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Stratigraphical Significance of the Early Cretaceous Belemnitida of Georgia

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ABSTRACT. The Lower Cretaceous sediments of Georgia are well characterized by belemnites. The scheme of division of inclusive sediments is given on the basis of the development stages of these organisms.

Key words: BELEMNITE, EARLY CRETACEOUS.

The belemnites play an important role in the complex of Early Cretaceous fauna of Georgia [1-15]. However, they are distributed unevenly in the sections. Barremian-Albian sections are characterized more completely. The belemnites are not found in Berriasian sediments.

The belemnites are extremely rare in Valanginian deposits. Only single findings are discovered here: *Curtohibolites orbignyanus* (Duval-Jouve), *Conobelus conicus* (Blainville), *C. extincorius* (Raspail), *Duvalia lata lata* (Blainville), *Pseudobelus bipartitus* (Blainville), *Hibolites prodromus* Schwetsoff. These forms are well known within the Mediterranean region and they are characterized by a rather wide range of the stratigraphical extension - from Berriasian up to Hauterivian. However, a part of species particularly: *Pseudobelus bipartitus*, *Conobelus conicus*, *C. extincorius* occur in Georgia only in the Valanginian.

Hauterivian sediments are also poor in belemnites, particularly their lower substage. Some authors indicate to *Curtohibolites orbignyanus* (Duval-Jouve), *Hibolites prodromus* Schwetsoff, *Duvalia binervia* (Raspail), *Pseudoduvalia polygonalis* (Blainville) from this level. Due to wide vertical extension of the above-mentioned species, this complex unfortunately does not allow to identify the Early Hauterivian age of the inclusive layers. The sediments of Upper Hauterivian are rich by rostrums of belemnites, which with the rare exception are connected with the upper zone of the upper Hauterivian - *Pseudothurmannia mortilleti*. The belemnites: *Hibolites longior* Schwetsoff, *H. inae* Eristavi, *H. jaculoides* Swinnerton, *Duvalia binervia* (Raspail), *D. lata lata* (Blainville), *Oxityeuthis jasikkovi* (Lahusen) are found in the upper zone of Upper Hauterivian in the sections of Georgia.

Barremian sediments are better characterized by belemnites, than Hauterivian one. The representatives of genus: *Mesohibolites* Stolley appeared for the first time in the lower Barremian. Early Barremian complex of belemnites are presented by the following species: *Mesohibolites gagicus* (Schwetsoff), *M. abchasiensis* Krimholz, *M. trastikensis* Stoyanova-Vergilova, *M. garshini* Stoyanova-Vergilova, *Hibolites subfusiformis* (Raspail), *H. jaculoides* Swinnerton, *H. pistilliformis* (Blainville), *Pseudoduvalia gagricus* (Schwetsoff), *P. pontica* (Schwetsoff). The rich complex of following belemnites occurs in upper Barremian: *Mesohibolites gladiiformis* (Uhlig), *M. varians* (Schwetsoff), *M. platyurus* (Duval-Jouve), *M. uhligi uhligi* (Schwetsoff), *M. uhligi georgicus* Nazarishvili,

Table:

Stratigraphical subdivision of Lower Cretaceous sediments of Georgia by belemnites

Stage	Substage	Zones and Layers (Kotetishvili, 1985), (Kakabadze, 1987)	Index belemnites
Albian	Upper	<i>Stoliczkaia dispar</i> , <i>Mortonicear rostratum</i>	<i>Parahibolites pseudoduvalia</i>
		L.w. <i>Aucellina gryphaeoides</i>	
		<i>Hysterocheras orbigny</i> , <i>Mortonicear inflatum</i>	
		L.w. <i>Actinoceramus sulcatus</i>	
	Middle	<i>Oxytropidoceras roissyanum</i>	<i>Neohibolites minimum</i>
		<i>Hoplites dentatus</i>	
Lower	<i>Douvilleiceras mammilatum</i>	<i>Neohibolites minor</i>	
	<i>Leymeriella tardefurcata</i>		
Aptian	Upper	<i>Hypracanthoplites jacobi</i>	<i>Neohibolites wollemanni</i>
		<i>Acanthoplites nolani</i>	<i>Mesohibolites brevis</i>
		<i>Colombiceras tobleri</i>	<i>Mesohibolites moderatus</i>
	Middle	<i>Epicheloniceras subnodosocostatum</i>	<i>Neohibolites aptiensis</i>
		<i>Dufrenoya furcata</i>	<i>Neohibolites clava clava</i>
	Lower	<i>Deshayesites deshayesi</i>	
<i>Deshayesites weissi</i> , <i>Procheloniceras albrechtiaustriacae</i>			
Barremian	Upper	<i>Horizon Pseudocrioceras waagenoides</i>	<i>Mesohibolites longus longus</i>
		<i>Colchidites securiformis</i>	
		<i>Imerites giraudi</i>	
		<i>Hemihoplites feradianus</i>	
		<i>Heinzia matura</i>	
	<i>Ancyloceras vandeheckii</i>		
	Lower	<i>Holcodiscus caillaudianus</i>	<i>Mezohibolites gagricus</i> , <i>Mesohibolites trastikensis</i>
		<i>Pulchellia compressissima</i>	
<i>Spitidiscus hugii</i>			
Hauterivian	Upper	<i>Pseudothurmania mortilleti</i>	<i>Hibolites jaculoides</i> , <i>Hibolites longior</i>
		<i>Speetonicerus subinversum</i>	-----
	Lower	<i>Crioceratites nolani</i>	-----
<i>Lyticoceras ambligonium</i>		-----	
Valanginian	Upper	<i>Neocomites noecomienis</i>	<i>Pseudobelus bipartitus</i>
	Lower	<i>Thurmanniceras thurmanni</i>	
Barriassian	U.	<i>Negrelliceras negreli</i>	-----
	M.	<i>Berriassella subrichteri</i>	-----
	L.		

