INTERNATIONAL SUBCOMMISSION ON JURASSIC STRATIGRAPHY

NEW **Website for the ISJS at http://www.es.ucl.ac.uk/people/bown/ISJSwebsite.htm**

Newsletter 32

Edited by Nicol Morton and Paul Bown

August 2005

CONTENTS

CHAIRMAN'S REPORT

Nicol MORTON
NICOL.MORTON@wanadoo.fr

Rôle of Jurassic Subcommission

This Newsletter, no. 32, is the first for the "new" Jurassic Subcommission, which was officially appointed by I.U.G.S. during the 32nd International Congress at Florence in August 2004 and will serve until the 33rd International Geological Congress on Oslo in 2008. While the Chairman's report last year reviewed what had been achieved during the previous four years, this report is more concerned with looking forward to the next four years.

The Jurassic Subcommission has two main rôles:

1. It is an official body of the International Commission on Stratigraphy (ICS, of which the various Subcommission chairmen are voting members) and of the International Union of Geological Sciences (IUGS). Each year we report to ICS, which reports in turn to IUGS (the ICS report for 2004 totalled 163 pages!). The Jurassic Subcommission receives from ICS each year a small amount of funding - reduced for 2005 to US$2000 (translated into 1523 Euros) because of the new commitment of IUGS to the International Year of Planet Earth. In this rôle we have three officers (Chairman, Vice-Chairman, Secretary) and twenty Voting Members, with, in addition, an unspecified number of Corresponding Members. Our function is to promote and coordinate long-term international cooperation and establish standards in stratigraphy, with the priority to define global chronostratigraphic units.

2. It is a worldwide association of all those who have an interest in the geology of the Jurassic, whether they are "official" members or not. I have always liked the phrase used by my friend John Callomon 'the Jurassic family' for this group – it reflects the friendly atmosphere of our meetings. In this rôle our function is to enable and promote international collaboration in research on the Jurassic and to sponsor regular international meetings. For me, personally, and perhaps for most of you, this is the more important rôle!

Objectives 2004-2008

For the next four years (also discussed last year, in my report to ICS for 2004) I noted the following proposed objectives for the Jurassic Subcommission for 2004 – 2008:

For those of us who are interested in the geology of the Jurassic the four-yearly International Symposia/ Congresses are a priority and these will be "officially" supported and sponsored. So also will other meetings as far as resources allow.

The priorities (not in order of merit) proposed for the Jurassic Subcommission for the next four years include:

1. Completion of GSSP proposals for all Jurassic Stages (remaining) by the next Jurassic Congress in Krakow, September 2006.

2. Stage Working Groups to standardise and propose GSSPs for Substages as appropriate, but named ONLY as Lower/Middle/Upper. We do not want to clutter up the nomenclature with named Substages such as Carixian, Domerian, etc. These will be approved by the Jurassic Subcommission, but ICS and IUGS have no current plans for involvement with Substages.

3. I suggest also asking the Stage Working Groups to define the bases of the Standard (Ammonite) Zones in terms not only of the correlation marker event but also to propose a stratotype point for the basal boundary in the same way as for the Stages. Similar definition of Regional Zones and maximising the detail of correlation with the Standard Zones would be very valuable.

4. Developing and expanding the Thematic Working Groups, some of which have been very successful. For this to work they need to be given more specific projects and targets - for example searching for and interpreting data from all sources relevant to reconstructing the palaeobiogeography or the climate of one or more specific time-intervals.

5. Investigate the establishment of databases which would bring together and make available information from all sources associated with the "members and friends" of the Jurassic.

Activities 2004-2005

The years 2004 and 2005 have been very active for the members of the Jurassic Subcommission:

1. A high-profile symposium was held during the International Geological Congress in Florence 2004. This was very well attended, with eight oral presentations during a half-day session on the afternoon of Tuesday 24th August and posters on display for the full day. A report is given in this Newsletter.

2. During 2005 three of the Stage Working Groups, Toarcian, Kimmeridgian and Tithonian, held discussion and field meetings. And results will be reported in the next Newsletter.

3. There is controversy regarding the proposals of some of the Working Groups, as is to be expected. Some of this is aired in the current Newsletter:

   (a) Recommendations by the Geoconservation Working Group convenor Kevin Page, concerning conservation and protection of fossils and fossil sites are discussed by some members of the Liaison

Working Group. Although they are not employed professionally as palaeontologists, they have made important contributions to our science and their views deserve to be taken into consideration.

(b) The proposals of the Kimmeridgian Working Group, convenor Andrzej Wierzbowski, are criticised by John Callomon. The issue of historical precedent is important in arriving at a proposal for the GSSP defining the base of a Stage, but should not preclude refinements if improved correlation can be achieved.

This Newsletter should not be taken as representing the "official" view of the Jurassic Subcommission, but should remain available for presentation of alternative views which should be considered by all its readers.

IGCP Projects. Projects funded by the International Geological Correlation Programme (IGCP) are independent of the Jurassic Subcommission but there are two with which we are associated. The highly successful Project 458, on Triassic–Jurassic Boundary Events, led by Stephen Hesselbo, Chris McRoberts and Jozsef Palfy, is coming towards the end of its term (see report by Jozsef Palfy) with its closing session in 2005. Starting in 2005 there is a new IGCP Project 506, on Marine and Non-marine Correlations in the Jurassic, which will be led by Jingeng Sha, Yongdong Wang and others (see report below).

Membership. Changes in the Voting Membership of the Jurassic Subcommission were reported in the Newsletter last year. These have been approved by ICS and IUGS. There will also be changes in the list of Corresponding Members, particularly to improve the geographical distribution of the membership. A new Subcommission Directory will be distributed by email as soon as possible. This will replace the Directory, which was distributed in 2001. We would like to thank retiring members for their service and extend a welcome to the new members.

In Memoriam. The last year has seen the loss of three colleagues who made extremely important contributions to Jurassic geology and we mark their passing with tributes in this Newsletter.

Asunción Linares (Granada) I have known for many years, though only slightly personally because she always seemed a quiet modest person. However, one cannot but be impressed by her contributions to Jurassic geology – the current healthy state of research on the Jurassic of Spain owes much to her training of generations of students who now occupy important posts and have established Spain as a significant centre for Jurassic research.

Jürgen Remane (Neuchâtel) has been a long-time participant in Jurassic research and in the Jurassic Symposia. As former Secretary and then Chairman of the International Commission on Stratigraphy his contributions to our science will be known and respected by all of us. He and his wife Angelika became close friends of myself and my wife Sheila; we will miss him personally and his contributions to our scientific discussions.

Howard Tipper (Tip) was a larger-than-life character of the type we sometimes have in geology. The best tribute I can make to his memory is to recall how it came about that the 5th Jurassic Symposium was held in Canada. During the fieldtrip before the 4th Symposium in Mendoza, Argentina, Giulio Pavia and I discussed where the following Jurassic Symposium should be. My opinion was that at that time (1994) the most significant new research results on the Jurassic had come from Spain (the influence of Asunción Linares and others) and from western Canada (Tip, Paul Smith and colleagues). There were no Spanish representatives in Argentina but there were some Canadians, so Russell Hall had the task of contacting his colleagues back home to obtain their agreement. So in 1998 we all met in Vancouver. My treasured personal memory is of the post-Symposium fieldtrip to the Queen Charlotte Islands, led by Tip. The photograph from Paul Smith brings back the memories.

Acknowledgements. The success of these Jurassic Newsletters depends on:

(a) Colleagues who contribute reports and articles detailing so many interesting activities and results from so many parts of the World;

(b) Paul Bown who puts the Newsletter together and organises the email distribution;

(c) The Corresponding, Voting and Honorary Members, who undertake its onward distribution.

My sincere thanks to all of you.

NEWS ITEMS & MEETINGS

7TH INTERNATIONAL CONGRESS ON THE JURASSIC SYSTEM, KRAKÓW, POLAND, 6th – 19th SEPTEMBER 2006

Andrzej WIERZBOWSKI, Jan GOLONKA, Michal KROBICKI & Jaroslaw ZACHARSKI, for the Organising Committee

General information and scientific programme

The 7th International Congress on the Jurassic System will be held in Poland, with scientific sessions in Krakow from 11th to 14th September 2006, a pre-Congress field trip on 6th to 10th September and post-Congress field trips on 15th to 19th September. The first circular is still available on the website at www2.uj.edu.pl/ING/jurassica. So far about 120 persons have responded. The second circular will be sent in Autumn 2005 to all who have returned the registration form. Information is also available from the Congress Secretaries: Dr Marcin BARSKI and Dr Magdalena SIDORCZUK, Institute of Geology, University of Warsaw, 02-089 Warszawa, Poland;
e-mail: secretary.isjs7@uw.edu.pl.

Although the scientific programme will cover all aspects of Jurassic geology, analysis of preliminary titles submitted so far indicate that some topics are especially popular:

1. Geodynamics: Jurassic tectonics and sedimentation in different areas;

2. Facies analysis and reconstruction of palaeoenvironments, taphonomy;

3. Palaecology, palaeogeography, palaeomagnetism, and palaeoceanography;

4. Integrated stratigraphy (biostratigraphy: ammonites and microfossils; sequence stratigraphy).

Some proposals deal with other topics, such as (a) Jurassic geoconservation and palaeontological heritage, (b) Jurassic organic geochemistry (e.g. geochemistry of black shales, the Jurassic petroleum system). We are interested in arranging special sessions devoted to such topics if there is sufficient interest.

Meetings of the Jurassic Subcommission Working Groups can be arranged, to demonstrate and discuss results of recent studies, notably those related to establishing a GSSP. We can also arrange meetings of other groups whose activities relate to the Jurassic, such as IGCP and ICDP projects.

Convenors, coordinators and/or leaders of groups are asked to indicate to the Congress Secretary their wish to organize a meeting.

Krakow (Cracow) – some information:
Kraków, the former capital of Poland, was the seat of kings (Wawel Castle). It is a scientific centre, having over 10 universities. The Jagiellonian University, founded in 1364, is one of the oldest in Europe.

The old Renaissance city has many architectural and cultural monuments, and museums, which is why it is on UNESCO's list of World Heritage Sites. This is a city of special charm, attracting millions of tourists every year. Apart from its historic attractions, spectacular and famous monuments, such as Royal Castle, St. Mary's Basilica, the Cloth Hall "Sukiennice", and Florianska Gate, there are numerous cafes and restaurants to attract visitors.

The climate is moderate, with temperatures in September typically ranging from 15 to 22ºC. Kraków is known for its scientific background and experience in the organisation of conferences and seminars.

MENNER CENTENARY CONFERENCES

Yuri GLADENKOV
gladenkov@ginras.ru

This is inform you that the international conference "Stratigraphic problems of the early 21 century: new ways and approaches" will be held on the 23-24th of November, 2005 in Geological Institute of the Russian Academy of Sciences (Moscow). The conference is devoted to the centenary of the distinguished Russian geologist Academician Vladimir Menner. In the 1970-1980s he was President of the International Commission on Stratigraphy and Chairman of the Paleogene Subcommission.

The program includes also two sessions:

(1) Jurassic System of Russia: problems of stratigraphy and palaeogeography (November 21-22)

(2) Micropaleontology of Russia (November 21-23).

For information about the "Stratigraphic Problems" conference, please contact Professor Yuri Gladenkov, email gladenkov@ginras.ru

For information about the "Jurassic System of Russia" conference, please contact Professor Victor Zaharov, zakharov@ginras.ru

32nd INTERNATIONAL GEOLOGICAL CONGRESS, FLORENCE, 2004
SYMPOSIUM G22.07 – JURASSIC WORLD (OUTSIDE THE PARK)

Nicol MORTON & Paul SMITH, Convenors
NICOL.MORTON@wanadoo.fr &
psmith@eos.ubc.ca

REPORT TO CONGRESS ORGANISERS

1- SESSION: G22.07 – Jurassic World (Outside the Park) (177)

2- Chairpersons: Nicol Morton (ISJS, Vogüé, France), Paul L. Smith (University of British Columbia, Vancouver, Canada)

3- Session description: The Symposium was organised as seven topics or themes reflecting aspects of the World during Jurassic times. For most topics one or two oral presentations were invited and other contributions presented as posters.

4- Number of abstracts actually presented: 26 (8 oral, 18 poster)

5- Overview of oral presentations: Oral presentations covered five of the topics. An introduction and review of the chronostratigraphic framework was followed by a summary update of the current Jurassic numerical timescale. Jurassic palaeoclimates were discussed in terms of atmospheric and oceanic circulation models and their expression in the rock record, followed by analysis of the significance of tropical and bipolar bivalve distribution patterns. Tectonic events were reviewed in the North Atlantic (Greenland and Denmark) and in western Tethys (NW Africa). Evolutionary events were illustrated by reference to ammonoid extinction and diversification from latest Triassic into early Jurassic. Finally, patterns and trends in marine ecosystems were presented and discussed.

6- Overview of poster presentations: Posters related to six of the topics were presented, with half on biostratigraphy and correlation using a wide range of techniques and contributing much new important data. Similarities of tectonic histories in disparate areas emerged from other posters. Particularly striking overall was the diversity of material presented. A small prize for the best poster was awarded by the Jurassic Subcommission to Bertinelli & Marcucci (Italy).

7- General comments: The Symposium was arranged to illustrate the wide range of research on Jurassic rocks and fossils in the exploration of what the World was like during Jurassic times. Of course, only a few aspects could be dealt with in the time available but the diversity of the presentations excited high levels of interest so that the session was full or well attended throughout. Some unexpected results relevant to urgent topics such as the GSSP for the base of the Jurassic emerged.

8- Announcements: No formal publication is planned for papers presented at this Symposium but the topics will be followed up at the 7th International Jurassic Congress to be held in Cracow, Poland in September 2006.

TITLES OF ORAL AND POSTER PRESENTATIONS

ORAL:

MORTON, Nicol: The Jurassic World: Introductory remarks and chronostratigraphical framework.

PALFY, Jozsef: Dating, correlation, and the time-scale in the Jurassic.

SELLWOOD, Bruce: Jurassic climates - general circulation models and the rock record.

SHA, Jingeng: Palaeoclimatological significance of the tropical and bipolar distribution patterns of the Middle Jurassic – Early Cretaceous bivalves.

INESON, Jon R & SURLYK, Finn: The Jurassic of Denmark and Greenland - key elements in the reconstruction of the North Atlantic Jurassic rift system.

ELMI, Serge: Jurassic tectonic events, their dating and correlation.

SMITH, Paul L.: Extinction and diversification in Early Jurassic ammonoids.

ABERHAN, Martin, FURSICH, Franz & KIESSLING, Wolfgang: Patterns and trends in Jurassic marine ecosystems.

POSTER:

PERILLI, Nicola, DUARTE, Luis Victor, ELMI, Serge, GOY, Antonio: Toarcian calcareous nannofossil biostratigraphy of Basque Cantabrian area (northern Spain) and Lusitanian Basin (central Portugal).

RAMBEAU, Claire, FÖLIMI, Karl B., ADATTE, Thierry, MATERA, Virginie, STEINMANN, Philipp, BERT, Didier: Anomalous cadmium concentrations in Bajocian carbonates of the Tethyan Realm.

VUKS, Valery: Foraminiferal zonation of the Upper Jurassic of the Caucasus - comparison of schemes and new results.

PIGOTT, Kulwadee L., PHILP, R.P., ENGEL, M.H., WEAVER, B.A.: Chemostratigraphy of the Upper Jurassic (Oxfordian) carbonate sequence of the Smackover Formation of southwest Alabama, U.S.A..

BERTINELLI, Angela, MARCUCCI, Marta: Lower Jurassic (Hettangian) radiolarian assemblages from the Mt. Camicia (Gran Sasso Range, central Appennines, Italy).

COMAS-RENGIFO, Maria Jose, DUARTE, Luis Victor, ELMI, Serge, GOY, Antonio, MOUTERDE, Rene, PERILLI, Nicola, ROCHA, Rogerio Bordalo: Ammonite and calcareous nannofossil assemblages across the Pliensbachian – Toarcian boundary in two key sections of Spain and Portugal.

MATSUOKA, Atsushi, TAKEI Masahiko: Late Jurassic (Kimmeridgian) ammonites from the Imaidani Group in the Shirokawa area, southwest Japan.

CHANDLER, Robert B., MORTON, Nicol, DIETZE, Volker: High resolution correlation of Aalenian – Lower Bajocian (Middle Jurassic) strata in western Europe based on ammonite biostratigraphy.

DUARTE, Luis Victor, PERILLI, Nicola, RODRIGUES, René, ANTONIOLI, Luzia, DINO, Rodolfo: Facies analysis, calcareous nannofossils and palynological evidences across the Sinemurian – Pliensbachian boundary in the western Iberia margin.

VENTURI, Federico, BILOTTA, Massimiliano, RICCI, Carlo: Early Jurassic connections between the western Tethys and Southern America - a new datum.

HUDSON, John D., MORTON, Nicol: Middle Jurassic climate in north-west Scotland.

FANTONI, Roberto, MASETTI, Daniele, ROMANA, Roberta, SARTORIO, Dario, TREVISANI, Enrico: Jurassic evolution of the extensional basins in the eastern Southern Alps (northern Italy).

FANTONI, Roberto, DECARLIS, Alessandro: Mesozoic extension at the western margin of the Southern Alps (northern Piedmont, Italy).

MORTON, Nicol. A tectonic event to start the Middle Jurassic?

MARINO, Maria Concetta: The articulated morphology of a Mesozoic escarpment (Monte Ziretto area, Cabo Sant'Andrea unit, Kabilo-Calabride Domain, NE Sicily).

FAZZUOLI, Milvio, SCHIROLLI, Paolo: Rosso ammonitico facies of the Tuscan Domain (northern Apennines) and its response to the lowermost Jurassic rifting.

REIJMER, John J.G., BLOMIER, Dierk P.G., GLÄSER, Ingo: Carbonate turbidite stacking patterns related to sea-level changes and ocean circulation (Jbel Bou Dahar, Lower Jurassic, High Atlas, Morocco).

MEYSSAMI, Ali: Footprints of Jurassic dinosaurs in Iran.

IGCP Project 458: Triassic-Jurassic boundary events

Jozsef PALFY, co-leader
palfy@nhmus.hu

The project, in its fourth year in 2004, sponsored a theme session at the 32nd International Geological Congress in Florence, Italy on August 26, 2004. This popular session, titled "Triassic-Jurassic boundary events" and encompassing a full day, included 15 oral presentations and 5 posters. Estimated audience varied from 50 to 80 people. Details of the presentations including abstracts are available from the IGCP 458 website at:

http://paleo.cortland.edu/ IGCP458/ igc/igc.html.

Also associated with the 32nd IGC, ICGP 458 organized and sponsored a full day field excursion to examine the classic Triassic/Jurassic boundary at the Grotta Arpaia and nearby sections at Portovenere on the Ligurian coast. The excursion was led by Gloria Ciarapica (Perugia, Italy) and Christopher McRoberts (Cortland, New York) and was attended by 21 scientists from Germany, UK, Denmark, Italy, USA, Canada, Hungary, and Slovakia. Participants had opportunity to study the significant outcrops and collect fossil specimens from the Grotta Arpaia and Muzzerone sections and were provided a boat excursion to nearby Tinto and Tintino Islands where the Triassic/Jurassic boundary was also exposed. A 12 page field guide was produced and provided participants details in regional and local stratigraphy, tectonics, paleontology, and geochemistry.

Research papers presented in Florence form the core of a special issue on "Triassic-Jurassic boundary events", to be published in *Palaeogeography, Palaeoecology, Palaeoclimatology*. IGCP 458 project leaders S. Hessebo, C. McRoberts, and J. Pálfy act as guest editors of the special issue for which nearly 30 manuscripts have been submitted.

The closing meeting and field workshop of the IGCP 458 project is scheduled for September 5-10, 2005, hosted jointly in Hungary and Austria. The focus of the field trips is the well-exposed sections that contain the Triassic-Jurassic boundary in different marine facies in both the Transdanubian Range in Hungary and the Northern Calcareous Alps in Austria. The field workshop provides an opportunity to visit some of the classical Alpine localities and some less well-known sites that were subject of recent integrated stratigraphic studies. In the final year of the IGCP 458 project, a full day will be devoted to conference presentations. Preliminary registration has been received from 42 project participants. For the conference program, 17 talks and 7 posters have been announced. For further information, please visit the project website: http://paleo.cortland.edu/IGCP458

IGCP Project 506: Marine and Non-marine Jurassic: Global correlation and major geological events

Jingeng SHA, co-leader
jgsha@nipas.ac.cn

Proposers: Jingeng Sha (China), Nicol Morton (France), William A.P. Wimbledon (UK), Paul E. Olsen (USA), Alberto C. Riccardi (Argentina), Grzegorz (Gregory) Pienkowski (Poland), Yongdong Wang (China).

Countries involved: Argentina, Australia, Burma, China, Denmark, France, Germany, Hungary, India, Japan, Malaysia, Mongolia, Morocco, The Netherlands, New Zealand, Poland, Romania, Russia, Switzerland, Thailand, UK, USA, Viet Nam.

Duration: 2005/2006(-2009).

Contact: Prof. Dr. Jingeng Sha, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, P. R. China; Tel: +86-25-8328 2101; Fax:+86-25-87714437;
Email: jgsha@nigpas.ac.cn

The Jurassic is an important period in the earth's history and for the evolution of life. It covers about 55-60 Ma time-span and encompasses some of the most significant global events in geological history, including mass extinctions, climate and sea level changes, volcanic activity, atmospheric CO_2

concentration, biodiversity change and the variation of marine and non-marine ecosystems. In particular, the Jurassic deposits in Europe, the Middle East and East Asia are major formations for hydrocarbon resources (including coal, oil and gas), showing significant value for the world's energy and mineral resources. Rich and diverse fossils have been recorded in both marine and non-marine sequences. Analysis of the biodiversity variation of such important fossil organisms is crucial for global correlation between marine and non-marine Jurassic deposits. In addition, volcanic rocks (especially tuffs) are also developed in the Jurassic of some areas. Significant work on marine/non-marine Jurassic has been carried out in the UK, USA, Argentina, China and India, especially the boundaries with the Triassic and Cretaceous have long been debated and but are not yet resolved on a global scale. Furthermore, our knowledge regarding major geological events is still limited as well as their record and potential correlation during the Jurassic interval. Therefore, an international project is necessary to unify the geologists and palaeontologists worldwide who are interested in the studies of the Jurassic system, with emphasis upon multidisciplinary integration. The project will use the integrated multidisciplinary methods, including palaeontological, lithostratigraph-ical, biostratigraphical, sequence stratigraphical, lithological including volcanic, sedimentological, geochemical, isotopic dating and geophysical, to solve the interrelated problems of correlation between marine and non-marine Jurassic, including the boundary intervals.

The aims of the project are:

- to highlight and emphasize the importance of the marine and non-marine Jurassic for understanding the evolutionary trends of both life and earth history;
- to provide a forum for enhancing international cooperation for geologists and paleontologists who are interested in the Jurassic System;
- to promote and produce a series of research results for the Jurassic system using a multidisciplinary approach;
- to help improve public education for a complete and good understanding of the whole Jurassic world, including the Jurassic dinosaurs.

First Annual Meeting, November 1 – 4, 2005

The first annual meeting of IGCP Project 506, together with an International Symposium on the Jurassic Boundary Events will be held in Nanjing, China, in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences.

For further details and a copy of the First Circular please contact:
Dr. Yongdong Wang (ydwang@nigpas.ac.cn).

LOCATION OF 8TH INTERNATIONAL CONGRESS/SYMPOSIUM ON THE JURASSIC SYSTEM, 2010

Nicol MORTON
NICOL.MORTON@wanadoo.fr

While we are all looking forward to the 7th International Jurassic Congress in Krakow, Poland, next year, it is also time to start thinking about plans for the 8th Congress/Symposium, which should be held in 2010. It seems that in some cultures the term "congress" may carry more weight than the term "symposium", so I suggest we could use either – to me they are synonymous.

Invitations are solicited for the location of the 8th International Symposium/Congress on the Jurassic System, to be held in 2010. The invitation should indicate the possible venue for the sessions and also give proposals for pre- and post-Symposium fieldtrips. An indication of possible dates would be helpful but precise dates are not required at this stage. Similarly, it is not necessary to give estimated costs, though these should be kept to a minimum to enable maximum participation.

The location for the 7th Congress was decided by open democratic vote during the closing session of the 6th Symposium in Mondello, Sicily. On that occasion there were four invitations, which were presented at the time of the meeting. However, some comments were received subsequently that only those who had been able to participate could be involved in the selection procedures. The final decision will still be made during the closing session in Krakow, but it is proposed to have a preliminary consultation by email before the Congress.

Outline proposals should be sent to me as an email attachment. These will then be emailed to all Voting, Corresponding and Honorary Members of the Jurassic Subcommission, who should forward the proposals to all colleagues who may be interested. A tally of preferences expressed by email to me (by a date to be specified) will be presented to the meeting in Krakow. We hope that in this way ALL who have an interest will be able to participate in the selection.

To enable this new procedure to take place within a reasonable time-frame, the deadline for submission of proposals is **15th March 2006.**

REPORTS OF WORKING GROUPS

TRIASSIC-JURASSIC BOUNDARY (HETTANGIAN) WORKING GROUP

Geoff WARRINGTON, Convenor
gw47@le.ac.uk

1. Organisational matters

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

The first circular of the TJBWG (15 February 1983) listed a Chairman (Mouterde) and 14 others as 'initial members'. By the time of the Erlangen symposium in 1984, a number of 'coordinators of work' on possible GSSPs, fossil groups and specialist topics had been identified. A list appended to the WG report to the International Commission on Stratigraphy (ICS) for 1988 included 55 names but was considered 'provisional' by the ICS Secretary-General (Remane) who advised that 'clarification' of membership status was necessary prior to any vote by the TJBWG. Warrington succeeded Guex as Secretary in 1991 and reported on the membership issue at a business meeting of the TJBWG convened in Mendoza on 23 October 1994, during the 4th International Congress on Jurassic Stratigraphy and Geology. Information provided by the previous secretary and ICS indicated that the TJBWG did not have a formal voting and corresponding membership, but that there were potentially 76 members; just over half of these responded to a questionnaire regarding interest and activity in TJBWG matters (*ISJS Newsletter*, **23**: 20). Proposals for a Voting Membership were submitted to the chairmen of the TJBWG (Mouterde) and the International Subcommission on Jurassic Stratigraphy (ISJS) (Enay) by the Secretary in 1996. A list of members of the TJBWG, comprising those who responded to a circular issued by the Secretary, was published in 1997 (*ISJS Newsletter*, **25**: 23-25) and a revised list, based on responses to a further circular, appeared in 1999 (*ISJS Newsletter*, **26**; 27-29).

ICS statutes ratified in January 1997 stated that an intersystem boundary working group, such as the TJBWG, should include 'ten (10) to twenty (20) Voting Members, including its officers, and shall represent regional and methodological diversity in an appropriate manner'. Revised statutes, ratified in February 2002, provide only for the appointment of a 'reasonable' number of members to 'represent regional and/or methodological diversity in an appropriate manner' and vote on relevant issues (*ISJS Newsletter*, **30**: 8).

In preparation for the start of the voting process to select a preferred candidate GSSP for the base of the Hettangian Stage, the Convenor and Secretary have reviewed the membership of the TJBWG in the light of current ICS statutes and with knowledge of those active in relevant studies. A voting membership that comprises such workers and represents 'regional and/or methodological diversity' appropriately has been compiled for approval by the ISJS.

1.2. Under ICS rules, the Convenor's duties as Secretary and a Voting Member of the Subcommission on Triassic Stratigraphy (STS) ended in August 2004. The new Secretary of the STS is Dr. C. McRoberts (Department of Geology, State University of New York at Cortland, P.O. Box 2000, Cortland, NY 13045, United States of America: *e-mail*: mcroberts@cortland.edu).

The TJBWG Convenor remains a member of the STS, in addition to being involved with IGCP Project 458 (Triassic-Jurassic Boundary Events) and, as the UK National Correspondent, with IGCP Project 467 (Triassic Time and Correlations).

