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1941

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*American Museum of Natural History*

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Colbert, Edwin H., "The Ancestral Ursid, *Hemicyon*, in Nebraska" (1941). *Bulletin of the University of Nebraska State Museum*. 25.  
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BULLETIN OF THE UNIVERSITY OF NEBRASKA  
STATE MUSEUM

ERWIN HINCKLEY BARBOUR, DIRECTOR

VOLUME 2      LINCOLN, NEBRASKA, JANUARY 1941      NUMBER 5

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The Ancestral Ursid, *Hemicyon*, in Nebraska

BY EDWIN H. COLBERT<sup>1</sup>

**D**URING the summer of 1928, a University of Nebraska State Museum field party, composed of Dr. A. L. Lugen and the writer, made a collection of upper Miocene and lower Pliocene mammals in Brown and Cherry counties, Nebraska. This collection was sponsored and made possible by the generosity of the late Hon. Charles H. Morrill.

Among the interesting specimens found as a result of this trip was the lower mandible of a new "bear-dog," belonging to the genus *Hemicyon*. This jaw was found in a canyon, some 12 or 15 miles north of Ainsworth, Nebraska, in beds near the top of the Tertiary section at this locality which are referable to the Devil's Gulch or "Valentine"<sup>2</sup> levels. Its age cannot be exactly stated, but is either upper Miocene or lowermost Pliocene.

This specimen is important in that it establishes the genus *Hemicyon* in the upper Tertiary sequence of the northern Great Plains area of North America. Hitherto the genus had been known only from the Santa Fé beds of New Mexico and the Barstow beds of California (Frick 1926).

It might be said here that this original discovery of *Hemicyon* in Brown county, Nebraska, has been more recently confirmed by Mr. James Quinn of the Field Museum of Chicago, who found a second jaw at no great distance from where the original specimen was discovered.

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<sup>1</sup> American Museum of Natural History, New York.

<sup>2</sup> The term "Valentine" is used here in a general sense, to include those upper Miocene and lower Pliocene beds subsequently delimited and named by Stirton and McGrew as the "Niobrara River," "Burge," and "Valentine," in this order from the older to the younger members of the series.

See Stirton, R. A. and McGrew, Paul O. 1935, Amer. Jour. Sci. (5), XXIX, pp. 125-132. Also a series of articles by McGrew, Paul O. and Meade, Grayson; Lewis, G. Edward; Colbert, Edwin H.; Johnson, F. Walker; Lugen, A. L. (1938), Amer. Jour. Sci. (5), XXXVI, pp. 197-227.



**Fig. 20.**—*Hemicyon barbouri*, new species. Type mandible, Neb. Mus. No. 1-26-6-28 LC. External lateral and crown views. Two-thirds natural size.

I wish to acknowledge the great kindness of Dr. Erwin H. Barbour, Director of the Nebraska State Museum, for loaning the specimen to me for study and description. Also, I must express to Dr. Barbour my appreciation for help in connection with the study of this fossil carnivore. To Mr. James Quinn and the Field Museum of Chicago, I wish to express my gratitude for the loan of the second jaw of *Hemicyon*, mentioned above. Also I wish to express my appreciation to Mr. Quinn for help in determining the exact locations of the fossils that form the subject of this paper.

***Hemicyon barbouri*, new species<sup>3</sup>**

**Type.**—Neb. Mus. No. 1-26-6-28 LC, a right mandibular ramus, in perfect condition, with C, P<sub>3</sub>-M<sub>3</sub>.

**Paratype.**—Field Mus. No. P 14934, a right mandibular ramus, complete but lacking the dentition.

**Horizon.**—"Valentine" or Devil's Gulch formation (used in the inclusive sense of the word). This species probably comes from the lower horizons of this series, of upper Miocene, or possibly of lower Pliocene age.

**Locality.**—Tributary canyons of the Niobrara river, about 15 miles north of Ainsworth, Nebraska. Dutch Creek canyon, about 2 miles southeast of Meadville, Nebraska; for the type. Lessig Creek canyon, about 3 miles southwest of Meadville, Nebraska; for the paratype.

