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Tertiary Mammals  
of Saskatchewan  
Part VI: The Oligocene  
Rhinoceroses

Loris S. Russell



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# Tijdschrift MUS - 93

LIFE SCIENCES CONTRIBUTIONS  
ROYAL ONTARIO MUSEUM  
NUMBER 133

LORIS S. RUSSELL

## Tertiary Mammals of Saskatchewan Part VI: The Oligocene Rhinoceroses

  
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**Canadian Cataloguing in Publication Data**

Russell, Loris S., 1904—

The oligocene rhinoceroses

(Tertiary mammals of Saskatchewan; pt. 6) (Life sciences contributions, ISSN 0384-8159; no. 133)

ISBN 0-88854-286-0

1. Rhinoceros, Fossil. 2. Palaeontology—Oligocene.

3. Palaeontology—Cypress Hills (Sask. and Alta.).

I. Royal Ontario Museum. II. Title. III. Series.

IV. Series: Life sciences contributions; no. 133)

QE882.U6R882

569'.72

C82-094166-2

Publication date: 9 March 1982

ISBN 0-88854-286-0

ISSN 0384-8159

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100 Queen's Park, Toronto, Canada M5S 2C6

PRINTED AND BOUND IN CANADA AT THE ALGER PRESS

# Tertiary Mammals of Saskatchewan

## Part VI: The Oligocene Rhinoceroses

### Abstract

Dissociated skulls and lower jaws of rhinocerotoid perissodactyls are described from the Cypress Hills Formation (Lower Oligocene) of the Cypress Hills, Saskatchewan. Most of these are from the Hunter Quarry, on Calf Creek, but other good specimens come from a locality northwest of Southfork Station. The following species are recognized: two species of *Hyracodon*; at least two, and possibly five species of *Trigonias*; and a new species of *Subhyracodon*. Two species are referred with question to *Caenopus*. The specimens are in the collections of the National Museum of Natural Sciences, Ottawa, the Saskatchewan Museum of Natural History, Regina, and the Royal Ontario Museum, Toronto.

### *Introduction*

Rhinocerotoid perissodactyls from the Cypress Hills Formation of Saskatchewan have been known since 1885, when E.D. Cope listed and briefly described fossil mammals collected by R.G. McConnell and T.C. Weston in the Cypress Hills, District of Assiniboia, North-West Territory. In 1891 Cope gave a more adequate description of the fauna, with good illustrations. Rhinocerotid material in the collection was assigned to *Caenopus occidentalis* (Leidy) and *C. pumilus* (Cope). Lawrence Lambe made an additional collection in 1904, and described *Hyracodon priscidens*, sp. nov., in 1906. In 1908 Lambe published a full description of the fauna and assigned the rhinocerotoid material to *Hyracodon nebrascensis* Leidy, *H. priscidens* Lambe, *Aceratherium mite* Cope, *A. occidentalis* (Leidy), *A. exiguum*, sp. nov., and ?*Leptaceratherium trigonodon* Osborn and Wortman.

No further account of the Cypress Hills fauna was attempted until 1934, when L.S. Russell published a short revision of the known material, including a collection made by W.E. Cutler for the British Museum (Natural History). Russell listed the rhinocerotoids as follows: *Hyracodon nebrascensis* Leidy, *H. arcidens priscidens* Lambe, *H. browni*, sp. nov., *Caenopus mitis* (Cope), *Subhyracodon occidentalis* (Leidy), and *S. trigonodus* (Osborn and Wortman).

