

## **Shells of Kosmoceras (Kosmoceratidae), as an object of studying by students at the laboratory classes on "Paleontology"**

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Modern paleontological researches have led to the essentially different representation about systematization and phylogenies of ammonites in comparison with the preceding stages of their study. Simultaneously with the description of extensive materials new taxonomical categories the number of which has greatly increased have been singled out. Many former genera have been a ranked into families and even superfamilies. In recent years, in connection with making up solid reports and reference-books, the problem of creating of scientifically well-grounded system of ammonites began to draw the increasing attention of paleontologists, and thanks to the joint efforts of many scientists from different countries the solution of this problem has strongly moved ahead. It is also necessary to note the increased interest to biology-ammonites questions. However, the exit of paleontology «from offices» in to university education system has become the main achievement of the present stage.

In training specialists in the field of geology the theoretical knowledge of the lecture course and laboratory classes on "Paleontology" are becoming of great importance. Despite the development of absolute stratigraphy methods, paleontological methods have not lost their actuality. In some cases during field researches the methods of relative stratigraphy allow to reduce the cost of research work considerably.

For studying the features of the morphological structure of ammonites. The shells of the genus Kosmoceras are most appropriate. The word "Kosmoceras" is derived from Greek "kosmos" meaning — the Universe and "keras" meaning — a horn. The name is not given accidentally it reflects the universal character of the distribution ammonites of the given kind.

The family Kosmoceratidae includes the following genera: Garantiana Huatt, 1900 (Garantia Rollier, 1911), Strenoceras Huatt, 1900, Spiroceras Quenstedt, 1858 (Patoceras Meek, 1876), Pseudocosmoceras Murashkin, 1930, Kepplerites Neumayr, 1892, Kosmoceras Waagen, 1869 (Cosmoceras Waagen, 1870), Mojarowskia Nikolaeva, 1955. (Fig.1)

The family has the following characteristic features: shells vary from plain-spiral, with more or less increased layers, to the developed and sometimes considerably straightened spiral. Edges are numerous and simple or branching, having up to three rows of humps or thorns and which end on the ventral side. A mouth has lateral "ears". The line of the shell is considerably dissected, rising in umbilicus parts. The first lateral line of the shell is deep with three-separate part. There are additional lines varying from one or two.

It is of great importance, that during the development of the ammonite. The process of phylogensis in that of ontogenesis is observed. This is shown in specificity of development of the shell lines, causing scientific interest not only in research but also in educational purposes.

Biogeographical features show that the family of Kosmoceratidae extended to oceans of the Tethys and Paleopacific. The Tethys was likely of be the centre of the origin of the family. This is indicated not only by the maximum quantity of genera of family Kosmoceratidae, but also by the localization of the representatives of such genera as Mojarowskii, Strenoceras and Pseudocosmoceras in the given place. (Fig. 2)

The family Kosmoceratidae is of archistratigraphic importance. The subzones of upper and middle Callovian of the Central part of Russia (Russian plate), the Northern Caucasus, Western Siberia have been distinguished in accordance whit the ammonites complex. (Fig.3)

The representatives of the given family allow not only to draw the inter-regional correlation of sediments, but also to carry out the coordination of biostratigraphical divisions within themselves and international stratigraphic chart (biostratigraphic subzone Kosmoceras jason).

The Museum of the Earth crust science of the BSU possesses an extensive collection of ammonites preserved in different condition. The collection includes 32 specimens of family Kosmoceratidae which are used in the educational process and for research purposes. The specimens of a high degree of preservation have been studied by means of the technique of Raup. The specimens of representatives of other families have also been taken from the museum funds for analysis.

