



A new species of squalid shark from the Lower Paleocene of the Saratov Province, Russia (Chondrichthyes: Squalidae)

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Centrophoroides volgensis sp. n. from the Lower Paleocene (Danian) deposits near Lysye Gory village in Saratov Prov. (Russia) is described. It is characterized by the relatively large size of teeth, relatively high main cusp and widened basement of the apron on tooth crowns.

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Introduction

Only a few localities in the world yield elasmobranchian remains of the earliest Cenozoic (Early Paleocene, Danian) age as a great sea level regression occurred in that time during which the marine sediments usually were not deposited in the Recent outlines of the continents. Elasmobranchians of the Danian age are known from Denmark and Southern Sweden (Davis, 1890; Siverson, 1995), Belgium (Herman, 1977), Greenland (Bendix-Almgren, 1969), Maryland (USA) (Ward & Wiest, 1990), Crimea (Ukraine), Mangyshlak Peninsula (Turkmenistan), and Saratov Prov. (Russia) (Glickman, 1980). In a small collection of elasmobranchian teeth ($n = 211$) from the Danian deposits in vicinity of Lysye Gory village in Saratov Prov. remains of *Carcharias* sp. predominated (85%), but teeth of *Notidanodon loozi* (Vincent, 1876) (Glickman, 1964, pl. 5, fig. 22), *Scyliorhinus* sp., *Eychlaodus lundgreni* (Davis, 1890) (Glickman, 1957, fig. 16), *Synechodus* sp., and *Otodus* sp. (Glickman, 1980) were also found. The locality yielding these remains has disappeared now, which makes the preserved collection unique. The teeth of a squalid shark from this sample are attributed to a new species of the genus *Centrophoroides* described below. The material is deposited in

the paleoichthyological collection of the Zoological Institute, Russian Academy of Sciences (ZIN PC).

Order SQUALIFORMES

Family SQUALIDAE

Genus *Centrophoroides* Davis, 1887

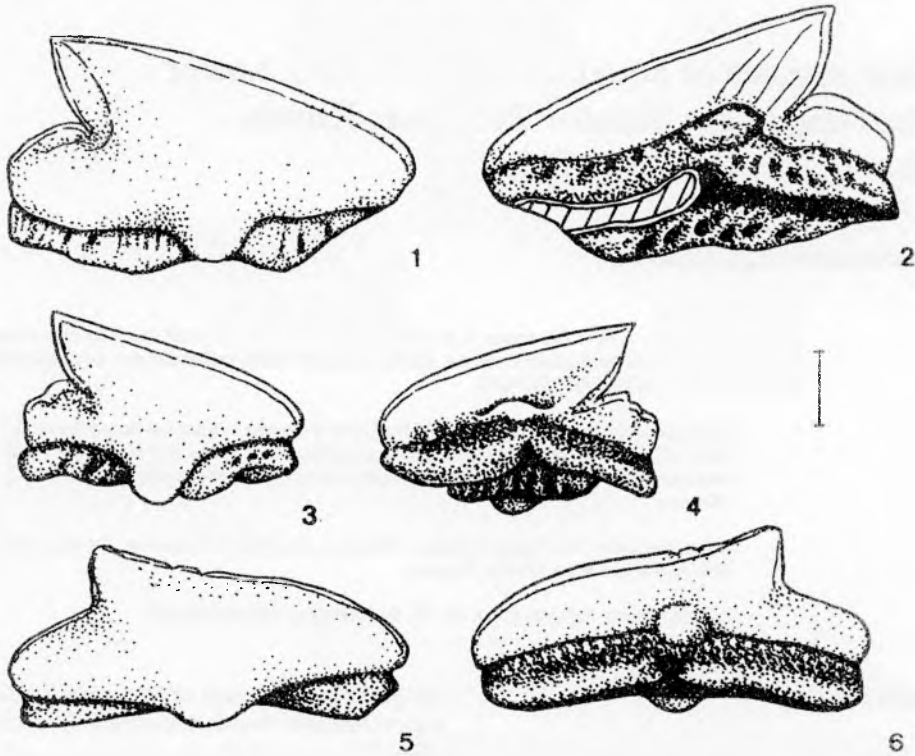
Centrophoroides volgensis sp. n. (Figs 1-6)

Squalus [sp.]: Glickman, 1980: 169.

