

A new genus of cutlassfish from the Upper Paleocene of Turkmenistan (Scombroidei: Trichiuroidea)

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A new genus and species of Trichiuroidea, *Argestichthys vysotzkyi* gen. et sp. n., is described from the Upper Paleocene (middle part of Danata Formation) of Turkmenistan. This genus is characterised by several unique derived characters in the structure of body lateral-line system, axial skeleton and jaw dentition, and similar to the Trichiuridae in several advanced characters (single supernumerary spine on first anal pterygiophore, extremely reduced supraoccipital crest, and presence of a pair of anteriorly directed canines on premaxillary). Many primitive characters of the new genus (body shape, low number of vertebrae, structure of suspensorium, opercular series, unpaired fin girdles, etc.) do not occur in the Trichiuridae, but are shared by the new genus with Gempylidae. The new genus also resembles the gempylid *Ruvettus* in the abdominal position of the first two anal pterygiophores. Therefore, *Argestichthys* is placed in Trichiuroidea *incertae sedis*.

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Cutlassfishes and snake mackerels (superfamily Trichiuroidea) are a widely distributed group of oceanic fishes inhabiting depths from 0 to 2000 m and known in fossils since terminal Upper Paleocene. Most fossil species are known since Eocene (Berg, 1955), but the earliest representative of trichiuroids, previously reported as Gempylidae gen. et sp. indet. (Bannikov, 1993), has been recently discovered in the terminal Upper Paleocene (middle part of Danata Formation) of Turkmenistan. Unfortunately, this taxon is represented by fragmentary material only, but a number of characters observed indicate that it is strikingly different from all known members of the superfamily. In the present paper, the "gempylids" from the Upper Paleocene of Turkmenistan are described as a new genus and species, *Argestichthys vysotzkyi*, of the Trichiuroidea *incertae sedis*.

The material examined is deposited at Palaeontological Institute (PIN), Moscow.

Superfamily TRICHIUROIDEA

Family ?

Genus *Argestichthys* gen. n.

Type-species *Argestichthys vysotzkyi* sp. n.

Diagnosis. Trichiuroid fishes characterised by the following unique derived features: (1) body

lateral-line system consists of two closely spaced parallel mediadorsal lines, first of which originates from nape and second one, under 11th dorsal-fin spine; (2) first haemal spine bears a proximal plate-like expansion; (3) most (if not all) jaw teeth not fixed. Other distinguishing features in combination: body relatively deep and short; trunk vertebrae about 15, posterior five of which with elongated, vertically oriented parapophyses; a pair of anteriorly directed symphyseal canines on premaxillary; sclerotic ring present; ectopterygoid not in contact with metapterygoid; supraoccipital crest extremely reduced; opercular bones without spination on posterior and ventral borders; coracoid without posteroventral plate; basipterygium large and dorsally inclined, with posterior process short; pelvics well developed, positioned under endings of ventral postcleithra; no dagger-like anal spines; first anal pterygiophore with single spine in supernumerary association; first two anal pterygiophores positioned anterior to first haemal spine and extend to last pair of pleural ribs; only 3rd and 4th anal pterygiophores articulate with corresponding haemal spines; and scales on body well developed.

Included species. Monotypic genus.

Comparison. This new genus is strikingly distinguished from all known trichiuroids. Several derived characters (single supernumerary spine on first anal pterygiophore, extremely reduced supraoccipital crest, and presence of a pair of

anteriorly directed canines on premaxillary) indicate close relationships of *Argestichthys* with Trichiuridae, but many primitive features shared by the new genus and Gempylidae are not found in trichiurids (see Relationships), therefore I consider *Argestichthys* as *Trichiuroidea incertae sedis*.

Etymology. The generic name is formed from Greek words *argestes* (south-west wind) and *ichthys* (fish).

***Argestichthys vysotzkyi* sp. n.**
(Figs 1-6)

Holotype. PIN, no. 4782/94, incomplete skeleton, SW Turkmenistan, 2 km NE of Uylya-Kushlyuk village, Upper Paleocene, middle part of Danata Formation.

Paratypes. PIN, no. 4782/95-98, incomplete skeletons of 4 specimens from the type locality.

Additional material. PIN, no. 4782/99-101, incomplete skeletons of 3 poorly preserved specimens from the type locality.

Description. Body fusiform, moderately elongate (body depth subequal to 2/3 of head length); dorsal contour of body smoothly convex (Fig. 1). Head moderately long, without distinct curvature of dorsal profile. Orbit round, its diameter subequal to 1/3 of head length. Mouth gape moderately large, extends to posterior third of orbit. Limits of individual bones of neurocranium not clear, but frontals apparently narrow, moderately expanded posteriorly and nearly smooth, and sphenotic relatively large and bearing lateral crests. Supraoccipital crest very short and low. Nasals elongate, tube-like. Sclerotic ring present. Parasphenoid thin, straight, exposed close to middle of orbit.

