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A New Genus *Uralosphinctes* (Virgatitidae, Ammonoidea) from the Kimmeridgian Stage of the Subpolar Urals and Western Siberia

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Abstract—A new ammonite genus *Uralosphinctes* (Virgatitidae), endemic to the Subpolar Urals and Western Siberia, is established. It differs from the closely related and coeval genus *Sarmatisphinctes* in a simple aperture in the microconchs and high ribbing coefficient in the terminal body chamber of the macroconchs. Microconchs of *Uralosphinctes* are also characterized by very variable ornamentation. Different specimens show variable rib density, strength, and ribbing coefficient.

Keywords: Upper Jurassic, Arctic, stratigraphy, ammonites

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INTRODUCTION

Virgatitidae are a Late Jurassic ammonite family, with a limited range and a comparatively short duration of existence (Rogov, 2021). The high rate of evolution and diverse ornamentation of Virgatitidae have long attracted the attention of researchers, and they were used since the mid-19th century as marker taxa for the Volgian Stage for European Russia (and later as index taxa of zones, subzones, and biohorizons). To the east of the Urals, virgatitids have frequently been reported from Volgian deposits (e.g., Bulynnikova and Yasovich, 1972; Poplavskaya and Lebedev, 1973; Mesezhnikov and Meledina, 1974; Yasovich and Poplavskaya, 1975), but these identifications were not subsequently confirmed, and the specimens were never illustrated.

Mesezhnikov (1973) described a species of ammonite from the terminal Kimmeridgian of the Subpolar Urals, originally assigned to the sub-Tethyan genus *Virgataxioceras* (*V. dividuum*). Until very recently (Rogov et al., 2025), this taxon was unknown outside the Subpolar Urals. Kutek and Zeiss (1997) proposed that Kimmeridgian virgatitids should be assigned to the genus *Sarmatisphinctes*, and provisionally assigned the species *V. dividuum* to this genus, as it is similar in the character of rib branching (based on the specimens illustrated by Mesezhnikov) to the type species *S. fallax*. Rogov (2021) also subsequently assigned this species to the genus *Sarmatisphinctes*. It should be noted that the species *dividuum* was not redescribed after its initial publication, and only recently were several additional finds from M.S. Mesezhnikov's collections illustrated (Rogov, 2021, Pl. 86, figs. 1, 3, 4). The species *dividuum* was proposed as the zonal index for the Upper Kimmeridgian (Mesezhnikov, 1973) and later came to be considered as the index of the upper subzone of the *Autissiodorensis* Zone (Mesezhnikov, 1984; Rogov, 2021).

MATERIAL

During the revision of the paleontological collections of the All-Russian Petroleum Research Geological Exploration Institute (VNIGRI), which are currently housed in the Aprelevka Branch of the All-Russian Research Geological Oil Institute (VNIGNI) (Aprelevka, collections 633 and RMA-65), 44 specimens of the species under consideration were discovered among the materials of M.S. Mesezhnikov, including specimens illustrated in the original description, as well as one macroconch specimen. All of them came from Bed 1 of Outcrop 28 on the Tolya River (Fig. 1; description of the section is given in: Zakharov and Mesezhnikov, 1974) and were part of the type series of *V. dividuum*, but with rare exceptions, these specimens were un-numbered. The whereabouts of the remaining specimens from the type series (Mesezhnikov indicated that he had about 60 specimens from three localities) are not known. Study of this representative collection made it possible to establish that the species *dividuum* differs significantly from representatives of the genus *Sarmatisphinctes* and should be

