INTERNATIONAL SUBCOMMISSION ON JURASSIC STRATIGRAPHY

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Newsletter 33

Edited by Nicol Morton and Paul Bown

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CHAIRMAN'S REPORT

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Last Year – Next Year. Another year gone – how time flies! The past year (2005-2006) was certainly eventful, with a number of important meetings, including the "last" of IGCP Project 458, the first of IGCP Project 506, field and discussion meeting of the Toarcian Working Group in Peniche (Portugal) and a joint field and discussion meeting of the Kimmeridgian and Tithonian Working Groups (WGs) in Stuttgart (Germany). These meetings, plus all the smaller meetings and a lot of hard work by individuals, are contributing significant data and results to research on the Jurassic. On behalf of all the "members and friends" of the Jurassic I express my sincere thanks.

The next year (2006-2007) is the most important in the four-year cycle of activities with which the Jurassic Subcommission is associated. It brings the 7th International Congress on the Jurassic System during which the fruits of all the work mentioned above will be presented. We owe a great debt of gratitude to our Polish colleagues under the Chairmanship of Andrzej Wierzbowski, for their dedication to the organisation of this event. Those of you who have not been involved in organising such an occasion cannot imagine just how much is involved! This is an especially important Congress because it comes at a critical time in the Subcommission's priority project of the selection and proposal of GSSPs for the remaining Jurassic Stages. This will be an important topic for the Congress.

Global Stratotypes. The priority in stratigraphical research for IUGS, its International Commission on Stratigraphy and the various System-related Subcommissions, remains completion of definition of the units of the International Stratigraphic Chart by the establishment of a Global Stratotype Section and Point (GSSP) for the basal boundary of each chronostratigraphic unit down to Stage level in the hierarchy. Some of the Subcommissions (e.g., Devonian, Silurian) completed these in the 1980s and are either having to revise these or are defining Substages; others are making slow progress. ICS remains optimistic about completion by the 2008 deadline.

In the Jurassic, four of the eleven Stages (Sinemurian, Pliensbachian, Aalenian, Bajocian) have ratified GSSPs. For three others (Toarcian, Callovian, Kimmeridgian) it seems that the preferred candidate section has been selected and a formal proposal to the Subcommission can be expected in late 2006 or early 2007. During the Jurassic Congress in Krakow, it is hoped that there will be progress with agreeing the preferred candidate section for the Bathonian and Oxfordian followed by formal proposals in 2007. The situation for the Triassic/Jurassic boundary (Hettangian) and the Tithonian are less clear and discussions in Krakow will be of particular importance.

The Jurassic/Cretaceous boundary is technically the responsibility of the Cretaceous Subcommission, but progress on in documentation and selection for this boundary is disappointingly slow. Input from members of the Jurassic Subcommission could be appropriate.

International Geological Correlation (Geoscience) Programme. These Projects are independent of the Jurassic Subcommission but the Jurassic Subcommission maintains links with two IGCP Projects:

Project 458: Triassic-Jurassic Boundary Events has contributed an enormous amount of important data on correlation around the Triassic/Jurassic boundary (though this is not its sole objective), which is proving of great value to the Triassic/Jurassic Boundary Working Group. Unfortunately, this Project formally ended in 2005 but there will be a Joint Special Session during the Krakow Congress.

Project 506: Marine and Non-marine Jurassic Correlation was approved to start in 2005 and is expected to run until 2009. The first meeting – a Symposium on Jurassic Boundary Events – was held in Nanjing, China in November 2005. The second meeting is a Topical Symposium on Marine and non-marine Jurassic: biodiversity and ecosystems during the 2nd International Palaeontological Congress in Beijing, China, in June 2006, followed by post-Congress field excursion C7 Terrestrial Triassic-Jurassic sequence and biota in the Junggar Basin, Xinjiang. The third meeting will be a Special Session during the Jurassic Congress in Krakow.

IUGS Revue of the International Commission on Stratigraphy. The International Commission on Stratigraphy is the largest of the Commissions within the International Union of Geological Sciences and has been in existence for a long time. In 2005 the IUGS Executive decided to establish an Ad-hoc Review Committee, under the Chairmanship of Alberto Riccardi, to review the ICS. [John Callomon was one of the Committee members.] The committee convened in Paris on 7th-8th November 2005.

In June 2006 the Executive Committee of IUGS announced that it approved the Review Committee report and "is pleased to congratulate ICS for the important work it has done in promoting stratigraphic research, as the establishment of GSSPs has produced an important by-product: a large improvement in stratigraphy as a science, world wide." Actions to be taken by ICS include: modifications to the statutes; that ICS publications should conform to the provisions of the *International Stratigraphic Guide* and production of new editions of the *Guide.*

Among 11 additional recommendations to ICS:
(i) Typological definitions of standard chronostratigraphic units by boundary stratotypes, such as Stage GSSPs, should be extended downwards;
(ii) The validity of parallel standard chronostratigraphic classifications should be recognised, with Primary and Secondary or Auxiliary Standards.
(iii) Definitions of GSSPs should not be constrained by an unrealistic deadline.

There has not yet been time for discussion within ICS, so any comments and suggestions would be welcome and can be passed on to ICS for consideration.

Membership. The number of Voting Members of the Jurassic Subcommission, 20 plus 3 Executive, is

governed by the Statutes. The number of Corresponding Members is not constrained in this way and is much larger so that a "world-wide web" of Correspondents is available. To make this feasible, a Directory is distributed to all members, but for this to be fully effective it must be kept up to date. It is, therefore, extremely important that you inform the members of the Executive (myself, Paul Bown and Paul Smith) of any change of address, especially of email address.

The Directory is not a confidential document, but it should not be misused. Its purpose is to make it easier for you to make contact with colleagues internationally. However, please do not use the email listings to send messages to all members, without prior approval from the Executive.

In Memoriam. This year we mark the passing of one of our colleagues, Milos Rakus (Bratislava). It was somewhat by chance that Milos' death became known to us, and we are grateful to his colleagues for the tribute to him in this Newsletter. Please do inform us of the passing of any colleague who would be known in the international Jurassic "family".

The Newsletter. The Newsletters of the Jurassic Subcommission are a valuable means of communication among colleagues. It is open to all to contribute (we edit mainly to try to improve language and meaning, and only very rarely to avoid inappropriate content), but it is NOT to be taken as representing an official view of the Subcommission.

The success of the Newsletter depends on all of you - many thanks for your contributions, and please circulate it further to interested colleagues.

NEWS ITEMS & MEETINGS

7TH INTERNATIONAL CONGRESS ON THE JURASSIC SYSTEM, KRAKOW, SEPTEMBER 2006

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The 7th International Congress on the Jurassic System will be held in Poland, in Kraków. The programme includes scientific sessions (11-14 September 2006), pre-Congress field trip (6-10 September) and post-Congress field trips 14/15-17/18 September). So far, about 200 persons have enrolled for the Congress, from 36 countries all over the world (Azerbaijan, Austria, Australia, Brazil, Bulgaria, Canada, China, Czech Republic, France, Germany, Hungary, India, Iran, Italy, Japan, Mexico, Morocco, Norway, Poland, Portugal, Qatar, Romania, Russia, Saudi Arabia, Slovakia, Slovenia, Spain, Switzerland, Tunisia, Ukraine, United Kingdom and Vietnam.). Registration for participation is still not closed.

About 220 presentations have been announced, including short talks (135) and posters (85), and abstracts will be published in an Abstract Book. The Congress will be also the occasion to discuss and propose the standard sections (GSSP) for the stage boundaries – the most advanced seem proposals for the Pliensbachian/Toarcian, Callovian/Oxfordian and Oxf-ordian/Kimmeridgian boundaries. A special session will be also devoted to the lower boundary of the Jurassic System. The presentations will be grouped in 9 sessions (two of them devoted to IGCP projects – no. 458 "Triassic-Jurassic boundary events", and no. 506 "Marine and non-marine Jurassic: global correlations and major geological events"). The contributions will be published in the Congress Volume (the manuscripts to be submitted during the Congress). Similarly, as during the previous Congress in Mondello in 2002 the decision will be taken about the timing and location of the next Congress in 2010.

Further information is available from the Congress Secretaries (secretary.isjs7@uw.edu.pl) and website (www2.uj.edu.pl/ING/jurassica).

IGCP PROJECT 458 (TRIASSIC/JURASSIC BOUNDARY EVENTS: MASS EXTINCTION, GLOBAL ENVIRONMENTAL CHANGE, AND DRIVING FORCES) COMPLETES ITS 5-YEAR PROJECT

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The leaders of IGCP project 458 announce the completion of their 5-year project. It has been an exciting five years and we have witnessed incredible advances in our understanding of events surrounding the Triassic/Jurassic boundary.

By any measure, IGCP project 458 can be deemed a success. The project has resulted in more than 100 publications, many in top-ranked journals including *Nature*, *Science*, and *Geology*, covering a broad spectrum of issues related to events at the Triassic/Jurassic boundary including: biochrononology, palaeoecology, geochronology, magnetostratigraphy and stable isotope geochemistry. In five years of activity, IGCP 458 has sponsored numerous field workshops at classic Triassic-Jurassic boundary sections including: southwest England (2001); Newark Basin Eastern USA (2002); Stará Lesná, Slovakia (2003); Portovenere, Italy (2004); Transdanubian Range, Hungary (2005); and the Northern Calcareous Alps, Austria (2005). Likewise, the project had a very prominent presence at numerous international meetings, often with very well attended thematic symposia sponsored by IGCP project 458 including the Geological Association of Canada Annual Meeting (2003) and the 32nd International Geological Congress, Florence Italy (2004).

This project was truly an international effort involving more than 200 participants from 31 countries. The project included active participants from: Albania, Argentina, Austria, Belgium, Canada, China, Czech Republic, Denmark, France, Germany, Hungary, India, Israel, Italy, Japan, Morocco, Mexico, Netherlands, New Zealand, Peru, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Switzerland, Turkey, UK, USA, Yugoslavia.

The IGCP 458 website will remain online at http://paleo.cortland.edu/IGCP458/. The site contains a variety of products related to the project including participant information, conference proceedings, field guides, and annual reports.

The final publication of IGCP Project 458 will be a special issue of *Palaeoecology, Palaeogeography, Palaeoclimatology*. This volume, edited by project leaders Steve Hesselbo, Christopher McRoberts, and Jozséf Pálfy, contains 22 manuscripts covering a wide variety of topics related to Triassic/Jurassic boundary events. The included manuscripts are rich in new data and hypotheses and will be the most comprehensive volume on the subject yet published. Announcements will be made to all IGCP 458 participants once the volume is in print

The leaders of IGCP Project 458 wish to thank those who have contributed to the project in publishing their work and/or participating in field workshops and symposia. Without their dedication and hard work, none of this would have been possible.

IGCP PROJECT 506 (MARINE AND NON-MARINE JURASSIC): 1ST SYMPOSIUM SUCCESSFULLY HELD IN NANJING

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The International Symposium on the Jurassic Boundary Events and the First Annual Symposium of IGCP 506 was successfully held from Nov. 1-4, 2005 in Nanjing, China. About 100 participants from 14 countries joined this meeting, including USA, UK, France, Russia, Sweden, Romania, Poland, Australia, Japan, Thailand, India, Viet Nam and China. About 72 abstracts were received and one Abstract Volume was printed for the symposium. There were 10 sessions for the symposium and a one-day field excursion was also arranged to examine the geology and Jurassic stratigraphy in the vicinity of Nanjing City, followed by a visit to the Nanjing Institute and scenic attractions of Nanjing. In addition, the International Working Group Meetings of IGCP 506 were held during the symposium.

This is the first annual symposium of IGCP 506 with the topic on the Jurassic boundary events. The symposium focussed on the recent advances in the studies on marine and non-marine Jurassic strato-boundaries and associated major geological events. This symposium mainly covered the following subjects: lithostratigraphy, biostratigraphy, chronostratigraphy, magnetostratigraphy, palaeontology, sedimentology, geochemistry, geophysics, coal and petroleum geology, isotope geology, event geology, palaeogeography and palaeoclimatology. In addition, the International Working Group of IGCP 506 held its first business meeting during this symposium so as to discuss our project targets, research directions, year-round programme plan and schedule, and to determine the Regional Representative Members or Country Coordinators of this IGCP project.

The symposium was started by an opening ceremony held on Nov. 1 at Liuyuan Hotel in the campus of Southeast University in Nanjing. Over 100 participants and invited guests attended the ceremony, including the representative officials from the Chinese Academy of Sciences, National Natural Science Foundation of China (NSFC) and China National Committee for IGCP. There were five Keynote Talks followed by the opening session. The IGCP-506 Leader, Prof. Jingeng Sha, China, Prof. A. Hallam (Former President of IPA, UK), Prof. Nicol Morton (Chairman of ISJS, France), Prof. Paul Olsen (Columbia University, USA) and Prof. Ji Qiang (Chinese Academy of Geological Sciences) presented keynote talks in the morning session.

There were 10 plenary invited talks, 30 general oral and five poster presentations during the symposium. These talks covered a variety of fields in Jurassic studies, including palaeobiology, biostratigraphy, magnetostratigraphy, sedimentology, geochemistry, tectonics, remote sensing, palaeogeography, sea level changes and palaeo-CO_2. Many Chinese researchers are active and in this symposium about 15 participants gave talks. In addition, the participants were very active in discussing a variety of topics regarding up-to-date progress of Jurassic studies, including the Triassic/Jurassic and Jurassic/Cretaceous boundaries, marine and non-marine Jurassic correlation, biodiversity of the Jurassic biota, palaeoclimate and ecosystems, tectonics and palaeogeography, palaeo-atmospheric circulation and greenhouse climate change, sea-level changes and the palaeoenvironment, palaeo-volcanics, etc.

Business meetings for the International Working Group of IGCP 506 were held twice during the symposium. Six co-leaders of the IGCP 506 and other regional representative coordinators and invited members attended these meetings. Many topics were discussed for the five-year plan of this project, including a series of workshops, symposia and field excursions, including scientific sessions at the Second International Palaeontological Congress (IPC2006) in Beijing, the 7th International Jurassic Congress (2007) in Krakow, the 33rd International Geological Congress (2008) in Oslo.

The symposium gained positive attention from the media in China, including the state Xinhua Agency, People's Daily, major internet news from Sina.com, Sohu.com, and CCTV, Nanjing TV. Several overseas media from Hong Kong, Malaysia and Japan also reported the news of this symposium.

8th INTERNATIONAL CONGRESS ON THE JURASSIC SYSTEM

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Location

As indicated in the last Newsletter (no. **32**, 2005, p. 6), invitations were sought for hosting the 8th International Congress/Symposium on the Jurassic System in 2010. Two invitations, both from Asia, have been received:

1. *China.* The first to be received was from a team headed by Jingeng SHA (Nanjing Institute of Geology and Palaeontology, China), supported by the Palaeontological Association of China, Suining City and Shelong County (Sichuan Province).

2. *India.* A second invitation was received from Jai KRISHNA (Banares Hindu University, Varanasi, India).

As proposed in *Newsletter* **32**, copies of both invitations have been circulated to all members of the Jurassic Subcommission for an informal sounding of preferences (which will be revealed during the discussion in Krakow).

During an open meeting of the Subcommission on the final day of the Jurassic Congress, there will be an opportunity for both Sha and Krishna to expand their invitations, followed by an open question and discussion session. A formal vote will follow. Please give careful thought to each of the invitations

Dates. The dates for the 7th Jurassic Congress in Krakow, and most of the previous symposia, have been traditionally in late summer, with September the favoured month. However, it has become evident in correspondence from various sources that September may not be the best time. In North America, France and some other countries university terms begin at the beginning of September, and similar dates apply for the start of school terms. This means that several likely participants will not be able to participate in the Krakow Congress.

Therefore, I propose to include discussion of the most appropriate dates for the 8th Congress immediately after the decision on location has been made. Please give this careful thought and discuss possible choices with your colleagues.

REPORTS OF WORKING GROUPS

TRIASSIC-JURASSIC BOUNDARY (HETTANGIAN) WORKING GROUP

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1. Organisational matters:

1.1 Membership of the Triassic-Jurassic Boundary Working Group (TJBWG)

This matter featured in the last Newsletter (**32**: 7); the ISJS Chairman has advocated an expanded voting membership and this is being addressed.

1.2. New results*:*

The final meeting of the IGCP Project 458 group was held in Hungary and Austria in September 2005 (see **3**, below). At that meeting it was evident that important new studies were in progress. Additionally, Dr S. P. Hesselbo has kindly advised the Convenor of the contents of a forthcoming special issue of *Palaeogeography, Palaeoclimatology, Palaeoecology*, edited by S. P. Hesselbo, C. A. McRoberts and J. Pálfy and entitled *'Triassic-Jurassic boundary events: problems, progress, possibilities'*. Publication of this volume is expected before the end of 2006 and corrected proofs may be available in time for the Jurassic Congress in September. The volume will comprise 23 articles, including several that present new information from three of the four candidate GSSPs that have been formally proposed for consideration by the TJBWG. Whilst it is impossible to delay the process to selection of a preferred candidate GSSP indefinitely, it is clearly necessary that the information in this imminent publication should be available for consideration. The Secretary has prepared a review of the present state of research on the definition and recognition of the base of the Hettangian, and of the Jurassic (**2**, below).

2. The GSSP for the base of the Jurassic – present state of research (by the Secretary, Gert Bloos)

The formal search for a GSSP for the base of the Jurassic began in 1988 with the foundation of the Triassic-Jurassic Boundary Working Group (TJBWG) within ISJS. Four candidate GSSPs have been proposed by members of this group (Bloos 2004b: p. 19; Warrington 2005): St. Audrie's Bay (Somerset, UK), Muller Canyon (Nevada, USA), Chilingote (Utcubamba Valley, Peru), and Kunga Island (British Columbia, Canada). Other important sections are known and one, in the Alps, may become a further candidate.

Investigations made by members of IGCP Project 458 (2001-2005: Triassic-Jurassic Boundary Events) have produced results that are important for discussions of the system boundary.

General situation – The main requirements for a GSSP, including continuous sedimentation in a marine environment, and a continuous fossil record, are very difficult to meet in Triassic-Jurassic boundary successions. The requirement of continuous sedimentation is generally realised in sequences that formed in deeper water, but in these the fauna is often scarce and restricted. In contrast, in shallow water deposits, faunas are rich and diverse, but gaps and facies breaks are common. A further difficulty is that no cosmopolitan species can be found and therefore reliable global correlations are difficult.

The most important time-diagnostic fossils in the Mesozoic are ammonites, particularly after the Triassic when conodonts were no longer available as an alternative. Therefore, the candidate sections have been thoroughly studied for ammonites, particularly in the typically almost ammonite-barren interval above the latest Triassic index fossils. Important new finds have been made, but even among the earliest ammonites of Jurassic type (family Psiloceratidae) no cosmopolitan species has been found.

A promising fossil group with regard to definition of the System boundary may be radiolarians that, in the Pacific region at least, show a spectacular break; this break may be global. One of the candidate GSSPs (Kunga Island, Canada) is based on this break.

The most significant stratigraphic result of IGCP Project 458 is the detection of a negative $\delta^{13}C_{org}$ isotope excursion around the end of the Triassic. A succeeding positive excursion is followed, in undoubted early Hettangian strata, by a second negative excursion. These excursions seem to be global and may, therefore, be used as proxies for approximate correlations.

The T/J transition in general – The late Triassic was a time of decline in the diversity of different fossil groups (Lucas & Tanner 2004), but the Triassic character of the fauna persisted. A minimum of diversity was reached in a relatively short time (Bloos

2004b: p. 20), which indicates an increase in environmental disturbances. The transition begins with the end-Triassic extinction, which is most obvious in the radiolarian turnover. It is situated in the "initial" negative $\delta^{13}C_{org}$ isotope excursion (Guex et al. 2004, fig. 5), which may reflect environmental disturbances. Above this level, occurrences of rare Triassic survivors are overlapped by the first occurrences of Jurassic forms, some of which appeared in the late Rhaetian. This overlap of Triassic and Jurassic forms renders the definition of the System boundary difficult.

Three possible definitions have been proposed for the T/J boundary: (1) within the succession of early psiloceratids (England, Nevada), (2) at the base of the psiloceratid succession (England, Nevada, Peru), (3) at the radiolarian turnover in the T/J transitional interval (Canada).

Proposal 1 – This is essentially the traditional System boundary adopted in Europe since the 19th century, at the appearance of *Psiloceras planorbis* and *P. calliphyllum* and the first widespread occurrence of psiloceratids. Since no psiloceratid species is cosmopolitan, global correlation is possible only by regional species and thus is essentially tentative. Since there is no difference in the associated fossils below and above a boundary based on this criterion, there are no biostratigraphical proxies to indicate its position where ammonites are lacking. In this case only earlier levels are available.

