>3</sup> referred four of Murchison's species to *Cryptolithus*, and Goldfuss in 1843 also used *Cryptolithus*, as did Emmrich again in 1845. In these same years, however, (1840-1845), Milne-Edwards, Eichwald, Burmeister, Munster, Portlock, and Lovén all used *Trinucleus*, either under the influence of the prestige of Murchison, or for the reason which influenced Hall<sup>4</sup> in 1847 in "adopting the generic name of Lhwyd as given by Murchison." Hall evidently believed in priority, but the third edition of Linnæus had not then been fixed upon as the point beyond which one should not go in reviving old names.

Barrande, in 1852, gave a good resumé of the uses of the names, and while he decided for *Trinucleus* on account of priority, he says: "Quelques savans, au nombre desquels nous distinguons Bronn et Goldfuss, ont maintenu le nom de *Cryptolithus* qui, sous certains reports, a le droit de priorité. La plupart des paléontologues ont employé de préférence la dénomination plus ancienne de *Trinucleus*, bien qu'elle date d'une époque où la nomenclature systématique n'était pas encore introduite dans la science. Il y a là une question de droit, qui

<sup>1</sup> Monthly American Journal of Geology, vol. 1, No. 12, p. 560, 1832.

<sup>2</sup> Silurian System, p. 659, pl. 23, 1839.

<sup>3</sup> De Trilobitis, etc., p. 49, 1839.

<sup>4</sup> Paleontology New York, vol. 1, p. 249, 1847.



nous semble compliquée. Il nous appartient pas de la résoudre, et dans le doute, nous avons adopté le nom généralement admis dans tous les pays, et que nous voyons introduit jusqu'en Amérique, par J. Hall, dans son bel ouvrage sur la Paléontologie de New-York."<sup>5</sup>

The next year, Salter<sup>6</sup>, in speaking of the name *Trinucleus* says: "The name of the genus can only be retained by general consent, for the typical species was formerly denominated *Cryptolithus*, and sufficiently described by Green;"..... "But in this case strict priority may be allowed to yield to classical feeling." In 1854, Angelin<sup>7</sup> used the family name *Cryptolithidae* though he employed *Trinucleus* for the genus.

From 1854 to 1890 *Cryptolithus* seems to have been pretty effectually submerged, but attention was drawn to it in the latter year by Vogdes<sup>8</sup>, who says of *Cryptolithus*: "This generic name should replace that of *Trinucleus*"; and again: "Sir. R. I. Murchison has revived this old name of Lhwyd's, and all subsequent paleontologists have adopted it. Lhwyd's description meant no more than the general name trilobite of the more modern writers, and could not, except by courtesy, set aside Dr. Jacob Green's genus *Cryptolithus*."

Thus we may divide the users of these names into three classes: first, those writers who from 1832 to 1851 used *Cryptolithus*; second, those who, like Hall, Barrande, and their followers, turned to *Trinucleus* on the ground of supposed priority; and third, men like Murchison, Salter, and many modern writers, who knew that *Cryptolithus* had priority, but who preferred the better name. On the mere ground of sentiment, which of course should have no weight at all, there would seem to be as much in favor of *Cryptolithus* as *Trinucleus*, and as a matter of simple justice everything points to the former name. The only argument against returning to *Cryptolithus* is the one of present convenience, and I must admit that is, practically, a very weighty argument. *Trinucleus* has gotten such a firm hold upon us that it will take more than ordinary courage to give it up. And it should be pointed out that we are in a fair way to saddle ourselves with more cases of this same kind. It will be interesting to see whether present day paleontologists are going to allow such names as some of those recently proposed by Jaekel for Agnostid genera or the still more flagrant *Glockeria* of

<sup>5</sup>Systeme silurien du centre de la Boheme, vol. 1, p. 610, 1852.

<sup>6</sup>Memoirs Geol. Sur. Unit. Kingdom, Dec. 7, p. 5, 1853.

<sup>7</sup>Palaeontologia Scandinavica. Pars 1. Fasc. 2, p. 64 of 3d ed., 1878.

<sup>8</sup>Bull. U.S. Geol. Survey, No. 63, pp. 107, 148.