More recent collections that have been studied by the writer include those of Fenley Hunter, 1936 and 1937, for the National Museum of Canada; L.S. Russell, 1939, for

the Royal Ontario Museum, and 1951, for the National Museum of Canada; G.E. Lindblad, 1952, for the National Museum of Canada; Bruce McCorquodale and A.E. Swanston, 1951, 1960 to 1962, for the Saskatchewan Museum of Natural History; A.G. Edmund, 1967 and 1968, and Gordon Gyrmov, 1972, for the Royal Ontario Museum. Most of these collections came from the Hunger Quarry, the location and history of which has been described elsewhere (Russell, 1972:3, 4). In brief, it is located on the east side of Calf Creek, in legal subdivisions 5 and 12, section 8, township 8, range 22, west of the 3rd meridian. The fossil-bearing deposits, which vary from poorly consolidated sand to indurated conglomerate, lie 18 or more metres above the contact of the Cypress Hills Formation on the Ravenscrag Formation (Palaeocene).

In 1962 Swanston discovered a new locality and mode of preservation for Cypress Hills mammals in road cuts northwest of Southfork station, southwest quarter, section 2, township 8, range 21, west of the 3rd meridian. The specimens were preserved in whitish bentonitic sandstone, and include important rhinocerotoid material.

The present account is based mainly on the Saskatchewan Museum and Royal Ontario Museum collections. In some cases systematic determination is not precise, as the specimens, even though well preserved, may not include the particular parts on which diagnoses have been based (e.g., the upper premolars). The policy in this study has been to provide detailed descriptions with illustrations of all good specimens, leaving more precise systematic determination for the time when additional, more diagnostic, material is available.

## *Systematic Description*

**Order Perissodactyla Owen, 1848**

**Superfamily Rhinoceroidea Gill, 1872**

**Family Hyracodontidae Cope, 1879**

### FAMILY CHARACTERS

Small to medium-sized rhinocerotoid perissodactyls with slender body proportions but relatively large head. Dentition rhinoceros-like but relatively primitive, and almost complete. Skull with well-developed sagittal crest. Manus and pes tridactyl.

### REMARKS

If the Late Eocene genus *Triplopus* be excluded from this family, the only remaining genera are *Hyracodon* of the Oligocene and *Prothyracodon* Scott and Osborn of the Late Eocene.

### *Hyracodon* Leidy, 1856

### GENERIC CHARACTERS

Dentition  $\frac{3 \ 1 \ 4 \ 3}{3 \ 1 \ 3 \ 3}$ . Upper incisors and canines simple, pointed, and slightly recurved, with no diastemata. Long post-canine diastema. Upper premolars

progressively more molariform from P<sup>1</sup> to P<sup>4</sup>, but all with distinct buccal cingulum; metaloph relatively short, tending to join postprotoloph with wear. M<sup>1</sup> and M<sup>2</sup> subquadrate, with small crista and antecrochet; M<sup>3</sup> trianguloid, but with ectoloph extended posterad beyond juncture with metaloph, as in M<sup>1</sup> and M<sup>2</sup>. Lower incisors and canines also forming continuous series, progressively larger from I<sub>1</sub>; more chisel-like and less recurved than corresponding upper teeth. P<sub>2</sub> submolariform; P<sub>3</sub> and P<sub>4</sub> molariform but with buccal cingulum more distinct than on molars. Lower molars characteristically rhinocerotoid.

#### TYPE

*Rhinoceros nebraskensis* Leidy, 1850

#### *Hyracodon priscidens* Lambe, 1906

#### TYPES

National Museum of Natural Sciences (NMC) 6564, holotype (Fig. 1), left and right maxillae of same individual, with left P<sup>1</sup> to P<sup>3</sup>, right P<sup>1</sup>, P<sup>2</sup>, and P<sup>4</sup>, and left and right M<sup>1</sup> to M<sup>3</sup>. NMC 6561, plesiotype (Fig. 2), mandibular symphysis with part of left ramus, roots of all incisors and canines, and well-preserved left P<sub>2</sub> to P<sub>4</sub>. From "Bone Coulee" (Conglomerate Creek valley), Cypress Hills, Saskatchewan.

