INTERNATIONAL SUBCOMMISSION ON JURASSIC STRATIGRAPHY

WORKING GROUP ON THE KIMMERIDGIAN-TITHONIAN BOUNDARY

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Newsletter n° 6

Rome, 1st March 1995

A. - REPORT AND NEWS

1. - ABOUT THE FIELD TRIP IN SOUTHERN FRANCE....

In the Newsletter n° 5 we gave information about the possibility to visit possible candidate sections for the stratotype of the Kimmeridgian/Tithonian boundary in South-East France. Since 1991, in the occasion of the Poitiers Symposium, it was decided to organize a field-trip of all the Upper Jurassic Working Groups in South-East France. Finally, the field trip has been organized in june 1994 for the Oxfordian and Kimmeridgian Working Groups only because of logistic problems.

On the other hand in the Newsletter n° 5 we wrote: "...ZEISS ATROPS and ENAY are now studying a solution for a field trip in 1995. The decision will be advertised in the next Newsletter."

Our french colleagues still have problems to organize the excursion for 1995. Thus, we can only hope to visit these french candidates sections in 1996. ZEISS and SCHWEIGERT are studying the possibility to organize a field meeting in Southern Germany in 1997.

We ask all colleagues who have possible candidate sections for the Kimmeridgian/Tithonian boundary to contact us in order to discuss the possibility to organize a field-trip.

2. - RE-ORGANIZATION OF THE ISJS WORKING GROUPS

As exposed by the President of the ISJS in different letters sent this year to the WG convenors and finally in the Newsletter n° 22, the conclusions of the International Commission on Stratigraphy (ICS) about the activity of the different Subcommissions show that only a few proposals for GSSP have been presented so far for approval. Concerning Jurassic, only two stage boundary sections will be proposed to ICS for discussion in Bejing International Congress (1997).

The activity of a Working Group is to carry on research on a special topic, in our case the Kimmeridgian-Tithonian boundary. The scope is to reach an agreement to propose a GSSP to the ICS.

Concerning our Working Group, we know where we want to draw the boundary, i. e. at the base of the Hybonotum Zone but, as exposed in the Newsletter 5, we are still unable to propose a continuous boundary stratotype section with sufficient faunal content !!!

The successful experience of the Bajocian Working Group, which proposes now the Cabo Mondego section, shows that the participants' suggestions on possible stratotype sections and then the excursions on them is the best way to proceed.

Thus, we have to concentrate our effort on this problem and to be able to propose a GSSP in the next five years. Obviously, it means that we have actually to do something for that. However,

sometimes it happens that we do not have the possibility to carry out this kind of research because of other professional projects or duties, changes in research field etc.

Most of the participants of our Working Group were totally inactive since the beginning of our history. It is hard to compile the "K/T Library" because almost everybody forgets to send any communications on his papers on topics related to the Kimmeridgian/Tithonian boundary or simply to the Tithonian.

We intend to re-build the Working Group and to limit it to the active members only. To be sure and in order to avoid an authoritarian behaviour, we ask you to fill the enclosed form and to send it back to the Secretary, F. CECCA, by May 1995.

Nevertheless, we will **cancel** from the Directory of our WG the colleagues who do not answer.

The colleagues who will give a positive answer are requested to give us suggestions for possible stratotype or auxiliary sections and ideas about the potential organisation of WG excursions to visit them.

B. - PARTICIPANTS' CONTRIBUTIONS

We present the second contribution from our participants since the beginning of our activities. We hope that this report will stimulate you to communicate news and results to the Working Group.

ABOUT THE KIMMERIDGIAN - TITHONIAN (VOLGIAN) BOUNDARY ON THE TERRITORY OF THE FORMER SOVIET UNION

by E. PROSOROVSKAYA, I. SEY & E. KALACHEVA Russian Geological Hsearch Institute (VSEGEI) St. Petersburg, 199026, Sredny pr. 74, Russia.

