INTERNATIONAL SUBCOMMISSION ON JURASSIC STRATIGRAPHY

NEWSLETTER N° 26

January 1999

A SUBCOMMISSION OF THE INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (I.U.G.S.)

INTERNATIONAL SUBCOMMISSION ON JURASSIC STRATIGRAPHY

NEWSLETTER N° 26

January 1999

Chairman: Prof. Giulio PAVIA - University of Turin, Italy

Secretary: Prof. Fabrizio CECCA - University of Marseille, France

A SUBCOMMISSION OF THE INTERNATIONAL
UNION OF GEOLOGICAL SCIENCES (I.U.G.S.)

NEWSLETTER N° 26

Letter from the Secretary p. 2

1 - Current status 3

1.1. Current status of GSSPs proposition/preparation 4
1.2. Anticipated work-plan for the period 1999-2000 5

2 - Statutes of the International Commission on Stratigraphy (ICS) 7

3 - The Jurassic palaeoenvironment maps of the Peri-Tethys programme: five selected glances within a 50 m. y. history (J. Thierry) 15

4 - Triassic/Jurassic Boundary WG 23

Report by the Secretary (G. Warrington) 24

5 - Jurassic Stage Boundary WGs 31

5.1. Hettangian-Sinemurian BWG (Bloos G.) 32
5.2. Sinemurian-Pliensbachian BWG (Meister C.) 33
5.3. Pliensbachian-Toarcian BWG (Elmi S.) 43
5.4. Toarcian-Aalenian BWG (Cresta S.) 46
5.5. Bajocian-Bathonian BWG (Mangold C.) 50
5.6. Bathonian-Callovian BWG (Callomon J. H.) 53
5.7. Callovian-Oxfordian BWG (Melendez G.) 61
5.8. Oxfordian-Kimmeridgian BWG (Melendez G. & Atrops F.) 67
5.9. Kimmeridgian-Tithonian BWG (Cecca F.) 74

6 - Jurassic Thematic Working Groups 75

6.1. Sequence Stratigraphy 76
6.2. Jurassic Microfossil Group 79

7 - Up-dated Directory of the ISJS 81

8 - Information on Symposia 85
6th Symposium on Jurassic Stratigraphy
1st National Colloquium on Jurassic of Morocco
Life and Environment in Purbeck Times

ADDENDA - Comparison research of terrestrial life and environments between western and eastern Eurasia during Purbeck times (Liu, B.) 87

LETTER FROM THE SECRETARY

You have just received the new ISJS Newsletter on your desk. Then you begin to read those parts attracting your attention. What happens later ?

It seems that some members of ISJS forget to communicate the informations contained in the Newsletter to the colleagues of their geographical area and field of interest.

I perfectly know how busy is everybody and that time is never enough. Nevertheless, you received a proposal to become a member of ISJS and you **accepted** the duties comprised in this engagement after the receipt of a letter that I sent you at the end of 1996.

Due to numerous complaints that both the Chairman and I have received, I am obliged to remind you the content of that letter, i. e. the **duties** of a member of ISJS.

1 - vote on the GSSPs' proposals (Voting Members only);
2 - active participation in the discussion and in the decisions taking place in the Subcommission;
3 - information to colleagues in the region or **country where you live or work** concerning activities in the Subcommission or news from the Subcommission;
4 - **circulation** of our Newsletter which is issued approximately once a year.
5 - **information** to the Jurassic Community, also by means of ISJS, on scientific **activities on Jurassic** successions of **your own country and field of interest.**

Points 3 and 4 are also concerned with linguistic needs because the English language is not currently spoken in most of the countries that you represent and even the latin alphabet may not be used. I would like to remind that most of you have been selected also because of their possibility to communicate with the international scientific community.

Point 5 is also very important. Just take the past issues of the Newsletter and read the useful reports of other Corresponding Members. Thierry's report in the present issue perfectly corresponds to what a Corresponding Member is supposed to do.

Therefore, do not put Newsletter 26 below a mound of papers growing up on your desk !!!

On the other hand, thanks to the cooperation of Terry POULTON, the Chairman and I are currently studying the possibility to create a Web site for ISJS. This will enable interested persons to get all information on activities about research on Jurassic Stratigraphy.

Many thanks for your cooperation and best wishes.

