

## Research Advances

# A New Discovery of *Colobodus* Agassiz, 1844 (Colobodontidae) from the Carnian (Upper Triassic) of Guizhou, South China



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Citation: Li et al., 2019. A New Discovery of *Colobodus* Agassiz, 1844 (Colobodontidae) from the Carnian (Upper Triassic) of Guizhou, South China. *Acta Geologica Sinica* (English Edition), 93(6): 1967–1968. DOI: 10.1111/1755-6724.13832

## Objective

Critical review of the Colobodontidae reveals that this family has important research value. Colobodontidae was universally accepted as a significant taxon among all Triassic ichthyolite in 2002. However, most colobodontids are probably confined to the Anisian and Ladinian in the western Tethys (Mutter, 2004). This work describes a well-preserved colobodontid discovered in Guizhou, South China, which sheds new light on its distribution and stratigraphic range.

## Methods

The repair work was completed in a physical way under a Leica stereo microscope M205C. Photographing the specimen was done by a 3D microscope VHX-100k and drawings were made directly by CorelDRAW with reference to the digital photographs.

## Results

### Systematic Paleontology

Order **Perleidiformes** Berg, 1940

Family **Colobodontidae** Andersson, 1916

Genus ***Colobodus*** Agassiz, 1844

**Diagnosis:** Large sized fusiform in body shape with slender infraorbitals; operculum and suboperculum covered by fine exquisite rugae; preoperculum inclines slightly forward; well-developed crushing dentition; scales richly ornamented with longitudinal ridges (Sun et al., 2008).

***Colobodus wushaensis*** sp. nov. (Fig. 1)

**Etymology:** Wusha (Named after the locality of the holotype–Wusha, Xingyi, Guizhou, South China).

**Holotype:** A fairly complete specimen (The Geological Museum of Guizhou Province. No.GZ12203845).

**Stratotype:** The Zhuganpo Member of the Falang Formation, Carnian, Upper Triassic (Mei et al., 2017).

**Diagnosis:** Relatively large, moderately fusiform body; jaw borders hemmed by slender–conical teeth, often

reduced posteriad along upper jaw border; supracleithrum absent; scales in anterior flank deeper than broad; the ganoin ornament on all scales shows a typical pattern consisting of straight and parallel ridges.

**Description:** An almost complete fish, except for the extremities of the fins. Its total length is 438mm and the maximum body depth is 113 mm (Fig. 1b). The depth of skull is 95mm, length of skull almost equals to depth of body (Fig. 1c). The postrostral is a large squarish bone, capping the most of the snout and separating the nasals. The paired nasals are irregularly rhomboidal. The frontal bone is narrow in lateral view and the middle of it is the widest, it is covered by more tubercles and elongate ganoin ridges. There are four infraorbital bones, the highest of which is usually considered as the dermosphenotic. The maxilla has a slight dislocation with narrow anterior region and significantly enlarged posterior plate. The mandible is wedge-shaped, which is largely covered by thick ganoin ridges and ganoin tubercles are present near the oral margin (Fig. 1a). Anterior edge of the jaw is in laid by slender–conical teeth and the teeth become small and dull at the back of the jaw, which shows a tendency towards crushing adaptation. The preoperculum is a large wedge-shaped and it inclines slightly forward. This specimen preserves a triradiate hyomandibular bone which has overlap with most region of the preoperculum, it plays a role in suspending the jaws and operculum. The operculum is a rectangle with round posterior border and the suboperculum is trapezoidal in outline. Both surfaces of them are decorated with ganoin rugae. A prominently sickle-shaped cleithrum is associated with the pectoral fin. There are 4 definite branchiostegal rays.

The pectoral fins are composed of approximately 18 lepidotrichia (Fig. 1g). The pelvic fins consisting of 10 lepidotrichia are the smallest. The rays of paired fins have long proximal bases and a row of fringing fulcra lies on the anteriormost ray. The dorsal and the anal fins are nearly equal in size, they are triangular-shaped with rather wide base and composed of about 25–28 lepidotrichia (Figs. 1h and 1i). The caudal fin is deeply cleft, the total number of its lepidotrichia is approximately 66 (Fig. 1j). The borders of all unpaired fins are fringed by delicate

