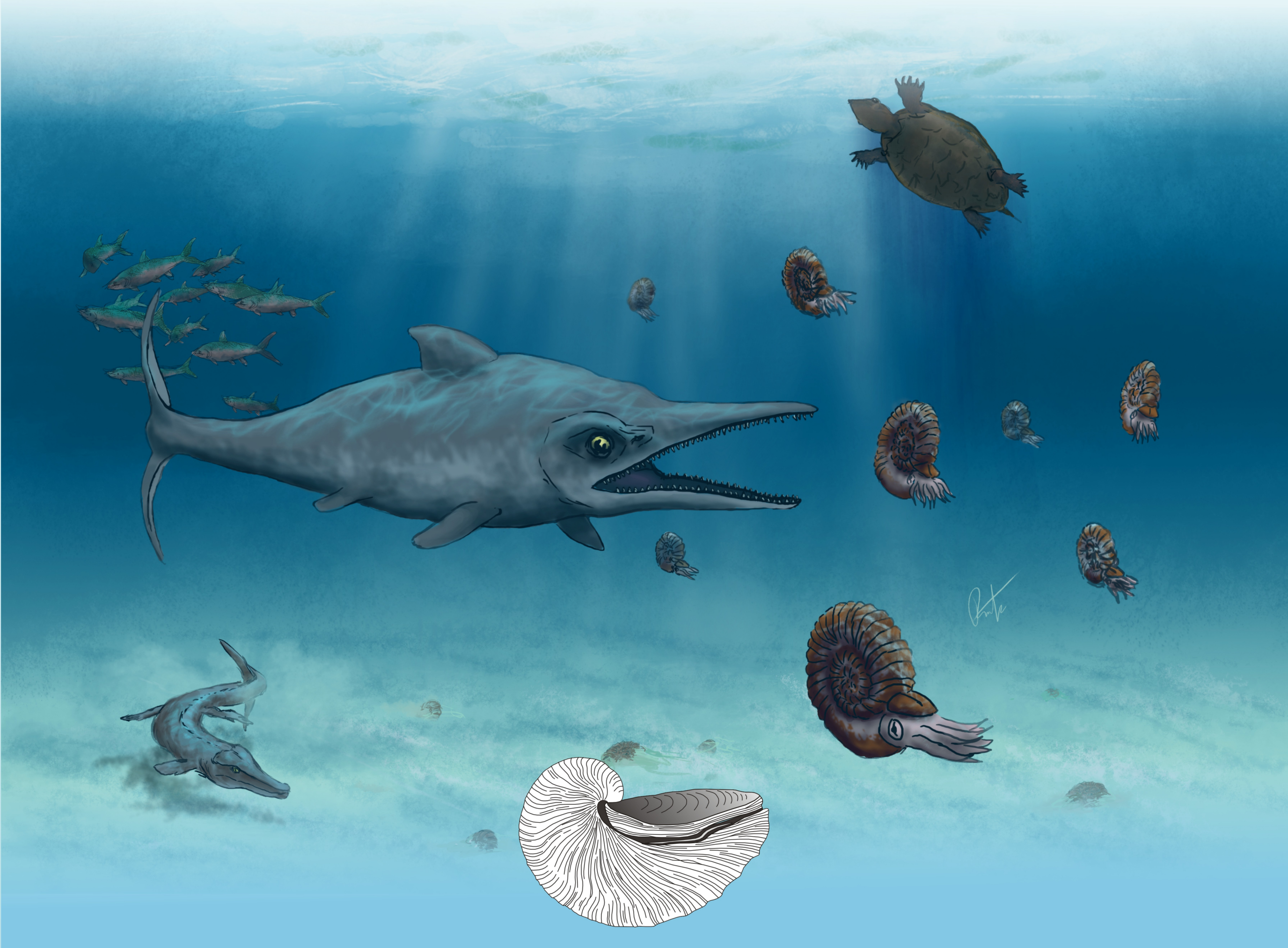
XIIth Jurassica Conference

Workshop of the ICS Berriasian Group and IGCP 632

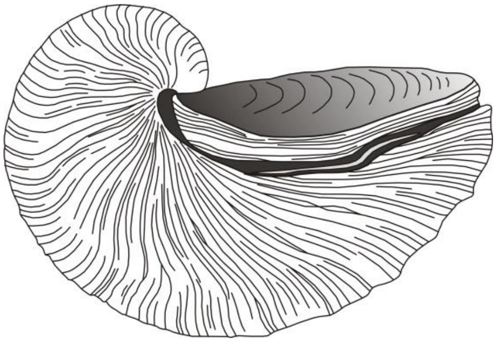
Field Trip Guide and Abstracts Book



Smolenice, Slovakia, April 19–23, 2016

Earth Science Institute, Slovak Academy of Sciences
Bratislava
2016

XIIth Jurassica Conference



Field Trip Guide and Abstracts Book

April 19–23, 2016,
Smolenice, Slovakia

Edited by: Jozef Michalík and Kamil Fekete

Earth Science Institute, Slovak Academy of Sciences
Bratislava 2016

Scientific Committee:

Organizing Committee:

Edited by: Jozef Michalík (Earth Science Institute, Slovak Academy of Sciences)
Kamil Fekete (Earth Science Institute, Slovak Academy of Sciences)

The editors are grateful for the financial support: Slovak Research and Development Agency, SRDA (project No. 14-0118).

The manuscripts in this abstract book have not been subjected to the review. The authors are fully responsible for the scientific content, language and copyright of submitted figures and data in their articles.

ISBN 978-80-85754-36-0

WORKSHOP OF THE ICS BERRIASIAN GROUP

(JURASSIC/CRETACEOUS BOUNDARY)

JKB workshop-stratotypes:

New Bio- and Magnetostratigraphic Data at the Jurassic-Cretaceous Boundary of the Chigan Cape (Vladivostok Region, Russia)

