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Franconictis (Mammalia: Carnivora) from the Late Oligocene of eastern Kazakstan

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Abstract.—The right dentary of a small carnivore from near Ayaguz in eastern Kazakstan is identified as *Franconictis* sp. aff. *F. vireti* (Dehm). *Franconictis* has previously been reported only from the early Miocene of Europe. Previous reports of *Plesictis* from Asia are not well founded. *Franconictis* from Ayaguz extends the geographic range of the genus into Asia and its temporal range back to the late Oligocene.

Fossil mammals from eastern Kazakstan are best known from the richly fossiliferous Paleogene-Neogene strata of the Zaysan basin (Fig. 1). Some Paleogene and more extensive Neogene mammalian assemblages are also known from the intermontane basins of the northern Tien Shan drained by the Ily River and its tributaries (Tleuberdina et al. 1993, Lucas & Bayshashov 1996, Emry et al. 1997). However, between the Ily and Zaysan basins, relatively few Cenozoic fossil mammals are known, in part because outcrops are limited in the relatively low topography of the Balkash-Alakol drainage basin. Here, we add to this sparse record a jaw of the mustelid carnivore *Franconictis,* collected near Ayaguz. *Franconictis* has previously been known only from the early Miocene of Europe (Wolsan 1993, Morlo 1996); this specimen is the first record of the genus from Asia and extends its temporal range back to the late Oligocene.

Abbreviations used.—When used in dental notations, upper case letters denote upper (skull) teeth and lower case letters denote lower (dentary) teeth. Institutional abbreviations used are: AMNH–American Museum of Natural History, New York; KAN–Kazak Academy of Sciences, Almaty.

Systematic Paleontology

Order Carnivora Bowdich, 1821
Family Mustelidae Fischer von Waldheim, 1817
Genus *Franconictis* Wolsan, 1993
Franconictis sp. aff. *F. vireti*
(Dehm 1950)
Fig. 2

Referred specimen.—KAN 401-67, horizontal ramus of right dentary with p1–m1, from lower Miocene strata termed "Aral svita" near Ayaguz, Kazakstan.

Description.—The dentary is narrow and shallow with two mental foramina on its labial aspect—one under the anterior root of the p2 and the other under the center of the p3. The ascending ramus is broken, but appears to have been tall and thin, with the anterior border of the coronoid fossa sharply defined.

There is a dorso-ventrally oval alveolus for the canine at the anterior edge of the dentary as preserved. Evidently the postcanine diastema was either short or nonexistent. The p1 is a small, well worn trenchant tooth with a single root. The crown consists

Fig. 1. Map of Kazakstan showing location of the Zaysan basin, the Ayaguz fossil mammal locality and the Ily basin in the eastern part of the country.

of an anteriorly situated main cusp (protoconid) with a long posterior surface sloping to a low heel. The p1 length = 2.4 mm, width = 1.3 mm.

The p2 has two distinct roots and a trenchant crown dominated by the tall protoconid. There is a very small anterior cingulid and a low, broad heel defined by the lingual cingulid which continues around the posterior margin of the tooth. The p2 length = 3.3 mm, width = 1.6 mm.

The p3 is similar to the p2 but larger and has a relatively longer anterior slope. A very slight swelling low on the posterior slope of the protoconid is an incipient postprotoconid cuspid. The p4 has a similar overall shape, except the anterior cingulid bears a distinct cuspid, there is a small cuspid (?metaconid) on the posterior slope of the protoconid, and the posterolingual cingulid is a sharp ridge produced into a small posterior accessory cuspid. The p3 length = 3.8 mm, width = 1.8 mm; p4 length = 4.6 mm, width = 2.1 mm.