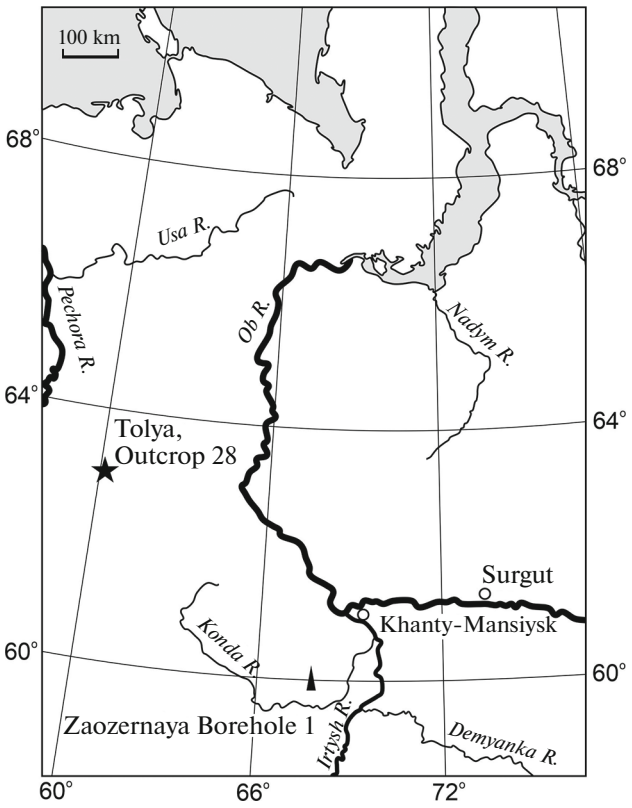


Fig. 1. Map showing the location of *Uralosphinctes* localities.

assigned to a new genus, the description of which is provided below. In addition to these specimens, a specimen from the core of the Zaozernaya-1 borehole was studied, although its species identification remains somewhat provisional, due to poor preservation.

SYSTEMATIC PALEONTOLOGY

Superfamily Perisphinctoidea Steinmann, 1890

Family Virgatitidae Spath, 1924

Genus *Uralosphinctes* Rogov, gen. nov.

Etymology. From the Ural Mountains.

Type species. *Virgataxioceras dividuum* Mesezhnikov, 1973.

Diagnosis. Shells of medium size (microconchs up to ~10 cm, macroconchs up to ~25 cm in diameter), compressed, discoidal, with a rounded venter. Whorl cross-section highly oval. Shell semievolute, umbilicus from moderately wide to wide. Ornamentation on inner whorls, up to approximately 3–4 cm in diameter, of radial biplicate ribs, as a rule frequent and fine, which divide approximately at midflank. In some specimens, shallow constrictions may be present (two to three per whorl). Later, single, triplicate, and intercalatory ribs appear; their furcation point shifts slightly higher. On terminal body chamber, ornamentation usually poorly ordered and with a combination of simple, biplicate, triplicate, and intercalatory ribs (in microconchs) or bundles of prorsiradiate ribs (three to four secondary ribs per primary rib plus several intercalatory ribs in macroconchs). Aperture simple, with a small, flared opening; sometimes accompanied by a constriction. Micro- and macroconchs retain prominent ornamentation to the end of the body chamber.

Composition: *U. dividuum* (Mesezhnikov, 1973) [m] (Pl. 6, figs. 1–10), and a macroconch represented by a single specimen, *Uralosphinctes* sp. [M] (Pl. 6, fig. 11); Upper Kimmeridgian Substage, *Autissiodorensis* Zone, *Dividuum* Subzone of the Subpolar Urals and Western Siberia.

Comparison. In the shell form and ontogeny of ornamentation, as well as the high degree of ornamentation variability, the new genus is close to *Sarmatisphinctes*, but differs from it in smaller size, as well as: (1) simple aperture in microconchs (in *Sarmatisphinctes*, the aperture of microconchs has lappets); (2) less regular ornamentation on the body chamber; (3) retention of a high ribbing coefficient on the terminal body chamber (TBC) of macroconchs. From the Early Volgian *Ilowaiskya* (which also have a simple aperture in microconchs), the new genus differs in the irregular ribbing on the TBC of microconchs and the high rib branching coefficient on the TBC of macroconchs.

Remarks. The similarity of the genus *Uralosphinctes* to *Sarmatisphinctes* in shell shape and changes in ornamentation during ontogeny, considering the stratigraphic distribution of these taxa, suggest that the former is a descendant of the latter. *Sarmatisphinctes* is known from the Upper Kimmeridgian of the Pechora Plate (sections on the Pizhma River). It is quite likely that the ancestors of *Uralosphinctes* entered the gulf of the West Siberian Sea, in the Subpolar Urals through a strait located in the Pay-Khoy region or slightly further south, but there is another possibil-