Note: Division of Lower Barremian is given by I. Kvantaliani and L. Sakhelashvili (8) and the Upper Barremian - by M. Kakabadze and E. Kotetishvili (6).

M. longus longus (Schwetzoff), *M. longus bulgaricus* Stoyanova-Vergilova, *M. minaret* (Raspail), *M. fallauxi* (Uhlig), *M. beskidensis* (Uhlig), *Hibolites subfusiformis* (Raspail), *H. jaculum* (Phillips), *H. inae* Eristavi, *Mucrohibolites schaoriensis* (Hetchinashvili), *Duvalia grasiana* (Duval-Jouve).

Aptian sediments are in abundance presented by belemnites, though many species: *Mesohibolites beskidensis*, *M. fallauxi*, *M. minaret*, *M. uhligi uhligi*, *M. uhligi georgicus*, *Duvalia grasiana* and others, wide spread in Upper Barremian, are also extended in lower Aptian. This circumstances make it difficult to draw a distinct boundary between Barremian and Aptian stages by belemnites. At the beginning of Aptian stages *Neohibolites* and *Parahibolites* were found. The following complex of belemnites occurs in lower Aptian of Georgia: *Mesohibolites beskidensis* (Uhlig), *M. fallauxi* (Uhlig), *M. minaret* (Raspail), *M. minareticus* Krimholz, *M. kalamus* Stoyanova-Vergilova, *M. renngarteni renngarteni* Krimholz, *M. renngarteni caucasicus* Nazarishvili, *M. nalcikensis* Krimholz, *M. uhligi uhligi* (Schwetzoff), *M. uhligi georgicus* Nazarishvili, *Neohibolites ewaldi* (Strombeck), *N. clava clava* Stolley, *N. clava tudarica* Ali-zade, *N. clava colchica* Nazarishvili, *N. montanus* Ali-zade, *N. azerbaijanensis* Ali-zade, *Hibolites inguriensis* Rouchadze, *H. bziensis* Rouchadze, *H. horeshaensis* Rouchadze, *Duvalia grasiana* (Duval-Jouve). There is the following complex in the Middle Aptian: *Mesohibolites moderatus* (Schwetzoff), *M. ekimbontchevi* Stoyanova-Vergilova, *M. elegans* (Schwetzoff), *M. elegantoides* Stoyanova-Vergilova, *M. notus* Mishunina, *Mucrohibolites issiae* Nazarishvili, *Mucr. krimholzi* Nazarishvili, *Neohibolites aptiensis* (Killian), *N. inflexus inflexus* Stolley, *N. inflexus angelanica* Ali-zade and these species: *Mesohibolites brevis* (Schwetzoff), *Mucrohibolites krimholzi* Nazarishvili, *Neohibolites wollemanni* Stolley, *N. strombecki* (Müller), *N. kabanovi* Nazarishvili, *N. subminor* Stolley are in the Upper Aptian.

It is comparatively easy to define the boundary between Aptian and Albian sections, because the complex found in Albian is very different from Aptian one. Almost no species of Aptian stage passes to Albian. The Lower Albian is presented by the following complex of belemnites: *Neohibolites minor* Stolley, *N. andrussovi* Natzkiy, *N. lickovi* Natzkiy, *N. schvetzovi* Natzkiy, *N. alboaptiensis* Natzkiy, *N. bajarunasi* Natzkiy. The Middle Albian is characterized by this complex: *Neohibolites minimus* (Lister), *N. pinguis* Stolley, *N. attenuatus* (Sowerby), *N. spiniformis* Krimholz, *N. stylioides* Renngarten and the Upper Albian is presented by the following complex of belemnites: *Neohibolites subtilis* Krimholz, *N. stylioides* Renngarten, *N. ultimus* (d'Orbigny), *Parahibolites pseudoduvalia* (Sinzow).

Summarizing all the aforementioned facts based on a detailed study of lower Cretaceous sections in Georgia, gathering paleontological material and also rich literature sources [1-15], allow us to specify the stratigraphical meaning of the single genus and species of belemnites and to offer a new scheme of biostratigraphical division of lower Cretaceous sediments by belemnites (Table 1).

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