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**New taxa and some taxonomic changes  
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*Microlampra  
heshanensis*



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## New taxa and some taxonomic changes of a latest Permian gastropod fauna from South China

Alexander Nützel, Pan Hua-Zhang and Douglas H. Erwin

### Abstract

For a latest Permian gastropod fauna from South China that was recently described by PAN & ERWIN (2002), some new taxa are introduced and several systematic and taxonomic changes are made. The exceptional preservation of the silicified gastropods in this fauna allows further consideration of the larval shell morphology and revised taxonomic assignments. The genus *Platyzona* is transferred from the family Murchisoniidae (Archaeogastropoda) to the family Goniasmidae (Caenogastropoda). The genus *Microlampra* is transferred from the family Trochidae (Archaeogastropoda) to the family Orthonemidae (Caenogastropoda). *Straparollus minutus* (family Euomphalidae, Archaeogastropoda) is transferred to the genus *Stuoraxis* (superfamily Architectonicoidea, Heterostropha) which indicates a continuous fossil record of this architectonicoid genus from the Late Permian to the Late Triassic. *Holopea bacca* is placed in the new genus *Heshanietta* (family Orthonemidae). *Propupaspira* and the new genus *Eosinocerithium* are placed in the new family Propupaspiridae. *Eosinocerithium* n. gen. is the earliest caenogastropod with a modern reticulate teleoconch ornament with nodular intersections, a feature characteristic of many Mesozoic to Recent cerithioids.

### Author's addresses

Dr. Alexander Nützel Institut für Paläontologie, Universität Erlangen, Loewenichstr. 28, D-91054 Erlangen, Germany, nuetzel@pal.uni-erlangen.de

Dr. Pan Hua-Zhang, Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing, People's Republic of China 210008

Dr. D. H. Erwin, Department of Paleobiology, MRC-121, National Museum of Natural History, Washington D. C. 20560 USA

## Introduction

Recently, PAN & ERWIN (2002) published a report on a silicified, diverse Late Permian gastropod fauna from South China. This fauna is very important for two reasons: first, it is very close to the Permian/Triassic mass extinction event (Changhsingian) and second, the material has well-preserved protoconchs which is rare for Palaeozoic gastropods and unique for those from the latest Permian. PAN & ERWIN (2002) have reported and described the gastropods in great detail. However, publication of this paper was delayed and a closer examination of the protoconchs in light of more recent literature on late Paleozoic and early Mesozoic gastropods suggest that systematic reassignments of some these gastropods are necessary. Such systematic revision is crucial for understanding the evolutionary history of the Gastropoda at the Permian/Triassic-boundary because it allows substantial comparison of Late Paleozoic and Early Mesozoic faunas.

## Age and Location

The stratigraphic position, geographical location, and preservation of the gastropod material were discussed in detail by PAN & ERWIN (2002). The material is silicified and comes from various localities in South China. It is of latest Permian (Changhsingian) age.

## Systematic Palaeontology

Class Gastropoda CUVIER 1797

Subclass Caenogastropoda COX 1959

Order Cerithimorpha GOLIKOV & STAROBOGATOV 1975

Family Goniasmidae NÜTZEL & BANDEL 2000

Genus *Platyzona* KNIGHT 1945

Pl. 1, fig.1-2

Remarks: The family Goniasmidae was erected for high-spired gastropods with a selenizone and a typical caenogastropod larval shell of heliciform shape (NÜTZEL & BANDEL 2000). In contrast, *Murchisonia* has an archaeogastropod protoconch of less than one whorl (FRÝDA 1999). *Platyzona pulchella* PAN & ERWIN 2002 (Pl. 1, fig. 1) and *Platyzona luculenta* PAN & ERWIN 2002 (Pl. 1, fig. 2) have a well-developed selenizone and exactly the same type of larval shell as the goniasmid genera *Goniasma* and *Cerithioides*. Therefore, we transfer

*Platyzona* from the Murchisoniidae (Archaeogastropoda) to the Goniasmidae (Caenogastropoda).

Family Orthonemidae NÜTZEL & BANDEL 2000

Genus *Microlampra* PAN & ERWIN 2002

Pl. 1, fig. 5-6

Remarks: *Microlampra* was introduced by PAN & ERWIN (2002) with two latest Permian species from South China assigned to it. The genus was placed in the vetigastropod superfamily Trochoidea. However, the type species *Microlampra heshanensis* has a beautifully preserved protoconch (Pl. 1, fig. 5-6) that shows that *Microlampra* is very similar to the caenogastropod genus *Orthonema*. The heliciform shell represents the same type as that of several *Orthonema* species illustrated by NÜTZEL (1998) and NÜTZEL & BANDEL (2000). The teleoconch ornament of strong revolving lirae resembles that of *Orthonema*. However, *Microlampra* is obviously broader and stouter. A closer examination of more mature specimens of *Microlampra* might reveal that it is actually a synonym of *Orthonema*. However, with the currently available specimens synonymization would be premature. The larval shell of *Microlampra heshanensis* comprises about three whorls and ends with a distinct sinusigera; it represents a planktotrophic caenogastropod larval shell. In contrast, planktotrophic larval shells have never been recognized in the Trochoidea and their protoconch consists of just one whorl or less than one whorl (BANDEL 1982, HASZPRUNAR 1993). Therefore, we transfer the genus from the Vetigastropoda (Trochoidea) to the caenogastropod family Orthonemidae NÜTZEL & BANDEL 2000.