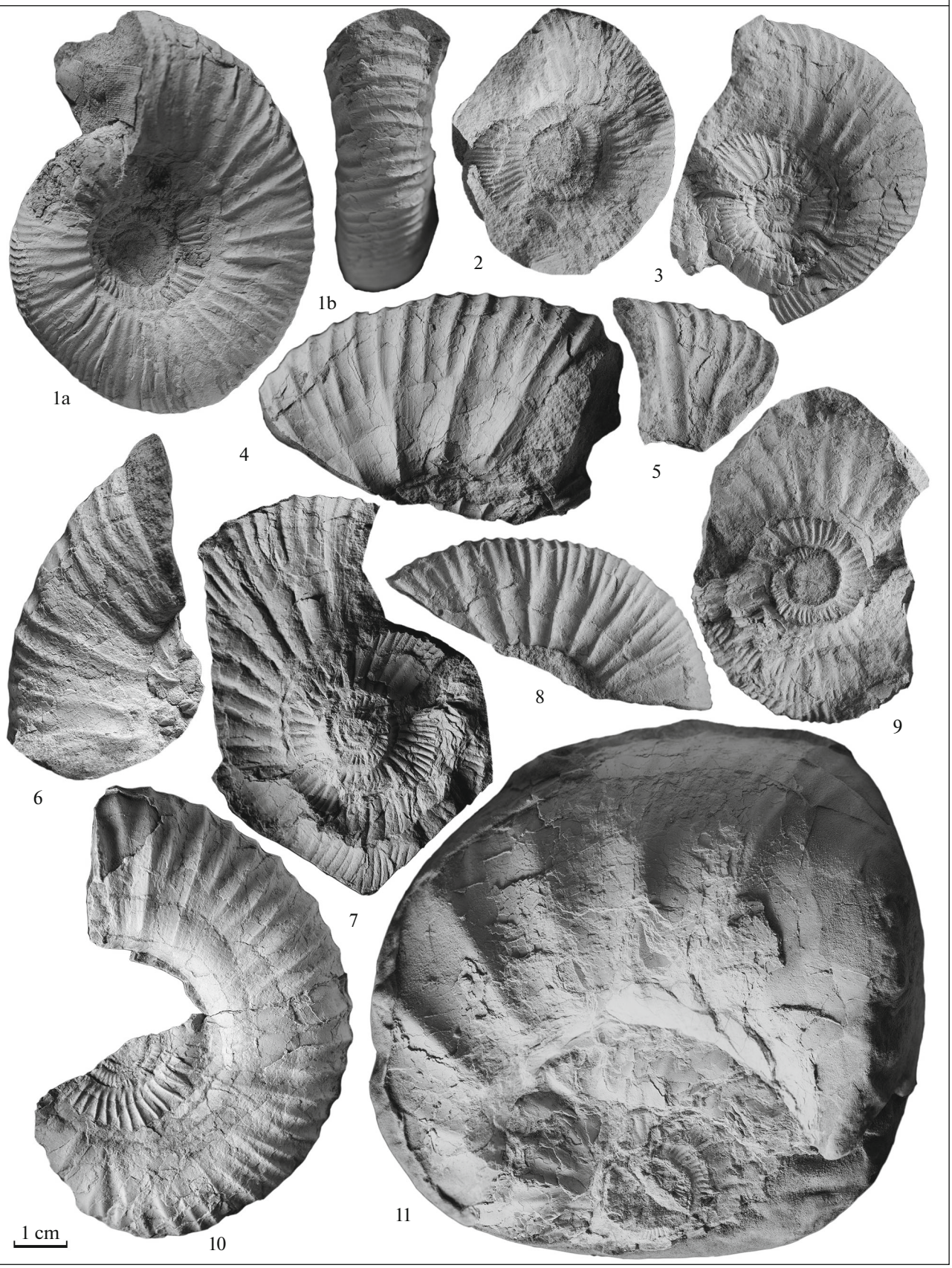
Explanation of Plate 6

All specimens come from the Upper Kimmeridgian (*Autissiodorensis* Zone, *Dividuum* Subzone), Bed 1 of Outcrop 28, Tolya River (Subpolar Urals) (collections of M.S. Mesezhnikov).

Figs. 1–10. *Uralosphinctes dividuum* (Mesezhnikov, 1973) [m]: (1) holotype 7511/633: (1a) lateral view, (1b) ventral view of the terminal body chamber; (2) specimen 7506/633, lateral view; (3) specimen 7502/633, lateral view; (4) specimen RMA-65/4, lateral view; (5) specimen RMA-65/10, lateral view; (6) specimen RMA-65/5, lateral view; (7) specimen RMA-65/6, lateral view; (8) specimen RMA-65/11, lateral view; (9) specimen 7505/633, lateral view; (10) specimen RMA-65/3, lateral view.

Fig. 11. *Uralosphinctes* sp. nov. [M], specimen RMA-65/12, lateral view.

Plate 6



ity that the Turgai Strait existed in the Late Kimmeridgian, and the new genus may have originated from a population of *Sarmatisphinctes* that entered Western Siberia from the south. Unfortunately, no ammonoids are found in the terminal Kimmeridgian (perhaps because of the erosion during the Volgian time?) in most of Western Siberia, so it is not yet possible to verify one of these hypotheses.

