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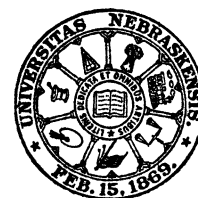
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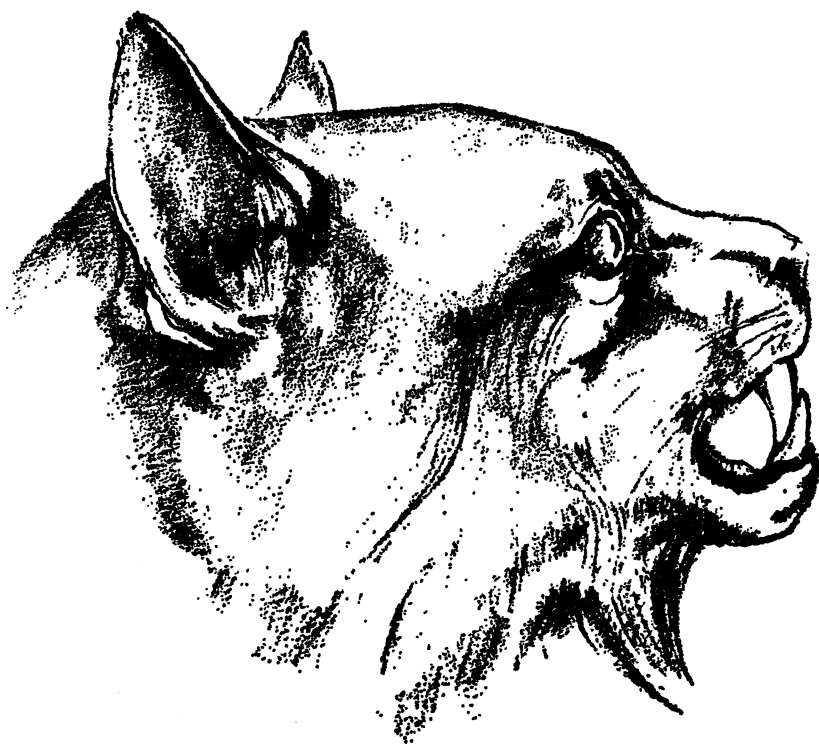
BULLETIN OF  
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# Two Lynx-like Cats from the Pliocene and Pleistocene





Frontispiece.—Restoration of the head *Lynx stouti*, new species. X1.

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## ABSTRACT

### Two Lynx-like Cats from the the Pliocene and Pleistocene

C. Bertrand Schultz

Larry D. Martin

A new species (*Lynx stouti*) of small felid is described from the lower Pliocene of Colorado. This form has several characters in common with the modern *Lynx* and may be ancestral to that genus. A new subspecies of *Lynx issiodorensis* Croizet and Jobert is described as *L. i. kurteni* from the Mullen Assemblage, Cherry County, Nebraska. The relationships of this form to other lynxes are discussed along with the paleo-distribution of the genus.

# Two Lynx-like Cats from the Pliocene and Pleistocene<sup>3</sup>

## INTRODUCTION

The classification of the felinae has always been somewhat controversial, especially at the generic level. One fairly homogenous group of cats which has been separated from the genus *Felis* are the lynxes. The ancestors of the modern lynxes can be traced back at least to the Villafranchian although the early forms did not have the characteristic short body and long legs found in the living species (Kurten, 1968, p. 80). New material from the Early Pliocene of Colorado U.N.S.M.<sup>4</sup> 25490 suggests that the separation of these small felids from other lines of felid evolution may have occurred quite early. By the Early Pleistocene the lynxes had already achieved a holartic distribution and are found in the Villafranchian of Europe and China as well as in the Blancan of North America. The characteristic form of this period is *Lynx issio-*

*dorensis* Croizet and Jobert which is known primarily from the Villafranchian of Europe. This species, or very closely related forms, are also known from Early Pleistocene sediments in North America and add strength to the already considerable arguments (Schultz and Stout, 1945, 1948; Schultz and Martin, 1970) for the correlation of the Villafranchian with the Blancan.