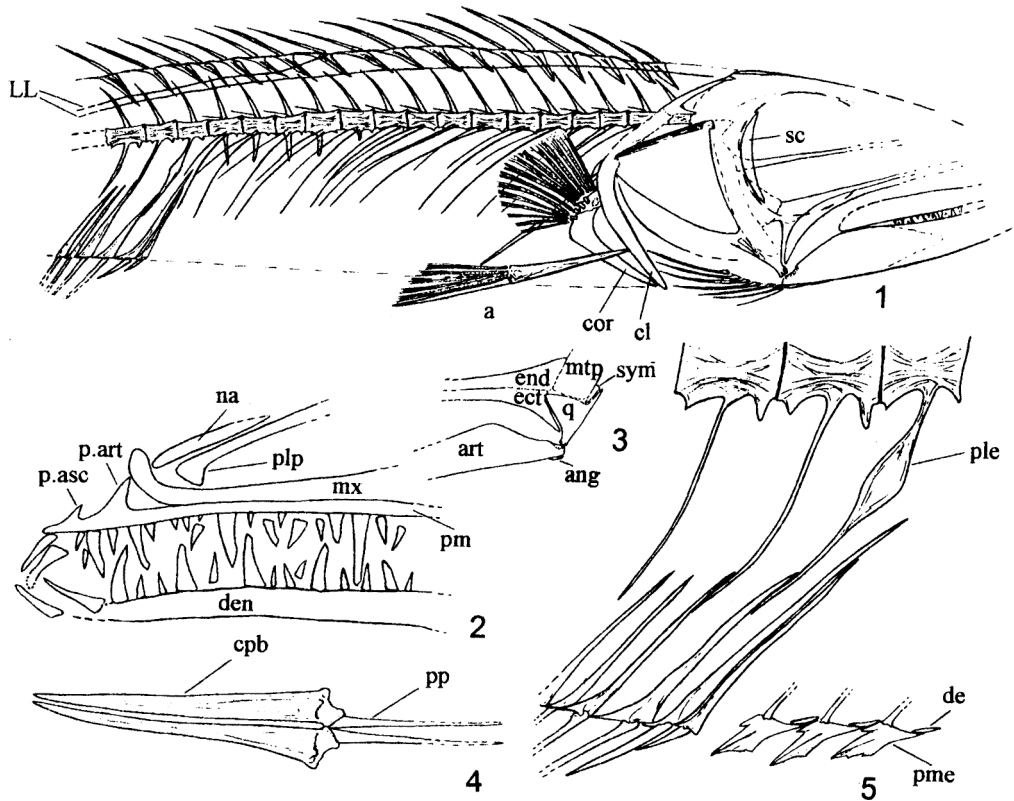
Jaw bones relatively narrow and long (Fig. 2). Lower jaw articulation situated under posterior third of orbit or nearly so. Dentary smoothly expands distally, divided into dorsal and ventral arms posteriorly; large fossa between arms accepts anterior process of articular. Articular firmly attached to dentary, without interosseous space between these bones. Posterior process of articular long and possesses well-developed articular face for quadrate. Ventral to process, small angular present. Premaxillary with small, shortened ascending process and relatively larger dorsal (articular) process. Maxillary only slightly expands posteriorly, with strong, rounded head. Supramaxillary unknown. Jaw dentition consists of variable-sized fangs and small conical teeth. All jaw teeth lack serrations, but most fangs broadened at tips and possibly barbed. Pair of small, anteriorly directed canines present on premaxillary symphysis. Most (if not all) teeth on jaws not fixed.

Suspensorium nearly vertical (anterior inclination of hyomandibular in specimen nr. 4782/

97 is result of postmortal distortion). Both endo- and ectopterygoids narrow and long, the latter not in contact with plate-like metapterygoid (Fig. 3). Quadrate imperfectly preserved, triangular, bearing transverse articular facet for lower jaw. Shaft of hyomandibular long, slender, oriented nearly vertically. Ventral end of hyomandibular shaft removed from posterior end of quadrate. Opercle quadrilateral; its dorsal margin distinctly thickened and tapers posteriorly to a point. Subopercle flat, triangular. Posterior and ventral margins of opercle and subopercle probably smooth; preopercle and interopercle imperfectly preserved. Gill rakers thin and long. Seven branchiostegal rays.