Fabrizio CECCA
Secretary of ISJS

The Secretary has a new address:

Prof. Fabrizio CECCA
Centre de Sédimentologie et Paléontologie
Université de Provence
3, place Victor Hugo - Case 67
F-13331 Marseille - FRANCE
Tel. +33.4.91106388
Fax +33.4.91649964
e-mail cecca@newsup.univ-mrs.fr

1 - CURRENT STATUS

1.1. CURRENT STATUS IN GSSPS' PROPOSITION/PREPARATION

STAGES	PROGRESS REPORT
TITHONIAN	Field trip and meeting will take place during 1998 at Canjuers, in the SE France basin. Next meetings could be organized in South Germany.
KIMMERIDGIAN	English workers prefer a GSSP section on the Dorset Coast. The secondary reference section for the mediterranean province is selected in the Crussol Mountain or in Iberian Chains.
OXFORDIAN	A draft of the proposal on the potential GSSP in SE France was presented at Vancouver Symposium (August 1998). The final proposal for ballot within ISJS is expected in a short time. The proposal will be submitted to ICS for ratification by October 1999.
CALLOVIAN	The proposal of a Swabian GSSP is in progress. During 1999 it will be submitted for ballot within the BWG and then to ISJS.
BATHONIAN	The Bas Auran section was selected as GSSP but still needs ratification within the BWG. During September 1998 new data from the complementary section of La Palud have been obtained. Towards end of 1998 a formal proposition of the GSSP can be done.
BAJOCIAN	The GSSP at Cabo Mondego was ratified in 1996. A new BWG meeting is planned by the end of 1999 or beginning 2000 in Hungary for discussion on the zonal scheme.
AALENIAN	The final proposal for the GSSP at the Fuentelsalz section in Iberian Chains is completed and will be submitted to ballot within ISJS by Spring 1999.
TOARCIAN	Candidates for GSSP in Spain or Noth Africa are under discussion within the BWG.
PLIENSBACHIAN	No definitive data ara available. Significant proposals are centered on Italian sections.
SINEMURIAN	The proposal for GSSP in Somerset (Quantock's head near Watchet, U.K.) is in progress. The ballot within BWG and ISJS is expected by October 1999.
HETTANGIAN and T/J BWG	The sections of New York Canyon (USA) and Queen Charlotte Islands (Canada) are implemented, and visited during the Vancouver Symposium in 1998. New data resulted available from the section in Somerset (UK). The fourth GSSP candidate is the Utcubamba Valley section (N. Peru). A new, and perhaps definitive meeting is planned in England. The ballot within the BWG is expected by the end 1999.

1.2. ANTICIPATED WORK PLAN FOR THE PERIOD 1999 -2000

1999: Presentation of proposals for Sinemurian, Aalenian, and Oxfordian GSSPs to ICS.
Submission of T/J, Bathonian and Kimmeridgian GSSP proposals to ISJS for voting.

2000: Presentation of proposals for T/J, Bathonian and Kimmeridgian GSSPs to ICS.
Preparation of Pliensbachian, Toarcian and Callovian GSSP proposals to ISJS for voting.
Selection of definitive candidates for Tithonian GSSP within the BWG.

2 - STATUTES OF THE INTERNATIONAL COMMISSION ON STRATIGRAPHY (ICS)

CONTENTS

1. Definitions
2. Purpose and Objectives
3. ICS Organization and Voting
4. ICS Bureau and Officers
5. ICS Subcommissions
6. ICS Committees
7. Establishment and Dissolution of ICS Constituent Bodies
8. Elections
9. Meetings
10. Annual Reports
11. Entry into Force and Amendments to Statutes

1. DEFINITIONS

The International Commission on Stratigraphy is a Commission established by the International Union of Geological Sciences. The Commission is hereinafter referred to as ICS and the Union as IUGS. The executive body of ICS is named the Bureau. The Full Commission of ICS is the quorum formed by the officers of the Bureau and the Chairpersons of each of the Subcommissions. They are the Voting Members of the Commission. The International Geological Congress, hereinafter referred to as IGC, is a conference of earth scientists normally held every four (4) years.

2. PURPOSE AND OBJECTIVES

ICS is a body of expert stratigraphers founded for the purpose of promoting and coordinating long-term international cooperation and establishing standards in stratigraphy. Its principal objectives are:

(a) the establishment and publication of a standard global chronostratigraphic scale and the preparation and publication of global correlation charts, with explanatory notes,

(b) the unification of lithostratigraphic nomenclature by organizing and documenting lithostratigraphic units on a global data base, with periodic updates,

c) the scrutiny of new stratigraphic methods and their integration into a multidisciplinary stratigraphy, and

(d) the definition of principles of stratigraphic classification, terminology and procedure and their publication in glossaries, with periodic revisions.