Wedekind<sup>9</sup> to get the same standing that *Trinuclaus* has.

Enough of the destructional phase of the subject. When I wrote before I did not see any way in which the name *Trinuclaus* could be retained, but after studying the large collection in the Museum of Comparative Zoology, a way has presented itself. The present tendency is to split our large genera up into a number of smaller groups, and "*Trinuclaus*" must doubtless be so divided. There are at present only two divisions in use, *Cryptolithus* or *Trinuclaus*, and *Tretaspis*, McCoy. As stated in my previous paper, Murchison's first species, *Trinuclaus caractaci*, is strictly congeneric with *Cryptolithus tessellatus*, but fortunately Murchison described six species when first proposing *Trinuclaus*. The fifth of these species, *Trinuclaus nudus*, is well known to be an *Ampyx*, and the sixth, *Trinuclaus? asaphoides*, was referred by Salter to *Ogygiocaris buchii*. This leaves four species, the first and fourth of which, *Trinuclaus caractaci* and *T. lloydi*, belong to the earlier genus *Cryptolithus*. The second and third, *Trinuclaus fimbriatus* and *T. radiatus*, have been referred by Salter<sup>10</sup> to *Tretaspis*. Now the type of *Tretaspis* is *Trinuclaus seticornis*, (Hisinger), as that species was understood by McCoy<sup>11</sup>. *Tretaspis* differs from *Cryptolithus* in having only the anterior part of the glabella bulbous, while the posterior part is constricted and shows two pairs of deep glabellar furrows. The cheeks also show eye-lines and simple eyes are present, even in the adult. Young specimens of some species of *Cryptolithus* show a poor development of these same characters, but as they are retained in the adult of *Tretaspis seticornis*, *T. bucklandi*, and other forms, (*Tretaspis reticulatus*, Ruedemann is a good American example), the genus is a valuable one, and well founded. *Trinuclaus fimbriatus* and *T. radiatus* do not, however, conform strictly to the type of either *Cryptolithus* or *Tretaspis*.

<sup>9</sup>Since my previous paper was written, this recent blunder, for such it seems, has come to my attention. Wedekind, in an article on the "Klassifikation der Phacopiden" in the Zeitschrift der Deutschen Geol. Gesellschaft, Bd. 63, heft 3, p. 323, 1912, has proposed the generic name *Glockeria* with *Phacops glockeri* as the type. Reed, as recently as 1905, on page 226 of the Geological Magazine of that year, proposed the name *Phacopidella* with *Phacops glockeri* as the type. Wedekind refers frequently to Reed's paper, and quotes *Phacopidella*, though he nowhere says that that name is preoccupied or otherwise unusable. Wedekind's *Glockeria* is not the same as Reed's *Phacopidella*, but it seems obvious that we can not found two genera upon a single species. I regret to have to add that the name *Reedia* was used by Ashmead in 1904 for a genus of wasps (Canadian Entomologist, 36, p. 9), so that Wedekind's intended compliment to Professor Reed is lost. In passing, it might be noted that *Phacops fecundus* Barrande, is not the type of *Phacops* s. s. as Wedekind has made it.

<sup>10</sup>Mem. Geol. Sur. Unit. Kingdom, Dec. 7, p. 8, 1853.

<sup>11</sup>Ann. Mag. Nat. Hist., ser. 2, vol. 4, pp. 401, 410, 1849.