#### REFERRED SPECIMENS

Saskatchewan Museum of Natural History (SMNH) P1634.1 (Figs. 3, 4), incomplete mandible with left and right P<sub>3</sub> to M<sub>3</sub>, and alveoli for I<sub>1</sub> to I<sub>3</sub>, C, and P<sub>2</sub>; Calf Creek. Royal Ontario Museum (ROM) 23195 (Fig. 5), mandibular fragment with part of symphysis, and left and right P<sub>2</sub> to M<sub>1</sub>, Hunter Quarry.

#### SPECIFIC CHARACTERS

Teeth relatively low crowned. Upper premolars with protoloph curving around through protocone to hypocone and almost to posterior cingulum; metaloph reaching protoloph on P<sup>1</sup> and P<sup>2</sup>, not on P<sup>3</sup> and P<sup>4</sup>; cingulum distinct and complete on anterior, lingual, and posterior sides. On M<sup>3</sup>, posterior extension of ectoloph short, and bent abruptly to point posterad, rather than continuing the line of ectoloph posterolingual. In lower dentition, P<sub>2</sub> narrows anterad, with short protolophid directed anterolingual rather than linguad; P<sub>3</sub> to M<sub>3</sub> very similar in size and crown pattern, but premolars having a more nearly continuous lingual cingulum than that of the molars.

#### DESCRIPTION

Lambe's account of the holotype is clear and comprehensive, and his illustrations are elegant (from his own drawings), so it is unnecessary to give a full description here. One or two comments are in order, however. For instance, Lambe (1908:41) mentions a "delicate crochet" on P<sup>4</sup>; this is a tiny spur projecting anterolingual from the free terminal of the metaloph. It may be an individual character, because the same

thing occurs on a skull of *Trigonias* (SMNH P1635.2) on the left P<sup>4</sup> but not on the right.

Lambe (1908:42) noted the long postcanine diastema on his plesiotype. On SMNH P1634.1 the gap between canine and P<sub>2</sub> alveoli is not as great, but still relatively longer than in *H. nebraskensis*. On SMNH P1634.1 the left ramus has a small, shallow pit on the buccal slope of the dorsal rim, closer to the alveolus of P<sub>2</sub> than to that of the canine, but well separated from both. The right ramus is broken at this point, but still shows a faint groove that may be the remnant of the corresponding pit. I interpret this pit as the vestige of the alveolus for a very juvenile or prenatal DP<sub>1</sub>, something *Hyracodon* is not supposed to have.

#### MEASUREMENTS (in millimetres)

|                                       | <i>Length</i> | <i>Width</i> |
|---------------------------------------|---------------|--------------|
| NMC 6564, holotype                    |               |              |
| Left P <sup>2</sup> to M <sup>3</sup> | 117.2         | —            |
| Left P <sup>1</sup>                   | 12.2          | 13.1         |
| Left P <sup>2</sup>                   | 16.0          | 18.5         |
| Left P <sup>3</sup>                   | 16.7          | 20.8         |
| Right P <sup>4</sup>                  | 17.2          | 22.7         |
| Left M <sup>1</sup>                   | 21.2          | 22.9         |
| Left M <sup>2</sup>                   | 23.7          | 26.2         |
| Left M <sup>3</sup>                   | 19.7          | 22.6         |
| NMC 6561, plesiotype                  |               |              |
| Left P <sub>2</sub>                   | 13.3          | 10.4         |
| Left P <sub>3</sub>                   | 15.7          | 12.6         |
| Left P <sub>4</sub>                   | 17.8          | 14.1         |
| SMNH P1634.1                          |               |              |
| Left P <sub>2</sub> to M <sub>3</sub> | 93.0          | —            |
| Left P <sub>2</sub> alveolus          | 14.6          | 18.2         |
| Left P <sub>3</sub>                   | 18.2          | 12.8         |
| Left P <sub>4</sub>                   | 18.0          | 14.7         |
| Left M <sub>1</sub>                   | 17.8          | 12.5         |
| Left M <sub>2</sub>                   | 21.2          | 13.3         |
| Left M <sub>3</sub>                   | +19.3         | 13.2         |
| ROM 23195                             |               |              |
| Left P <sub>2</sub>                   | 15.7          | 10.9         |
| Left P <sub>3</sub>                   | 18.3          | 12.6         |
| Left P <sub>4</sub>                   | 22.9          | 12.7         |
| Right M <sub>1</sub>                  | 19.0          | 12.8         |
| Left M <sub>2</sub>                   | 22.5          | 12.3         |