***Uralosphinctes dividuum* (Mesezhnikov, 1973) [m]**

Plate 6, figs. 1–10

Virgataxioceras dividuum Mesezhnikov, 1973, p. 78, pl. 25, figs. 2–5.

Sarmatisphinctes dividuum: Kutek and Zeiss, 1997, p. 145; Rogov, 2021, pl. 86, figs. 1, 3, 4.

"*Sarmatisphinctes*" cf. *dividuum*: Rogov et al., 2025, text-fig. 3.2.

Holotype. Specimen 7511/633 (in Mesezhnikov, 1973, the holotype number in the text and in the plate captions is given incorrectly); Tolya River, Outcrop 28, Bed 1; Upper Kimmeridgian Substage, *Autissiodorensis* Zone, *Dividuum* Subzone (re-illustrated here: Pl. 6, fig. 1).

Form. Shell of medium size (up to 7–10 cm in diameter), compressed, moderately evolute, with rounded ventral side. Whorl cross-section oval, flanks flattened. Umbilicus from moderately wide to wide, with a gently sloping umbilical wall. Umbilical width increases with age from 30–35% at 30–40 mm diameter to 38–42% at 70–80 mm diameter. The whorl cross-section of the inner whorls (Mesezhnikov, 1973, text-fig. 6) up to 30–35 mm diameter is rounded, becoming more elongate in height with age. The aperture is simple, with a small, flared opening (Pl. 6, figs. 1, 3, 5–7).

Ornamentation. The inner whorls possess thin radial biplicate ribs. Beginning at 3–4 cm diameter, triplicate, single, and intercalatory ribs appear. Shallow prorsiradiate constrictions may be present (as a rule, on the inner whorls, up to about 40 mm diameter), bounded posteriorly by a triplicate rib and anteriorly by a single rib. On the outer whorls, triplicate ribs predominate; biplicate and single ribs occur more rarely. On the terminal body chamber (TBC), the ribbing is most variable and may be represented by variously expressed biplicate, triplicate, single, and intercalatory ribs. The ribs remain radial at all growth stages, but on the TBC they sometimes are slightly prorsiradiate. The distance between ribs increases with age in most specimens, but some ammonites in the sample either have sparse ribbing starting from the inner whorls (Pl. 6 fig. 10; fig. 3) or, conversely, retain dense ribbing on the TBC (Pl. 6, fig. 2). Constrictions are narrow, indistinct, irregularly spaced; absent in many specimens. In some specimens, wide constrictions may also appear before the terminal aperture (Pl. 6, fig. 5) or at some distance before it (Pl. 6, figs. 1, 6).

Suture line (Fig. 2) resembles that of other early virgatitids (Ilovaisky and Florensky, 1941, text-fig. 19) and is characterized by an almost subradial direction on the outer part of the whorl, as well as narrow lobes and saddles (except for the relatively wide V and L lobes).

Dimensions in mm and ratios:

Specimen no.	W	H	D	Du	W/H	W/D	H/D	Du/D	Rp	R.c.
7505/633*	–	20.95	57.18	20.02	60	21.6	35.9	31.8	12*	~3.5
7505/633*		15.9	38.5						18	2
7502/633*		29	78						14*	3.42
7506/633*			48.2	16.6					13*	2.23
7516/633*		19.5							14*	2.85
holotype 7511/633*	20.3	25.9	72.6	28.4					17	2.7
RMA-65/1*			77.3	29.5					16*	3.5
RMA-65/2*			99.5						14*	3.14
RMA-65/3*		28.2	81.4	33.1						
RMA-65/8*		25.9		34.3					12*	2.5
RMA-65/8*			~46						16*	
RMA-65/8*			~73	31.2					16*	2.6

W—whorl width, H—whorl height, D—whorl diameter; Du—umbilical diameter; Rp—number of primary ribs per half whorl; R.c.—ribbing coefficient. * Next to the specimen number indicates that the specimen is deformed and measurements are approximate; * next to Rp and R.c. data means that measurements were made for 1/4 rather than 1/2 whorl and multiplied by 2.

