

# A NEW SPECIES OF CHIMAEROID FISH FROM THE UPPER CRETACEOUS OF THE SARATOV REGION, RUSSIA

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**ABSTRACT.** *Amylodon karamysh* sp. nov. (Chondrichthyes, Holocephali, Chimaeridae) is described from the Early Campanian (Late Cretaceous) of the Saratov Region, Russia. It is based on a single mandibular plate with a relatively short outer margin and four small median tritons. The morphology of the mandibular plate of *A. karamysh* appears to have evolved from the condition in the chimaerid *Ischyodus*, which implies that the shearing-type dentitions of *Amylodon* and *Rhinochimaera* were probably of independent origin.

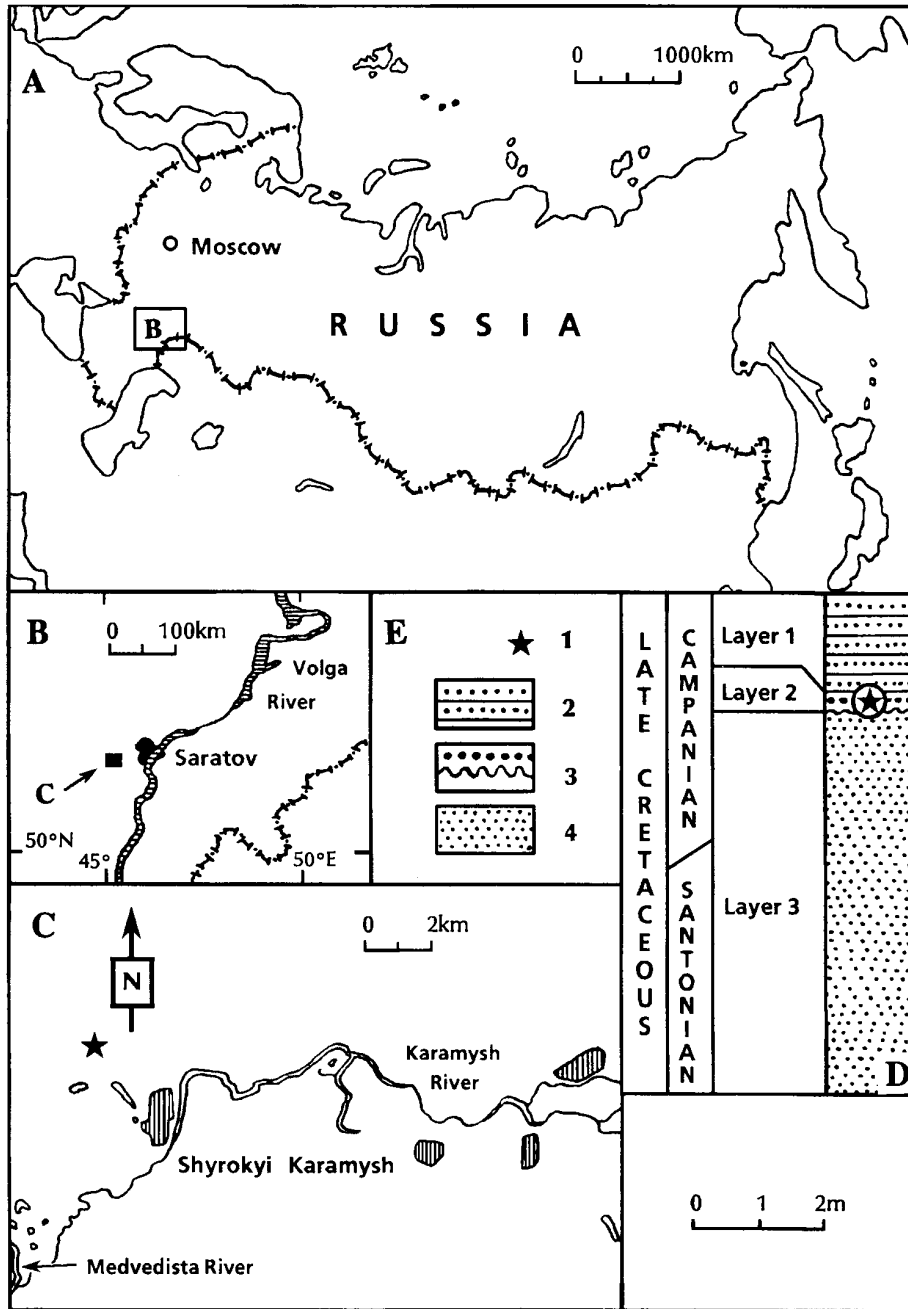
CHIMAEROID fish are a compact group of holocephalan chondrichthyans which now occur in the deep waters of all oceans. However, in the Mesozoic and early Cenozoic, they were widespread and abundant in continental seas and are represented in the fossil record most commonly by their dental plates. Chimaeroids have three pairs of dental plates: vomerine and palatine plates in the upper jaws, and mandibular plates in the lower jaws. Each dental plate consists of a mass of acellular bone in which are set several structures composed of pleromin – the dental tritons. The tritons exposed along the occlusal margin are usually composed of laminated plates of massive pleromin, while those on the lingual surface tend to be elongate parallel columns of vascular pleromin. These vascular tritons occupy most of the lingual surfaces in primitive chimaeroids (*Ischyodus*, *Edaphodon*, *Elasmodus*) and are adapted for crushing. In more derived forms, however, such as *Elasmodectes*, *Amylodon* and *Rhinochimaera*, the vascular lingual tritons are greatly reduced in size or are absent, whereas the occlusal tritons may become more prominent. This type of dentition is associated with a shearing bite. In the following account, the terminology and orientation of chimaeroid dental plates follows the usage of Ward and Grande (1991).