The scientific activities shall be carried out through projects or meetings arranged in collaboration with IUGS-affiliated organizations, IUGS-joint programs, non-governmental bodies and inter-governmental bodies.

3. ICS ORGANIZATION AND VOTING

ICS is managed by the Bureau which consists of elected and appointed officers. ICS is organized into two types of constituent bodies, Subcommissions and Committees, with their own executives and members. Subcommissions are bodies created for the long-term study of specific aspects of stratigraphy. Committees are bodies created for limited or short-term stratigraphic tasks. The Chairpersons of the Subcommissions and the Bureau members are the voting members of the Full Commission. The Full Commission makes all formal decisions of ICS. Chairperson of the Full Commission is the Chairperson of ICS.

The members of the Full Commission make their decisions by vote. For approval, all decisions, including elections, require a sixty percent (60%) majority of delivered votes, provided that a quorum of 60% has been attained. Such votes are conducted by postal ballot, giving a deadline of sixty (60) calendar days for the receipt of the votes. Voting Members may vote "yes," "no" or "abstain."

4. ICS BUREAU AND OFFICERS

The officers of the ICS Bureau shall be the Chairperson, the 1st Vice Chairperson, the 2nd Vice Chairperson, the Vice Chairperson at Large and the Secretary General. The post as officer of ICS is limited to eight years. The position of Chairperson is limited to one term (4 years), but for the sake of continuity the Chairperson will be one of the elected bureau members during the preceding term (4 years). All Past Chairpersons will become consultant ex-officio members of the Bureau. All officers serve in an individual capacity. The other officers shall serve as advisors to the Chairperson and assist him/her in the performance of his/her duties.

4.1 Chairperson

The Chairperson shall be the chief executive officer of ICS. He/she shall manage its activities and set scientific goals for the individual Subcommissions and Committees within the scope of the authority delegated to him/her by IUGS. He/she shall keep the financial accounts of ICS. He/she shall solicit the advice of the Full Commission, when necessary, for the administration of ICS and consult with it on matters of major policy and scientific programs either by correspondence or by meetings.

4.2 1st Vice Chairperson

The First Vice Chairperson shall serve as Chairperson for the remainder of the term of office when the position of Chairperson should become vacant.

4.3 2nd Vice Chairperson

The 2nd Vice Chairperson shall replace the 1st Vice Chairperson if he/she has to serve as Chairperson (according to 4.2) or if the position of 1st Vice Chairperson should become vacant.

4.4 Vice Chairperson at Large

One Bureau member shall coordinate the work of ICS with the Preparatory Committee of the next IGC. He/she is appointed by the other officers of the Bureau in consultation with members of the Full Commission and Preparatory Committee of the next IGC.

4.5 Secretary

The Secretary shall assist the Chairperson in his/her administrative and scientific work. He/she shall record the minutes of meetings of the ICS Bureau and of the Full Commission and keep the financial accounts of ICS. He/she organizes the votes within the Full Commission.

4.6 Past Chairpersons

The Past Chairpersons shall serve as consultant ex-officio members of the Bureau.

5. ICS SUBCOMMISSIONS

5.1 Composition of Subcommissions

Each Subcommission shall be managed by an executive body consisting of a Chairperson, at least one Vice Chairperson and a Secretary.

Subcommissions shall be made up of between ten (10) to twenty (20) Voting Members, including their officers. They shall represent regional and methodological diversity in an appropriate manner. Membership may be terminated if a Voting Member fails to participate in the work of the Subcommission and does not respond to communications from its Chairperson.

Subcommissions may appoint a reasonable number of Corresponding Members for the advice of Voting Members in achieving the assigned scientific tasks.

5.2 Officers

The Chairperson shall be the chief executive officer of the Subcommission. He/she is responsible for the execution of agreed scientific goals and the preparation and the contents of annual scientificand financial reports of the Subcommission. In consultation with the Voting Members of the Subcommission, he/she establishes work plans and operating budget requests for the following year. The Vice Chairperson shall serve as Chairperson when the position of Chairperson should become vacant. The Secretary assists the Chairperson in his/her scientific and administrative duties and is responsible for the organization of votes within the Subcommission.

