

## Biostratigraphic chart for the Lower Cretaceous of the central and eastern European (Russian) platform

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A standard correlation chart was compiled for the Lower Cretaceous of the Russian Platform in 1954. It was published in 1955 and unified charts and correlation charts were specified in 1962. Thirteen and nineteen zones respectively were recognized in the first and second versions of the standard part of the chart. The correlation part initially covered 10 and 11 regions respectively. In the 1962 chart, the Valanginian was subdivided into Lower, Middle and Upper Valanginian, comprising the *rjasanensis* and *stenomphala* zones (Lower Valanginian), *hoplitooides*, *keyserlingi* + *michalskii* zones (Middle Valanginian) and *polyptychus* zone (Upper Valanginian). In the Lower Hauterivian the *hystrix* zone and the higher *biassalensis* zone were recognized for the central regions and Emba region respectively. The *versicolor* zone was recognized in the Upper Hauterivian. The *decheni* + *discofalcatatus* and *jasikowi* zones were recognized for the Lower and Upper Barremian, respectively. The Aptian was subdivided into Lower and Upper Aptian. The Lower Aptian comprised the *ridzewskiyi*, *weissi* + *bowerbanki* + *deshayesi* zones. The Upper Aptian comprised the *tschernyschewi* and *melchioris* zones. The Upper, Middle and Lower Albian comprised (in ascending order) the *jacobi* and *tardefurcata* (Lower), *dentatus* (Middle) and *inflata* (Upper) zones. The standard part was represented by the *ammonite* zones with typical cephalopod assemblages and scarce bivalves.

During the subsequent 30 years, extensive stratigraphic data resulting from surveys, prospecting and exploration necessitated the compilation of new charts. Consequently, the Interdepartmental Stratigraphic Committee (MSC of the USSR) decided to compile new charts using the available data and incorporating the state-of-the-art position on Stage subdivision of the Lower Cretaceous. The standard part of the chart incorporates data available for 18 districts and subdistricts belonging to four major regions of the central and eastern Russian Platform. These are the Moscow Syncline, Ulyanovsk-Saratov Trough, north-western Caspian Depression, and the Kalmyk-Astrakhan Volga region. The most abundant faunal occurrences were reported from the Moscow Syncline, and it is therefore used as a type area. Sixteen authors from five cities (Moscow, Nizhnii Novgorod, Saratov, Guriev, St. Petersburg) and nine institutions (PGOTsentrgeologia, Moscow University, VSEGEI, VNIGRI, PGOSevmorgeologia, Volgogeologia, NII of Saratov University, Nizhnevolzhskgeologia, and KazNIGRI) took part in the compilation of the present chart. All the recently published data were taken into account as well. PGOTsentrgeologia represented by

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General Stratigraphical scale			Biostratigraphic chart for the central							
System	Series	Stage	Substage	Zonation (MSK, 1981)	Zones Russian Platform	Buchia Zones	Stratum with Belemnites	Stratum and zone with Foraminifera	Formation (Horizon)	
C r e t a c e o u s	E a r t h y	Albian	Upper	Stoliczkaia dispar				Stratum with Trochammina kugtangensis	Varavinsky	
				Mortonoceras inflatum - Hysteroeras orbigny	Mortonoceras inflatum		Guembelitia evginae Epistomina postdorsopiana			
				Anahoplites rossicus						
			Middle	Anahoplites daviesi - Daghestanites daghestanensis				Haplophragmoides Stratum with H. ultramarinus Marginulina hangensis	Kolchuginsky	
				Anahoplites intermedius	Anahoplites intermedius		Evolutinella albensis, Dorothia gradata			
		Lower	Hoplites dentatus	Hoplites dentatus			Conorboides mtra, Epistoma spinulifera Orthokarstenia asperula			
			Protophilites archariatus Sonneratia perinflata Leymeriella regularis Leymeriella tardefurcata Proleymeriella schrammeni							
		Aptian	Middle	Upper	Hypacanthopites jacobi	Hypacanthopites jacobi			Turrilina ovexa, Quadrinophina minima	Kotlovsky
					Acanthopites nolani					
				Parahoplites melchioris	Parahoplites melchioris		Vermulina kasakstanica Gavelinella rjermmeda Gavelinella timokova / Rosalina dampelae Giantulina aptiensis			
	Lower		Colombiceras crassicoatum - Epicheloniceras subnodosocostatum	Epicheloniceras tschernyschewi		Glomospira aptiensis Koeglundina aptiensis				
			Dufrenoyia furcata Deshayesites deshayesi	Deshayesites deshayesi		Stratum with Buliminella humilis Gavelinella infracoplanata				
	Barremian	Upper	Colchidiscus securiformis				Oxyteuthis jasykowi	Conorbinopsis barremicus, Gyroidinoides sokolovae	Vladimirian	
			Sitesites seranonis - Barremites strettostoma							
		Lower	Holodiscus caliaudanus - Nicklesia pulchella				Milammia mtiukae			
			Upper	Pseudothurmannia angulicostata - Craspedodiscus discofalcatus	Craspedodiscus discofalcatus			Hbolktes sp		Spiropectamina parvula
										Quinqueloculina micra Marginulina comma
	Subsarynella sayni - Speetonoceras subversum						Cribrostomoides infracretaceus, Trochammina gyroldiformis			
	Hauterivian	Upper							Jaroslavlian	
			Crioceratites nolani Acanthodiscus radiatus	Pavlovites polyptychoides Homolomites bojarkensis	Buchia aff. crassicolis B. sublaevis, B. crassicolis					
Lower		Saynoceras verrucosum Neocomites neocomiensis	Polyptychites polyptychus	Buchia sublaevis						
		Kilianella raubaudiana	Polyptychites keyserlingi - Ternnoptychites hoplitoides	Buchia keyserlingi						
Pseudogarnieria undulato - plicatilis		Buchia inflata								
Berriasian	Fauriella boissieri	Surites teikwinianus	Buchia volgensis Buchia okensis Buchia unctoides		Acrotheutis mosquensis Acrotheutis russiensis	Riasanian				
		Tirnovella occitanica	Riasanites rjasanensis	Buchia fischeriana Buchia urshensis Buchia volgensis Buchia okensis						
	Pseudosubplanites ponticus - P. grandis									

