

III.—A new species of *Hyracodon* (*H. priscidens*) from the Oligocene of the Cypress hills, Assiniboia.

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A species of *Hyracodon* is represented, in the collection of 1904 from the Oligocene deposits at Bone coulée, Cypress hills, by the upper jaw, with teeth, giving the complete premolar—molar series. Three teeth are missing, viz., the fourth premolar from the left side, and the second and third premolars from the right. As the form of the tooth in each case is seen in the corresponding one of the opposite side, the details of structure of all the cheek teeth are presented. The ectoloph of the right third premolar remains. The teeth are in an excellent state of preservation, and, as they are only slightly worn, evidently belonged to a young animal. The last molar on either side has not protruded from the jaw to its fullest extent. Both jugals are preserved, and on the right side part of the squamosal is present.

The specimen to which the following remarks apply, consists for the most part of the two maxillary bones holding teeth. These bones are imperfect in their lateral upward extension. The right **maxilla** is broken off slightly in advance of the first premolar, but on the left side the full extent of the diastema, separating the first premolar from the canine, is preserved. The lower margin of the orbital opening on either side is intact.

The specimen indicates an animal of about the size of *Hyracodon nebrascensis*, Leidy from the Oligocene of Nebraska, South Dakota and Colorado, from which, however, judging from its tooth structure, it differed specifically.

The Cypress hills species, as compared with *H. nebrascensis*, exhibits the following characteristics:—(1) The teeth are shorter or more brachyodont; (2) in the premolars the protoloph is continued in a curve round the inner end of the metaloph, the tetartocone being confluent with the deutocone and arising from the protoloph; (3) in the last molar,  $m^3$ , the ectoloph is relatively much shorter with a concomitant greater development of the metaloph; (4) the exterior cingulum is developed only on the posterior half of the base of the ectoloph in the seven teeth, and the internal cingulum is absent in  $p^1$ ; (5) the parastyle in the premolars is only slightly developed; (6) the skull is apparently flatter and relatively more elongate, the lower margin of the orbit being less distant from the alveolar border, and the jugal less curved upward

in the posterior half of its length; (?) the diastema in advance of  $p^1$  is proportionately longer and its margin is not so arched.

For the Cypress hills species of Hyracodon, the name *priscidens* is proposed, indicative of the less advanced stage of its dentition as compared with *H. nebrascensis*. In the form of its premolars, it is decidedly primitive, and implies a position in a direct line of descent from Hyrachyus. A progressive character is seen in the squareness of the premolars, which, in Hyrachyus, are triangular, also in these teeth the metaloph is much advanced in comparison with the Eocene genus.

In *H. priscidens*, as in the type species,  $m^3$  is much the largest tooth, and  $m^1$  is larger than  $p^4$ . The molars occupy about the same space antero-posteriorly as the premolars.

In the premolars there is a progression toward the molar pattern, but the advance has been slow. The anterior premolars are more progressive than the posterior ones in some respects. This is shown in the tendency to the separation of the tetartocone from the deutocone seen in passing from  $p^4$  forward. In  $p^4$  the tetartocone and the deutocone are very closely united, but in  $p^2$ , although still connected to the protoloph, the tetartocone has moved farther toward the posterior border of the crown, lengthening the anterior loph and also effecting a junction with the metaloph.

In  $p^4$  the cross-lophs are unequal in length, the protoloph, in which the tetartocone is very intimately united with the deutocone, not passing beyond a point in line with the inner end of the metaloph, which is short and curves slightly backward. In  $p^3$  the protoloph is increased in length by the shifting backward of the tetartocone, with a tendency to separate from the deutocone. The two lochs remain distinct, the anterior one passing slightly beyond the inner end of the metaloph, which, in this tooth, is developed to about the same extent as that of  $p^4$ , with a like backward obliquity. In  $p^2$  the protoloph is still further increased in length and curves round the inner margin of the crown considerably past the metaloph toward the posterior border of the tooth. The metaloph curves slightly forward, and unites with the protoloph at a point some distance in advance of the latter's posterior termination. The increased length of the protoloph is due to the further recession of the tetartocone from the deutocone, although the union of the two remains complete. In  $p^1$  the protoloph is separate from the metaloph, a narrow but distinct sinus dividing them, and the tetartocone arises from the metaloph, which, in its inner half, presents a concave surface forward. A variation is noticed in the right first premolar of the Cypress hills specimen. In this tooth the sinus, seen in the left first premolar, in advance of the metaloph does not occur, in which case the tetartocone would still be said to arise from

the protoloph that, commencing at the ectoloph behind the parastyle, forms a high continuous wall curving round the inner border of the tooth for some distance past its union with the metaloph, giving to the protoloph a length proportionately still greater than the corresponding loph of  $p^2$ . The left first premolar above described resembles the corresponding tooth of *H. nebrascensis* as figured by Leidy in plate XIV, figure 5, accompanying his description of the type species in "The Ancient Fauna of Nebraska," 1852 (Smithsonian Contributions to Knowledge). The other premolars in this figure denote a stage of evolution much in advance of the corresponding teeth of *H. priscidens*.