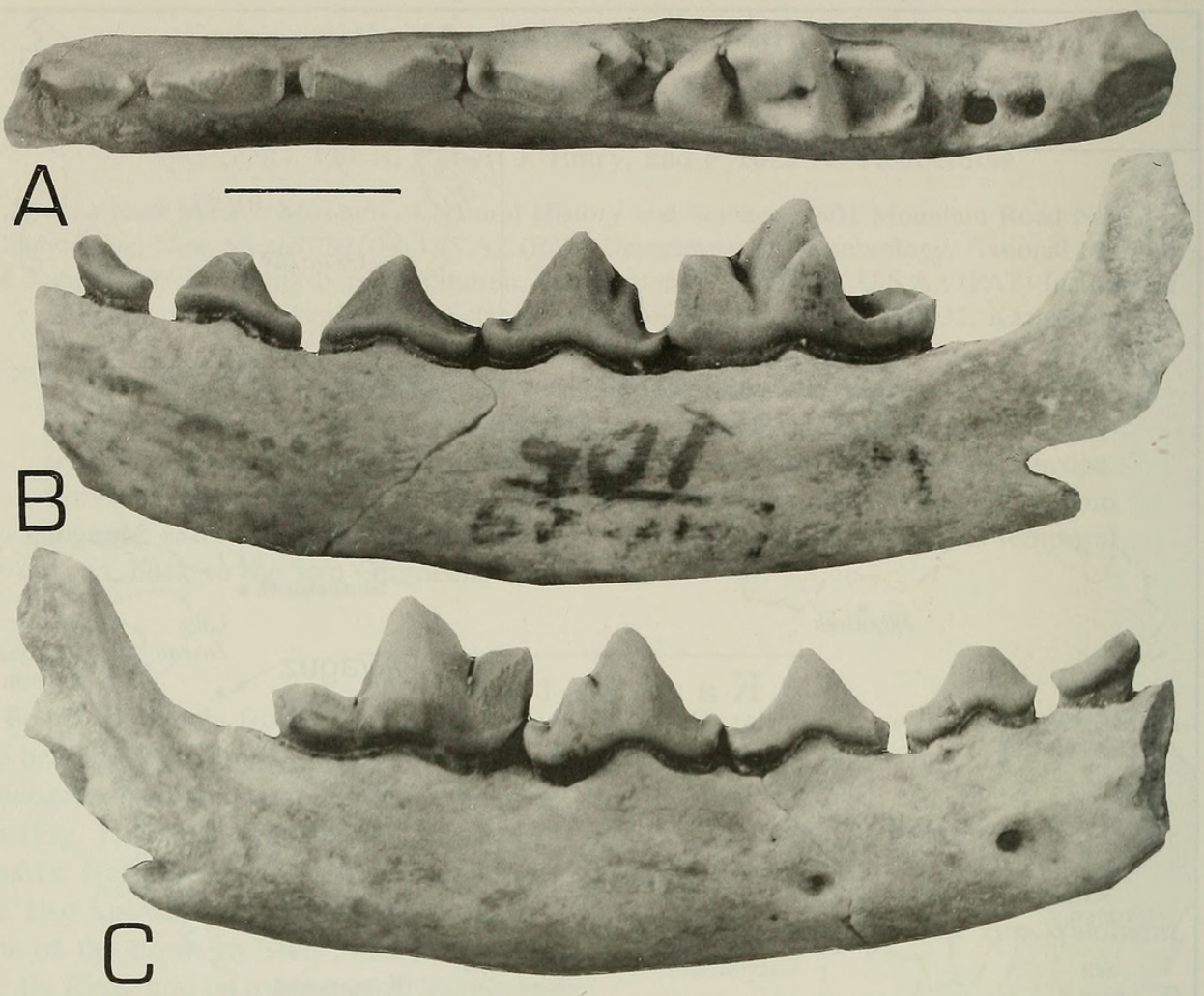

Fig. 2. *Franconictis* sp. aff. *F. vireti* (Dehm) from eastern Kazakstan, KAN 401-67, right dentary with p1–m1, occlusal (A), lingual (B) and labial (C) views. Bar scale = 5 mm.

The m1 is the only molar tooth remaining in the jaw, and it is substantially larger than the other teeth. The large, postero-labially canted protoconid dominates the trigonid. A relatively small and low metaconid is directly lingual to the protoconid, and a larger but lower paraconid projects antero-lingually, so that the trigonid basin is broadly open lingually. A carnassial notch interrupts the paracristid. The low talonid consists of a basin surrounded by a relatively sharp rim, which is much lower lingually than labially. The hypoconid is relatively large and the entoconid is present but poorly differentiated as a small cuspid on the posterolingual rim of the talonid; between the hypoconid and entoconid are two small, bead-like cuspids. The m1 length = 6.4 mm, width = 2.9 mm.

The m2 is missing, but its position is indicated by two alveoli, the posterior of which is well up on the slope of the ascending ramus. It was obviously a much smaller tooth than the m1.