**Diagnosis.**—A large *Hemicyon*, characterized by:

- a. The very heavy mandibular ramus.
- b. The vertical symphysis.
- c. The very large masseteric fossa, and the correspondingly small premasseteric fossa.
- d. The heavy, stout canine.
- e. The relatively small cheek teeth.

This new carnivore from northern Nebraska, though undoubtedly of the genus *Hemicyon*, displays some rather unusual characters that distinctly set it apart as a separate species. These are as follows:

The heavy mandibular ramus is at once one of the most notable features of this new species. Proportionately it is certainly the most heavy ramus to be found among the several species of *Hemicyon*, and actually it is equalled in size only by the rami of the largest individuals of other species. In this new species the horizontal ramus is almost as deep anteriorly as posteriorly, in which *Hemicyon barbouri* differs from all of the other species of the genus hitherto known, and because of this the lower border of the mandible forms a relatively straight profile, as compared with the slanting borders in other species. Secondly, the very straight, almost vertical mandibular symphysis of *Hemicyon barbouri* distinctly separates this species from all other members of the

<sup>3</sup> For Dr. Erwin H. Barbour, Director of the University of Nebraska State Museum and professor of paleontology.



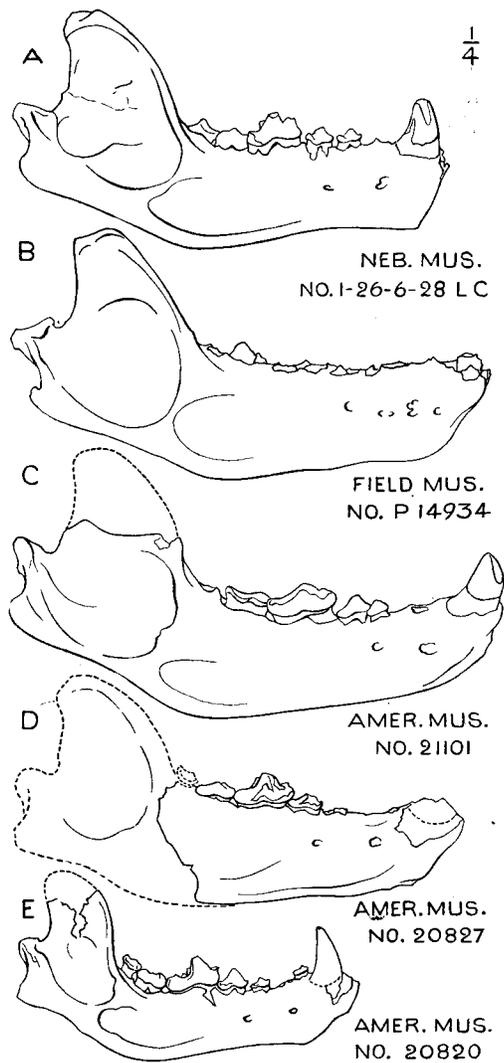
**Fig. 21.**—*Hemicyon barbouri*, new species. Type mandible, Neb. Mus. No. 1-26-6-28 LC. Internal lateral view. Two-thirds natural size.

genus. Indeed, the mandibular symphysis is so straight that it forms an angle of about  $65^\circ$  with the lower border of the horizontal ramus—a decided contrast to the rounded symphyses of other species of *Hemicyon*. The vertical and angular symphysis, taken together with the massiveness of the jaw, constitute the most striking characters typical of the mandible in this new species.

But a third character of the mandible whereby this new form may be contrasted with most of the other species of *Hemicyon* is the large masseteric fossa and the correlatively small premasseteric fossa. The premasseteric fossa is a generic character in *Hemicyon*, and characteristically it is of such size that it extends back, particularly along its ventral border, posteriorly to the back of the last molar. But in the new species now under consideration (the reason for which it resembles one other American form, *Hemicyon ursinus*), the large masseteric fossa has invaded the area of the premasseteric fossa, especially near the ventral border of the jaw, so that the anterior of the two fossae does not extend back appreciably beyond  $M_3$ . Moreover, the premasseteric fossa of *Hemicyon* usually extends farther forward than it does in this new species.