5.3 Intersystem Boundary Working Groups

Subcommissions which are responsible for one of the systems of the chronostratigraphic scale shall have an Intersystem Boundary Working Group for definition of the lower boundary of that system, if no boundary-stratotype has yet been defined.

Each Intersystem Boundary Work Group shall have a Chairperson, a Vice Chairperson and a Secretary. The Chairperson of the Intersystem Boundary Working Group shall be a Voting Member of the respective Subcommission and report to its Chairperson.

Intersystem Boundary Working Groups shall be made up of ten (10) to twenty (20) Voting Members, including its officers, and shall represent regional and methodological diversity in an appropriate manner. Membership may be terminated if a Voting Member fails to participate in the work of the Working Group and does not respond to communications from its Chairperson.

Intersystem Boundary Work Groups may appoint a reasonable number of Corresponding Members if they require their advice in achieving the assigned scientific task.

5.4 Other Bodies

Subcommissions may appoint such working groups, regional committees or other ad hoc groups which they consider necessary to fulfill their scientific tasks. These bodies report to the Chairperson of the respective Subcommission.

6. ICS COMMITTEES

The Committees report directly to the ICS Bureau. The organization of Committees is related to their scientific tasks and is subject to approval by the ICS Chairperson.

7. ESTABLISHMENT AND DISSOLUTION OF ICS CONSTITUENT BODIES

7.1 Subcommissions

New Subcommissions shall be established by the IUGS Council when the Full Commission of ICS is convinced of the necessity and makes a recommendation for the establishment of a new ICS Subcommission to the IUGS Council. When approved by the IUGS Council, the IUGS Executive Committee shall appoint a temporary Chairperson, Vice Chairperson and Secretary and the other initial members of the new Subcommission, following the proposal by the Full Commission of ICS. To develop this proposal, the Full Commission of ICS shall select the initial members and temporary officers from a recommendation made by the ICS Chairperson. For subsequent terms of office, elections shall be held within the Subcommission by a quorum of Voting Members.

The dissolution of Subcommissions requires the consent of the IUGS Council.

In case of chronostratigraphically oriented Subcommissions, a new Intersystem Boundary Working Group may be appointed if there is a strong demand to replace an existing boundary-stratotype with or without notable change of the boundary level. If at least sixty percent (60%) of the

Voting Members of the Subcommissions responsible for the system above and below the boundary and of the Commission vote in favor of undertaking a boundary revision, a new Intersystem Boundary Working Group shall be established, which may then propose a new boundary-stratotype or confirm the old.

At the demand of the Chairperson of the Subcommission to which the Intersystem Boundary Working Groups reports, and with the approval of the Chairperson of ICS, an existing Intersystem Boundary Working Group may be reorganized to continue with new officers and members.

In both cases, the following procedure, conducted by the Chairperson of the Subcommission to which the Intersystem Boundary Work Group reports, shall be followed:

(a) A list of candidates for Voting Membership in the new Working Group is established based on nominations from Voting Members of the Subcommissions dealing with the systems above and below the boundary. Nominees may, in part, be Voting Members of the old Working Group; they need not be Voting Members of one of the Subcommissions.

(b) From these nominees, the Voting Members of the Subcommission responsible for the system above the boundary shall elect between ten (10) and twenty (20) Voting Members of the new Working Group.

(c) The new Voting Members shall subsequently elect the officers of the new working Group.

Intersystem Boundary Work Groups are automatically dissolved once they have fulfilled their objective.

7.2 Committees

New Committees may be established by decision of the Full Commission. The initial members and temporary officers of the new Committee shall be appointed by the Chairperson of ICS after consultation with the other Bureau members and after opportunity for suggestions has been given to Subcommissions of ICS. For subsequent terms of office, the Committee shall elect its officers by a quorum of Voting Members.

Committees may be dissolved, reorganized or regrouped with other ICS bodies by decision of the Full Commission.

8. ELECTIONS

8.1 Terms of Office

The term of office for the Voting Members of the Full Commission, of Subcommissions and their constituent bodies, and of Committees shall be the period between two IGCs, normally four (4) years. The Chairperson of ICS cannot be reelected. The Secretary General is appointed by the elected Chairperson before entering into office as Chairperson. The elected Bureau members shall be reelectable only for one more four-year term after his/her election for the initial term of office.