2. Meetings

The Convenor was an invited speaker at the 32nd Open University Geological Society Symposium *(185 Ma Time Walk - discover our heritage*) at Wimborne, Dorset, UK (9-11 July, 2004). He also delivered the invited Annual Lecture of the Devonshire Association (Geology Section) at a joint meeting of that group and the Torquay Natural History Society in Torquay, Devon, UK (15 January, 2005). Both talks covered the succession in the western part of the Dorset and East Devon Coast World Heritage Site (*'The Jurassic Coast*'), including the Triassic to lowest Jurassic sequence.

The Convenor and Secretary were invited speakers at a meeting (*The Hettangian in Hettange, from science to geological heritage*) held in Grande-Hettange (Moselle, France) to celebrate the 20th anniversary of the establishment of a geological reserve at the eponymous site of the Hettangian Stage. The Convenor also outlined the work of the TJBWG, in the opening session of the meeting, and chaired a scientific session on the Hettangian. Scientific sessions (1 and 2 April) attracted around 80 participants; field excursions were held on 31 March and 3 and 4 April. The contributions appear in a volume made available at the meeting (HANZO, M. (coord.). 2005); those relevant to the TJBWG are listed below (**4.1**).

The Convenor and Secretary were unable to attend the 32nd International Geological Congress in Florence (August, 2004), which included a symposium (G22.07: *Jurassic World - outside the Park*), organised by the ISJS, and a thematic session (T04.03) on Triassic-Jurassic boundary events, organised by IGCP Project 458. Contributions to the latter will appear in a special issue of *Palaeogeography, Palaeoclimatology, Palaeoecology*. Of related interest were contributions in sessions G17.03 (*Paleobiodiversity and major biotic changes in Earth history*), G22.06 (*Triassic in the Tethys realm*), S11.01 (*The Geological Time Scale – recent developments and global correlations*) and T04.01 (*Mass extinctions and other large ecosystem perturbations: extraterrestrial and terrestrial causes*). Abstracts of contributions are available through the IGC website: www.32igc.info/igc32; abstracts of contributions to the IGCP 458 thematic session are also available through the project website: http://paleo.cortland.edu/IGCP458/igc/igc.html.

Contributions presented at a workshop (*Late Triassic-Early Jurassic events in the framework of the Pangea break up*) held on Capri (30 September - 1 October 2003) have appeared in an issue of *Bolletino della Società Geologica Italiana* (see **4.2**).

3. Future meetings

The 7th International Congress on the Jurassic System, at Kraków, Poland, will comprise scientific sessions (11-14 September, 2006), preceded by a pre-congress field trip (6-10 September) and followed by post-congress field trips (15-19 September). The congress website is at: www2.uj.edu.pl/ING/jurassica. A formal business meeting of the TJBWG will be organised during this congress.

4. New literature relevant to the TJBWG (compiled by the Convenor)

4.1. Contributions in: HANZO, M. (coord.). 2005. *Colloque de l'Hettangien à Hettange, de la science au patrimoine* (Hettange, 1-3 avril 2005). Nancy, Université Henri Poincaré, 183pp:

BARBE, S., COURVILLE, P., DERYCKE, C. & CRÔNIER, C. La coupe de Vitteaux (Côte-d'Or, NE France): ruptures dans l'enregistrement paléobiologique (microrestes de vertébrés) autour de la limite Trias-Jurassique: 33.

BLOOS, G. On the Hettangian in Germany: 101-106.

BOUTON, P., BÉCAUD, M., BESSONNAT, G., BRANGER, P. & VIAUD, J.-M. L'Hettangien de la bordure nord du Bassin Aquitain (Vendée, Deux-Sèvres - France): 83-88.

BRIQUEU, L., HAMON, Y., LAUER-LEREDDE, C. & MERZERAUD, G. Cyclostratigraphie haute et très haute résolution de l'Hettangien par l'étude fréquentielle des diagraphies enregistrées dans le forage Balazuc (marge Ardéchoise du bassin sud-est de la France): 123-126.

CAMUZARD, J.-P. Les enregistrements pédosédimentaires, marqueurs des séries transgressives de bordure de massif ancien: l'example du Lias inférieur (Hettangien) de Saint-Lin (Gâtine Poitevine): 119-122.

COLIN, J.-P. Les ostracodes de l'Hettangian: aperçu mondial: 57-62.

DELSATE, D. Les faunes de vertébrés dans les couches de passage du Trias au Jurassique au nord de la Lorraine, à travers les collections du Muséum de Luxembourg: 35-39.

DUGUÉ, O. Modalités de la transgression liasique sur la bordure occidentale du bassin parisien (Normandie, France): 77-81.

ELMI, S. L'Hettangien à l'example du sud-est de la France: eustatisme et contrôle tectonique regional: 89-94.

GUÉRIN-FRANIATTE, S. & MULLER, A. Les "Grès du Luxembourg": leurs positions biostratigraphiques: 47-51.

HALLAM, A. Why SW England is a key area for studying the end-Triassic mass extinction: 9.

HANZO, M. Hettangien: 160.

LATHUILIÈRE, B. & MARCHAL, D. Crises de diversité des coraux du Trias au Dogger: 27-32.

LATHUILIÈRE, B., FABER, A. & LERICHE, G. La crise Trias-Lias: 157-158.

MACCHIONI, F. Hettangian ammonite biostratigraphy in Italy: past, present and future: 53-56.

MULLER, A. & GUÉRIN-FRANIATTE, S. Les "Grès du Luxembourg": des depôts de playa des "Marnes à marnolites" aux marnes marines de "Strassen": 109-113.

MULLER, A. & MÜLLER, E. Vivre la nature sans frontières: géologie et paysages dans le pays de trois frontières: 139-141.

PAGE, K. N. The Hettangian ammonite faunas of the west Somerset coast (south west England) and their significance for the correlation of the candidate GSSP (Global Stratotype and Point) for the base of the Jurassic at St. Audries Bay: 15-19.

PÁLFY, J. Correlated environmental change and extinction at the Triassic-Jurassic boundary: 5-8.

PITARU, S. A Triassic-Jurassic boundary sequence and Hettangian ammonite faunas at Black Bear Ridge, Williston Lake, Canada: 21-26.

ROBIN, C., GUILOCHEAU, F., LE SOLLEUZ, A. & DOIN, M. P. Le Bassin de Paris: un témoin du calendrier des événements géologiques d'échelle lithosphérique: 65-70.

ROUSSELLE, B., ELMI, S. & RULLEAU, L. L'Hettangien de la région Lyonnaise: 95-99.

THUY, B., FABER, A., WEIS, R., CONTI, M. A., MONARI, S. & VALENTINI, M. Éléments nouveaux de faunes d'invertébrés dans l'Hettangien de la Lorraine Belge et Luxembourgeoise, à travers les collections du Muséum de Luxembourg: 43-46.

VAN DEN BRIL, K. & SWENNEN, R. Carbonate concretions and cementation in the Luxembourg sandstone: 115-118.

WARRINGTON, G. The Triassic-Jurassic boundary - a review: 11-14.

4.2. Contributions in: *Bolletino della Società Geologica Italiana*, **124** (1); 2005:

BARATTOLO, F. & ROMANO, R. Shallow carbonate platform bioevents during the Upper Triassic-Lower Jurassic: an evolutive interpretation: 123-142.

BAZZUCCHI, P., BERTINELLI, A., CIARAPICA, G., MARCUCCI, M., PASSERI, L., RIGO, M. & ROGHI, G. The Late Triassic-Jurassic stratigraphic succession of Pignola (Lagonegro-Molise Basin, Southern Apennines, Italy): 143-153.

BERTINELLI, A., CIARAPICA, G., DE ZANCHE, V., MARCUCCI, M., MIETTO, P., PASSERI, L., RIGO, M. & ROGHI, G. Stratigraphic evolution of the Triassic-Jurassic Sasso di Castalda succession (Lagonegro Basin, Southern Apennines, Italy): 161-175.

BERTINELLI, A., CIARAPICA, G. & PASSERI, L. Late Triassic-Jurassic basinal successions in Molise and northern Basilicata: the northernmost witness of the Ionian Ocean: 177-188.

CIARAPICA, G. & PASSERI, L. Late Triassic and Early Jurassic sedimentary evolution of the Northern Apennines: an overview: 189-201.

IANNACE, A., PARENTE, M. & ZAMPARELLI, V. The Upper Triassic platform margin facies of Southern Apennines and their Jurassic fate: state of the art: 203-214.

IANNACE, A., PARENTE, M. & ZAMPARELLI, V. An early Jurassic submarine scarp in the Western Matese Mountains: 215-221.

LUALDI, A. Late Triassic/Early Jurassic sedimentary gaps in the Ligurian Alps (Prepiemontese and Peimontese domain): 223-230.

PASSERI, L., BERTINELLI, A. & CIARAPICA, G. Paleogeographic meaning of the Late Triassic-Early Jurassic Lagonegro units: 231-245.

PASSERI, L. & VENTURI, F. Timing and causes of drowning of the Calcare Massiccio platform in Northern Apennines: 247-258.

PIUBELLI, D., AVANZINI, M. & MIETTO, P. The Early Jurassic ichnogenus *Kayentapus* at Lavini di Marco ichnosite (NE Italy). Global distribution and palaeogeographic implications: 259-267.

REGGIANI, L., BERTINELLI, A., CIARAPICA, G., MARCUCCI, M., PASSERI, L., RICCI, C. & RIGO, M. Triassic-Jurassic stratigraphy of the Madonna del Sirino succession (Lagonegro Basin, Southern Apennines, Italy): 281-291.

4.3. Other contributions:

AMBROSE, K. & WILLIAMS, F. 2004. Bibliography of the geology of Leicestershire and Rutland. Part 2: 1971-2003. *Mercian Geologist*, **16** (1): 5-26.

ARCHE, A., LÓPEZ-GÓMEZ, J., MARZO, M. & VARGAS, H. 2004. The siliciclastic Permian-Triassic deposits in Central and Northeastern Iberian Peninsula (Iberian, Ebro and Catalan Basins): a proposal for correlation. *Geologica Acta,* **2** (4): 305-320.

ARCUCCI, A. B., MARSICANO, C. A. & CASELLI, A. T. 2004. Tetrapod association and palaeoenvironment of the Los Colorados Formation (Argentina): a significant sample from Western Gondwana at the end of the Triassic. *Géobios*, **37** (5): 557-568.

ARIAS, C. & WHATLEY, R. 2004. Distribution patterns of Early Jurassic Ostracoda and possible communication routes through the European epicontinental sea: evidence of changes in ocean circulation patterns and its consequence to climate change. *Neues Jahrbuch für Geologie und Paläontologie Abhandlungen*, **232** (H.1): 1-55.

BAMBACH, R. K., KNOLL, A. H. & WANG, S. C. 2004. Origination, extinction, and mass depletions of marine diversity. *Paleobiology*, **30** (4): 522-542.

BELIVANOVA, V.K. & SAPUNOV, I. G. 2003. The pre-Callovian stratigraphic gap in the Central Balkanides: a key for the interpretation of the Early-Middle Jurassic gaps in Bulgaria. *Geologica Balcanica*, **33** (1-2): 17-33.

BELIVANOVA, V.K. & SAPUNOV, I. G. 2003. Features of some Early-Middle Jurassic diastems in Bulgaria. *Geologica Balcanica*, **33** (1-2): 35-45.

BERNER, R. A. 2004. *The Phanerozoic Carbon Cycle: CO_2 and O_2*. Oxford: Oxford University Press, viii+150pp.

BERTINELLI, A., NANNARONE, C., PASSERI, L. & VENTURI, F. 2004. Hettangian ammonites and radiolarians in the Mt. Camicia (Gran Sasso, Central Apennines). *Rivista Italiana di Paleontologia e Stratigrafia*, **110** (1): 87-95.

BLOOS, G. 2004. Psiloceratids of the earliest Jurassic in the North-West European and Mediterranean provinces - remarks and new observations. *Stuttgarter Beiträge zur Naturkunde, Serie B (Geologie und Paläontologie)*, Nr.347: 15pp.

BORDY, E. M., HANCOX, P. J. & RUBIDGE, B. S. 2004. Basin develpment during the deposition of the Elliot Formation (Late Triassic-Early Jurassic) Karoo Supergroup, South Africa. *South African Journal of Geology,* **107** (3): 397-412.

BORDY, E. M., HANCOX, P. J. & RUBIDGE, B. S. 2004. Provenance study of the Late Triassic-Early Jurassic Elliot Formation, main Karoo Basin, South Africa. *South African Journal of Geology*, **107** (4): 587-602.

BOUATMANI, R., MEDINA, F., AIT SALEM, A. & HOEPFFNER, Ch. 2004. Le bassin d'Essaouira (Maroc): géometrie et style des structures liées au rifting de l'Atlantique central. *Africa Science Review*, **11** (2): 107-123.

BUSBY, C. 2004. Continental growth at convergent margins facing large ocean basins: a case study from Mesozoic convergent-margin basins of Baja California, Mexico. *Tectonophysics*, **392** (1-4): 241-277.

CARNEY, J. N., AMBROSE, K., BRANDON, A., LEWIS, M. A., ROYLES, C. P. & SHEPPARD, T. H. 2004. *Geology of the country around Melton Mowbray.* Sheet description of the British Geological Survey, 1:50 000 Series Sheet 142 (England and Wales). Keyworth, Nottingham: British Geological Survey, vi+118pp.

CHAFFEY, J. 2003. *An illustrated guide to the Dorset and East Devon Coast.* Tiverton: Dorset Books, 64pp.

COHEN, A. S. 2004. The rhenium-osmium isotope system: applications to geochronological and palaeoenvironmental problems. *Journal of the Geological Society, London*, **161** (4): 729-734.

COLBACH, R., GUÉRIN-FRANIATTE, S. & MAQUIL, R. 2003. Nouvelles données paléontologiques dans l'Hettangian du Plateau de Burmerange (Grand-Duché de Luxembourg). *Ferrantia,* **36**: 45-52.

COLLINS, J. S. H. 2002. A taxonomic review of British decapod Crustacea. *Bulletin of Mizunami Fossil Museum*, **29**: 81-92.

COUREL, L., AIT-SALEM. H., BENAOUISS, N., ET-TOUHAMI, M., FEKIRINE, B., OUJIDI, M., SOUSSI, M. & TOURANI, A. 2003. Mid-Triassic to Early Liassic clastic/evaporitic deposits over the Maghreb Platform. *Palaeogeography, Palaeoclimatology, Palaeoecology,* **196** (1-2): 157-176.

DECROUEZ, D. & JURIENS-COTTET, I. 2004. Les collections du département de géologie et de paléontologie du Muséum d'histoire naturelle de Genève. 80. La collection générale (Echinodermata, sauf Echinozoa). *Revue de Paléobiologie, Genève*, **23** (1): 387-396.

EDWARDS, R. A. & GALLOIS, R. W. 2004. Geology of the Sidmouth district - a brief explanation of the geological map. *Sheet Explanation of the British Geological Survey*. 1:50 000 Sheet 326 and 340 Sidmouth (England and Wales). Keyworth, Nottingham: British Geological Survey, ii+30pp.

FAILL, R. T. 2003. The early Mesozoic Birdsboro central Atlantic margin basin in the Mid-Atlantic region, eastern United States. *Bulletin of the Geological Society of America*, **115** (4): 406-421.

FOOTE, M. 2003. Origination and extinction through the Phanerozoic: a new approach. *The Journal of Geology*, **111** (2): 125-148.

FRANZESE, J., SPALLETTI, L., PÉREZ, I. G. & MacDONALD, D. 2003. Tectonic and paleoenvironmental evolution of Mesozoic sedimentary basins along the Andean foothills of Argentina (32º-54ºS). *Journal of South American Earth Sciences*, **16** (1): 81-90.

GALLI, M. T., JADOUL, F., BERNASCONI, S. M. & WEISSERT, H. 2005. Anomalies in global carbon cycling and extinction at the Triassic/Jurassic boundary: evidence from a marine C-isotope record. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **216** (3-4): 203-214.

GILLETTE, D. D. 2003. The geographic and phylogenetic position of sauropod dinosaurs from the Kota formation (early Jurassic) of India. *Journal of Asian Earth Sciences*, **21** (6): 683-689.

GONZÁLEZ, B., MENÉNDEZ, C. E., GUTIÉRREZ, C. & GARCIA-RAMOS, J. C. 2004. Subunidades litoestratigráficas de la Formación Gijon (Triásico Superior - Jurásico Inferior) en Asturias. *Geo-Temas*, **6** (2): 71-74.

GRADSTEIN, F. M. & OGG, J. G. 2004. Geologic Time Scale 2004 - why, how, and where next! *Lethaia*, **37** (2): 175-181.

GRADSTEIN, F. M., OGG, J. G., SMITH, A. G., BLEEKER, W. & LOURENS, L. J. 2004. A new Geologic Time Scale, with special reference to Precambrian and Neogene. *Episodes*, **27** (2): 83-100.

GRADSTEIN, F. M., OGG, J. G. & SMITH, A. G. (eds). 2005. *A Geologic Time Scale 2004.* Cambridge: Cambridge University Press, 610pp.

GUÉRIN-FRANIATTE, S. 2003. Biostratigraphie dans le Lias du Grand-Duché de Luxembourg: le sondage de Capellen. *Ferrantia*, **36**: 65-77.

GUEX, J., BARTOLINI, A., ATUDOREI, V. & TAYLOR, D. 2004. High-resolution ammonite and carbon isotope stratigraphy across the Triassic-Jurassic boundary at New York Canyon (Nevada). *Earth and Planetary Science Letters*, **225** (1): 29-41.

HAAS, J. & TARDY-FILÁCZ, E. 2004. Facies changes in the Triassic-Jurassic boundary interval in an intraplatform basin succession at Cs_vár (Transdanubian Range, Hungary). *Sedimentary Geology*, **168** (1-2): 19-48.

HALL, R. & PITARU, S. 2004. New Hettangian ammonite faunas and a Triassic-Jurassic boundary succession, Fernie Formation, Williston Lake, British Columbia. *Rivista Italiana di Paleontologia e Stratigrafia*, **110** (1): 35-42.

HALLAM, A. & WIGNALL, P. 2004. Discussion on sea-level change and facies development across potential Triassic-Jurassic boundary horizons, SW Britain: reply by Hesslbo, S. P., Robinson, S. A. & Surlyk, F. *Journal of the Geological Society, London*, **161** (6): 1053-1056.

HAMON, Y., MERZERAUD, G. & COMBES, P.-J. 2005. Des cycles haute frequénce de variations du niveau marine relatif enregistrés dans les discontinuités sédimentaires: un example dans le Lias inférieur de Lodève (Sud-Est de la France). *Bulletin de la Société Géologique de France*, **176** (1): 57-68.

HAUTMANN, M. 2004. Early Mesozoic evolution of alivincular bivalve ligaments and its implications for the timing of the 'Mesozoic marine revolution'. *Lethaia*, **37** (2): 165-172.

HAUTMANN, M. 2004. Effect of end-Triassic CO_2 maximum on carbonate sedimentation and marine mass extinction. *Facies*, **50**: 257-261.

HOLSTEIN, B. 2004. Palynologische Untersuchungen der Kössener Schichten (Rhät, Alpine Obertrias). *Jahrbuch der Geologischen Bundesanstalt, Wien*, Bd. **144** (H.3-4): 261-365.

HORI, N. 2004. Jurassic radiolarians from chert and clastic rocks of the Chichibu Belt in the Tayohashi district, Aichi Prefecture, Southwest Japan. *Bulletin of the Geological Survey of Japan*, **55** (9-10): 335-388.

HOUNSLOW, M. W., POSEN, P. E. & WARRINGTON, G. 2004. Magnetostratigraphy and biostratigraphy of the Upper Triassic and lowermost Jurassic succession, St. Audrie's Bay, UK. *Palaeogeography, Palaeoclimatology, Paleoecology*, **213** (3-4): 331-358.

HOWE, S., OWEN, G. & SHARPE, T. 2004. *Walking the Rocks. Six walks discovering scenery and geology along the Glamorgan coast.* Cardiff: Geologists' Association - South Wales Group, 116pp.

HUYNH, T. T. & POULSEN, C. J. 2005. Rising atmospheric CO_2 as a possible trigger for the end-Triassic mass extinction. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **217** (3-4): 223-242.

KASHIWAGI, K. & KURIMOTO, C. 2003. Reexamination of radiolarian biochronology of the Shimizu Formation (Northern Chichibu Belt) in the Shimizu-Misato area, western Kii Peninsula, Southwest Japan. *Bulletin of the Geological Survey of Japan*, **54** (7-8): 279-293.

KENT, D. V. & TAUXE, L. 2005. Corrected Late Triassic latitudes for continents adjacent to the North Atlantic. *Science*, **307** (No.5707): 240-244.

KNIGHT, K. B., NOMADE, S., RENNE, P. R., MARZOLI, A., BERTRAND, H. & YOUBI, N. 2004. The Central Atlantic Magmatic Province at the Triassic-Jurassic boundary: paleomagnetic and $^{40}Ar/^{39}Ar$ evidence from Morocco for brief, episodic volcanism. *Earth and Planetary Science Letters*, **228** (1-2): 143-160.

KNOLL, F. 2005. The tetrapod fauna of the Upper Elliot and Clarens formations in the main Karoo Basin (South Africa and Lesotho). *Bulletin de la Société Géologique de France*, **176** (1): 81-91.

LOCKLAIR, R. E. & LERMAN, A. 2005. A model of Phanerozoic cycles of carbon and calcium in the global ocean: evaluation and constraints on ocean chemistry and input fluxes. *Chemical Geology*, **217** (1-2): 113-126.

LUCAS, S. G. 2005. 25 years of mass extinctions and impacts. *Geotimes*, **50** (2): 28-32.

MacLEOD, N. 2004. Identifying Phanerozoic extinction controls: statistical considerations and preliminary results. *Geological Society, London, Special Publications*, **230**: 11-33.

MARZOLI, A., BERTRAND, H., KNIGHT, K. B., CIRILLI, S., BURATTI, N., VÉRATI, C., NOMADE, S., RENNE, P. R., YOUBI, N., MARTINI, R., ALLENBACH, K., NEUWERTH, R., RAPAILLE, C., ZANINETTI, L. & BELLIENI, G. 2004. Synchrony of the Central Atlantic magmatic province and the Triassic-Jurassic boundary climatic and biotic crisis. *Geology*, **32** (1): 973-976.

MAY, V. 2003. Blue Anchor - Watchet - Lilstock, Somerset. In: MAY, V. J. & HANSOM, J. D. (eds). *Coastal Geomorphology of Great Britain.* Geological Conservation Review Series, **28**: 145-148. Peterborough: Joint Nature Conservation Committee.

MAY, V. 2003. Nash Point, Glamorgan. In: MAY, V. J. & HANSOM, J. D. (eds). *Coastal Geomorphology of Great Britain.* Geological Conservation Review Series, **28**: 148-151. Peterborough: Joint Nature Conservation Committee.

McGHEE, G. R., Jr., SHEEHAN, P. M., BOTTJER, D. J. & DROSER, M. L. 2004. Ecological ranking of Phanerozoic biodiversity crises: ecological and taxonomic severities are decoupled. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **211** (3-4): 289-297.

McHONE, J. G. 2003. Volatile emissions from central Atlantic Magmatic province basalts: mass assumptions and environmental consequences. In: HAMES, W. E., McHONE, J. G., RENNE, P. R. & RUPPEL, C. (eds). *The Central Atlantic Magmatic Province: perspectives from the rifted fragments of Pangea*. American Geophysical Union Monograph, **136**: 241-254.

MOLINA-GARZA, R. S., GEISSMAN, J. W. & LUCAS, S. G. 2003. Paleomagnetism and magnetostratigraphy of the lower Glen Canyon and upper Chinle Groups, Jurassic-Triassic of northern Arizona and northeast Utah. *Journal of Geophysical Research*, **108**, B4: EPM 1 - 1-24.

MUTTONI, G., ERBA, E., KENT, D. V. & BACHTADSE, V. 2005. Mesozoic Alpine facies deposition as a result of past latitudinal plate motion. *Nature*, **434** (No.7029): 59-63.

MUTTONI, G., ERBA, E., KENT, D. V. & BACHTADSE, V. 2005. Erratum: Mesozoic Alpine facies deposition as a result of past latitudinal plate motion. *Nature*, **434** (No.703): 792.

NEL, A., MARIE, V. & SCHMEISSNER, S. 2002. Revision of the Lower Mesozoic dragonfly family Triassolestidae [Tillyard, 1918] (Odonata: Epiproctophora). *Annales de Paléontologie*, **88** (4): 189-214.

NEUWEILER, F. & BERNOULLI, D. 2005. Mesozoic (Lower Jurassic) red stromatactis limestones from the Southern Alps (Arzo, Switzerland): calcite mineral authigenesis and syneresis-type deformation. *International Journal of Earth Sciences*, **94** (1): 130-146.

NEUWEILER, F. & BERNOULLI, D. 2005. Erratum: Mesozoic (Lower Jurassic) red stromatactis limestones from the Southern Alps (Arzo, Switzerland): calcite mineral authigenesis and syneresis-type deformation. *International Journal of Earth Sciences*, **94** (2): 317.

NIEDŸWIEDZKI, G. & PIEÑKOWSKI, G. 2004. A dinosaur track association from Early Jurassic deltaic deposits of Podole near Opatów, Poland. *Geological Quarterly*, **48** (4): 333-228.

OGG, J. G. 2004. Status of divisions of the International Geologic Time Scale. *Lethaia*, **37** (2): 183-199.

OLSEN, P. E., SUES, H.-D., RAINFORTH, E. C., KENT, D. V., KOEBERL, C., HUBER, H., MONTANARI, A., FOWELL, S. J., SZAJNA, M. J. & HARTLINE, B. W. 2003. Response to comment on "Ascent of the dinosaurs linked to an iridium anomaly at the Triassic-Jurassic boundary". *Science*, **301**, (No.5630): 169.

ORTÍ, F. & SALVANY, J. M. 2004. Coastal salina evaporites of the Triassic-Liassic boundary in the Iberian Peninsula: the Alacón borehole. *Geologica Acta*, **2** (4): 291-304.

PAGE, K. N. 2005. Jurassic. In: SELLEY, R. C., COCKS, L. R. M. & PLIMER, I. R. (eds) *Encyclopedia of Geology*, **3**: 352-360. Amsterdam, Elsevier.

PROZ, P.-A. 2004. Les collections du département de géologie et de paléontologie du Muséum d'histoire naturelle de Genève. 83. Les collections A. PREVOST & J.-L. PREVOST. *Revue de Paléobiologie, Genève*, **23** (1): 425-433.

RADLEY, J. D. 2003. Early Jurassic bioerosion: Severn basin and adjacent areas. *Proceedings of the Cotteswold Naturalists' Field Club*, **42** (3): 183-184.

RICCARDI, A. C., DAMBORENEA, S. E., MANCEÑIDO, M. O. & IGLESIA LLANOS, M. P. 2004. The Triassic/Jurassic boundary in the Andes of Argentina. *Rivista Italiana di Paleontologia e Stratigrafia*, **110** (1): 69-76.

ROGERS, R. R., ROGERS, K. C., MUNYIKWA, D., TERRY, R. C. & SINGER, B. S. 2004. Sedimentology and taphonomy of the upper Karoo-equivalent Mpandi Formation in the Tuli Basin of Zimbabwe, with a new $^{40}Ar/^{39}Ar$ age for the Tuli basalts. *Journal of African Earth Sciences*, **40** (3-4): 147-161.

ROHDE, R. A. & MULLER, R. A. 2005. Cycles in fossil diversity. *Nature*, **434** (No.7030): 208-210.

RONCHI, P., IMPERIAL, E., SCOTTI, P., CERIANI, A., JADOUL, F. & RICCHIUTO, T. 2003. The thermal and diagenetic history of the Dolomia Principale in the Iseo Basin (Southern Alps, Italy). *Atti Ticinensi di Scienze della Terra*, Serie Speciale **9**: 83-87.

SCHWEITZER, H.-J. & KIRCHNER, M. 2003. Die rhäto-jurassischen Floren des Iran und Afghanistans. 13. Cycadophyta III. Benettitales. *Palaeontographica*, **B.264** (1-6): 1-166.

SENGUPTA, S. 2003. Gondwana sedimentation in the Pranhita-Godavari Valley: a review. *Journal of Asian Earth Sciences*, **21** (6): 633-642.