Another feature distinctive of this new jaw, though to a lesser degree than the characters already enumerated, is the broad ascending ramus, the anterior border of which is less vertical than is usually the case in *Hemicyon*. The shape of the ascending ramus in the new species is owing to the fact that it is perhaps not so high, proportionately, as in other species, while its antero-posterior diameter is probably proportionately greater than is the case among any of the other forms belonging to this genus. Therefore, the front border rakes back in a long, anteriorly convex sweep.

Finally, *Hemicyon barbouri* is distinguished by the stout, but relatively short, canine, and by the comparatively small size of the cheek teeth. The teeth are very much worn in the type specimen, so that detailed descriptions are not possible. But the canine, in spite of its worn condition, shows by its shape that it was comparatively short in relation to its great diameter. The premolars are small and, as is typical of *Hemicyon*, relatively simple. That is, they are essentially elongated, simple cones, with slight anterior and posterior cingula. The carnassial is typified by its distinct metaconid, and its relatively large talonid. In *Hemicyon* the talonid is characteristically basined, and such would seem to be the case in the present species. But in *Hemicyon barbouri*, the basin is seemingly small, and internally placed—so that it has a long buccal slope—and when greatly worn, as it is in the type specimen, it acquires a deceptive appearance, seeming to be



**Fig. 22.**—Comparison of the mandibular rami of the North American species of *Hemicyon*. (A) *Hemicyon barbouri*, new species; type. (B) *Hemicyon barbouri*, new species; paratype. (C) *Hemicyon ursinus* (Cope); neotype. (D) *Hemicyon californicus* Frick; type. (E) *Hemicyon barstowensis* Frick; paratype. (C), (D), and (E) after Frick, 1926. All figures one-fourth natural size.

trenchant rather than basined. The second and third molars are much worn in the type, but it would seem evident that they show the usual form typical of *Hemicyon*. They are noteworthy because of their small size.

Of the several species of *Hemicyon* with which this Nebraska form may be advantageously compared, *Hemicyon ursinus* from the Santa Fé beds of New Mexico, is perhaps the most closely comparable, on the basis of the totality of anatomical characters available. Yet even between these two species, the differences are sharply enough drawn so that there can be no doubt as to their specific distinctness. *Hemicyon barbouri* is similar to *Hemicyon ursinus* in size, and also as to the massiveness of the mandible. Of course, as was noted above, the ramus of the Nebraska species is even heavier anteriorly than it is in the Santa Fé form, which is characterized by its massive mandible. Moreover, both *Hemicyon barbouri* and *Hemicyon ursinus* are similar by virtue of their large masseteric fossae, and the relatively small premasseteric fossae, although in the former species the premasseteric fossa is noticeably smaller than it is in the latter. They resemble each other, too, in their antero-posteriorly broad ascending rami. But the differences between the two species are outstanding. These are, notably, the more angular symphysis of the Nebraska form, its smaller premasseteric fossa, and the much smaller teeth, especially the molars.

*Hemicyon barbouri* is considerably larger than *Hemicyon barstowensis* from the Barstow beds of California, and the mandible is much more massive than in this latter form. This is apparent not only as to the horizontal ramus, with its angular symphysis (as compared with the sloping symphysis of the California type) but also with regard to the ascending ramus, which is relatively much broader in the Nebraska species than it is in the California form. It is interesting to notice, however, that although *Hemicyon barbouri* gives the impression of being much larger and more robust than *Hemicyon barstowensis*, its molar teeth are practically identical in size with those of the California species. This discrepancy is due, of course, to the unusually small size of the cheek teeth in the Nebraska species.

*Hemicyon barbouri* is approximately equal in size to *Hemicyon californicus*, another Barstow species. But, as in the other cases, it differs from this species by reason of its more angular symphysis, smaller premasseteric fossa and smaller teeth. In this connection it might be said that there is a possibility that *Hemicyon californicus* is synonymous with *Hemicyon barstowensis*. Both species come from the same horizon. The differences between

Measurements of *Hemicyon* spp.