Voting Members of Subcommissions, including Intersystem Boundary Work Groups, and of Committees shall be reelectable for two more four-year terms after their election for the initial term of office. At the end of each term one-third (1/3) of the Voting Members shall be replaced by new Voting Members. In case of extraordinary organizational or scientific circumstances, Voting Membership may be extended after approval has been obtained from the ICS Chairperson.

8.2 Nominating Committee

The Nominating Committee is the body elected by the Full Commission for proposing candidates for the position of the Chairperson, the 1st Vice Chairperson and the 2nd Vice Chairperson. The Committee shall consist of five (5) members. The Chairperson of the Nominating Committee shall be appointed by the ICS Chairperson.

A slate of candidates for the Nominating Committee, having declared that they are willing to serve, shall be prepared by the ICS Chairperson, starting at least twenty-four (24) months prior to the next IGC. At the same time, all Voting Members of the Commission can propose additional

candidates for the Nominating Committee to the ICS Chairperson. This slate shall be submitted to the Voting Members of the Commission for election not later than twenty-one (21) months prior to the next IGC. The same voting stipulations apply as for the election of ICS officers.

8.3 Nomination of Officers of the ICS Bureau

The Nominating Committee shall invite proposals of candidates for the positions of Chairperson, First Vice Chairperson of the Bureau from all Subcommissions of ICS, but the Committee shall not be restricted thereby in its choice of candidates.

The Nominating Committee shall evaluate the merits of all proposed candidates for each position, taking into consideration their scientific qualification, managerial capability and willingness to serve. The Committee shall nominate to the ICS Chairperson one candidate for each of the three positions no later than eighteen (18) months prior to the next IGC, bearing in mind geographical and disciplinary diversity in order to ensure that the principle schools of stratigraphic thought are represented in the Bureau.

Upon receipt of the Nominating Committee's submission, the Chairperson of ICS shall promptly circulate the proposal of nominated candidates to all the Voting Members of the Commission. If Voting Members disagree with any of the selected candidates, they may propose, in addition, their own candidate(s) to the Chairperson of ICS and of the Nominating Committee, provided that twenty-five percent (25%) of the Voting Members of the Commission are in support of such proposal, that the Chairperson of ICS and of the Nominating Committee has received such proposal no later than fourteen (14) months prior to the next IGC and that these candidates fulfill the same prerequisites as required from the candidates proposed by the Nominating Committee.

8.4 Nomination of Chairpersons of Subcommissions

Each Subcommission of ICS shall propose to the ICS Chairperson one or two qualified candidates who are willing to serve as Chairperson and one or two candidates willing to serve as Vice-Chairperson.

8.5 Election Procedure

In case of a single candidate, the officers of the ICS Bureau and the Chairpersons of ICS Subcommissions are elected by a sixty percent (60%) majority. In case of more than one candidate, a relative majority will suffice for election.

8.5.1 ICS Bureau

No later than twelve (12) months prior to the next IGC, the Chairperson of the Nominating Committee shall mail to all Voting Members of the Commission a ballot containing:

(a) the name of the candidate for Chairperson, together with the name of his/her selected Secretary,

(b) the names of the candidates for the 1st and the 2nd Vice Chairpersons.

A short curriculum vitae of all candidates shall be attached. A deadline of sixty (60) calendar days shall be given for the return of the ballots.

The election requires approval by the IUGS Executive Committee and ratification by the IUGS Council.

8.5.2 Chairpersons of ICS Subcommission

Chairpersons and Vice- Chairpersons of Subcommissions of ICS shall be elected by the Voting Members of the Commission by ballot to be mailed by the ICS Secretary not later than twelve (12) months prior to the next IGC.

8.5.3 Others

Voting Members of Subcommissions and bodies reporting to Subcommissions, including Intersystem Boundary Working Groups and their Chairpersons, and Chairpersons and Voting Members of Committees shall be elected by the Voting Members of the respective bodies at the time of election of Chairpersons of Subcommissions. Voting Members of an Intersystem Boundary Working Group are confirmed by the Chairperson of the Subcommission to which it reports. The election of Voting Members of Subcommissions, including Chairpersons of Intersystem Boundary Working Groups, and of Chairpersons and Voting Members of Committees is subject to approval by the ICS Chairperson.

9. MEETINGS

The Bureau shall meet at the request of the Chairperson or of any two other officers of the Bureau.