INTRODUCTION

The Kimmeridgian - Tithonian (Volgian) boundary on the territory of the former Soviet Union (FSU) is one of the difficult questions in the Jurassic stratigraphy.

As for the southern regions of FSU (the Crimea, Caucasus, Transcaucasus, Central Asia), where the Tithonian is the terminal stage of the Jurassic system, Kimmeridgian and Tithonian stages are mainly represented in a regressive cycle and often can be determined only by their position between Oxfordian and Cretaceous deposits. There are different formations with different facies; the regressive lagoon deposits, without faunas, are the most widespread. The lack of faunas and the fast lateral variation make the correlations very difficult.

In the Boreal regions, where the Volgian is the terminal Jurassic stage, Kimmeridgian and Volgian stages are represented by normal marine deposits in many districts (Russian platform, Northern Urals, Siberia, Eastern Russia). But there are only isolated solitary sections with a continuous uninterrupted stratigraphic succession and abundance of both Kimmeridgian and Volgian fossils. Although the Volgian was the time of the most extensive Mesozoic transgression (MESEZHNIKOV, 1989), the limited occurrence of Kimmeridgian and lowermost Volgian deposits is due to the erosion caused by the short but geographically wide Early Volgian regression.

KIMMERIDGIAN - TITHONIAN (K/T) BOUNDARY

CRIMEA - Kimmeridgian deposits in Crimea are preserved from the erosion only in limited, scanty areas. The best sections here are in the SW and W parts of the peninsula but the presence of Kimmeridgian deposits is not always clear, or the Upper Kimmeridgian is absent and in this case the Tithonian directly overlies the Lower Kimmeridgian. The Lower Tithonian is here established by *Richterella richteri* (OPPEL), *Haploceras cristifer* ZITTEL, *H. woehleri* (OPPEL), *Virgatosphinctes saheraensis* SPATH (Stratigraphy of the USSR, Jurassic system, 1972).

NORTHERN CAUCASUS - In this area the Kimmeridgian - Tithonian deposits are exposed in lithologically heterogeneous sections representing different facies (calcareous and volcanic rocks, flysch, evaporites). The places where the Kimmeridgian and Tithonian stages are represented in continuous successions and characterized by ammonites are rare. In the central part of the Northern Caucasus (Baksan - Assa interfluve) the Kimmeridgian is composed by limestones with thin sandstones, dolomites and gritstones (SACHAROV & KHIMSHIASHVILI, 1967; SACHAROV, 1984; SACHAROV et al., 1987; The Jurassic Ammonite Zones, 1988). One can only suppose the uppermost Kimmeridgian here, because the ammonites indicate the Lower Kimmeridgian and the base of the Upper Kimmeridgian (beds with *Aspidoceras* and *Idoceras*). The Early Tithonian *Lithacoceras ulmense* (OPPEL) was recorded from the thick overlying dolomites. In general the Lower Tithonian is represented in this area by evaporites and what is called the Kimmeridgian - Lower Tithonian of Northern Caucasus is represented by saline deposits. According to all the above mentioned facts it is clear that there is no possibility to identify the K/T boundary here (BEZNOSOV, 1973).

TRANSCAUCASUS - As for the former area, there is no possibility to identify this boundary here. In the Transcaucasus region the Kimmeridgian is mostly represented by lagoon deposits (Georgia) or volcanic rocks (Armenia, Azerbaidjan). In some districts there is a marine Kimmeridgian but without ammonites in its upper part. At the same time in Azerbaidjan (Konachgermaz Formation) there are findings of the Late Kimmeridgian species *Hybonoticeras beckeri* (NEUMAYR) while in the overlying Martuni Formation beds with *"Subplanites" contiguus* (CATULLO), *Haploceras carachtheis* (ZEUSCHNER), *"Perisphinctes" zitteli* SIEM. have been recognized (ROSTOVTSEV, 1992). However, the identification of the K/T boundary remains impossible. The uppermost Jurassic is composed by limestones, dolomites and volcanic rocks. Ammonites are extremely rare and only some findings are reported.