Speaking principally of *T. fimbriatus*, which is the better known species, it has glabellar furrows, though not so well developed as in the typical *Tretaspis*, but, so far as I can learn, lacks the simple eyes and eye-lines of that genus. But the greatest obvious peculiarity of the species is the character of the fringe, which, instead of being marked by concentric rows of perforations, is crossed by a system of radiating ridges and furrows. Reed has recently studied the fringes of the various English species of "*Trinuclaus*", and he speaks thus of the fringe in *Trinuclaus fimbriatus*:<sup>12</sup> "The upper surface has all the pits arranged in radial sulci except near the genal angles." And again: "the dividing radial ridges vary from the extreme development in *T. fimbriatus*, Murchison, to the scarcely differentiated structures in *T. nicholsoni*." I am aware that Reed also says of the arrangement of the pits in concentric or radial rows that "Frequently different stages occur in the same species or different parts of the fringe of the same individual," and that he does not seem to give very high classificatory value to the pattern of the fringe. Still, we have here an extreme development along one line, which, taken with the other characteristics of the specimens, form a combination which may have the value of a generic group. The principal characters seem to be as follows: Glabella obovate, glabellar furrows present, but weaker than in *Tretaspis*, eye-lines and simple eyes absent in the adult, fringe ornamented with radiating furrows separated by strong ridges. I would therefore propose to select Murchison's second species, *Trinuclaus fimbriatus*, as the type of *Trinuclaus*, and let the genus stand or fall on the basis of that species. Ruedemann's *Tretaspis diademata*<sup>13</sup> would certainly belong to the genus as thus restricted, and probably *Trinuclaus coscinorhinus*, Angelin<sup>14</sup>, as well. Professor F. R. Cowper Reed has announced his intention of revising the British species of *Trinuclaus*, and it will be interesting to see if, when the species are better known, such a grouping will be of value. We seem to have four possible courses open to us, and of them I personally prefer the fourth:

First, use *Cryptolithus* and make *Trinuclaus* a direct synonym.

Second, ignore *Cryptolithus* and continue to use *Trinuclaus* on the score of convenience.

Third, make *Trinuclaus fimbriatus* the type of the genus and make a broad enough definition to include the type of *Tretaspis*, in which case *Trinuclaus* would replace *Tretaspis*, the latter

<sup>12</sup>Geological Magazine, vol. 9, Dec. 5, pp. 349, 385, 1912.

<sup>13</sup>Bull. N. Y. State Museum, No. 49, p. 46, pl. 3, figs. 12-14, 1901.

<sup>14</sup>Pal. Scandinavia, vol. 1, 3d ed., 1878, p. 65, pl. 34, fig. 4.

genus going into the synonymy. This would be practically the position of Salter except that we would use *Cryptolithus* for *Trinuclaus*, and *Trinuclaus* for *Tretaspis*.

Fourth, use the three names, *Cryptolithus* for the type of *tessellatus* and *caractaci*, *Trinuclaus* for *fimbriatus* and its allies, and *Tretaspis* for *seticornis* and the like.

### ZAPUS PRINCIPS MINOR.

#### A NEW MOUSE RECORD FOR MANITOBA.

The mouse whose name appears above was one of a small collection recently determined through the courtesy of Dr. H. W. Henshaw, of Washington, who informs me that its capture at Aweme, Manitoba, constitutes, not only a record for the Province, but also extends the known range of this rodent considerably further eastward. As a matter of fact, however, these mice appear to be the usual race met with in south-western Manitoba, as we have yet to discover any other. They are found not infrequently on the edges of woods among low bushes and occasionally in tall grass in open situations.

Like other members of the genus, they are by no means easy to capture and their long jumps (from five to seven feet) combined with their habit of doubling, often completely mystify a dog, as they would doubtless a coyote or fox; besides this they have an instinctive knowledge of their colour resemblance to the surrounding objects and so, after a few puzzling leaps, will crouch down and remain perfectly motionless until danger seems past, when they creep silently away. This is when they have strayed from their burrows. When their homes are at hand they quickly vanish beneath the ground.

*Zapus principis minor* may be described briefly as follows: length 219 mm., tail vertabræ 131, hind foot 30; colour agaty, sides ochraceous, moderately covered with black tipped hairs; lower parts yellowish with a slight tinge of pink fading to white beneath. It resembles closely other species of the genus, particularly *Z. hudsonius campestris*, from which it differs, however, in being slightly smaller and more brightly coloured.

But one of these mice has previously been recorded for Manitoba, namely *Z. hudsonius*, the type locality for which is Hudson's Bay. Probably at least one other—*campestris*—will eventually turn up within our boundaries, and since the extension of the Province to Hudson's Bay, others may well be discovered in the north country.

STUART CRIDDLE.

## THE SHADE TREES OF OTTAWA.\*

In this paper several introduced species are included, but only in a few cases are varieties referred to. Those who wish to learn about the most valuable varieties can readily do so at the Central Experimental Farm, where all hardy and useful varieties are being tested. We exclude from consideration in this paper all evergreens and fruit trees.