Identification.—The presence of a single-rooted p1 supports assignment of KAN 401-67 to the Mustelidae *sensu* Wolsan (1993). Among mustelids, its closest similarity is to "*Plesictis,*" particularly the relatively small species "*P.*" *vireti* from Wintershof-West, Germany (e.g., Dehm 1950, figs. 92–99). Points of close resemblance include the shallow dentary, single-rooted p1, lack of a posterior cuspid on p2 or p3, m1 trigonid less than three times as long as the talonid, m1 protoconid relatively low, broad and posteriorly inclined, m1 metaconid higher than paraconid, m1 entoconid

and entoconulid poorly differentiated, m2 two-rooted, and m2 alveoli on the ascending ramus.

In a re-evaluation of the phylogeny and classification of European mustelids, Wolsan (1993) recently removed *Plesictis vireti* from *Plesictis* and placed it in the new genus *Franconictis.* Given its strong similarity to *P. vireti,* we identify KAN 401-67 as *Franconictis,* but do not attempt a definite species-level identification of so incomplete a specimen. Therefore, we identify KAN 401-67 as *Franconictis* sp. aff. *F. vireti.* M. Wolsan (in litt., 1997) notes that KAN 401-67 is slightly smaller and "more primitive" than *F. vireti* and probably represents a new species of *Franconictis,* but we believe the specimen is inadequate material upon which to base a new species.

Plesictis in Asia

To our knowledge (also see Russell & Zhai 1987, Werdelin 1996), *Plesictis* has been reported only twice from Asia. Gabuniya (1964) first reported *Plesictis* based on an isolated canine, fragment of a distal humerus and partial metacarpal (Gabuniya 1964, figs. 17–19) from the Benara locality (late Oligocene) in western Georgia. These fossils represent a small carnivore, but are not sufficient to identify *Plesictis.* Therefore, we identify them as Carnivora, indeterminate.

Mellett (1968) reported cf. *Plesictis* sp. from the upper part of the Hsanda Gol Formation (Mongolia, late Oligocene) based on AMNH 21654, a right dentary with m1–2 (Fig. 3). In this specimen, m1 is much larger than m2 and has a long, tall trigonid with the basin broadly open lingually. Its protoconid is large, tall and inclined postero-labially, and the metaconid is a much lower, pointed cuspid lingual to the protoconid. The paraconid is intermediate in size between the protoconid and metaconid and is massive and projects anteriorly. A carnassial notch interrupts the paracristid. The talonid is very low and cup-like with a distinct

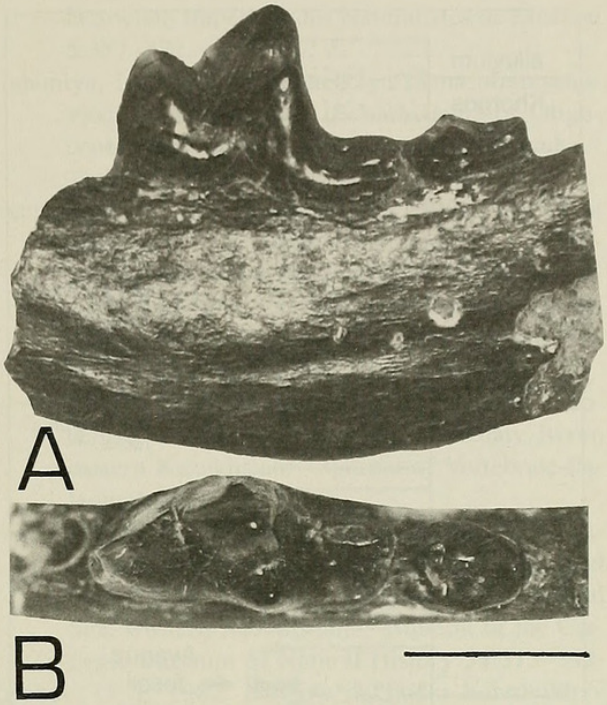

Fig. 3. AMNH 21654, *Stenoplesictis constans* from the Hsanda Gol Formation of Mongolia, right dentary fragment with m1–2, lingual (A) and occlusal (B) views. Bar scale = 5 mm.

hypoconid. The m1 length = 8.4 mm, width = 4.0 mm.

The m2 is a small, oval tooth with a three-cusped trigonid and a low talonid with a shelf-like posterior rim. The m2 length = 3.6 mm, width = 2.8 mm.