#### REMARKS

Sinclair (1922) recognized four "types" or species of *Hyracodon*, based on the progressive molarization of the upper premolars. The first "type", *H. arcidens*

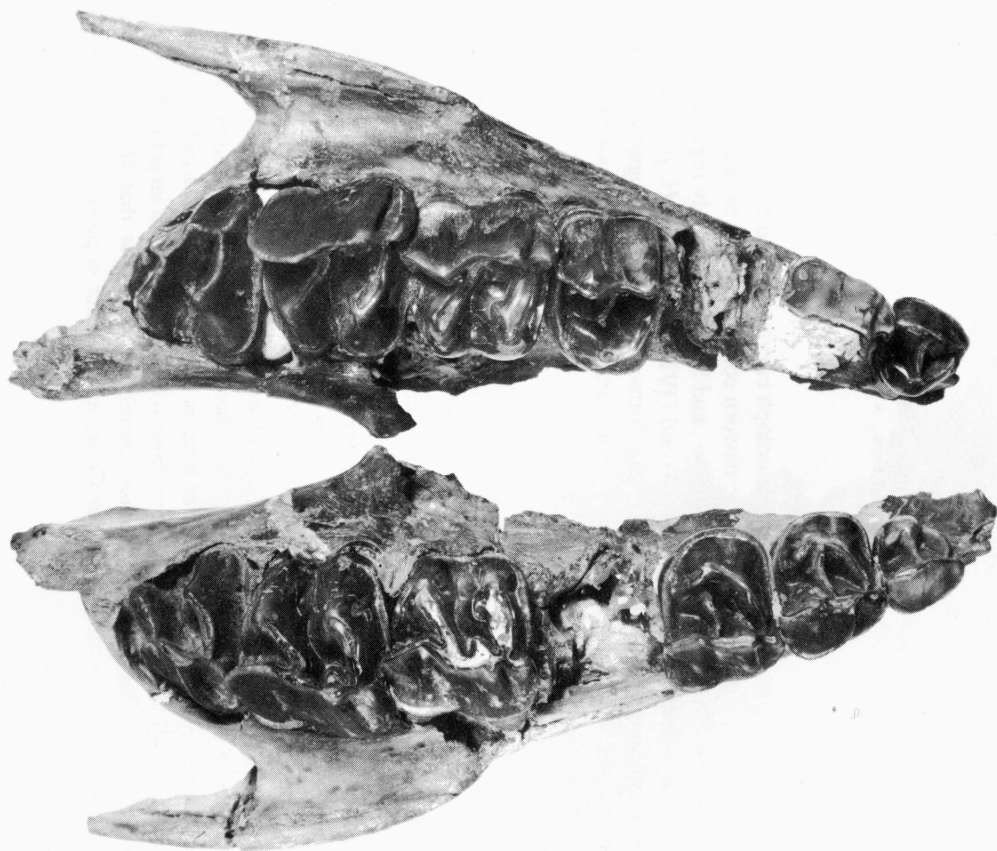


Fig. 1 *Hyracodon priscidens* Lambe, holotype, NMC 6564, incomplete right and left maxillae with right P<sup>1</sup>, P<sup>2</sup>, P<sup>4</sup>, M<sup>1</sup>, M<sup>2</sup>, M<sup>3</sup>, and left P<sup>1</sup>, P<sup>2</sup>, P<sup>3</sup>, M<sup>1</sup>, M<sup>2</sup>, M<sup>3</sup>; occlusal view, × 1.





