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Cretaceous Ecosystems and Their Responses to Paleoenvironmental Changes in Asia and the Western Pacific: Short papers for the Fourth International Symposium of IGCP Project 608, Novosibirsk, August 15–20, 2016 / Dzyuba, O.S., Pestchevitskaya, E.B., and Shurygin, B.N., Eds. – Novosibirsk, IPGG SB RAS, 2016. – 134 p.

The book contains materials of the reports submitted to the Fourth International Symposium of International Geoscience Programme (IGCP) Project 608. Theoretical, methodical and practical questions of Cretaceous paleogeography, paleontological characteristics and stratigraphy of different regions of Asia and the Western Pacific are discussed. The significant attention is given to the Cretaceous climate and environmental changes, biogeography, biodiversity of terrestrial and marine ecosystems, and vertebrates of Asia and Western Pacific.

This book will be of interest to a wide range of geoscientists who study the Cretaceous Period.

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Cover illustration: *Psittacosaurus sibiricus*. Painting by Andrey A. Atuchin

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Ryazanian (Boreal Berriasian) ammonite succession of the Nordvik section (Russian Arctic): Revision and new data

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The section on the Nordvik Peninsula (the Laptev Sea coast, Anabar Bay) is studied since the 50th of last century that provides a lot of material. Nevertheless, it requires new revision. This investigation is based on some samples collected by V.A. Zakharov, Yu.I. Bogomolov, V.A. Marinov, but major part of the material was collected by the authors during 2003, 2009, 2011, and 2014 field seasons. The published data were analyzed (Basov et al., 1970; Zakharov et al., 1983; Bogomolov, 1989), and the N.I. Shulgina's collection located in the CSRGS museum (Saint Petersburg) was investigated.

The entire Ryazanian stage is here exposed comprising five ammonite zones. The base of the first *Chetaites sibiricus* Zone (about 3.5 m thick) is commonly defined in the Nordvik section at the base of thin bed 18 (3–5 cm) of phosphatic chalk (Fig. 1) according to the first occurrence of *Praetollia*. It should be noted that there are some questions on *Chetaites* occurrences from *C. sibiricus* Zone in the Nordvik section. The specimens of *C.* cf. *sibiricus* previously represented by N.I. Shulgina (Zakharov et al., 1983) cannot be attributed to this genus, because they are characterized by Craspeditidae-like suture pattern and a moderately tight umbilicus that allows the reliable identification of these forms as *Praetollia*. *C.* cf. *sibiricus* shown by Zakharov and Rogov (2008; Table II, Fig. 8) is hardly belongs to this genus; *C.* aff. *sibiricus* mentioned in the same publication (Ibid, Table II, Fig. 9) is characterized by a Craspeditidae-like suture pattern. This form is close to *Craspedites* (*Taimyroceras*), but differs in its large size in comparison to other *Craspedites* (*Taimyroceras*). In the collection of the authors, there is an exclusive specimen with wide umbilicus, which is important diagnostic feature of the genus *Chetaites*. However, this specimen was found in the next higher ammonite zone, i.e. *Hectoroceras kochi* Zone.

The assemblage of the *Chetaites sibiricus* Zone generally consists of various *Praetollia* as well as rare *Craspedites* (*Taimyroceras*), *Boreophylloceras*, and *Borealites* (?). New data show that previous occurrences of *Borealites* at such low stratigraphic level (Igolnikov, 2010) cannot be considered as definitive, because some large shells of *Praetollia* can have rather clear rib differentiations, typical for *Borealites*.

The base of second Ryazanian zone, *Hectoroceras kochi* (about 8.9 m thick), is defined by first appearance of index species and confined to the base of massive concretion horizon in the bed 23 (Fig. 1). It confirms the initial point of view on the location of zone base (Basov et al., 1970) that is supported by new occurrences of *H. kochi* at this level. In the lower third of the zone, various *Praetollia* continue to prevail among ammonites, several specimens of *Borealites* (*Borealites*) and single *Chetaites*, *Bochianites*, and *Biasaloceras* are found. Well preserved ammonites are rare in the middle part of the section commonly containing rare concretions, but there are some imprints defined as *Borealites* (?) sp. ind. There are plenty of ammonites in the upper part of the zone: *Borealites* (*Borealites*) and *Borealites* (*Pseudocraspedites*) are the most abundant, and *Boreophylloceras* and *Anabaroceras* are rare here. As the last one concerned, we should note that these are not the first findings outside the type locality (Anabar River lower reaches), but they are most ancient (type collection contains Valanginian specimens) (Repin, 2012).