This specimen conforms well to *Stenoplesictis,* particularly in its relatively tall m1 trigonid, prevallid shear on m1, small m2 with a well developed trigonid and narrow, trenchant talonid, and lack of m3 (Dashzeveg 1996). Indeed, AMNH 21654 closely resembles *Stenoplesictis constans* from the Hsanda Gol Formation (Matthew & Granger 1924, fig. 6F), to which we assign it. Therefore, there are no well founded reports of *Plesictis* in Asia.

Biostratigraphy and Biochronology

The locality from which KAN 401-67 was collected is on the right bank of the Ayaguz River, 29 km downstream from the town of Ayaguz, in eastern Kazakstan. The vertebrate-producing strata (Fig. 4) here rest with erosional unconformity on red beds

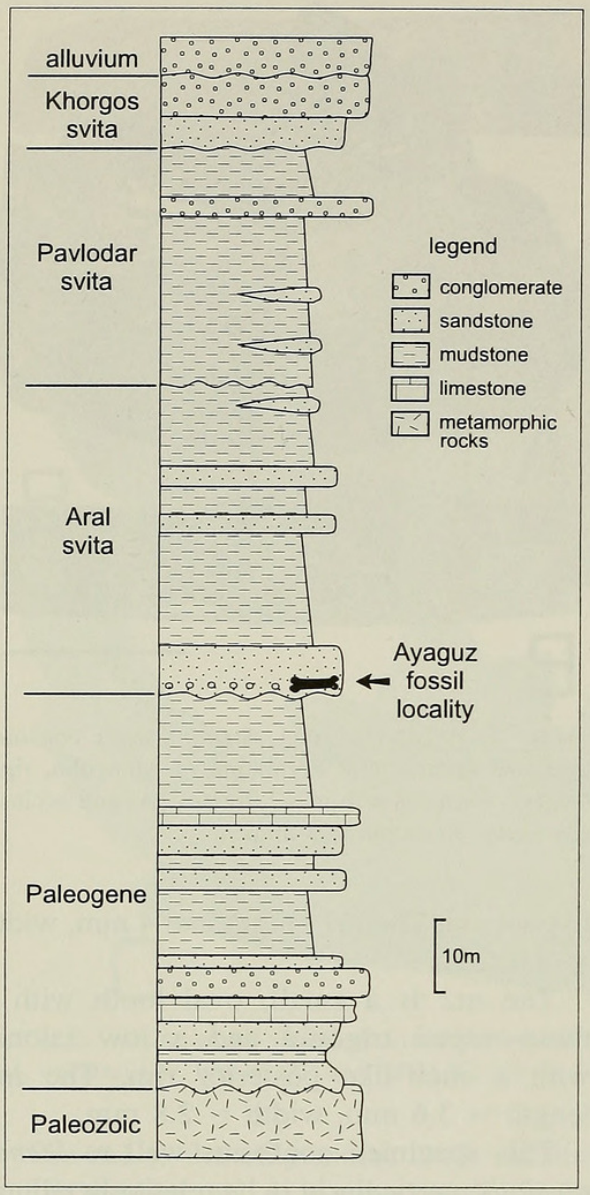

Fig. 4. Measured section of strata exposed in the Ayaguz River basin showing the stratigraphic position of the Ayaguz fossil mammal locality (after Tolochko & Aubekerova 1971).

that elsewhere in the Balkash-Alakol basin produce middle Eocene (Irdinmanhan) mammals (on the Shinzhaly River to the south: Didenko-Kislitsina 1990; Lucas et al. 1997). The fossiliferous bed at the Ayaguz River locality is composed of rusty green sandy clays and sandy gravel lenses at the base of a section referred to as "Aral svita" by Tolochko & Aubekerova (1971). In addition to *Franconictis,* the following taxa have been reported from this site: the lagomorphs *Sinolagomys* cf. *S. major* Bohlin and *Desmatolagus* cf. *D. robustus* Matthew & Granger; the castorids *Asiacastor antecedens* Lychev and *Steneofiber depereti* Mayet; and an indeterminate tragulid artiodactyl (Musakulova 1971, Erbayeva 1982, Lychev 1982).