*Heshanietta* n. gen.

Pl. 1, fig. 3-4

Type species: *Holopea bacca* PAN & ERWIN 2002, Upper member of Heshan Formation (Changhsingian), Heshan County, Guangxi Province

Etymology: after the Heshan Province (South China) where the type locality of the type species is located

Diagnosis: Small trochiform, umbilicated caenogastropod with round, smooth whorls and deep sutures; growth lines almost straight; protoconch simple, smooth, of about two whorls, clearly demarcated from teleoconch

Remarks: *Heshanietta bacca* was assigned to the genus *Holopea* HALL 1847 by PAN & ERWIN (2002). Indeed, the teleoconch of *Heshanietta bacca* resembles closely that of the Ordovician type species of *Holopea*, *Holopea symmetrica* HALL 1847. However, this teleoconch is not very characteristic and the protoconch of *Holopea symmetrica* is unknown. Given the high geological age of *Holopea*, it seems unlikely that *Heshanietta bacca* belongs to this genus. DZIK (1994) reported that all known Ordovician gastropod protoconchs have an openly coiled initial whorl. However, a caenogastropod larval shell with closely coiled initial whorl like that of *Heshanietta bacca* has never been reported from the early Palaeozoic. Therefore, it seems appropriate to propose the new caenogastropod genus *Heshanietta* for the Permian species *H. bacca*.

#### Propupaspiridae new family

Pl. 1, fig. 11-13

Assigned genera: *Propupaspira* PAN & ERWIN 2002 (typical genus) and *Eosinocerithium* n. gen.

Diagnosis: High-spired caenogastropods with reticulately ornamented or smooth teleoconch and a planktotrophic larval shell with a net-like, irregular ornament

Discussion: Two caenogastropod genera that share a very similar, characteristic larval shell morphology but differing considerably in teleoconch morphology are assigned to the new family Propupaspiridae: *Propupaspira* PAN & ERWIN 2002 (typical genus) (Pl. 1, fig. 12-13) and *Eosinocerithium* n. gen. (Pl. 1, fig. 11). *Propupaspira* was included in the subulitoid family Soleniscidae by PAN & ERWIN (2002) but the Soleniscidae have a smooth larval shell and most have a very distinct columellar fold (NÜTZEL *et al.* 2000). *Eosinocerithium* n. gen. was reported by PAN & ERWIN (2002) under the name *Eucycloscala* sp. but *Eucycloscala* is a vetigastropod as is indicated by its protoconch (BANDEL 1993, see below). The larval shell morphology could indicate that the Propupaspiridae are closely related to the Late Triassic Popenellidae BANDEL 1992 which however differ considerably in teleoconch morphology. The Popenellidae have a teleoconch ornament of collabral axial ribs and strongly sinuous growth lines (BANDEL 1992). Both families, Propupaspiridae and Popenellidae, are probably precursors of the largely Mesozoic family Procerithiidae as indicated by their high-spired shape and larval shell morphology.

*Eosinocerithium* n. gen.

Pl. 1, fig. 11

Type species: *Eosinocerithium reticulatum* n. sp. (Pl. 1, fig. 11)

Etymology: *Eo-* after Greek god of the morning because it is one of the earliest cerithimorphs; *-sino-* for China; *-cerithium* because the new genus resembles the genus *Cerithium*.

Diagnosis: High-spired gastropods with a planktotrophic larval shell with a net-like, irregular ornament and a teleoconch ornament of axial ribs and spiral lirae with nodular intersections.

*Eosinocerithium reticulatum* n. sp.

Pl. 1, fig. 11

Holotype (only specimen): Specimen figured by PAN & ERWIN (2002, fig. 7.16) as *Eucycloscala* sp. (USNM 127655)

Etymology: For the reticulate Teleoconch ornament

Stratum typicum: Latest Permian, Changhsingian

Locus typicus: South China, Western Yunnan, locality ADL 703 (see PAN & ERWIN 2002, p. 49)

Diagnosis: As for the genus that is monospecific so far.

Remarks: This monospecific genus is known from the single specimen described and illustrated by PAN & ERWIN (2002) as *Eucycloscala* sp. BANDEL (1993) illustrated the typical vetigastropod protoconch of the Late Triassic type species of *Eucycloscala*. However, the protoconch of *Eosinocerithium reticulatum* n. sp. represents a typical caenogastropod larval shell which differs fundamentally from the protoconch of *Eucycloscala*. The only specimen at hand is very well-preserved and shows the teleoconch ornament along with the larval shell. This specimen provides more morphological information than is available for many species that are based on numerous but poorly preserved specimens. This justifies a new genus even though it is based on a single specimen.