Over the last century, our knowledge of Cretaceous chimaeroids from the territory of the former Russian Empire and USSR has increased greatly. During the nineteenth century, only one genus (*Ischyodus*) was reported from the Cretaceous of Russia (Rogovich 1860; Sinzov 1872). In the most recent published review, seven chimaeroid genera were recorded in Cretaceous vertebrate faunas of the USSR by Glickman *et al.* (1987). These comprised *Ischyodus*, *Edaphodon*, *Elasmodectes*, *Ganodus*, *Chimaera*, a probable callorhynchid (*Callorhynchus* or a new genus), and a rhinochimaerid (*Rhinochimaera*, determined from an egg-capsule, plus a dentition from an undescribed, possibly new, genus). A further chimaeroid genus, *Amylodon*, is reported here for the first time from the Cretaceous of Russia. This genus was known previously only from the Palaeogene of Belgium and England.

## GEOLOGICAL BACKGROUND

The specimen described here comes from the Campanian (Upper Cretaceous) deposits near the village of Shyrokyi Karamysh (51° 21' 3" N, 45° 2' 7" E) in the Saratov Region (Text-fig. 1). The locality is a poor exposure in a ravine. It consists of three beds (Text-fig. 1).

(1) A coarse quartz glauconitic sand, about 6 m thick, containing the bivalve *Syniclonema laeve* (Nilsson), a shark coprolite and teeth and bone fragments of plesiosaurs.



TEXT-FIG. 1. Geographical maps and stratigraphical section of the Karamysh locality. A, map of Russia giving general position of the Saratov Region. B-C, progressive enlargements specifying the position of the locality within the Saratov Region. D, section at the locality. E, key to D. 1, productive horizon; 2, sandstone; 3, phosphatic conglomerate; 4, sand.

(2) A phosphatic conglomerate, up to 400 mm thick, with the bivalves *Monticola* cf. *vesicularis* (Lamarck), the holotype of *Amylodon karamysh* sp. nov., a fragment of a long beak and a mandibular plate of *Edaphodon* sp., several dental plates of *Ischyodus* cf. *bifurcatus* Case, numerous coprolites and shark teeth including *Cretolamna borealis* (Priem), *Pseudoisurus arcuatus* (Woodward), *Eostriatolamia* ex gr. *subulata* (Agassiz), *Pseudocorax laevis* (Leriche), teeth of the teleost fish family Enchodontidae, and the remains of polycotyloid and elasmosaurid plesiosaurs, and mosasaurs.

(3) A quartz glauconitic sandstone, about 1.5 m thick, with fragments of belemnite rostra. In a neighbouring exposure, also near Shyrokyy Karamysh, Bed 3 yields *Belemnitella mucronata* (Schlotheim), the abundant species in the lower part of the Upper Campanian (Bondareva and Morosov 1970). The molluscs from Bed 2 suggest a late Early Campanian age (E. M. Pervushov, pers. comm.). The shark fauna from Bed 2 is also characteristic of the Early Campanian, the same species occurring with *Belemnitella mucronata* in the Early Campanian phosphatic chalks in the Paris Basin (Priem 1897).

#### SYSTEMATIC PALAEOLOGY

Class HOLOCEPHALI Bonaparte, 1832  
 Order CHIMAERIFORMES Buen, 1926  
 Suborder CHIMAEROIDEI Patterson, 1965  
 Family CHIMAERIDAE Rafinesque, 1815  
 Genus AMYLODON Storms, 1895

*Type species.* *Amylodon delheidi* Storms, 1895, from the Rupelian of Belgium.

