

Some murchisoniid gastropods from the Middle and Upper Carboniferous of the Central part of Russian Plate

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ABSTRACT. The species of the genera *Vebericochlis* Licharew, *Orthonema* Meek et Worthen, and *Cibecuia* Winters are mentioned for the first time from the Middle and Upper Carboniferous of the Central part of Russian Plate. The genera *Vebericochlis* and *Cibecuia* have been previously known only from the Permian. One species of *Vebericochlis*, 6 species of *Orthonema* and 2 species of *Cibecuia*, with the new species *O. borovskensis* sp. nov., *O. paulum* sp. nov., *O. simplex* sp. nov., *C. sinelnikovae* sp. nov., and *C. magnum* sp. nov., are described from the studied region. In addition, *Vebericochlis maclayi* Licharew, 1967 and *Orthonema silinae* (Licharew, 1975), which were not found in the studied region but are important for diagnostics of these genera, are described herein. The morphology of the genera is considered in detail. Based on the morphological characters of different species of *Orthonema*, the genus is referred to the murchisoniid gastropods. The studied genera are placed in the family Orthonemidae Nützel et Bandel, 2000, the later is revised and assigned to the superfamily Murchisoniacea Koken, 1896.

This paper continues the study of the murchisoniid gastropods from the Middle and Upper Carboniferous of the Central part of the Russian Plate [Mazaev, 2001]. Three genera: *Orthonema* Meek et Worthen, 1862, *Vebericochlis* Licharew, 1967, and *Cibecuia* Winters, 1956 were found in the region for the first time. Moreover, *Vebericochlis* and *Cibecuia*, which were previously known only from the Permian, are for the first time recorded in the Carboniferous units. The total of 9 species are recognized from the studied region, and 5 of them are new. In addition, two species: *Vebericochlis maclayi* Licharew, 1967 and *Orthonema silinae* (Licharew, 1975) are revised and redescribed here. These two species were not found in the studied region, but their teleoconchs possess very important characters for the diagnoses of the genera. Three genera studied herein are assigned to Orthonemidae Nützel et Bandel, 2000. The important data on teleoconch morphology of the type genus of the family have been obtained, and the diagnoses of the genus and family are changed. The Orthonemidae, which have been originally proposed as family of Caenogastropoda,

are assigned here to the suborder Murchisonioidei Cox et Knight, 1960.

Over 160 specimens from the Moscow Basin and Oksko-Tzninskiy Swell have been studied. The specimens sporadically occur in the offshore sublittoral facies together with other diverse and abundant skeletal remains. The material (except several moulds of *Cibecuia magnum* sp. nov., including No. 4471/65/2, Fig. 5 Q) is represented by imprints and has been studied using their latex moulds. Some imprints have distinctly preserved fine growth lines. Few of them show complete apertural margin with a slit, and juvenile whorls with fine ornamentation. The material described here is housed in the Paleontological Museum of the Russian Academy of Sciences, collection No. 4471.

Rather well preserved shells from the Myachkovian Provincial Stage of the East Urals and from the Upper Carboniferous and Lower Permian of Middle Asia were also studied in the Central Geological Museum (CGM), St.-Petersburg, collections No. 9758 and No. 8336. This material was described in detail by Licharew [1967, 1968, 1975].

Morphology

The apertural margin of gastropod shell usually includes numerous characters which are important for its diagnostics. Since the shells of murchisoniid gastropods with completely preserved apertural margin are seldom found, we can deduce its structure only from the growth lines. The study of them is of the key position in the paper, especially for the genus *Orthonema*. This genus currently includes numerous species with considerable variation in the growth line patterns.

Originally, when Meek and Worthen [1861] established the genus, they particularly emphasized that the type species, *O. salteri* (Meek et Worthen, 1861), has straight, orthocone growth lines. This character was reflected in the name of the taxon. *O. frequens* Licharew, 1968 has a similar pattern of the growth lines (Fig. 1 A). Another species, *O. inoratum* Knight, 1934 was figured [Knight, 1934, pl. 57, fig. 1 d] with sharp shallow labral sinus (Fig. 1 B). *O. marvinwelleri* Knight, 1934 possesses narrow and obviously deep labral sinus placed just below the