ANDREY YU. GUZHIKOV[1], VLADIMIR V. ARKADIEV[2], EVGENIJ YU. BARABOSHKIN[3], A. A. FEODOROVA[4], O.V. SHUREKOVA[4], E.E. BARABOSHKIN[3], A. G. MANIKIN[1], V. V. GOLOZUBOV[5], S. A. KASAT-KIN[5], and V. P. NECHAEV[5]

[1]*Chernyshevsky Saratov State University, Saratov, Russia; aguzhikov@yandex.ru*
[2]*Saint Petersburg State University, St. Petersburg, Russia; arkadievvv@mail.ru*
[3]*Lomonosov Moscow State University, Moscow, Russia; EJBaraboshkin@mail.ru*
[4]*Research and Production Enterprise Geologorazvedka, St. Petersburg, Russia*
[5]*Far East Geological Institute FEB RAS, Vladivostok, Russia*

We have studied the well-known Chigan section (Chigan Cape, Podiapolsky Town region, coordinates 42°57'37.8"N, 123°17'47.0"E) previously referred to Berriasella jacobi ammonite zone (Konovalov, Konovalova, 1997; Sey, Kalacheva, 1999) based on ammonite findings: *Pseudosubplanites* cf. *grandis*, *P.* aff. *combesi*, *Berriasella* ex gr. *jacobi*, *Dalmasiceras*, and others. Some geologists [5] supposed that the section contains Jurassic–Cretaceous (J/K) boundary interval. Stratigraphic description of the section was accomplished by macrofauna searching and samples collecting for the paleomagnetic and micropaleontological analysis. Outcrops consist of gray poorly sorted muddy sandstones (fig. 1).