Remarks – *Psiloceras planorbis* is known only in rapidly subsiding areas in Britain and NW Germany. The first widespread form in the NW European Province is the succeeding species, *P. psilonotum* [probably a junior synonym of *Psiloceras sampsoni* (Portlock)]. Nevertheless *P. planorbis* should remain the basal index fossil of the Jurassic in this proposal for historical reasons, and because it succeeds the psiloceratid genus *Neophyllites*. The boundary *Neophyllites*/*Psiloceras* is easier to correlate than one between two very similar species of *Psiloceras* (Bloos & Page 2000; Page 2005).

In the Mediterranean Province, the NW European *Psiloceras planorbis* is generally correlated with *P. calliphyllum*. The alpine horizon of *P. calliphyllum* is generally condensed. It contains a diverse fauna of Mediterranean psiloceratids and rare elements of the NW European Planorbis Subzone (*Psiloceras* cf. p*silonotum*, *P. plicatulum*; Bloos 2004a: p. 10-13) and of higher levels with *Caloceras* and *Waehneroceras* (*sensu* Lange 1941, 1952). *Neophyllites* is absent in this condensed sequence, except in very rare cases. There are indications that *Neophyllites* occurs below *P. calliphyllum* (Bloos 2004a: p. 13-14). Thus, the probable alpine boundary *Neophyllites neumayri*/*Psiloceras calliphyllum* can be correlated approximately with the NW European *Neophyllites antecedens*/*Psiloceras planorbis* boundary. The occurrence of *P. calliphyllum* in the Himalayas (Yin et al., in press) indicates that long-distance correlation of this level is possible.

A correlation with N and S America is more difficult. Species of *Psiloceras* in these regions differ from those of NW Europe and the Tethys; they are generally thicker and, in contrast to almost all NW European psiloceratids, have well-developed nodes on the innermost whorls. These differences indicate an evolution that was essentially independent from that in Europe.

Two correlations have been proposed. That of Guex et al. (2003, tab. 1; 2004, fig. 4), correlating *Psiloceras planorbis* with *P. calliphyllum* and *P. pacificum*, is based on the $\delta^{13}C_{org}$ isotope signature. It is supported by the supposed occurrence of the genus *Neophyllites* below; however, that determination is questionable because of the poor preservation of specimens from below the level of *P. pacificum* (Guex et al. 2003, fig. 2A).

The correlation of Hillebrandt (2000b: 89–93, tab. 2) is based on the development of the genus *Psiloceras* in N and S America, from completely smooth forms (*P. tilmanni* group) at the base, through partly ribbed forms, to completely ribbed forms. This development is also observed, though less distinctly, in Tethyan forms (see below), but is not apparent in NW Europe, where the lowest recorded species, *P. erugatum*, shows ribbing on the inner whorls and the later *P. planorbis* and *P. psilonotum* are smooth. If the successions in America and the Tethys had connection with an unknown centre, this development could be more or less parallel in time, and similar stages in the development of ribbing could be the basis of rough correlation, in spite of differences in other characters caused by provincialism.

In S America, the first form of *Psiloceras* with well-developed ribbing on the inner whorls (*P. planocostatum*: Hillebrandt 2000a: 160-163, pl. 8, figs 1-9) appears in the upper part of the range of *P. tilmanni*. In N America, a questionable highest *P. tilmanni* was found together with *P. pacificum* (Guex 1995, pl. 6, fig. 3; Guex et al. 2003, tab. 1). Since *P. pacificum* is almost devoid of ribbing, and no species with well-developed ribbing is associated with *P. pacificum*, this species could be earlier than *P. planocostatum* (Hillebrandt 2000b, tab. 2).

The Tethyan *Psiloceras calliphyllum* has more pronounced ribbing on the inner whorls than *P. pacificum*, and it occurs with several other ribbed species, such as *P. naumanni*, *P. costosum*, *P. strongolum*, *P. trochoeides* and *P. gernense* (see Lange 1952). This advanced stage of ribbing may indicate that this assemblage is younger than that of *P. tilmanni* and *P. pacificum*. Therefore the forms of the Calliphyllum Zone may indicate a correlation with the zones of *P. polymorphum* in N America and *P. primocostatum* in S America (Guex 1980: 136-137). The Tethyan Calliphyllum Zone contains elements of the NW European Planorbis Subzone that can, therefore, also be correlated with the Polymorphum and Primocostatum zones (Hillebrandt 2000b, tab. 2). In contrast to the Planorbis Subzone however, the two American zones cannot be subdivided into ammonite horizons, so that the *Neophyllites*/*Psiloceras* boundary cannot be recognised there (Hillebrandt 2000b, tab. 2).

It is difficult to decide whether the correlation proposed by Guex or that proposed by Hillebrandt is most

appropriate because the vertical distance between *P. pacificum* and *P. polymorphum* is too short to be distinguished satisfactorily on the $\delta^{13}C_{org}$ isotope curve.

Definition of the T/J boundary at the appearance of *Psiloceras planorbis* near Watchet (Somerset, UK) offers both excellent exposures and a distinct time plane at the *Neophyllites antecedens*/*Psiloceras planorbis* boundary (in bed 9 near Watchet, rather than in the higher bed 13 as formerly assumed; Warrington et al. 1994; Bloos & Page 2000). Satisfactory correlation with the Tethys is possible by means of the *Neophyllites neumayri*/*Psiloceras calliphyllum* boundary. Correlation with N and S America would be possible using the bases of the Polymorphum and the Primocostatum zones, according to Hillebrandt, and of the Pacificum Zone according to Guex. All psiloceratids below these boundaries would then be Triassic.

The System boundary could not be recognised where ammonites are lacking because no suitable proxies are known at or near this level. But in marine facies ammonites are rather common so that the lack of proxies would be a problem predominantly in non-marine sections.

Proposal 2 – If the System boundary is placed at the level of the earliest psiloceratids above Triassic index fossils, all psiloceratids would be Jurassic and the difficulty of distinguishing between Triassic and Jurassic psiloceratids would be avoided.

With the exception of a tiny specimen of *Psiloceras* from the Westbury Formation (Penarth Group; Rhaetian) in the UK (Donovan et al. 1989), all known psiloceratids occur above the latest Triassic index fossils *Choristoceras marshi, C. crickmayi* and *Misikella posthernsteini*. The earliest psiloceratids are the *P. tilmanni* group in N and S America, and *P. erugatum* in NW Europe. In the western Tethys, a new, presently undescribed, *Psiloceras* has been reported from the Tiefengraben Member (Kendlbach Formation) near Hinterriss, in the Karwendel Mountains, Northern Calcareous Alps (Krystyn et al. 2005: A9, fig. 6a). Another important transitional ammonite succession has been discovered in southern Tibet (Yin et al., in press).

Remarks – *Psiloceras erugatum* occurs below *Neophyllites* in NW Europe but an equivalent of this species has not yet been found below *Neophyllites* in the Alps (i.e. in the Tiefengraben Member).

In NW Europe, *Psiloceras erugatum* is the earliest known *Psiloceras* with ribbing on the inner whorls. According to Hillebrandt's considerations on ribbing, it must be younger than *P. tilmanni* and the new *Psiloceras* from the Alps. This is supported by comparison of the $\delta^{13}C_{org}$ isotope curves of the Tiefengraben section (near Kendlbachgraben) and St. Audrie's Bay (UK) which shows (Krystyn et al. 2005, fig. 8) that the position of the new alpine *Psiloceras* corresponds with a level about 3.5 m below *P. planorbis*, and therefore, also below *P. erugatum*, in the St. Audrie's Bay section. Therefore, *P. erugatum* does not belong to the earliest psiloceratids. It occurs only in the UK and convincing correlations by ammonites or proxies are not proposed. With regard to correlation, particularly with the Tethys and with facies lacking ammonites, a definition of the System boundary based on this species (Page 2005) probably offers no significant advantages in comparison with using *P. planorbis*.

In Peru (Chilingote), the earliest psiloceratid is *Psiloceras tilmanni* s.l. (Hillebrandt 2000a: 178, pl. 11, fig. 1), which occurs below the slightly different *P. tilmanni* s.s.; it co-occurs with *Odoghertyceras*, a probable choristoceratid (Guex et al. 1998). Other associated fossils are neither abundant nor diverse. In Muller Canyon (Nevada), 7 m of very poorly fossiliferous beds separate the level of the highest *Choristoceras crickmayi* and a thin bed with the earliest psiloceratid (Guex et al. 2004, fig. 1). This psiloceratid is flattened but has a narrow umbilicus, well developed nodes on the innermost whorls, and lacks distinct ribbing; it therefore belongs to the *P. tilmanni* group. It is associated with *P. spelae*, a small *Psiloceras* (Guex et al. 1998). The succeeding c.6 m of beds lack ammonites but in the overlying 1 m (up to the lowest *Psiloceras pacificum*) psiloceratids (*P. marcouxi*; Guex et al. 1998) and crushed, smooth forms [*Neophyllites* of Guex et al. (2003), and cf. *Neophyllites* of Guex et al. (2004)] occur with the latest *Choristoceras* species, *C. minutum* (Guex 1995), and *Odoghertyceras deweveri* (Guex et al. 1998), which is probably also a choristoceratid.

The new, undescribed, *Psiloceras* from the Alps (see above) shows similarities to *P. tilmanni*. It is narrow-whorled and lacks distinct ribbing. Nodes on the innermost whorls are well developed but the shape is slightly different. As with *P. tilmanni* from Muller Canyon, this form occurs only in a thin bed in the transitional interval, 6 to 7 m above the highest *Choristoceras marshi* and 7 to 8 m below the horizon of *Psiloceras calliphyllum* (Karwendel section near Hinterriss).

On the basis of fossils, it is difficult to decide whether *P. tilmanni* and the alpine *Psiloceras* are coeval. On the basis of the $\delta^{13}C_{org}$ isotope curves, *P. tilmanni* seems to appear earlier in Muller Canyon (Krystyn et al. 2005, fig. 8), but the stratigraphic ranges of both forms are not known and could overlap. According to the carbon isotope curves illustrated by Krystyn et al. (2005, fig. 8), the levels at St. Audrie's Bay equivalent to that of the lowest *P. tilmanni* in Muller Canyon and of the alpine *Psiloceras* could be about 1 to 2 m and about 2.5 m above the base of the Blue Lias respectively. The carbon isotope curve of Chilingote (Peru) is not yet known.

In comparison with the Muller Canyon and new alpine (Karwendel Mountains) sections, that at Chilingote is favoured by optimally preserved ammonites. The alpine specimens are at least partly three-dimensional and show suture lines. The preservation in Muller Canyon is less satisfactory; the ammonites below the level of the occurrence of *P. pacificum* are crushed and suture lines are lacking.

The earliest ammonite faunas from Chilingote and the Karwendel are monotypic and do not overlap with

elements of Triassic type. In this regard the ammonite fauna of Muller Canyon is more diverse.
In all three sections an ammonite-barren interval occurs between the highest Triassic index fossils and the lowermost *Psiloceras*. This interval is about 7 m thick in Muller Canyon and 6 to 7 m in the Karwendel; at Chilingote its thickness is not yet known. At Chilingote, radiolarians just below the appearance of *P. tilmanni* (Hillebrandt 2000b: 89) may be of Jurassic type, rather than Triassic as formerly thought (unpublished information: E. Carter, to A. v. Hillebrandt).

The Chilingote section is very poor in fossils, apart from ammonites. In Muller Canyon, pelecypods are the main associated group, and microfossils are not preserved in the silt facies. In the Karwendel, well-preserved, diverse micro- and macrofaunal and palynomorph associations occur, but are not yet published. In the Tiefengraben section of Krystyn et al. (2005) the supposed stratigraphic position of the new *Psiloceras* is indicated, though it has not been found there.

As the earliest *Psiloceras* are extremely rare in most parts of the world, proxies are generally needed for correlation. According to Krystyn et al. (2005, figs 6a, 6b), several proxies are available. In the Karwendel section, the lowermost appearance of the palynomorph *Cerebropollenites thiergartii* is proposed (Kuerschner et al., submitted for publication). A similar situation with regard to proxies may be expected for the Muller Canyon section, where the lowest occurrence of the bivalve *Agerchlamys* is proposed (Lucas et al. 2005: 13-14). This means that the vertical distance of the earliest *Psiloceras* to probable proxies is short (about 3 m) in contrast to the considerably greater separation from the horizons of *P. calliphyllum* (9 m) in the alpine section and *P. pacificum* with respect to *P. polymorphum* (10 to 11 m) at Muller Canyon. No younger proxies would be available for the horizons of Proposal 1.

Proposal 3 – New investigations suggest that a turnover in radiolarians could be a global event, with potential for marking the system boundary (Carter & Hori 2005; Korte et al. 2005). However, successions with sufficiently well preserved radiolarians are rare and are poor in other fossils. Therefore, correlation with other fossil groups is difficult and the relative stratigraphic position of the turnover is not known. No proxies in other fossil groups are known that would serve to identify this level in sections without radiolarians.

The strong impact on the evolution of radiolarians suggests that the radiolarian turnover is close to the end-Triassic extinction event. This is supported by its position within the "initial" negative carbon isotope excursion (Kennecott Point: Guex et al. 2004, fig. 5). However, since that excursion occurs in the latest Triassic succession, the radiolarian turnover may also be latest Triassic, as defined by the above mentioned index fossils *Choristoceras marshi, C. crickmayi* and *Misikella posthernsteini*. This is underlined by the occurrence of *Misikella posthernsteini* above the "initial" negative carbon isotope excursion in the UK. The end-Triassic extinction event in radiolarians may not have been abrupt (Lucas & Tanner 2004), but this does not affect the conspicuous difference between late Rhaetian and early Hettangian radiolarians. However, it is not yet proved that the change in radiolarians was global.

Updated versions of the formal candidate GSSP proposals are required as a basis for final discussion and for the ballot.

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3. Meetings

The Convenor attended the International Field Workshop on the Triassic of Germany and the surrounding countries (14–20 July 2005), organised by Professor G. H. Bachmann (Martin-Luther-Universität Halle-Wittenberg). This included a visit to a quarry at Kammerbruch, on the Grosser Seeberg, c.28 km WSW of Erfurt, where the Exter Formation (= Rhätkeuper) and succeeding Lias Psilonoten Beds (Lower Hettangian) were seen. This is the type locality for the spores *Cornutisporites seebergensis* Schulz 1962, and *Semiretisporis gothae* Reinhardt 1962, both described from the 'Rhät', and *Foraminisporis jurassicus* Schulz 1967, described from the Lias.

The 5th Field Workshop of IGCP Project 458 (Hungary and Austria; 5 – 10 September 2005) had the theme 'Triassic-Jurassic boundary events recorded in platform to basinal marine depositional environments of the western Tethys'. The Convenor and Secretary attended field excursions and the conference session in Hungary; the Secretary also attended field excursions in Austria. The Convenor was invited to present an update on TJBWG activities during a business meeting of the IGCP project group. The field excursions included visits to Triassic-Jurassic boundary sequences at Tata, Csvár, and the Bakony Mountains in Hungary, and at Adnet, Steinplatte Mountain, and the Kendlbachgraben and Tiefengraben, in the Northern Calcareous Alps near Salzburg, Austria.

The Convenor was invited to address a meeting of the Dorset Natural History and Archaeological Society (Dorchester, UK; 9 November 2005), as part of a lecture series on the Dorset and East Devon Coast World Heritage Site (the 'Jurassic Coast'), and also attended a meeting of the 'Petroleum Geological Atlas of the Southern Permian Basin area' project (Hannover, Germany; 2–3 March, 2006).

4. Future meetings

The 7th International Congress on the Jurassic System, at Kraków, Poland (11 – 14 September, 2006), will include a joint session on the work of the TJBWG and the IGCP Project 458 ('Triassic-Jurassic boundary events'), and a special session on 'Marine and non-marine Jurassic: global correlation and major geological events' (IGCP Project 506). The Congress website is at: www2.uj.edu.pl/ING/jurassica.

5. New literature relevant to the TJBWG (compiled by the Convenor, Geoff Warrington)

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5. Contact information

Members of the TJBWG are asked to inform the Convenor and Secretary immediately of any changes in their contact details (postal address, telephone and/or FAX numbers (including national and area codes), or e-mail address) in order to ensure that they receive notices and information from the WG.

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PLIENSBACHIAN WORKING GROUP

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Since the ratification by the IUGS Executive in March 2005, the proposition for the Pliensbachian GSSP has been formalized and improved for publication and is now in press in *Episodes*, the official journal of the International Union of Geological Sciences.

The 7th International Congress on the Jurassic System in Krakow (Poland) will be a good opportunity to discuss and prepare the strategy (magnetostratigraphy, isotope stratigraphy and biostratigraphy) to standardize and propose (a) GSSP(s) for the Pliensbachian Substages. The Lower Pliensbachian–Upper Pliensbachian boundary is quite well known in Euroboreal and western Tethys regions and even in Pacific areas. Once again, the main problem will be the strong provincialism and consequently correlations between these regions.

Some recent publications on the Sinemurian - Pliensbachian

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TOARCIAN WORKING GROUP

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[with contribution by Samuel MAILLIOT, Emanuela MATTIOLI, Bernard PITTET and Nicola PERILLI]

Progress report: Peniche field-meeting (Portugal), June 2005

The second circular of the 7th International Congress on the Jurassic System (Sept. 2006) indicates that a working session on the Toarcian will be held during the meeting. Work on the proposal of a GSSP for this stage is in progress with several studies on the Peniche section in Portugal. I shall be glad to have the widest debate on this topic during the Krakow session and invite special communications on this subject. For discussions within the Toarcian Working Group all remarks are welcome; in the post-Congress voting no response will be taken as approval of the proposals.

Below, you can find a summary of interesting and important results achieved during the Peniche session both in the field and during the discussion:

1. Agreement on the position of the Pliensbachian/Toarcian boundary, to be placed at the base of bed 15e, the last bed of the "Couches de passage" ("Transition beds"). This bed marks the massive appearance of the *Dactylioceras* (*Eodactylites*) associated with *Paltarpites.*
2. Agreement on the proposal of the Peniche section (Ponta do Trovão) as GSSP candidate.
3. The participants in the field meeting collected *in situ* the main components of the macrofauna. New sampling for micro- and nannopalaeontology and for geochemical analysis was also carried out.
4. The succession of a basal level with *Eodactylites* (15e) and of a succeeding level with *Dact.* (*Orthodactylites*) *crosbeyi* has been confirmed. Palaeontological study is however delicate owing to the small size of the pyritous casts. These forms were attributed to *Coeloceras* sp. aff. *dayi* (Reynès) by Mouterde (1955, p. 25). New data from sections in Vendée (Western France on the border of the Armorican Massif near Thouars; Bécaud, in press) confirm this observation. Similar results have been obtained at Mellala (NW Algeria, Traras Mountains). The distinction of a Crosbeyi horizon can be useful; it corresponds roughly to the Clevelandicum Subzone of Yorkshire. *D. (O.) crosbeyi* is used here as an informal index to avoid any confusion with the NW European standard. It must be emphasised that the use of the Tenuicostatum horizon (or Subzone) is difficult and, even, unrealistic in the Tethys because the index-species is rare or absent.
5. The field measurements given by the successive authors have been checked. Some confusion has been corrected:
   - thickness of the levels 16, outcropping under the hypoxic beds;
   - comparison and correlation between the numbers given by Mouterde, Duarte, Wilson, Elmi *et al.*

Mouterde's numeration will be retained but it must be considered that the thickness of the upper part of 16 has been exaggerated (6 m instead of 9 m for the levels 16c/d (Mouterde, 1955) = 16 E/G (Elmi *et al.*, 1996). This correction has no consequence for the GSSP position. The new and precise observations will be reported indicating their position above the base of 16a, see also depositional sequence, by Pittet *in* Mailliot).