SHAH, B. A. 2001. Fluvial sedimentation of the Tiki-Hatala formations (Triassic-Jurassic) in a part of the

Johilla-Son valley, Rewa Basin, M.P. *Indian Journal of Geology,* **73** (2): 93-106.

SIMMS, M. J. 2003. The Lower Lias of northern Gloucestershire: new data on Early Jurassic stratigraphy and outcrop patterns from temporary exposures. *Proceedings of the Cotteswold Naturalists' Field Club*, **42** (3): 191-205.

SIMMS M. J, CHIDLAW N, MORTON N & PAGE KN. 2004. British Lower Jurassic Stratigraphy. *Geological Conservation Review Series, Joint Nature Conservation Committee*. 458 pages, ISBN 1 86107 495 6

SOUSSI, M. 2003. Nouvelle nomenclature lithostratigraphique "evenementielle" pour le Jurassique de la Tunisie atlasique. *Géobios*, **36** (6): 761-773.

THULBORN, T. 2003. Comment on "Ascent of dinosaurs linked to an iridium anomaly at the Triassic-Jurassic boundary". *Science*, **301** (No.5630): 169.

TI_LJAR, J., VLAHOVI_, I., VELI_, I. & SOKA_, B. 2002. Carbonate platform megafacies of the Jurassic and Cretaceous deposits of the Karst Dinarides. *Geologia Croatica*, **55** (2): 139-170.

TRIPATHI, A. 2004. Palynology evidences of hitherto unrecognised Jurassic sedimentation in Rajmahal Basin, India. *Rivista Italiana di Paleontologia e Stratigrafia*, **110** (1): 35-42.

TWITCHETT, R. J. & BARRAS, C. G. 2004. Trace fossils in the aftermath of mass extinction events. *Geological Society, London, Special Publications*, **228**: 355-382.

VAN DE SCHOOTBRUGGE, B., BAILEY, T. R., ROSENTHAL, Y., KATZ, M. E., WRIGHT, J. D., MILLER, K. G., FEIST-BURKHARDT, S. & FALKOWSKI, P. G. 2005. Early Jurassic climate change and the radiation of organic walled microplankton in the Tethys Ocean. *Paleobiology*, **31** (1): 73-97.

VUKS, V. Ja. 2004. Biodiversity of microorganisms (foraminifers) as environmental indicators of the boundary of the Triassic and Jurassic in Caucasus. *Environmental Micropaleontology, Microbiology and Meiobenthology*, **1**: 40-47.

WALL, G. R. T. & JENKYNS, H. C. 2004. The age, origin and tectonic significance of Mesozoic sediment-filled fissures in the Mendip Hills (SW England): implications for extension models and Jurassic sea level curves. *Geological Magazine*, **141** (4): 471-504.

WALSH, S. L., GRADSTEIN, F. M. & OGG, J. G. 2004. History, philosophy and application of the Global Stratotype Section and Point. *Lethaia*, **37** (2): 201-218.

WARD, P. D., GARRISON, G. H., HAGGART, J. W., KRING, D. A. & BEATTIE, M. J. 2004. Isotopic evidence bearing on Late Triassic extinction events, Queen Charlotte Islands, British Columbia, and implications for the duration and cause of the Triassic/Jurassic mass extinctions. *Earth and Planetary Science Letters*, **224** (3-4): 589-600.

WARRINGTON, G. 2004. Red rocks of the west - the tip of the 'iceberg'. *Open University Geological Society Journal*, **25** (2): 28-32.

WHITE, R. V. & SAUNDERS, A. V. 2005. Volcanism, impact and mass extinctions: incredible or credible coincidences? *Lithos*, **79** (3-4): 299-316.

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.

Geoff Warrington, Convenor: TJBWG
3 Lamcote Gardens, Radcliffe on Trent, Nottingham NG12 2BS, UK. E-mail: gw47@le.ac.uk

Gert Bloos, Secretary: TJBWG
Staatlisches Musem fur Naturkunde, Rosenstein 1, D-70191, Stuttgart, Germany E-mail: bloos.smns@ naturkundemuseum-bw.de

SINEMURIAN WORKING GROUP

Gert BLOOS, Convenor
bloos.smns@naturkundemuseum-bw.de

Most members of the Sinemurian Working Group are also members of the T/J boundary WG, and work towards the T/J boundary GSSP must have priority, since the Sinemurian GSSP has already been ratified by IUGS.

The next step will be the zonal subdivision and the selection of type sections for the bases of the zones. Since the zonal subdivision is not global but restricted to faunal provinces most probably the type sections cannot be called GSSP's.

I plan a more detailed documentation and revision of the ammonites of the basal Sinemurian, the Conybeari Subzone, in UK and Germany.

PLIENSBACHIAN WORKING GROUP

Christian MEISTER, Convenor
christian.meister@mhn.ville-ge.ch

In 2004 the International Commision on Stratigraphy approved the proposal for the Pliensbachian GSSP (Jurassic System) with 15 YES (100%) votes, with a few remarks (4 votes were not received). Then in March 2005 it was approved by the IUGS Executive at the AGM and is now formally ratified.

«The Global Boundary Stratotype Section and Point (GSSP) for the base of the Pliensbachian Stage is defined at the base of bed 73b at Wine Haven, Robin Hood's Bay, Yorkshire Coast, UK. This level coincides with the ammonite association *Bifericeras donovani* DOMMERGUES & MEISTER and *Apoderoceras* sp., which define the base of the *Phricodoceras taylori* Subzone of the *Uptonia jamesoni* ammonite Zone. Secondary global markers include a $^{87}Sr/^{86}Sr$ ratio of 0.707425 and a brief

reversed-polarity magnetic zone within the uppermost Sinemurian».

I take this opportunity to warmly thank all the members of the Pliensbachian Working Group whose contributions were essential to the completion of this GSSP project.

The next step will be the formal definition of the Lower and Upper Substages and their Standard Chronozones. To solve the problems of correlation between the different Regional Zonations will also be a challenge.

Some recent publications on Sinemurian - Pliensbachian ammonites and brachiopods:

DOMMERGUES, J.-L., MEISTER, C. & JAILLARD E. (2004) - Ammonites de la formation Santiago de la zone subandine du S-E de l'Equateur (Jurassique inférieur, Sinémurien). *Revue de Paléobiologie*, 23(1): 355-371.

DOMMERGUES, J.-L., MEISTER, C. & NEIGE P. (2004) - *Fuciniceras capilliolusitanicum* nov. sp., une nouvelle espèce d'ammonite du Domérien lusitanien (Pliensbachien, Portugal). *Revue de Paléobiologie*, 23(1): 373-386.

DOMMERGUES, J.-L., MEISTER, C., NEIGE P. & R.B. ROCHA (2004) - Endemic Sinemurian (Early Jurassic) ammonites from the Lusitanian Basin (Portugal). *Revue de Paléobiologie*, 23(2): 529-549.

DOMMERGUES, J.-L., MEISTER, C., SOUISSI F & H. ABDALLAH (2004) - *Paratropidoceras* nov. gen. *numidianum* nov. sp. *et Tunisiceras* nov. gen. *insolitus* nov, sp., deux nouveaux genres et deux nouvelles espèces d'ammonites du Carixien de la Téthys méditerranéenne (Pliensbachien, Tunisie). *Revue de Paléobiologie*, 23(2): 463-475.

FERRETTI A. (2004) – Dimorphism in some Domerian Hildoceratidae. *Revue de Paléobiologie*, 23(2): 463-475.

MEISTER, C. & J.G. FRIEBE (2003) - Austroalpine Liassic ammonites from Vorarlberg (Austria, Nothern Calcareous Alps). *Beiträge zur Paläontologie*, Wien 28: 9-99.

RUBAN D.A. (2004) – Diversity dynamics of Early-Middle Jurassic brachiopods of Caucasus, and the Pliensbachian-Toarcian mass extinction. *Acta Palaeontol. Pol.* 49(2): 275-282.

SATO T., HACHIYA K. & Y. MIZUNO (2003) – Discovery of a Lower Jurassic (Upper Pliensbachian) ammonite *Canavaria* from the Mino Belt at Neo, Gifu Prefecture. *Bulletin of the Mizunami Fossil Museum* 30: 147-149.

VENTURI F., NANNARONE C. & M. BILOTTA (2004) – Eoderoceratidae (Mollusca, Ammonoidea) from the «Corniola» of the Central Apennines, related to the Sinemurian-Pliensbachian boundary in the mediterranean area. *Bollettino della Societa Paleontologica Italiana*, 43(3): 361-382.

[P.S. from ISJS Chairman: Named Substages, such as Carixian and Domerian are not recognised by ICS, hence use of Lower and Upper.]

AALENIAN WORKING GROUP

Maria Helena HENRIQUES, Convenor
hhenriq@dct.uc.pt

Stefano Cresta has retired from the ISJS, after a period of valuable activities on the Aalenian. Under his coordination and collaboration, relevant advances on Aalenian research have been achieved, in particular the establishment of the Aalenian GSSP (in Fuentelsaz, Spain, 2001) and the revision of Gemmelaro´s Jurassic ammonite collection (2002). Both successes result from a huge effort of coordination by Stefano Cresta.

As a specialist on Aalenian stratigraphy and convenor of the AWG, Stefano was particularly skilled in involving different specialists from distant parts of the world. Replacing him will be a hard task, so after the invitation that Nicol Morton addressed to me to be the next convenor of the AWG, I would like to state that the work to be done in the near future will depend very much on the effective communication between all the members, and on the cooperative work we will be able to do.

So, in coming years, AWG members should address the following goals:

- 1. to build a directory of AWG members for global communication, using CIT, to be available next Jurassic Congress in Poland (2006);
- 2. to establish internationally agreed subdivisions of the Stage;
- 3. to establish formal standard (Chrono-) Zones for the Aalenian Stage;
- 4. to keep AWG members informed on advances in Aalenian research, through the submission of regular reports to ISJS Newsletter.

Tasks two and three must follow Task one. Task four will be an ongoing one, but it will depend on the information that members can send to me. Aalenian researchers are kindly requested to contact me to work on the directory, as well as for any suggestions, information and comments.

As a first contribution to Task 4, an important work on brachiopod paleontology from the Lower-Middle Jurassic boundary of the Lusitanian Basin has recently (November, 2004) been successfully completed at the Universidad Complutense de Madrid (Spain), by Jose Benito Andrade González - "Los braquiópodos del Tránsito Jurásico inferior-Jurásico medio de la Cuenca Lusitánica (Portugal)", Unpublished PhD thesis, 252 p.

BATHONIAN WORKING GROUP

Sixto R. FERNÁNDEZ-LÓPEZ, Convenor
Email sixto@geo.ucm.es

The presentation of the French section of Bas Auran (data from both the Ravin du Bès and the Ravin d'Auran outcrops), in the Geological Reserve of Haute-Provence (France), is still under study and in preparation. New studies include additional collecting of ammonites in the Cabo Mondego outcrop (Portugal) are progressing. The new results should be

available for the next Congress on the Jurassic System planned for 2006 in Poland. A formal proposal of the GSSP is expected by the end of 2006.

References to new literature relevant to the Bathonian Working Group are listed below:

ALLEMAND, P.; DROMART, G.; GARCIA, J.P.; GAUMET, F. & ROBIN, C. 2004. One My scale subsidence of carbonate sedimentary bodies and the viscosity of the lower crust. *Journal of Geodynamics*, 37: 103–124.

AVERIANOV, A.O.; MARTIN, T. & BAKIROV, A.A. 2005. Pterosaur and dinosaur remains from the Middle Jurassic Balabansai Svita in the Northern Fergana Depression, Kyrgyzstan (Central Asia). *Palaeontology*, 48: 135–155.

CALLOMON, J.H. 2003. The Middle Jurassic of western and northern Europe: its subdivisions, geochronology and correlations. Geological Survey of Denmark and Greenland Bulletin, 1: 61-73.

DAY, J.J.; NORMAN, D.B.; GALE, A.S.; UPCHURCH, P. & POWELL, H.P. 2004. A Middle Jurassic dinosaur trackway site from Oxfordshire, UK. *Palaeontology*, 47: 319–348.

DROMART, G.; GARCIA, J.P.; GAUMET, F.; PICARD, S.; ROUSSEAU, M.; ATROPS, F.; LECUYER, C. & SHEPPARD, S.M.F. 2003. Perturbation of the carbon cycle at the Middle/Late Jurassic transition: geological and geochemical evidence. *American Journal of Science*, 303: 667–707.

FLOREK, M.; YOUN, H.S.; RO, C.U.; WIERZBOWSKI, H.; OSÁN, J.; KAZIMIERCZAK, W. & KUCZUMOW, A. 2004. Investigation of chemical composition of belemnite rostra by synchrotron-based X-ray microfluorescence and diffraction. and electron microprobe. *Journal of Alloys and Compounds*, 362: 99–106.

FÜRSICH, F.T.; SINGH, I.B.; JOACHIMSKI, M.; KRUMM, S.; SCHLIRF, M. & SCHLIRF, S. 2005. Palaeoclimate reconstructions of the Middle Jurassic of Kachchh (western India): an integrated approach based on palaeoecological, oxygen isotopic, and clay mineralogical data. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 217: 289– 309.

GEIGER, M.; CLARK, D.N. & METTE, W. 2004. Reappraisal of the timing of the breakup of Gondwana based on sedimentological and seismic evidence from the Morondava Basin, Madagascar. *Journal of African Earth Sciences*, 38: 363–381.

GIUSBERTI, L. & COCCIONI, R. 2003. *Posadia feroniensis* n. gen., n. sp. (Lituolida, Hormosinidae) from the Bathonian of Sardinia, Italy. *Journal of Foraminiferal Research*, 33: 211–218.

LAVILLE, E.; PIQUE, A.; AMRHAR, M. & CHARROUD, M. 2004. A restatement of the Mesozoic Atlasic Rifting (Morocco). *Journal of African Earth Sciences*, 38: 145–153.

HOLMDEN, C. & HUDSON, J.D. 2003. $^{87}Sr/^{86}Sr$ and Sr/Ca Investigation of Jurassic mollusks from Scotland: Implications for paleosalinities and the Sr/Ca ratio of seawater. *GSA Bulletin*, 115: 1249–1264.

MITTA, V.V. 2004. *Sokurella galaczi* gen. et sp. nov. and other Middle Jurassic Parkinsoniidae (Ammonoidea) from the lower reaches of the Volga River. Paleontological Journal, 38: 257-264.

MOYNE, S. & NEIGE, P. 2004. Cladistic analysis of the Middle Jurassic ammonite radiation. *Geol. Mag.* 141: 115–123.

MOYNE, S.; NEIGE, P.; MARCHAND, D. & THIERRY, J. 2004. Répartition mondiale des faunes d'ammonites au Jurassique moyen (Aalénien supérieur à Bathonien moyen) : relations entre biodiversité et paléogéographie. *Bull. Soc. géol. Fr.*, 175: 513-523.

NAVARRO, N.; NEIGE, P. & MARCHAND, D. 2005. Faunal invasions as a source of morphological constraints and innovations? The diversification of the early Cardioceratidae (Ammonoidea; Middle Jurassic). *Paleobiology*, 31: 98–116.

ROUSSEAU, M.; DROMART, G.; GARCIA, J.P.; ATROPS, F. & GUILLOCHEAU, F. 2005. Jurassic evolution of the Arabian carbonate platform edge in the central Oman Mountains. *Journal of the Geological Society, London*, 162: 349–362.

SCHLÖGL, J. & RAKÚS, M. 2004. Ammonites of Arabian origin from the Early Bathonian of the Czorsztyn Unit, Pieniny Klippen Belt (Western Carpathian, Slovakia). *N. Jb. Geol. Paläont. Mh.*, 2004: 449-460.

SCHWEIGERT, G.; DIETL, G. & DIETZE, V. 2003. Neue Nachweise von *Phlycticeras* und *Oecoptychius* (Ammonitina: Strigoceratindae: Phlycticeratinae). *Stuttgarter Beitr. Naturk.*, 335: 1-21.

THIERRY, J. 2003. Les ammonites du Bathonien-Callovien du Boulonnais: biodiversité, biostratigraphie et biogeography. *Geobios*, 36: 93–126.

UNDERWOOD, C.J. 2004. Environmental controls on the distribution of neoselachian sharks and rays within the British Bathonian (Middle Jurassic). *Palaeogeography, Palaeoclimatology, Palaeoecology*, 203: 107-126.

UPADHYAY, R.; RAI, J. & SINHA, A.K. 2005. New record of Bathonian–Callovian calcareous nannofossils in the eastern Karakoram block: a possible clue to understanding the dextral offset along the Karakoram Fault. *Terra Nova*, 17:149–157.

CALLOVIAN WORKING GROUP

John CALLOMON, Convenor
johncallomon@lineone.net

There is not much new to report since last year. Writing up the formal proposal is still in progress, and for those many of you who find that they cannot meanwhile get on with anything else pending the final ratification of the PSSP (Primary Stratotype Section and Point) by the ICS, the good news is that the proposals have not been changed since they were set out in the volume of proceedings of the meeting in Vancouver in 1998 (Callomon & Dietl, 2000). Nothing stratigraphical has happened since to give cause to modify the proposals in any way - at least, nothing that has come to my notice. The Bathonian-

Callovian boundary lies at the base of the Kepplerites keppleri biohorizon in its type-area around Albstadt-Peffingen, in Hohenzollern Swabia, formally in a type-section excavated for the purpose in a nature-reserve in the Roschbachtal, 1 km west of the centre of Pfeffingen.

There are just three points. First, the type-locality of the species Kepplerites keppleri lies at the Achalm, a hill near Eningen, 5 km east of Reutlingen, whereas the type-locality of the biohorizon of K. keppleri lies in Albstadt-Pfeffingen, 35 km to the south-west. There is good material from Eningen in the collections, including the type of K. keppleri in Munich, but we have no detailed description of a section in which the material can be located. At Pfeffingen there are large collections from very precisely located horizons (Callomon & Dietl, fig.3a, beds 5, 6a). The question arises whether the levels with Kepplerites at Eningen and Pfeffingen are truly of precisely same age, at the level of time-resolution now generally attainable in the Jurassic by means of ammonites: whether the assemblages of specimens from the two localities are indistinguishable or not, whether the type of the index came in fact from its eponymous faunal horizon. At first glance, the faunal assemblages appeared to be the same. On closer examination, there seemed to be slight differences: the forms from Pfeffingen seemed to be less strongly sculptured. But finally, after comparing enough material from Eningen (in Munich, Stuttgart, Tübingen, Paris and London) with the large collections from Pfeffingen (Stuttgart) the conclusion is firmly that they are the same. The differences are apparent, due to differences in preservation. The material from Pfeffingen, from hard stone, consists mostly of internal casts without test. The specimens from Eningen, from softer beds, have the test preserved. The last possible doubts about the geographical extent and the unique age at its type-locality of the keppleri horizon are therefore finally dispelled.

Second, further exploration of the Middle Jurassic on the Russian Platform by Vasili Mitta and other colleagues continues to turn up more and more new faunal horizons of undoubted pre-Callovian age. The myth of the Great Worldwide Bathonian Regression is being finally laid to rest even in the region in which it had always been regarded as most firmly demonstrated. The new discoveries contain elements that link up with both western Europe and East Greenland. It seems in consequence that the Bathonian-Callovian boundary in the Boreal SSSP (Secondary Stratotype Section and Point) in Jameson Land (see Callomon 1993) may have been drawn a little too low. The Boreal Bathonian there was even more extensive than previously thought. We await Vasili's descriptions with great interest.

Some previously unpublished sections across the Boreal Bathonian-Callovian boundary in East Greenland have recently been described. The first two lie in central Jameson Land at Fossilbjerget (71°N), aptly so named by Nordenskjoeld in 1900, nos. 42, 43 in Callomon (1993), and show probably the best-developed ammonite biostratigraphy across the boundary in Greenland (Callomon, 2005). They are therefore the natural candidates for a boundary stratotype (SSSP) in the Boreal secondary standard zonation. The precise level has still to be decided. A third succession to have yielded a good ammonite and dinoflagellate biostratigraphy lies far to the north, on the quasi-littoral relict sediments preserved on the east coast of Store Koldewey (76°N) (Piasecki et al., 2005).

Third, a more general point relating to magnetostratigraphy. The type section at Pfeffingen was sampled for remanent palaeomagnetism in 1997 by J.G. Ogg and G. Dietl. The lithologies are iron-rich, argillaceous and limonite-oolitic. The succession of events leading to their present state is (a) slow, probably highly discontinuous - 'condensed' - sedimentation; (b) large-scale, coarse bioturbation by burrowers such as those forming Thalassinoides, destroying all primary sedimentary structures and concentrating the iron ooliths into typical pockets or clouds; (c) fairly early diagenetic concretionary induration through mobilisation of cements, now sideritic or pyritic, forming well-differentiated, very hard beds with undulating, nodular boundaries or scattered concretions in softer shales, preserving their contained fossils from crushing and other forms of distortion by (d), subsequent dewatering and compaction. Thus, the ammonites in the hard beds and concretions have hollow phragmocones partially filled with sparry calcite or other minerals, while those in the non-indurated, shaly, softer beds are crushed flat. Although now shaly, perhaps somewhat laminated, these softer beds were at the time just as burrowed and bioturbated as the hard beds in which the bioturbational structures can still be observed.

The determinations of remanent magnetism were experimentally successful and sufficient to give clear indication of N/R polarity at numerous levels in the parts of the section covered, beds 2 to 7 (downwards) in Fig. 3a of Callomon & Dietl (2000, p.48), together 1.2 m thick. Beds 4-6a (0.6 m) span the two lowest ammonite faunal horizons of the Callovian, the keppleri and quenstedti horizons of the Keppleri Subzone of the Herveyi Zone. The Bathonian-Callovian boundary lies between beds 6a and 6b. The magnetic signals then appear to indicate clearly that even within the single beds 6a (0.15 m) and 4 (0.4 m) there were several polarity-reversals: N in the lower part, R in the upper part, of bed 6a, keppleri horizon; N in the lower part, then several of both N and R in the higher parts, of bed 4, quenstedti horizon. But even if the lithological record of the time-spans involved is highly incomplete, which may well be the case, and there really had been such a rapidity of polarity-reversals, the fact remains that any original sedimentary time-proxy in the form of sedimentary layering within a bed, factor (a) above, was completely destroyed by the subsequent bioturbation, (b). Yet it is the geomagnetic imprint at stage (a) that is supposed to be significant. So what is it that is being measured? And what significance does it have, if any? Could it be the crystallisation of step (c)? I have been unable to obtain answers to these questions. Can someone help?

References

Callomon, J.H. 1993. The ammonite succession in the Middle Jurassic of East Greenland. Bulletin of the Geological Society of Denmark, 40, 83-115.

Callomon, J.H. 2005. Description of a new species of ammonite, Kepplerites tenuifasciculatus n.sp., from the Middle Jurassic, Lower Callovian of East Greenland. Appendix to Alsen, P. and Surlyk, F. Maximum Middle Jurassic transgression in East Greenland: evidence from new ammonite finds, Bjørnedal, Traill Ø. Geological Survey of Denmark and Greenland Bulletin 5, 42-49.

Callomon, J.H. & Dietl, G. 2000. On the proposed basal boundary stratotype(GSSP) of the Middle Jurassic Callovian Stage. In: Hall, R.L. & Smith, P.L. (eds), Advances in Jurassic Research 2000, 41-54. Trans Tech Publications, CH-Zürich.

Piasecki, S., Callomon, J.H. & Stemmerik, L. Jurassic dinoflagellate cyst stratigraphy of Store Koldewey, North-East Greenland. Geological Survey of Denmark and Greenland Bulletin 5, 99-112.

OXFORDIAN WORKING GROUP

Guillermo MELENDEZ< Convenor
gmelende@posta.unizar.es

There is not much to add to previous reports concerning the probable joint presentation of two complementary candidates for the Callovian-Oxfordian GSSP: Savournon (SE France) and Dorset (Red Cliff Point, S England). In fact in recent weeks I have been chasing the main coordinators of both proposals, François Atrops and Kevin Page to arrange a joint meeting before summer in order to be able to compare ammonite successions from both localities. The (informal) meeting has been finally fixed in Zaragoza (all three together) for the first week of June. Our intention is to take the material (ammonite collections) from both sections and compare them during 4-5 days of work trying to make progress in recognizing the uppermost Callovian ammonite association (Paucicostatum Horizon) and the lower-most Oxfordian ammonite association within Mariae Zone (Thuouxensis?, Scarburgense?, Woodhamense?) in order to reach agreement on some Cardioceratid species still under discussion and revision. A further point of discussion will be the detailed revision of Perisphinctid and Hecticoceratid successions as found in recent collections in both areas during 2003 and 2004.

The results of discussions should lead to a first concluding set of papers, which are intended to be sent for publication before the end of the year. Results from SE France will obviously integrate the data first published by D. Fortwengler, D. Marchand et al. (ammonites) and by Niels Poulsen (dinoflagellates). This process should lead to the general sharing presentation of a GSSP proposal at the ISJS Meeting in Krakow, 2006.

Concerning other supplementary analyses (nannoplankton, chemical isotopes and other microfossils, analysis of samples from Savournon are expected to be completed by September 2005 by the team lead by Anna Chiara Bartolini (University of Paris). Magneto-stratigraphic analyses in this locality have so far proved blank.

Concerning the section at Red Cliff Point (Dorset), parallel analyses to those on ammonites, mainly foraminifera, belemnites and other invertebrates, are being carried out by colleagues from University of Plymouth (Malcolm Hart and colleagues) and they seem to indicate good results. Other geochemical, magnetostratigraphic and radiometric analyses seem less promising. Micropalaeontological and nannoplankton studies are still under way and are more promising.

KIMMERIDGIAN WORKING GROUP

Andrzej Wierzbowski, Convenor
Andrzej.Wierzbowski@uw.edu.pl

The detailed study on the ammonite succession of the uppermost Oxfordian-lowest Kimmeridgian at Flodigarry section, Staffin Bay, Isle of Skye is waiting for final opinions of referees of the *Transactions of the Royal Society of Edinburgh*. The publication of the study will give background for complete documentation of this section, which would enable its presentation as one of the GSSP candidates of the Oxfordian/ Kimmeridgian boundary (another would be the Submediterranean section).

There are many problems concerning correlation, distinguishing the level, which could be treated as a uniform Oxfordian/Kimmeridgian boundary, selecting a GSSP, etc, which should be discussed in near future. Such an opportunity will be the forthcoming meeting of the Kimmeridgian and Tithonian Working Groups held at Stuttgart, June 2005 (organized by G. Schweigert).

A new study, including the biostratigraphical analyses of dinoflagellate and ammonite materials from cores in northern Poland by Marcin Barski and Bronslaw A. Matyja, is nearly completed. The study covers the stratigraphical interval from the Bifurcatus Zone to the Platynota Zone (or Pseudocordata Zone to Baylei Zone) well documented by both Submediterranean and Subboreal/Boreal ammonites abundant in the cores, and showing well preserved and diversified assemblages of dinocysts.

The study of the Boreal ammonite (cardioceratids) succession in the Oxfordian and Kimmeridgian from northern Siberia is currently prepared by M. Rogov.

TITHONIAN WORKING GROUP

Federico OLORIZ, Convenor & Gunther Schweigert, Secretary foloriz@goliat.ugr.es & schweigert.smns@naturkundemuseum-bw.de

The next meeting of the Kimmeridgian and Tithonian Working Groups together will be held in Stuttgart, Germany, from June 20th to June 24th, 2005. The scientific program is as follows:

June, 20st (Monday): Arrival at "Museum am Löwentor" and registration until the late afternoon

(about 17.00). Joint dinner in the evening possible; visit of the typical small Swabian town of Stuttgart-Bad Cannstatt.

June, 21nd (Tuesday): Scientific session, possibility for oral presentations or poster presentations of relevant new results on the Ox/Ki and/or Ki/Ti boundary; demonstration of ammonite faunas around the Ox/Ki and Ki/Ti boundaries in Swabia.