Comparison. The only available macroconch specimen, which in this paper is identified as *Uralosphinctes* sp. [M], can only be compared with *U. dividuum* for some features. The inner whorls of the macroconch are poorly preserved; the TBC of the macroconch differs from the TBC of microconchs in a

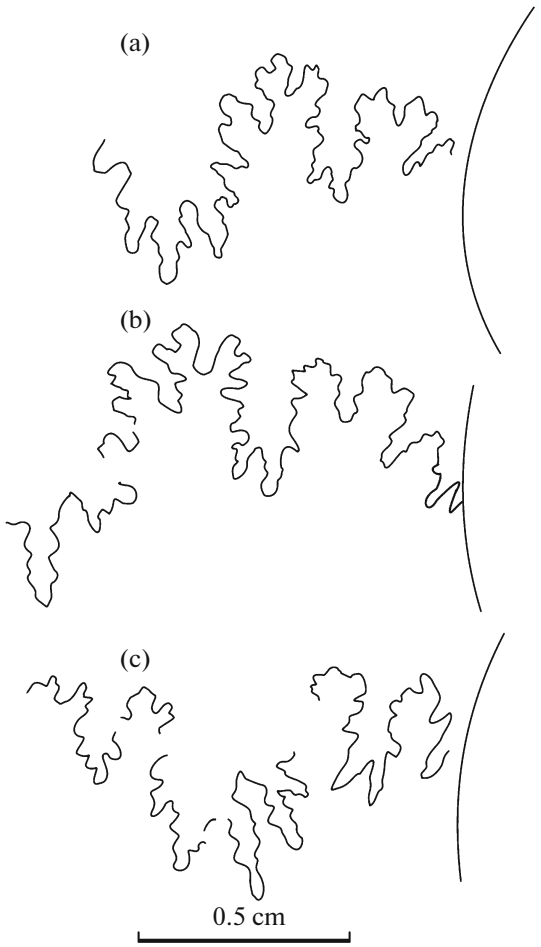


Fig. 2. Sutures of *Uralosphinctes dividuum* (Mesezhnikov, 1973) [m]: (a, b) specimen 7505/633: (a) at whorl height 9.5 mm, (b) at whorl height 12.8 mm; (c) specimen RMA-65/1, at whorl height 12.04 mm.

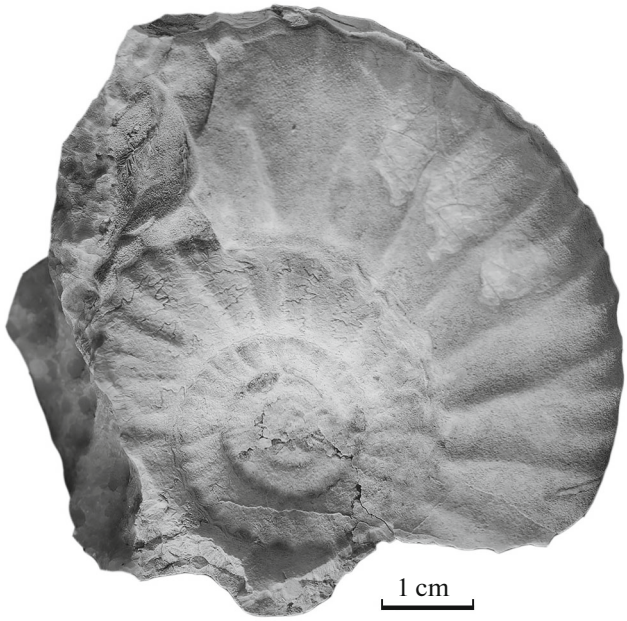


Fig. 3. Specimen of *Uralosphinctes dividuum* (Mesezhnikov, 1973) with sparse and coarse ribbing, specimen RMA-65/8; Tolya River, Outcrop 28, Bed 1; Upper Kimmeridgian, *Autissiodorensis* Zone, *Dividuum* Subzone.

higher rib branching ratio and a higher point of their branching. The microconch shells are also a third of half the size of the macroconch.

Variability. The species is characterized by very high variability of ornamentation on the outer and, to a lesser extent, inner whorls. On the inner whorls, the rib frequency, the shell size at which triplicate ribs appear, and the density of triplicate ribs vary. On the outer whorls and especially on the TBC, the coarseness, rib density, and ribbing coefficient vary strongly, and can change from 2 to almost 4. The diameter of adult specimens with TBC also varies considerably, changing from about 5 to 10 cm.

Material. 36 specimens from the type locality, of variable preservation including complete and incomplete shells, shell fragments and impressions. All specimens are to some extent deformed—mainly compressed laterally, but often also compressed in other planes, so all measurements given above are to some degree approximate.

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This work does not contain any studies involving human or recent animal subjects.

CONFLICT OF INTEREST

The author of this work declares that he has no conflicts of interest.

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