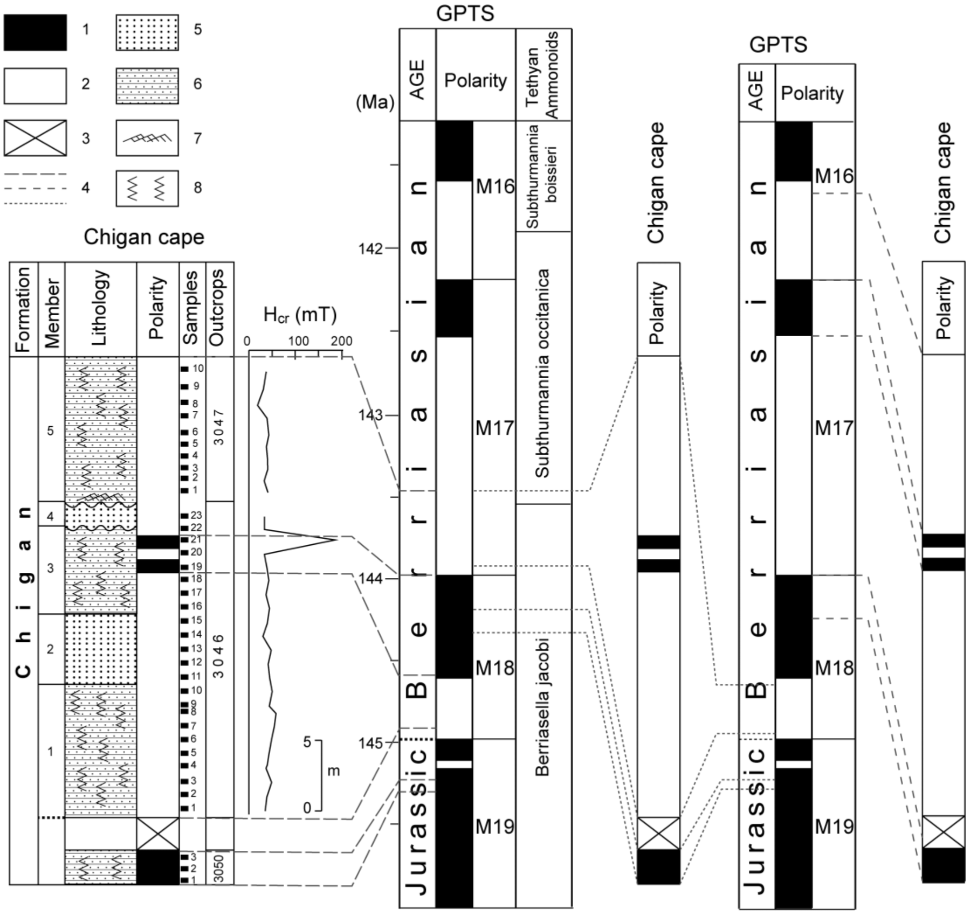


Fig. 1. Different variants of paleomagnetic correlations of the Chigan cape section with the Geomagnetic Polarity Time Scale (GPTS) (Gradstein et al., 2012). Legend: polarity: 1 – normal, 2 – reverse, 3 – no data; 4 – correlation lines of different possible correlations; lithology: 5 – sandstones, 6 – muddy sandstones, 7 – cross-bedding, 8 – bioturbation.

Most of sandstones are intensively burrowed by *Schaubcylindrichnus coronus* Frey et Howard, 1981, as a dominate ichnogenus, and also contain *Teichichnus* isp., *Thalassinoides* isp., *Ophiomorpha irregulaire* Frey, Howard et Pryor, 1978, *Phycosiphon incertum* Fischer-Ooster, 1858, *Rhizocorallium commune* Schmid, 1876, *Asterichnus lawrencensis* Bandel, 1967, *Bichordites monastiriensis* Plaziat et Mahmoudi, 1988, *Neonereites uniserialis* Seilacher, 1960, *N. biserialis* Seilacher, 1960 and some non-identified taxa (Baraboshkin, Baraboshkin, 2015). The ichnoassemblage and lithology are typical for the lower shoreface zone. A specific 1.5-m level of middle-upper shoreface massive sandstones (member 4) was recognized in the middle part of the section. It is limited by the erosional surfaces at the base and at the top. The upper surface is a transgressive surface, which is overlaid by 10-cm cross-bedded sandstone, replaced laterally by bioclastic rudstones. The visible thickness of the section is 33 m. These layers crop out in steep cliffs at a distance of 500 meters. Its bedding is nearly horizontal and they are crossed by a number of Late Cretaceous gabbro dikes. For the comparison we have studied section 3050 to the south (~1.1 km), which continues the Chigan Formation (Sey, Kalacheva, 1999) and has the same stratigraphic age (Konovalov, Konovalova, 1997).