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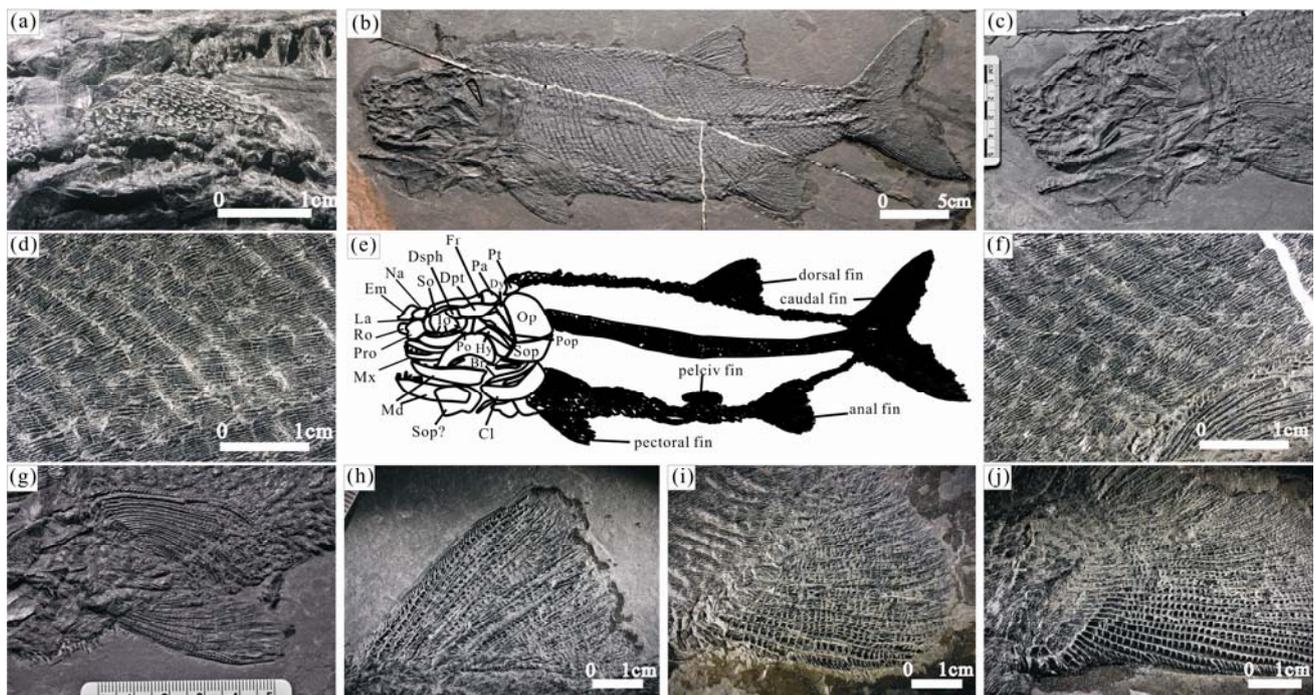


Fig. 1. The photographs and drawing of the holotype.

(a) Mandible; (b) Photograph of the holotype; (c) Skull; (d) Anterior flank scales; (e) Drawing of the holotype; (f) Medial flank scales; (g) Pectoral fins; (h) Dorsal fin; (i) Anal fin; (j) Partial lower lobe of caudal fin. Br, Branchiostegal rays; Cl, Cleithrum; Dy, Dermohyal; Dpt, Dermopterotic; Dsph, Dermospherotic; Em, Ethmoid; Fr, Frontal; Hy, Hyomandibular; Io, Infraorbital; La, Lachrymal; Mx, Maxilla; Md, Mandible; Na, Nasal; Op, Operculum; Pa, Parietal; Pt, Posttemporal; Pro, Postrostral; Po, Postorbital; Pop, Preoperculum; Ro, Rostral; So, Supraorbital; Sop, Suboperculum.

fulcra and rays are completely segmented. The squamation is a conspicuous feature of the new specimen. The scales on anterior trunk are rectangle (Fig. 1d), the scales on the middle of body are squarish (Fig. 1f), and the rest are rhombic. All scales are ornamented with dense, straight and nearly parallel ganoin ridges.

### Conclusions

The genus *Colobodus* has been used as a hospice, and become universally applied to fish remains, such as molariform teeth associated with richly ornamented scales. *Colobodus bassanii* Alessandri, 1910 and *Colobodus baii* Sun, 2008 are widely accepted as memberships of this genus. *C. wushaensis* sp. nov. is distinguished from *C. bassanii* and *C. baii* by its absent supracleithrum; at least four preserved branchiostegal rays and stronger ventral shaft of the hyomandibular.

In *C. bassanii* and *C. baii*, the ganoin ornament on the scales is strongly variable, which is related to their positions. But in *C. wushaensis* sp. nov., the ornament of ganoin ridges on all scales is almost uniform. Actually, the variable ornament on scales in different specimens has been an enigma. According to statistical studies on colobodontids squamation, the variation of ganoin ornament may depend on age and size of the fish and on the palaeoenvironment in which it lived.

It must be pointed out that above-mentioned three species are produced at different strata. Respectively,

middle Pelsonian (Anisian), late Anisian/early Ladinian and Carnian. Although the evidence of age is not enough to establish new species, it is feasible to establish new taxon in the genus *Colobodus* according to observed morphological differences.

### Acknowledgments

Wang Mingkun (Northwest University) and Su Fei (China University of Geosciences, Beijing) are thanked for their advice that considerably improved the manuscript. This study was financially supported by the National Natural Sciences Foundation of China (grant No.41762001) and the Basic Research Funds Project of China Geological Survey (grant No. JYYWF201818).

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