Desmatolagus ranges in age from Ergilian to Shandgolian in China-Mongolia, and is a characteristic Oligocene genus (Russell & Zhai 1987, Qiu & Qiu 1995). The ochotonid *Sinolagomys* is a characteristic late Oligocene taxon in China and Mongolia, though it has its youngest occurrence (*S. pachygnathus*) in the early Shanwangian (early Miocene) of China (Qiu & Qiu 1995). Therefore, Erbayeva (1982) assigned the Ayaguz mammal locality a late Oligocene age.

Lychev (1982, 1987, *in* Lychev & Aubekerova 1971) described *Asiacastor* from localities in eastern Kazakstan that he assigned a Miocene age, although there is no clear basis for the age assignment. Indeed, *Asiacastor* is known from the late Oligocene Aral local fauna, north of the Aral Sea in western Kazakstan (Lucas et al. 1998). In Asia, the genus *Steneofiber* is of Oligocene and Miocene age (Russell & Zhai 1987). Tragulids range through the Oligo-Miocene boundary, so the indeterminate tragulid from the Ayaguz locality is of no precise biochronological significance. We thus support Erbayeva's (1982) assignment of a late Oligocene age to the Ayaguz mammal locality.

Franconictis is known in European early Miocene (MN 1–4) mammal assemblages (Mein 1989, Bruijn et al. 1992, Wolsan 1993, Morlo 1996, Steininger et al. 1996). Its occurrence in eastern Kazakstan thus is an extension of its temporal range back to the late Oligocene. Wolsan's (in litt. 1997) interpretation of the Kazak specimen of *Franconictis* as more primitive than European *Franconictis vireti* is consistent with an older age for the Kazak occurrence. Furthermore, given that the distribution of *Franconictis* in Asia is largely unknown, an older age for the genus in Asia than in Eu-

rope is quite plausible. On face value it might suggest an Asian origin of the genus during the Oligocene, and subsequent immigration to Europe in the early Miocene.

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Literature Cited

Bowdich, T. E. 1821. An analysis of the natural classification of Mammalia for the use of students and travellers. J. Smith, Paris, 115 pp.

Bruijn, H. De, R. Daams, G. Daxner-Höck, V. Fahlbusch, L. Ginsburg, P. Mein, J. Morales, E. Heinzemann, D. F. Mayhew, A. J. Van Der Muelen, N. Schmidt-Kittler, & M. Telles Antunes. 1992. Report of the RCMNS working group on fossil mammals, Reisensburg 1990.—Newsletters on Stratigraphy 26:65–118.

Dashzeveg, D. 1996. Some carnivorous mammals from the Paleogene of the eastern Gobi Desert, Mongolia, and the application of Oligocene carnivores to stratigraphic correlation.—American Museum Novitates 3179:1–14.

Dehm, R. 1950. Die Raubtiere aus dem Mittel-Miocän (Burdigalium) von Wintershof-West bei Eichstätt in Bayern.—Abhandlungen der Bayerischen Akademie der Wissenschaften Mathematisch-naturwissenschaftliche Klasse, Neue Folge 58: 1–141.

Didenko-Kislitsina, L. K. 1990. Geologicheskoye razvitiye yugo-vostochnovo Kazakhstana v Kainozoye [Geological development of southeastern Kazakstan during the Cenozoic]. Akademiya Nauk Kazakhskoy SSR, Institut Gidrogeologii i Gidrofiziki, Almaty, 49 pp.

Emry, R. J., S. G. Lucas, & B. U. Bayshashov. 1997. Brontothere bone bed in the Eocene of eastern Kazakstan.—Journal of Vertebrate Paleontology 17 (supplement to no. 3):44A.

Erbayeva, M. A. 1982. Kainozoiskie zaitseobraznye Kazakstana [Cenozoic lagomorphs of Kazakstan].—Materialy po Istorii Fauny i Flory Kazakhstana 8:25–38.

Fischer, G. 1817. Adversaria zoologica.—Mémoires de la Société Impériale des Naturalistes de Moscou 5:357–472.

Gabuniya, L. K. 1964. Benarskaya fauna oligotsenovykh pozvonochnykh [Benara fauna of Oligocene vertebrates]. Izdatelstvo "Metsniereba," Tbilisi, 266 pp.

Lucas, S. G., & B. U. Bayshashov. 1996. The giant rhinoceros *Paraceratherium* from the late Oligocene at Aktau Mountain, southeastern Kazakhstan, and its biochronological significance.—Neues Jahrbuch für Geologie und Paläontologie, Monatshefte 1996:539–548.