Holotype. ZIN PC 1/1, lower(?) anterior tooth (Figs 3, 4), Russia, Saratov Prov., Lysye Gory, Lower Paleocene (Danian).

Paratypes. ZIN PC 2/1, lower posterior tooth (Figs 5, 6); ZIN PC 3/1, upper(?) tooth (Figs 1, 2). Locality and age as for holotype.

Description. Crown of teeth with rather straight, not serrated mesial cutting edge and pronounced notch at base of short cusp. Main cusp relatively high and its distal cutting edge long, forming angle less than or near to 90° with root longitudinal axis. Apron not much protruding, regularly decreasing in width from its base to apex. Uvula small and weakly marked, slightly hollowed in upper part. Lingual bulge conspicuous. Root relatively low, its basal face



Figs 1-6. *Centrophoroides volgensis* sp. n. 1, 2, paratype, ZIN PC 3/1, upper(?) tooth; 3, 4, holotype, ZIN PC 1/1, lower(?) anterior tooth; 5, 6, paratype, ZIN PC 2/1, lower posterior tooth. Scale: 1 mm.

concave in profile. Labial face of root with 2-3 axial foramina from each side of apron. Lingual side of root with 2-4 irregular axial foramina. Infundibulum not very large. Dental overlap from one file to the next weak.

Discussion. The new species differs from *C. latidens* Davis, 1887, the type and only previously described species of *Centrophoroides* (Upper Santonian of Lebanon: Cappetta, 1980), in the larger size of teeth, relatively high main cusp and more widened basement of the apron on tooth crowns.

The teeth of *C. volgensis* sp. n. are similar to those attributed to *Acanthias appendiculatus* Ag., 1843 from the Turonian and Campanian of Lithuania (Dalinkevičius, 1935) which may belong to *Centrophoroides* (Cappetta, 1987, p. 53), but differ in the relatively short apron better separated from the rest of the crown.

The new species differs from *Protosqualus sigei* Cappetta, 1977 from the Upper Albian of France (Cappetta, 1977), the type species of *Protosqualus* Cappetta, 1977, in the larger

teeth, relatively short basement of the apron, and wider main cusp which is nearly pin-shaped in *P. sigei*. In the same features of teeth and by more low tooth root *C. volgensis* sp. n. differs also from the Recent *Cirrhigaleus barbifer* Tanaka, 1912, the only species of this genus (Herman et al., 1989).

C. volgensis sp. n. differs from *Centrosqualus primaevus* (Pictet, 1850) from the Upper Santonian of Lebanon (Cappetta, 1980), the type species of *Centrosqualus* Signeux, 1950, in the considerably larger size, lower root of the teeth, and the shape of the apron which in *C. primaevus* is well separated from the rest of the crown and is widened at its extremity.

The squalid teeth from the Maestrichtian of Holland (Herman, 1977, pl. 5, fig. 6a-6k), originally attributed to *Centrosqualus appendiculatus* (Ag., 1843) and referred to the genus *Centrophoroides* by Cappetta (1987, p.53), may actually belong to *Centrosqualus* because of the structure of the dorsal fin spine found together with teeth (Herman, 1977, pl.

5, fig. 6l). This spine has a broad depression lacking enameloid on lateral face, which is characteristic of fin spines of *Centrosqualus* but not *Centrophoroides* (Cappetta, 1980, 1987). Additionally, the teeth attributed to *Centrosqualus appendiculatus* possess a long apron which sometimes show a widening at its extremity, another similarity with *Centrosqualus* distinguishing them from *Centrophoroides*. The same is true for teeth from the Campanian of Germany attributed to *Centrophoroides appendiculatus* (Müller & Schöllmann, 1989).

C. volgensis sp. n. differs from *Megasqualus orpiensis* (Winkler, 1874) from the Upper Paleocene – Lower Eocene of Europe and Kazakhstan (Herman, 1982), the type species of *Megasqualus* Herman, 1982, in the lesser size of teeth, presence of only 2–3 elliptical foramina on each side of the labial root face, relatively short apron, smaller infundibulum, and absence of vertical elliptical hollows separated by pillars along the lingual limit of the enameloid.