In the premolars of the Cypress hills species the deuterocone arises from the protoloph as in  $p^3$  and  $p^4$  of *Hyrachyus agrarius*, Leidy of the Bridger Eocene of Wyoming and Utah, but in the second, third, and fourth premolars the general outline of the tooth is quadrangular instead of triangular as in *Hyrachyus*. The transverse diameter of  $p^4$  is relatively greater than that of either  $p^3$  or  $p^2$ . The second, third, and fourth premolars are provided with a well defined cingulum that is continuous round the entire base of the crown, except at the base of the tritocone; at the base of the parastyle the cingulum is feebly shown with increasing faintness in passing from  $p^4$  to  $p^2$ . In the first premolar the exterior cingulum is developed only in the posterior half of the ectoloph, the posterior cingulum is strong, the anterior cingulum extends but a short distance from the parastyle and there is no internal cingulum.

In the molars the cross-lophs are nearly equal in length, the protoloph being slightly the longer, the hypocone is strongly developed and of the size of the protocone, from which it is separated by a deep anterior valley (medisinus). A crista, strongest in  $m^1$ , is developed from the ectoloph, and an antecrochet, of fair size in  $m^1$ , smaller in  $m^2$ , and incipient in  $m^3$ , is given off from the protoloph. In  $p^4$ , in addition to a small crista, and an indication of an antecrochet in the form of a distinct tubercle, there is a delicate crochet,<sup>1</sup> which is of interest as a decidedly progressive character. In the molars there is no internal cingulum, but posteriorly, anteriorly, and externally the cingulum is as in the premolars, except that externally it is scarcely more than suggested at the base of the parastyle. As already mentioned, the ectoloph in  $m^3$  is short as compared with that of  $m^2$  and  $m^1$ , principally on account of the reduction in size of the metacone, which does not extend, as in the other molars, far posterior to its junction with the meta-

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<sup>1</sup> Professor H. F. Osborn, in his memoir on "The Extinct Rhinoceroses" (Memoirs of the Amer. Mus. of Nat. Hist., Vol. I., Part III., p. 89, 1898), has mentioned that the 'crochet' is "peculiar to the true *Rhinoceros* molars" and is "only feebly developed, if at all, in the *Amynodonts* and *Hyracodonts*."

loph, but is curtailed at this point, in consequence of which there is only a slight indication of the formation of a posterior valley (postsinus) that in *H. nebrascensis* has reached a more advanced stage.

The order of premolar transformation in *H. priscidens* is apparently an exception to the usual metamorphosis of the Hyracodont premolars, which, as stated by Osborn in his memoir on "The Extinct Rhinoceroses," 1898, p. 90, is presented in three successive stages of evolution toward the molar pattern in the second, third and fourth premolars, the last premolar ( $p^4$ ) being the most advanced. In *H. priscidens* the fourth premolar is the least advanced as regards the relation of the loph to each other, although in other respects, viz., in the presence of secondary crest folds ("crista," "antecrochet" and "crochet") a decided advance has been made, and it may be considered in this regard as more progressive than  $p^1$ ,  $p^2$  and  $p^3$ .

## MEASUREMENTS.

	H. priscidens.	H. planiceps. <sup>1</sup>	H. nebrascensis. <sup>1</sup>
	M.	M.	M.
Upper molar series, length....	.062	.103	.070
Upper premolar series, length.	.062		
M. <sup>1</sup> width (tr.).....	.0232	.035	.026
M. <sup>2</sup> ".....	.0245	.036	.028
M. <sup>3</sup> .....	.024	.037	.026
M. <sup>1</sup> length (a. p.).....	.022		
M. <sup>2</sup> ".....	.023	.035	.027
M. <sup>3</sup> .....	.0195	.040	
P. <sup>1</sup> width (tr.).....	.0135		
P. <sup>2</sup> ".....	.020		
P. <sup>3</sup> .....	.0217		
P. <sup>4</sup> .....	.023		
P. <sup>1</sup> length (a. p.).....	.0123		
P. <sup>2</sup> ".....	.016		
P. <sup>3</sup> .....	.0168		
P. <sup>4</sup> .....	.0173		

<sup>1</sup> The measurements of the teeth of *H. planiceps* and *H. nebrascensis* are taken from the "Preliminary account of the Fossil Mammals from the White river formation, contained in the museum of Comparative Zoology," by W. B. Scott and Henry F. Osborn, 1887, p. 171, Bull. Mus. Comp. Zool., Harvard College.

## PLATE I.

Figure 1.—Premolar—molar series of teeth of the left side of *Hyra-*  
*codon priscidens*, as seen from below. Natural size.

Figure 1a.—The same teeth; external view. Natural size.

*pr.*, protocone; *d.*, deutocone; *tr.*, triticocone; *te.*, tetartocone.