New data on the succession of *Surites* from the *analogus* group fully comply with previous results (Basov et al., 1970; Zakharov et al., 1983), and the base of the *Surites analogus* Zone (4.3 m) is defined at the base of the bed 31 (Fig. 1). Along with *Surites*, the assemblage also comprises *Borealites* (*Pseudocraspedites*) and *Borealites* (*Ronkinites*), but they are less frequent.

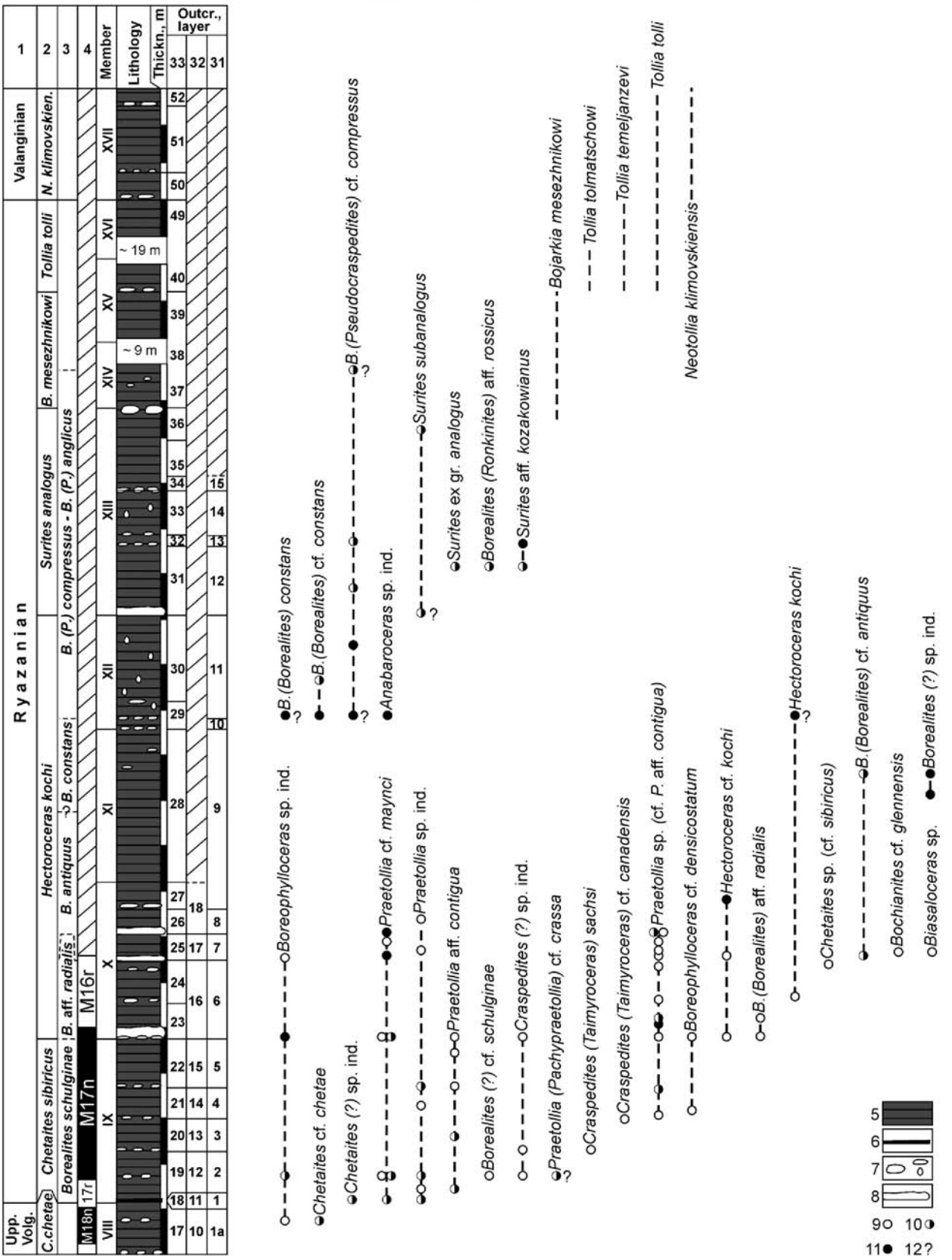

Fig. 1. Distribution of all known Ryazanian ammonite records in the Nordvik section (1967–2014). 1 – stage/substage, 2 – ammonite zones (Boreal standard), 3 – *Borealites* beds (A.E. Igolnikov), 4 – paleomagnetic zones; 5–8 – lithology: 5 – silty clays to claystones, 6 – phosphatic chalk, 7 – carbonate concretions, 8 – massive concretion horizon; 9–11 – localities: 9 – Outcrop 32, 10 – Outcrop 33, 11 – Outcrop 31; 12 – approximate position or loose occurrences from bed. Numbers of beds are after Zakharov et al. (1983) for the outcrops 32 and 33, and after A.E. Igolnikov (field data 2014) for the Outcrop 31. Thickness scale 1 m.

The *Bojarkia mesezhnikowi* and *Tollia tolli* zones, the uppermost two Ryazanian zones in the Nordvik section, are defined according to Yu.I. Bogomolov (1989). There are no fundamentally new data on these intervals, but the occurrence of *Boreophylloceras* sp. in the rock debris of *B. mesezhnikowi* Zone should be noted.

The continuous Ryazanian from the Nordvik outcrops with abundant ammonites and distinct zone boundaries can be regarded as a reference section for the north of Siberia. For instance, *Praetollia* confined only to the bottom of the *Chetaites sibiricus* Zone in the Kheta River section (Alekseev, 1984) remained unexplainable for a long time. *Praetollia* and *Hectoroceras* were previously reported from the Nordvik Peninsula and Greenland (Basov et al., 1970; Zakharov et al., 1983; Surlyk, 1973), and they are recently found in the *Hectoroceras kochi* Zone in the Lena River (Rogov et al., 2011) and in the North Sea regions (Abbink et al., 2001). Thus, the part of the Kheta River section previously assigned to the *C. sibiricus* Zone (Saks, 1972; Alekseev, 1984) can be now considered as the *H. kochi* Zone due to co-occurrence of *Chetaites* sp. and *Hectoroceras* sp. in the base of