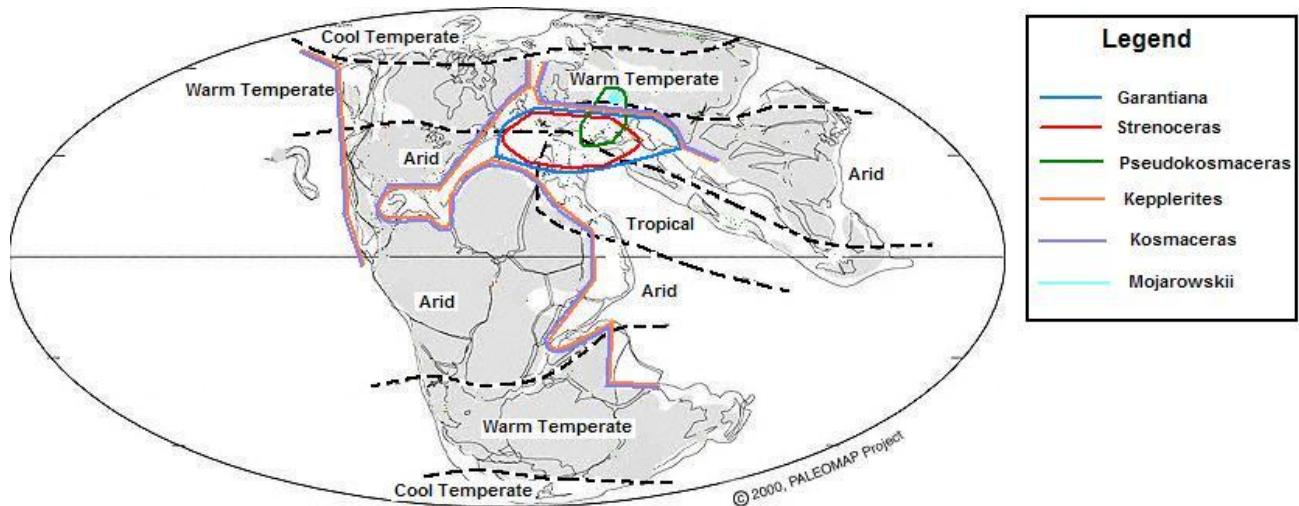


Fig. 2. Natural habitat of Kosmoceras genuses

According to the technique of Raup, the rate of expansion of ammonites layers of genus *Kosmoceras* Waagen 1869 (*Cosmoceras* Waagen, 1870) proved to be in limits  $W = 3,4 - 4,9$ , and the degree of overlapping  $D = 0,22 - 0,44$ . These data shows evolutionary changes in the group of Ammonitida: in early Jurassic periods of forms with more or less extending and overlapping shells ( $D \sim 0,4 - 0,5$ ,  $W \sim 2$ ) prevailed the Cretaceous period shells with moderately extending Layers ( $D \sim 0,3$ ,  $W \sim 2,5$  is traced). This gives the possibility to draw a conclusion that the genus *Kosmoceras* Waagen reflects one of the evolution links of group Ammonitida. The fact that these changes are connected, with the transition in to the new adaptive environment is rather interesting. And ecological aspects are likely to have played an important role in the course of evolution. However it is necessary to notice the specific character of morphological changes at the level of species which in fact general, does not contradict to existing biological theories and theories of evolutionary.

General chart			Russian plate		Northern Caucasus		m. Kugitang		Western Siberia	
Substage	Zone	Subzone								
Upper	Quenstedtoceras lamberti	-	Clay, marl, Thickness 30 cm	Quenstedtoceras lamberti	Limestone, dolomite, Thickness of 7,5 m.	Quenstedtoceras lamberti	Kugitangsky suite, Thickness 150 cm	Quenstedtoceras lamberti		
	Peltoceras athleta	-		Peltoceras athleta		Peltoceras athleta		Peltoceras athleta		
Middle	Erymnoceras coronatum	Kosmoceras grossouvrei	Clay, marl oolitic, sandy clay, Thickness of 18 m.	Erymnoceras coronarium	Limestone, sandstone, aleurolites, conglomerates, Capacity Thickness 50-60 cm	Kosmoceras pollux	Bajsunsky suite, 45-60 cm	Erymnoceras coronatum	Argillite, bituminous argillite, Thickness 4-30 cm	
		Kosmoceras obductum				Erymnoceras coronarium				
	Kosmoceras jason	Kosmoceras jason	Kosmoceras jason	Kosmoceras jason	Bajsunsky suite, 45-60 cm	Kosmoceras jason	Kosmoceras jason	Quenstedtoceras sp., Erymnoceras sp., Kosmoceras sp		
		Kosmoceras medea				Kosmoceras jason				