### *Lynx stouti*,<sup>5</sup> new species

**Holotype.**—Palate with I<sup>1-3</sup>, C/, P<sup>1-4</sup>, M<sup>1</sup> and most of the zygomatic arches, several fragments of skull including the right petrosal bone, mandible with I<sub>1-3</sub>, /C, P<sub>2-3</sub>, M<sub>1</sub>, atlas vertebra; U.N.S.M. 25490 (Fig. 1, A-H); collected by T. M. Stout and Lyle Harvey, 1940.

**Type Locality.**—From SW. ¼, Sec. 27, T. 12N., R 55W., Logan County, Colorado.

**Stratigraphic Occurrence.**—Early Pliocene (Valentinian), from lower part of Ogallala Group, in basal coarse reddish silts and clay, below a prominent concretionary zone.

**Diagnosis.**—A cat smaller than "*Felis*" *longignathus* Shotwell and "*Felis*" *proterolyncis* Savage with the following characteristics: dental formula I 3/3, C 1/1, P 4/3, M1/1; face very short with only a small distance between C 1/1 and P 3/3; I 3/3 only slightly larger than other incisors; prominent metaconid on M<sub>1</sub>.

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<sup>4</sup> Abbreviations used in descriptions: alv., alveolus or alveoli; br., broken; rt., root or roots; U.N.S.M., University of Nebraska State Museum.

<sup>5</sup> Named in honor of Professor Thompson Mylan Stout who helped collect the holotype and who has made so many valuable contributions to a better understanding of the Cenozoic history of Nebraska.