The Full Commission shall meet regularly during the IGC. Additional meetings of the Full Commission may be called by the Chairperson of ICS with the advice of the ICS Bureau.

Subcommissions, Intersystem Boundary Working Groups, and Committees shall endeavor to hold at least one meeting during each IGC. They are encouraged to organize additional meetings during major international conferences on their field of scientific expertise.

10. ANNUAL REPORTS

10.1 Subcommissions and Committees

The Chairpersons of ICS Subcommissions and Committees shall transmit annual reports to the Chairperson and the Secretary of ICS no later than the first of November of each year. The annual reports shall include an overview of the scientific activities and achievements, together with the statement of operating accounts, for the current year and work plans and anticipated achievements, with the operating budget request, for the following year. In the case of Subcommissions with constituent bodies, these Subcommissions' reports shall include the scientific achievements and plans of these bodies.

Intersystem Boundary Working Groups shall prepare annual reports to the Chairpersons of the Subcommissions dealing with the systems above and below the studied boundary. The Subcommission responsible for the system above the studied boundary shall include this information in its report. It is also responsible for including the Working Group's operating costs in that Subcommission's budget.

10.2 Full Commission

The Chairperson of ICS shall submit a consolidated annual report on behalf of ICS to the IUGS Executive Committee at the time stipulated by that Committee. The ICS report shall contain the reports of the individual Subcommissions and Committees and shall, in addition:

(a) highlight the scientific achievements of these constituent ICS bodies,
(b) communicate all formal decisions taken by the Full Commission of ICS,
(c) report on administrative matters of ICS,
(d) provide a consolidated statement of ICS' operating accounts for the current year, and
(e) submit the work plans and recommend a consolidated operating budget request of ICS for the following year.

11. ENTRY INTO FORCE AND AMENDMENTS TO STATUTES

These Statutes shall come into force as soon as they have been approved by the Full Commission and by the IUGS Council.

These Statutes were approved by the Full Commission December 13, 1996, and accepted by the IUGS Executive Committee at its meeting, January 15-18, 1997.

These Statutes supersede the Statutes accepted by the IUGS Council on January 1995.

These Statutes may be amended by an approval vote of the Full Commission, subject to ratification by the IUGS Council.

3 - The Jurassic palaeoenvironment maps of the Peri-Tethys Programme: five selected glances within a 50 m. y. history

by

J. Thierry

Informations concerning the Jurassic in the Peri-Tethys programme

THE JURASSIC PALAEOENVIRONMENT MAPS OF THE PERI-TETHYS PROGRAMME: FIVE SELECTED GLANCES WITHIN A 50 M.Y. HISTORY

J. THIERRY, coordinator

Université de Bourgogne, Centre des Sciences de la Terre
et UMR CNRS 5561, 6, Bd Gabriel , 21000, Dijon, France
Tel (33) 3-80-39-63-62; Fax (33) 3-80-39-63-87; e.mail jthierry@u-bourgogne.fr

The aim of the "Peri-Tethys Programme" is to examine the behaviour of Central North and South Peri-Tethyan areas, at the end of the Palaeozoic times and during the Mesozoic - Cenozoic Tethys Ocean evolution (from Moscovian, Upper Carboniferous to late Pleistocene), in the light of the framework provided by the end of the Variscan Orogeny. The results of the synthesis will be illustrated by palaeogeographic maps which include litho-biofacies, palaeoenvironmental interpretations, constraints on the fracture pattern and regional tectonics.

As the Jurassic time interval and subdivisions are well controlled by biostratigraphic data (ammonites and brachiopods on both North and South Tethyan areas, reinforced by dinoflagellates on the North, and larger foraminifers and radiolarians on the South), fairly good correlations allow to realise five selected maps (Upper Sinemurian, Middle Toarcian, Middle Callovian, Lower Kimmeridgian and Lower Tithonian) which will be published in an atlas of 25 maps accompanied by a volume of explanatory notes.