Fig. 3. Callovian sediments of the CIS countries

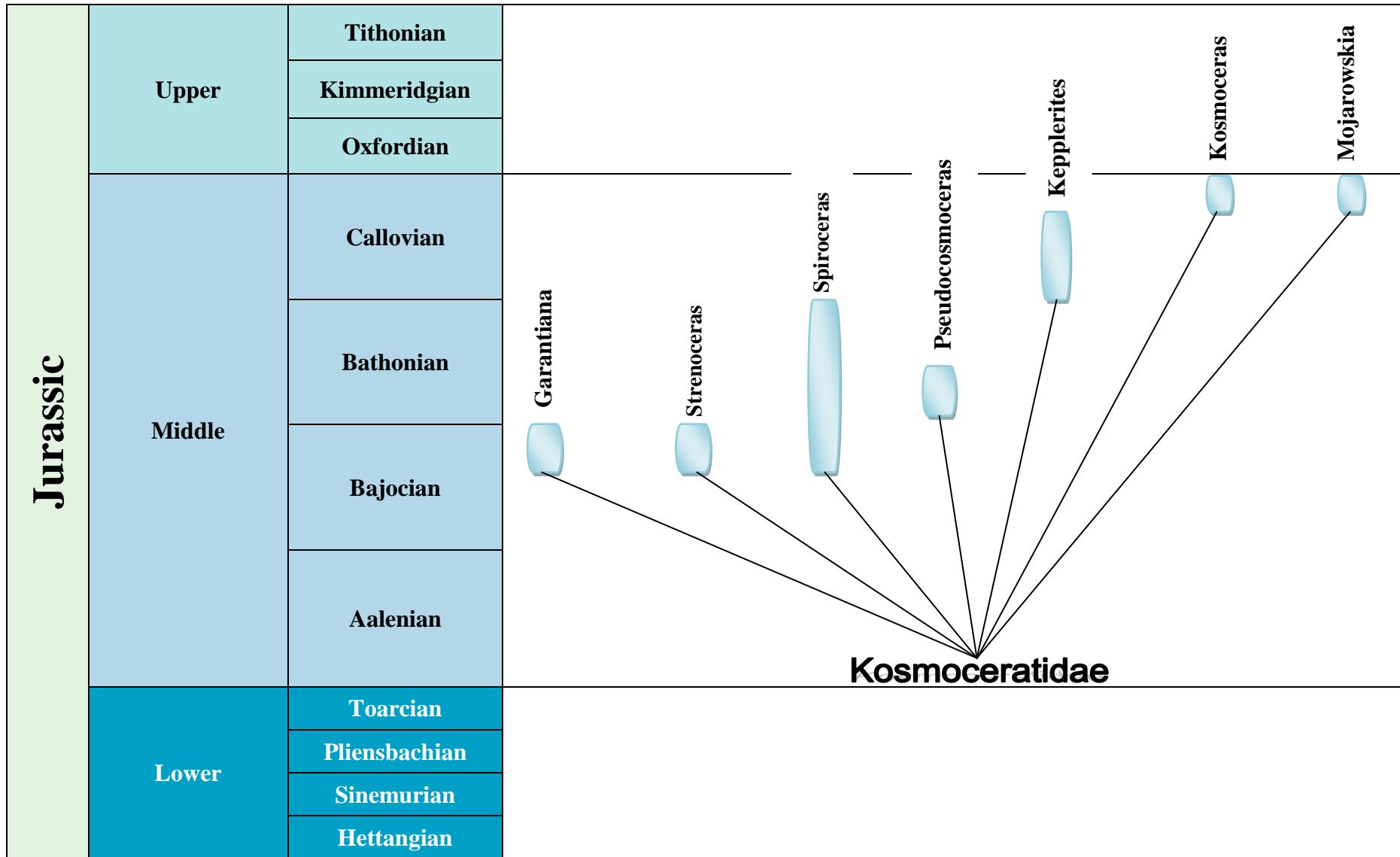


Fig. 1. Genealogy tree by family of Kosmoceratidae