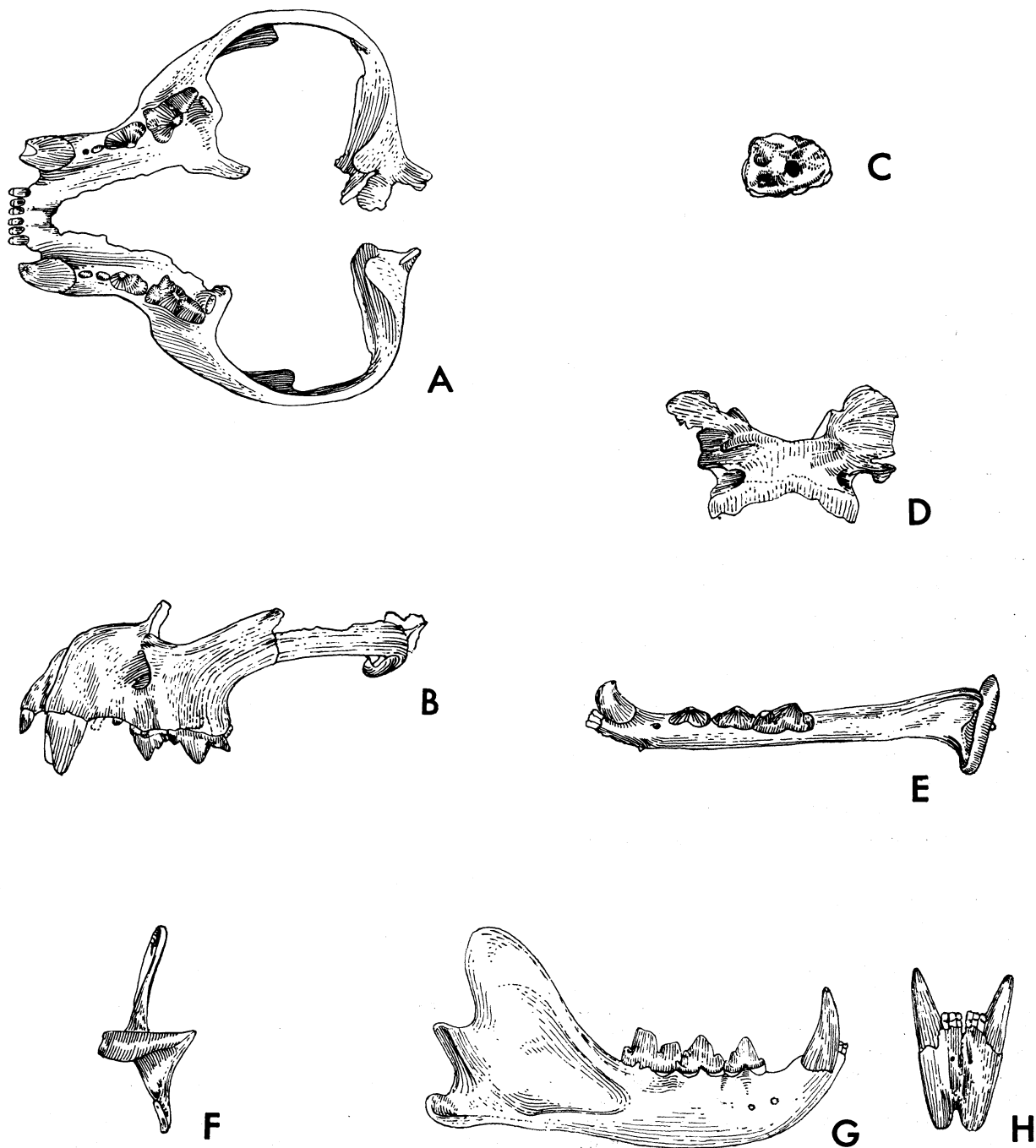


Fig. 1—*Felis stouti*, new species, holotype, U.N.S.M. 25490, partial skull (A, lateral, and B, palatal views); right petrosal bone (C, internal lateral view); atlas vertebra (D, ventral view); right ramus (E, dorsal; F, posterior; and G, lateral views); mandible (H, anterior view), from the Valentine Formation, Logan County, Colorado. X1.

TABLE 1  
*Lynx stouti*, NEW SPECIES  
 MEASUREMENTS<sup>1</sup> OF SKULL

Palate	<i>L. stouti</i> n. sp.
	Holotype U.N.S.M. 25490
Greatest width across muzzle at canines.....	25
Greatest width across zygomatic arches.....	(62) <sup>2</sup>
Anterior palatal width (minimum) between superior canines.....	14
Width across palate between posterior ends of alveoli for superior carnassials.....	32
Length from anterior end of canine alveolus to posterior end of M <sup>1</sup> .....	31
Length from anterior end of P <sup>1</sup> to posterior end of M <sup>1</sup> .....	23
I <sup>1</sup> greatest transverse diameter.....	1.1
I <sup>2</sup> greatest transverse diameter.....	1.3
I <sup>3</sup> greatest transverse diameter.....	1.5
C/ anteroposterior diameter.....	6.5
C/ transverse diameter.....	4.7
P <sup>1</sup> anteroposterior diameter.....	2
P <sup>1</sup> greatest transverse diameter.....	1.5
P <sup>2</sup> anteroposterior diameter.....	2.4
P <sup>2</sup> greatest transverse diameter.....	1.5
P <sup>3</sup> anteroposterior diameter.....	6.8
P <sup>3</sup> greatest transverse diameter.....	3.8
P <sup>4</sup> anteroposterior diameter.....	10
P <sup>4</sup> greatest transverse diameter.....	5.4
Width of incisor series measured between outer sides of alveolae for third upper incisors....	9
M <sup>1</sup> greatest diameter.....	3.6

<sup>1</sup> The measurements are taken to the nearest millimeter except on dentition where they are measured to the nearest one-tenth of a millimeter.

<sup>2</sup> ( ) = approximate

**Description.**—A cat the size of *Felis catus*, with a short broad muzzle; petrosal wide and flat; alveoli for upper canines expanded about as in *F. pardalis*; infraorbital foramen large; skull short and enlarged; canine relatively massive and long; canine flattened on the lingual side with an anterior-lingual ridge; anterior face of canine not grooved as in many *Felis*; P<sup>1-2</sup> relatively large and lacking a pronounced parastyle; P<sup>4</sup> with large parastyle, large protocone, paracone large and posteriorly inclined, carnassial notch deep and metacone elongated about as in *Felis catus*; M<sup>1</sup> small and single cusped; deep circular embrasure pit between P<sup>4</sup> and M<sup>1</sup>. Mandible with short gap between /C and P<sub>2</sub>; shape of anterior portion of ramus and position of the two small mental foramina similar to those in the

domestic cat; ramus massive for its small size; angular process unusually large; mandibular condyle slightly built but proportionally very wide; masseteric fossa large and extending under posterior margin of M<sub>1</sub>; coronoid process relatively wide; I<sub>1-3</sub> small single cusped teeth with I<sub>3</sub> very slightly larger than other incisors; canine relatively large; P<sub>2</sub> small single cusped, “peg-like” tooth; P<sub>3-4</sub> about equal in size with paraconid and metaconid about equal in size; deep, open carnassial notch and a large metaconid; atlas vertebra with wings more posterior and dorsal surfaces more excavated, and with the intervertebral foramen more rounded than in *Lynx rufus*.