June, 22rd (Wednesday): Field trip (with bus or few private cars, depending on the number of participants) to the western part of Swabia: Plettenberg Quarry near Dotternhausen with Bimammatum/Planula zonal boundary beds (type area of the Hauffianum Subzone) – recent excavations in the Upper Kimmeridgian Nusplingen Lithographic Limestone – Lower Tithonian massive limestones interfingering with bedded limestones in a large quarry near Liptingen – Ki-Ti boundary beds at Talmühle section near Engen).

June, 23th (Thursday): Field trip to sections of the Upper Kimmeridgian and lowermost Tithonian in the middle part of the Swabian Alb (quarries and road cuttings in the surroundings of Grabenstetten, Donnstetten, Bad Urach-Wittlingen).

June, 24th (Friday): Further discussions and resolutions until the early afternoon; departure.

New Literature

References of new papers concerning the Ki/Ti boundary, Tithonian stratigraphy or containing information on these topics are listed below. This list includes only those that have been communicated to the Convenor or to the Secretary.

CECCA, F., VRIELYNCK, B., LAVOYER, T. & GAGET, H. (2005): Changes in the ammonite taxonomical diversity gradient during the late Jurassic–early Cretaceous. – Journal of Biogeography, **32**: 535-547.

DIETL, G. & SCHWEIGERT, G. (2004): The Nusplingen Lithographic Limestone – a "fossil lagerstaette" of Late Kimmeridgian age from the Swabian Alb (Germany). – Rivista Italiana di Paleontologia e Stratigrafia, **110**: 303-309.

HOUSA, V., KRS, M., MAN, O., PRUNER, P. VENHODOVÁ, D., CECCA, F., NARDI, G., PISCITELLO, M. (2004): Combined magnetostratigraphic, palaeomagnetic and calpionellid investigations across Jurassic/Cretaceous boundary strata in the Bosso Valley, Umbria, central Italy. – Cretaceous Research, **25**: 771-785.

MARINO, M. C., ANDREINI, G., BALDANZA, A., D´ARPA, C., MARIOTTI, N., PALLINI, G., PARISI, G. & PETTI, F. M. (2004): Middle Jurassic – Early Cretaceous integrated biostratigraphy (ammonites, calcareous nannofossils and calpionellids) of the Contrada Diesi section (south-western Sicily, Italy). – Rivista Italiana di Paleontologia e Stratigrafia, **110**: 357-372.

OLÓRIZ, F. & VILLASEÑOR, A.B. (2005): *Ceratosphinctes* (Ammonitina, Kimmeridgian) in Mexico: from rare but typical inhabitant of west-Tethyan epioceanic and epicontinental waters to a geographically widespread ammonite genus. Geobios [in press]

PAVIA, G., LANZA, R., LOZAR, F., MARTIRE, L., OLÓRIZ, F. & ZANELLA, E. (2004): Integrated stratigraphy from the Contrada Fornazzo section, Monti Inici, Western Sicily, Italy: Proposed G.S.S.P. for the basal boundary of the Tithonian Stage. – Rivista Italiana di Paleontologia e Stratigrafia, **110**: 329-338.

ROGOV, M. A. (2004): The Russian Platform as a key region for Volgian/Tithonian correlation: a review of the Mediterranean faunal elements and ammonite biostratigraphy of the Volgian Stage. – Rivista Italiana di Paleontologia e Stratigrafia, **110**: 321-328.

ROGOV, M. A. (2004): Aptychi from the Volgian Stage of the Russian Platform. – Paleontological Journal, **38**/2: 141-147.

SCHWEIGERT, G. & SCHERZINGER, A. (2004): New efforts for a revision and correlation of the Neuburg Formation (Tithonian, SW Germany). – Rivista Italiana di Paleontologia e Stratigrafia, **110**: 311-320.

SCHWEIGERT, G. & VALLON, L. H. (2005): First record and correlation value of *Aulacostephanus* cf. *subundorae* (PAVLOW) (Ammonoidea, Upper Jurassic) from SW Germany. – Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, **2005** (2): 65-82.

TAKEI, M., MATSUOKA, A., YANG, Q., KOBAYASHI, K., NAGAHASHI, T., ZENG, Q., WANG, Y. & HE, G. (2004): Late Jurassic and Early Cretaceous ammonites from the Weimei formation in Gyangze, southern Tibet. – Rivista Italiana di Paleontologia e Stratigrafia, **110**: 269-272.

YIN, J. & ENAY, R. (2004): Tithonian ammonoid biostratigraphy in eastern Himalayan Tibet. – Geobios, **37**: 667-686.

ZAKHAROV, V. A. & ROGOV, M. A. (2004): The Boreal-Tethyan biogeographical mollusc ecotone in Europe during the Jurassic-Cretaceous transition. – Rivista Italiana di Paleontologia e Stratigrafia, **110**: 339-344.

GEOCONSERVATION WORKING GROUP

Kevin PAGE, Convenor
KevinP@bello-page.fsnet.co.uk

Council of Europe Recommendation on geological conservation: Geoconservation in Europe took a major step forward on the 5th May 2004 with the approval by the Committee of Ministers of the Council of Europe of '*Recommendation Rec(2004)3 on conservation of the geological heritage and areas of special geological interest*'.

The statement recommends that member states:

· *"Identify in their territories areas of special geological interest, the preservation and management of which may contribute to the protection and enrichment of national and European geological*

heritage; in this context, take into account existing geological conservation programmes."

- *"Develop national strategies and guidelines for the protection and management of areas of special geological interest embodying the principles of inventory development, site classification, database development, site condition monitoring and tourist and visitor management, to ensure sustainable use of areas of geological interest through appropriate management."*
- *"Reinforce existing legal instruments or develop new ones, to protect areas of special geological interest and moveable items of geological heritage, making full use of existing international conventions."*
- *"Support information and education programmes to promote action in the field of geological heritage conservation."*
- *"Strengthen co-operation with international organisations, scientific institutions and NGOs in the field of geological heritage conservation."*
- *"Allocate adequate financial resources to support the initiatives proposed above."*
- *"Report to the Council of Europe on the implementation of this recommendation five years after its adoption, so that an assessment of its impact may be carried out."*

Separate Appendices describe the main themes of the recommendation more fully and include a series of proposed actions, which include:

"Governments of member states should support the work of IUGS, ProGEO, NGOs and other relevant organisations within their areas of jurisdiction, encouraging collaboration with statutory national authorities…." (Appendix 2).

"Governments of member states should develop national guidelines for managing areas of geological interest…" (Appendix 3).

"Government of member states should consider: developing and implementing new laws if …areas [of geological importance] cannot be protected by existing laws…., strengthening existing laws to increase protection…, the implementation of new or existing laws for the protection of areas of geological interest…" (Appendix 4)

"Governments of member states should review their existing legal and voluntary supervision methods to ensure that moveable geological heritage is protected by appropriate legal means, in the national and international context." (Appendix 4)

"Governments of member states should strengthen co-operation with international organisations, scientific institutions and NGOs by encouraging participation by state organisations in the geological conservation programmes identified in this recommendation and promoting collaboration between the relevant institutions and organisations." (Appendix 6)

This recommendation will influence the development of geological conservation in many European countries and may well ultimately develop into a legally binding directive. In the meantime, however, it can create important opportunities for interested colleagues to develop positive relationships with governmental bodies in their own countries. Clearly the Geoconservation Working Group and the ISJS in general is exactly the type of NGO (i.e., Non-Governmental Organisation) that the recommendation invokes and could therefore provide a context for such initiatives. Please keep the WG informed of any such developments!

The proposed ISJS Guidelines for the Protection of the Global Geological Time Scale and the Conservation of Palaeontological Heritage: Not surprisingly, some of the themes incorporated in the Council of Europe recommendation echo some of the those of the proposed guidelines developed in the context of the Geoconservation Working Group of the ISJS (Page 2002, 2004), especially those concerning international collaboration and the theme of conserving moveable geological heritage. The latter recommendations have recently been presented to a forum on geoconservation in France (see below) and will also be presented to the next ProGEO symposium in Portugal in September (see below also). Through this wider promotion, it is hoped that the general themes of the recommendation will generate useful discussion and support and further develop into a document that can influence conservation policy and practice. If any colleagues have any additional comments to make, to help refine the Statement, please get in contact!

L'Hettangian à Hettange, de la science au patrimonie – pour les 20 ans de la Réserve Naturelle (1-3 April 2005, Hettange-Grande (Mosselle, France): This important recent meeting, organised by Micheline Hanzo and colleagues of the Université Henri Poincaré, Nancy, in collaboration with the Réserve Naturelle Géologique de Hettange-Grande and the Musée national de'histoire du Luxembourg, developed the twin themes of geoconservation and Jurassic science in a novel, integrated approach to a geological congress. Detailed scientific discussions of the Triassic-Jurassic transition and problems of defining the basal boundary of the Hettangian were followed by sessions on geological heritage protection and management. Excursions also illustrated both themes and naturally included the historical type locality of Renevier's original Hettangian Stage, close to Hettange-Grande and now one of France's excellent suite of Réserves Naturelles Géologiques.

As part of the heritage session the proposed conservation guidelines of the WG were presented to an audience which included some of the leading players in geoconservation in France (Page 2005, below) and it is hoped that valuable feedback will be received. The proceedings of the conference have been published as:

HANZO, M. (coord.) 2005. *Colloque L'Hettangien á Hettange, de la science au patrimoine, 1-3 avril 2005*. Nancy, Université Henri Poincaré, 183pp.

IV International Symposium ProGEO on the Conservation of the Geological Heritage – 13th-16th September 2005 (Braga, Portugal): The next big European meeting dedicated to geological heritage will take place latter this year and it is not too late to book in! ProGEO is of course Europe's leading NGO dedicated to geological conservation (further information about the organisation can be found on www.sgn.se/hotell/progeo) and brings together a huge array of experts and practitioners from all over the community, its immediate neighbours and of course from many other countries globally. The Jurassic will undoubtedly have a high profile at the meeting, not least as one of the Symposium excursions, to be led by Maria Helena Henriques is dedicated to the "*Jurassic Heritage and Geoconservation in Portugual*"! This heritage includes the ratified GSSP for the base of the Bajocian Stage, plus candidates for the Toarcian and possibly the Bathonian.

As already indicated, the proposed conservation guidelines of the WG will be presented to this meeting as: Page, K.N. and Meléndez, G., International science versus national heritage? – Guidelines for the enlightened management of palaeontological heritage and stratotype localities.

No doubt there will be opportunities for impromptu meetings between those members of the WG in attendance!

Further information about the meeting can be obtained from: IV International Symposium ProGEO Organising Committee, Centro de Ciências da Terra, Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal (Website: www.dct.umoinho.pt/cct/progeo2005/; Email: progeo2005@dct.uminho.pt).

REFERENCES

PAGE, K.N. 2002. Geoconservation Working Group: proposed statement on the conservation of palaeontological heritage and stratotypes. *In*: MARTIRE, L. (ed.), *6th International Symposium on the Jurassic System, Mondello, Sicilly, Italy (September 12-22, 2002): Third Circular*. International Subcommission on Jurassic Stratigraphy: Appendix (electronically published).

PAGE, K.N. 2004. The protection of Jurassic sites and fossils: challenges for global Jurassic science. *Rivista Italiana di Paleontologia e Stratigrafia* 110: 373-379.

PAGE, K.N. 2005. Reconciling science and heritage protection – recommendations from the Geoconservation Working Group of the International Subcommission on Jurassic Stratigraphy. In: Hanzo, M. (coord), *Colloque L'Hettangien á Hettange, de la science au patrimoine, 1-3 avril 2005*. Nancy, Université Henri Poincaré: 129-133.

LIAISON WORKING GROUP

Robert B. CHANDLER, Convenor
aalenian@blueyonder.co.uk

I can again report continued success in collaboration with European colleagues. Presented below are short progress reports and observations by a number of workers in the Jurassic. Richard Edmonds updates us on the code for collectors on the Dorset coast and David Sole and Steve Etches present a view on the code for fossil collecting. David and Steve are experienced and serious collectors concentrating on the Jurassic of Dorset (southern England). I have collaborated with the former on numerous investigations into the Aalenian and Bajocian of Dorset. The latter is well known for his outstanding collection of Kimmeridge Clay material on display at his home in Kimmeridge. Colin Parsons and John Huxtable present two accounts of the research presently taking place around Sherborne in Dorset UK. Murray Edmunds describes a new find; Lubomir Metodiev presents the objectives of his new research and Volker Dietze reports on the collaboration between Germany and the UK on some Middle Jurassic ammonites.

I would also like to bring to our readers' attention some unwelcome news. My good friend Hans Rieber (Zurich) suffered a stroke some months ago. His recovery has been slow and I wish to offer our thoughts for his rapid return to full health.

Dorset and East Devon Coast World Heritage Site team

Richard EDMONDS, Earth Science Manager
r.edmonds@dorsetcc.gov.uk

The West Dorset fossil collecting code of conduct continues to operate along the coast between Lyme Regis and Burton Bradstock. Few records of key scientifically important fossils have been made this year but it has been one of the driest winters since records began and this, coupled with very few storms, means that very little material has been coming out of the cliffs and landslides. Records are available at www.charmouth.org.

Following the Earth Heritage World Heritage conference held in Dorset last September, a paper on the management of collecting pressures on palaeontological sites is being developed between the Joint Nature Conservation Committee, English Nature and the World Heritage Team. This should be available by June at the conference web site hosted by the Geoconservation Commission at www.geoconservation.com/conference. The aim is to develop a practical approach to the management of palaeontological heritage based on an understanding of the sensitivity of the site and the collecting pressure on it. The management of an open and eroding coastline must be quite different from a disused quarry, mine tip or cave deposit simply because the sensitivity of these sites varies hugely. Furthermore, the practical management for these sites will also be different. It may be impossible to control access on an open and eroding coastline but access can be controlled within a

working quarry or cave deposit. The paper will use the Earth Science Conservation Classification system developed within the UK and will point to practical guidance that will be helpful to non-specialist site managers. Examples from the UK and geological World Heritage Sites will be used to illustrate the approach.

Controls on the collecting of fossils

David SOLE & Steve ETCHES
Davidsole@btinternet.com &
steveetches@hotmail.com

Through the Liaison Working Group we would like to express our concerns with regard to the proposed 'Statement of Guidelines for the Conservation of Palaeontological Heritage and the Protection of the Global Geological Time Scale' that has been produced by the ISJS Geoconservation Working Group (GWG).

The first part of the Statement, following the preamble, recommends that fossils ('palaeontological heritage') should be classified into 4 categories, as follows:

Categories 1 and 2. These must be deposited within nationally recognised institutions.

Category 3. These fossils should be managed by 'preventing' their 'over-exploitation' and 'ensuring that the needs of education and research are not prejudiced…' which indicates control and enforcement. This category includes fossils, which are assessed to be of 'especial suitability for museum display or educational use'.

Category 4. This provides the best (perhaps the only) chance for the collector to keep any fossils. They are described as 'common and representative species and specimens', provided they are 'well represented in national museums and other institutions, or sufficiently abundant' that collecting them 'will not prejudice future scientific work'. If they are not considered to be well represented, etc., presumably the collector would be stopped from collecting them or have to surrender them later.

In order to clarify the full scope of this classification scheme, the Statement adds that these proposals *'can provide a guide for regulating the ultimate destination of any palaeontological specimens collected'*.

The second part of the Statement proposes a system of management of 'geological sites of regional and international importance for the definition and use of a global Geological Time Scale, including stratotype sections and reference localities'. This would appear to include a very large number of sites, not limited to GSSPs.

Some form of administrative body would control all these localities, including access and collecting, on behalf of the State in place of the landowner, owner of the mineral rights or site operator. Access would be 'free and open' for scientists. For everyone else, 'steps should be taken to control, restrict or prohibit' collecting. The paragraph relating to Category 1 fossils urges that similar privileged access be extended to *all other sites* too: 'Legal systems should…ensure …free and open access to palaeontological localities for bona fide geological study'. The landowner, etc. would thus be *obliged* to permit entry (and presumably collecting also) for the purpose of study.

These proposals would require fundamental changes in aspects of UK law before they could be implemented here, both with regard to the rights of landowners, site operators and others, concerning access, and with regard to the owners of fossils both before and after discovery and extraction. This could possibly come about through some form of European Community geoconservation Directive.

As collectors we are concerned above all with the dramatic impact such changes would have on our ability to find fossils and keep or dispose of them as we wished. No doubt members of the GWG would see such changes as being entirely beneficial to scientists and palaeontology. If so, then we consider they must have failed to take proper account, firstly, of the enormous contribution that collectors in the UK have made and are continuing to make to palaeontology (while still relatively free of restraint by the law), and, secondly, to take account of what drives collectors and how they would react to the proposed controls. (By 'collectors', on this occasion, we mean those who collect fossils primarily to keep or sell, rather than for research, that is to say those whom the GWG would *not* regard as 'bona fide').

The great importance of the contribution made by these collectors over many years is obvious in museum collections throughout the UK whether they be national, regional or smaller museums. What sort of displays would be possible if they only had material found by 'bona fide persons or groups'?

- Collectors contribute time, energy, initiative, persistence, expertise and, sometimes, considerable financial investment to pursue their interest, in many cases thereby saving fossils that would otherwise be destroyed. Undertaking this 'rescue collecting' is probably when they are performing their most valuable service for palaeontology, when very often they are the only ones willing and available to do so, as at working quarries, temporary exposures and fast eroding coasts (of particular relevance to the UK of course).

  Some collectors would undoubtedly be put off collecting as a result of greatly increased controls at sites and having to surrender their better fossils. The volume of material being recovered would decline. Would there be enough 'bona fide' collectors to fill the gaps? Would the State have to employ collectors? How many would be needed, for example, to cover the many important sites along the Dorset and East Devon Coast World Heritage Site?

- Some collectors, rather than give up, would continue to collect but fail to offer their better fossils for evaluation for fear of having them confiscated. They would remain out of sight and again science would be the loser.

- The suggested controls could be expected to discourage many, particularly younger people, from becoming collectors, the starting point for many future palaeontologists.
- Another point to ponder is the fact that many fossils might only qualify for confiscation after the collector (or someone on his behalf) has spent many hours on preparation, revealing them, for example, to be specially suitable for museum or educational use. Has *any* thought been given to the collector's reaction to such a possibility?

The potential management problems are daunting. The GWG's fossil classification scheme could provide for the State 'through the use of expert advisers or assessors' to confiscate (described as 'regulating the ultimate destination') *any* fossil from the collector, (although it does – generously – recommend 'a degree of flexibility' in the case of Category 4 fossils). It seems that the expert assessors would therefore have the *right* (perhaps even the duty) to inspect *all* fossils wherever found, firstly to establish into which category a fossil falls and then decide whether or not it should be confiscated. (Fossils considered to be in Categories 1 and 2 would be taken automatically). How would they deal with a collector who refused to co-operate? Would there be a right to enter a property to inspect fossils or to stop and search a collector 'in the field'?

Consider the situation at a fast eroding coastline with numerous access points and many thousands of visitors. Access obviously could not be controlled. Would collectors be required to display their finds for inspection as part of the normal beach scene? This may appear fanciful, but not impossible if the proposed measures were to be enforced. Contrast that scenario with the present situation here on the West Dorset Coast where English Nature (the national nature conservation agency), local government, land owners, academics, museums (including London's Natural History Museum) and collectors are all working together voluntarily and achieving very worthwhile results.

Cost is of course another crucial matter that must be considered. The cost of enacting the necessary legislation and establishing and administering the proposed system, including assessment and enforcement, would be considerable. It is unrealistic to believe there would ever be sufficient funding to enforce an effective level of control. Collecting would continue but at a reduced level with much of it probably illegal, inevitably leading to the creation of a black market. We consider it very unlikely that more fossils would become available for research than under the present UK system, which, to its credit, still allows fossil collecting to be enjoyed by the many rather than by an élite few.

We are certainly not opposed to the principle of geoconservation and to achieving better access to sites for research, but measures taken must be practicable, realistic and proportionate, taking account of *all* interests. Strict controls such as those being suggested together with enforcement measures would polarise views and undoubtedly damage relations between the academic community and collectors. The best way to address fossil collecting issues is to seek consensus and cooperation. All involved should recognise that far more can be achieved with that approach than by imposing oppressive controls such as the GWG is advocating.

An update on my activities

Colin PARSONS
colinfparsons@btinternet.com

The effect that John Huxtable has had on my return to the palaeontological world should be evident from the content of the page in this Internet link: www.drcolinparsons.org.uk/geo-blog.htm, which is on my geological web site. It was my visit to the second Red Hole Lane excavation (entry 5 on the cited page), which particularly excited my interest in certain Lower Bajocian ammonite faunas. The discovery of an ammonite group in North Dorset, previously only recorded in South America, re-awakened my curiosity regarding the origins of the genus *Chondroceras* prompted by Westermann & Riccardi's 1979 description of *Chondromileia*, see the following page at the same web site root, (/chondromileia.htm).

A major part of the second volume of my PhD thesis, was a monograph of the Subfamily *SPHAEROCERATINAE,* now also available on my web site, where there is a phylogenetic summary diagram of the possible evolution of this group: (/sphaeroceratids.pdf, Figure 32). Written in 1978, before the publication of Westermann & Riccardi's work, I promoted the idea of a single common ancestor for the Sphaeroceratids in the upper Laeviuscula Zone, originating from *Frogdenites.* The final chapter in my thesis written in 1979-80, was a summary of my thoughts on Bajocian stratigraphy, and here I mentioned the possibility that the existing genus *Chondroceras* might be polyphyletic and that the species *C. evolvescens, delphinus* and *grandiforme,* were possibly an independent offshoot of *Emileia,* (/std-zones.pdf, p. 17). Forward to the end of last year, when I found, together with John Huxtable, a series of small specimens referable to *Chondromileia*, which largely confirmed these ideas, as they suggested a marked reduction in size, up the sequence. I have subsequently contacted Alberto Riccardi and he has indicated that he intends to re-examine the museum collections, to see if there is any evidence for stratigraphically related size change in the S. American material. I should mention at this point, the great kindness of Bob Chandler, who has loaned me three specimens of *Chondromileia*, which he was intending to describe himself and who has removed any mention of these specimens from his own work.

I am currently working on a paper describing the *Chondromileia* specimens, the related *Emileia* population in the Clatcombe, Red Hole Lane area and their relationship to Sphaeroceratid phylogeny. Unfortunately, this is being held up by the inordinate amount of time being taken by the Natural History Museum to produce some photos.

I am also intermittently working on the unpublished manuscript of the revisionary Appendix volume of the reprint of S.S. Buckman's Type Ammonites (1972-6). Currently, I am progressing the Aalenian - Bajocian specimens, as I have some competence in this area and am incorporating copies of the individual photographs as well as any additional data. I am currently just starting on Volume 4. A longer-term project is a synoptic photographic catalogue of the Aalenian/ Bajocian ammonites in the Tesson collection of the Natural History Museum. I have taken all the photos, measured the specimens and done all the catalogue collation; it just remains to produce the final PDF file!

News from Dorset

John HUXTABLE
johnhuxtable@hotmail.com

Since my 1999 report on the stratigraphy and fossil fauna of temporary sections in the Inferior Oolite of Redhole Lane, near Sherborne north Dorset, I have opened further extensive sections some 80m west of the original site, which have yielded additional, useful details. This fieldwork was sponsored by Peter Langham of Lyme Regis and I was pleased to welcome Colin Parsons to the site as well as his many contributions to interpreting some of the findings.

1. My previous report erected a new informal unit within the Sauzei Zone, the Clatcombe Fossil Bed, within which was indicated a new faunal horizon with an undescribed ammonite fauna not previously identified within the English succession but with affinity with deposits in northern Germany. The recent excavations yielded more of this material, from bed 4c of my report, placed as Bj-11b of the table of ammonite faunal horizons of Callomon and Chandler (1990, emend. Callomon 1995). The collected fauna has now been reviewed by Colin Parsons, the results so far indicating some but not direct similarity with material from the upper Sauzei Zone deposits of Sandford Lane, the Redhole Lane material containing many of the same morphotypes but which, on balance, indicate an ammonite fauna that is different, probably younger. For discussion please visit www.drcolinparsons.org.uk/pinguis.htm and with the opportunity to collect more of these ammonites I believe it may suggest that this deposit is very close to the zonal boundary with the Humphriesianum Zone, but whether or not younger than Bj-12 (index *Stephanoceras rhytum*) is uncertain at this time.

2. The overall thickness of the Sauzei age deposits as seen here were much thicker than previously reported, with 4c *circa* 20 cm compared to the previously reported 5 cm and with a well-defined lithological break at its base. The subjacent 4b much as already described but the *Emileia* sp. listed as from 4c could now be demonstrated as within the top few centimetres of 4b, invariably eroded with much worm marking and undoubtedly derived from earlier deposits. Immediately below in 4a, abundant, fresh ammonites were observed that included specimens of *Chondromileia* (see Colin Parsons report, this Newsletter). Of particular note was the very great abundance of *Emileia* spp. throughout 4a but it was possible to discern these could be differentiated into two groups. In the upper part two forms dominated: one more planulate and aff., but not *polyschides* (Waagen), the other aff., but not *vagabunda* (Buckman). All consistently smaller than these named species and complete to a plain with raised lip mouth-border. These suggest either that there is much variation within existing named species or that they represent new, younger species and Colin has proposed that with further collecting of these shells to assess their variability, it is probable that it will be found that they are not, in fact, different but the end members of a single, variable biospecies, and as suggested here, new.

   Within 4a a further distinction could be observed with regard to the ammonite content of the lower part of this bed, which was more marly and as previously described. Higher in the bed there was an almost complete absence of *E. (Otoites)* sp. but numerous *Sonninia* sp. and '*Skirroceras*' sp. Within the marly sequence *Otoites* including *E. (Otoites) sauzei* (d'Orbigny) and cf. became abundant, many complete with lappets. Associated were numerous *E. (E.) greppini* (Maubeuge) with less numerous forms cf. *vagabunda* (Buckman) but generally incomplete. Also of note were numerous specimens of *Strigoceras strigifer* (Buckman) of diameters of 12 cm and of *Sonninia* spp.

3. As the excavations moved westward the quality of preservation noticeably declined with an increase in silty matter within the limestone fabric and limonite coating of the larger ammonites. Wood fragments became abundant with lengths up to 45 cm and, as a first for my 30 years collecting from the Inferior Oolite, some saurian bone fragments, associated with a large wood fragment and an *Emileia*. The bones are with the NHM London for identification. Does this all suggest a period in Sauzei time at Redhole Lane when the shore was not too far distant?

In the general area of Redhole Lane I believe there exists the opportunity to obtain much more detail on the life and times of the Sauzei and upper Laeviuscula Zones. The considerable lateral variations in both lithologies and faunal content of the rockbeds seen here and nearby at Sandford Lane, Frogden/Oborne Wood and Milborne Wick continue to demonstrate that in north Dorset (and elsewhere in Dorset) and south Somerset there are so many 'snapshots' of sediments laid down during these times, many probably of short duration and with distinct ammonite content. Whilst often 'condensed', the sequences conform to the accepted chronostratigraphic table and their often abundant ammonite content should further help to illustrate the changes in evolution, migration, even cryptogenic appearances, of recognised species.

All this work relies on the goodwill of the landowners and I hope that the support of the Sherborne Castle Estate (the Digby family who have kindly given their

consents since 1892), and their tenant farmer Mr. Peter Hunt of Blackmarsh Farm, may continue in the future and I again express my thanks for their generosity of permissions for the various periods of fieldwork on the Estates grounds.

References

CALLOMON J.H. AND CHANDLER,R.B. 1990 A review of the ammonite horizons of the Aalenian-Lower Bajocian Stages of Southern England. In: S.Cresta and G.Pavia (eds.) Atti del meeting sulla stratigrafia del Bajociano. Memorie Descrittive della Carta Geologica d'Italia. **40** , 85-112.

CALLOMON, J.H. 1995 Time from fossils: S.S.Buckman and Jurassic high-resolution geochronology. In: M.J.Le Bas (ed.) Milestones in geology.Geological Society London Memoirs, **16**, 127-50.

HUXTABLE, JOHN G. 1999 A review of the stratigraphy of the Inferior Oolite (Bajocian Stage, Middle Jurassic), near Clatcombe, Sherborne, with a description of temporary sections. Proceedings of the Dorset Natural History and Archaeological Society, **121**, 101-106.