Macrofauna. In the rockfall at the base of the section we found the remains of ammonites: an imprint of *Pseudosubplanites* cf. *combesi* Le Hégarat (fig.2) and living chamber fragment of *Pseudosubplanites* sp. In addition, in the collection of I.V. Konovalova (1993), courtesy of the "Primorgeologiya" Company, we have determined *Berriasella* cf. *jacobi* Mazenot (fig. 3) and *Pseudosubplanites* sp., also found in the debris at the base of the same sections. All these findings characterize the Lower Berriasian Jacobi Zone. It should be noted that *P.* cf. *combesi* differs from other *Pseudosubplanites* by evolute shell and prevalence of bifurcate ribs. It is also very similar to some Upper Tithonian forms (*Oloriziceras* type).

Fig. 2. *Pseudosubplanites* cf. *combesi* Le Hégarat. Collected by V.P. Nechaev, 2014.

Fig. 3. Cast of *Berriasella* cf. *jacobi* Mazenot. Collection of I.V.Konovalova, 1993, sample 15-1547. Scale bar is 1 cm.

Palynology. The plant detritus, poor preserved gymnosperms pollen and spores, rare indeterminate proximochorate – proximate cysts and dinocysts *Sirmiodinium grossii* Alberti, *Systematophora areolata* Klement and *Tubotuberella rhombiformis* Vozzhen. were found in only one sample (3046/3) of 14. This assemblage ranges from Oxfordian to Early Valanginian.

Foraminifers. It was studied 11 powders and 3 thin sections for definition of microfossils. Thin sections (№№3046-3, 3a, 10) contain hardly distinguishable cross-sections of *Reophax, Bulbobaculites, Ammobaculites, Kutsevella, Flabellammina, Triplasia*?, *Gaudryina*?, *Trochammina.* The assemblage of agglutinated foraminifers was found in the outcrops 3046, 3047, 3050. It consists of primitive (~ 30%) *Reophax* (40%), Haplophragmiidae (50%), *Trochammina* (10%) and rare species Ataxophragmiidae (3%). The comparison of the assemblages with *Gaudryina* ex gr. *gerkei, Kutsevella labythnangensis, K. praegoodlandensis* from Chigan Cape with foraminifera zones (f-zones) and beds of Spitsbergen, Pechora Basin, Siberia is difficult, because they were formed under different conditions. Chigan assemblages are closer to the shallow-water assemblages of the north Western Siberia. In Bolshekhetsky area the assemblage with *Evolutinella* spp., *Gaudryina* cf. *gerkei* was found together with ammonites of the *Taimyrensis* Zone. It has 16 species common in f-assemblage of Chigan Cape. The assemblage with *Gaudryina gerkei, Trochammina rosaceaformis*, which was found together with *Buchia* cf. *volgensis* (Lahusen) has 13 identical species (Naydenov et al., 2013). A similar pattern is observed in the Chigan Formation sandstones with *Gaudryina* ex gr. *gerkei, Kutsevella labythnangensis, K. praegoodlandensis.* The section 3050 contains “Volga-type” *Trochammina* and *Evolutinella*, but the section 3046 contains "the Neocomian type" *Gaudryina* ex gr. *gerkei* and a lot of *Trochammina*.