**Discussion.**—*Lynx stouti* is a very small lynx-like cat. It differs from the two small cats near-



TABLE 2  
*Lynx stouti*, NEW SPECIES  
*Lynx issiodorensis kurteni*, NEW SUBSPECIES  
 COMPARATIVE MEASUREMENTS  
 OF MANDIBULAR RAMI

MANDIBULAR RAMI	<i>Lynx stouti</i> , n. sp. Holotype U.N.S.M. 25490	<i>Lynx issiodorensis kurteni</i> , n. subsp. Holotype U.N.S.M. 59233	<i>Lynx issiodorensis kurteni</i> Referred U.N.S.M. 25504
Length from anterior end of symphysis to posterior end of condyle.....	63	114	
Length from anterior end of /C to posterior end of M <sub>1</sub> .....	34	46	48
Distance between alveoli for /C and P <sub>3</sub> .....	6	11	11
Length from anterior end of P <sub>2</sub> to posterior end of M <sub>1</sub> .....	25		
Length from anterior end of P <sub>3</sub> to posterior end of M <sub>1</sub> .....	22.2	36	( 36)
Depth of ramus below posterior end of M <sub>1</sub> .....	12	24	23
Thickness of ramus below M <sub>1</sub> .....	6	11	10
Height from inferior border of angle to summit of condyle.....	16	26	
Height from inferior border of angle to summit of coronoid process.....	32	56	
Transverse width of condyle.....	15	26	
Greatest depth of condyle.....	5	10	
I <sub>1</sub> greatest transverse diameter.....	.8		
I <sub>2</sub> greatest transverse diameter.....	1		
I <sub>3</sub> greatest transverse diameter.....	1.2		
/C greatest transverse diameter.....	4.2		( 7.3)
/C greatest anteroposterior diameter at base of enamel.....	5.2		(11.3)
P <sub>2</sub> greatest transverse diameter.....	1.3		
P <sub>2</sub> anteroposterior diameter.....	1.7		
P <sub>3</sub> greatest transverse diameter.....	3.1	5	5.5
P <sub>3</sub> anteroposterior diameter.....	6.1	9.1	10.3
P <sub>4</sub> greatest transverse diameter.....	3.3	6	( 6)
P <sub>4</sub> anteroposterior diameter.....	7.2	12.2	(10.7)
M <sub>1</sub> greatest transverse diameter.....	3.9	6.9	( 5.7)
M <sub>1</sub> anteroposterior diameter.....	9	14	(14.2)

est it in age "*Felis*" *proterlyncis* Savage and "*F.*" *longignathus*<sup>6</sup> Shotwell in having a relatively longer distance between /C and P<sub>3</sub>, in the presence of P<sub>2</sub>, the presence of a metaconid on M<sub>1</sub>; and the absence of the bulbous cusp in the lingual valley of "*F.*" *longignathus* described by Shotwell (1956, p. 735). The posterior margin of the petrosal is wide and flat (rounded and grooved on *Lynx rufus*). The anterior margin

<sup>6</sup> Incorrectly spelled as *longignatha* in Shotwell (1956, p. 735) and as *longignatus* in Stephens (1959, p. 45).

of the petrosal does not seem to be expanded as in *Lynx rexroadensis* (Stephens, 1959, p. 41). *Lynx rexroadensis* lacks P<sub>1</sub> but does have a very small P<sub>2</sub>. The canine is ridged and bears a flattened lingual surface in *L. rexroadensis* and *L. stouti*. A talonid is not developed on the metaconid of M<sub>1</sub> as is usually the case in *Pseudaelurus*. The canines in most specimens of *Pseudaelurus* are less conical and more saber-like than they are in *Lynx stouti*; however, the presence of four upper premolars is re-