6. Belemnite rostra are abundant in the "Transition beds" (15a-15e); geochemical study of Sr is in progress across the boundary (Hesselbo, Jenkyns, Oliveira).
7. Palaeomagnetism measurements were disappointing (Duarte). However, the Almonacid de la Cuba section in the Iberic Ranges is proposed as a complementary reference (Goy and his team) and biostratigraphic correlation with Peniche is good.
8. Ammonites from levels 15 and 16 (across the boundary) have been figured in the guidebook (Elmi, Mouterde, Rocha; Mouterde's collection). This illustration will be extended in a future "Newsletter" of the Subcommission.
9. The general data on ammonite faunas have been synthesized. The results obtained in Western France (Vendée) and in Western Algeria (Mellala) allow a better understanding of the correlations between the Tethyan and the NW European faunas and succession. Absence of *Eodactylites* in the NW European Province has often been blamed on provincialism. In fact, it is often due to stratigraphical gaps that are known for a long time (studies of Buckman, Howarth, Gabilly and others). A palaeobiogeographic gradient existed. The relative abundance of *Eodactylites* is lower in the North but there is no true segregation. Moreover, the apparent differences are emphasized by a general fall of the biodiversity, especially for the ammonites, near the PLI/TOA boundary. The thickest sections (Mellala and several sections in Morocco) indicate also that the *paltus* group (*Paltarpites* or *Protogrammoceras*) appeared before the mass development of *Eodactylites*. The *Eodactylites* marker is of fundamental importance because it is known in Chile and North America.
10. Nannofossils (Mailliot, Mattioli, Oliveira, Perilli) and ostracods (Bodergat, Cabral, Pinto), indicate that the chosen PLI/TOA boundary does not correspond with a special event in the history of these groups, a remark already made for the foraminifera (Ruget *et al.*). The foraminifera are dominated by "Domerian" species until the end of the Crosbeyi horizon. Nannoplankton were in a diversification phase that started during the Late Pliensbachian and ended in

the Early Toarcian. A new study of the foraminifera will be made by Hart.

11. The "anoxic" (or hypoxic) event occurred later than the Stage boundary. The duration of the separating interval is that of an ammonite zone. It took place at the beginning of the Serpentinum/Levisoni Zone. It is coeval with an important change or turnover of the microfauna and microflora but cannot be used to determine the GSSP. Obviously, the hypoxic maximum (TOC maximum, Duarte) occurred after the specialization phase known in the brachiopods (small specimens of the "*Koninckella* fauna" = classic "*Leptaena* fauna"). This brachiopod event happened generally at the beginning of the Semicelatum Subzone (Crosbeyi horizon). However, it began earlier (Elisa Subzone) in some North African basins (Alméras, in progress).
12. The "Transition beds" can be interpreted as a condensed interval, following the general faunal impoverishment during the Solare Subzone. The major lithological change (= first Toarcian flooding of Duarte and colleagues) is found at the base of the overlying marls (16a; base of the Crosbeyi horizon). Cyclicity interpretation of the Peniche section is in progress (Pittet and colleagues).
13. The organization of the meeting was perfectly assured by the Universidade Nova de Lisboa (CIGA) and by the Universidade de Coimbra (GC/UC) thanks to Prof. Rocha and Dr. Duarte. Thirty specialists from five countries participated. This work has been supported by the project BIOSCALES (POCTI/36438/PAL/2000).
14. Protection of the site will be secured in good conditions. The town of Peniche is highly interested in the GSSP project. We thank the town council for its help and for the very friendly reception.

References of the papers included in the field meeting document

The Peniche Section (Portugal). Candidate for the Toarcian Global Stratotype Section and Point. Toarcian Working Group. Field Trip Meeting. Peniche 10 – 11 June 2005. Published by GIGA Universidade Nova de Lisboa and Univ. de Coimbra.

ELMI S. – Toarcian Working Group. 2005 Report and prospects. p. 2-10 (with contributions by R. Mouterde and R.B. Rocha).

DUARTE L.V. Lithostratigraphy, sequence stratigraphy and depositional setting of the Pliensbachian and Toarcian series in the Lusitanian Basin (Portugal). p. 11- 19, 5 fig.

ELMI S., MOUTERDE R. & ROCHA R.B. – Toarcian GSSP candidate: the Peniche section at Ponta do Trovão. p. 20-30, 2 fig., 2 pl.

RUGET Ch. - Notes on the Lower Toarcian microfauna at Peniche. p. 31.

PINTO S., CABRAL M.C. 1 DUARTE L.V. – Preliminary data on the ostracod fauna from the Lower Toarcian of Peniche. p. 32 -38, 4 fig., 2 pl.

VEIGA de OLIVEIRA L.C., PERILLI N. & DUARTE L.V. Calcareous nannofossil assemblages around the Pliensbachian/Toarcian stage boundary in the reference section of Pëniche (Portugal). p. 39-45, 3 fig.

MAILLIOT S. – Calcareous nannofossil distribution in the Lower Toarcian of the Peniche section. p. 46. (with contribution by B. PITTET).

VEIGA de OLIVEIRA L.C., DUARTE L.V. & RODRIGUES R. Chemostratigraphy (TOC, $\delta^{13}C$, $\delta^{18}O$) around the Pliensbachian/Toarcian boundary in the reference section of Peniche (Lusitanian Basin, Portugal). Preliminary results. p. 47-51, 2 fig.

The Pliensbachian/Toarcian boundary: the record of calcareous nannofossils at Peniche (Ponta do Trovão, Lusitanian Basin)

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The Pliensbachian/Toarcian boundary is easily recognized on the basis of ammonites (rapid and abundant appearance of several species of the *Eodactylites* group) as well as by the gradual diversification trend of calcareous nannofossils. This radiation of coccolithophorids is recorded at Peniche as well as in many other Tethyan localities. According to Bown et al. (2004), the species richness increases abruptly from about 27 to 40 taxa in the Upper Pliensbachian, and a further increase is recorded in the basal Toarcian. The nannoplankton speciation at this time interval mainly involved the placoliths (coccoliths which have two sub-horizontal shields separated by a tube, Bown & Young, 1998). This pattern produced a shift from the assemblage composition of the Pliensbachian, dominated by muroliths (coccoliths having a wall-like, sub-vertical rim, Bown & Young, 1998) to the Toarcian assemblages, dominated by placoliths.

The Pliensbachian/Toarcian boundary, as defined by ammonites at Peniche (Elmi et al., 2005), lies within the NJT5b nannofossil subzone, which is defined by the first occurrence (FO) of *Lotharingius sigillatus* (Mattioli and Erba, 1999 – southern margin of the Tethys). The FO of this biomarker is recorded within the Emaciatum/ Spinatum ammonite Zone, at the top of Solare Subzone, in the stratigraphic interval just below the "Transition beds" or "Couches de passage" in the Peniche section. This reproducible event is also identified in the Hawskerense ammonite Subzone (Spinatum Zone) of the Basque-Cantabrian basin (Northern Spain; Perilli & Comas, 2002). The base of the NJT5b nannofossil subzone shortly pre-dates the Pliensbachian/Toarcian boundary as defined by ammonites.

The Pliensbachian/Toarcian boundary is also marked by an important increase in the absolute nannofossil abundance per gram of rock. In the marl-limestone alternations of the Upper Pliensbachian, the mean absolute abundance of nannofossils measured at Peniche is $44*10^6$ specimens per gram of rock (Reggiani, 2005). In the " Transition beds ", the mean value measured by Mailliot (2005, PhD thesis in progress) is about $700*10^6$. In this interval the lithology is represented by marl-limestone alternations, similarly to the Upper Pliensbachian interval. These nannofossil quantities should be, however, corrected for the accumulation rate in the two intervals, as the transition beds could be affected by condensation that could in part explain the

high abundances in the Peniche section. A similar increase in nannofossil absolute abundance across the boundary is also reported for other Tethyan settings (Mattioli et al., 2004).

Small-sized *Lotharingius* like *L. hauffii* and *L. frodoi* display increasing relative abundances in the basal Toarcian. Three and half meters above the boundary, within the Semicelatum ammonite Subzone (Polymorphum Zone), a peak in abundance of over-calcified specimens of *Lotharingius frodoi* is observed (Mailliot, PhD thesis in progress). This peak in the biocalcification of this nannofossil species is likely linked to palaeoenvironmental conditions.

Compared to the ammonite record, the definition of the Pliensbachian/Toarcian boundary by nannofossils is not marked by a precise and distinct event, but gradual changes and several events occurring across the boundary permit good characterization of this time interval.

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BAJOCIAN WORKING GROUP

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A short meeting of the Working Group is being planned for the Jurassic Congress in Krakow. I would like to pass on the position of Convenor to someone else – volunteers/suggestions, please.

BATHONIAN WORKING GROUP

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In preparation for discussions during the 7th International Congress on the Jurassic System, planned for 2006 in Krakow (Poland), we would like to use this report to bring everyone else up-to-date about the latest developments, so that the time in Krakow can be used to greater effect.

In order to establish the Bathonian GSSP there are two particularly relevant areas: Digne-Barrême (SE France) and Cabo Mondego (Portugal). New studies and additional collecting of ammonites are in progress.

The leading candidate is in the Ravin du Bés section, Bas Auran, in the Geological Reserve of Haute-Provence (SE France). Ammonoid specimens from 14 stratigraphical levels, through 8 m in thickness, of the Bomfordi and Parvum subzones have been studied on the Bas Auran section. Most of these ammonoids pertain to collections previously studied for bio- and chronostratigraphical purposes by several authors (Sturani, 1967; Pavia, 1984; Torrens, 1987; Innocenti et al., 1988; Olivero et al., 1997). Sedimentological data and sequence-stratigraphy interpretations of this section have been published by Ferry & Mangold (1995). New results of the biochronostratigraphical and taphonomic analysis of ammonoid fossil-assemblages at the Bajocian/Bathonian boundary in the Bas Auran will be presented in Krakow.

Ammonites of the Bajocian/Bathonian boundary are scarce at Cabo Mondego region. However, they are recorded in an expanded stratigraphic section, which can be studied through several kilometres of coastal outcrops. Several papers have described Lower Bathonian ammonites from the classical section of Cabo Mondego, 200 m WNW of the lighthouse (Section-90) (Ruget-Perrot, 1961; Elmi, 1967, 1971; Elmi et al., 1971; Mangold, 1971ab, 1990; Rocha et al., 1981, 1987; Mangold & Rioult, 1997). However, this classical section was modified and access became difficult in 1990 due to the operations of several stone quarries. At the present time, there are two other outcrops allowing detailed study of the Bajocian/ Bathonian boundary of this region. The first is 500 m SW of the lighthouse, the so-called Section-02, on the coastline (Fernández-López & Henriques, 2002). The second, 700 m N of the lighthouse, the so-called Section-04, is located at an active quarry front after 2004. The ammonite succession at the Bajocian/ Bathonian boundary in the Cabo Mondego region, taking into account data achieved in these three observable sections, will also be presented in Krakow. Through up to ten metres thickness of strata, over forty successive assemblages have been recognized in the Parvum Subzone.

The formal proposal for the Bathonian GSSP is expected by the end 2006. We hope it will be possible to arrive at a preferred candidate after the Congress. This decision cannot be made by formal vote during the Congress, because the proper route is a postal or email vote by all members of the Working Group. However, it will surely

be possible to leave Krakow with at least the prospect of an early proposal to ISJS.

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CALLOVIAN WORKING GROUP

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As far as a proposal for a Callovian GSSP is concerned, nothing has substantially changed in the one put forward at the Vancouver Symposium (Callomon & Dietl 1998, published 2000). It remains only to supplement it with some details relating to secondary standards, either bioprovincial when based on ammonites or otherwise when not, and pointers to some reference sections traversing the Bathonian-Callovian boundary that might illustrate some particular bio- or other stratigraphical character better than what is to be seen at the type sections. There have been no comments since Vancouver from any quarter, for or against the proposals put forward there, and I shall therefore take these as the basis for an updated version written with the Voting Members, etc., of ISJS in mind as the primary readers.

Reference:

CALLOMON, J.H. & DIETL, G. 2000. On the proposed Basal Boundary Stratotype (GSSP) of the Middle Jurrassic Callovian Stage. In: HALL, A.R. & SMITH, P.L. (eds), Advances in Jurassic Research 2000, *GeoResearch Forum*, **6**, 41-53. Trans Tech Publications, Zürich.

OXFORDIAN WORKING GROUP

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(With contributions by Kevin N. PAGE, François ATROPS, and Mikhail ROGOV)

The work of the Oxfordian Working Group has been carried on during recent months in order to finalise presentation of a sound proposal of a GSSP candidate for the Callovian-Oxfordian stage boundary. Until now the two main candidates have been the section at Savournon, near Serres (Provence, SE France) and the section at Redcliff Point, near Weymouth (Dorset, S England, U.K.). These display, to some extent, similar features but also some consistent differences in their fossil content. However, a further proposal from Michail Rogov will be presented to the Jurassic Congress in Krakow.

New Section on the Russian Platform

New information has come from our colleague Mikhail Rogov (Geological Institute; Russian Academy of Sciences, Pyzhevskii Lane 7, Moscow) about a further good candidate section - the Dubki section at Saratov (Russia), some 720 km from Moscow. In fact, this section has been proposed as a reference section for the

Callovian-Oxfordian boundary by Kiselev *et al*. (2006) in an Abstract submitted for the Jurassic Congress in Krakow. See fig. 1 for a picture of the Dubki section).
It is proposed that the next Oxfordian Working Group meeting be held at Dubki to record the ammonite successions from the Callovian-Oxfordian transition. The owner of the quarry has warmly supported the proposal. A provisional outline of a one-week meeting is:
1) Arrival in Moscow, registration, brief scientific session, inspection of collections; brief introduction to the Saratov sections, with excellent Middle-Upper Callovian succession.
2) Travel to Saratov (by bus?); scientific session (Middle Jurassic and Callovian/Oxfordian boundary); excursions to Dubki section (the proposed reference section for the Callovian-Oxfordian stage boundary) and probably some other Middle Jurassic sections.
3) Travel to Ulianovsk and the lectostratotype of the Volgian, the Gorodische section.
4) Return to Moscow.

Dates: Taking account of the September 2006 date for the Jurassic Congress and Subcommission meeting in Krakow, the convenience of OWG members and availability of the organizers, the best dates for this Working Group Meeting seem to be Spring 2007 (May-June).

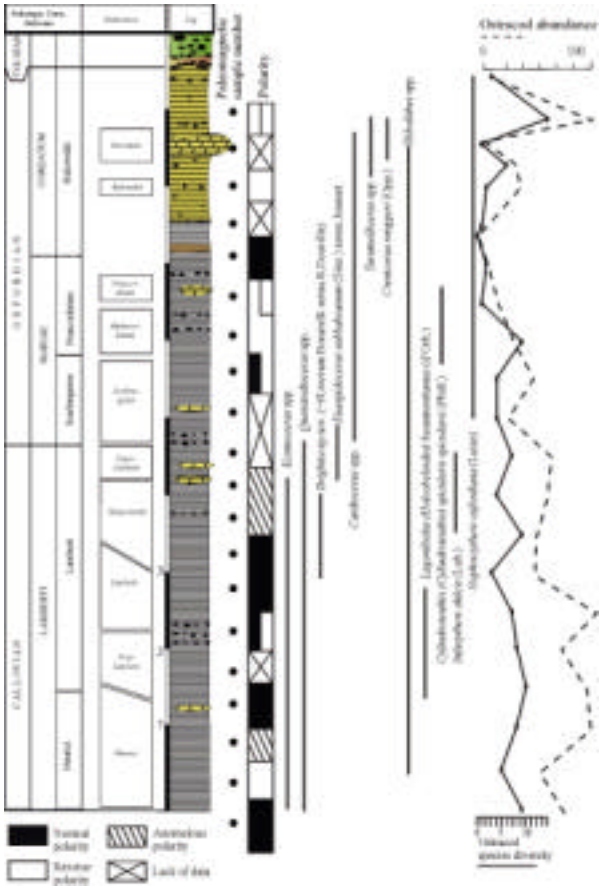

Fig. 1: Stratigraphic log of Callovian-Oxfordian transition at Dubki, Saratov (Russia), summarizing the current state of progress (from Kiselev et al., 2006).

New information about Redcliff Point

The multidisciplinary project on preparation of a proposal of the Redcliff Point section (near Weymouth, Dorset, S. England) has progressed enough for a "synthesis" paper (or progress report) to be presented by K. Page, G. Meléndez, M. Hart, G. Price, J.K. Wright, P. Bown and J. Bello, on the *Integrated stratigraphical study of the candidate Oxfordian Global Stratotype section and Point (GSSP) at Redcliff Point, Weymouth, Dorset, UK* in Krakow.

The main results (Page *et al.* 2006) may be summarized as follows:

(1) The boundary sequence lies entirely within soft, clay facies of the Oxford Clay Formation, frequently with a relatively high carbonate content, thereby facilitating the excellent preservation of both macro- and microfauna (and flora).
(2) Ammonites in particular are conspicuous and, although typically crushed, partly retain aragonitic shell and are fully determinable. By convention, the stage boundary is drawn at the first occurrence of the genus *Cardioceras*, which has been interpreted as corresponding to the transition between '*Quenstedtoceras*' *paucicostatum* (Lange) and *Cardioceras* ex gr. *scarburgense* (Young and Bird), specifically at the first occurrence of *C. woodhamense* Arkell *sensu* Callomon **(***non* Marchand**)**. This transition is well seen at Redcliff and provides the primary means by which the boundary can be correlated.
(3) Associated perisphinctids (including *Peltoceras*, *Alligaticeras* and *Euaspidoceras*) provide additional biostratigraphical information to characterize the uppermost Callovian, *'Q.' paucicostatum* Horizon, most precisely late representatives of *Alligaticeras* of the *A. alligatus* (Leckenby) group. Early representatives of *Properisphinctes* of the *P. bernensis* (Loriol) group, allow recognition of the basal Oxfordian Scarburgense Subzone.
(4) Among other macrofossil groups, belemnitids (from information elsewhere in the UK) suggest that the end of the Callovian marks the local virtual disappearance of Boreal cylindroteuthids and persistence of Tethyan hibolithids into the early Oxfordian.
(5) Changes in microfossil groups associated with the boundary are particularly marked in foraminifera and nannoplankton. Analyses of ostracods and other fossil remains, such as holothurians, continue.
(6) Isotopic analyses of belemnites are promising, although still not conclusive or complete. Magneto-stratigraphic analyses have so far provided few results.

Sections at Savournon, near Serres (Provence, SE France)

The remarkably expanded sections spanning the Callovian to lower Oxfordian in black shale (*Terres noires*) facies across the Vocontian Basin in Provence, SE France, count among the most classical sections to be proposed as GSSP candidate for the Callovian-Oxfordian stage boundary. The most favourable points include a super-expanded clay succession for this stratigraphic interval, which, in most Tethyan regions (both Submediterranean and Mediterranean areas *s.s.*) are represented by condensed carbonate facies with a widespread expanded stratigraphic gap. The abundant ammonites, recorded throughout the sequence, are highly diversified, with representatives of Boreal and Mediterranean families, which would "guarantee" a complete, detailed biostratigraphic succession. This situation was apparent in the first section described, at Thuoux, where a large ammonite collection was studied

by Fortwengler & Marchand (1994, 1997). Subsequent debate emphasised the inadequacy of this section because of preservation of ammonites as pyritic nuclei, as well as the general difficulty of recording a complete *in situ* sequence and locating the exact point of the stage boundary at a precise bed. Similarly, the results of dinoflagellate analyses are less precise compared with those of nearby Savournon.

At Savournon the upper Callovian (Lamberti Biozone) to lowest Oxfordian (Mariae Biozone) sequence is also generally represented in "*Terres noires*" facies, but the section is less expanded, and some key limestone beds provide (crucially) well-preserved and well-located specimens, which provide sounder biostratigraphic information compared with Thoux. The dinoflagellate sequence is also more detailed. These facts led Atrops and Meléndez (2003) to propose the section of Peyral, at Savournon, as a better GSSP candidate for the Callovian-Oxfordian stage boundary.

Details of the ammonite sequence at this locality were presented as follows:

"The Callovian-Oxfordian boundary is marked by the replacement of "*Cardioceras*" of the *paucicostatum* (Lange) group by true *Cardioceras* of the *scarburgense* Young & Bird group. The first 21 m belong undoubtedly to the upper Callovian Lamberti Zone, Lamberti Subzone, by the common record of *Quenstedtoceras* of the *lamberti* (J. Sowerby) group, as well as scarce specimens of *Poculisphinctes* and *Alligaticeras*. Within this interval, the upper 10 m has yielded common specimens of "*Cardioceras*" *paucicostatum* (Lange), hence characterising the uppermost Callovian Paucicostatum Horizon. Above this level a c. 10 m thick marly interval with thin nodular limestone intercalations has yielded few ammonites, mainly *Hecticoceras suevum*. The record of some typical specimens of "*Cardioceras*" *paucicostatum* (Lange) indicates a probable uppermost Callovian, Paucicostatum Horizon age for this interval. The next 10-11 m (levels 26-29) contain a rich ammonite assemblage yielding common *Peltoceras* sp. and *Hecticoceras* spp. (including *Brightia thuouxensis* Fortwengler). This association might in fact characterise the basal Oxfordian Thuouxensis Horizon (Fortwengler & Marchand, 1994, 1997). However, the record of scarce specimens of *Cardioceras* showing still the dominant morphology of "*Cardioceras*" *paucicostatum* (Lange) with no evidence of the typical *Cardioceras scarburgense* Young & Bird would rather suggest this interval to be integrated as a terminal interval within the uppermost Callovian, rather than in the basal Oxfordian".