———, R. J. Emry, & B. U. Bayshashov. 1997. Eocene Perissodactyla from the Shinzhaly River, eastern Kazakhstan.—Journal of Vertebrate Paleontology 17:235–246.

———, E. G. Kordikova, & R. J. Emry. 1998. Oligocene stratigraphy, sequence stratigraphy and mammalian biochronology north of the Aral Sea, western Kazakhstan.—Bulletin of the Carnegie Museum of Natural History 34:313–348.

Lychev, G. F. 1982. Novyye nakhodki bobrovikh v Pavlodarskoi i Semipalatinskoi oblastyakh [New finds of beavers in the Pavlodar and Semipalatinsk Districts].—Materialy po Istorii Fauny i Flory Kazakhstana 8:39–49.

———. 1987. Novyye svedeniya o vymershikh bobrovykh Prizaysanya i sopredelnovo Sintsizyanya [New data on extinct beavers from Prizaysan and adjacent Xinjiang].—Materialy po Istorii Fauny i Flory Kazakhstana 9:69–81.

———, & P. A. Aubekerova. 1971. Iskopayemyye bobry Kazakhstana [Fossil beavers of Kazakhstan].—Materialy po Istorii Fauny i Flory Kazakhstana 5:12–33.

Matthew, W. D., & W. Granger. 1924. New Carnivora from the Tertiary of Mongolia.—American Museum Novitates 104:1–9.

Mein, P. 1989. Updating of MN zones. Pp. 73–90 *in* E. H. Lindsay, V. Fahlbusch & P. Mein, eds., European Neogene mammal chronology. Plenum Press, New York.

Mellett, J. S. 1968. The Oligocene Hsanda Gol Formation, Mongolia: A revised faunal list.—American Museum Novitates 2318:1–16.

Morlo, M. 1996. Carnivoren aus dem Unter-Miozän des Mainzer Beckens (2. Mustelida, Pinnipedia, Feliformia, *Palaeogale*).—Senckenbergiana Lethaea 76:193–249.

Musakulova, L. T. 1971. Myestonakhozhdeniye iskopayemykh tragulid v Kazakhstanye [Localities of fossil tragulids in Kazakhstan].—Materialy po Istorii Fauny i Flory Kazakhstana 5:52–56.

Qiu, Z., & Z. Qiu. 1995. Chronological sequence and subdivision of Chinese Neogene mammalian faunas.—Palaeoecology, Palaeogeography, Palaeoclimatology 116:41–70.

Russell, D. E., & R. Zhai. 1987. The Paleogene of

Asia: Mammals and stratigraphy.—Mémoires du Muséum National d'Histoire Naturelle, Sciences de la Terre 52:1–488.

Steininger, F. F., W. A. Berggren, D. V. Kent, R. L. Bernor, S. Sen, & J. Agusti. 1996. Circum-Mediterranean Neogene (Miocene and Pliocene) marine-continental chronologic correlations of European mammal units. Pp. 7–46 *in* R. L. Bernor, V. Fahlbusch, & H-W. Mittmann, eds., The evolution of western Eurasian Neogene mammal faunas. Columbia University Press, New York.

Tleuberdina, P. A., L. T. Abdrakhmanova, & B. U. Bayshashov. 1993. Rannemiotsyenovaya fauna mlyekopitayushikh Dzhungarskovo Alatau (G. Aktau) [Early Miocene mammalian fauna of the Dzhungarian Alatau (Aktau Mountain)].—Materialy po Istorii Fauny i Flory Kazakhstana 12: 92–115.

Tolochko, V. V., & P. A. Aubekerova, P. A. 1971. Eotsen-Pliotsenovyye otlozheniya sredney chasti basseyna r. Ayaguz [Eocene-Pliocene outcrops of the middle part of the Ayaguz River basin].—Geologiya i Poleznye Iskopayemyye Yuzhnovo Kazakstana, 4:154–160.

Werdelin, L. 1996. Carnivores, exclusive of Hyaenidae, from the later Miocene of Europe and western Asia. Pp. 271–289 *in* R. L. Bernor, V. Fahlbusch & H-W. Mittmann, eds., The evolution of western Eurasian Neogene mammal faunas. Columbia University Press, New York.

Wolsan, M. 1993. Phylogeny and classification of early European Mustelida (Mammalia: Carnivora).—Acta Theriologica 38:345–384.