As for the other fossil groups in the Kimmeridgian and Tithonian stages, there are some attempts to establish zones based on Foraminifera (MAKAR'EVA & SACHAROV, 1982; TODRIA, 1977), there are also beds with Brachiopoda (PROSOROVSKAYA, 1993a, b) but until now these groups cannot be used to identify the K/T boundary.

CENTRAL ASIA - As it has been mentioned above, K/T deposits are formed during a large regressive cycle (which lasted from the top of the Callovian - base of the Oxfordian up to the mid-Berriasian) and lagoon facies is widespread here. There are only solitary isolated findings of ammonites in this interval in Balkhan, Kopet Dag and Gissar.

KIMMERIDGIAN - VOLGIAN (K/V) BOUNDARY

These stages are mainly represented in Boreal and Sub-Boreal regions by terrigenous deposits and, besides, by volcanic and siliceous rocks in Eastern Russia. The Kimmeridgian is mostly represented by finegrained rocks (clays and aleurolithes, carbonates often), sometimes by sands and sandstones. The Volgian has more various lithological composition (from conglomerates to fine aleurolithes and clays).

The best continuous K/V sections are exposed in the central part of the Russian platform (Gorodishche) and its southeastern surrounding (Berdyanka River Basin) as well as in the eastern slopes of the Northern Urals. As for the other regions of the FSU where Kimmeridgian and Volgian deposits occur, the boundary beds are eroded or they do not contain significant faunas for its identification.

The best studied ammonite succession is in the Volgian lectostratotype (Gorodishche). The uppermost Kimmeridgian is here composed by clay - marls (7 m) of the Autissiodorensis Zone; two subzones, Subeumela at the base and Fallax on top are represented. An abundant ammonite assemblage is known from here: Aulacostephanus (Aulacostephanoides) autissiodorensis (COTTEAU), A. (A.) volgensis (VISCHN.), A. (A.) kirghisensis (ORB.), A. (A.) undorae (PAVL.), Amoeboceras (Nannocardioceras) subtilicostatum (PAVL.), Virgataxioceras fallax (ILOV. & FLOR.) Sutneria subeumela (SCHNEID), Haploceras cf. subelimatum (FONT.), Subdichotomoceras (S.) sublacertosus (ILOV. & FLOR.), Glochiceras spp. These clay - marls conformably pass to the base of the Volgian and in particular to the clay - marls (5 m) of the Klimovi Zone, which contain Ilowaiskya klimovi (ILOV. & FLOR.), Sutneria cf. subeumela (SCHNEID), Neochetoceras cf. steraspis (OPPEL), Gravesia cf. gigas (ORB.), G. sp. and Glochiceras spp. (GERASIMOV & MIKHAILOV, 1966; MESEZHNIKOV et al., 1977; The Jurassic Ammonite Zones, 1988).

A rather similar section is exposed along the Berdyanka River: Upper Kimmeridgian sandstones with *Virgataxioceras fallax* (ILOV. & FLOR.), *Aulacostephanus jasonoides* (PAVL.) conformably pass to sandstones with *Ilowaiskya klimovi* (ILOV. & FLOR.). Thus, the K/V here coincides with the boundary between the beds with *Virgataxioceras fallax* and *Ilowaiskya klimovi* (GERASIMOV & MIKHAILOV, 1966).