Fig. 2 *Hyracodon priscidens* Lambe, plesiotype, NMC 6561, incomplete left mandibular ramus with symphysis with left P<sub>2</sub> to P<sub>4</sub>; occlusal view, × 1.

Cope, is characterized by having the protoloph curving around the lingual end of the metaloph but not connected to it in the unworn condition. This broadly describes the structure of the P<sup>4</sup> (and P<sup>3</sup>) in *H. priscidens*, and Sinclair definitely regarded Lambe's species as a synonym of *H. arcidens*. Wood (1928) also placed *H. priscidens* in *H. arcidens*, although recognizing that the former was less "progressive" in the structure of the upper premolars. Scott (1941) dismissed these variations in the upper premolars as subspecific, and placed all of the described species of *Hyracodon* within *H. nebraskensis* (Leidy).

Comparison of Lambe's holotype with Sinclair's figure of *H. arcidens* and Wood's (1926) figure of *H. petersoni* shows that the structure of P<sup>3</sup> and P<sup>4</sup> in *H. priscidens* is much closer to that of *H. petersoni* than that of *H. arcidens*. The direction of the metaloph and its abrupt termination indicate that even in well-worn teeth the metaloph would not close off the median valley. In *H. arcidens* (Sinclair, 1922, fig. 1), the metaloph joins the protoloph at an early stage of wear, and the protoloph does not extend posterad of the junction. In another feature, the posterad extension of the ectoloph on M<sup>3</sup>, *H. priscidens* is more like *H. petersoni* than *H. arcidens*.

In conclusion, *H. priscidens* and *H. petersoni* are as distinct from *H. arcidens* as that species is from *H. nebraskensis*. But there is still some uncertainty about the nomenclature, owing to the question of what is the holotype of *H. arcidens* (Sinclair, 1922: 68). I shall leave this problem to those who have access to larger collections of White River specimens of *Hyracodon*, merely pointing out that *H. priscidens* is distinct specifically from *H. arcidens* Cope, as the latter is presently understood.

### *Hyracodon petersoni* Wood, 1926

#### TYPE

Carnegie Museum, Cat. Vert. Foss. No. 3572, incomplete maxillae and premaxillae, with most of the dentition. Chadron Formation, Sioux County, Nebraska.



Fig. 3 *Hyracodon priscidens* Lambe, SMNH P1634.1, incomplete mandible with P<sub>3</sub> to M<sub>3</sub> and alveoli for I<sub>1</sub> to I<sub>3</sub>, C, and P<sub>2</sub>; left lateral view, × 1.



Fig. 4 *Hyracodon priscidens* Lambe, SMNH P1634.1; occlusal view,  $\times 1$ .

REFERRED SPECIMENS

SMNH P1179.1, right maxillary fragment with deeply worn P<sup>3</sup> to M<sup>3</sup>. SMNH P1179.2 (Fig. 6), right maxillary fragment with P<sup>3</sup> to M<sup>3</sup>, the M<sup>1</sup> deeply worn, other teeth well worn. SMNH P1204.1 (Figs. 7, 8), incomplete mandible with I<sub>1</sub>, I<sub>2</sub>, and alveolus for I<sub>3</sub>, both C, right P<sub>2</sub> to M<sub>3</sub>, left P<sub>3</sub> to M<sub>3</sub>. All specimens from the Southfork locality.