C. volgensis sp. n. differs from the species of *Squalus* L., 1758 (Campanian–Recent) (Bigelow & Schroeder, 1957; Ledoux, 1970, 1972; Merrett, 1973; Herman, 1982; Herman & al., 1989) in the structure of the apron of teeth, which in *Squalus* is usually longer and have parallel edges. Only teeth of *Squalus vundermarcki* Müller & Schöllmann, 1989 from the Campanian of Germany (Müller & Schöllmann, 1989) resemble *C. volgensis* sp. n. in short apron. The former species may belong to the genus *Centrophoroides*, it differs from the new species in the different height of anterior and posterior crown-root boundary seen from the labial tooth side.

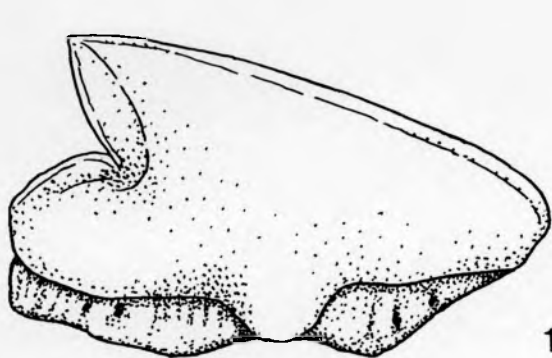
The new species clearly differs from the species of *Centrophorus* Müller & Henle, 1837 (Turonian–Recent), *Atractophorus* Gilchrist, 1922 (Recent), and *Deania* Jordan & Snyder, 1902 (Lower Miocene – Recent) in the low root of teeth.

Distribution. Turgai Sea, Early Paleocene.

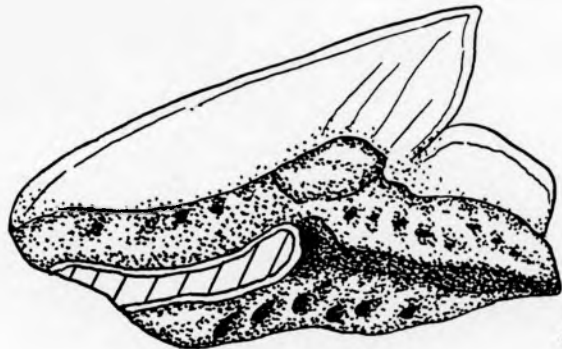
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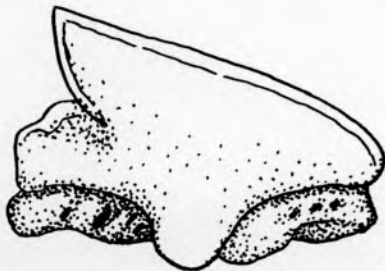
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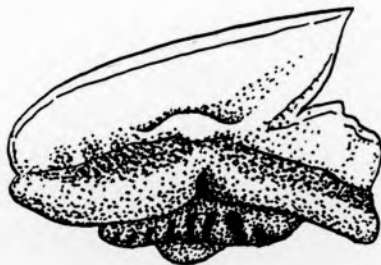
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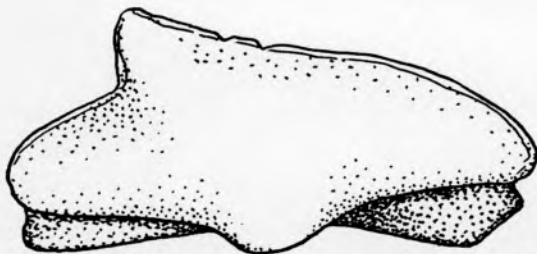
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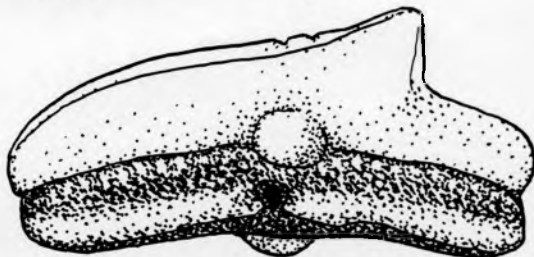
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