Magnetostratigraphy. Samples from 34 stratigraphic levels were studied in the sections 3046, 3047 and from three stratigraphic levels – in section 3050 (Fig. 1). The sandstones have magnetic susceptibility (*K*) 6-$12{*}10^{-5}$ SI units and **NRM** $0.02\text{-}2.15{*}10^{-3}$ A/m

(The gabbro have *K*=60-140$*$10^{-5} SI units, **NRM** = 100-1000$*$10^{-3}A/m). Magnetite or related titanomagnetite are the principal magnetic minerals in the sandstones and gabbro. The hematite was found at the only level (sample 3046/21 near the base of member 4) (Fig. 1). Usually such levels are related to hiatuses and active oxidation of magnetite grains. Thermomagnetic and alternating field cleaning showed reproducible results, which substantially increase the reliability of paleomagnetic measurements relative to the results based only on one of magnetic cleaning procedures. The gabbro samples have one component of the **NRM** – **ChRM** (*D*=293°, *I*=84°). The mean paleomagnetic direction in sandstones: *D*=247°, *I*=(-84°).

The paleomagnetic column of sections 3046-3047 consists of the reverse polarity zone (R). Two narrow intervals of normal polarity (N) were recorded in the middle part of the R-zone (Fig. 1). The baked contact test is positive (the sandstones from unbaked zone have a reverse magnetization; the baked zone and the gabbro have normal **NRM**). Normal polarity fixes in the outcrop 3050 (Fig. 1). These facts demonstrate the ancient nature of the magnetization. The test of reversal is negative, but this fact does not reject the hypothesis of the ancient nature of the **NRM**, because gabbro is tens of millions years younger than the sandstone, and outcrops 3050 and 3046-3047 are located in different the tectonic blocks.

Discussion. Ammonite findings correspond to the well-known data (Konovalov, Konovalova, 1997; Sey, Kalacheva, 1999) on presence of the Jacobi Zone in this section. If the previous ammonite findings from the uppermost Chigan Formation characterized Jacobi zone, therefore the R-magnetozone can be analogue either polarity Chron M18r, or M17r. This R-zone may be equivalent to the M18 + M17r, because small N-polarity interval (samples 3046/19-21) corresponds to the break in sedimentation and a significant part of M18n could not preserve in the section (Fig. 1).

The main result of this study is the possibility of obtaining of paleomagnetic and micropaleontologic data together with the ammonite findings, which gives a hope for the determination of the J/K boundary in the Chigan Formation in future.

This study has been supported by RFBR grants *№ 14-05-31152, 13-05-00745a, 16-05-00207a* and the RF Ministry of Education and Sciences in the scientific field (*project 1757*).

References:

Baraboshkin E.Yu., Baraboshkin E.E. 2015. Ichnology of the Jurassic-Cretaceous boundary interval of the Chigan Cape (Vladivostok region, Russia). *In:* E.Yu.Baraboshkin, D.E.Bykov (Eds.), *The International Scientific Conference on the Jurassic/Cretaceous boundary. September 7-13, 2015, Samara (Russia). Proceedings volume. “Kassandra”, Togliatti* 21–24.

Gradstein F., Ogg J.G., Schmitz M.D., Ogg, G.M. 2012. *The Geologic Time Scale 2012*. Elsevier. 1144 pp.

Konovalov V.P., Konovalova I.V. 1997. The problem of the Jurassic-Cretaceous boundary in the Sikhote-Alin. *Tikhookean Geol.* 16, 6., 125–134.

Naydenov L.F., Repin Yu.S., Kolpenskaya N.N., Kulikova N.K., Savelyeva Y.N., Feodorova A.A., Shurekova O.V. 2013. New materials on the biostratigraphy of the Upper Jurassic and Lower Cretaceous deposits of the North part of the Western Siberia. *In:* Zakharov, V.A. et. al. (Ed.), *Jurassic System of Russia: Problems of Stratigraphy and Paleogeography. Proc. 5th All-Russian Conf. (), Tyumen, 23-27 Sept., 2013. OOO “IzdatNaukaServis”, Ekaterinburg,* 152–156 (in Russian).

Sey I.I., Kalacheva E.D. 1999. Lower Berriasian of Southern Primorye (Far East Russia) and the problem of Boreal-Tethyan correlation. *Palaeogeography, Palaeoclimatology, Palaeoecology* 150., 49–63.