the section (Saks, 1972; Zakharov, 1990). The base of the *H. kochi* Zone must be identified by the first appearance of *Hectoroceras* (Casey et al., 1988). Nevertheless, *Hectoroceras* specimens from the Kheta River have never been described in the publications and they are absent in the collection (excluding the specimen from the rock debris apparently of the higher stratigraphic levels), so it is impossible to check the accuracy of their definitions. According to the field data of M.A. Rogov (2015 season), Outcrop 21 in the Kheta River completely consists of Quaternary rock debris, and the Lower Cretaceous with very rare ammonites can be only found in the pits. All specimens of *C. sibiricus* were found in the large bun-shaped concretions of calcareous siltstones from the rock debris of lower stratigraphic level that is evidenced by rock structure, as opposed to the visible section basement in the publications of predecessors (Saks, 1972; Alekseev, 1984; Zakharov, 1990). In this case, it is important either to select the neostratotype for the *C. sibiricus* Zone or use *Praetollia maynci* as index species for the lowermost zone of the Ryazanian stage in Siberia.

Chetaites and *Borealites* successions in the Nordvik section show that S.N. Alekseev's (1984) tripartite division of the *Hectoroceras kochi* Zone can be extended. Approximately 5 m of the section between the layers containing *Hectoroceras* and the last *Chetaites*, which can be compared with the *H. kochi* Subzone, and the level marked by the first appearance of *Borealites* (*Borealites*) *constans* do not contain any ammonites (Fig. 1). This lacuna corresponds to the layers with *B.* (*B.*) *antiquus*.

Using the data on ammonite succession in the Nordvik section, the boundaries of the *Hectoroceras kochi* Zone can be more accurately defined in the absence index species. The section in the Lena River lower reaches can be used as an example (Rogov et al., 2011). Here, there is the *Chetaites sibiricus* Zone with *Chetaites*, *Praetollia*, and *Borealites* in the bottom of the Ryazanian part of the section. This assemblage is typical for the lower third of the *H. kochi* Zone, so the *C. sibiricus* Zone may be absent in the region.

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