The second region where it is possible to observe the continuous succession of Upper Kimmeridgian and Lower Volgian beds is the eastern slope of the Northern Urals. The best section here is located along the Lopsia River. The uppermost Kimmeridgian clays with Aulacostephanus (Aulacostephanoides) volgensis (VISCH.), A. (A.) undorae (PAVL.), Virgataxioceras dividuum MESEZH. gradually pass to the lowermost Volgian aleurithe with *Eosphinctes gracilecostatum* Mesezh., E. cf. magnum MESEZH., Gravesia polypleura HAHN. In the headstream of the Tolja River the clays with Virgataxioceras dividuum also pass to aleurithe with *Eosphinctes magnum* MESEZH., E. cf. gracilecostatum MESEZH. and Gravesia sp. M. S. MESEZHNIKOV (1984) recognized here the Autissiodorensis Zone, with the Virgataxioceras dividuum Subzone in its upper part, and the Eosphinctes magnum Zone. The K/V boundary coincides with the boundary between these two zones.

In other regions of Northern Europe and Siberia the K/V boundary coincides with a sedimentary gap. In the basin of the Pechora River (Pishma River) the beds with Aulacostephanus (Aulacostephanoides) undorae (PAVL.), A. (A.) volgensis (VISCH.), A. (A.) kirghisensis (ORB.), A. (A.) autissiodorensis (COTTEAU), A. (Pararasenia) cf. quenstedti (DURAND), A. (P.) pishmae (KHUD.) are overlain, with an angular unconformity, by deposits with Pectinatites (upper part of the Lower Volgian).

In Northern Siberia (Left Bojarka River) also the uppermost Kimmeridgian with *Oxydiscites taimyrensis* MESEZH., *Amoeboceras (Nannocardioceras)* sp., *A. (Euprinoceras) sokolovi* (BODYL.) of the Oxydiscites taimyrensis Zone is overlain by the Pectinatus Zone (MESEZHNIKOV, 1984).

Thus, according to the ammonite scale of the central and northern parts of FSU, the K/V boundary is the top of the Autissiodorensis Zoneand the base of the Klimovi Zone (Russian platform) or Magnum Zone (Northern Urals). Their zonal assemblages include *Gravesia* spp. with the other ammonites.

Also the Bivalvia Buchia characterizes the K/V boundary. The whole Upper Kimmeridgian is characterized by the maximum development of Buchia tenuistriata (LAH.), sometimes together with *B. rugosa* (FISCH.) and *B. mosquensis* (BUCH): B. tenuistriata Zone in Siberia (ZAKHAROV, 1981) and B. tenuistriata - B. rugosa Zone in the Far East (SEY & KALACHEVA, 1993). The Lower Volgian is characterized by the maximum development of *B. rugosa* and *B. mosquensis*. The mosquensis-rugosa Zone (lower part of the Middle Volgian) is established in the Russian platform, Far East and, apparently, in Siberia (ZAKHAROV, 1987). However, because of the hiatus occurring mostly everywhere at the base of the Volgian, it is impossible to recognize with certainty the K/V boundary by means of *Buchia*.

According to foraminifera, the K/V boundary is represented on the Russian platform (Gorodishche section) between *Pseudolamarkina pseudorjasanensis* - *Haplophragnium monstratus* Zone and the *P. bieleckae* - *Verneuilinoides kirillae* Zone. The former corresponds to the Upper Kimmeridgian (= Acanthicum, Eudoxus and Autissiodorensis ammonite Zones) while the latter to the Lower Volgian (= Klimovi and Sokclovi Zones) (AZBEL et al., 1986).

For the same section there is the attempt (NIKIFOROVA, 1986) to establish the K/V boundary according to the nannoplankton: coccolith assemblage from the Upper Kimmeridgian (= Eudoxus and Autissiodorensis Zones) has the greatest resemblance with the association of the *Vekshinella stranderi* Zone of S England and N France. The Lower Volgian assemblage has been correlated by E. V. Nikiforova with the association of the *Watznaueria communis* Zone in England and France.

Thus, it is possible to propose the stratotype of the K/V boundary in the type-area of the Volgian stage at the Gorodishche section (Russian platform, FSU) where the stratigraphic succession is continuous and the possibility to establish the K/V boundary both by ammonites and foraminifera exists.

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C. - K/T BOUNDARY LIBRARY

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