Posttemporal possesses elongate dorsal articular process and well developed anteroventral process. Supracleithrum and cleithrum narrow. Coracoid lacks posteroventral plate. Four pectoral bony radials present. Two postcleithra, of which dorsal one small and narrow. Ventral postcleithrum strong, very long, rib-like, extends nearly to ventral margin of body. Pectoral fin large, consists of about 14-16 rays. Basipterygium (Fig. 4) well developed, narrow and long, located under pectoral girdle, dorsally inclined and extending anteriorly between cleithrum and coracoid, not fused in midline. Posterior process of basipterygium shorter than central part. No scale-like element in pelvic fin. Pelvic fin well developed, with strong spine and 5 branched rays, positioned well posterior to pectoral-fin origin (under endings of ventral postcleithra). Pelvic-fin length nearly equal to length of five vertebrae.

Dorsal fin originates above opercle and at least in anterior half of body consists of thin, moderately long spines. Number of dorsal-fin spines and its pterygiophores equal to number of interneural spaces. First dorsal spine half as long as second; remaining spines only slightly gradually increasing in length, at least in anterior portion of fin. Pterygiophores supporting dorsal-fin spines composed of large, expanded proximal-middle element and small, elongate distal element, which articulate by extensive overlapping. Dorsal-fin spine articulates with proximal-middle element closer to distal element of preceding pterygiophore than to that of maternal one (Fig. 5). First anal-fin spine about as long as 1/4 of the second; the latter half as long as subsequent rays. First two anal pterygiophores situated anterior to first haemal spine, inclined anteriorly and extending to last pair of pleural ribs; second one the longest (Fig. 6). First anal pterygiophore with a single spine, which is in supernumerary association. Third and fourth anal pterygiophores articulate with first and second haemal spines, respectively (possibly, were connected by liga-



Figs 1-4. *Argesticthys vysotzkyi* gen. et sp. n.: 1, reconstruction (based mostly on holotype 4782/94 and partially on paratypes nos. 4782/95, 96); 2, jaws (based on paratype no. 4782/97, juvenile); 3, articular and part of suspensorium (based on paratypes nos. 4782/96, 97); 4, basipterygium (based on holotype and paratypes nos. 4782/95, 96); 5, dorsal-fin pterygiophores and spines (based on holotype); 6, anterior haemal spines and anal pterygiophores (based on paratypes nos. 4782/95, 98). Abbreviations: *ang*, angular; *art*, articular; *cl*, cleithrum; *cor*, coracoideum; *cpb*, central part of basipterygium; *de*, distal element of dorsal-fin pterygiophore; *den*, dentale; *ect*, ectopterygoideum; *end*, endopterygoideum; *LL*, body lateral lines; *mtp*, metapterygoideum; *mx*, maxillare; *na*, nasale; *p.art*, processus articularis premaxillae; *p.asc*, processus ascendens premaxillae; *ple*, plate-like expansion of first haemal spine; *plp*, palatal process of ethmoid; *pm*, premaxillare; *pme*, proximal-middle element of dorsal-fin pterygiophore; *pp*, posterior process of basipterygium; *q*, quadratum; *sc*, sclerotica; *sym*, symplecticum.

ments); shafts of remaining anal pterygiophores not articulated with corresponding haemal spines, two in each interhaemal space at least in anterior part of fin.

Vertebrae elongate cylindrical (1.5-1.7 times as long as deep), bearing longitudinal crests. There are about 15 trunk vertebrae. Number of caudal vertebrae unknown, but possibly low, judging by relatively deep and shortened body. Last five trunk vertebrae with narrow, spine-like parapophyses gradually increasing in length posteriorly; posterior ones slightly longer than height of vertebra. Dorsal zygapophyses longitudinally oriented, ventral ones nearly perpendicular to longitudinal axis of vertebra. Pleural ribs thin, moderately long, strongly inclined

posteriorly. Both epineurals and epicentrals present in abdominal region of vertebral column. Epineurals strongly depressed, nearly parallel to vertebral column. First haemal spine with proximal rhomboidal plate-like expansion.

Scalation well developed but rather imperfectly preserved. Two mediodorsal body lateral lines present, lower of which originates from nape and is almost straight. Upper lateral-line canal originates under eleventh dorsal-fin spine; its origin positioned close to dorsal contour of body, anteriorly lowers on short distance and further runs parallel to lower lateral line. No traces of other lateral line canals on body.

Etymology. The species is named in memory of Soviet poet V.S. Vysotzky (1938-1980).