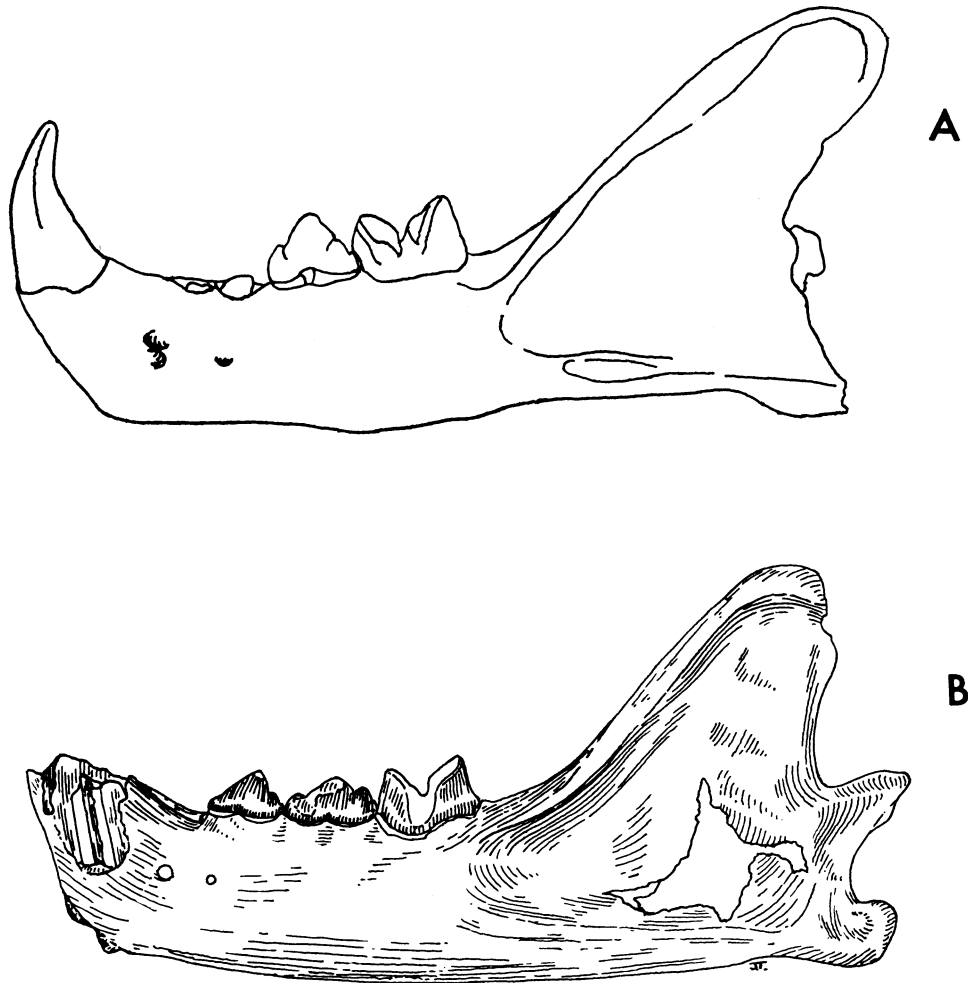


Fig. 2—*Lynx issiodorensis*, referred specimen from the Villafranchian of Saint-Vallier, France, A. lateral view of left ramus (after Viret, 1954, Plate 17, Figure 9). X1. *L. issiodorensis kurteni*, holotype, U.N.S.M. 39233, B. lateral view of left ramus, from the ?Early Kansan, Cherry County, Nebraska. X1 .

garded as characteristic of *Pseudaelurus* by Stock (1934, p. 1057). Probably *Felis stouti* should be named the genotype of a new genus. The diagnosis of this new genus would be difficult without a thorough revision of all the Felinae, and we have not undertaken it for this paper.

***Lynx issiodorensis kurteni*,<sup>7</sup> new subspecies**

**Holotype.**—Left ramus with  $I_{1-3}$  al.,  $/C$  rt.,  $P_2$ - $M_1$ , U.N.S.M. 39233 (Fig. 2, B).

<sup>7</sup> Named in honor of Bjorn Kurten (of Helsinki, Finland), who has made significant contributions to the study of fossil felids.

**Type Locality.**—U.N.S.M. Coll. Loc. Cr-102, NW.  $\frac{1}{4}$ , sec. 18, T. 25N., R 33W, southern Cherry County, Nebraska.