PARSONS, C.F. 1976 A stratigraphic revision of the humphriesianum/subfurcatum Zone rocks (Bajocian Stage, Middle Jurassic) of Southern England. Newsletters on Stratigraphy, **5**, 114-42.

A rare encounter: The ammonite *Villania* (Till) in the Lias of South Humberside, NE England.

Murray EDMUNDS
murray.edmunds@watermeadow.com

Liassic ammonite biostratigraphers might be interested to learn of an isolated find of an ammonite provisionally identified as *Villania* cf. *densilobata* (Till) in South Humberside, England. This is the first report of this ammonite genus in the Northwest European province. *Villania* is best known from Villány, Hungary, from which it takes its name (Dommergues & Géczy, 1989; Géczy, 1998), and it has also been figured from the Bilecik region of Turkey (Alkaya, 1982). It is reported to occur along the Southern margin of the Eurasian continent ranging from the Western Alps to the Pontides (Géczy, 1998).

The find was actually made several years ago in Crosby Warren quarry, Scunthorpe. This quarry was created during the 19th and early 20th centuries as a result of open cast mining for extraction of Frodingham Ironstone for the local steel industry. A considerable thickness of overlying Liassic marls and clays ranging from the Oxynoticeras oxynotum through to the Orthodactylites tenuicostatum zones were exposed here. In recent years, however, the quarry has been used as a land-fill site for waste disposal, so has been progressively lost.

Unfortunately, the fossil was found *ex situ*, but clues to its stratigraphical position are provided by its preservation and associated taxa. The fossil (Figs. 1-3) is preserved as a series of mud-filled septa, partly enclosed in a small pink–buff-coloured mudstone nodule. It preserves traces of the inner shell layer.

Figs. 1-3. *Villania cf. densilobata* (Till) from South Humberside, England.

Examples, in identical preservation, of *Phricodoceras cornutum* (Simpson) and of *Apoderoceras sparsinodum* (Quenstedt), which is characterised by inflation and '*Hyperderoceras*'-like inner whorls (Figured), were also found *ex situ* at the site. It is therefore cautiously inferred that the specimen is likely derived from a high horizon in the Phricodoceras taylori subzone of the Uptonia jamesoni zone. This is consistent with stratigraphical knowledge of the genus elsewhere.

The specimen is a partial phragmocone, the maximum dimension (length of preserved outer whorl) being 95 mm, representing two consecutive whorls. The inner whorl (max. diameter ~43 mm) bears distinct swollen primary ribs (10 per half whorl). These are somewhat worn, but have the impression of being bituberculate with the outer (ventrolateral) tubercle quite substantial. From the ventrolateral tubercle, fine secondaries pass over the venter without forward deflection. On the outer whorl, the primary ribs have degenerated to distant vague swellings, but secondaries are still distinct. The whorl section is close to circular, there is slight involution, and the suture line is highly elaborate. The specimen is bequeathed to Oxford University Museum as OUM J.75100.

The systematic position of *Villania* is now generally recognised as being close to *Epideroceras* Spath, from which it has presumably evolved by the retention of inflated whorl section; this feature is seen only in the nuclei of *Epideroceras*. Until recently, these ammonites have traditionally been placed together in the family Phricodoceratidae Spath, but there is now a growing consensus that *Phricodoceras* Hyatt is not an Eoderoceratoid but a late member of Schlotheimidae Spath (Dommergues & Meister, 1999; Edmunds et al. 2003; Page in Simms et al. 2004). Thus, *Villania* would be best positioned within the Superfamily Eoderoceratoidea Spath, Family Epideroceratdiae Dommergues & Meister. Most taxa within Epideroceratidae appear to have had a distribution centred along the Northern margin of the Tethys (Dommergues & Géczy, 1989), although *Epideroceras*, *Jamesonites* Buckman and now *Villania* are occasionally reported in Northwest Europe.

References:

ALKAYA, F. 1982. On the presence of Villania (Ammonoidea) in Turkey. *Bulletin of the Mineral Research and Exploration Institute of Turkey*, 97-98, 40-43.

DOMMERGUES, J-L & GÉCZY, B. 1989. Les fane d'ammonites du Carixian basal de Villany (Hongire); un temoin palaeobiogeographique des peuplements de la marge meridionale du continent Euro-Asiatique. *Revue de Paléobiologie*, 8, 21-37.

DOMMERGUES, J-L & MEISTER C. 1999. Cladistic formalisation of relationships within a superfamily of Lower Jurassic Ammonitina: Eoderocerataceae Spath, 1929. *Revue de Paléobiologie*, 18, 273-286.

EDMUNDS, M., VARAH, M. & BENTLEY, A. 2003. The ammonite biostratigraphy of the Lower Lias 'Armatum Bed' (Upper Sinemurian–Lower Pliensbachian) at St. Peter's Field, Radstock, Somerset. *Proceedings of the Geologists' Association*, 114, 65-96.

GÉCZY, B. 1998. Lower Pliensbachian ammonites of Villány (Hungary). *Hantkeniana*, 2, 5-47.

SIMMS M. J, CHIDLAW N, MORTON N & PAGE KN. 2004. British Lower Jurassic Stratigraphy. *Geological Conservation Review Series, Joint Nature Conservation Committee*. 458 pages, ISBN 1 86107 495 6

The Aalenian and the Bajocian ammonite faunas from the Balkan Mts (Bulgaria) - state of knowledge and perspectives for biostratigraphic investigations

Lubomir METODIEV and *Robert B. CHANDLER*
lubo@geology.bas.bg & Aalenian@aol.com

The Jurassic ammonite faunas in Bulgaria are relatively well studied. About 100 publications devoted to the taxonomy and biostratigraphy of the Jurassic ammonites, collected from the exposures in the Balkan Mts, have appeared during the last 100 years. Amongst the ammonite associations, those from the Lower and Upper Jurassic are particularly well known. The taxonomic composition of the major taxa is generally clear. For the Toarcian and the Upper Jurassic standard zonal schemes have been proposed. There are indications for the presence of some ammonite zonal units in the Sinemurian, Pliensbachian and in the Middle Jurassic. However, apart from several earlier taxonomic and

biostratigraphic studies on the Aalenian, Bajocian and Bathonian ammonites, other data on the Middle Jurassic ammonites do not exist. At present there is no biostratigraphically-documented succession of Middle Jurassic strata in the area. The main reason for this probably results from the nature of the rocks in which the Aalenian and Bajocian ammonites are preserved. They are the clayey-limestone sediments of the Boukorovtsi Member of the Ozirovo Formation and the Bov Formation, the biodetrital limestones of the Ozirovo and the Polaten Formations and the black shales of the Etropole Formation. These strata are usually poorly exposed, cropping out in tectonically affected areas, or in regions of high mountains. During the last two years well-exposed and continuous sections, containing well-preserved Aalenian and Bajocian ammonites have been located in the Balkan Mts. Considering the lack of modern evidence concerning the ammonite faunas of these rocks and the lack of any data for some stratigraphical levels, it is desirable that a full description and revision is undertaken. The purpose of this short communication is to summarise available data on the Aalenian and Bajocian ammonites in Bulgaria and to present the possibilities for further taxonomic and biostratigraphical investigations.

Geographical and geological setting. In the area of the Balkan Mts (Bulgaria) the Aalenian and the Bajocian rocks are distributed into several narrow parallel strips of sediments with NW-SE and W-E trends. They outcrop from the border with the Republic of Serbia in the West to the foot of the Peak

Fig. 1. Picture of one of the main exposures of the Etropole and Bov Formation, envisaged for biostratigraphic investigations of the Bajocian, Ponor Planina Mountain, western Balkan Mts.

Botev to the East. From the palaeogeographic point of view these sediments have been accumulated into a highly fragmented shallow basin, located to the southern margin of the Moesian Platform in the Tethyan realm (Fourcade et al., 1995). The Aalenian and Bajocian rocks represent marine epicontinental environments containing abundant fossil faunas, including ammonites, belemnites, brachiopods and bivalves (Sapunov, Tchoumatchenco, 1988; Sapunov et al., 1988, 1991). They have been subdivided into several lithostratigraphic units as follows: the Ozirovo Formation, the Etropole Formation, the Gradets Formation, the Polaten Formation and the Bov Formation (Stephanov, 1966; Sapunov, 1969; Sapunov, Tchoumatchenco, Shopov, 1967; Sapunov, Tchoumatchenco, 1986, 1991). The Ozirovo Formation displays varied lithology. In the localities of the Ponor-Kremikovtsi Jurassic strip, Vrachanska Planina Mt. and in the outcrops of the Troyanska Planina Mt., its uppermost parts are composed of sandy and ferruginous, biodetrital, ooidal and ooid-bearing limestones, while in the Ponor Planina Mt, Zaburde, Milanovo and Etropole - Teteven region it consist of clayey-limestone cyclic sediments (Boukorovtsi Member). The Ozirovo Formation is overlaid by sharp lithological boundary by the Etropole Formation, which is represented by black ferruginous shales with sideritic concretions, quartzitized aleurolites (Lopyan Member) and siltstones (Shipkovo Member). The Etropole Formation is replaced by the white non-calcareous quartz sandstones of the Gradets Formation in the Ponor-Kremikovtsi Jurassic strip. Above these sediments the marl-limestone successions of the Bov Formation and terrigenous biodetritic limestones of the Polaten Formation are deposited.

Localities and material. Amongst the lithostratigraphic units named above, the rocks of the Ozirovo Formation, the Boukorovtsi Member, the Etropole Formation, the Bov Formation and the Polaten Formation contain ammonites. The ammonites usually occur as components of shell-beds and are moderately compacted whole or crushed shells included in shell debris. Those in the limestones are usually preserved as calcareous internal moulds, comprising the phragmocone to the beginning of the body chamber. The ammonites from the clayey beds are phosphatized with preserved mouth-borders. Despite the shallow marine nature of the facies (with frequent gaps and condensation) they yield a more or less continuous ammonite succession from the base of the Aalenian to the Bajocian - Bathonian boundary. Following a general review of localities where the Aalenian and the Bajocian outcrop, the exposures from three regions of the Western and Central Balkan Mts have been selected for detailed biostratigraphic study on the base of their stratigraphic continuity, exposition and ammonite content. The first region includes the outcrops, located in the Ponor Planina Mountain (Western Balkan Mts, Sofia District), about to 60 km to the north of Sofia. The second region covers the exposures of the Zlatishko-Tetevenska Planina Mountain and the third one comprises the localities in the Troyanska Planina Mountain (Central Balkan Mts, Lovech District), situated about 100-150 km to the northeast of Sofia. These localities have the best conditions to carry out detailed stratigraphical study because of their good ammonite distribution throughout. They have yielded more than 300 specimens of Leioceratinae, Graphoceratidae and Hammatoceratidae, which enable us to produce the most complete biostratigraphy to date for the Aalenian of Bulgaria. We are also able to identify a characteristic suite of guide fossils establishing the position locally of the Aalenian-Bajocian boundary. The Aalenian ammonites prove the existence of the Leioceras opalinum, Ludwigia murchisonae, Brasilia bradfordensis and Graphoceras concavum Zones (Sapunov, 1964, 1968, 1969; Metodiev, 1997, 2000). About 250 specimens are available from the Bajocian. Some have been published before (Sapunov, 1963, 1964, 1971). They indicate a succession from the

Hyperlioceras discites Zone at the base to the Parkinsonia parkinsoni Zone above. They consist of taxa of the families Sonniniidae, Oppeliidae and Stephanoceratidae. Our improved knowledge of the Aalenian ammonite fauna is not yet matched in the Bajocian. This requires new and continuous bed-by-bed collecting in order to understand its distribution and taxonomic composition. Our investigation will provide new evidence, filling in gaps that exist in the distribution of Bulgarian Middle Jurassic ammonites.

General objectives and aims. There are several aims to be achieved through the biostratigraphical investigations of the Aalenian and the Bajocian in Bulgaria:

- Revision and re-evaluation of the existing collections of Aalenian and Bajocian ammonites from previous workers found in the national collection. They are stored at the Museum of Palaeontology and Historical Geology of the University of Sofia "St. Kliment Ohridski".
- Collection of completely new ammonite material from selected sections of the Ozirovo, Polaten Formation and especially of the Etropole and Bov formations from the western and central Balkan Mts.
- Construction of a scheme of ammonite biohorizons that can be integrated in to the standard zonal scheme.
- Correlation of the Bulgarian ammonite zones for the Aalenian and the Bajocian with the faunal horizons of other areas of Europe (Dietze & Chandler, 2001; Dietze et al., 2002; Callomon & Chandler, 1990; Sandoval, 1979, 1983; Sandoval & Chandler, 2000; Fernández-López, 1985; Rocha et al., 1990; Contini et al., 1997; Rioult et al., 1997).
- Investigation of the taxonomic composition, morphological variability and possible phylogenetic relationships of the Aalenian and Bajocian ammonites from the Balkan Mts and a review of the taxonomic problems that exist.

This study will be based on a synthesis of fieldwork and taxonomic investigations. It involves collaboration of an international team of ammonite workers including: Dr. Lubomir Metodiev (Geological Institute, Bulgaria), Mr. Robert Chandler (United Kingdom), Mr. Volker Dietze (Germany) and Dr. Louis Rulleau (University of Lyon, France). Dr. Metodiev is working on the Toarcian and the Aalenian ammonites from the Balkan Mts. He recently discovered new localities for Aalenian and Lower Bajocian ammonites in the region as well as several sections that seem to be very suitable for biostratigraphic research of the ammonites. He will be responsible for the fieldwork and collection of the ammonite faunas. Mr. Chandler, Mr. Dietze and Dr. Rulleau are specialists on Jurassic ammonites. They will assist in the taxonomic examination of the material sampled and provide advice and feedback on the research as it progresses.

References

CALLOMON, J.H., R.B. CHANDLER. 1990. A review of the ammonite horizons of the Aalenian and Lower Bajocian Stages in the Middle Jurassic of Southern England. *Mem. descr. Carta geol. Ital.*, **40**; 85 - 112.

CONTINI, D., S. ELMI, R. MOUTERDE, M. RIOULT. 1997. Aalénien. In: *"Groupe Français d'étude du Jurassique "Biostratigraphie du Jurassique ouest-européen et méditerranéen: zonations parallèles et distribution des invertébrés et microfossile"* (Cariou, E., P. Hantzpergue Coord.). *Bull. Centre Rech. Elf Explor.*, **17**; 37 - 40, tables Va, b, pls. 12, 13.

DIETZE, V., R.B. CHANDLER. 2001. New Stephanoceratids (Ammonitina) from the Lower Bajocian of Burton (Somerset, S England) and Achdorf (Wutach area, SW Germany). *Stuttgarter Beitr. Naturk., Ser. B*, **312**; 1-22, 9 pls.

DIETZE, V., G. SCHWEIBERT, J. CALLOMON, H. GAUTHIER. 2002. Garantiana- und führe Parkinsoni-Zone (Ober-Bajocium, Mittlerer Jura) am Ipf (östliche Schwäbische Alb, SW-Deutschland) mit Bemerkungen zur Phylogenie der Ammonitengattung *Garantiana* Macke, 1907. *Stuttgarter Beitr. Naturk., Ser. B*, **315**; 1-89, 17 pls.

FERNÁNDEZ-LÓPEZ, S. 1985. El Bajocience en la Cordillera. PhD thesis. Facultad de Ciencias Geologicas, Departt. de Paleontología, Universidad Complutense Madrid, 848+23 pp., 67 pls, 116 tabls.

FOURCADE, E., J. AZÉMA, J.-P. BASSOULET, F. CECCA, J. DERCOURT. 1995. Palaeogeography and paleoenvironment of the Tethyan realm during the Jurassic break up of Pangea. In: *"The Ocean Basins and Margins. Volume 8: The Tethys Ocean"* (edited by A.E.M. Nairn et al.). Plenum Press, New York; 191 - 214.

METODIEV, L. S. 1997. Toarcian and Aalenian ammonites in a part of the Western Stara Planina Mts, Bulgaria (taxonomy, stratigraphy). *Geologica Balc.*, **27, 3-4**; 3-31.

METODIEV, L. S. 2000. Etude de la limite Toarcien - Aalénien et stratigraphie de l'Aalénien dans quelques coupes du Mont Balkan occidental et central en Bulgarie. *Strata*, **1, 10**; 117-121.

RIOULT, M., D. CONTINI, S. ELMI, J. GABILLY, R. MOUTERDE. 1997. Bajocien. In: *"Groupe Français d'étude du Jurassique "Biostratigraphie du Jurassique ouest-européen et méditerranéen: zonations parallèles et distribution des invertébrés et microfossile"* (Cariou, E., P. Hantzpergue Coord.). *Bull. Centre Rech. Elf Explor.*, **17**; 41 - 53, table VI, pls. 14, 15.

ROCHA, R.B., M.H. HENRIQUES, A.F. SOARES, R. MOUTERDE, B. CALOO, C. RUGET, S. FERNÁNDEZ-LÓPEZ. 1990. The Cabo Mondego section as a possible Bajocian boundary stratotype. *Mem. Descr. Carta Geol. d'It.*, **40**; 49-60.

SANDOVAL, J. 1979. El Bajocence en la zona Subbetica. *Cuad. Geol. Univ. Granada*, **10**; 25 - 440.

SANDOVAL, J. 1983. Biostratigrafia y Paleontologia (Stephanoceratacea y Perisphinctacea) del Bajocence y Bathonense en las Cordilleras Béticas. I, II. *Tesis Doct. Univ. Granada*; 613 pp.

SANDOVAL, J., R.B. CHANDLER. 2000. The Sonninid ammonite *Euhoploceras* from the Middle

Jurassic of South-west England and Southern Spain. *Palaeontology*, **43, 3**; 495-532, 13 pls.
SAPUNOV, I. 1963. The ammonites from the Bajocian genus *Protoecotraustes* Spath (Haploceratidae). *Trav. géol. Bulg, Sér. paléont.*, **5**; 149-163 (in Bulgarian).
SAPUNOV, I. 1964. Revision of several Bajocian ammonites from the ferriferous Jurassic of the Troyan region. *Trav. géol. Bulg, Sér. paléont.*, **6**; 249-261 (in Bulgarian).
SAPUNOV, I. 1968. New data about the ammonite zonal succession of the aalenian in Bulgaria. *C. R. Acad. Bulg. Sci.*, **21, 6**; 537-539.
SAPUNOV, I. 1969. On the age of the iron ores of the Ponor-Gradets Jurrasic strip (Western Balkan Range). *C. R. Acad. Bulg. Sci.*, **22, 7**; 807-810.
SAPUNOV, I. 1969. On certain recent stratigraphical problems of the Jurassic system in Bulgaria. *Bull. Geol. Inst., Ser. Stratig. and Lithol.*, **18**, 5-20 (in Bulgarian).
SAPUNOV, I. 1971. The Bajocian ammonite genus *Bradfordia* S. Buckman, 1910 (Oppeliidae) from Bulgaria. *Bull. Geol. Inst., Ser. Paleont.*, **20**; 73 - 90 (in Bulgarian).
SAPUNOV, I., P. TCHOUMATCHENCO, V. SHOPOV. 1967. Biostratigraphy of the Lower Jurassic rocks near the village of Komshtitsa, District of Sofia (Western Balkan Range). *Bull. Geol. Inst., Ser Geotect., Stratigr. and Lithol.*, **16**; 125 - 143 (in Bulgarian).
SAPUNOV, I., P. TCHOUMATCHENCO. 1986. Revision of the Bulgarian Jurassic lithostratigraphic units introduced until 1985. *Rev. Bulg. Geol. Soc.*, **47, 1**; 32-50 (in Bulgarian).
SAPUNOV, I. G., P. V. TCHOUMATCHENCO. 1988. Bulgarian experience in Lower Jurassic biozonation based on different fossil groups - a retrospection. *2nd International Symposium on Jurassic Stratigraphy, Lisboa*; 699-715.
SAPUNOV, I., P. TCHOUMATCHENCO. 1991. Revision of the Bulgarian Jurassic lithostratigraphic units introduced until 1990. *Rev. Bulg. Geol. Soc.*, **52, 2**, 56-66 (in Bulgarian).
SAPUNOV, I. G., P. V. TCHOUMATCHENCO, P. A. MITOV. 1988. The Jurassic evolution of the North-western Bulgaria. *Geologica Balc.*, **18, 1;** 3-82 (in Russian).
SAPUNOV, I., P. TCHOUMATCHENCO, _. ATANASOV, _. MARINKOV. 1991. The Central Northern Bulgaria during the Jurassic. *Geologica Balc.*, **21, 5***;* 3-68 (in Russian).
STEPHANOV, J. 1966. The Middle Jurassic ammonite genus *Oecotraustes* Waagen. *Trav. géol. Bulg, Sér. paléont.*, **8**; 29 - 69.

News on Lower Bajocian Stratigraphy and on the evolution of the Sonniniidae

Volker DIETZE
v.dietze@t-online.de

As announced in Newsletter 31 the revision of the Sonniniidae and stratrigraphy of the Lower Bajocian in Eastern Swabia is now completed due to a fruitful collaboration of German (V. DIETZE, G. SCHWEIGERT) and English specialists (J. H. CALLOMON, R. B. CHANDLER). The work is in press in *Stuttgarter Beiträge zur Naturkunde, Serie B* and will be published in Spring 2005.

The successions in the "Sowerbyi-Oolith" around Gingen/Nenningen/Winzingen (Eastern Swabian Alb) starts in the Ovale Zone with the *oechslei* horizon that contains the last *Fissilobiceas ovale*. The characteristic guide fossil *Pseudoshirbuirnia oechslei* is a rare element of the fauna. This horizon is followed by the *adicra* _ and *adicra* _ horizons, which lie in the Trigonalis Subzone of the Laeviuscula Zone. These horizons are dominated by *Shirbuirnia gingensis* (often misidentified as "*Sonninia*" *ovalis* in the past), *Witchellia pseudoromanoides* and *Sonninia adicra.* The still younger *stephani* horizon lies also in the Trigonalis Subzone. Characteristic elements are *Pseudoshirbuirnia stephani*, *Shirbuirnia trigonalis*, and *Fissilobiceras fissilobatum*. Old collections contain a few *Witchellia* spp. of the *W. spinifera* group that provide evidence for the Laeviuscula Subzone in the following "_-Tone".

An exhaustive correlation was made with other areas of Southern Germany (Wutach, Ringsheim) and especially Southern England (Dorset, Somerset, see fig. 1).

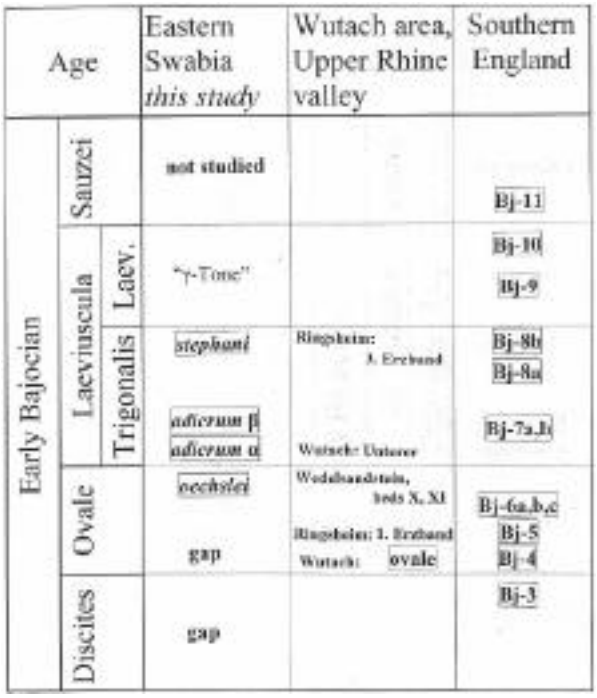

Fig. 1: Correlation of the Lower Bajocian (Ovale and Laeviscula zones) of Southern Germany and Southern England

The sonninid fauna – our present investigations ended in the Trigonalis Subzone – specimens belong to only five chronoclines, which can be followed through time, some of them up into the Humphriesianum Zone. The bulk of genera erected for sonniniids in the past are only a result of morphological, not of natural biological division.

The genus *Sonninia* starts in the Upper Aalenian ("*Euhoploceras*") and continues at least into the Sauzei Zone (group of *S. propinquans*/*patella*).

The genus *Witchellia* starts in the Ovale Zone and ranges up into the Humphriesianum Zone.

Shirbuirnia shows its acme in the Trigonalis Subzone.

The newly erected genus *Pseudoshirbuirnia* (type species: *Amaltheus stephani*) ranges from the Ovale Zone to the Humphriesianum Zone.

Fissilobiceras seems to belong to the hammatoceratids, ranging from the base of the Ovale Zone to the Humphriesianum Zone.

We intend to describe the ammonite fauna and stratigraphy of the Discites and Ovale Zones of the Wutach and Ringsheim area in near future. The Sauzei Zone of the Hohenzollern area is presently under investigation.

CORRESPONDENCE

A FURTHER COMMENT ON THE GSSP OF THE KIMMERIDGIAN STAGE

John CALLOMON
johncallomon@lineone.net

Since writing on this subject in last year's *Newsletter 32*, I have had a chance to look at the paper by our colleagues of the Kimmeridgian Working Group, in which they give a very fine new description of the section across the Oxfordian-Kimmeridgian boundary and of its ammonites in Staffin Bay on the Isle of Skye (Matyja et al., 2004). Its importance lies in typifying the ammonite biostratigraphy of the Upper Oxfordian-Boreal Kimmeridgian boundary succession to a degree of completeness and detail so far unrivalled anywhere else. It is therefore with little doubt the leading candidate for the definition of the standard Boreal chronostratigraphy of the Boreal Kimmeridgian.

But the authors go on to suggest that the Staffin succession should also be considered as a candidate for the definition of the GSSP of the Kimmeridgian Stage as a whole, i.e., as that of the primary standard. But to do this, the boundary should be lowered slightly from its present level at the base of the *Pictonia densicostata* horizon of Dorset because of the discovery of a new faunal horizon just below, in the non-sequence that undoubtedly lies below the *densicostata* horizon of Dorset. And the reason why this new horizon should be already included in the Kimmeridgian and no longer in the Oxfordian at the top is that its characteristic and hence time-diagnostic ammonites belong already to *Pictonia*: *Pictonia* sp.nov., to be described, the earliest form of the genus.

I am afraid this argument serves merely to reinforce my previous comments.

(1) Salfeld's standard Stage was defined as a (chrono)stratigraphic unit, whose lowest standard Zone was the Baylei Zone. It was not defined as the biostratigraphic range-zone of the genus *Pictonia* which, as has been stressed repeatedly, depends on who thinks some particular specimen is still/already a *Pictonia*, as opposed to underlying *Ringsteadia* or overlying *Rasenia*, genera founded independently elsewhere, a biotaxonomic judgement; and is dependent on the state of knowledge at the time, e.g., Dorset a century ago vs. Staffin today. What matters in stratigraphy is the succession of distinguishable fossil assemblages and their biohorizons, not to what genus they may be assigned.

(2) A time-plane *defining* a chronostratigraphic boundary is then drawn between two such horizons, i.e., at the base of the higher one, and subsequent discoveries of new horizons are then slotted in according to whether they lie above or below that time-plane. And the *choice* of biohorizon defining a standard chronostratigraphical unit should be governed above all by the extent to which it can be recognized elsewhere, by its correlatability.

(3) The unchallenged time-plane defining the base of the Baylei Zone and hence of the primary Kimmeridgian has been that of *Pictonia densicostata* for a long time, certainly from well before the ICS invented its GSSPs. *P. densicostata* is extremely well characterized across the whole of its range of variability (not inconsiderable) on the basis of very large collections of complete, adult, well-preserved specimens and has been unambiguously identified in the Boulonnais, on the Dorset coast, in northern Dorset, in Wiltshire around Swindon, in Oxfordshire near Thame, in Cambridgeshire, in Lincolnshire (as was) at South Ferriby - where a superb, absolutely typical specimen of *Amoeboceras bauhini* has come from the same concretion as several equally superb *P. densicostata* (J. Whicher collection) - and now again at Staffin, at more or less the same level as recorded previously, a little above the only easily-recognizable marker, the famous level of calcareous concretions of bed 36. 1000 km: what other ammonite faunal horizon can boast such a distribution? (Staffin is further from the Dorset coast than are the Pyrenees).