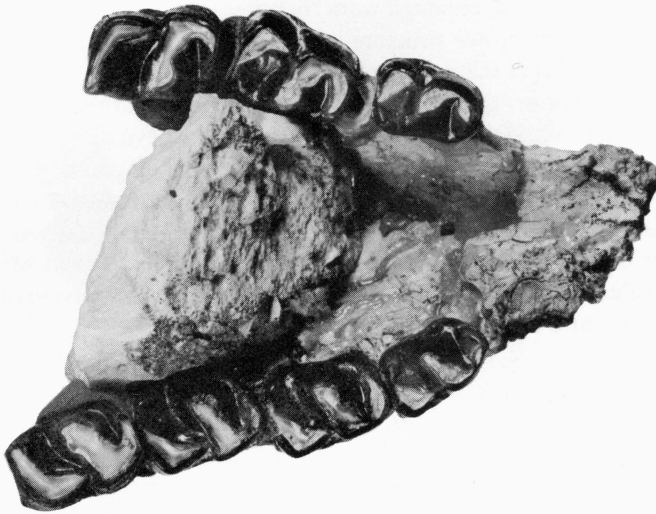


Fig. 5 *Hyracodon priscidens* Lambe, ROM 23195, mandibular fragment with part of symphysis, with left P<sub>2</sub> to P<sub>4</sub> and right P<sub>2</sub> to M<sub>1</sub>; occlusal view, × 1.



Fig. 6 *Hyracodon petersoni* Wood, SMNH P1179.2, right maxillary fragment with P<sup>3</sup> to M<sup>3</sup>; occlusal view, × 1.

## SPECIFIC CHARACTERS

Relatively small and slender. P<sup>2</sup> with hypocone connected directly to protocone and metaloph. P<sup>3</sup> and P<sup>4</sup> with hypocone connected to protocone, but with lingual end of metaloph curving posterad to leave a wide opening between it and hypocone; distinct cingulum on buccal slope of metacone. M<sup>3</sup> with short posterior extension of ectoloph projecting posterad.

## DESCRIPTION

The dentition of P1179.2, although worn, is better preserved than that of P1179.1. P<sup>3</sup> is well worn but some crown structure is still visible. The metaloph is confluent with the hypocone crest, but the nature of the junction suggests that the two crests were separate when unworn. On P<sup>4</sup> the crown is less worn, and the tip of the metaloph curves posterad to avoid the hypocone. Both premolars have a cingulum on the buccal side of the metacone, and an almost continuous lingual cingulum. On M<sup>1</sup> the crown structure is obliterated by wear. M<sup>2</sup> is in about the same stage of wear as P<sup>4</sup>; the posterior extension of the ectoloph is short and points posterad. There is an antecrochet on the posterior side of the protoloph. Both M<sup>1</sup> and M<sup>2</sup> have a short buccal cingulum on the metacone. M<sup>3</sup> has a short posterad extension of the ectoloph, and a rudiment of a crista.

The mandible, P1204.1, is tentatively referred to this species because the size and proportions are appropriate to the two maxillary fragments. The coronoid, condyle, and angle are missing on both sides. The I<sub>1</sub> is peglike, but both have lost the crown. I<sub>2</sub> has a peglike root but a wedge-shaped crown, the edge orientated obliquely. I<sub>3</sub> is represented by a small, compressed alveolus. The C has a long cylindrical root and a short, conoid crown; it is directed almost vertically, with only a slight recurve. The diastema between C and P<sub>2</sub> is about equal in length to P<sub>3</sub>; the mandibular rim here is broadly indented in both vertical and horizontal profile; the symphysis internally is troughlike, and extends posterad to the midlength of P<sub>2</sub>. That tooth has a trianguloid crown, with the ectolophid terminating anteriorly in a small cuspid, and with two short transverse lophids posteriorly, the valley between being open lingually. P<sub>3</sub> is almost molariform, except that the trigonid is narrower than the talonid. P<sub>4</sub> is molariform, but like P<sub>3</sub> has a strong buccal and weak lingual cingulum. M<sub>1</sub> is deeply worn, but appears to have been similar to M<sub>2</sub>. That tooth is less worn, and shows that the anterior arms of the protolophid and hypolophid are orientated slightly anterlingual, rather than directly anterad as in *H. nebraskensis* and *H. priscidens*. M<sub>3</sub> is similar, and, being moderately worn, shows a more angulate crest at the hypoconid than in the other two species; the parastylid is slightly recurved.