# and eastern East European (Russian) platform

## T y p i c a l A s s e m b l a g e s

Ammonites	Bivalvia	Belemnites	Brachiopoda	Foraminifera	Radiolaria
Calliophiles vraconensis Spath. Prohystraceras cf. goodhalli Spath.	Aucellina gryphaeoides (Sow.) Aucellina stuckenbergi Pavl., Actinoceramus sulcatoides Sav.	Parahelmites touriae (Weign.)		Haplophragmoides ulorobis Eich, Ammobaculites explanatus Man., Trochammina kugltangensis Byk. Haplophragmoides ultramarinus (Vass.), Epi- stomina postdorsolena (Vass.), Hedbergella caspia (Vass.), H. globigerinellinoides (Subb.), Guembeltia eugeniae Vass.	Parodiscus(?) inflatus Smet. A. P. (P.) P. (P.) K. Aliev Stichococpa. Berale K. Aliev, Orculites mulla Kozl. Orculites Pesagno
Dimorphophiles beresovkensis Glas. D. cf. burkensis Glas., Anaphilites sp.  Hapilites dentatus (Sow.) H. spathi Breist, H. benettianus (Sow.), H. delucii (Brongst.), H. angierianus Ret., Archophiles jachromensis (Nik.)	Inoceramus anglicus			Haplophragmoides ultramarinus (Vass.), Evolu- tinea albensis Nik. et Vass., Valvulinaria parva Khan, Marginulina hangensis Vass.	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
Anadesmoceras tenue Casey A. stranguilum Casey Vnigraceras sinovi Sav. Archophiles bogoslovskyi Sav. A. cf. gerassimovi Bar. et J. Mich. A. jachromensis (Nik.) Ctenoceras (Necosynella) continuum Mich. Hypacanthophiles jacobi (Coll.)				Protosinella aharbomina (Chapm.), Haplophragmoides nonioides Reuss, H. chapmani Moroz, Haplophrag- maequale (Roem.), Tibicula pyramidalis Reuss, Gas- drynopsis filiformis (Berth.), Dorothis gradata (Berth.). Evolutina subvoluta Nik. et Mjatl., Gasdryna barrowensis Tap., Lentaculina monostica (Reuss), Cuneolites mitra (Hir- Eptonina spinulosa (Reuss), Gavelinella intermedia narma- ca (Berth.), Orthokarmania epaculata (Chapm.), Pseudostoma littora (Berth.), Neobulimina vasidosa (Khan.), Lingulogavelinella staleia (Bukal.)	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
Parahelmites melchioris Anth.				Lentaculina gaultina (Berth.), Palmula costata Aleks., P. kasachstanica Aleks., Valvulinaria gracili- formis Dam., Patalinoides involutatus Mjatl., Hedbergella planispina (Tap.)	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
Epicheloniceras tschernyschewi (Sinz.)				Recurvirodes beiratae Vass., Ammobaculites erectus Casp. Dorothis nitens Nik. et Vass., Verruculites kasachstanicus Mjatl., Verruculoides caspica Mjatl., Verruculoides bore- al. Tap., saratensis Mjatl., Trochammina saratensis Mjatl. Mertulites ruzhanskis (Crasph.)	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
Sannarhinoceras trautschoidi (Sinz.)				Lentaculina kasachstanica Vass., Valvulinella kasachstanica (Mjatl.), Gyrodinoides scaber Mjatl., Gaudinella apertus Mjatl., Rossella dampfata (Mjatl.)	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
Deshayesiella watsi (Neum. et Uhl.) D. deshayesi (Leym.), D. consobrinoides Sinz. D. volgensis Glasun., Sannarhinoceras trautschoidi Sinz. Tropasium bowerbanki Sow. Matheronites ridzewskiy (Kar.)	Inoceramus volgensis Glasun., Inoceramus borealis Glasun., Corbula porifera Tr.			Hyparantina apica (Damp. et Dan), Glomospira apertus Mjatl., Mjatlucina gaultina (Berth.), Haplo- phragmoides ibericus (Mjatl.), H. rosaceus Subb., Ammobaculites erectus Craspin, Eptonina danica Mjatl., Hedbergella apertus Bar.	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