**Stratigraphic Occurrence.**—?Early Kansan.

**Referred Material.**—Right ramus with  $/C$  al.,  $P_2$  and  $P_3$ - $M_1$  rts; U.N.S.M. 25504; partial maxilla with  $C/$  rt.,  $P^3$  anterior rt. U.N.S.M. 76013; distal end of a left humerus; U.N.S.M. (Fig. 3); U.N.S.M. 76013 from same locality as holotype, and U.N.S.M. 25504 from U.N.S.M. Coll. Loc. Cr-10, Pit 4, Cherry County, Nebraska.

**Diagnosis.**—A felid intermediate in size between *Lynx canadensis* and *Felis concolor* and resembling *Lynx issiodorensis* (Fig. 2, A) from

which it differs in the angle and length of the coronoid process.

**Description.**—A felid the size of *Lynx issiodorensis* with  $I_{1-3}$  indicated by small crowded alveolae; canine large, diastema short;  $P_3$  with small metaconid;  $P_4$  with large paraconid, protoconid, and relatively well-developed metaconid and talonid,  $M_1$  small, with deep, open carnassial notch and no metaconid; two mental foramina in front of and under  $P_2$ ; coronoid process relatively short and straight, upper canine large; upper diastema short, humerus larger and more expanded distally than in *Lynx canadensis*.

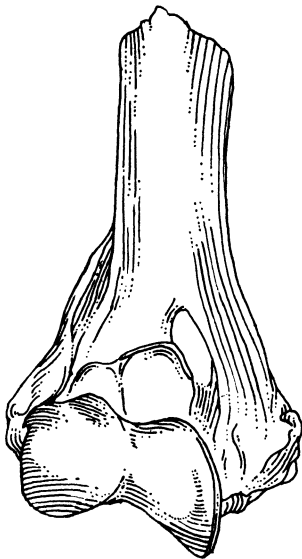


Fig. 3—*Lynx issiodorensis kurteni*, referred specimen, U.N.S.M. 76025, anterior view of left humerus. X1.

**Discussion.**—The assignment of the Nebraska material to a European species must be regarded as tentative. As we have recognized no consistent differences between *Lynx issiodorensis kurteni* from *L. issiodorensis* of Europe except for the shape of the coronoid process a subspecific separation is all that seems warranted at the present time. Examination of a population of *L. rufus* indicates that even this character is somewhat variable. *Lynx issiodorensis kurteni* is smaller than *Felis studeri* Savage, *F. palaeoonca* Meade, *F. lacustris* Gazin and the cat from the Cita Canyon Local Fauna described by Savage (1960, p. 337) as *Felis*,

?aff. *Felis (Lynx) issiodorensis* (Croizet and Jobert). *Lynx rexroadensis* is based on upper dentitions only and therefore cannot be successfully compared, but seems to be a cat of about the same size as *L. i. kurteni*. The age of *L. i. kurteni* is probably late Blancan although the Mullen Assemblage includes both late Blancan and early Illinoian forms (Martin, 1972).

## SUMMARY AND CONCLUSIONS

*Lynx stouti* was a small cat with certain lynx-like characteristics. It possesses a number of primitive features including the presence of  $P^1$  and  $P_2$  as well as the large metaconid on  $M_1$ . It is older than, and perhaps ancestral to "*Felis*" *proterolyncis* Savage from the Hemphillian Optima Local Fauna of Oklahoma, which, however, lacks  $P_2$  (Savage, 1941, p. 698). *Lynx rexroadensis* Stephens which retains the  $P^2$  may also be descended from *L. stouti*. *Lynx rexroadensis* is about the same size and age as *Lynx issiodorensis* and its relationship to this form should be carefully evaluated. At the present time there seems to be considerable evidence for a separate lineage of small cats which may be included in the genus *Lynx*, and we have used *Lynx* as a genus rather than subgenus of *Felis* (as in Simpson, 1945) for that reason. The presence in the Early Pleistocene (Blancan) of North America of a complex of small felids related to *Lynx issiodorensis* of the Villafranchian of Eurasia is fairly well established (Savage, 1960, p. 318 and pp. 337–339). The assignment of *L. i. kurteni* to the European species is made with some misgivings and may have to be revised when better material is available. However, there is little doubt that it belongs to this general group of felids. *Felis lacustris* (Gazin, 1933) is a larger cat than *Lynx issiodorensis* and is similar in size to the cougar, *Felis concolor*.

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