(4) So what purpose would be served by now moving the Oxfordian-Kimmeridgian boundary downwards to begin instead at the base of the horizon of *Pictonia* sp.nov.? A species that has so far been recognized only at Staffin? Based on how much good, uncrushed complete adult material? And is it really a *Pictonia* and not still a *Ringsteadia*? And what would be the loss to someone who quite justifiably goes to Staffin to study a more complete transect of the upper Oxfordian-Lower Kimmeridgian than is available in Dorset, to be told that the odd metre or so of clays below bed 36 is still Oxfordian and not already Kimmeridgian? But to be also told that he is indeed truly in the Kimmeridgian at already only a few cm above bed 36, with a precision and confidence that he would find it hard to rival anywhere else in the geological column?

(5) Secondary standards: the Boreal Kimmeridgian. Looking at Matyja *et al*'s Fig.2, the lower limit of the range of *A. bauhini* coincides exactly with the lower limit of *P. densicostata*. Why not therefore define the base of the Boreal Bauhini Zone to coincide exactly with the level of first appearance of *P. densicostata* at Staffin? That would not remove the formal need for a

separate secondary standard, for the Boreal and Subboreal zonations as a whole are distinct. But it would make the base of the Boreal Kimmeridgian, defined by a SSSP at Staffin, coincide *within the precision of correlation* with that of the primary standard, PSSP, on the Dorset coast. And that precision would then be so high that no-one need ever lose sleep over it in the way the correlation between the primary standard in Dorset and the secondary Submediterranean standard has caused us to do. One thing less to worry about. And more time to devote to the real problem outstanding, that of the definition of the SSSP of the Crussolian.

Epilogue. Let us in the Jurassic continue to do what we have been doing for a century and a half and not be too diverted by the doctrinal aspirations of stratigraphical commissions. We have been, and continue to be, ahead.

Reference.

MATYJA, B.A., PAGE, K., WIERZBOWSKI, A. & WRIGHT, J.K. 2004. Subboreal/Boreal ammonite succession at the Oxfordian/Kimmeridgian boundary in the Flodigarry section (Staffin Bay, Isle of Skye, UK). *Rivista Italiana di Paleontologia e Stratigrafia*, **110**, 273-278.

JURASSIC RESEARCH MEETINGS IN ARGENTINA 2003-2005

Susana DAMBORENEA
sdambore@fcnym.unlp.edu.ar

The first national meeting, *Primer Simposio Argentino del Jurásico*, was organized by A.C. Riccardi and held at La Plata Natural Sciences Museum on May 22nd, 2003. Seventeen communications were given on different aspects of southern South America Jurassic geology and palaeontology. Abstracts were published in *Ameghiniana Suplemento Resúmenes* 40: 41R-48R. Ten full papers are now in press in a *Geological Acta* 0AMERICA (ANDES AND PATAGONIA)
Edited by A.C. RICCARDI, Geologica Acta, Vol.3, Nº2, 2005

LATE TRIASSIC TO EARLY JURASSIC SEDIMENTATION IN THE NORTHERN NEUQUÉN BASIN, ARGENTINA: TECTOSEDIMENTARY EVOLUTION OF THE FIRST TRANSGRESSION:

S. LANÉS lucero_sil@yahoo.com.ar

The paper interprets and discusses the Late Triassic-Early Jurassic of the first transgression at northern Neuquén basin (Argentina) and its paleostructural control due to ancient horsts and half-grabens. Six vertical sections were chosen along two east-west and north-south transects. Depositional systems have been determined and correlated by means of ammonite, bivalve and brachiopod biostratigraphy. Two regions can be distinguished based on the areal distribution of the contemporaneous depositional systems in the studied area; one at the east and the other to the west of El Freno creek. Vertical sections in the western region record shallowing upward fluvio-dominated, transverse, normal-fault-controlled, slope-type fan deltas and intermediate shelf to Gilbert-type fan deltas. Vertical sections in the eastern region record a transgressive siliciclastic storm-dominated shelf, evolving from wave-dominated estuary to turbidity current influenced outer shelf. Accommodation *vs*. sedimentary supply ratio leads to identification of two stages of differing tectonic behaviour. The first one (Rhaetian-late Early Sinemurian) shows an accommodation greater than the sedimentary supply leading to the deposition of the western slope-type fan deltas. The second stage (late Early Sinemurian-Toarcian) shows a varying accommodation: during the late Early Sinemurian, accommodation was outpaced by sedimentary supply leading the intermediate-type fan delta to prograde. Later (late Early Sinemurian-Toarcian), accommodation exceeded the supply again, allowing transgression of the marine shelf and the increase in the marine depositional area. The two stages coincided with synrift and sag phases previously proposed for the southern Neuquén basin.

TRACKING SEA BED TOPOGRAPHY IN THE JURASSIC. THE LOTENA GROUP IN THE SIERRA DE LA VACA MUERTA (NEUQUÉN BASIN, ARGENTINA): C. ZAVALA

czavala@criba.edu.ar

The Lotena Group is a clastic to evaporitic unit up to 650 m thick that accumulated during the Middle to Late Jurassic in the Neuquén Basin, western Argentina. Extensive fieldwork carried out in the Sierra de la Vaca Muerta and Arroyo Covunco areas, including the measurement of seven detailed stratigraphic sections and geological mapping allow the discrimination of six unconformity-bounded units or sequences. The first sequence is composed of red beds and vaporates belonging to the Tábanos Formation that unconformably overlies strata of the Lower to Middle Jurassic Cuyo Group. Sequences 2 to 5 are shallow marine and display a basal sandstone interval attributed to confined shelfal sandstone lobes. These grade vertically into unconfined shelfal sandstone lobes, and terminate with carbonate deposits. The basal interval is restricted to the thickest areas of each sequence, a relationship attributed to structural relief. Sequence 6 has a very irregular shape and strongly truncates the underlying deposits. It is composed almost entirely of massive carbonate strata that were deposited by density currents. Facies analysis and stratigraphic mapping suggest periodic recycling of previous accumulations. Stratigraphic evidence suggests that the Lotena Group in the Sierra de la Vaca Muerta and adjacent areas probably accumulated over a tectonically unstable basement. Sequences 1, 2 and 3 display evidence of accumulation in an extensional tectonic setting, while sequences 4, 5 and 6 experienced a northward shift of their depocentres associated with extensive erosional truncation of the marginal areas, suggesting that accumulation was affected by early stages of growth of the Covunco anticline.

HIGH FREQUENCY SUBTIDAL-PERITID-AL CYCLES OF THE CALLOVIAN CALA-BOZO FORMATION (NEUQUÉN BASIN, WESTERN ARGENTINA): PRELIMINARY APPROACH: R.M. PALMA, G.L. LO FORTE, M. MEDHLI, R.D. PIETHÉ and S.G. LANÉS palma@gl.fcen.uba.ar; galof@gl.fcen.uba.ar; rpiethe@yahoo.com.ar; mehdimina@hotmail.com

The Calabozo Formation (Cuyo Mesosequence, Neuquén Basin) is made up by a thin, up to 30 m thick Middle Jurassic carbonate-dominated sequence. The minor, thin siliciclastic facies in this formation (i.e. lowermost granule-pebble shoreface conglomerate and fine-grained sandstones interbedded among the lower carbonates) record early transgressive shoreline and shallow lagoonal-subtidal sedimentation, respectively. The major carbonate deposits have been split into six facies and seven microfacies on the base of macroscopic field observation and petrological analysis. The carbonate facies have been grouped into three major assemblages: 1) Tidal flat facies assemblage (including the planar laminated algal boundstone facies; 2) Inner platform facies assemblage (including peloidal and bioclastic wackestone, coral floatstone and bioclastic and intraclastic packstone facies; and 3) Platform margin assemblage (including oolitic-peloidal packstone-grainstone facies**).** A fossil algal record made up by dasycladacean species (*Salpingoporella annulata, Cylindroporella* sp. and *Heteroporella* sp.) and blue-green algae (*Cayeuxia* (*Rivularia*) *piae*, and *Cayeuxia* (*Rivularia*) *kurdistanensis*) has been reported for the first time in this unit. The analysis of the intracycle facies and microfacies arrangements, as well as the nature of the cycle bounding surfaces, enabled one to identify two kinds of cycles. 1) Widespread subtidal cycles capped by shallow to intermediate subtidal facies, with no evidence of subaerial exposure at cycle tops; and 2) a minor subtidal cycle with similar shallowing-upward trend but capped by peritidal facies. The stacking pattern and thickness trend of these cycles was studied to determine possible allocyclic and autocyclic controls on their evolution. The Fischer plots reveal that the deposition of the Calabozo Formation subtidal-peritidal cycles took place under upward decreasing accommodation space conditions which may be related to eustatic lowering.

HIERARCHY OF BOUNDING SURFACES IN AEOLIAN SANDSTONES OF THE JURASSIC TORDILLO FORMATION (NEUQUÉN BASIN, ARGENTINA): *C. ZAVALA, H. MARETTO & M. DI MEGLIO* czavala@criba.edu.ar

The Tordillo Formation is a continental clastic unit deposited in the Neuquén Basin during the Late Jurassic. This paper discusses the stratigraphy of the succession outcropping at the Quebrada del Sapo, with emphasis on the origin, dimensions and hierarchy of bounding surfaces of aeolian deposits. Field survey, supported by the measurement of three detailed stratigraphic sections and line drawings of photographic panels allow the identification of four unconformity bounded units within the succession, informally named as T1, T2, T3 and T4. Units T1 and T3 are composed of conglomerates and pebbly sandstones deposited by density flows in a lacustrine environment. Paleocurrents indicate a source area located in the northeast while the presence of angular sandstone blocks suggests resedimentation processes. T2 and T4 units are composed of fine to medium grained sandstones of aeolian origin, characterized by large scale dunes and minor dry interdunes. Both units have sharp bases, and overlie a deflation surface characterized by the presence of ventifacts. Paleocurrents suggest a paleowind direction from the southwest. Internal bounding surfaces show a hierarchy of at least four discrete surfaces which were numbered according to their crescent extension. Type 1 surfaces are related to the normal advance of the dune front. Type 2 are reactivation surfaces within a single dune set. Type 3 surfaces relate to set superposition. Type 4 surfaces are related to extensive deflation of the dune complex, and define at least nine elementary aeolian sequences in the T4 unit.

CHEMOSTRATIGRAPHY OF THE PLIEN-SBACHIAN, PUESTO ARAYA FORMAT-ION (NEUQUÉN BASIN, ARGENTINA): *S.A. VALENCIO M.C. CAGNONI A.M. RAMOS A.C. RICCARDI AND H.O. PANARELLO* susana@ingeis.uba.ar; mariana@ingeis.uba.ar; adriana@ingeis.uba.ar; panarello@ingeis.uba.ar riccardi@museo.fcnym.unlp.edu.ar

In a preliminary attempt to establish an isotope stratigraphy, strontium, carbon and oxygen isotope ratios were determined from marine biogenic carbonates of Pliensbachian age, in the context of scheme of local ammonite zones correlatable to the European Standard Zonation. Two sections, río Atuel and arroyo Serrucho, of the mainly siliciclastic Puesto Araya Formation, Neuquén Basin, south-western Mendoza, Argentina, were studied. Specimens of the bivalve genera *Weyla* Bhöm and *Gryphaea* Lamarck were selected for the isotopic determinations because of their low-Mg calcite original mineralogy and widespread presence. Scanning electron microscopy, X-ray diffraction and X-ray fluorescence spectrometry techniques were used to control the good degree of preservation of most of the biogenic material, as evidenced by pristine fabrics, 100% calcite composition and Sr, Mn and Fe concentrations. Although strontium isotope ratios are slightly scattered, it is possible to compare them with those of the Lower Jurassic seawater reference curve. Carbon isotope signals show two relative maxima, correlatable with those recorded for the upper part of the Ibex Zone and the middle part of the Margaritatus Zone in various European sections, indicating the possible global significance of these events. $\delta^{18}O$ values were found to be unreliable for isotope stratigraphy, as they are largely depleted in comparison to those of coeval unaltered marine carbonates.

ISOTOPIC CHARACTERIZATION OF JURASSIC EVAPORITES. ACONCAGUA-NEUQUÉN BASIN, ARGENTINA: *G.L. LO FORTE, F. ORTÍ AND L. ROSELL* galof@gl.fcen.uba.ar; orti@natura.geo.ub.es; lrosell@ub.edu

Isotopic analysis can be used to interpret the origin of evaporitic sediments. A preliminary isotopic study of strontium, oxygen and sulphur has been carried out in Ca-sulphate facies of Jurassic marine evaporites (Tábanos Formation and Auquilco Formation) outcropping in southern Mendoza, Aconcagua-Neuquén Basin (Argentina), as a part of a comprehensive sedimentologic study. The analysed sections are located at arroyo Las Leñitas, Cañada Ancha and arroyo Blanco. Sampled units include laminated, banded, and nodular lithofacies, made up by anhydrite, secondary gypsum and calcite. The mineralogy was studied by conventional petrographic analysis and X-ray diffraction. The $^{87}Sr/^{86}Sr$ ratio was obtained in six samples, with values ranging from 0.706793 to 0.706839, which match marine calcium-sulphate data of the same age. A similar conclusion may be derived from ten samples analysed for oxygen ($\delta^{18}O$) and sulphur ($\delta^{34}S$) isotopic composition: the obtained values are between +11.55‰ and +14.42‰, and between +17.25‰ and +18.48‰ respectively. The sedimentologic-stratigraphic evidence and the isotopic data both suggest a marine origin for the Tábanos and Auquilco evaporites, without an analytically detectable contribution of continental waters or hydrothermal solutions. The results also suggest that no isotope fractionation occurred during the primary gypsum-to-anhydrite-to-secondary gypsum transformations.

BIOFACIES ANALYSIS OF HETTANGIAN-SINEMURIAN BIVALVE/BRACHIOPOD ASSOCIATIONS FROM THE NEUQUÉN BASIN (ARGENTINA): S.E. DAMBORENEA AND M.O. MANCEÑIDO sdambore@fcnym.unlp.edu.ar; mmanceni@fcnym.unlp.edu.ar

Based upon extensive sampling with strict stratigraphical control on Hettangian and Sinemurian deposits cropping out at the river Atuel region (southwest Mendoza Province), the presence of all bivalve and brachiopod genera was recorded. Data gathered from the analysed interval were processed by multivariate analysis and the resulting Q-mode dendrogram was used to discriminate five associations (i.e. *Entolium*-limoids, *Pholadomya-Pinna-Pleuromya*, *Weyla-Gryphaea*, *Lywea* and *Cardinioides*). These are not in simple stratigraphical succession but are recurrent, reflecting palaeosynecological and biofacies influences. The palaeoenvironmental implications of these associations are analysed, as well as their geographical and stratigraphical distributions in the studied sections (Arroyo Malo, El Pedrero and Las Chilcas). The *Cardinioides* association is controlled by palaeosalinity and corresponds to a paralic/estuarine environment, of restricted geographical and stratigraphical distribution, whereas the remaining associations correspond to normal marine shelf to littoral environments. The *Lywea* association is interpreted as allochthonous and probably an impoverished subset derived from the diverse *Weyla-Gryphaea* association. On the basis of the palaeoautecological characteristics of the taxa involved in terms of guilds represented in these benthonic associations, it is concluded that most of the associations were dominated by the epifauna, whereas in the *Pholadomya-Pinna-Pleuromya* association the infauna and semi-infauna were particularly conspicuous and diverse, and the *Cardinioides* association was characterized by shallow infauna. Typical basinal biofacies from deeper, offshore environments, and fresh-water biofacies, are both missing.

FIRST TEUTHID CEPHALOPOD FROM THE LOWER JURASSIC OF SOUTH AMERICA (NEUQUÉN BASIN, ARGENTINA): A.C. RICCARDI riccardi@fcnym.unlp.edu.ar

A new species of squid, *Teudopsis jeletzkyi* n. sp., is described from the Toarcian (Lower Jurassic) Molles Formation in Neuquen Province, central west Argentina. Fossil squids have thus far been unknown in the Mesozoic of South America. This species is the first record of the Order Teuthida in the Jurassic of South America.

HETEROCHRONY IN MIDDLE JURASSIC SPECIES OF GRYPHAEA (OSTREOIDEA, GRYPHAEIDAE) FROM SOUTHERN SOUTH AMERICA: A. RUBILAR arubilar@sernageomin.cl

Morphological changes along ontogeny, based on size, are analysed in five species of *Gryphaea* from the Middle Jurassic of southern South America. Three of these taxa are new: *G. apiculata* n. sp., *G. varillasensis* n. sp. and *G. euteicha* n. sp. All five species have thin radial striae on the left valve. They are regarded as closely related on the basis of the similar configuration of the main part of the left valve (especially during the first ontogenetic stages), the associated development of the posterior flange (and sulcus), the comparable variability and/or recurrent morphology of these and other structures, and their relative stratigraphic position or age. They show differences in the relative appearance time and development of several characters, and similar changes probably have also occurred stratigraphically, at least, in *G. oxytropis* PHILIPPI and *G. euteicha* n. sp. All these features allow the recognition of size (morphology)-based heterochronic processes (peramorphic and paedomorphic), either in the origin of most of these taxa or in morphologic changes, which developed along time in some of them. This work provides preliminary evidence of the most remarkable iterative occurrence of heterochrony known to date in oysters.

INFLUENCE OF A BIOHERMAL BELT ON THE LACUSTRINE SEDIMENTATION OF THE CAÑADÓN ASFALTO FORMATION (UPPER JURASSIC, CHUBUT PROVINCE, SOUTHERN ARGENTINA): N.G. CABALERI AND C. ARMELLA cabaleri@ingeis.uba.ar; armella@ingeis.uba.ar

The Upper Jurassic Cañadón Asfalto Formation (Cañadón Asfalto Basin, Patagonia Argentina), consists mainly of carbonate deposits accumulated in hydrologically closed lakes, which were especially sensitive to rainfall changes. The lacustrine carbonate

sedimentation also interplayed with volcanic episodes recorded by tuffs and lavas, as observed in different basin sectors. These lakes probably underwent warm, alternating humid-subarid and arid conditions that resulted in spreading and shrinkage cycles of the closed water bodies. In the Cerro Cóndor area, carbonates were deposited as part of a 500 m long and 39 m thick microbial biohermal body that extended over 5.5 km^2, overlying a hard basalt substratum. This bioherm ridge acted as a physiographic barrier that controlled the sedimentation in the surrounding lacustrine zones, whose environments ranged from shallow and deep littoral to eulittoral (including microbial patch reefs) and palustrine. A hydrologically isolated portion of the lacustrine basin evolved into a pan lake where widespread carbonate evaporite sequences developed.

After the first conference, it was decided that a second meeting should be organized by Instituto de Geocronología y Geología Isotópica, Universidad de Buenos Aires on May 18-19, 2005.

Organizers: Héctor A. Leanza, Claudia Armella, Nora Cabaleri, Mariana Cagnoni, Adriana Ramos, Diego Silva Nieto, and Susana Valencio. This will include contributions on:

- Structural style of the Atuel depocenter in the Neuquén Basin
- Early Jurassic transgression in southern Mendoza
- Sedimentology and palaebotany of the Atuel rift, Early Jurassic
- Environmental evolution and geochemic-isotopic characterization of the Calabozo Formation, Middle Jurassic, Mendoza
- Lithofacies of the Mesozoic volcanism in Patagonia
- Geochemical characterization of the Jurassic magmatism in Patagonia
- Aeolian Mesozoic deposits of the Andean and Subandean basins in NW Argentina
- Taphoflora from the petrified woods at Gran Bajo de San Julián, Santa Cruz
- Middle-Late Jurassic palynology from Chubut Province, Patagonia
- Early and Middle Jurassic benthonic foraminifers from the Neuquén Basin
- The recovery of marine bivalve faunas after the end-Triassic extinction in the Neuquén Basin
- Middle-Late Jurassic conchostracans from northern Patagonia
- Jurassic plesiosaurs from Patagonia
- Jurassic ichthyosaurs from the Neuquén Basin

DORSET AND EAST DEVON COAST WORLD HERITAGE SITE TEAM

Richard EDMONDS, Earth Science Manager
r.edmonds@dorsetcc.gov.uk

Introduction

The Dorset and East Devon Coast was designated a World Heritage Site in 2001 as the cliffs and foreshore between Exmouth in East Devon and Studland Bay in Dorset display a virtually complete record through the entire Mesozoic. The Site also contains a number of internationally important palaeontological localities and a superb variety of coastal landforms. The history in the development of the geological sciences along this coast is extraordinary.

The successful Nomination of the coast was led by Dorset and Devon County Councils and the Dorset Coast Forum on behalf of the UK Government. The councils now support a World Heritage Team (WHT) comprising five full time members of staff. The aim is ambitious; conservation, education and economic regeneration based on sustainable tourism, improved quality (services and facilities) and social inclusion. The WHT has a strategic role in building a framework for development but many projects will only happen if local people take a lead.

Science and conservation

The Science and Conservation Advisory Group (SCAG) is now chaired by Professor Vince May, a recently retired geomorphologist from Bournemouth University. The Science and Conservation Advisory Network (SCAN) came about following the generous contributions to the Nomination document by many researchers. The SCAN has been contacted on matters that may impact on the Site and their views have proved invaluable. An application to place 200 metres of rock armour along the Mid-Triassic cliffs east of Sidmouth was turned down by the Government inspector on the grounds of environmental damage and cost benefit. An application to build three houses on the cliff edge of the Portland Harbour Shore went to an informal planning appeal in March 2005. Views from the SCAN illustrated the full range of issues on the site. The inspector agreed with Weymouth and Portland Borough Council and turned down the appeal. At Durlston Bay, Swanage, it has been concluded that the landslide of 2000 was triggered by poor surface drainage relating to housing development inland rather than marine erosion. As a result any coast defence scheme would not qualify for grant aid. Improved drainage of the cliff top area is seen as the best solution. At Lyme Regis, major works start along the sea frontage in April 2005, including excavations in the Lower Lias. Although outside the WHS, the Team have been involved in establishing a watching brief for the recovery of palaeontological specimens and stratigraphical recording with Lyme Regis Museum staff and a freelance geologist.

Trial monitoring techniques have been developed for the Lower Lias, based on the Geological Conservation Review (GCR) interests, incorporating both the Joint Nature Conservation Committee (JNCC) and English Nature (EN) site monitoring requirements. Comments

and observations from the scientific community were invited through the SCAN. A database to hold the monitoring records is now under development with the JNCC and EN, using their existing GCR database. But the WHT want to develop more advanced monitoring and recording techniques, particularly of the fossils that are being found from the site and the geomorphological events along it. Members of the SCAN (and anyone who would like to join it) are invited to make comments about the condition of the Site at any time. The West Dorset fossil collecting code continues to operate and a brief report of that is provided in the *Liaison Working Group* section of this Newsletter.

The WHT is aware of the decline in funding for scientific research, particularly in subjects such as palaeontology. The Team does not have access to resources to fund a research programme but believe that their role should be in promoting thematic symposia based on topics contained within the coast. Possible subjects include the Triassic stratigraphy of East Devon, Purbeck Geomorphology, Purbeck (Lower Cretaceous) palaeontology and dinosaur trackways. The WHT has been able to support specific studies such as the Redcliff Point investigation as a candidate GSSP for the Oxfordian/Callovian boundary undertaken by Plymouth University.

The acquisition and display of fossils from the Site remains a challenge. Steve Etches, a well respected collector at Kimmeridge, is seeking to display his outstanding collection of Kimmeridgian specimens. Dinosaur trackways continue to be unearthed in the Purbeck quarries while the WHT has sponsored a detailed survey of the trackway discovered on Portland in 2000. Here, new quarry owners are indicating a more positive view to the recovery and eventual display of these specimens on the Island. In West Dorset, collectors continue to press for a museum or exhibition of local specimens. The key issue is that of sustainability.

An international conference 'Earth heritage World heritage' was held in Dorset in September 2004. The event was jointly hosted by the Joint Nature Conservation Committee, English Nature and the WHT. The theme was '*involving people in geodiversity'* and the conference was aimed at people in a position to champion the Earth Sciences in a broad range of ways. A management weekend followed, with a focus on site conservation and use. A web site has been established in order to develop the themes of the conference (www.geoconservation.com/ conference/index). A paper on the site-based approach to the management of collecting pressure on palaeontological sites is being developed and should be on the web site by June 2005.

Interpretation

The objective, in terms of the development of facilities that interpret the World Heritage Site, is to promote enjoyment, understanding and special interest, out of season tourism on a sustainable basis. Only appropriate activities have been identified for promotion. Some parts of the Site are far too sensitive for an increase in activities while others are too dangerous. Local expectation has been identified through a series of Gateway Town meetings in which stakeholders were invited to express their vision for the future. Where these visions fit with the World Heritage story and the sustainable development of the coast, they have been incorporated into an Interpretation Action Plan (IAP).

The approach is working. In 2003, Dorset County Council was able to regain their lease to Durlston Castle near Swanage. The Castle overlooks Durlston Bay, which contains a magnificent exposure of the Lower Cretaceous Purbeck Beds and lies within a Country Park, which is important for wildlife. The Charmouth Heritage Coast Centre was successful in its application to the Heritage Lottery Fund and the Fine Family Foundation to extend the facilities on the sea front to include an education classroom and greater space for displays. Dorset County Museum in Dorchester made a successful application to the Heritage Lottery Fund for £336, 000 for a new geological gallery with a focus on the Jurassic Coast together with essential improvements to the building. In East Devon the IAP supports applications for potential visitor centres in Exmouth and Seaton to interpret the local environment, particularly the Exe and Axe estuaries and the World Heritage Site. The Team has assisted in the development of an exhibition in Sidmouth Museum.

A great deal of interpretation is required through events and activities and this is on the increase. The Dorset County Museum has hosted winter lectures on geology over the last three years. One objective is to bring leading scientists to the area to highlight the cutting edge of the science. This year, the theme has been geology in a world context with speakers such as Professor Simon Conway Morris talking about the Burgess Shale and the nature of the Cambrian Explosion. Lyme Regis Museum hosted 'Mary Anning Day' for the second year and one of the highlights was a lecture by Dr Hugh Torrens on *'Mary Anning fossils, fame and fortune'*. The Lyme Regis Development Trust, in association with the Natural History Museum, also hosted the Lyme Regis Fossil Festival in April 2005, involving leading scientists in public events, lectures and walks. The aim was to celebrate the rich heritage of the town and to bring top scientists and their stories to the people who live there. The two days were a great success.

Education

An Education Working Group has been established, chaired by Professor Chris Wilson, previous chair of the Open University Geological Society. An Education strategy has been published and has received much praise. The vision of the strategy is: *'Providing formative experiences for young and old visitors to the World Heritage Site that inspires and enthuses them about the beauty and uniqueness of the Dorset and East Devon Coast.'*

An Education Co-ordinator was appointed in the autumn of 2004 and current key projects include: Jurassic Coast teacher training workshops, developing

Jurassic Coast national curriculum teaching and learning materials, developing a Junior Ranger Programme (location based activities for children linking heritage centers along the WHS) and linking to other national and international WHS's through the World Heritage in Young Hands Forum, Newcastle April 6-11th 2005.

Conclusions

There is a lot going on. A very large part of the work is about getting others to see and grasp the opportunities created by World Heritage. The approach is being recognised. Professor Denys Brunsden received an OBE in 2004 in recognition of his work on the coast over the last forty years as a geomorphologist with a particular interest in the landslides of the Dorset coast, Chair of the Dorset Coast Forum and figurehead for the work relating to the World Heritage Site. Furthermore, the work of the World Heritage Team has been recognised at an international level. The Team were a finalist in the World Legacy Sustainable Tourism award in 2004, organised by the National Geographic and Conservation International and winner of the Tourism for Tomorrow Destination category award 2005 from the World Travel and Tourism Council. Conservation of the Site remains paramount and scientists and researchers are reminded that their contribution to this work is welcome. We want to see scientific ideas disseminated through interaction with the public along this coast and we also need to be sure that the Site is not being over exploited, hence the monitoring programme. Your views are welcome.