		Oxyteuthis jasykovi (Lah.)		Sulimella humilis Ant. et A. Kuzn., Gavelinella infracretacea (Mjatl.), Caricostella woodi (Khan), Gerbertella drossierensis F. et M. Bolivina kusnezovae Ant.	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Quinqueloculina infracretacea A. Kuzn., Cornuspira cretacea Reuss, Lentaculina barremica (Agal.), Marginulina spinulosa Mjatl., M. eichenbergi Mjatl., Discorbis agalarovae Ant., Conobroides ibericus Mjatl., Conorbipopsis barremicus (Mjatl.), Gyrodinoides sokolovae (Mjatl.), Gavelinella barremiana Bett.	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Litocula buliformis (Brady), Haplophragmoides barre- micus Mjatl., Mjatlucina gaultina (Berth.), M. chapma- ni M., Ammobaculites scobianensis M., A. raephalo- ides Bar., Trochammina numerosa Ak., Evolutina portensis M. et Kossik, Pseudobolivina teplovskan- is Mjatl.	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Ammodiscus infracretaceus Ak., Haplophrag- moides multiformis Ak., Spiroplectammina mag- na Ak. et Kallig, Textularia aff. minuta Berth., Trochammina mitra Ak., T. mica Ak., Bimontellina textulariformis Ak., Verruculina minuscula Ak., Spiroplectammina parvula A. Kuzn.	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Margulinella gracilissima (Reuss), M. compta Roem., M. zaspelovae var. nordkaspensis Mjatl., Marginulina pyramidalis (Koch), Valvulinaria perobitqua (Reuss), Strobilina praesicula M., G. pricea Reuss, Quinque- loculina mitra (Mam.)	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Kabanoviella kabanovi Sm. Kabanoviella latuseni, Sm. Praeyclothyris remota Sm.	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Mjatlucina multivoluta (Rom.), Tolypanmina cretacea Dain., Haplophragmoides subchap- mani Kuzn., Ammobaculites bagenalliformis M., A. subaequalis M., Trochammina neocomiana M., Valvulinamina ratnovskajae Kus., Ver- ruculoides neocomiensis (Mjatl.), Subbo- baculites volksenis (Dain.), Pseudobolivi- na styrica Mjatl., Cibicides mouleus infra- cretaceous (Mjatl.)	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Acrotheuthis sokolovi Sm., Akrotheuthis caspica Sm., Lyasovya planifera Sm., Valgathyris Sm.	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Acrotheuthis subquadrate (Roem.) Acrotheuthis arctica (Blöthg.) Pachytheuthis subquadrate (Roem.) Acrotheuthis lateralis (Phill.) A. crassa (Blöthg.)	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Buchia crassicollis (Keys.), B. sublaevis (Keys.) Buchia sublaevis (Keys.), B. crassicollis (Keys.) B. keyserlingi (Tr.), Inoceramus sp., Campanoceras sp.	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Buchia crassicollis (Keys.), B. sublaevis (Keys.) Buchia inflata (Lah.), B. crassa (Pavl.) B. keyserlingi (Tr.)	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
				Buchia volgensis (Lah.), B. okensis (Pavl.) B. unclodes (Pavl.), B. fischeriana (d'Orb.) Campanoceras lamellosus (Sow.) Lima subcostata Geras	Crucella messinae Pesagno, Phacelliforma concordica Lipm Acanitolyta Umblicata Rüst. Stichococpa com-
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A. G. OLFERIEV and P. A. GERASIMOV contributed greatly to the compilation of the chart. N. I. SHULGINA and S. A. CHIRVA were appointed responsible for the organizing work and consideration of the chart by the Interdepartmental Stratigraphic Committee and its chairman A. I. ZHAMOIDA.