Comparison of candidate sections

In an attempt to summarize the relevant features of all candidate sections, a comparative table is presented with features rated 1 to 5 depending on the degree of progress in study or excellence of data. The four candidate sections [Thuoux Savournon, Redcliff Point and Dubki (Saratov)] are evaluated for the following factors:

- study and intensity of study (number and detail of studies published so far);
- lithologic sequence (expanded, condensed, completeness);
- ammonite wealth (abundance);
- ammonite material (mainly quality of specimens and state of preservation);
- ammonite completeness of succession (appropriateness of record);
- belemnites;
- bivalves;
- brachiopods;
- other macroinvertebrates;
- foraminifera;
- nannoplankton;
- ostracods;
- magnetostratigraphy (results);
- isotopes (analyses made and results);
- correlation potential (depending partly on all preceding factors, but mostly biogeographic diversity of ammonite groups).

Numbers in brackets indicate values presumably to be reached on completion of work in progress; a Question mark indicates no information available at present.

Section	Study	Lith Seq	Amm Weal	Amm Mat	Amm Com	Bel	Biv	Brac	Other
Thuoux	3	5	4	(1)	(3)	(2)	(1)	(?)	(?)
Savournon	2(3)	4	4	4	4	(2)	(2)	(?)	(?)
Redcliff P.	(4)	3(4)	5	(5)	4	3	(1)	(1)	(2-3)
Dubki	2(3)	3(4)	3	3	3(4)	4	(?)	(?)	(?)

Section	Forams	Nannopl	Ostr	Dinos	Mag	Isotopes	Corre
Thuoux	(?)	(?)	(?)	4	No	(?)	2(3)
Savournon	(?)	(?)	(?)	5	No	(?)	3(4)
Redcliff P.	3(4)	(4)	3	(?)	2(3)	(?)	4
Dubki	(?)	(?)	5	(?)	5	(?)	2(3)

Comments on the evaluation features

Studies on the sections are developed in detail in the section of Thuoux and a bit less in Savournon (no published figured specimens) and Dubki. The most complete, multidisciplinary approach, integrating a larger number of fossil groups and different analyses, is probably being taken on Redcliff Point. The lithologic sequence is, by far, most expanded (and complete) in Thuoux. It is a bit less expanded and slightly affected by small faults in Savournon (although this is not a real problem to record the section) and clearly more reduced in thickness (? condensed) although presumably not less complete, in Redcliff Point and Dubki.

All sections display superb ammonite successions, the most important factor for biostratigraphical purposes and selecting a GSSP, in all aspects: wealth; state of preservation and completeness of ammonite record. However, Thuoux received less favorable reviews due to the poor state of preservation of ammonites, as small pyritic nuclei, making them difficult to interpret. Also the completeness of ammonite successions (or the possibilities of record) may cast some doubts on Thuoux, due to the difficulties to record a detailed "*in situ*" succession of ammonites. This situation is clearly more favourable in the section of Savournon, where ammonites, preserved in carbonate nodules, are often more complete with part of the body chamber. At this point the best conditions are shown by ammonites at Redcliff Point. There, although generally crushed, and preserved in very soft black clay facies, which need previous consolidation with a product (*paraloid*), specimens are generally complete preserving the body

chamber and the fragile ornamentation. As a result, the completeness of the ammonite record would be higher in Savournon and Redcliff Point, which would stand as main GSSP candidate sections, and a bit lower in Thuoux. Data from the section of Dubki are so far little known. Best data from microfossil groups come from Redcliff Point, which has provided good results in foraminifera and nannoplankton. Ostracods seem to be best represented/studied in Dubki. Dinoflagellates in turn, have provided the best results so far in Thuoux and, most especially, in Savournon

Data from other invertebrate groups are still sparse and scarce. Belemnites show a good record in the sections of Redcliff Point and Dubki, and have supplied important biostratigraphic and palaeobiogeographic information, offering good possibilities for isotope analyses. Finally, geochemical analyses are still not much developed (although they are under way in most of the sections). Magnetostratigraphic analyses have proved blank in SE France, are still doubtful in Redcliff Point and have given excellent results in Dubki (see Fig. 1: Kiselev *et al.*, 2006).

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KIMMERIDGIAN WORKING GROUP

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The complete documentation of the section at Flodigarry, Staffin Bay, Isle of Skye is finished, and this will enable presentation of the section as the GSSP candidate of the Oxfordian/Kimmeridgian boundary. This gives the most complete section so far known of the Boreal/Subboreal succession as a candidate for the primary standard of the base of the Kimmeridgian Stage.

There has been much discussion whether the standard should be recognized in a Boreal/Subboreal succession (which is generally of lesser correlation potential), or it should be newly defined (and modified) in a Submediterranean succession. The former approach is, however, so firmly entrenched in the geological tradition (including even the name Kimmeridgian) that it seems inappropriate to change the location of the primary standard (see Callomon J., 2005. A further comment on the GSSP of the Kimmeridgian Stage - *ISJS Newsletter* 32: 28-29). However, using the Dorset section originally indicated by Salfeld as the standard for the base of the Kimmeridgian, and retaining the *Pictonia densicostata* horizon (the first level occurring above the stratigraphical gap) as the lowest level of the Kimmeridgian Stage leads to a definition, which does not fulfill the basic requirements for a GSSP according to ICS. It is preferable to put the Oxfordian/ Kimmeridgian boundary at a slightly lower level than the *Pictonia densicostata* horizon, i.e. at the base of the *Pictonia flodigarriensis* horizon. This is the first *Pictonia* horizon recognized in the very complete succession in the Flodigarry section, Staffin Bay at Skye treated as the new standard for the stage (Matyja B.A., Wierzbowski A., Wright J.K. [2006] The Subboreal/Boreal ammonite succession at the Oxfordian/ Kimmeridgian boundary at Flodigarry, Staffin Bay [Isle of Skye]. *Transactions of Royal Society of Edinburgh, Earth Sciences*, 96(4): 309-318). Such placing of the boundary has also important consequences for better recognition of this boundary in the Submediterranean succession.

At the base of the *Pictonia flodigarriensis* horizon at Flodigarry, besides the first representatives of the genus *Pictonia*, there appear also the first *Prorasenia* (microconch of *Pictonia*), as well as the first small-sized ammonites of the subgenus *Plasmatites* of the genus *Amoeboceras*. All these ammonites occur in some Submediterranean sections (in Poland, and Germany) together with ammonites of the Bimammatum Subzone of the Bimammatum Zone. This means that the boundary between the Oxfordian and Kimmeridgian, as defined in the Subboreal/Boreal successions, should be placed somewhere around the Hypselum Subzone (Oxfordian) and the Bimammatum Subzone (Kimmeridgian). Detailed studies of the Submediterranean successions are necessary to define precisely the newly placed Oxfordian/Kimmeridgian boundary – but still we have many possibilities to locate it very closely.

At present we have no other good options, and this is the best compromise. Placing the boundary at this level also has some advantages for distant extra-European areas where the strongly diversified perisphinctids have generally little correlation value. The change from the Hypselum Subzone (in future the Hypselum Zone being the uppermost Oxfordian), and the Bimammatum Subzone of the Bimammatum Zone (lowermost Kimmeridgian) corresponds also to the transition between older aspidoceratids (*Euaspidoceras, Neaspidoceras*), and younger ones (*Aspidoceras, Pseudowaagenia, Physodoceras*), which may be useful in correlating the boundary. Other ammonites, especially haploceratids (Ochetoceratinae and Taramelliceratinae), could also be important in recognition of the Oxfordian/ Kimmeridgian boundary.

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KI-TI Boundary News: Working Group meeting in Stuttgart

From June 20-24th, 2005 a joint meeting of the Oxfordian/Kimmeridgian and Tithonian Working Groups took place in Stuttgart, Germany. The focus of this meeting was the definition of the lower boundaries of the Kimmeridgian and Tithonian and the search for stratotypes for these boundaries.

After the registration in the afternoon we met in the town of Stuttgart-Bad Cannstatt in the nice atmosphere of a typical restaurant. The next morning the Working groups' session was officially opened in the Natural History Museum, with greetings submitted by the Director of the Museum, Prof. Dr. J. Eder.

During this first day 8 oral contributions and one poster were presented and discussed. The presentations dealt with the stratigraphy of the Upper Jurassic in Spain, Germany, France, Poland, Argentina, Crimea, European part of Russia and northern Siberia. During the breaks the ammonite collections of the relevant intervals in SW Germany housed in the museum were presented, with additional material from participants also demonstrated, compared and discussed.

During the next two days field trips to the Upper Jurassic of the Swabian Alb were organized by Dr. Günter Schweigert, the enthusiastic amateur palaeontologist Armin Scherzinger, and Dr. Gerd Dietl. On June 22nd we visited sections in the Upper Jurassic of the western part of the Swabian Alb. We visited the boundary between the Impressamergel and Wohlgeschichtete Kalke formations (*Bimammatum* and *Planula* zones) in the Plettenberg quarry, the late Kimmeridgian Nusplingen Lithographic Limestone Formation (famous for its excellent preservation of fossils), Tithonian limestones in a large quarry near Liptingen, and at least the Kimmeridgian/Tithonian boundary beds along the railroad cutting at Talmühle near Engen. In the break after lunch the large collection of ammonites of Burkhart Russ in Nusplingen was visited in a special exhibition.

On June 23rd we visited the type section of the Obere Felsenkalke Formation (*Beckeri* Zone) in the Moeck quarry E of the village of Grabenstetten and the Kimmeridgian/Tithonian boundary beds along the road from Bad Urach to Grabenstetten. Moreover, limestone deposits of late Kimmeridgian age (Ulmense Subzone) were shown in a quarry near Donnstetten, and also the basal Tithonian beds along the road from Bad Urach to Wittlingen were studied. During the field trips it was possible to collect fossils, mainly ammonites, from the exposures.

During the last day, June 24th, after an oral presentation of G. Schweigert on the famous Jurassic palaeontologist A. Oppel, the results were discussed, and additional fossil material from Swabia and Franconia could be studied in the magazine of the museum. The next (internal) meeting will be during the international Jurassic Congress in Poland.

Publication. *A special volume of the journal "Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen" will be issued in 2006, with 7 contributions on Oxfordian/Kimeridgian and Kimmeridgian/Tithonian news:*

GLOWNIAK, E. (2006): The *Platysphinctes* immigration event: biostratigraphic and paleobiogeographic implications for the Middle Oxfordian (Late Jurassic) seas of Central Europe (NW Germany and Poland).

ATROPS, A., MELÉNDEZ, G. BELLO, J. PÉREZ-URRESTI, I. & RAMAJO, J.: The Oxfordian-Kimmeridgian boundary in Submediterranean Province (SE France and Iberian Range, Spain): Ammonite successions and proposal of a possible GSSP candidate.

MELÉNDEZ, G., BELLO, J., DELVENE G., PÉREZ-URRESTI, I. & J. RAMAJO: Upper Oxfordian to lower Kimmeridgian stratigraphy and ammonite successions from NE Iberian Range, Spain.

PARENT, H., SCHERZINGER, A. & SCHWEIGERT, G.: The earliest ammonite faunas of the Andean lower Tithonian of the Neuquén-Mendoza Basin, Argentina – Chile.

OLÓRIZ, F., BOUGHDIRI, M. & MARQUES, B. (2006): Remarks on relative phenotype stability in two Tithonian ammonite species first described from the Tunisian Dorsale – a preliminary approach to interpreting metapopulation dynamics in ammonites.

SCHERZINGER, A. & MITTA, V.: New data on ammonites and stratigraphy of the Upper Kimmeridgian and Lower Volgian (Upper Jurassic) of the middle Volga Region (Russia).

SCHERZINGER, A., SCHWEIGERT, G. & PARENT, H.: Dimorphism and aptychus in *Gravesia* SALFELD (Ammonoidea, Late Jurassic).

Participants in the meeting. Germany*: Dr. G. Dietl (Stuttgart), Dr. M. Franz (Freiburg i. Br.), Dr. G. Schweigert (Stuttgart), Dipl.-Ing. A. Scherzinger (Ludwigsburg), Dipl.-Geol. L. Vallon (Stuttgart).* Great Britain: *Prof. J. H. Callomon (London).* Spain: *Prof. G. Meléndez (Zaragoza).* Hungary: *Dr. I. Fözy (Budapest).* Poland: *Dr. M. Barski (Warsaw), Prof. A. Wierzbowski (Warsaw).* Russia: *Dipl-Geol. Y. Bogomolov, Dr. V. Mitta, Dr. M. Rogov (Moscow).* Argentina*: Dr. H. Parent (Rosario).*

New Literature

References to new papers concerning KI/TI boundary, Tithonian stratigraphy or containing information on these topics, are listed below. These papers are only those which have been communicated to the Convenor or to the Secretary

ENAY, R., HANTZPERGUE, R., SOUSSI, M. & MANGOLD, C. (2005): La limite Kimméridgien–Tithonien et l'âge des formations du Jurassique supérieur de la Dorsale tunisienne, comparaisons avec l'Algérie et la Sicile. Géobios, **38**: 437-450.

BOUGHDIRI, M., OLÓRIZ, F., LOPEZ MARQUES, B., LAYEB, M., DE MATOS, J. & SALLOUHI, H. (2005): Upper Kimmeridgian and Tithonian ammonites from the Tunisian «Dorsale» (NE Tunisia): updated biostratigraphy from the Jebel

Oust. Rivista Italiana di Paleontologia e Stratigrafia, **110,** 1: 249-254.

SATO, T., MIZUNO, M., HACHIYA, K & YASUI, K. (2005): Jurassic Ammonites collected from the Shima Peninsula, Mie Prefecture. – Bulletin of the Mizunami Fossil Museum, **32**: 235-243.

SCHWEIGERT, G. (2005): Ammonite biostratigraphy as a tool for dating Upper Jurassic lithographic limestones from South Germany – first results and open questions. Zitteliana, B, **26**: 22-23.

ZEISS, A., SCHULBERT, C. & VIOHL, G. (2005): The ammonites from Schamhaupten (Southern Franconian Alb, Bavaria) – an interesting faunal association at the boundary Upper Kimmeridian/Lower Tithonian. Zitteliana, B, **26**: 29.

GEOCONSERVATION WORKING GROUP

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Introduction

The geoconservation highlight of the last year was undoubtedly the IVth International Symposium ProGEO in the Conservation of the Geological Heritage, held in the University of Minho, Braga, Portugal, last September. ProGEO is the European association for the protection of the Geological heritage (www.sgn.se/hotell/progeo) and these symposia provide the most important fora for the development of geoconservation methodology, not only in Europe, but perhaps globally as well. This excellent meeting is reviewed further below:

The last year also saw the wider dissemination of the Working Group's classification of palaeontological heritage as a guide to conservation, as published in full in the proceedings of the last ISJS symposium in Palermo (Page 2004). The first presentation (Page 2005a) was to the 20th anniversary meeting of the Réserve géologique de Hettange-Grande, the type locality of the Hettangian Stage – a remarkable occasion combining geological science and geological heritage themes. The audience consequently was very broad in scope ranging from an international panel of scientists through most of the major players in geoconservation in France to the local community itself.

The second presentation of the guidelines was to the Braga ProGEO meeting, in collaboration with Guillermo Meléndez of the Universidad de Zaragoza. A key theme in the latter paper was the problems created for science by 'too little' or 'too much' conservation and examples were taken from, respectively, the UK and Spain (abstract published as Page and Meléndez 2005 and reproduced below). The former used figures previously cited in the Hettange paper, which demonstrate that the fossil collecting code established within the Dorset and East Devon World Heritage Site is failing, some might say spectacularly, to adequately safeguard the palaeontological heritage of the area.

The paper was very well received by many in the meeting and interesting discussion ensued. Rather than review the implications of the figures presented, however, one of the administrative authorities responsible for the area chose a different approach. In a remarkably Orwellian move an attempt was made after the conference to discredit the publication of the review including through the insertion of an unrefereed commentary in the meeting's proceedings. As such actions have implications for geoconservation in Europe, and indeed several members of the Subcommission have received unsolicited emails on the subject, it is regrettably necessary to comment further on this matter below.

As a consequence of these matters and a number of issues relevant to the function of the Subcommission, its working groups and this Newsletter have arisen, and some important decisions may need to be taken about how future activities should be conducted.

IVth International Symposium ProGEO in the Conservation of the Geological Heritage, University of Minho, Braga, Portugal (l3-16 September 2005)

The symposium marks another major milestone in the development of geoconservation as a distinct discipline within scientific and heritage studies and practice. Around 133 presentations covered all aspects of the subject from across Europe and beyond. Those of particular relevance to the Jurassic include those listed below, together with page numbers in the Abstracts volume (Earth Sciences Centre, University of Minho 2005, *IVth International Symposium ProGEO in the Conservation of the Geological Heritage: Abstracts*, University of Minho):

Page, K.N. and Meléndez, G., International science versus national heritage? Guidelines for the enlightened management of palaeontological heritage and stratotype localities (p.12).

Pérex-Lorrente, F. Dinosaur footprints to World Heritage candidacy (p.14).

Duarte, C.B., Duarte, L.V. and Tavares, A.O., The Lower Jurassic cliffs of S. Pedro de Moel (Portugal): A case study of the application of a geological heritage inventory to land-use planning (p.31).

Edmonds, R., Larwood, J. and Weighell T., Sustainable site-based management of collecting pressure on palaeontological sites (p.39).

Meléndez, G., Soria, M. and Delvene, G., Protecting the Jurassic outcrops in the northeastern Iberian Cordillera (E. Spain): Legal framework, measures for geoconservation and social management (p.41).

Henriques, M.H., The Museu da Pedra (Cantanhedre, central Portugal); where Jurassic meets the public (p.130).

Henriques, M.H, Azerêdo, A.C., Duarte, L.V. and Ramalho, M.M., Jurassic heritage and geoconservation in Portugal (p.132).

Duarte, L.V., The Jurassic reference section of Peniche (Portugal). Geological and educational interest (p.133).

Carapito, M.C., Jurassic paleontological heritage and micropaleontological heritage of Cabo Montego (Potugal) (p.134).

Azerêdo, A.C. and Ramalho, M.M., The Jurassic geological heritage at the Parque Natural das Serras de Aire, E. Candeeiros (central Portugal): selected examples from a broad spectrum (p.139).

Henriques, M.H. and Ramalho, M.M., Jurassic Heritage of Cabo Mondego (central Portugal) (p.140).
Ramalho, M.M. and Azerêdo, A.C., Upper Jurassic features of heritage value at Nazaré region (central Portugal): some examples (p.141).

The undoubted highlight of the meeting for Jurassic specialists, however, was the post-symposium field excursion to the Jurassic, which provided a marvelous opportunity to examine and discuss the conservation and scientific interest of some of the regions most important sites. Needless to say, these included the Bajocian GSSP at Cabo Mondego and the leading candidate GSSP for the Toarcian at Peniche. Particularly relevant was a Portuguese statute that gives a high level of protection to the country's coastline – would-be researchers take note, as legal permissions are needed before any geological sampling of these areas can be carried out!

The excursion also included a visit to the community focussed Museu da Pedra at Cantanhedre, an area famous for its Bajocian ammonites, and the spectacular Middle Jurassic dinosaur trackways of the Parque Natural das Serras de Aire in eastern Candeeiros (the museum's achievements in geoconservation education have recently been recognised by the award of a national "ProGeo-National Geographic" prize).