The Lyme Regis Fossil Festival, April 2005, hosted by the Lyme Regis Development Trust and involving the Natural History Museum and local collectors in an educational event that benefited everyone.

Photographic monitoring of the Burton Coast to capture geomorphological change. The first montage (upper) was taken in the summer of 2004; the second (lower) in April 2005 following a cliff fall through the Bridport Sands and Middle Jurassic Inferior Oolite.

THE WARTAE SUBZONE – A PROPOSAL FOR THE LOWER BOUNDARY OF THE UNIFIED UPPER OXFORDIAN SUBSTAGE IN THE SUBMEDITERRANEAN PROVINCE

Ewa GLOWNIAK
Email Glowniak_EK@uw.edu.pl

The lower boundary of the Wartae Subzone as defined by Glowniak (1997b, 1998) (*non sensu* Tintant, 1958) has been recommended as the lower boundary of the unified Upper Oxfordian Substage in the Submediterranean Province (Glowniak, 2002). This boundary is approximately time-equivalent to the base of the Glosense Zone and the base of the Boreal Upper Oxfordian as proposed by Sykes and Callomon (1979) (Text-fig. 1). Currently in common use there are two different substage boundaries of the Upper Oxfordian in the Submediterranean Province, both placed higher up (fig. 1): one at the base of the Stenocycloides Subzone, the lower subzone of the Bifurcatus Zone as defined by Cariou et al. (1971) (e.g. Cariou et al., 1997); and the other at the base of the overlying Bimammatum Zone (cf. e.g. Kutek et al., 1973; Brochwicz-Lewiski 1976; Meléndez et al., 1985; Cariou et al., 1991; Gygi, 2000).

The base of the Bimammatum Zone falls in the upper part of the Boreal Upper Oxfordian (Matyja & Wierzbowski, 1997), but slightly below the traditional Oxfordian/ Kimmeridgian Stage boundary in the Boreal and also Subboreal zonal scheme (cf. Matyja et al., 2004). The base of the Stenocycloides Subzone, considered by French authors (Cariou et al., 1997) as a close equivalent to the lower boundary of the Boreal Upper Oxfordian, is in fact placed significantly above it. This opinion has been proved in the Submediterranean sections of the Polish Jura Chain in central Poland (Atrops et al., 1993; Matyja & Wierzbowski, 1994), where the first appearance of *Amoeboceras transitorium*, the species characteristic for the lower part of the Glosense Zone, has been recognized considerably below the base of the Stenocycloides Subzone. The exact level of appearance of this species has been re-evaluated with reference to the co-occurring members of the

genus *Perisphinctes* (Matyja & Glowniak, 1998). *Amoebo-ceras transitorium* appears in the topmost part of the Elisabethae Subzone, accompanied by the last representatives of *Perisphinctes* (*Dichotomosphinctes*) *elisabethae*. The next slightly higher distinct faunal level lies at the base of the overlying Wartae Subzone, and is marked by the first occurrence of *Perisphinctes* (*Dichotomoceras*) *wartae* and/or *Perisphinctes* (*Peri-sphinctes*) *cautisnigrae* (Glowniak, 1997a, cf. section below). The lower boundary of the Wartae Subzone thus lies somewhat above, but close to, the lower boundary of the British Glosense Zone, and approximately correlates with the base of the Upper Oxfordian in the Boreal and also NW Europe Zonal scheme.

The further correlation of the Wartae Subzone with the NW Europe Zonal scheme is substantiated mainly by members of the genus *Perisphinctes*. The lower boundary of the Wartae Subzone correlates with the base of the Cautisnigrae Subzone of the Cautisnigrae Zone. This opinion is proved by the perisphinctid species co-occurring with *P.* (*D.*) *wartae* in Czestochowa (Glowniak 1997a) - the type locality of the latter species. It is accompanied there in single horizons by *Perisphinctes* (*Perisphinctes*) *cautisnigrae* - the "English" species of distinct cuneiform ribs as figured by Arkell (1935, pl. 1, figs. 1-2, pl. 3, figs. 1-2; 1937, pl. 3, figs. 1-3). It is certainly this form that co-occurs with *P.* (*Dichotomoceras*) *wartae* in the Polish sections. It has been considered a presumed macroconch counterpart of *wartae*. *Perisphinctes* (*Perisphinctes*) *cuneicostatus* - the other species commonly recognized as a macroconch counterpart of *P.* (*D.*) *wartae* - has not been hitherto reliably recognized in the studied material from Poland. *P.* (*P.*) *cuneicostatus* is a French form, the type locality of which, and the type horizon, remain unknown (Enay, 1966).

A different opinion, according to which *P.* (*P.*) *cautisnigrae* first appears above the levels with *P.* (*D.*) *wartae*, and represents a subsequent form ranging higher, only in the Stenocycloides Subzone of the Bifurcatus Zone (e. g. Enay, 1966; Cariou, et al. 1997), has not been confirmed in the area of Czestochowa. It also seems not to be confirmed in the type area of *P.* (*P.*) *cautisnigrae* in the Red Beds of the Trigonia Clavellata Member at Osmington in southern England, where it is accompanied by *Perisphinctes cautisrufae* Arkell, 1936 (Arkell, 1936, pl. 10, figs. 1a-c, 2a, 2b). This form seems close to, if not conspecific with, the Polish species *P.* (*D.*) *wartae*. Relevant argument for the proximate level of first appearance of *P.* (*D.*) *wartae* and *P.* (*P.*) *cautisnigrae*, is their relation to the first appearance of early *Amoeboceras* ex gr. *Glosense*, *A. glosense* and *A. transitorium*. The species *P.* (*P.*) *cautisnigrae* first appears in the British sections somewhat above, but close to the first appearance of *A. glosense* (Wright, 2001). Similarly, the first appearance of *P.* (*D.*) *wartae* in Poland is somewhat above the first appearance of *A. transitorium* (Matyja & Glowniak 1998). *P.* (*P.*) *cautisnigrae* and *P.* (*D.*) *wartae*, in their type areas, occur thus at levels in the lower part of the Boreal Glosense Zone.

Another question is the precise correlation of the Polish Wartae Subzone with the standard zonation of the Submediterranean Oxfordian in West Europe (Cariou et al., 1997). The main correlation difficulty so far is the scarcity of perisphinctid ammonites co-occurring with the members of the genus *Larcheria* - the taxon diagnostic for the Schilli Subzone as distinguished in West Europe. This taxon is profuse in sections of West Europe, but disappears eastward of Switzerland. Previous attempts to correlate the levels yielding *Larcheria* with those of appearance of *P. wartae* lead to rather ambiguous conclusions (cf. Meléndez & Fontana, 1991, Atrops & Meléndez, 1993). Comparative studies on the ammonite collections from the Polish Jura Chain in Poland and from the Jura Mountains in Switzerland (Collection no IGPUW/A/36 in the Faculty of Geology of the University of Warsaw and the Collection of R. A. Gygi and S. Gygi in the Natural History Museum in Basel), carried out in cooperation with Dr. R. A. Gygi between 1998 and 2001, provided new relevant co-occurrences of perisphinctid taxa, significant for the correlation of the Wartae Subzone with the Schilli Subzone. The material used for the correlation comes from the type areas of *P.* (*D.*) *wartae* (Poland), and of *Larcheria schilli* (the Swiss Jura Mountains). In Switzerland, *Larcheria schilli* is associated in single horizons with *P.* (*D.*) *wartae*. The lower boundary of the Wartae Subzone is approximately coeval with the lower boundary of the Schilli Subzone in Switzerland. Details of the correlation herein presented will be published elsewhere.

The lower boundary of the Wartae Subzone is a convenient level to be recognized as the lower boundary of a unified Upper Oxfordian in the Submediterranean Province, due to its correlation value. There remains the problem of its assignation at zonal level. To promote the Wartae Subzone into a full Zone, following the example of the Schilli Subzone in Switzerland (the Schilli Zone as defined by Gygi, 2001), in my opinion seems unjustified. Of the two boundaries of the Wartae Subzone, only the lower one, the Elisabethae/Wartae boundary, deserves to be distinguished as a zonal boundary. Noticeable evolutionary changes occur at this boundary in ammonites of a single phylogenetic lineage of the genus *Perisphinctes* (Glowniak, 1997a). At this boundary the subgenus *Dichotomosphinctes*, and also the macroconchs of the subgenus *Perisphinctes*, both characteristic for the underlying Elisabethae Subzone, die out. They are directly succeeded by their phylogenetic successors, the big microconchs of *Perisphinctes* (*Dichotomoceras*) *wartae* and *Perisphinctes* (*Perisphinctes*) *cautisnigrae*, which first appear at this boundary. The two previous species, by some elements of their shell-morphology, tend to the forms from the overlying Stenocycloides and Grossouvrei Subzones of the Bifurcatus Zone: to the subgenus *Dichotomoceras*, to which *P. wartae* has been herein reassigned, and to *Perisphinctes* s. str. with distinct cuneiform ribs, which first appear in

macroconchs from the Wartae Subzone. For that reason the Wartae Subzone has been included in the Bifurcatus Zone above, as a basal Subzone (Glowniak 1998). The base of the Bifurcatus Zone has been then placed below the lower boundary of the Bifurcatus Zone sensu auctorum (cf. Cariou et al, 1997; Gygi, 2001) - coeval with the base of the Stenocycloides Subzone. There is evidence, however, that some forms bearing elements of the shell morphology of the subgenus *Dichotomoceras*, appear already below the Stenocycloides Subzone (Gygi & Persoz, 1986; Atrops & Meléndez, 1993).

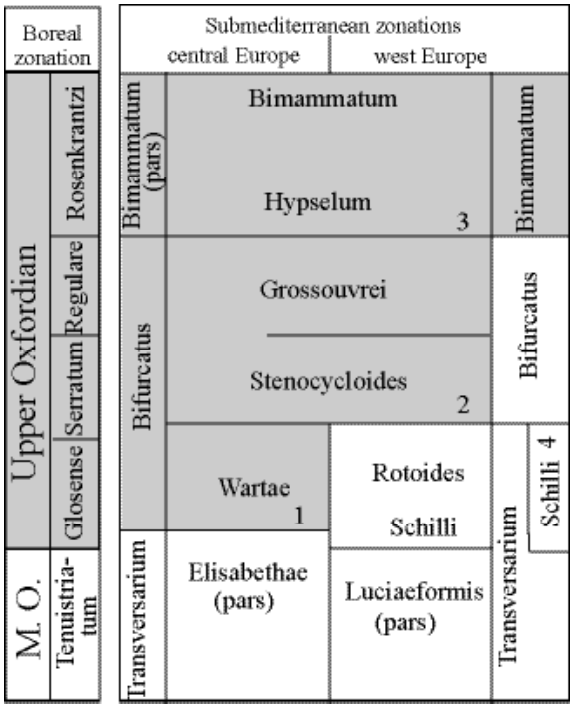

Fig. 1. Correlations in the Upper Oxfordian between the Boreal (Sykes & Callomon, 1979) and the Submediterranean zonal schemes as distinguished in central Europe (Glowniak 1998) and in western Europe (Cariou et al. 1997). The base of the Wartae Subzone (1) approximately correlates with the base of the Upper Oxfordian in the Boreal zonation. It is placed somewhat below the Stenocycloides Subzone (2), and considerably lower than the base of the Bimammatum Zone (2) - each of the two boundaries currently used as the base of the Submediterranean Upper Oxfordian. The Wartae Subzone approximately correlates with the Schilli Zone (4) as distinguished by Gygi (2001). (M.O. is for the Middle Oxfordian).

Conclusions:

1. There has not been so far a uniformly defined Middle/Upper Oxfordian Substage boundary in the Submediterranean Oxfordian zonal scheme. In the traditional usage, the base of the Upper Oxfordian has been drawn at the base of the Stenocycloides Subzone, or higher, at the base of the Bimammatum Zone.
2. The boundary between the Elisabethae and Wartae Subzones is recommended as the lower boundary of the unified Upper Oxfordian in the Submediterranean Province.
3. The Elisabethae/ Wartae Subzone boundary is of great correlation potential in, and beyond of the Submediterranean Province:
- it approximates to the base of the Schilli Subzone in the Submediterranean Province;
- it correlates with the lower boundary of the Cautisnigrae Subzone and the Cautisnigrae Zone in NW European zonal scheme;
- it lies slightly above, but close to, the lower boundary of the Boreal Glosense Zone.
4. The Elisabethae/ Wartae Subzone boundary correlates with the base of the Upper Oxfordian in the Boreal and also NW Europe Zonal schemes.
5. The Wartae Subzone has been absorbed into the Bifurcatus Zone above, as basal Subzone (Glowniak 1998), and the base of the Bifurcatus Zone has been placed somewhat below the lower boundary of the Bifurcatus Zone sensu auctorum (cf. Cariou et al 1997, Gygi 2001).

References:

ARKELL, W.J. 1935. A Monograph on the ammonites of the English Corallian Beds. *Palaeontographical Society*, **1**, p. I-XXXII, p. 1 - 30.

ARKELL, W.J. 1936. A Monograph on the ammonites of the English Corallian Beds. *Palaeontographical Society*, **2**, p. XXXIII-XLVI, p. 31 - 42.

ARKELL, W.J. 1937. A Monograph on the ammonites of the English Corallian Beds. *Palaeontographical Society*, **3**, p. XLVII-LIV, p. 43 - 67.

ATROPS, F., GYGI, R., MATYJA B. A., WIERZBOWSKI, A. 1993. The Amoeboceras faunas in the Middle Oxfordian - lowermost Kimmeridgian, Submediterranean succession, and their correlation value. Acta Geologica Polonica 43, 213 – 227

ATROPS, F., MELÉNDEZ, G. 1993. Current trends in systematics of Jurassic Ammonoidea: The case of Oxfordian-Kimmeridgian perisphinctids from southern Europe. In: 3-me Symposium International: Céphalopodes Actuels et Fossiles. Symposium F. Roman (Ed. by ELMI, S. MANGOLD, C. & ALMERAS, Y.). Geobios Mém. Spéc. 15, 19 - 31.

BROCHWICZ-LEWI_SKI, W. 1976. Oxfordian of the Cz_stochowa area. I. Biostratigraphy. Bulletin de l'Académie Polonaise des sciences, Série des Sciences de la Terre, **24**, 37 - 46.

CARIOU, E., ENAY, R., ATROPS, F., HANTZPERGUE, P., MARCHAND, D. & RIOULT, M. 1997. Oxfordien. In: Biostratigraphie du Jurassique Ouest-Européen et Méditerranéen: zonations parallèles et distribution des invertébrés et microfossiles. (Coord. by CARIOU, E. & HANTZPERGUE, P.). Bulletin Centre Rech. Elf Explor. Prod., **17**, 79-86.

– & ENAY, R., TINTANT, H. 1971. Oxfordien (Province subméditerranéenne). *In*: R. MOUTERDE, R. ENAY, J. MATTEI, M. RIOULT, J. THIERRY & H. TINTANT: Les zones du Jurassic en France. Comptes rendus Sommaire des Séances de la Société Géologique de France, **6**, 18 - 21. Paris.

– & MELÉNDEZ, G., BRANGER, P. 1991. Définition d'une échelle biochronologique fine pour une

zone d'ammonites de l'Oxfordien moyen: zone à Transversarium (province subméditerranéenne). Comptes rendus de L'Académie des Sciences de Paris, **313 II**, 703 - 708.

ENAY, R. 1966. L'Oxfordien dans la moitié sud du Jura Français. I: Etude stratigraphique. II: Contribution a la connaissance des Périsphinctidés. Nouvelles Archives Muséum d'Histoire Naturelle de Lyon 8, 324 pp. (I), p. 325 - 624 (II).

GYGI, R. A. 2000. Integrated Stratigraphy of the Oxfordian and Kimmeridgian (Late Jurassic) in northern Switzerland and adjacent southern Germany. Memoirs of the Swiss Academy of Science, **104**, 152 pp.

– 2001. Perisphinctacean ammonites of the type Transversarium Zone (Middle Oxfordian, Late Jurassic) in northern Switzerland. Schweizerische Paläontologische Abhandlungen, **122**, 170 pp.

GYGI, R. A., PERSOZ, F., 1986. Mineralostratigraphy, litho and biostratigraphy combined in correlation of the Oxfordian (Late Jurassic) formations of the Swiss Jura Range. Eclogae Geologicae Helvetiae, **79**, 385-454.

G_OWNIAK, E. 1997a. Filogeneza, taksonomia i znaczenie stratygraficzne amoniów z rodziny Perisphinctidae oksfordu _rodkowego Jury Krakowsko-Cz_stochowskiej (with atlas). Ph.D. thesis, Geology Department of the University of Warsaw, Warsaw, Pl. 1-49, 330 pp.

– 1997b. Middle Oxfordian ammonites. In: G_OWNIAK, E., MATYJA, B.A., POULSEN N. & WIERZBOWSKI, A. Oxfordian (Jurassic) Meeting in Poland, 26 - 28 May 1997 (report). Jurassic Microfossils Group Newsletter **6**, 12 - 13.

– 1998. The new Perisphinctid subdivision of the Middle Oxfordian and the Lowermost Upper Oxfordian in the Submediterranean Province. In: 5th International Symposium on the Jurassic System, Vancouver 1998, Abstracts Volume, 31-32.

– 2002. A unified boundary of the Middle/Upper Oxfordian in the Submediterranean Province. In: 6th International Symposium on the Jurassic System, Palermo 2002, Abstracts Volume, 72 - 73.

KUTEK, J., MATYJA B. A., WIERZBOWSKI, A. 1973. Stratigraphical problems of the Upper Jurassic deposits in the Warszawa Synclinorium. Acta Geologica Polonica, **23**, 547-576.

MATYJA, B.A., G_OWNIAK, E. 1998. Ammonite successions of the Plicatilis and the Transversarium Zone in the Submediterranean Middle Oxfordian of Poland. In: Mellem- Øvre Jura i Polen. EFP-1995 project: Det polske Mellem-Øvre Jura Epikratoniske Bassin, Stratigrafi, Facies og Bassin Historie. Program Østeuropa. Poulsen, N.E., Bojesen-Koefoed, J., Drewniak, A., G_owniak, E., Ineson, J., Matyja, B.A., Merta, T., Wierzbowski, A.). Geological Survey of Denmark and Greenland Ministry of Environment and Energy, Danmarks og Grønlands Geologiske Undersøgelse Rapport 1998/14, 73 - 100.

MATYJA, B.A., PAGE, K., WIERZBOWSKI, A., WRIGHT, J. K. 2004. Oxfordian/Kimmeridgian boundary at Isle of Skye. Rivista Italiana di Paleontologia e Stratigrafia, **110**, 273 –278.

MATYJA, B.A., WIERZBOWSKI, A. 1994. On correlation of Submediterranean and Boreal ammonite zonations of the Middle and Upper Oxfordian: new data from Central Poland. Geobios Mém. Spéc. **17**, 351-358.

– & – 1997. A quest for a unified Oxfordian/Kimmeridgian boundary: implications of the ammonite succession at the turn of the Bimammatum and Planula Zones in the Wielu_ Upland, Central Poland. Acta Geologica Polonica, **47**, 77 – 105.

MÉLENDEZ, G., FONTANA, B. 1991. Sobre la posición estratigráfica de *Perisphinctes wartae* Bukowski y el desarollo de la subbiozona Rotoides (Biozona Transversarium) en la Cordillera Ibérica Nororiental. Geogaceta **10,** 38-42.

– & SEQUEIROS, L., BROCHWICZ-LEWI_SKI, W. 1985. Tentative biostratigraphic subdivision for the Oxfordian of the Submediterranean Province on the base of perisphinctids. In: O. Michelsen & A. Zeiss (eds). Symposium on Jurassic Stratigraphy, Erlangen 1984, **2**, 481 - 502.

SYKES, R.M., CALLOMON, J.H. 1979. The *Amoeboceras* zonation of the Boreal Upper Oxfordian. Palaeontology **22**, 839-903.

TINTANT, H. 1958. Sur la stratigraphie de l'Oxfordien supérieur aux environs de Dijon (Côte d'Or). Comptes rendus de l'Académie des Sciences de Paris, **246**, 2504-2507.

WRIGHT, J. K. 2001. Osmington. In: J. K. Wright & B. M. Cox (Eds.). British Upper Jurassic Stratigraphy (Oxfordian to Kimmeridgian), Geological Conservation Review Series, **21**, 18-30. Joint Nature Conservation Committee, Peterborough.

REPORT ON JURASSIC ACTIVITIES IN PORTUGAL FOR 2004-2005

Maria Helena HENRIQUES
hhenriq@ci.uc.pt

During 2004 there were several activities involving Jurassic researchers in Portugal.

The 23rd Meeting of the International Association of Sedimentologists took place in Portugal, from the 15th to the 17th of September, 2004, at the University of Coimbra. The proposed general theme was Sedimentology and Society. There were 334 inscriptions from 36 different countries. During the three days of the meeting 254 communications were presented including a total of 159 posters. There were 4 pre-meeting field trips and 2 post-meeting field trips, with a total participation of 96 persons and 18 leaders. One of the post-meeting field trips concerned mainly the Jurassic record of the Lusitanian Basin, resulting in a special field trip guide book edited by L. V. DUARTE & M. H. HENRIQUES ("Carboniferous and Jurassic Carbonate Platforms of Iberia", 23rd IAS Meeting of Sedimentology, Coimbra, 2004, Field Trip Guide Book Volume 1, 130 p, 2004).

Further scientific events include the IV International Symposium ProGEO on the Conservation of the

Geological Heritage to be held in Braga (North Portugal), from 13th to 16th September, 2005. The symposium is organized by the Earth Sciences Centre of the University of Minho and by the European Association for the Conservation of the Geological Heritage (ProGEO). Concerning Jurassic Geology, the Organizing Committee of the symposium proposes a fieldtrip on the Jurassic Heritage and Geoconservation in Portugal by M. H. Henriques and L. Duarte from the University of Coimbra (Portugal), and A. Azerêdo and M. Ramalho from the University of Lisbon (Portugal). Inscriptions and further details are available on the official website of the symposium: www.dct.uminho.pt/cct/progeo2005.

A synthesis on the Jurassic record of the Lusitanian Basin was published during 2004, by A. C. AZERÊDO, L. V. DUARTE, M. H. HENRIQUES & G. MANUPPELLA ("Da dinâmica continental no Triásico aos mares no Jurássico Inferior e Médio", Cadernos Geol. Portugal, Instituto Geológico e Mineiro, Lisboa, 43 p., 14 figs., est. I-VII, 2003).

R. PENA DOS REIS & M. H. HENRIQUES published "Litologias" (2003, Museu Mineralógico e Geológico, Universidade de Coimbra, 100 p.), a book of photographs including the most emblematic landscapes of Portugal with geological relevance. Jurassic outcrops from the Lusitanian Basin are widely represented, in particular Cabo Mondego region, with the Bathonian section here represented on the front cover.

Fig. 1. Participants of the 23rd IAS Meeting of Sedimentology field trip on "The Early Jurassic carbonate evolution in the Lusitanian Basin (Portugal): facies, sequence stratigraphy and cyclicity", coordinated by L. Duarte (University of Coimbra, Portugal). Photo taken at the final stop in the Peniche section (Portugal).

NEW RESULTS OF THE STUDY ON EARLY JURASSIC AMMONITES FROM VIET NAM AND THEIR STRATIGRAPHIC IMPLICATIONS

Vu KHUC, Christian MEISTER, Dang TRAN HUYEN
duythanh@hn.vnn.vn
christian.meister@mhn.ville-ge.ch

Abstract: *During 1997-1999 C. Meister came twice to Viet Nam to collaborate with Vietnamese paleontologists on the study of Early Jurassic ammonites, carried out in both Jurassic basins of the country – Nong Son and Da Lat. The ammonite collection is abundant, enabling an accurate listing of ammonites occurring in the lower part of the Jurassic in these basins, with 2 new genera and 6 new species. This new paleontological study has led to important stratigraphic conclusions.*

1. Research history

In Viet Nam there are two Jurassic basins: the Nong Son Basin in Central Viet Nam and the Da Lat Basin in South Viet Nam. The first basin was widely well known since 1908 with the description by H. Counillon [2] of the "Huu Nien Fauna" including the Hettangian ammonite *"Psiloceras (Aegoceras) longipon-tinum* Oppel". The second basin has been known since 1914 with the description by H. Mansuy [5] of the Toarcian ammonite "*Hildoceras*" *lantenoisi* Mansuy from Tri An. In his work on the Jurassic geology of the world W.J. Arkell [1] revised the ammonite of the Huu Nien Fauna, and renamed it as *Waehneroceras* sp. also of Hettangian age.

Later, H. Fontaine carried out his field study in both of these basins. From the Nong Son Basin his collection is rather abundant in bivalves, which were studied by I. Hayami [3], but samples of ammonites are badly preserved and could not give a reliable determination. In the Da Lat Basin, H. Fontaine succeeded in gathering an abundant collection of both ammonites and bivalves of Toarcian age near the Lo Duc Village, situated not far from the Tri An locality of H. Mansuy. The ammonite fauna was sent to T. Sato, who gave the following list [8]: *Dumortieria lantenoisi* (Mans.) (= *Hildoceras lantenoisi* sensu Mansuy [5]), *D.* cf. *metita* Buckman, *Pseudo-grammoceras loducensis* Sato, *Pseudammatoceras mollukanum* (Cloos), *Hammatoceras* sp.. At the same time Ta Tran Tan, the Vietnamese colleague of Fontaine, collected for the first time in the Da Lat Basin (Chau Thoi Mt) a Sinemurian ammonite collection described by him as "*Coroniceras rotiforme* (Sow.)", *"Asteroceras stellare* (Sow.)", *"Oxynoticeras* cf. *oxynotum* (Quenst.)", *Arnioceras* sp., "*Arietites* sp." [9].

During the period 1975-1980, Vietnamese geologists have been carrying out the geological mapping at the scale of 1:500,000 in all the territory of South Viet Nam. This work established a panoramic picture of Jurassic stratigraphy in both basins. Ammonites were sent to Yu. Repin (St. Peterburg) for identification. According to his study, in the Nong Son Basin there are two ammonite levels: "*Laqueoceras*" sp.,

"*Saxoceras*" sp. of Hettangian, and "*Xipheroceras dudressieri* (d'Orb.)" of Sinemurian. In the Da Lat Basin in addition to known Sinemurian at Chau Thoi and Toarcian at Tri An and Lo Duc, there is a Pliensbachian level with *Paltarpites toyoranus* (Yok.), "*Dactylioceras*" sp. and *Arieticeras* sp.. In the Da Lat Basin Middle Jurassic with *Planammatoceras* sp. was established for the first time [11]. Jurassic sediments in the Nong Son Basin were described as Tho Lam Formation, and those in the Da Lat Basin as Ban Don Formation. The first includes marine sediments in the lower part, but continental red beds in the upper part; the second has only marine sediments.

Since then, work on geological at 1:200,000 and 1:50,000 has been carried out in many areas, necessitating more detailed subdivision of the Jurassic: In the **Nong Son Basin**, Jurassic sediments have been subdivided into 3 formations, namely **Ban Co Fm.** (including coarse-grained beds of Early Hettangian age), **Khe Ren Fm.** (terrigenous beds of Late Hettangian - Toarcian age with the "Huu-nien Fauna" at the base), and **Huu Chanh Fm.** (continental red beds of Middle Jurassic age with silicified wood fossil) [10].

In the **Da Lat Basin**, there are two main facies. In the major part of the basin only marine sediments occur, subdivided into 4 formations, namely **Dak Bung Fm.** (including coarse-grained beds with a badly preserved ammonite fossil of Arietitids and *Cardinia* of supposedly Early Sinemurian age), **Dak Krong Fm.** (terrigenous beds with different ammonite levels from Late Sinemurian to Toarcian), **Ma Da Fm.** (fine-grained sediments of gulf facies with the Aalenian *Planammatoceras* and Bajocian *Fontannesia* faunules), and **Song Phan Fm.** (terrigenous beds with a poor bivalve faunule of supposedly Bajocian-Bathonian age). On the basin margins the marine sediments in the lower part and continental red beds in the upper part have been subdivided into 3 formations with the **Dak Bung** and **Dak Krong Fms** of Early Jurassic age in the lower part, and the **Ea Sup Fm.** of Middle Jurassic age in the upper part [12].