## SALICACEAE.

There are about six species of native Willows that attain the character of trees, yet few of them can stand the dry soil of a city. They are more common in the country and along the borders of streams. As a family they have soft pliant wood, slender branches, and large fibrous roots. The roots are remarkable for their toughness and tenacity of life.

There are several large willows in a vacant lot near Rideau Gate, and throughout lower town they are more frequent than in the other parts of the city. I am not sufficiently familiar with the particular characteristics of this family in the winter to say to which species they belong—whether *Salix alba*, *S. nigra*, or *S. fragilis*, but think they belong to the first, the white willow. This willow possesses some of the more important qualities requisite for a shade tree: it can readily be transplanted and it has great tenacity of life. As long as it has sufficient moisture it will grow. And yet it is not a tree to be recommended. It cannot compare in beauty either of foliage or of outline with other trees. Yet there are some exceptions.

The Weeping Willow, *Salix Babylonica*, is an introduced species, and deserves mention as a remarkably graceful tree, although it is more commonly associated with cemeteries than as a city shade tree; and I do not know of one growing in the city, although it is included in the catalogue of trees and shrubs that grow at the Experimental Farm, and is classed as "hardy." There are about 150 species or varieties of willow planted there, of which one half are counted as hardy, and possibly more would have thrived if planted on the low ground near the Canal. The Wisconsin Weeping Willow, *S. Babylonica dolorosa*, has been introduced along the Driveway and is doing well.

Among the Poplars the most important is an introduced one, *Populus nigra pyramidalis*, the Lombardy Poplar. This tree possesses a very characteristic outline, even more so than the elm, and is therefore well known to everybody. This outline is just as marked in the winter as in the summer. Its branches

\*Paper read by Dr. E. H. Blackader at a meeting of the Botanical Branch held at the residence of Mr. J. J. Carter, March 1st, 1913.



are perpendicular and long, the terminal twigs having a slight inward curve. When blown by the wind the whole tree sways with a graceful feathery effect. Perhaps the best known of these poplars are the ones that can be seen from the Plaza in Major Hill Park. They overlook the canal, and from their position show to good effect, and form a picturesque sky-line. There are many other Lombardy Poplars throughout the city, and their number might well be increased, for this is a handsome tree, holding its leaves late into the autumn.

The Balsam Poplar, *P. balsamifera*, is a native species, and holds its own in the city, although it appears to be rarely transplanted to the street line, but grows in gardens or in neglected lots. In some cities it is recommended where there is much coal smoke. It is a large, handsome tree, with several shades of yellow or greenish-yellow to brown on the large limbs.

The Cottonwood, *P. monilifera* or *deltoides*, grows to a large size and is fairly common. One great objection to this poplar is the enormous quantity of cottony stuff that falls for two or three weeks in the early part of the summer, and is carried everywhere by the wind.

The Abele, or Silver or White Poplar, *P. alba*, probably also grows about the city, and may be recommended where there is plenty of space. The peculiar white-tomentose matter on the under surface of the leaves is characteristic, and the peculiar mingling of green and white makes this tree a very effective ornamental one. This beautiful silveriness of the under surface is rather heightened in the twilight. One great disadvantage of this tree is the numerous suckers it produces.

#### JUGLANDACEÆ.

The Butternut, *Juglans cinerea*, grows commonly all around Ottawa, and there are probably some growing within the city limits. When in the open its huge branches spread out almost horizontally. Its terminal twigs are large, and its leaves are late in coming out and fall early. Nevertheless, the large compound pinnate leaves give a very handsome effect, and the tree is well worthy of cultivation where there is plenty of space.

The Walnut, *J. nigra*, deserves to be planted more commonly around the city. The branches are much more upright or ascending than the butternut. The bark is darker in color, and the leaves are quite smooth above. The only tree I know of in the city is situated well in from the street line at the south-west corner of O'Connor and Somerset Sts.