An excellent guide was provided to the sites visited, including the following papers:

Henriques, M.H, Azerêdo, A.C., Duarte, L.V. and Ramalho, M.M., Jurassic heritage and geoconservation in Portugal. *In*: Henriques, M.H, Azerêdo, A.C., Duarte, L.V. and Ramalho, M.M. (eds), *Jurassic Heritage and Geoconservation in Portugal: Selected Sites*, Geosciences Centre, University of Coimbra, pp.7-16.
Azerêdo, A.C. and Ramalho, M.M., The Jurassic geological heritage at the Parque Natural das Serras de Aire, E. Candeeiros (central Portugal): selected examples from a broad spectrum. *In*: Henriques, M.H, Azerêdo, A.C., Duarte, L.V. and Ramalho, M.M. (eds), *Jurassic Heritage and Geoconservation in Portugal: Selected Sites*, Geosciences Centre, University of Coimbra, pp.17-22.
Duarte, L.V., The Jurassic of the Peniche peninsula (central Portugal): an international referenec point of great scientific value and educational interest. *In*: Henriques, M.H, Azerêdo, A.C., Duarte, L.V. and Ramalho, M.M. (eds), *Jurassic Heritage and Geoconservation in Portugal: Selected Sites*, Geosciences Centre, University of Coimbra, pp.13-32.
Ramalho, M.M. and Azerêdo, A.C., Upper Jurassic features of heritage value at Nazaré region (central Portugal): some examples. *In*: Henriques, M.H, Azerêdo, A.C., Duarte, L.V. and Ramalho, M.M. (eds), *Jurassic Heritage and Geoconservation in Portugal: Selected Sites*, Geosciences Centre, University of Coimbra, pp.33-36.
Henriques, M.H. and Ramalho, M.M., Jurassic Heritage of Cabo Mondego (central Portugal). *In*: Henriques, M.H, Azerêdo, A.C., Duarte, L.V. and Ramalho, M.M. (eds), *Jurassic Heritage and Geoconservation in Portugal: Selected Sites*, Geosciences Centre, University of Coimbra, pp.37-44.
Henriques, M.H., The Museu da Pedra (Cantanhedre, central Portugal); where Jurassic meets the public. *In*: Henriques, M.H, Azerêdo, A.C., Duarte, L.V. and Ramalho, M.M. (eds), *Jurassic Heritage and Geoconservation in Portugal: Selected Sites*, Geosciences Centre, University of Coimbra, pp.45-55.

Opportunities to relax at a number of strategically placed bars close to the GSSP sites also provided a valuable chance to discuss the activities of the ISJS's Geoconservation Working Group with a number of key members. The results of some of these discussions will be presented at the next ISJS symposium in Krakow!

Politics and fossils in the UK

Although the UK was one the first countries in Europe to establish a systematic network of protected sites, it still has no legal protected status for palaeontological heritage, unlike many other European countries, and existing statutory mechanisms are generally not used. As a result, many nationally designated conservation sites remain vulnerable to inappropriate fossil collecting activity. Faced with a legislative focus on site protection, rather than the contained moveable heritage, a reliance on voluntary 'codes of conduct' has consequently developed. In part this also reflects an attempt not to alienate a strong tradition of amateur geologists who have been a major contributor to geosciences in the UK (Geologist's Association 2006) and this aim is certainly to be supported. Very little or typically no legislative framework supports these codes, however, and the most destructive site users can remain undeterred from their activities.

Such a code is in place within the well known southern English 'Jurassic Coast' World Heritage site (Edmonds 2001). This famous area has become the focus of intensive commercial fossil collecting activity – as a result it has also become a microcosm for the issues facing palaeontological site management in the UK as a whole (Page 2005b). Along with large quantities of specimens from protected sites in the UK, many fossils from elsewhere in the world are also on sale in the area – thus raising additional concerns about the international consequences of this trade in the UK.

The Dorset collecting Code, however, allows any fossil collector to remove fossils from the World Heritage site providing that that they report 'significant' finds (as defined in the Code's guidelines). Six months are then allowed for UK institutions to raise sufficient monies to meet what would inevitably be an international market price, to secure the future of the specimen as a part of the national heritage (but only, of course, if the find is reported and if the museums are able to raise sufficient money…). What makes this scenario even more remarkable is that the majority of the fossils already belong to the State by virtue of land *ownership* by local governmental authorities and national conservation organisations (including both State and NGOs) and that the entire area is also 'protected' by national conservation legislation.

The problems associated with the code are compounded by the fact that the guidelines are drawn to emphasise primarily vertebrate materials and effectively discard

whole classes of other important fossils. Ammonites, in particular, the key stratigraphical tools for Jurassic marine sequences, are considered to be little more than "*bread and butter*" fossils for these collectors (i.e. providing a basic financial income) and generally not even worth recording in the scheme. Other fossil groups such as squids and echinoderms fair little better.

Local newspaper reports confirm some of the background to this approach, as a strong emphasis in the development of the World Heritage site revolves around the designation's perceived economic potential for tourism. A newspaper headline, for instance, following the receipt of a tourism award, forecasted a resultant £60,000,000 increase in income from visitors with the head of a regional tourism body declaring the area to be "*…the only World Heritage site in the world you can hit with a hammer…*" (*Western Morning News*, April 2005). Given this virtual fossil free-for-all and the large profits that can openly be made by their sale, it is perhaps not surprising that the only negative responses to the ISJS Geoconservation Working Group's recommendations for palaeontological conservation (Page 2004) have come from Dorset, in particular from commercial fossil dealers and other collectors (for instance Sole and Etches 2005).

This recording scheme, however, provides a valuable way in which to assess the scientific and heritage management 'effectiveness' of a non-legislative collector-focussed approach by comparison with the records of systematically collected total faunas from a palaeontological recovery project on an adjacent major highway-building scheme (Page 1991). The latter excavated one of the primary fossil units on the West Dorset coast, the upper part of the Shales-with-Beef Member and the Black Ven Marls Member (Sinemurian: Birchi to Raricostatum subchronozones) and ideally it would have been preferable to compare records from just this interval, where 2470 specimens were documented in the road excavations. The surprisingly low number of specimens recorded on the coast, however, necessitated an initial assumption that the records from the road cuttings were representative of the average relative abundance of various fossil groups in the Lias as a whole – they were therefore compared with those from such an interval on the coast. One group is relatively well recorded by the collecting Code, however, reptiles - and they therefore provide a useful standard for estimating the recovery of other groups on the coast (see Table 1).

FOSSIL GROUP	**Charmouth Bypass Site** (specimens of particular scientific importance bracketed)	**West Dorset Coast, Register** (i.e. World Heritage site)	**Expected no. of specimens of particular scientific importance on the coast**	**Estimated loss from the coast** (no. of specimens)
Reptiles	3 (3)	14	14 [e.g. 3 x 4.7 = 14]	0
Fish	18 (10)	4	(10 x 4.7 =) 47	(47–4 =) 43
Insects	106 (106)	4	(106 x 4.7 =) 498	(498-4 =) 494
Teuthids (squids)	8 (8)	1	(8 x 4.7 =) 38	(38-1 =) 37
Ammonites	2215 (140)	4	(140 x 4.7 =) 658	(658-4 =) 654
Miscellaneous	71 (10)	7	(10 x 4.7 =) 47	(47-7 =) 40
TOTALS	2420 (277)	34	1304	1270

Table 1: ***Comparison of the records of Jurassic fossils from the scientific recording scheme of the Charmouth Bypass site (1989-1990) and the West Dorset Coast Fossil Collecting Code register (1999-2002). Scientific importance of specimens on the bypass site was assessed in accordance with the ISJS Geoconservation Working Group guidelines.***

These results suggest that over 1300 specimens of particular scientific note would have been expected on the coast over this period and hence recorded by the World Heritage collecting scheme. The actual figure of only 34, however, even allowing for a few unrecorded academic studies, demonstrates that the Code has delivered little scientific benefit, especially as some of the key recorded specimens are still in private ownership – including a remarkable complete skeleton of the early armoured dinosaur, *Scelidosaurus*.

This simple analysis was first presented to the English governmental conservation agency, English Nature and the local West Dorset County Council in November 2002 and again in mid 2005 and as a courtesy and in confidence, the full unpublished text of the Braga manuscript (Page and Meléndez, see abstract reproduced below) was also sent to English Nature prior to the September meeting. On each occasion the analysis was ignored and no discussion initiated. What followed next, however, was really quite remarkable and demonstrates a form of attempted information control of which George Orwell's 'Ministry of Truth' would have been proud. After the meeting concluded, a geological group in English Nature's head office wrote to the editor and conference organising committee, requesting that a statement was appended to the published paper. This statement included the following:

"Whilst English Nature (the UK government's advisor on wildlife and geological conservation in England) welcomes debate on strategies for geological conservation, we wish it to be known that we disagree with aspects of this paper. In particular, we disagree with comments about the approach being taken to the management of palaeontological resources in England and, specifically, in the Dorset and East Devon Coast World Heritage Site. Within the World Heritage Site we work as one of a number of partners to conserve and promote the scientific, educational and recreational value of this spectacular coastline, and we feel that this paper gives an ***unfair and inaccurate*** *portrayal of the approach being taken."*

This statement and related correspondence was also widely circulated to the Chairman of the Jurassic Subcommission and a range of other authorities in a blatant attempt to further undermine the credibility of the analysis and, of course, its author (KNP). As a result, Bill Wimbledon (as a Jurassic Subcommission member and on behalf of ProGEO) wrote to English Nature's Chief Scientist, expressing extreme concern

about the attempted interference with the Braga publication and the free-for-all over collecting in Dorset. A remarkable 3 months later, English Nature replied, but still provided no meaningful response to the issues raised. In particular, there was no reply to one of the key points, that a respect for protected sites, which had been developed over many years in Britain, was now being eroded by the unhindered commercial collecting and trading and atmosphere of exploitation that was being promoted in Dorset. In a recent meeting with English Nature the ostrich-like denial continued and a number of bizarre reasons were listed in an attempt to demonstrate how scientifically-gathered records from a road construction site, 1 km inland from the WH coast, could not possibly be compared with the records of fossil finds on the coast.

This is not the first time that critics of the Code have found themselves the subject of indignant retorts, however, and even when concerned articles have appeared in regional and national newspapers in the UK, the response has been swift and often damming. Complaints to English Nature from the British Institution for Geological Conservation (BIGC) – the UK's coordinating body for ProGEO - have also fallen on deaf ears. Interestingly, others are beginning to question the appropriateness of the Dorset scenario and in the geological enthusiasts magazine, *Down to Earth*, after a recent landslip in the area was promoted in the press as '*Riches in store for fossil seekers'* (*Western Morning News* 1/06) and '*The fossil hunter's gold coast*' (*The Times* 21/1/06) the editor, Chris Darmon, observed that people were being "*...driven into a near frenzy by the prospect of finding that perfect ammonite that might be worth a lot of money on e-bay*" (Darmon 2006). He concluded, "*At a national level it would require the likes of English Nature…to re-examine its policy on collecting and draw up the necessary codes. The present situation involving so-called 'responsible' collecting is clearly not working and is at odds with guidelines for both archaeology and botany*".

There are clear issues here for the Geoconservation Working Group and geoconservation in Europe as a whole, however. Conservation practice and philosophy will only develop and improve if there is meaningful and open debate on matters of concern. Sometimes the conclusions of analyses and assessments may be inconvenient and uncomfortable, but denial and suppression can only hinder the development of new and more effective techniques – and crucially can only have adverse effects for science. As has also been amply demonstrated by this episode, there is now an international aspect to such information control as some UK authorities now seem to feel that they can also manipulate debate internationally by attempting to influence international organisations. This attitude is also demonstrated by the background to a website cited by English Nature in their Statement (http://www.geoconservation.com/conference/docs/fossil.htm) where discussion on the management of palaeontological heritage within *World Heritage* sites *globally* – i.e. not just in the UK - is solicited. A cursory look at the initial circulation list for this consultation, however, reveals very few palaeonotologists… and one can be sure that UK prejudices will be reflected by any final analysis.

Ironically, it is precisely the virtual removal of palaeontologists and stratigraphers from the decision-making process in conservation, which was the key theme of the Braga paper - I wonder if English Nature will ever see the irony of the approach they adopted when attempting to undermine the paper? A double irony is that in highlighting the Braga paper, and the previous Hettange paper (Page 2005), they have also raised the profile of two works in the UK which might otherwise have remained quietly and innocuously buried in the 'foreign' scientific literature!

Fortunately, a different approach has been adopted elsewhere in the UK, and Scottish Natural Heritage – an equivalent body to English Nature - has used the newsletter of the UK Palaeontological Association to generate feedback on its own developing fossil-collecting policy (Macfadyen 2006). In addition, Countryside Council for Wales in conjunction with police forces has recently raided a well-known fossil shop in Lyme Regis in Dorset, to recover dinosaur footprints stolen from a statutorily protected SSSI, in Wales. These discrepancies in approach within the UK belie a lack of national coordination or lead in the field of geoconservation, a void that, of course, can only adequately be filled by palaeontologists and stratigraphers.

There is light at the end of the tunnel in England, however, as in October English Nature ceases to exist as it is absorbed into a new countryside organisation, Natural England. The latter's corporate plan states that stronger links will be developed with scientific organisations, and combined with an all new management structure, perhaps the policies of the past can at last be reviewed.

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Appendix 1: International science versus national heritage? – Guidelines for the enlightened management of palaeontological heritage and stratotype localities

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Abstract: The loss of geological sites due to development or neglect, combined with the increasingly destructive activities of specimen collectors, eventually stimulated the development of heritage protection laws in many European countries in the later twentieth century, to safeguard geological heritage. In addition, a whole new profession of heritage managers developed, to implement these new laws and 'police' the protected sites. Such laws and procedures inevitably invoke national traditions and perspectives, but all too commonly can marginalise and even exclude geoscientists from the localities that they themselves first brought to the attention of the authorities. This issue can be of particular significance for stratotype localities where the contained faunas or rocks themselves have an international importance, but can be rendered effectively useless if site management procedures do not readily permit continued international study.

In the absence of any international agreements, or within Europe, conventions or directives to address such issues, the Geoconservation Working Group of the International Subcommission on Jurassic Stratigraphy (ISJS, International Commission on Stratigraphy), developed a series of recommendations in 2002. These guidelines aimed to promote an appropriate balance between conservation and science, within a spirit of international co-operation. They suggest a classification of palaeontological heritage from Category 1 to Category 4, where Category 1 are type specimens requiring the highest level of protection and Category 4 are common, even rock forming, taxa which *do not* require any level of protection especially when they lie outwith a legally protected site. Category 2 are specimens of especial scientific interest, including figured specimens, and Category 3 are potentially scientifically informative, but not unique or of great rarity.

A parallel set of guidelines recommend appropriate site management procedures for internationally important stratotype localities, to ensure their continued contribution to international scientific studies. Both schedules will, it is hoped, be of value to both geoscientists and site managers alike and help promote an 'enlightened' approach to the management of internationally important stratigraphical and palaeontological localities.

[In: Earth Sciences Centre, University of Minho (ed.) 2005. *IVth International Symposium ProGEO in the Conservation of the Geological Heritage: Abstracts*, University of Minho, p.12]

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Dear Friends it is time again to report on the activities of the Liaison Working Group, an assembly comprising mostly of amateurs or "Outsiders" (Torrens 2006, Proceedings of the Geologists' Association, **117** p. 1-8). According to Hugh Torrens the amateurs should henceforth be known as "outsiders". I therefore respectfully suggest the title of this working party be newly named "The Outsiders Liaison Working Group". I say this in jest of course! Considering such outsiders would have included the likes of Thomas Wright and S.S. Buckman it starts to make you wonder who the "insiders" are? Whether you are inside or outside, each of us makes a contribution to the sum knowledge of Jurassic science. I congratulate Hugh on his efforts to bring honour to the status of amateur, but I have not yet personally become at ease with being termed an outsider.

I wish to congratulate one member of our group. Steve Etches has recently been selected to receive the Mary Anning Award of the Palaeontological Association. Very well deserved, congratulations Steve! I also wish to celebrate the life of Austin Lockwood of the UK who died recently. Austin was an inexhaustible source of enthusiasm to both young and old. He ran 'Rockwatch', a geology club for children in the London area, and inspired many a young palaeontologist. The value of a good teacher is enormous and Austin was without doubt that!

I have prepared this column for a number of *Newsletter*s now and I thought I might indulge myself by writing here about the roots of my interest in the subject as example of the importance of introducing geology to young people from the earliest age possible. I attended school in London and started a school geology club at the age of 12. John Hanson, a geography teacher, had a personal interest in the subject and gave up weekends and much personal time to take the club on field trips. In May 1967 we visited Bridport in Dorset. Here I made first contact with the Jurassic Coast, a connection that will celebrate 40 years of personal research next year. John Hanson died before it was possible to make further visits, so the club continued in his memory. Originally 'Spencer Park

Geology Club' my good friend John Callomon suggested that due to our devotion to this particular region and it's ammonites we should be named the 'Wessex Cephalopod Club' What follows here is an account of the activities of the club and our friends.

Activities of the Wessex Cephalopod Club: A permanent display at Sherborne Castle

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We are all familiar with the fossils collected by S. S. Buckman and his father James. Much of the material they collected comes from well know sites such as Sandford Lane, Frogden (Fig. 1), Clatcombe, Louse Hill and many more, all in the Sherborne area of Dorset. Much of the classical geology around Sherborne in Dorset lies within the property of Sherborne Castle Estates. The owners, the Digby family, discussed with me the possibility of mounting an exhibition of fossils found on Estate property. In cooperation with English Nature and Dorset County Council plans are now well advanced. The Estate has made available within the present display areas of the castle, an area that will be utilised to construct a permanent geological display. This will involve the erection of cabinets, exhibition structures and specialist consultation by various geological experts. Information boards and photographs that give an account of the geological importance of the region will support a display of fossils and rock specimens. The entranceway to the area will also be used to provide a display of building stones used locally.

The castle was the home of Sir Walter Raleigh and is now open to the public on a seasonal basis. Various projects on Estate land have brought considerable new understanding to the area's geology. It is proposed that the display should be running within a year. The items to be displayed have been made available by volunteers from various agencies involved in Dorset geology including English Nature, Dorset County Council and various consultants and preparators of fossil material. The intention is to promote an understanding of the Estates geology and highlight its relationship to the 'Jurassic Coast' to the south.

Geological justification: The display would be a permanent record of an important period of geological research conducted in an area of outstanding importance in respect of Jurassic geology and would celebrate one of the most historically important testing grounds for the discipline of biostratigraphy. Sherborne Castle Estate lies in an area of highly fossiliferous Middle Jurassic strata (mostly Aalenian-Bathonian), the Inferior Oolite Formation resting on Lias, Bridport Sands. These rocks have been the subject of intense study including work by William Smith, but more importantly the home and research area of Sydney Savory Buckman (1865-1929). During the earlier part of his lifetime Buckman made detailed recordings of almost every exposure in the area, many of them within the confines of the Estate. Most of the localities are disused small pits but some are still quarried today, e.g. Frogden Quarry, Oborne. The Buckman family moved to Sherborne in the 1860s following James Buckman's removal from the post of Professor of Agricultural Geology at Cirencester due to his support of the views of Charles Darwin. The family house at Coombe is a short distance from the proposed exhibit and James Buckman is buried nearby in the Churchyard at Bradford Abbas. The exhibit will be central to the area investigated by the Buckman's and will complement the classical succession of Jurassic rocks displayed along the Jurassic Heritage Coast.

James Buckman was responsible for initiating the Dorset Natural History and Archaeological Society and was the collector of many specimens later described by S. S. Buckman in his writings. The majority of these are ammonites with type status currently housed in our national museums.

Structurally the area is unique in that the effects of contemporary Jurassic earth movements have affected sedimentation in rich fossil bearing limestones. The result is that in any number of very locally adjacent sites the stratigraphy is quite different. Slices of time are preserved in horizons of rock characterized by abundant ammonites. Between these strata are time gaps of unknown extent. Buckman, Arkell and later Parsons (1970s), and Callomon and Chandler (1990s onwards) have undertaken painstaking detailed study of each locality and have compiled tables of biohorizons based on fossil ammonites. These bio (faunal) horizons have enabled a detailed biostratigraphy to be compiled and applied to these rocks to produce an unparalleled biochronological resolution of geological time.

Fig. 1. Frogden Quarry, Dorset.

West Dorset (UK) fossil collecting code: Summary of statistics 1999 to 2006

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The collecting code aims to promote communication and awareness between collectors and researchers and museums. An important aspect of the code required collectors to record specimens of key scientific importance ('Category 1 specimens'). These records are available on the Charmouth Heritage Coast Centre web site at www.charmouth.org so that anyone with an interest can see what is being found. Researchers are urged to use the recording scheme as a way to promote awareness of their interests amongst collectors. The Centre wardens and World Heritage staff can provide the link between researchers and the collectors.

So what has been found? After seven years of collecting, 96 records have been made of which two records respectively contain 34 and 23 individual insects, making a total of 151 specimens. Of these, 28 are Category 1 specimens and 62 are Category 2 specimens. Six have been declassified as not being of importance. Four records belong to one individual specimen, an exceptionally well-preserved skeleton of the dinosaur *Scelidosaurus*.