The left hand part of the chart shows the ammonite zonation for the Lower Cretaceous worked out under the guidance of Dr. V. N. VERESHCHAGIN for the entire former Soviet Union; it was published in the Resolution of the MSC and its permanent Commission (1981).

However, it is quite obvious that a general zonation cannot be used for the entire former Soviet Union, and that only regional zonal schemes can be applied. Unfortunately, the author was ill at the time and could not advocate her viewpoint. Nevertheless, the above scheme is considered to be mandatory, though undoubtedly the left hand part should contain zones of stratotype stages.

The right hand part of the chart presents a regional scheme for the central and eastern regions, comprising 19 ammonite zones. In contrast to the earlier charts, parallel zonations are also given: The *Buchia* zones, belemnite, and foraminifera zones and beds, as well as radiolaria and brachiopod beds. Also we give the 7 formation members (or series) which can be seen throughout all the regions.

The Berriasian in this scheme comprises two zones. The lower zone remained the same (*rjasanensis*). However, I believe that the *rjasanensis* Zone can be subdivided into three zones or subzones – *rjasanensis* + *subclypeiforme*, *rjasanensis* + *kochi*, and *rjasanensis* + *euthymiceras* + *spasskensis* – but this proposal has not been accepted. The higher (*stenomphala*) zone of the original scheme was replaced by the *tzikwinianus* zone (GERASIMOV, 1971) because the index species of the former zone had not been recorded and its range was uncertain.

In the Lower Valanginian, SAZONOVA (1970) recognized the *undulato-plicatilis* zone. GERASIMOV (1986) amalgamated the overlying *hoplitoides* and *keyserlingi* zones into a single zone because he considered that it was impossible to distinguish them. The former *polyptychus* zone remained in the Upper Valanginian. The *bojarkensis* and *polyptychoides* zones (ARISTOV & IVANOV, 1971; SHULGINA et al., 1979) were recognized in the Lower Hauterivian for the first time. In my opinion, the Hauterivian *versicolor* zone of the original scheme should be assigned to the Lower Hauterivian because of the fact that in the boreal, more northern regions it lies just above the deposits of the *bojarkensis* Zone. However, the geologists from the Caucasus who were present at the meeting where the decision regarding the scheme was taken presented reasons for placing the zone in the Upper Hauterivian. With regard to the zonal scheme for the higher stages, I agreed with what had been decided by the authors because I have not personally studied the Barremian, Aptian and Albian.

In Addition to the chart presented here, three other stratigraphic charts were compiled for the Russian Platform. Two of these consist of the standard and correlation part. In East Belarus and the South Ukraine, (four districts and subdistricts), the deposits contain mainly foraminifers and pollen-and-spore assemblages. Here only four ammonite zones can be recognized: *keyserlingi* + *hoplitoides*, *versicolor*, *dentatus*, *inflatum* and *dispar*. Six beds with palynoflora were recognized in the standard part.

For the northern regions of the Russian Platform (seven districts) starting from Franz Josef Land, Kolguev Island, the Timan-Pechora region, and the Syzola River basin, the Neocomian of the standard part is represented by the Siberian zones and faunal assemblages. The higher horizons contain foraminifers

and palynoflora. A working chart was compiled for the south-western part of the platform. The Lower Cretaceous deposits of the southern Baltic area, West Belarus, Cis-Carpathians, the South Ukraine, and the Black Sea and Moldavia area (ten districts) are represented only by the upper part of the succession (Aptian-Albian) and contain scarce marine bivalves, foraminifers and shark's teeth (Lithuania).

About 40 authors participated in the compilation of the four charts.

In terms of palaeozoogeography, the East European Platform belongs (at least for the Neocomian) to the Boreal-Atlantic realm. In a joint paper (SAKS et al., 1971) three areas: Boreal-Atlantic, Boreal-Pacific and Arctic regions were recognized in the Boreal Realm. Each of the regions was subdivided into a number of provinces. The Boreal-Atlantic region consists of the East and West European provinces. The East European province contains the Russian subprovince and the Pechora subprovince. The West European region includes Poland, England and Germany.

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