At that time the problems confronting Vietnamese geologists were:

1) Is there a Hettangian ammonite level in the Da Lat Basin, or more generally, did the Jurassic marine transgression begin at the same time in both basins?

2) Was there communication between the two basins? This needed detailed studies on the faunas of both basins, and first of all study of ammonites.

2. New data on Jurassic paleontology and stratigraphy in Viet Nam

To help solve these problems, the Geological Museum of Ha Noi invited Dr Christian Meister (Museum of Natural History of Geneva) to collaborate with Vietnamese paleontologists in the study of the Early Jurassic ammonites of Viet Nam.

C. Meister came to Viet Nam twice. In 1997, the working group, including the authors of this paper, carried out field trips in the Nong Son Basin. The ammonite collection is very abundant; it was studied in Geneva with the collaboration of Peter Doyle, studying the belemnites. The results were published in the 2000 in *Geobios* [6]. In 1999, field trips were carried out in the Da Lat Basin in two main areas: Chau Thoi Mt situated near HoChiMinh City and Dak Lak Province situated on the Tay Nguyen Plateau. The ammonite collection is also very abundant, but gathered mainly in the lower part of the Jurassic sections. It was also studied in Geneva and published in the 2002 on *Revue Paléobiologique* [7].

Palaeontology.

1) Many generic and specific names have been revised with the establishment of two new genera and six new species, as follows:

- *Tongdzuyites nongsonensis = Psiloceras (Aegoceras) longipontinum* sensu Counillon [1] = *Laqueoceras* sp. sensu Repin in Vu Khuc [11] = *Xipheroceras dudressieri* sensu Repin in Vu Khuc [11] = *Jamesonites* sp. sensu Vu Khuc and Cariou [13];
- *Ectocentrites kherucensis = Saxoceras* sp. sensu Repin in Vu Khuc [11];
- *Ectocentrites dommerguesi = Dactylioceras* sp. sensu Repin in Vu Khuc [11];
- *Discamphiceras tongdzuyi = Harpoceras (Ovaticeras)* sp. sensu Vu Khuc [11] = *Paroxynoticeras tongdzuyi* sensu Vu Khuc and Cariou [13];
- *Dalaticeras flexuosum = Arieticeras* sp. sensu Vu Khuc and Cariou [13];
- *Arnioceras* aff. *semicostatum = Coroniceras rotiforme* sensu Ta Tran Tan [9] = *Arnioceras oppeli* sensu Vu Khuc and Cariou [13].

2) The species *Ectocentrites dommerguesi,* together with the bivalves *Protocardia philippianum* Dunker, *Nicaniella* sp., *Thracia* sp. occur in both basins [6] so there was marine communication between the Nong Son and Da Lat Basins;

3) The studied fauna has a clearly endemic character; it seems to be isolated from the Tethyian and Pacific Early Jurassic faunas [7].

Stratigraphy

1) Although the studied fauna is an endemic one, based on the generic composition and morphologic comparisons, it can be dated as very Early Sinemurian, i.e., the "Huu Nien Fauna" is not Hettangian, but Early Sinemurian in age [7];

2) According to their stratigraphic distribution, the lower Sinemurian beds in the Nong Son Basin contain *Tongdzuyites nongsonensis*, *Ectocentrites kherucensis*, while in the Da Lat Basin – *Eolytoceras* aff. *guexi, Discamphiceras asiaticus*. The middle Sinemurian beds in the Nong Son Basin contain *Ectocentrites dommerguesi,* and in the Da Lat Basin – *Ectocentrites dommerguesi, Dalaticeras flexuosum, D. krongii, Discamphiceras tongdzuyi*. The upper Sinemurian beds in the Da Lat Basin contain *Arnioceras* aff. *semicostatum*.

3) Under the above beds, there is a formation of coarse-grained sediments (basal gritstone and sandstone), this means that the Early Jurassic transgression in the areas studied may have begun at the same time, in Late Hettangian.

The new results of this study can be summarized in the following Table of subdivision and correlation of Jurassic sediments in the Nong Son and Da Lat basins.

<table>
<tr><td rowspan="2">Age</td><td rowspan="2">Nong Son Basin</td><td colspan="2">Da Lat Basin</td></tr>
<tr><td>Marginal area</td><td>Central area</td></tr>
<tr><td>J_2bj-bt</td><td rowspan="2">Huu Chanh Fm: continental red beds containing silicified wood fossils

Thickness: 500 m</td><td rowspan="2">Ea Sup Fm: continental red beds containing fresh-water bivalves and silicified wood fossils

Thickness: 400-460m</td><td>Song Phan Fm: interca-lation of sandstone and siltstone, yielding Bositra bronni

Thickness: 750-850 m</td></tr>
<tr><td>J_2a-bj</td><td>Ma Da Fm: mainly of banded clay shale, mudstone yielding Planammatoceras sp. in the lower part and Fontannesia sp. in the upper part

Thickness: 410-500 m</td></tr>
<tr><td>J_1s-t</td><td>Khe Ren Fm: siltstone, clay shale, thin interbeds of marl grading upward to an intercalation of sandstone and siltstone, yielding Tongdzuyites nongsonensis, Ectocentrites kherucensis in the basal beds and a bit higher Ectocentrites dommerguesi,

Thickness: 120-180 m</td><td colspan="2">Dak Krong Fm: calcareous siltstone, marl, calcareous sandstone containing concretions bearing fossils, yielding:
- Dumortieria, Pseudogrammoceras
- Paltarpites
- Discamphiceras, Eolytoceras, Tongdzuyites, Ectocentrites, Dalaticeras, Arnioceras

Thickness: 650-800 m</td></tr>
<tr><td>J_1h^2</td><td>Ban Co Fm: conglomerate, puddingstone, sandstone

Thickness: 570-850 m</td><td colspan="2">Dak Bung Fm: basal conglomerate, sandstone, yielding Arietitidae, Cardinia depressa

Thickness: 120-320 m</td></tr>
</table>

REFERENCES

ARKELL, W.J., 1956. Jurassic geology of the world. Edinburgh, 806 p.

COUNILLON, H., 1908. Sur le gisement liasique de Huu-niên, province de Quang-nam. Bull. Soc. Géol. France, 4 sér., VIII / 7-8: 524-532.

HAYAMI, I., 1964. Some Lower Jurassic pelecypods from South Viet Nam collected by Dr H. Fontaine. Jap. Journ. Geol. Geogr., XXXV : 163-174.

HAYAMI, I. 1972. Lower Jurassic bivalves from the environs of Saigon. Geol. Paleont. SE Asia, 10: 179-230.

MANSUY, H. 1914. Gisement liasique des schistes de Tri-an (Cochinchine). Mém. Serv. Géol. Indochine, III/2: 237-239.

MEISTER, C., VU KHUC, DANG TRÂN HUYÊN, P. DOYLE, 2000. Les ammonites et les belemnites du Jurassique inférieur du Huu Niên, province de Quang Nam, Viêt Nam Central. GEOBIOS, 33/ 1: 79-96.

MEISTER, C., VU KHUC, DANG TRÂN HUYÊN, 2002. Les ammonites du Jurassique inférieur des provinces de Dak Lak et de Hô Chi Minh Ville, Viêt Nam du Sud. Revue Paléobiol., 21/1: 439-483.

SATO, T., 1972. Ammonites du Toarcien au Nord de Saigon, Sud Vietnam. Geol. Paleont. SE Asia, 10: 231-242.

TA TRÂN TÂN, 1968. Ammonites sinémuriennes à Châu-thoi (Biên-hoa). Arch. Géol. Viêtnam, 11: 103-112.

VU KHUC, 1986. Faunas and stratigraphy of marine Jurassic in Viet Nam. Newsletter Intern. Subc. Jur. Strat., 13, Enclosure 2.

VU KHUC (Ed.), 1991. Paleontological Atlas of Vietnam. Vol. 3. Mollusca. Sci. & Techn. Publ. House, Ha Noi. 208 p.

VU KHUC, NGUYEN DUC THANG, 1996. Bajocian ammonites found recently in South Viet Nam. Journ. Earth Sci., 18/4: 375-378 (in Vietnamese).

VU KHUC, E. CARIOU, 1998. Ammonites from Jurassic basins of Viet Nam and their stratigraphic implications. Journ. Geology, 11-12: 107-120. Ha Noi

DEFINITION OF THE TRIASSIC-JURASSIC BOUNDARY

Spencer G. LUCAS, Jean GUEX, Lawrence H. TANNER David TAYLOR, Wolfram M. KUERSCHNER, Viorel ATUDOREI and Annachiara BARTOLINI
slucas@nmmnh.state.nm.us

Abstract - The criterion for definition of the Triassic-Jurassic boundary should be a marker event of optimal global correlateability. Only an ammonite event meets this criterion, and the lowest occurrence of *Psiloceras tilmann*i in the New York Canyon area of Nevada, USA provides the most globally correlateable datum. Other potential marker events for definition of the Triassic-Jurassic boundary (bivalve, conodont and radiolarian bio-events, mass extinction and a carbon isotope excursion) have less correlation potential.

[Editorial note: The full text of this paper is published in *Albertiana* no. 32, the newsletter of the Triassic Subcommission. Spencer Lucas asked that it be circulated within the Jurassic Subcommission so I have included the abstract in this Jurassic Newsletter. The paper is a formal proposal for the GSSP of the base of the Jurassic System and the Hettangian Stage and will be considered by the Triassic – Jurassic Boundary Working Group. NM]

SESSION ON THE JURASSIC SYSTEM AT THE 2004 ANNUAL MEETING OF THE GEOLOGICAL SOCIETY OF JAPAN

Atsushi MATSUOKA
matsuoka@geo.sc.niigata-u.ac.jp

A topical session, "The Jurassic System", was organized during the 111th annual meeting of the Geological Society of Japan (Sept. 18-20, 2004) in Chiba University. The following six papers 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. 18-20, 2005) in Kyoto University.

NIKAIDO, T. & MATSUOKA, A. 2004. Middle Jurassic radiolarian fossils from clasts of the Raga Formation and provenance of Raga Formation, Miyako Group in Iwate Prefecture.

MATSUOKA, A. 2004. Radiolarian paleobiegeography in the latest Jurassic time – *Vallupus* Assemblage and *Eucyrtidiellum* Assemblage.

YAO, A. & NISHIHARA, C. 2004. Specific composition of the Middle Jurassic *Unuma echinatus* Assemblage (radiolarians): Part 13.

NAKAE, S. 2004. Where had terrigenous sediments in the Jurassic subduction zone been accreted? ; a speculation from the duration of their sedimentation.

KONDO, Y. 2004. Temporal changes in the bivalve fauna in salinity-controlled environments, particularly those in the Jurassic.

SATO, T. 2004. Jurassic ammonites discovered from the accretionary complex of the Inner Belt – an overview.

HETTANGIAN – SINEMURIAN AMMONITES OF NEW ZEALAND

Graeme STEVENS
Email dianeandgraeme@xtra.co.nz

A monograph on the Hettangian and Sinemurian ammonites of New Zealand has recently been published:

G.R.Stevens 2004: Hettangian-Sinemurian Ammonites of New Zealand. *New Zealand Geological Survey Palaeontological Bulletin* **76**; *NZ Institute of Geological and Nuclear Sciences Monograph* **23**.

All the occurrences of Hettangian/Sinemurian ammonites in New Zealand are in sediments of the Murihiku Supergroup. These sediments were originally deposited in a fore–arc basin in a convergent margin volcanic arc environment. The volcanic arc extended along the South West Pacific edge of Gondwanaland.

In the Hettangian the following Subzones are represented in New Zealand:

(i) Early Hettangian: Planorbis (?and Pre–Planorbis Beds); Johnstoni.

(ii) Middle Hettangian: Portlocki.

(iii) Upper Hettangian: Extranodosa; Complanata.

Taxa of Hettangian age are: *Phylloceras psilomorphum* Neumayr; *Eolytoceras* cf. *taskoi* Frebold; *Ectocentrites* cf. *petersi* (Hauer); *Psiloceras* cf. *pacificum* Guex; *Psiloceras* cf. *plicatulum* (Quenstedt); *Waehneroceras otapiriense* n.sp.; *Macrogrammites* cf. *grammicum* Buckman; *Storthoceras* cf. *extracostatum* (Wähner); *Murihikuites mackellari* n.gen. et n.sp.; *Kammerkarites megastoma* (Gümbel); *Kammerkarites frigga* (Wähner); *Kammerkarites* cf. *toxophorum* (Wähner); *Angulaticeras marmoreum* (Oppel); *Schlotheimia extranodosa* (Wähner).

The following taxa span the Hettangian/Sinemurian boundary: *Nevadaphyllites pounamuus* n.sp. and *Paracaloceras (Gyrophioceras) loraense* n.sp. The Laqueus Subzone of the Middle Hettangian does not appear to be represented in the New Zealand succession, suggesting either non–preservation of the relevant age–indicative ammonites, or a period of non–deposition.

The record of ammonites of Sinemurian age in New Zealand is rather fragmentary. Only some of the subzones of the Bucklandi and Semicostatum Zones are represented (i.e., Bucklandi Zone: Conybeari and Rotiforme Subzones. Semicostatum Zone: Lyra Subzone).

Taxa of Early Sinemurian age are: *Metophioceras marokopaense* n.sp; *Metophioceras brevidorsale* (Quenstedt); *Angulaticeras flaghillense* n.sp.; *Angulaticeras* cf. *ventricosum* (Sowerby); *Coronicer-as campbelli* n.sp.; *Arnioceras* cf. *bodleyi* (J. Buckman).

Ammonites corresponding to the Scipionianum and Sauzeanum Subzones of the Semicostatum Zone appear to be absent. Also apparently absent are ammonites corresponding to the Turneri Zone, the remaining zone of the Early Sinemurian, together with those of the entire Late Sinemurian. As with the apparent absence of ammonites corresponding to the Laqueus Subzone in the Hettangian, it is not possible to determine whether this absence is due to non–preservation of the requisite taxa or to non–deposition.

The overall diversity of the New Zealand Hettangian/Sinemurian ammonite fauna is rather low when compared with that of Europe, for example – both in the numbers of taxa and the size of the populations. The most likely explanation for this low diversity is that in Hettangian/Sinemurian times New Zealand occupied an active intra–arc geosynclinal sedimentary environment, with facies conditions that were often unfavourable for ammonite life. In addition, New Zealand's palaeolatitude position at the time placed it in a climate zone (warm–temperate) that was probably less than optimal for ammonite life, compared with the more favourable tropical and sub-tropical conditions then prevailing in Europe, for example.

Particularly strong faunal links exist with NW Europe, and especially with the alpine regions of Bavaria, Austria and Slovenia. Very close links are also apparent with the ammonite sequences in British Columbia (Western Canada) and Nevada (Western USA). Links with South America are less clear and similarly those with SE Asia. The presence of these faunal links may be interpreted to indicate that very accessible faunal migration routes were available from Europe to Western North America via the Hispanic Corridor and then via the embryonic Pacific Ocean to New Zealand and New Caledonia.

IN MEMORIAM

ASUNCIÓN LINARES RODRIGUEZ (1921 – 2005)

José SANDOVAL & Leandro SEQUEIROS
sandoval@ugr.es and lsequeiros@probesi.org

After a productive teaching career and a long illness, Professor Asunción Linares Rodríguez died at 84 years of age in Granada on 21 April 2005. She was the second woman to become a full professor at the university (after the Spanish Civil War) and the first in a science faculty in Spain.

In a period when the sciences were reserved for men, Asunción fully demonstrated the capacity of women to do science. She was born in Pulianas, a town very close to the city of Granada, on 12 February 1921 in a middle-class family.

She went to primary school in her hometown and earned her secondary-school degree at Instituto Angel Ganivet in Granada (in those days few women completed secondary school in Spain). Starting in 1942, she completed her undergraduate work at the University of Madrid in 1947. Then she earned her doctorate after writing her doctoral thesis on trilobites under the direction of Professor Bermudo Meléndez, passing her exam brilliantly in 1952 with the highest honours. Apart from her doctoral thesis, her first research works were dedicated to this group of Palaeozoic arthropods. From 1947 on, she joined the teaching staff of the university and carried out her research. She held the posts of professor (1947-1961), and scientific collaborator in the Lucas Mallada Institute of the CSIC (Spanish Science Council, 1958-1962). She pursued special studies in France (Paris, Lyon, Lille, Dijon, Rueil-Malmaison) between 1957 and 1961 under the direction of Professors Albert de Lapparent, M. Lys, Gonzague Dubar, Paul Fallot, Durand Delga, Jean Cuvillier, and René Mouterde. In 1961 she became a full professor of Palaeontology at the University of Granada. From that time on, for 26 years, she continued her work at the same university, being the professor of many generations of geologists and naturalists.

Her research is reflected in part by 18 doctoral theses that she directed, which treat many topics until then not studied in Spain, notable among these: the regional geology of the Betic Cordillera; taxonomic and biostratigraphic studies of planktonic and benthonic foraminifers and radiolarians; studies of micro- and macromammals of the Neogene in the intramontane basins of the Betic Cordillera; and especially the study of ammonoids of the Jurassic and Lower Cretaceous. She also directed an undetermined number (around a hundred) master's theses. In addition, she published more than 100 works of palaeontological research, especially on the ammonites of the Jurassic and Cretaceous, and presented a great number of communications and invited conferences at national and international congresses.

Thanks to her initiative and to all of the theses, Spanish palaeontology, and particularly the study of ammonoids, saw a great advance and succeeded in rising to a European level of excellence, an achievement that was inconceivable at the time that Asunción Linares began her research. Many of her doctorate students have occupied important teaching, research, and academic posts at different universities

(Granada, Cordoba, Huelva, La Laguna, Malaga, Basque Country, Tetouan, Seville, and Zaragoza) as well as at the CSIC. She was the director of the Department of Palaeontology of the University of Granada from its foundation in 1964 until 1986. During this period of political and economic difficulties in Spain, where research was abandoned to fate, she took on the task of setting up laboratories with palaeontological collections that were a reference for all of Spain. Moreover, she established a palaeontological library with not only the most renowned palaeontological journals of the period but also important monographs, many of these old and much needed for palaeontological research.

Together with Professor Fontboté, she co-founded Geology studies at the University of Granada, which soon achieved national and international recognition. She was a writer for the journal *Cuadernos de Geología de la Universidad de Granada* from its foundation in 1970, being director of the Writing Committee of the journal from 1977 to 1985. She was a member of the Geological Society of France since 1958. She was a founding member of the Geological Society of Spain and of the Editorial Committee of the *Spanish Journal of Geology* (Sociedad Geológica de España), and she was a founding member of the Honour Society of the Palaeontology Society of Spain (Sociedad Paleontológica de España). She participated as a researcher in eight research projects, acting as head researcher in three of these. She was a numbered academician of the Academy of Exact, Physical, and Natural Sciences of Granada (Academia de Ciencias Exactas, Físicas y Naturales de Granada) and was president of the Spanish Commission for Jurassic Studies (Comisión Española para estudios del Jurásico). She served as the Director of Student Aid of the University of Granada (Directora de Asistencia Estudiantil de la Universidad de Granada, 1980-1981), vice rector of Academic Planning of the University of Granada (Ordenación Académica de la Universidad de Granada, 1980-81) and Director for the Institute of Educational Sciences of Granada (Instituto de Ciencias de la Educación de Granada, 1981-1984). In 1987, after her retirement, she became professor emeritus of the University of Granada, working as such until three years before her death.

After her death, her dedication to charitable causes became known, having worked as a volunteer in hospitals, helping homeless women, and serving as president of the board of the Institution of Pope John XXIII, an organization devoted to the education of infants and children in underprivileged zones. She was tireless, dedicating ever more time to palaeontology and especially to ammonoids and the biostratigraphy of the Jurassic, which were her great passion.

Jürgen Rudolf REMANE (1934 – 2004)

Nicol MORTON
NICOL.MORTON@wanadoo.fr

On the 15th November 2004 Jürgen Remane finally lost his long battle with illness. His passing is of course a great loss to his wife Angelika and to his family, to whom we extend our deepest sympathy. It is also a great loss to us his friends and colleagues in the "Jurassic family".

Many of us have fond memories of Jürgen's presence in the Jurassic Symposia over the years. He was a regular participant, sometimes in his role as Chairman of the International Commission on Stratigraphy. On such occasions he would give a lecture on chronostratigraphical principles and the ideal requirements for a boundary stratotype (GSSP) of the Stages. This usually resulted in a lively discussion between Jürgen and John Callomon, which I personally always found most entertaining. One could have thought that they were great enemies. However, I noted that soon afterwards they were always together for drinks or meals and that their mutual respect, despite differences of opinion, was always evident.

We were delighted to have Jürgen's participation, together with Angelika, at the most recent Jurassic Symposium, Sicily 2002, and especially to see him on the pre-Symposium fieldtrip in western Sicily. Most of us did not realise at the time how ill he was. The walk to the quarries was slower for him than previously – accompanied by my wife, Sheila, there were frequent stops to photograph flowers or the scenery. However, I remember very well one evening after dinner at the hotel in Erici, he was esconced in a corner happily engaged in lively discussions. The seriousness of his physical condition was disguised from all but a few of us who knew. Looking at the photograph of him, taken only a few months before his death, one cannot but be surprised.

Jürgen was born in Kiel, Germany, on 16th May 1934. His father was Professor of Zoology in Kiel and Halle so Jürgen became interested in the natural sciences, studying in Germany at Plön, Kiel and Tübingen. After his *Vordiplom* he spent one year in Grenoble, France, obtaining the *Diplôme des Études supérieurs* in geology, before returning to Tübingen where he studied for his doctorate under the direction of O.H. Schindewolf. His graduate studies were interspersed

with periods of training abroad, especially with the Geological Survey of Sweden. On obtaining his doctorate in 1962 he became Assistant in Göttingen, before moving to Neuchâtel in 1969, where he was rapidly promoted, becoming Professor in 1978. He was a very active researcher, with numerous publications, and teacher, mainly in Neuchâtel but also in Geneva and Linares, Mexico.

It is impossible for me to summarise all Jürgen's scientific achievements, so I mention only some aspects. Perhaps his best known research contribution is his pioneering work on calpionellids in the Upper Jurassic and Lower Cretaceous carbonates of the Tethyan Realm. This demonstrated the great biostratigraphical usefulness of these fossils in the relative dating and correlation of the uppermost Jurassic and lowermost Cretaceous. Calpionellid biostratigraphy will, most probably, provide the key correlation event for defining the base of the Cretaceous.

As a result of his stratigraphical researches Jürgen became involved in various stratigraphy subcommissions, and the International Commission on Stratigraphy of the International Union of Geological Sciences, first as member, then as General Secretary and finally as Chairman. In these roles he established revised guidelines for the selection and nomination of basal boundary stratotypes to define a stable chronostratigraphic scale at the level of Stages, considered by many stratigraphers (except in the Jurassic?) as the basic units for chronostratigraphy. The guidelines consisted of a list of the 'ideal' properties of a section to be proposed as the international reference point (GSSP). Of course, he recognised (as was emphasised by others) that such an ideal section would almost certainly never be found – the best available would have to suffice. In parallel with this work of definition, was integration of different stratigraphical methods and the best available numerical dates. This work, which culminated in the publication of the International Stratigraphic Chart by IUGS in 2000, established a sound academic foundation for the ongoing work of ICS, which is now also realising the economic value.

The other major contribution by Jürgen I would like to mention is his role as Chief Editor of the journal of the Geological Society of Switzerland, *Eclogae Geologica Helvetiae*, from 1997 until the end of his life. His breadth of experience and wealth of international contacts ensured that the journal maintained a high international reputation.

Jürgen was involved in many aspects of our science, to which he contributed so much internationally and in different Systems. He always said that he particularly appreciated and enjoyed the friendly family atmosphere of the Jurassic Symposia. He contributed greatly to this with his generous and jovial character – always approachable and always ready with encouraging words. He went out of his way to be helpful, and we can confirm this from personal experience.

HOWARD W. TIPPER (1923 – 2005)

Paul L. SMITH
Email psmith@eos.ubc.ca

I am sorry to announce the death of Dr. Howard W. Tipper who succumbed to respiratory complications on April 21ST, 2005 after a long battle fighting a brain tumour. Howard, known almost universally within his profession as 'Tip', was born in Huntsville Ontario in 1923. He obtained his PhD in geology from the University of Western Washington during the course of which he served as a field assistant with the Geological Survey of Canada (GSC), beginning an association that was to last for the rest of his life. After working in Ottawa, where he and his wife Esther had 3 boys (Barry, Brian and Kim), he moved to Vancouver in 1969 so that he could concentrate more effectively on the focus of his career, the geology of the Western Cordillera.

While many of you will know Tip through his long association with the Jurassic Subcommission, few will have an appreciation of the length of his career or the diversity of topics he tackled during his lifetime. He was a respected authority on the glacial history, regional geology, tectonics, stratigraphy and paleontology of the Canadian Cordillera. When he began fieldwork, searching for metals to help the war effort, it was on horse back, mapping areas of British Columbia that had been heavily glaciated. This had two influences on him. Firstly, he began amassing a wealth of information on the glaciation and deglaciation of British Columbia that would result in several classic papers. Secondly, bedrock outcrops were so few and far between that he got into the habit of wringing the maximum amount of information from an outcrop, particularly anything that had a bearing on correlation. When his attention turned to the Hazelton and Smithers areas of central British Columbia, his passion for the Jurassic began in earnest. The volcanic arc environments in which the Jurassic rocks were deposited resulted in rapid and complex facies changes made even more difficult to understand by their complex tectonic setting. Some geologists simplified their maps and ignored the difficulties but Tip showed that ammonites were the key to correlation and a meaningful understanding of the geology. His work to the south, in the Taseko Lakes map area, produced rich, strongly endemic faunas from parts of the Jurassic that were not well understood elsewhere in the world, let alone in British Columbia. He found he needed help and so began a long relationship with his GSC colleagues and paleontological mentors Hans Frebold and George Jeletzky. The paper published with Hans Frebold in 1970 in the *Canadian Journal of Earth Sciences* summarized the current state of knowledge of the Jurassic of western Canada and became a milestone contribution.

I met Tip in 1980 and for the last 25 years of his life we had a wonderful time exploring British Columbia by helicopter and boat. Much time was spent in the Queen Charlotte Islands and some of you will recall the field trip there that Tip directed as part of the Vth Jurassic Symposium held in Vancouver in 1998.

There were two main aims to our collaborative work: 1) trying to understand Jurassic paleobiogeography in the context of displaced terranes, and 2) capitalizing on the opportunity for time scale calibration afforded by the interbedding of volcanic rocks with marine sedimentary rocks yielding Lower Jurassic ammonites and radiolarians. He hoped to see a fully integrated time scale for the Early Jurassic of North America but, sadly, much of the Canadian data for the Hettangian and Sinemurian was excluded when the American group published the ammonite zonation independently in 2000. A positive outcome is that there are 3 papers in press, 1 in review, and at least 1 more to be submitted that will supplement the zonation with Canadian data. It is unlikely that all these papers will be published before 2007 which means that Tip's publication record will span an incredible 60 years!

Tip was a pioneer in the exploration of the geology of British Columbia. You can imagine that it came as a considerable surprise to me to discover that he hated camping. I suspect it was because of the early hardships in the field when cutting trail for horses and living off the land. He referred to tents dismissively as 'rag houses' but his general attitude to survival in the wilderness had at least one positive outcome. His base camps, or as we used to call them 'Chez Tipper', were often luxurious with floor boards in the tents, wood-burning stoves, showers, lanterns and plenty of good wholesome food. All these supplies had to be flown in by helicopter or float plane, of course.

Tip was a kind man possessed of quiet sense of humour. During his last difficult days, I was having a somewhat one-sided conversation with him when, speaking euphemistically, I spoke of this all being part of life's grand journey. He slowly turned his head and, with a twinkle in his eye, asked: "Why, where are you going?" In preparing for Tip's remembrance service I was amazed at the number of people who came forward to say how grateful they were to him for giving them their big break, suggesting a line of research, or offering encouragement at a critical time in their life. In his passing, many of us have lost a great friend, but we have all lost a great colleague.

Howard Tipper (Tip) leading a fieldtrip for the Vth International Jurassic Symposium on Queen Charlotte Islands in 1998.