Specimens by type:

- 32 reptiles (13 category 1, 16 Category 2, 3 declassified)
- 13 fish (1 category 1, 9 Category 2, 3 unclassified)
- 11 ammonites (2 Category 1, 6 Category 2, 3 unclassified)
- 13 insect records (68 specimens) 6 Category 1, the remainder Category 2)
- Found by 33 individual collectors

Thirty-nine specimens have been donated to museums (two of Category 1). This includes the collection of 34 insects. The original collection was in the region of 90 specimens but only 34 were selected by Dr Andrew Ross for the Natural History Museum, London. Of these, one has been identified as a likely new species. Nine specimens have been sold to museums including two Category 1 specimens, one being a new species of ichthyosaur. The very latest record, made in March 2006, also looks to be a new species of ichthyosaur. Interestingly, three new species of ichthyosaur have now been found in the last ten years at the top of the Belemnite Marl (Pliensbachian) by one local collector.

The majority of Category 1 specimens remain with collectors. In the case of at least ten specimens the collectors are keen to see these specimens retained for display and/or acquisition within a future museum or exhibition in the local area. The World Heritage Team is working with Lyme Regis Museum and the town's Development Trust on plans for a cultural quarter, which will include an expanded museum and geology gallery. The Natural History Museum, London is also involved in the project, and this partnership offers exciting developments in the future.

Fig. 2. Chris Moore with the recently discovered ichthyosaur (record 96) from the top of the Belemnite Marls, Seatown, Dorset.

Notes from an Amateur Palaeontologist

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Bob asked me to make a small contribution to the *Newsletter.* My interest in 'rocks' started as a child collecting fossils from the Inferior Oolite of Sherborne where I was at school. It was this collecting and delving in the school library (which had a remarkable selection of books including SS Buckman's 'Ammonites of the Inferior Oolite Series' and Hudleston's 'Monograph of the Inferior Oolite Gastropoda') that started my lifelong interest in science. I was encouraged by Hugh Torrens, a contemporary at school and Phil Palmer of the Natural History Museum in London. Like many schoolboys before me, I used to take my paltry box of specimens to that mysterious door in the Palaeontology Department of the Museum in London, returning the next holiday to retrieve them and eventually to be ushered into Phil's office for a cup of tea and discussion of the finds. In my final school exams I wrote a dissertation on the ammonites from Halfway House (subsequently published in part); these were the days when you could choose a special topic if you wished. This was amazingly well received and was certainly in part instrumental in my being accepted to study Natural Sciences at Cambridge University. There is no doubt at all that collecting fossils initiated my lifelong passion for science. Please, then, let us not become so obsessed with conservation that we destroy this opportunity for future generations.

After I left school I continued to collect from the Inferior Oolite of Sherborne and Dundry and recorded, in very simple terms, a temporary exposure at Oborne Wood. For the next 30 years I pursued a career in medical science and research but retained a keen interest in the broader aspects of geology, always an escape into something different, particularly when traveling, whether for holiday or work.

Now that I am retired I am reviving my interest in the Jurassic and plan to do some research. Some years ago I started a detailed biostratigraphic log of the Coleby Mudstones, the Lias clays above the Frodingham Ironstone, in the various disused opencast mines at Scunthorpe. My intention was to test the application of Kevin Page's 'horizons' to this sequence and to document it in more detail than had hitherto been done, but extensive slumping and thus a paucity of accurately localised fossils may defeat me. My collection is being put into Access™ and will be available to anyone interested. Almost all the material is accurately localised stratigraphically and it will eventually go to an appropriate Museum, possibly Bristol.

In Praise of Professional Preparators

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The professional collection of fossils for sale as aesthetic ornaments to tourists, or as specimens to private collectors and museums, has a long tradition dating back at least as far as the 19th century. Some of its pioneers, such as Mary Anning, are now widely celebrated as heroic figures of folklore who expanded the frontiers of palaeontological knowledge. Yet in recent times the profession that she once practiced has

become subject to periodic criticism, as its interests are sometimes perceived to conflict with the pursuit of scientific understanding. The main criticism is one of loss of data arising from over-zealous removal of material and/or lax data collection. Attempts to resolve competing interests have led to the establishment of various local codes and regulations, and this remains an area of on-going negotiation. But one aspect of the profession that must surely be regarded as positive by all the palaeontological community is the increasing level of skill and technological sophistication practiced by those of who prepare fossils for public sale or, particularly, as a paid service to collectors. The use of miniature compressed air chisels, air-abrasive and chemical techniques and the desire to achieve aesthetic excellence is enabling unprecedented levels of preservational (and sometimes taphonomical) detail to be revealed.

Two examples of work by two of the UK's foremost preparators are figured here. Both are examples of the ammonite *Eoderoceras armatum* (Sowerby) that are bequeathed to Oxford University Museum. This species is a challenging one to extract when enclosed in hard matrix due to its evolute form and spinate ornament. The examples figured have required quite different preparation techniques. Specimen A was collected from the Pabay Shale Formation of Raasay and was enclosed in a pyritic nodule. The outer water-worn whorl was all that was visible. The dense, hard matrix was painstakingly removed using air pen and air abrasive to reveal the delicate spines of the inner whorls and the fine detail of the ornament. The work was carried out by Mike Marshall who has many years' experience extracting ammonites from similar nodules from the Upper Lias shales of Whitby.

Fig. 3. Prepared specimens of Eoderoceras armatum (Sowerby); A from Pabay Shale Formation, Isle of Raasay, NW Scotland; B from armatum Bed, Lower Lias, Radstock, Somerset, SW England.

Example B is a large phragmocone from the Radstock '*armatum* bed'. Examples from this locality are revealed when the relatively soft limestone is cleaved along bedding planes. However, while the matrix readily separates from the major part of the fossil, spines are invariably detached and left behind in the limestone counterpart ('negative'). As the ammonite is in a soft phosphatic preservation, the spines were chemically consolidated, numbered, individually removed from the counterpart and replaced on the specimen. Note also how the preparator, alert to the scientific study of the material upon which he was working, has avoided any unnatural restoration and has revealed a phosphatic clast in the centre of the ammonite to retain some taphonomical context. This specimen was prepared by Andy Cowap who has now developed a series of bespoke techniques for preparing the rather delicate fossil material from this location.

Of course, this personal endorsement must be provided with the caveat that fossil preparators are in a position to artificially enhance specimens through various levels of falsification, and some collectors (myself included in former times) can encourage such practice. This is an area where we must realise our responsibilities, as it is a far greater service to posterity to bequeath fossils with quality data than a poorly curated collection of apparent aesthetic perfection. Dedicated private collectors/ researchers have the potential to leave a valuable legacy by collaborating with skilled professional preparators. Pride on both parts is the key.

Update on a Jurassic field site - Horn Park Quarry, Beaminster, Dorset

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The Dorset branch of the Geologists' Association local group has within it a number of seasoned campaigners known locally as the Geogeriatrics. These individuals help to keep SSSIs and features of geological importance monitored. Last year I wrote on behalf of the Geogeriatrics to English Nature concerning a worrying development at Horn Park, a famous Aalenian-Bajocian locality.

Horn Park-Geogeriatrics visit 18-3-05

"Word had come that the SSSI at Horn Park had been damaged by illegal collectors, Those of you who remember the work that DGAG members, amongst others, put in will be angered and saddened to see the accompanying pictures (Fig. 4).

The tarpaulin that our Working Group Convenor purchased to protect the exposed ammonites has been torn into small pieces, and the ammonites protected by it have all been taken, apart that is from those that were merely smashed. There is no protection for what remains, nor explanatory boards or requests to visitors to respect a unique geological site".

The site displays a number of limestone beds with numerous ammonites (Fig. 5). It is very satisfying to be able to report and provide photographic evidence of official reaction to the misuse of an important site. English Nature secured funding to erect a security fence around the site, and as can be seen from the picture the SSSI is now very much better protected. The fencing on the skyline is designed to be unobtrusive. In my opinion this is entirely successful (Fig. 6).

Fig. 5. Abundant large Brasilia, formerly in situ at Horn Park Quarry, Dorset, SW England.

Fig. 6. New protective fence at Horn Park Quarry, Dorset, SW England.

Importantly as well, the County Council, Dorset GA Group, Dorset Regionally Important Geological Sites Group and local amateurs have all been involved in discussing how the site might be best preserved and made available to visitors. Suggestions of walkways, displays and interpretation boards have been made. Unauthorised access to the fossil beds will not be allowed, but viewpoints for the "spur of the moment" visitor are under consideration.

Congratulations are due to English Nature and their contractors Surehoard, a local firm, and thanks to Ted Seale the owner of the Industrial Site for his cooperation.

CORRESPONDENCE

THE GOLDEN SPIKE: TARNISHED OR RESPLENDENT?

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A serious problem has arisen. A note from Desmond Donovan posed the question: when was the concept of the Golden Spike first introduced into stratigraphy as shorthand for what the geeks of the ICS were later to dignify under the portentous term Global Stratotype Section and Point? The first reference to it in print he could find was in Derek Ager's entertaining but perceptive account of *The Nature of the Stratigraphical Record* (Macmillan, 1973). But I know that it was in circulation orally well before that, certainly in the 1960s. Its origins lie in our first (*sic*) ISJS Colloquium in Luxembourg in 1962, at which the typological definition of the units of what today we call our standard chronostratigraphical scale was mooted.

The first attempt was in terms of Standard Stage Stratotype Sections, the Stages being those of one of our Early Prophets (1850). Unfortunately, like the edicts of all the best prophets, his indications as to what was meant by Stages were not unambiguous. Attempts to reach consensus leading nowhere; recourse had to be made as last resort to consultation of Scripture itself. I recall the plenary session falling into rapt silence as we were given sonorous readings from the Book of Saint Alcide. But even that did not help. Those Stage Stratotypes either overlapped time-wise at the edges or didn't join up. Stage Stratotypes were therefore silently abandoned and the problem shifted elsewhere by administrative action. Stages were simply defined in terms of their lowest and highest contained Zones, those introduced by a slightly later prophet, Saint Albert (1856-58).

After the meeting closed, some of us twigged on by realizing that to avoid gaps and overlaps in the standard succession, all one had to do was to define the members of a standard stratigraphical scale in terms of their bases, their tops being automatically the bases of the next higher members in the scale. Ergo, to define typologically the base of a Stage, or that of its lowest Zone, all you had to do is find a section traversing it and define the boundary by a marker at the appropriate level, to hammer in a Golden Spike. This novel idea was put before an astonished public by Derek Ager in *Nature* (1963: **198**, 1045), although nothing as vulgar as a Golden Spike was mentioned. (It was only much later that I discovered that such a solution was implied already by Hedberg at the International Geological Congress in Algiers in 1952, published 1954, in effectively defining the limits of chronostratigraphic Stages in terms of bounding time-planes. No-one else I knew seemed to have picked this up either; but then, who ever reads the shelf-metres of publications put out by IGCs?).

So, the Golden Stratigraphic Spike was current in the 1960s. But where and when did it first appear in print? Who would know? First stop USGS Washington. Our spy there (careful!), Lucy Edwards, knowledgeable in matters stratigraphical as practised in North America, did not know either. Only one Next Step: "The web is

a wonderful thing", she reports. "Here is more than you want to know about the 'Golden Spike', from http://www.nps.gov/gosp/history/spike.html." To wit:

The Last Spikes
Most people have heard about driving the Golden Spike at Promontory Point. The facts may be surprising. The Golden Spike Ceremony, which took place May 10, 1869, was held at Promontory Summit, Utah Territory, thirty-seven miles north of Promontory Point, and nobody had ever attempted to "drive" a golden spike.

Misconceptions surrounding the Ceremony started in the newspapers of the time. Due to the press of the crowd on May 10, not one member of the Press saw the Ceremony, and many reporters had actually written their special "eyewitness" accounts days before the Golden Spike Ceremony was even planned [*plus ça change*]. The only information the reporters had was that some sort of celebration was to take place May 8, near Promontory Point (the only place marked on their maps), and that Central Pacific President Leland Stanford was bringing a gold spike. Final plans for the Ceremony were not made until the morning of May 10, when dignitaries of the Central Pacific met with those of the Union Pacific, who had been delayed two days by angry workers and rainy weather.

On May 4, 1869, with the scheduled May 8 completion of the Railroad imminent, Stanford's friend, San Francisco contractor David Hewes, was upset to discover nobody had prepared a special commemorative token for the event. Unable to persuade anyone to finance the casting of a solid gold or silver section of rail [!], Hewes decided upon a more practical token. Taking over $400 worth of his own gold, he had W.T. Garratt of Garratt foundry fashion and cast a 5 5/8 inch long, 14.03 ounce, 17.6 carat golden spike. Then it was taken to San Francisco jewellers Schulz, Fischer & Mohrig for the finishing touches and engraving on the top and four sides. Only about $350 worth of gold was used to make the spike, with the remainder left attached in a large sprue.

After casting, the spike was engraved on one side, "May God continue the unity of our Country as the Railroad unites the two great Oceans of the world." Another side read, "The Pacific Railroad ground broken Jany 8th 1863 and completed May 8th 1869." The top of the spike was simply engraved, "The Last Spike." Although there was another spike of solid gold at the Ceremony, Hewes' spike became famous as the "Golden Spike".

[At least three further Spikes had been provided, by Nevada, Arizona and a San Francisco newspaper proprietor. Two of them were however made of lesser metals, even if gold-plated. A special cross-tie of laurelwood was also made for the occasion drilled in the appropriate places to take all four spikes. There was much speechifying:]

Stanford then offered a rousing speech. He was to have been followed by [Union Pacific Vice-President Thomas] Durant, but, due to Durant's severe headache (most likely a hangover from the previous night's party in Ogden), Union Pacific's Chief Engineer, General Grenville Dodge, took Durant's place and gave a few short, yet enthusiastic words. [Came the time to drive the spike:] Being a man of large stature, Stanford took a mighty swing at the spike, and struck the tie instead. Durant, still not feeling too well, took a feeble swing, and did not even hit the tie! Finally, a regular rail worker drove home the last spike, and the telegrapher, W. N. Shilling of Western Union, sent the long awaited message, "D-O-N-E." The time; 12:47 P.M., Monday, May 10, 1869.

After the Ceremony, the Golden Spike traveled back to California in the laurelwood tie aboard Stanford's coach. Following a brief time on display, the Spike was returned to David Hewes. Hewes kept it until 1892, when he donated his extensive rare art collection, including the Golden Spike, to the museum of newly built Leland Stanford Junior University, Palo Alto, California [as it then was!]. The silver plated spike maul [sledge hammer] was also given to Leland Stanford and became part of the collection at Stanford University museum. The famous laurelwood tie remained on display in Sacramento until 1890. By then, Central Pacific had been reorganized into Southern Pacific, and the tie was taken to the railroad's San Francisco offices in the Flood Building. Unfortunately, the building and tie also fell victim to the great earthquake and fire of 1906.

Today, replicas of the precious metal spikes, laurelwood tie, and silver plated spike maul can be seen at Golden Spike National Historic Site, Promontory Summit, Utah. Re-enactments of the Golden Spike Ceremony take place each May 10th, and again during the Annual Railroader's Festival, held the second Saturday in August.

* * * * *

Jurassickers of the World, we have some way to go. An annual festival of re-enactment at Cap Mondego? Reinforces my prime criterion guiding the choice of location of a Stage GSSP: proximity to a good restaurant. Will Nicol fund those eleven Golden Spikes? Would he be able to hit them with a hammer (after the festivities)?

GLOBAL RADIOLARIAN ZONATION FOR THE PLIENSBACHIAN TO AALENIAN

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The Pliensbachian to Aalenian Radiolarian Working Group was organized in 2000, at INTERRAD IX in Blairsden, California. The ultimate goal of this group was to produce global Unitary Associations (UA) zonation for the Pliensbachian to Aalenian that would connect zonation for the Hettangian-Sinemurian (Carter et al. 1998) with zonation for the Middle and Upper Jurassic of Tethys (Baumgartner et al. 1995).

Initial meetings in 2001 and 2002 were held in Ljubljana, Slovenia, where members gathered to compare faunas from various areas of the world and produce the first catalogue of species (with limits of variation) that would eventually be used in this zonation. The project covers localities (ranging from Boreal, to Temperate and Tethyan) in Queen Charlotte Islands and Northeast British Columbia (E.S. Carter),

Baja California Sur (P.A. Whalen), Slovenia (S. Gorican), Turkey (P. De Wever/P. Dumitrica), Oman (P. Dumitrica/S. Gorican), Austria (L. O'Dogherty), and Japan (R.S. Hori/A. Matsuoka). Databases consisting of all catalogue species present in these localities were used to construct the first preliminary UA zonation, which was presented at the 6th International Symposium of the Jurassic System in Mondello, Sicily (Gorican et al., 2002).

Work has continued by all members of the group, and the catalogue is now complete. It presents the revised taxonomy (with detailed synonymies) of over 280 species with a plate of each species illustrating intraspecific variation and geographic distribution. This catalogue will be issued by the Ivan Rakovec Institute of Palaeontology, Ljubljana, Slovenia (expected Fall 2006) and should provide a valuable aid for all radiolarian workers dealing with this part of the Jurassic.

Work on the final zonation began October 2005 by J. Guex, S. Gorican and E. Carter and is based on 145 widely-distributed species, *i.e.* about half the catalogue species were eliminated from the total dataset because they are either rare, long-ranging or non-diagnostic with wide limits of variability. Rich well-preserved radiolarians from thick continuous stratigraphic sections in Queen Charlotte Islands provide the most detailed record for the Pliensbachian to Aalenian interval, and all collections are tied with North American ammonite zones or assemblages. An initial sequence of 25 UAs (including ammonite data) was determined from this material only. Subsequently, data from other areas were added and a global sequence of nine radiolarian zones was obtained. These zones can be correlated worldwide and link previously established UA zonations mentioned above. This work will be presented at the forthcoming 7th International Congress on the Jurassic System in Kraków, Poland, September 2006.

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DORSET AND EAST DEVON COAST WORLD HERITAGE SITE: TOWARDS A RESEARCH STRATEGY

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Introduction

Up until now the main activity of the World Heritage Site Earth science team has focussed on dissemination of information about the site and the establishment of a monitoring system, which will provide the basis for future reporting to the UK Government and UNESCO on the state of the Site. A Geodiversity Action Plan has been established for the County of Dorset as a whole. The overall management of the Site is carried out through a Management Plan overseen by the World Heritage Site Steering Group.

The Vision for the Site and the Framework for Action emphasise the central role of Earth science research. They are given below in Boxes 1 and 2

DORSET AND EAST DEVON COAST WORLD HERITAGE SITE:
VISION

Our fundamental vision is that World Heritage Status in Dorset and East Devon will inspire people to celebrate, appreciate and enjoy the World Heritage Site, and to safeguard it for future generations in the best possible condition. We wish to ensure World Heritage Status becomes a vibrant strand of the life of Dorset and East Devon, benefiting local people, visitors and the environment throughout the area.

We will take a lead to secure the World Heritage Site as a place where:

- ***Globally important geology and geomorphology is recognised and conserved, for science, education, and public enjoyment;***
- ***First class facilities are provided to enable local people and visitors to understand and learn about its special qualities in accessible, innovative and interesting ways;***
- ***Research is actively encouraged and science is advanced;***
- ***The public profile for the earth sciences is raised, and their relevance to today's world is demonstrated;***

We aspire to be the leading regional and national example of how achieving the conservation, understanding, enjoyment and sustainable use of the environment can also lead to economic and social development.

The Framework for Action sets out prioritised actions to be pursued for the Dorset and East Devon Coast, which was awarded World Heritage Site Status in December 2001. It identifies a range of measures that relate to the World Heritage Site (WHS - which comprises undeveloped cliffs and beaches), and the wider 'World Heritage Coast' (WHC), which includes the towns, villages and countryside, which provide the essential infrastructure and services for the local people who live on the coast and the people who visit it.

The overall aim is to manage the Site and this wider area, the World Heritage Coast, in a cohesive way, that recognises it as an 'attractor' for visitors (including local people), and leads to increased understanding, appreciation and support for conservation of the World Heritage Site, and to tangible benefits for the quality of life of local people and visitors.

The Framework for Action develops the policies of the World Heritage Management Plan, which was prepared for the Site alone as part of the submission to UNESCO. This included the following objectives for the Site:

World Heritage Site Objective 1: to conserve the geology and geomorphology of the Site by:

- ***ensuring that there is minimal disturbance to natural coastal processes due to human activities***
- ***ensuring that human activities do not significantly reduce the quality of coastal exposures of geology within the Site***
- ***promoting responsible collection of fossils and other geological specimens.***

World Heritage Site Objective 2: to conserve, and enhance where appropriate, the quality of the landscape and seascape of the Site.