The Hickory, sub-family *Carya*, is mentioned more for the wish to see it than the fact that it exists here. *Carya alba* or *Hicoria ovata*, the shell-bark hickory, is the most important and



the most characteristic of the family. Its wood is so valuable that possibly it has become exterminated in this locality. It ought to be replanted, especially in the large parks at Rockcliffe or Britannia, or if the Government provide for a National Park. It appears to be spreading on Mount Royal Park at Montreal. No doubt the fruit would be appreciated both by squirrels and boys. The bark of this tree is characteristic and peculiar. It breaks up into oblong plates, the ends of which curve outwards, while they cling at the centre. This peels off easily, hence the name, shell-bark or shag-bark.

#### BETULACEÆ.

(Including the Birches and the Hornbeams.)

Of the Birches the most ornamental and therefore the most valuable are the cut-leaved and pendulous or weeping varieties. How many varieties there are, I am not prepared to say, but they all seem related to *B. alba* or *B. populifolia*. Of course these beautiful varieties are of use only on lawns, but they are fairly common about the city. Their lower limbs come too low for them to be used along the street line, to say nothing of how much and how quickly they would be ruined by horses and passers-by.

The Common White Birch, *B. populifolia*, is common at Rockcliffe, and is too easily recognized to need description.

The Yellow Birch, *B. lutea*, also grows at Rockcliffe, but is much less common. It prefers rich, moist woodland. There are several trees in the hollow near where the new artesian well has been sunk. This is a beautiful tree in its native haunts. The bark of the trunk is of a yellowish or silver-grey color, which detaches horizontally in thin filmy layers which curl up like ribbons. In the spring the inner bark is a rich golden yellow. The catkins are upright, sessile, and very short in proportion to their breadth.

Of the Ironwoods the Hop Hornbeam, *Ostrya Virginiana*, is the only species, so far as I know, that is represented in the city. There is one on Gladstone Ave. near Metcalfe St., and several in Major Hill Park on the bank overlooking the pond. It is a tree that is more conspicuous and beautiful in the winter than in the summer, although the peculiar hop-like strobiles on the terminal twigs may attract the attention of some. But in the winter, and when standing all alone, then the tiny graceful birch-like twigs, tipped with bunches of two or three upright catkins, appear in all their native beauty. The trunk also is characteristic. It gives the appearance of strength. The bark is grey and split into numerous partly exfoliated strips, much narrower and tinier than on any other tree.

The other Hornbeam, *Carpinus caroliniana*, may not grow within the city limits. A peculiarity of its growth is the manner in which the sinews of the branches are prolonged down the trunk, giving a peculiar muscular or Gothic effect. This is seen also to some extent in the beech. This tree is recommended for arbor-walks in the parks in some cities.

#### FAGACEÆ.

This includes the Beech, *Fagus ferruginea* or *grandifolia*, and the Oaks, *Quercus*, of which we have only two representatives. (The Chestnut, *Castanea dentata*, is rather a fruit tree, and does not thrive well here).

The Beech deserves to be planted much more commonly than it is. One great objection is that it is apt to be destroyed by boys with their penknives.

It is surprising, since our trees are leafless one half of the year, that so little attention is paid to planting for winter beauty. The winter beauty of the beech is considered quite equal to that of the elm. It is no less charming in early spring, and in the summer-time a forest of beeches has a most beautiful and bewitching effect. The compact, light grey bark of the beech tree is characteristic. This remains unbroken to a great age, and is perpetuated on the branches. Another noticeable feature is the muscular or buttress effect running down from the large branches, and more marked as the tree gets older.

There are several varieties of the Purple or Copper Beech, which add a beauty to a large lawn or park. Some fine specimens may be seen along the Driveway.

There are two species of oak that may be found in the city as shade trees, the Mossy-cup Oak and the Red Oak.

The Mossy-cup or Bur Oak, *Q. macrocarpa*, is very common in Ottawa South. The corky ridges on its branches gives it some resemblance to the Corky Elm. But the branches themselves are very different. In the elm the branches have all an outward and downward direction, in the oak they are contorted and angular, and never drooping.