	<i>Hemicyon barbouri</i> Type, Neb. Mus. No. 1-26-6-28 LC	<i>Hemicyon barbouri</i> Paratype, Field Mus. No. P 14934	<i>Hemicyon ursinus</i> Amer. Mus. No. 21101	<i>Hemicyon californicus</i> Type, Amer. Mus. No. 20827	<i>Hemicyon barstovensis</i> Type, Amer. Mus. No. 20810	<i>Hemicyon sansaniensis</i> Type
<i>Mandible</i>						
Length, cond.-inc.	228	255	256			
Depth, M <sub>2</sub>	55	61	62			
Depth, P <sub>2</sub>	47	53	44	42	37	44.5
<i>Dentition</i>						
C L x W	20 x 13	18.5 x 14.5			20	
P <sub>1</sub> L x W						
P <sub>2</sub> L x W						
P <sub>3</sub> L x W	12 x 7	10 x 8				
P <sub>4</sub> L x W	15.5 x 8.5	16.5 x 9				15.5
M <sub>1</sub> L x W	29.5 x 13.5	35.4 x 15		15.5	29.2 x 12.7	33 x 15
M <sub>2</sub> L x W	20.5 x 12.5	23 x 15		33 x 15	17.7 x 12	20 x 13.5
M <sub>3</sub> L x W	12.5 x 9			20 x 13.5	10.5 x 8.5	
Ratio -P <sub>3-4</sub> /M <sub>1-2</sub>	52	37		48	50	
Ratio M <sub>1-2</sub> /Mandible	24	28				
Ratio Depth P <sub>2</sub> : M <sub>2</sub> /length	20:24	21:24	17:24			

them are about the same as those between individuals of a new *Hemicyon* from the Tung Gur formation of Mongolia, in which species several jaws from a single quarry are known. On the other hand, it may be that the real difference in size between the teeth of the two California species denotes a valid specific distinction, for in the case of the Mongolian species, the teeth were of a practically uniform size, even though the jaws varied considerably as to their dimensions.

*Hemicyon barbouri* is not so very different from the generic type, *Hemicyon sansaniensis*, as to size, and it also shows certain resemblances to the European species with regard to the structure of the mandible. Thus, although the ascending ramus is broken in the generic type, thereby adding to the difficulty of making any final conclusions as to its shape, it would seem evident that the masseteric fossa in this species, like that in the Nebraska form, is large. Moreover, the mandibular ramus is heavy in *Hemicyon sansaniensis* as in *Hemicyon barbouri*, but in its general shape it more closely resembles the ramus in *Hemicyon ursinus*. Also, the premasseteric fossa and the molar dentition are larger in the generic type than in the new species here described, a difference that distinguishes *Hemicyon barbouri* from all of the other species of the genus.

One other European species may be compared with *Hemicyon barbouri*, namely *Hemicyon göriachensis*. But again, this form, like others compared with the Nebraska species, is characterized by its much larger teeth, particularly the second lower molar, which is of unusual size.

Finally, it may be said that *Hemicyon barbouri* is comparable in many respects to a new *Hemicyon* (described in Colbert, 1939) from the upper Miocene Tung Gur beds of Mongolia. The differences between the two forms are about the same as the differences between the Nebraska species and other North American forms.

The general resemblances and differences between *Hemicyon barbouri* and the several species with which it has been compared are shown by the outlines of the mandibular rami in the accompanying figures and table of measurements.

**Geographic Distribution and Geologic Range of *Hemicyon*.—**

The discovery of *Hemicyon* in northern Nebraska establishes the genus in the Great Plains area of North America. Consequently this animal is now known from three localities in North America: California, New Mexico, and Nebraska. In the Old World the genus has been discovered at several localities in Europe, particularly in France and Germany, and in Asia, in Mongolia. Geologically speaking, the genus is of middle to upper Miocene age in Europe; and of upper Miocene age in Mongolia and North America.

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