Relationships

Among Trichiuroidea, *Argestichthys* possesses the following unique derived characters, which support its generic status: unique pattern of body lateral-line system, first haemal spine bears proximal plate-like expansion, and most (if not all) jaw teeth not fixed. Presence of proximal plate-like expansion on first haemal spine is not found in any other Trichiuroidei, but occurs within Scombroidei in the family Scombridae. In Scombridae, the degree of expansion and curvature of this plate indicate phylogenetic advancement (Bannikov, 1985). Since other synapomorphies between Scombridae and *Argestichthys* are not known, I consider this character to be independently derived in both groups. Other derived characters of *Argestichthys*, occurring in other members of Trichiuroidea, are: first two anal pterygiophores positioned anterior to first haemal spine and extending to last pair of pleural ribs; 3rd and 4th anal pterygiophores articulate with corresponding haemal spines; presence of a pair of anteriorly directed symphyseal canines on premaxillary; supraoccipital crest extremely reduced, and first anal pterygiophore with single supernumerary spine.

Among Scombroidei, the only other genera having anal pterygiophore(s) abdominal in position and located anterior to first haemal spine are the gempylid *Ruvettus* (pers. observ.) and the trichiurid *Benthodesmus* (Gago, 1998). However, in *Benthodesmus* only first anal-fin pterygiophore is in abdominal position, while in *Argestichthys* both first and second. *Ruvettus* has two anterior pterygiophores in abdominal position, but contrary to the Paleocene genus its shafts are equidimensional, while in *Argestichthys* the second one is distinctly longer. This character is considered to be possibly homoplastic and independently derived at least in *Benthodesmus*. In Gempylidae, shafts of anal pterygiophores are not articulated with corresponding haemal spines and at least two in each interhaemal space, while in Trichiuridae the number of haemal spines and anal pterygiophores is equal and all anal pterygiophores are attached to haemals. *Argestichthys* occupies intermediate position between them (only first two haemal spines articulate with corresponding pterygiophore shafts).

Argestichthys strongly resembles trichiurids in combination of the following characters advanced for Trichiuridae (Gago, 1998): presence of a pair of anteriorly directed symphyseal canines on premaxillary, supraoccipital crest extremely reduced, and first anal pterygiophore with a single supernumerary spine. Among the Trichiuridae, a pair of anteriorly directed small canines on premaxillary is present in *Leptur-*

acanthus, *Eupleurogrammus*, *Tentoriceps* and *Trichiurus*, all of which included in a monophyletic lineage by Gago (1998, fig. 4). Most of Gempylidae have moderately high supraoccipital crest, while in Trichiuridae the supraoccipital crest is a small, thin ridge, low on cranium (except *Assurger*, *Evoxymetopon*, *Tentoriceps*, *Trichiurus* and *Lepidopus altifrons*, in which it is relatively high). The presence of an extremely reduced supraoccipital crest in *Argestichthys* indicates its relatively advanced status. The presence of a single supernumerary spine on first anal pterygiophore is an advanced character of *Tentoriceps*, *Lepturacanthus*, *Eupleurogrammus* and *Trichiurus* (Gago, 1998, p. 57). In these genera and *Argestichthys*, also the first anal-fin spine is narrowed (not dagger-like), which indicates relatively advanced status (Bannikov & Parin, 1995, p. 730 noted the presence of dagger-like anal spine as plesiomorphic state for Trichiuridae).

However, *Argestichthys* is characterised by several plesiomorphic characters occurring in Gempylidae: body relatively deep and short in adults; presence of sclerotic ring; ectopterygoid not in contact with metapterygoid; opercular bones without spination on posterior and ventral borders; coracoid without posteroventral plate; well developed, dorsally inclined basipterygium with posterior process short and pelvic fins well developed, relatively posterior in position; well developed scale cover. Although total vertebral count of *Argestichthys* is not known, its body form strongly suggests that the number of vertebrae in the Paleocene genus was close to minimum for trichiuroids and primitive gempylids (e.g., *Nesiarchus*, which, according to Tucker, 1956, p. 123, seems to stand very close to primitive Trichiuridae). Similarities between *Argestichthys* and Gempylidae are based only on plesiomorphic characters, which give little reasons for inclusion of *Argestichthys* in Gempylidae. The Paleocene genus has several characters indicating its phylogenetic relationship with Trichiuridae, but the absence of many derived characters of Trichiuridae discussed by Gago (1998) prevents inclusion of *Argestichthys* in Trichiuridae. Therefore, I consider *Argestichthys* as Trichiuroidea *incertae sedis*. Among trichiurids, *Argestichthys* possesses several derived characters of monophyletic lineage including *Lepturacanthus*, *Eupleurogrammus*, *Tentoriceps* and *Trichiurus*, and further investigations based on more complete material possibly will indicate close relationships of *Argestichthys* to this lineage. On the other hand, the presence of anterior two anal pterygiophores in abdominal position is a derived character of *Argestichthys* similar to that of *Ruvettus*, but no other synapomorphies between these genera are found. This mosaic pat-

tern of primitive and derived characters in *Argestichthys* probably suggests its proximity to the generalised ancestor of Trichiuridae.

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