The Common Red Oak, *Q. rubra*, is the prevailing type at Rockcliffe and in Rideau Hall grounds. This species belongs to the second group of oaks. Their leaves are bristle-pointed, and the fruit matures the second year. It most nearly approaches the English Oak, *R. robur*, in the effect it gives of massy strength and durability. These two species have the widest range, especially to the north, of any of the native species.

## URTICACEÆ.

The American Elm, *Ulmus americana*, is deservedly the best known and the most popular of all our shade trees. Whether in the city or the country it is equally well known and equally useful and beautiful. It possesses many advantages. It can be readily transplanted, and stands a great amount of cutting and pruning. It thrives on almost any kind of soil. It is a fairly rapid grower, and soon spreads out in a broad umbrageous outline. Its lower limbs may be pruned away, leaving plenty of space for air and sunshine, and not losing in beauty of outline.

Besides the Common White Elm, there are several other interesting and valuable species in the city.

The Cork or Rock Elm, *U. racemosa*, is a valuable timber tree and is commonly planted. Perhaps it is too common, for the large corky ridges on its lower branches have a rather un-  
gainly effect. The corky ridges on the lower branches are characteristic and probably more pronounced in the city than in its native soil.

The Slippery Elm, *U. fulva*, probably also grows in the city. It is a fortunate thing for its life that it is not so easily recognized. Its limbs are more rigid and divide at a slightly greater angle than the common elm. Its terminal branches and twigs do not have the outward and downward sweep that is so characteristic of the common White Elm. The simplest way of identifying this elm is to bite and moisten a twig with the saliva. The mucilaginous or slippery quality is then easily recognized by rubbing between the fingers.

The English Elm, *U. campestris*, and the Scotch Elm, *U. glabra*, are also planted about the city. There is one English Elm near the arcade on Parliament Hill. On Gloucester St. between Bank and O'Connor streets, there are several Scotch Elms, *U. glabra*.

The Hackberry, *Celtis occidentalis*, is mentioned more for the wish than the fact of its growing here. There was one tree growing along the banks of the Rideau River, in Ottawa South, but it perished last year in the march of city growth. There is no reason why this tree should not grow well along the Driveway. The hackberry has the outline of the elm, but it is out of its range here and rarely produces its fruit so far north.

Red Mulberry, *Morus rubra*, grows on Lisgar St., a few doors east from Bank St., on the south side. It is probably the only specimen in the city. The bark is scaly, and has a reddish tinge.

The terminal twigs are fine, and have an elm-like appearance. It seems to be a valuable and long-lived shade tree.

#### ROSACEÆ.

The only species that calls for our attention as a shade tree is the Mountain Ash. This is fairly common. Its bright red berries are conspicuous during the fall and early part of the winter, and make it a deservedly popular ornamental tree. There are several varieties of the European Rowan Tree, *Pyrus aucuparia*.\* The American one, *P. americana* is at its best in our latitude. It becomes a shrub farther south, and extends far north to the shores of James Bay.

#### LEGUMINOSÆ.

The Kentucky Coffee Tree, *Gymnocladus dioica* or *canadensis* is far from home in this latitude. There is only one specimen, so far as I know, growing in the city. It is on the Normal School grounds on Elgin St., but there are several at the Experimental Farm. This tree is remarkably homely in winter. Its smaller branches are so thick and blunt, and its leaves so late in coming out that it has earned the title, *Chicot*, the dead tree, among our French-Canadian neighbors. But, in summer its leaves are characteristic and beautiful. It is one of the very few trees that produce doubly compound leaves.

The only other large tree that produces such leaves is the Honey Locust, *Gleditsia triacanthos*. It grows at the Experimental Farm and is marked as half-hardy.

The Common Locust, *Robinia pseudacacia* would be far more valuable both as a shade tree and for its timber if it could be effectually protected from the ravages of boring insects. There is almost an avenue of these trees near Rockcliffe, and the street is appropriately named, Acacia Avenue, but it is a rare tree in other parts of the city. Some say it is not a beautiful tree in winter. Its bark is deeply furrowed, and inclined to scale; the trunk is often twisted, the branches are irregular and contorted and twiggy. The seed-pods hang on the tree all winter.

(To be continued.)

\* One member here stated that all the mountain ashes about the city belong to the introduced European species, and that it is even spreading to nearby woods.



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