World Heritage Site Objective 3: to welcome local people and visitors to the Site at levels which it can sustain, by encouraging those with responsibilities to:

- ***ensure that provision of public access and information helps to match visitor numbers to the capacity of the Site, and maintains the tranquillity of remote areas***

World Heritage Site Objective 4: to encourage safe use of the Site by educational groups of all ages, and to provide a high quality range of educational information and services about the Site.

World Heritage Site Objective 5: to foster the gathering and dissemination of scientific information about the Site.

For the avoidance of confusion, "the Site" refers throughout this document to the area inscribed by UNESCO in 2001 as a World Heritage Site. The entirety of this area is protected by UK statutory conservation designations.

A monitoring programme and database have been put in place with support from English Nature and the Joint Nature Conservation Committee (JNCC). Analysis of the changes or otherwise, recorded in the database is now required to assess their implications for the integrity and sustainability of the Site.

The main priority now is to establish a Research Strategy for the Site. There are a number of reasons why this is appropriate now:
a. the monitoring database is operational;
b. Memorandum of Understanding has been agreed with the Natural History Museum;
c. the Channel Coast Observatory has extended its shoreline monitoring programme westwards into the Site;
d. a wider strategic monitoring programme for the SW Peninsula Coast has been funded;
e. the launch of Phase 2 of the Shoreline Management Plans (at Studland on 14th March 2006).

In addition, there has been substantial investment by external agencies such as SWRDA in the wider economic and social multipliers from the designation as a World Heritage Site. Dorset is also a key county within the DEFRA/ODPM Pathfinder programmes developing scenarios, etc., within the context of the UK ICZM Strategy Development.

A number of Site-wide strategies have been developed, for example for Arts and for Education. These also need an enhanced research base upon which to understand and evaluate their role in sustaining the integrity of the Site itself.

1. The quality and history of research carried out in the Site was a key justification for Inscription and continued research is a key objective of the World Heritage Management Plan (Box 2).

2. Research carried out in the Site may well provide guidance for research programmes and improved research capability in other earth science World Heritage Sites where these are less well developed.
This paper outlines the basis for a Research Strategy for the Dorset and East Devon Coast World Heritage Site.

A Research Strategy For The Dorset And East Devon Coast World Heritage Site

The overall **aim** of the Strategy is to identify and stimulate research, which improves overall understanding of the Site, contributes to its sustainability and enhances its contribution to the Earth sciences.

Research activities take place along a continuum from those needed to solve a very specific, localised problem to those of national/international importance aimed at addressing generic "big questions". A three-fold division of this continuum offers a practical research framework for use by the JCWHS as long as it is remembered that some overlap may occur between the levels. Each level might be expected to attract different types of funding.

Research for the management of the site (and its setting)
Such research would include activities like gathering data for, and analysing data on, conservation monitoring, erosion rates, visitors and traffic. Although the costs of some such studies might principally be expected to be a JCWHS management cost, some studies are likely to be carried out by other agencies as part of their own work. External funding should be sought where possible.

Generating knowledge about the site
Such research might enhance the visitor's experience (e.g. help explain some feature or distribution of organisms along the site), provide data for a national study (e.g. bird or dolphin sightings), or contribute to an international database (e.g. a biostratigraphical one). Funding for such studies might come from JCWHS but would probably be mainly external (e.g. from the RSPB). Many studies at this 'level' might be small-scale and carried out as student projects (MRes or MSc). In addition, research carried out within and around the Site by industry has contributed to understanding of petroleum geology and this is expected to continue.

Research on 'big questions' in Earth sciences
This may well include research into the effectiveness of management of this and other World Heritage Sites. This is likely to be hypothesis-driven research where the JCWHS provides the 'natural' laboratory for study. Such work might be funded by a UK research council, (e.g. of Mesozoic marine environments or basin inversion – NERC; or genetic diversity – BBSRC; or clay composition control on land slippage – EPSRC; or social demographics – ESRC; or – AHRC). JCWHS may be able to attract such research if it wanted, or provide infrastructural support, but is unlikely to be able to initiate such research, which would be set in train by individual researchers or research groups.

Guiding principles for the research strategy

As a statement of intent/guiding principle, JCWHS will:

1. Undertake and encourage research which is necessary for, or helps, the effective management of the Site, its conservation, use and enjoyment.

2. Promote the Site as an important scientific 'infrastructure' for researchers by coordinating access via the Web to, and where appropriate developing electronic sources of, data and information about the Site (e.g. collections in Museums, etc., maps, seismic data, monitoring data, ongoing and past research studies undertaken on the site).

3. Attract researchers at all levels to undertake projects along the coast by:
i) providing the electronic access referred to above,
ii) specifically seeking to attract small-scale studies (e.g. by Masters students)
iii) by 'publishing' the results of their studies electronically with linking material so as to make more of the whole than the sum of the parts, and
iv) holding topic-specific workshops concerned with research related to the JCWHS.

4. Promote ecological and other life science research, particularly that related to wildlife conservation and of

public visitor interest, while focusing available resources on the geological and geomorphological *raison d'etre* of the Site.

5. Encourage and promote research in the social sciences and education which evaluates:
i) the effectiveness of the management of the Site and its wider environment, and
ii) the dissemination of knowledge about the Site, for example in interpretation.

Goals Of The Research Programme

The effective application of these principles will be indicated by achievement of the following goals:

✓ Site condition of the Jurassic Coast is good and its features, exposures and processes are available for research in the best possible condition;
✓ Site condition is known and proven based on effective monitoring and consultation with scientists and other key user groups;
✓ High quality site management is informed and improved by focussed research;
✓ There are increased partnerships between scientists, landowners, museums, collectors and other key groups and agencies;
✓ The coast provides inspiration for existing and future scientists at all levels and of all ages;
✓ There is good and improving local infrastructure and services to support this (including museums etc.);
✓ Information and knowledge held about the coast is highly accessible physically and intellectually on and off site, and is disseminated internationally;
✓ Leading edge research is being carried out on earth sciences, protected area management and the impacts and best practice management of World Heritage Site Status;
✓ The WHS, and its science and conservation programme makes an active contribution to public and scientific debate at national and international level, and be at the cutting edge of the public understanding of science. This should encompass key (and potentially controversial) issues for Earth sciences (e.g. evolutionary studies, climate change, site management techniques and performance) and the impact and effectiveness of World Heritage Site and Protected Area management generally.

The regular reporting to UNESCO will include statements on the level of achievement of these goals and the evidence that supports them.

HISTORY OF THE INTERNATIONAL SUBCOMMISSION ON JURASSIC STRATIGRAPHY, PART I

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To write a history of the International Subcommission on the Jurassic – what an idea!

We'll leave aside for the moment the period after 1977, the year when the present structure of the Subcommission was put in place. From this date we have available good documentation – the *Newsletters* **1** to **32** and the publications of the various Colloquia/Congresses/Symposia, which together give a good account of the structure and the activities of the Subcommission.
By contrast, the period before 1977 can be described as "prehistoric" and for this the history of the Subcommission has to be reconstructed – with still a lot of uncertainty - from a small number of sparse sources, more often memories than factual documents. But the difficulties don't mean that we cannot try!

Part I. The First Subcommission, or "The Maubeuge Era" (1960/1967–1977)

Towards a Jurassic Subcommission

Why two dates, 1960 and 1967? We will see that the Subcommission was not created until 1967, but the preceding years throw light on its birth.

From letters exchanged with P.L. Maubeuge since February 1959, it was in December 1960 that his personal address letterhead was replaced by the letterhead "Commission de Stratigraphie – Colloque du Jurassique". It was also in December 1960 that the meeting of a Colloquium on the Jurassic, in Luxembourg in 1962, was announced. This same letter announced his election to the Commission on Stratigraphy during the International Geological Congress at Copenhagen in summer 1960 and, at his initiative, that the Commission on Stratigraphy charged P.L. Maubeuge with the mission to "organise one or two Colloquia on the Jurassic System" (Comtes rendus of the Ist Jurassic Colloquium, p. 20).

But still there is no mention of a Jurassic Subcommission. In his opening address to the Colloquium (Comtes rendu p. 20), Maubeuge recalled that the idea of a Subcommission had been launched at the Algiers Congress in 1952 but that nothing had been done. In a letter of December 1964 (when the volume of Colloquium Proceedings had been printed), P.L. Maubeuge wrote "*One speaks very forcefully of a Jurassic Subcommission, of which I will be president*".

The first mention of the Jurassic Subcommission dates from 1967 when, in January 1967, appeared the letterhead with the name of IUGS and the Jurassic Subcommission. It seems that the birth was not without problems; from a letter from its President, P.L. Maubeuge, in May 1967: "*I needed enough old-time support to create our Jurassic Subcommission*". This alludes to the question already raised in a 1962 circular of the Stratigraphy Commission (*cf.* Proceedings of the 1st Colloquium, p. 31), contrasting the supporters of a single Subcommission for the whole Mesozoic and those of three Subcommissions (Triassic, Jurassic, Cretaceous).

The Jurassic Subcommission is probably one of the oldest existing and certainly the first in the Mesozoic, well before those of the Triassic and Cretaceous, which appeared later, after 1970. Organiser and President of the two Jurassic Colloquia, Luxembourg I (1962) and Luxembourg II (1967), P.L. Maubeuge would be the President until the "renewal" of 1977.

This last event put a final stop to the disfunctioning of the Subcommission and the autocratic behaviour of its President, evident especially after Luxembourg II and during the preparation of the Colloquium on the

Jurassic-Cretaceous boundary at Lyon-Neuchâtel (1973), of which more later. Throughout this period no records of the composition, membership changes and work of the Subcommission were distributed. The only information available comes from members who made known their disagreements.

Thus, in an unofficial account, by R. du Dresnay, of the meeting held in September 1969 in Budapest (on the occasion of a Congress of the Carpatho-Balkan Association), distributed in November 1969, appear the names: D.V. Ager (UK), R. Casey (UK), M. Collignon (France), Kobel (Germany), P.L. Maubeuge (President), V. Menner (USSR) and M. Rakus (Czechoslovakia). Other members were Stipanicic (Argentina) and H. Hölder (Germany), who ceased to be Vice-President in October 1970.

(b) The two Jurassic Colloquia, Luxembourg I and Luxembourg II

Apart from having been the initiator of the first Jurassic Subcommission, P.L. Maubeuge must be credited with having set up and organised these two Colloquia.

Luxembourg I was for a start a formidable meeting of a large number of Jurassic specialists from very many countries. Undoubtedly many individuals were already in contact through exchanges of publications and meetings between some had occurred, but this was an occasion for many more exchanges.

All who participated in the work of the 1st Jurassic Colloquium are unanimous in recognising the excellent spirit that reigned throughout. Truly. "*there was an extraordinary spirit of international cooperation and reciprocal understanding*" (P.L. Maubeuge 1969, Comments and remarks on the functioning, work and results of the Jurassic Subcommission).

Equally, what made its success was agreement on a unified scale of Stages of the Jurassic, except the terminal Stage, and its subdivision into Sub-Systems [i.e. Series]. To cite P.L. Maubeuge again: "*it is not a memory enhanced by time to recall the extraordinary atmosphere of international cooperation, even if discussions were lively*".

We would not return to revise this unified scale, except to refine the boundaries and develop greater possibilities of distant correlation. The acceptance of a same scale of stages would enable taking forward the work on the content of the stages and correlations with zonal reference scales.

Luxembourg II was a success in participation, but did not bring the same enthusiasm as that of the first colloquium. The reasons are not at all clear but the most evident seems to have been the absence of a common objective of equal importance and following the same requirement as that of agreeing a unified scale of stages.

Another reason explains the lesser impact of Luxembourg II, the delay in publication of results. While the volume of the Proceedings of Luxembourg I (1962) appeared rapidly (1964), the scientific papers presented at Luxembourg II (1967) were published in No. 75 of the Mémoires du BRGM dated as 1971, but in reality distributed at the beginning of the year 1974 (legal data at the end of the volume). In the meantime many of the papers presented at Luxembourg II had already been published elsewhere, something which strongly reduced the impact which Luxembourg II should and could have had.

Finally, one cannot hide the fact of a certain mistrust with respect to P.L. Maubeuge, already evident during the colloquium, mistrust which weighed heavily on the editing of the volume of communications. Publication was envisaged in Luxembourg and in the absence of sufficient public and/or private funds a subscription was opened by P.L. Maubeuge, but the reticence of many to respond did not enable him to get together the necessary funds. The file was taken up by the B.R.G.M., which would add to the discredit of P.L. Maubeuge.

(c) The crisis of the Lyon-Neuchâtel Colloquium (1973) and the end of the Maubeuge Era

This crisis has remained largely unknown to many members of the geological community concerned, even though it reached the highest echelons of geologists and up to the President of the French Republic!

At Veszprem (Hungary), during the Congress of the Carpatho-Balkan Association, it was decided to have a colloquium (or congress) on the Jurassic-Cretaceous boundary, with visits to classic localities in SE France and Lyon proposed for holding the colloquium. It was necessary to overcome the reservations of many foreign colleagues who feared and did not want a "*new Luxembourg under Maubeuge's leadership*". A certain flexibility was allowed as to date, 1971 or 1973, the latter preferred by Lyon (1972 being the date of the International Geological Congress in Montreal).

The Colloquium was to be mixed and should bring together the two Subcommissions involved, the Cretaceous Subcommission in course of being organised by R. Lafitte. Very quickly P.L. Maubeuge asserted his wish to take over the organisation, with Lyon responsible for preparation of the field trips. Furthermore, he selected only the 1971 date and from November 1969, arguing the "defection of Lyon", he proposed the organisation of the colloquium to our colleagues in Neuchâtel.

Meeting in Geneva in December 1969, colleagues from Neuchâtel and Lyon began a close collaboration, which would lead to the Lyon-Neuchâtel Colloquium of 1973. But the road was long and difficult. Maubeuge moaned about the 1973 date, but continued his stalling tactics: refusal that the Subcommission name appear in the circular, limiting the Lyon-Neuchâtel meeting to "*an international field meeting, excluding any colloquium*" because "*it is only the Jurassic Subcommission that can arrange such a meeting*" and finally, projected an "international colloquium on the Triassic-Jurassic and Jurassic-Cretaceous boundaries in Hungary in 1975"!

The President of the Commission on Stratigraphy, V. Menner, and the Secretary General of I.U.G.S., S. van der Heide, were finally alerted, but did not succeed in swaying P.L. Maubeuge. After having given his agreement in April 1971, he went back on this in June

1972 and persisted with his refusals up to the International Geological Congress in Montreal in 1972! Not without appealing to the President of the French Republic and other French university authorities!

P.L. Maubeude would go back on his last refusal in September 1972, just after the Montreal Congress, where he was reappointed in his rôle as president of the Subcommission and "asked to participate" in an official capacity at the Colloquium on the Jurassic-Cretaceous boundary. He undoubtedly remained President until the Mexico International Geological Congress in 1976, where the renewal was probably prepared which was set in motion in Stuttgart in 1977.

Part II. From 1977, the new Subcommission.

Arnold Zeiss, who participated in the Stuttgart meeting in 1977 and was the first President of the "New Era", will write this part of the history of the Jurassic Subcommission. It was he who initiated the changes of direction introduced by the directives of I.U.G.S. and the Commission on Stratigraphy on GSSPs. After him and just as he had done, I tried to motivate our colleagues on this topic and was able to present a GSSP before the end of my two terms of office.

[Editorial note: This article is in response to a request from me to Arnold Zeiss and Raymond Enay in January 2006:
Very few of the current membership of ISJS, including to some extent myself, know about the history of the International Subcommission on Jurassic Stratigraphy and I think it would be interesting to include an article on this in the next ISJS Newsletter.
Part I has been written by Raymond Enay, and translated from French by me. We plan to include the follow-on Part II by Arnold Zeiss in Newsletter 34.
Nicol Morton]

REPORT ON JURASSIC ACTIVITIES IN PORTUGAL FOR 2005

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IV International Symposium ProGEO on the Conservation of the Geological Heritage, Braga (Portugal); 13-16 September, 2005

The IV International Symposium ProGEO on the Conservation of the Geological Heritage was held between 13-16 September 2005 at the University of Minho (Braga, Portugal), organised by ProGEO (European Association for the Conservation of the Geological Heritage) and by the Earth Sciences Department of the University of Minho. One hundred and sixty participants from more than thirty countries presented about one hundred and fifty oral and poster contributions. These contributions were devoted to diverse themes, including Portuguese frameworks of international relevance, like the Jurassic Heritage in the Lusitanian Basin.

One of the four fieldtrips organized to see the Portuguese geodiversity was Field Trip C, which was focussed on the *Jurassic Heritage and Geoconservation in Portugal: selected sites.* The fieldtrip was organized by Helena Henriques (University of Coimbra), Ana Azerêdo (University of Lisbon), Luís Duarte (University of Coimbra) and Miguel Ramalho (Liga para a Protecção da Natureza), and the refereed volume has been published and distributed to all Symposium participants. Participants of the fieldtrip included colleagues from Russia, Mozambique, Germany, Poland, UK and Spain, including Kevin Page, Convenor of the Geoconservation Working Group of the ISJS.

The Fieldtrip Guide Book [HENRIQUES, M. H. (General Co-ordinator), AZEREDO, A. C., DUARTE, L. V. & RAMALHO, M. M. (2005) – "Jurassic Heritage and Geoconservation in Portugal: Selected Sites, "IV International Symposium ProGEO on the Conservation of the Geological Heritage, Field Trip Guide Book", *Geosciences Centre, University of Coimbra*, 86 p. (ISBN: 972-99745-0-0)] includes several contributions related to the Jurassic Heritage outcropping in the Lusitanian Basin (Central Portugal):

HENRIQUES, M. H., AZEREDO, A. C., DUARTE, L. V. & RAMALHO, M. M. (2005) – "Jurassic Heritage and Geoconservation in Portugal: an overview", pp. 7-15, PL. 1, FIGS. 1-10.

HENRIQUES, M. H. & RAMALHO, M. M. (2005) – "Jurassic Heritage of Cabo Mondego (Central Portugal)", pp. 37-43, pl. 5, figs. 1-7.

HENRIQUES, M. H. (2005) – "The Museu da Pedra (Cantanhede, Central Portugal): where Jurassic meets the public", pp. 45-55, pl. 6, figs. 1-4.

Participants of the fieldtrip on the Jurassic Heritage and Geoconservation in Portugal: selected sites at Galinha Quarry Natural Monument (Central Portugal).

THE FIFTH MEETING OF THE POLISH GEOLOGICAL SOCIETY WORKING GROUP FOR THE JURASSIC SYSTEM *JURASSICA*, KROSCIENKO UPON DUNAJEC, 26-28 SEPTEMBER, 2005

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The Fifth Meeting of the Polish Working Group for the Jurassic System *Jurassica*, affiliated with the Polish Geological Society, was held on 26-28 September, 2005 in Kroscienko on the Dunajec River. The meeting was organized in the heart of the Pieniny Klippen Belt (PKB) where several generations of geologists have

been racking their brains in attempt to explain the complicated geology of the belt. Small fragment of the PKB occur in Poland but the structure extends from the vicinity of Vienna through Western Slovakia, Poland, Eastern Slovakia, Transcarpathian Ukraine to Romania.

The key to understanding the Mesozoic-Cenozoic geology of the PKB is the Jurassic, a period when the belt was subjected to the most eventful tectonic and sedimentary episodes related to the dynamic history of the northeastern part of the Western Tethys Ocean. In the PKB we can explore the numerous, widely distributed Jurassic facies typical of the whole Alpine orogen: from *Gresten*-type sediments through spotted limestones and marls (*Fleckenkalk/Fleckenmergel*), various crinoidal limestones, red nodular limestones of the *Ammonitico Rosso* facies, multicoloured radiolarites, *Calpionella* limestones, micritic limestones of *Maiolica* (= *Biancone*) type (that form, for example, the Trzy Korony and the Sokolica peaks in Poland) up to the world-famous Rogoznik coquinas. The latter were introduced into the world literature by M. Neumayr as "the Rogoznik Beds", followed by W.J. Arkell who included this unit into his monumental book on World Jurassic as the best, biostratigraphically documented, Middle Tithonian ammonite zone Semiformiceras semiforme in the whole Alpine/Carpathian area. The abundance of fossils in the Rogoznik Beds, the history and the present stage of their palaeontological and biostratigraphic studies made the so-called "Rogoznik klippe" an important geotype. In 1989 the klippe was included in the UNESCO World Geological Heritage List as a top-class scientific site of international palaeontological and stratigraphical importance (the second, and last, such geological site in Poland is the Wieliczka Salt Mine). From the Rogoznik Beds originate the fossil collections prepared and studied as early as in the XIXth century by K. Zittel, M. Neumayr, S. Zareczny and V. Uhlig. For decades interest in this particular site and succession has not diminished. Still, new concepts and hypotheses arise, which attempt to explain the role of this region in the geological evolution of this part of Europe within the Mesozoic/Cainozoic history of the Alpine-Carpathian-Dinaride orogenic belt.