*Diagnosis.* Dentition of shearing type. Tritors on the dental plates are very reduced in number and size. On the mandibular dental plate, the median tritor is represented by a few short stripes of vascular pleromin or is absent. The outer margin of the mandibular dental plate is straight.

*Amylodon karamysh* sp. nov.

Text-figure 2

*Derivation of name.* The species is named after the River Karamysh, close to the type locality.

*Holotype.* N 154/109, a left mandibular dental plate, in the collections of the Department of Palaeontology, Saratov State University.

*Locality and horizon.* Shyrokyy Karamysh village, Lysogorsk District, Saratov Region, Russia; latest Early Campanian, Upper Cretaceous.

*Diagnosis.* Large *Amylodon* with mandibular dental plate having a relatively short outer margin (63 per cent. of the total oblique length) and four minute longitudinal median tritors.

*Description.* The mandibular plate (Text-fig. 2) has a distinct beak and wide symphysis. As well as the four median tritors, there is one short stick-like anterior inner tritor on the tip of the beak and another similar tritor on the posterior margin of the plate near the end of the outer margin. The outer margin is somewhat damaged and, consequently, the structure of the outer tritors is unknown. Below the outer margin, the mandibular plate shows a slight thickening which forms a band along the margin. The oblique length of the mandibular plate (from beak tip to caudal extremity) is 104 mm. The angle between posterior and symphyisial margins of the mandibular plate is approximately 28°. The thickness of the dental plate is consistently 7–8 mm throughout its length.



TEXT-FIG. 2. *Amylodon karamysh* sp. nov. SSU N.154/104, holotype left mandibular plate; Lower Campanian, Upper Cretaceous; Shyrokhi Karamysh, Saratov Region, Russia. A, medial; B, occlusal; C, lateral views. Scale bar represents 10 mm.

*Systematic position.* The mandibular dental plate is assigned to the genus *Amylodon* because it has extremely reduced tritors (contra *Ischyodus*, *Edaphodon*, *Elasmodus*, *Pachymylus*, *Brachymylus*, *Callorhynchus*, *Chimaera* and *Harriota*), a straight outer margin (contra *Elasmodectes*), and an upwardly elevated beak (contra *Rhinochimaera*).

*A. karamysh* differs from the type species, *A. delheidi* Storms, 1895 from the Oligocene (Rupelian) of Belgium, in that the former possesses four small median tritors on the mandibular plate, together with a short outer margin. Mandibular dental plates have not been described for *A. eocenica* Woodward and White, 1930, and *A. venablesae* Casier, 1966, from the Eocene (Ypresian) of England (Woodward and White 1930; Ward 1973). However, they resemble those of *A. delheidi* in being mesiodistally narrower; larger specimens have a rounded post-occlusal/basal margin similar to that of *A. karamysh*; and there is no median tritor (David Ward, pers. comm.). A Bartonian mandibular plate assigned to *Amylodon eocenica* by Woodward and White (1930), but removed from that species by Ward (1973) and referred to as '*Amylodon* sp.', differs from the above in possessing a large undivided median tritor and in the shape and position of the anterior inner tritor.

## DISCUSSION

*Amylodon delheidi* was established on the basis of a single mandibular plate of shearing type without tritons on the occlusal surface (Storms 1895, pl. 4, figs 11–12). Woodward and White (1930) considered their Early Tertiary '*Chimaera*' *eocenica* to be an intermediate form between Mesozoic chimaeroids with crushing dentitions and the derived Oligocene *Amylodon* and Recent *Rhinochimaera* with purely shearing dentition. The two genera have been assumed to be closely related and both Obruchev (1964) and Ward (1973) have classified *Amylodon* as a rhinochimaeroid. However, the dentition of the Recent *Rhinochimaera pacifica* Mitsukuri (Garman 1904, pl. 8, figs 1–2; Tadashi and Garrick 1979, fig. 1B) differs from that of *Amylodon*. In particular, the beak of the mandibular plate of *Rhinochimaera* is curved downwards and inwards below the vomerine plates, or is straight (Garman 1904, p. 225), whereas it is elevated upwards in *Amylodon*. This suggests that the shearing dentition was derived independently in *Amylodon* and *Rhinochimaera*. *Amylodon* has the same distribution of tritons on the dental plates as the Cretaceous *Ischyodus* and may have evolved from that genus.

There is a trend of increase in the relative length of the outer margin of the mandibular dental plate in *Amylodon* species from the Cretaceous to the Oligocene. In *A. karamysh* (Campanian), the outer margin is 63 per cent. of the oblique length of the mandibular plate; in Ward's *Amylodon* sp. (Bartonian) it is 74 per cent., and in *A. delheidi* (Rupelian) it is 77 per cent. This trend presumably reflects increasing shearing capability in the dentition of this phylogenetic lineage.

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