The teleoconch ornament of this *Eosinocerithium* is remarkable because it resembles that of many modern caenogastropods, e.g. within the Cerithioidea. NÜTZEL (2002a) found that this type of reticulate ornament with nodular intersection became more and more abundant in different evolutionary lines since the Late Triassic and interpreted this to represent an early aspect of the Mesozoic marine revolution. *Eosinocerithium* is one of the earliest caenogastropods to display this reticulate teleoconch ornament. These similarities suggest a

*Eosinocerithium* n. gen.

Pl. 1, fig. 11

Type species: *Eosinocerithium reticulatum* n. sp. (Pl. 1, fig. 11)

Etymology: *Eo-* after Greck god of the morning because it is one of the earliest cerithimorphs; *-sino-* for China; *-cerithium* because the new genus resembles the genus *Cerithium*.

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close relationship to the Mesozoic procerithiids, most of which have the same type of teleoconch ornament.

Subclass Heterostropha FISCHER 1885 (Heterobranchia)

Order Allogastropoda HASZPRUNAR 1985

Superfamily Architectonoidea GRAY 1850

Family Stuuraxidae BANDEL 1996

Genus *Stuuraxis* BANDEL 1996

Type-species: *Stuuraxis lehmanni* BANDEL 1996, Late Triassic, Early Carnian, Cassian Formation, Northern Italy

Diagnosis: Planispiral shell with a flatly sinistral protoconch of about two whorls with larval shell of about; embryonic shell smooth; first part of larval shell with collabral ribs

*Stuuraxis minutus* (PAN & ERWIN 2002)

New combination

Pl. 1, fig. 7-10

2002 *Straparollus minutus* n. sp. – PAN & ERWIN, p. 19, fig. 10.6-10.11

Remarks: The species was well described by PAN & ERWIN (2002) and we refer to this description. We add the observation that the larval shell is flatly sinistral. The sinistral larval shell shows that *Stuuraxis minutus* (PAN & ERWIN 2002) is a member of the Heterostropha (or Heterobranchia) and probably of the order Allogastropoda and superfamily Architectonicoidea. *Stuuraxis minutus* was previously placed in the genus *Straparollus* MONTFORT 1810 which is a typical member of the family Euomphalidae. However, all Euomphalidae with known protoconch are not heterostrophic and differ considerably in protoconch morphology (YOO 1994, BANDEL & FRÝDA 1998, NÜTZEL 2002b). *Stuuraxis minutus* is so similar to the type species of *Stuuraxis*, *S. lehmanni*, from the Carnian Cassian Formation that it is even most difficult to distinguish both shells on the species-level. *Stuuraxis* represents indeed a very convincing example for a genus that survived the Permian/Triassic mass extinction event. It is noteworthy that HERHOLZ (1992, fig. 2) illustrated an isolated sinistral architectonicid larval shell from the Late Carboniferous of Western Germany. This larval shell also closely resembles the protoconch of *Stuuraxis*. The same type of architectonoid larval shell was illustrated by SCHRÖDER (1995, pl. 13, fig. 9-11) from the lowermost Cretaceous of Poland. This indicates that the architectonicids with their

distinct larval shell morphology have a continuous fossil record from the Carboniferous to the Recent.

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## Plate 1

- Fig. 1: *Platyzona pulchella* PAN & ERWIN, from PAN & ERWIN 2002 fig. 8.1, X 80.  
Fig. 2: *Platyzona luculenta* PAN & ERWIN, from PAN & ERWIN 2002 fig. 9.8, X 80.  
Fig. 3: *Heshanietta bacca* (PAN & ERWIN), from PAN & ERWIN 2002 fig. 8.11, X 120.  
Fig. 4: *Heshanietta bacca* (PAN & ERWIN), from PAN & ERWIN 2002 fig. 8.5, X 80.  
Fig. 5: *Microlampra heshanensis* PAN & ERWIN, from PAN & ERWIN 2002 fig. 6.2, X 100.  
Fig. 6: *Microlampra heshanensis* PAN & ERWIN, from PAN & ERWIN 2002 fig. 6.3, X 100.  
Fig. 7: *Stuoraxis minutus* (PAN & ERWIN), from PAN & ERWIN 2002 fig. 10.8, X 45.  
Fig. 8: *Stuoraxis minutus* (PAN & ERWIN), from PAN & ERWIN 2002 fig. 10.6, X 45.  
Fig. 9: *Stuoraxis minutus* (PAN & ERWIN), from PAN & ERWIN 2002 fig. 10.10, X 100.  
Fig. 10: *Stuoraxis minutus* (PAN & ERWIN), from PAN & ERWIN 2002 fig. 10.11, 100.  
Fig. 11: *Eosinocerithium reticulatum* n. gen., n. sp. from PAN & ERWIN 2002 fig. 7.16  
("Eucycloscala sp."), X 75.  
Fig. 12: *Propupaspira eleganta* (PAN & ERWIN), from PAN & ERWIN 2002 fig. 20.9, X 160.  
Fig. 13: *Propupaspira eleganta* (PAN & ERWIN), from PAN & ERWIN 2002 fig. 20.8, X 60.