Intensive field studies on the PKB in Poland continued over several years by the multinational, Polish-Slovakian-Ukrainian working team and could not be run without the particular support from the local authorities. The members of the Organizing Committee of the Fifth Meeting (Renata Jach, Jan Golonka, Jaroslaw Zacharski and Michal Krobicki) express deep gratitude to the Pieniny National Park authorities (particularly to the Director Mr. Michal Sokolowski and to Ms. Teresa Ciesielka, Mr. Krzysztof Karwowski, Mr. Slawomir Wrobel and to past Director, Mr. Andrzej Szczocarz) for their interest in the studies and kind assistance. Sincere thanks are due to Dr Bozena Kotonska, the Malopolska Nature Conservation Superintendent, who enabled the field studies in the area of nature conservation reserves (some of these sites were founded several years ago as uninhabited natural sites). Our understanding of the geology of the PKB would be much less without their contributions.

The meeting was attended by about 50 representatives of various scientific institutions, including colleagues from the Slovakian and Czech Republics who were particularly welcome in making the meeting truly international. During the first day 24 presentations gave the attendants the wide spectrum of latest achievements:

Maria Barbacka, Elzbieta Wcislo-Luraniec & Jadwiga Ziaja – *Systematics, environmental accommodation and taphonomy of Lower Jurassic flora from Odrowaz*;

Andrzej Boczarowski – *The importance of decay microtraces preserved on sclerotoms of echinoderms from Bathonian strata in Gnaszyn*;

Pawel Branski – *Influence of paleogeographic and paleoclimatic conditions on mineral composition of Lower Jurassic clays from the southern part of Polish basin (outline of the problem)*;

Anna Feldman-Olszewska – *Development of sedimentation in the Middle Jurassic sequence in Kujawy*;

Ewa Glowniak – *Biogeographic range of immigration event of Oxfordian genus* Platysphinctes *(Ammonoidea, Perisphinctidae) in Central Europe: northwest Germany and southern Poland*;

Jan Golonka, Halina Jedrzejowska-Tyczkowska, Michal Krobicki, Piotr Misiarz, Jacek Matyszkiewicz, Barbara Olszewska & Nestor Oszczypko – *Paleogeography and plate tectonics of northern Tethys and peri-Tethys in Poland and in adjacent areas during the Jurassic and Early Cretaceous; megasequences of Upper Jurassic and Lower Cretaceous of the Carpathian Foredeep*;

Jacek Grabowski – *The Jurassic/Cretaceous boundary within the Lower Sub-Tatric Succession of the Western Tatra Mts.: litho-, bio- and magneto-stratigraphy*;

Jacek Gutowski & Hemin Koyi – *The Jurassic-Cretaceous evolution of peri-Carpathian segment of the Mid-Poland Trough revealed by the results of analogue models*;

Urszula Hara – *The Lower Oxfordian bryozoans from the northeastern margin the Holy Cross Mts. – preliminary report*;

Katarzyna Jacher-Sliwczynska, Marek Michalik & Jens Schneider – *Isotopic composition of lead from Oxfordian limestones of the Silesian-Krakow Jurassic terrain versus the Zn-Pb ore deposits*;

Michal Krobicki, Jan Golonka, Tadeusz Slomka, Ewa Malata & Nestor Oszczypko – *The Late Jurassic-Early Cretaceous volcanism in the Ukrainian Carpathians – preliminary results*;

Michal Krobicki, Bronislaw Andrzej Matyja & Andrzej Wierzbowski – *The Jurassic-Lower Cretaceous successions from Priborzhavskoe (Pieniny Klippen Belt, southwestern Ukraine) and their paleogeographic importance*;

Michal Krobicki & Alfred Uchman – *Depositional paleoenvironment of Middle Jurassic Mn-radiolarites of the Branisko and the Pieniny successions (Pieniny Klippen Belt) based upon the analysis of trace fossils*;

Marek Lewandowski, Roman Aubrecht, Michal Krobicki, Bronislaw Andrzej Matyja, Daniela Rehakova, Jan Schlogl, Magdalena Sidorczuk & Andrzej Wierzbowski – *Paleogeographic position of Upper Jurassic sediments from the Pieniny Klippen*

Belt: new paleomagnetic data from Poland and Slovakia;

Andrzej Maksym & Boguslaw Liszka – *Current results of studies on Mesozoic sediments in the Basznia-Lubaczow area*;

Jozef Michalik – *The Brodno section – a candidate of the Carpathian regional stratotype of the Jurassic/Cretaceous boundary*;

Anna Maria Ociepa – *New representative of leafed liverworts from Jurassic sediments of the Western Antarctica*;

Szymon Ostrowski – *The Callovian crinoid sandstones from the vicinity of Cmielow and Ostrowiec Swietokrzyski*;

Grzegorz Pienkowski & Grzegorz Niedzwiedzki – *First tracks of pterosaurs in Poland from the Kimmeridgian tidal flat sediments in Wierzbica near Radom*;

Dusan Plasienka – *The Borinka Unit (Male Karpaty Mts., Western Carpathians): sedimentary and tectonic model of clastics-dominated, rift-related Jurassic halfgraben*;

Petr Skupien & Zdenek Vasicek – *Recent biostratigraphical and lithostratigraphical research of the Stramberk Limestones in the Kotouc quarry*;

Patrycja Szczepanik, Madgalena Witkowska & Zbigniew Sawlowicz – *Depositional conditions of Middle Jurassic ore-bearing clays from Ogrodzieniec (the Krakow-Czestochowa Upland) – preliminary results of geochemical studies*;

Hubert Wierzbowski & Grzegorz Zielinski – *Sr isotopic stratigraphy of marine water in the Oxfordian – an attempt to calibration of isochrone*;

Piotr Ziolkowski – *Paleomagnetism of the Upper Jurassic rocks from the Krakow Upland – preliminary results.*

The abstracts were published in Volume 3 of *Volumina Jurassica.* Additionally, this periodical published several papers dealing with Jurassic topics.

In the PKB area field trips will be held for participants of the 7th International Jurassic Congress, organized by the Polish Working Group in September 2006 in Krakow. The Polish Working Group aims to present to geologists interested in the Jurassic the problems of the complicated geological (first of all Jurassic) history of the area. The September 2005 meeting was a general practice run for the Congress!

The evening activities of the first meeting day were devoted to discussions on current preparations for the Congress and the election of new Working Group managers. Jacek Gutowski was elected President of the Polish Working Group and Andrzej Wierzbowski, Anna Feldman-Olszewska (Secretary) Renata Jach and Grzegorz Pienkowski are members of the Managing Committee.

The two next days of the meeting (27-28 September, 2005) were devoted to field trips focussed on the stratigraphy, sedimentology and palaeogeography of Jurassic strata in the PKB. During the first day the participants visited the Headquarters of the Pieniny National Park (Photo. 1) where Mr. Michal Sokolowski, Park Director, presented the permanent exhibition of the Pieniny Mts. history, recent problems and the cultural and natural amenities of the area. More detailed explanations were given for the geological part of the exhibition prepared by Andrzej Wierzbowski and Michal Krobicki as an introduction to the field trips. The first trip started from Kroscienko village and included the Jaworki village area (the Grajcarek Stream valley at the entrance to the Homole Gorge), then a walk along the gorge (Photo. 2), presentation of the succession at the rock gate in the Zaskale-Bodnarowka nature conservation reserve, a walk at the foot of the Beresnik Mt. to the Biala Woda Stream valley (Photo. 3), crossing the Polish-Slovakian border at the Rozdziele Pass, a visit to Litmanova village (Slovakia) and return to Kroscienko by bus. During this trip several "classic" Jurassic sequences of the Czorsztyn, Niedzica and Czertezik successions were presented.

Photo. 1. Participants in the main building of the Pieniny National Park headquarter (photo. M. Krobicki).

Photo. 2. First-day trip at the Czajakowa Skala Klippe in the Homole Gorge (photo. J. Gutowski).

The second-day trip traveled from Kroscienko to the ruins of Czorsztyn Castle, then through the Flaki Range and Niedzica village to Falsztyn village and, finally, to the Oblazowa Klippe in the Bialka River Break in Spisz (Photo. 4). Participants examined the Jurassic sequences of the Czorsztyn Succession (at Czorsztyn Castle, in Oblazowa and Falsztyn) as well as of the Branisko Succession (Flaki Range). The meeting was completed in the evening. All promised to come to Krakow in September 2006. The Organizers express their gratitude to all who contributed to the organization of the meeting and its positive atmosphere. Special thanks are due to the personnel of the Sokolica Hotel in Kroscienko.

Photo. 3. The "Sphinx Rock" in the Biala Woda Stream valley (red nodular limestones of the Ammonitico Rosso facies from the Czorsztyn Succession) (photo. M. Krobicki).

Photo. 4. The Bialka River Break between the Oblazowa and the Kramnica Klippen (photo. J. Gutowski).

GROUPE FRANÇAIS D'ÉTUDES DU JURASSIQUE (GFEJ)

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French investigators interested in Jurassic times are grouped in an association, the ***"Groupe Français d'Etudes du Jurassique",*** which welcomes all French (or mainly French) geologists involved in studies dealing with the Jurassic. The main goal is to stimulate communication between investigators interested in the Jurassic through annual field excursions, common scientific programmes, etc. The excursion of the past year was in Morocco where a general view of the Jurassic from different structural units was presented. The present programme deals with the construction of a paleobathymetric scale by means of a multidisciplinary study of a Middle Oxfordian transect from continent to ocean.

You can get to know more about the association from its website: ***http://www.gfej.fr.st/*** Here you'll get some ideas about the history of this "old lady", information about French diplomas and PhD theses in progress, member's publications, programmes, past field-trips… and many others things.

So then, please, click and see!

SESSION ON THE JURASSIC SYSTEM AT THE 2005 ANNUAL MEETING OF THE GEOLOGICAL SOCIETY OF JAPAN AND PUBLICATIONS BY JAPANESE SCIENTISTS IN 2005

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A topical session, "The Jurassic System", was organized during the 112th annual meeting of the Geological Society of Japan (Sept. 18-20, 2005) in Kyoto University. The following 10 talks and two posters were presented in the session and summaries are included in the abstract volume. A similar topical session is being planned for the next annual meeting of the Society (Sept. 16-18, 2006) in Kochi University.

Oral presentations:

AITA, Y., TAKEMURA, A., YAMAKITA, S., HORI, S. R., KAMATA, Y., SUZUKI, N., SAKAKIBARA, M., KODAMA, K., SAKAI, T., CAMPBELL, H. J. & SPÖRLI, K. B. (2005): Pelagic stratigraphy in the accretionary complexes of the Waipapa Terrane, North Island, New Zealand and a significance of high latitude radiolarian faunas.

HORI, R. S., SAKAKIBARA, M., MAEDA, T., HIGUCHI, Y. FUJIKI, T., AITA, Y., SAKAI, T., TAKEMURA, A., YAMAKITA, S., KODAMA, K., IKEHARA, M., KAMATA, Y., SUZUKI, N., CAMPBELL, H. J. & SPÖRLI, K. B. (2005): Geochemical characteristics of a chert-clastic sequence from Arrow Rocks Island, Northland, New Zealand, and Early Triassic Oceanic Anoxic Events.

YAO, A., KUWAHARA, K., EZAKI, Y., LIU, J., HAO, W., YAO, J., KUANG, G., LI, J. & LUO, Y. (2005): Early-Middle Triassic radiolarian assemblages from South China -Record of recovery process after P/T extinction event-

MATSUOKA, A. (2005): Marine eco-system inferred from radiolarian prey: End Triassic mass extinction and its recovery.

ISHIDA, N. (2005): Upper Jurassic strata in the Southern Chichibu terrane, Itsuki-Gokanosho area, Kumamoto Prefecture.

HATAKEDA, K. (2005): Taxonomic study of *Tricolocapsa* (Jurassic radiolarian Polycystine) and its applicability to the Jurassic radiolarian biostratigraphy.

NIKAIDO, T. & MATSUOKA, A. (2005): Oceanic plate stratigraphy of accretionary complex inferred from overlaying conglomerates. - Example of the

Magisawa Formation and the Miyako Group, Taro Belt, North Kitakami Mountains.

NAGATA, K. & KOMATSU, T. (2005): Bivalve assemblage containing the Boreal elements (e.g. *Kolymonectes*) in the Lower Jurassic Higuchi Group.

KONDO, Y., KOZAI, T., KIKUCHI, N. & SUGAWARA, K. (2005): Ecological and taxonomic diversification in the Jurassic and Cretaceous brackish-water faunas in Japan.

SATO, T. (2005): Synoptic list of the Jurassic ammonites from the Outer Belt of Southwest Japan.

Poster presentations:

SUGAMORI, Y. (2005): Paleozoic and Mesozoic in the Kyoto Nishiyama area - Beginning age of the Tamba Terrane.

SHIBUTANI, S., HORI, R. S. & SAKAKIBARA, M. (2005): Triassic? – Jurassic accretionary complex from the Ikuno district, Tamba Terrane, Hyogo Prefecture, Southwest Japan.

Publications on Jurassic of Japan or by Japanese scientists in 2005:

KASHIWAGI, K., NIWA, M. & TOKIWA, T. (2005): Early Jurassic radiolarians from the Chichibu Composite Belt in the Sannokou area, central Kii Peninsula, Southwest Japan. The Journal of the Geological Society of Japan, 111, no. 3, 170-181.

KASHIWAGI, K., TSUKADA, K., NIWA, M., NIWA, K. & MIYAKOSHI, N. (2006 in press): Radiolarians of the *Stylocapsa*(?) *spiralis* Zone (uppermost Middle to lower Upper Jurassic) extracted from a borehole core sample in the Chichibu Composite Belt, Hamakita City, Shizuoka Prefecture, Southwest Japan. Memoir of the Fukui Prefectural Dinosaur Museum, no. 5. (In Japanese with English abstract)

MATSUOKA, A., YANG, Q. & TAKEI, M. (2005): Latest Jurassic-earliest Cretaceous radiolarian fauna from the Xialu Chert in the Yarlung Zangbo Suture Zone, Southern Tibet: Comparison with coeval western Pacific radiolarian faunas and paleoceanographic implications. The Island Arc, 14, 338-345, 2005.

NISHIHARA, C. & YAO, A. (2005): Faunal change of Middle Jurassic (Bajocian) radiolarians from manganese nodules in the Inuyama area, Central Japan. Journal of Geosciences, Osaka City University, 48, 109-121.

NISHIHARA, C. & YAO, A. (2005): Faunal change of Middle Jurassic (Bajocian) radiolarians in the Inuyama area of the Mino Terrane. Fossils (Palaeontological Society of Japan), no. 78, 32-39. (In Japanese with English abstract)

MONOGRAPHS AVAILABLE

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I have some extra copies of the following Sturani and Pavia monographs for “ammonite colleagues” who are interested:

STURANI C. 1967. Ammonites and Stratigraphy of the Bathonian in the Digne-Barreme area. Boll. Soc. Paleont. Ital., 5.

STURANI C., 1971. Ammonites and Stratigraphy of the "Posidonia alpina" beds of the Venetian Alps. Mem. Geologia Padova, 28.

PAVIA G. 1971. Ammoniti del Baiociano superiore di Digne. Boll. Soc. Paleont. Ital., 10.

PAVIA G., BENETTI A. & MINETTI C., 1987, Il Rosso Ammonitico dei Monti Lessini Veronesi. Ammoniti e discontinuità stratigrafiche del Kimmeridgiano inferiore. Boll. Soc. Paleont. Ital., 26.

RESEARCH ON THE JURASSIC OF EASTERN AND NORTHERN IRAN

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For many years our research team comprising myself, F. Fuersich and M. Wilmsen (Wuerzburg University, Germany) and M. Majidifard (Geological Survey of Iran) have been carrying out research studies on the Jurassic strata of eastern and northern Iran. Herewith, a list of our latest publications. Hoping to see you in Krakow.

SEYED-EMAMI, K., FÜRSICH, F. T. and WILMSEN, M. (2004): Documentation and significance of tectonic events in the northern Tabas Block (east Central Iran) during Middle and Late Jurassic: structural, sedimentary and stratigraphic evidence. Rivista Italiana Paleont. Stratigr., 110 (1), 163-171, Milano.

WILMSEN, M., FÜRSICH, F. T. and SEYED-EMAMI, K. (2004): Facies architecture and dynamic of a Jurassic (Callovian – Kimmerigdian) carbonate system: the Esfandiar subgroup of the northern Tabas Block, East-Central Iran. Rivista Italiana Paleont. Stratigr., 110 (1), Milano.

SEYED-EMAMI, K., FÜRSICH, F. T., WILMSEN, M., SCHAIRER, G. and MAJIDIFARD, M. R. (2004): First record of Jurassic (Toarcian – Bajocian) ammonites from the northern Lut Block, east-central Iran. Acta Geologica Polonica, 54 (1), 77-94, Warsaw.

WILMSEN, M., WIESE, F., SEYED-EMAMI, K. FURSICH, F.T. (2005): First record and palaeo-(bio-) geographical signififance of Turonian ammonites from the Shotori Mountains, east-central Iran. 7th Int. Cretaceous Symposium, Program and Abstracts vol. 238, Neuchatel, Switzerland [abstract].

WILMSEN, M., WIESE, F, SEYED-EMAMI, K. and FURSICH, F.T. (2005): First record and significance of Turonian (Cretaceous) ammonites from east-central Iran (Shotori Mountains). Ber. Inst. Erdw. Karl-Franzens-Universität, 10, 138-139, Graz [abstract].

WILMSEN, M., SEYED-EMAMI, K., WIESE, F. and FÜRSICH, F. T. (2005): First record and paleogeographical significance of Cretaceous (Turonian) ammonites from the Shotori Mountains. Cretaceous Research, 26, 181-195.

FÜRSICH F.T., HAUTMANN, B., SENOWBARI-DRYAN, B. and SEYED-EMAMI K. (2005): The Upper Triassic Nayband and Darkuh formations of east-central Iran: Stratigraphy, facies patterns and biota of extensional basins on an accreted terrane. Beringeria, 35, 53-133, Wuerzburg.

FÜRSICH, F. T, WILMSEN, M., SEYED-EMAMI, K., CECCA, F. and MAJIDIFARD, M.R. (2005): The upper Shemshak Formation (Toarcian-Aalenian) of the Eastern Alborz (Iran): Biota and palaeoenvironments during a transgressive-regressive cycle. Facies, 51, 365-384, Erlangen.

SEYED-EMAMI, K., FÜRSICH, F. T., WILMSEN, M., SCHAIRER, G. and MAJIDIFARD, M. R. (2005): Toarcian and Aalenian (Jurassic) ammonites from the Shemshak Formation of the Jajarm area (eastern Alborz, Iran). Paläontologische Zeitschrift, 79/3, 349-369.

SEYED-EMAMI, K., FURSICH, F.T., WILMSEN, M., MAJIDIFARD, M.R., CECCA F. and SHEKARIFARD, A., (in press): Stratigraphy and ammonite fauna of the upper Shemshak Formation (Toarcian-Aalenian) at Tazareh, east of Shahroud (eastern Alborz, Iran).

SEYED-EMAMI, K., FURSICH, F.T. & WILMSEN, M. (2006): New Evidence on the Lithostratigraphy of the Jurassic System in the Northern Tabas Block, East-Central Iran. Geosciences, 15(57), 78-95 [in Farsi].

IN MEMORIAM

MILOS RAKUS (1934 – 2005)

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We would like to dedicate these few lines to our good friend and colleague Milos Rakús, who died in May 2005 after short and unsuccessful fight against an insidious disease. Some of you knew him from afar only as a specialist of Lower Jurassic ammonites, Carpathian and Alpine geology or NW Africa. Those, who spent unforgettable moments with him in the field, in his garden or just anywhere around a table will remember Milos also as a lover of good wine, beauty in women, Chinese poetry and the Slovak mountains.