Initiated in 1994 below the responsability of Programme Leaders Jean DERCOURT (Paris) and Maurizio GAETANI (Milano), the Peri-Tethys Programme is sponsored by a Consortium of petroleum companies and scientific organisms (AGIP, ARCO, CHEVRON, CNRS-INSU, CONOCO, EAP(ELF), EXXON, IFP, SHELL, SONATRACH, TOTAL, UPMC) and managed by a Planning Committee and a Programme Committee. After four years of intensive work devoted on the one hand to the collecting of new data and the compilation of still known ones, and on the other hand to hand-drawn provisional drafts of the maps, the Peri-Tethys Programme is now going into its terminal phase. The definitive digitalized maps will be ready and submited both in CD-ROM and paper-printed version to the sponsors in mid 1999; public broadcasting will be in summer 2000, nearby the sessions of the Internatinal Geological Congress of Rio (Brazil), after the unavoidable confidential delay of one year asked by the contracting sponsors.

A - Outstanding geographic, palinspastic and geodynamic framework:

The covered region is limited in the North to the areas between on the West, the Atlantic Ocean, and on the East, the Urals Mountains in Europe; in the South, it covers North Africa, Middle East and Arabia. The concerned areas are the North European basins and platforms from North Sea to Russia and that associated with the Alpine chains to the North of the Tethys (Peri-Alpine/Carpathians/Crimea/North Caucasus forelands, Peri-Caspian basin, Turan platform); to the South, the concerned regions lies at the periphery of the African-Saharan/Arabian craton: Moghreb, intra-Tethyan basins of the Middle-East and Iran, Zagros Mountains and basins associated to the East African Corner from Sudan to Somalia.

The palinspastic reconstructions used are that of the previous published Tethys maps in 1993 and based on palaeomagnetic data which fit as close as possible to the selected chronostratigraphic interval: Upper Sinemurian interpolated reconstruction, -198Ma.; Middle Toarcian East Coast

Anomaly, -180Ma; Middle Callovian, -160 Ma., Early Kimmeridgian Anomalies BS/M25-M24/21, -140Ma. and Early Tithonian Anomalies M21/M22-M21/M218, -130Ma.

The break-up of the Pangea and the Tethys Ocean opening range from Early Triassic to Mid-Cretaceous; the Jurassic illustrates a transitional step. Considering North-Europe fixed, the African-Arabian plates move with a simple West-South-West to East-North-East anti-clockwise divergence. The "Atlantic Tethys" opening is ascertained in Callovian; earlier Bajocian-Bathonian marine conditions are controversial and till Toarcian-Aalenian, it is a continental rift. Within the East African areas, the "Mozambican Ocean", initiates earlier in Toarcian. On the North-Eastern areas, the closure of the basins that previously separated the North continental basins, drives to a large land mass on Russia. In the "Mediterranean seuil lithosphérique", the opening-widening and/or narrowing-closing of oceanic areas ("Ligurian Tethys", "Vardar Ocean", etc...) occur as early as in Sinemurian and span all along the Jurassic.

The interior of the North and South continental plates, far from the Tethyan margins, were affected by such movements and have registered successive events: extensional basins with strong subsidence and high heat flow were created, epicratonic platforms were more or less flooded by epicontinental seas, creating or closing seaways which affected marine-terrestrial biomes and biotas.

B- The selected time slices and the problems of correlations:

In addition to the fundamental topics of map-scale, geographic projection and palinspastic reconstruction, the main difficulties which arose for Jurassic Peri-Tethys palaeoenvironment maps, concern correlations between marine/non-marine sediments, platform and basin deposits, North/South margins and Western/Eastern areas. To maximise the correlations in marine areas, the time slices has been chosen near transgressive events which can be as far as possible precisely located either in an up-to-date ammonite zonal scheme or in correlated parallel scales of brachiopods, belemnites, foraminifers, radiolarians, spores and pollen, calcareous nannofossils, calpionellids, etc.... When such a precision cannot be reached, a larger and comprehensive time interval is used (successive biozones, part of a substage, substage or even stage) overall for continental deposits, platform carbonates, deep ocean deposits, etc... The coordinator is informed by each contributor about the precision of the recorded data and the basic biostratigraphical scale used. In addition, a set of more than 800 validation points, give accurate data which help correlations and palaeoenvironments interpretation.

The Lower Jurassic is illustrated by an Early-Upper Sinemurian map (= Lotharingian; *circa* Obtusum zone; 194-197 Ma) during a transgressive episode which peak transgression is in the Lowermost Pliensbachian. The Middle Toarcian map (*circa* Bifrons zone; 178-181Ma) corresponds to a peak transgression. Correlations are quite easy because of enough cosmopolitan faunas.

Faunal Middle Jurassic provincialism sets in Middle Callovian (*circa* Coronatum zone; 156-158 Ma) at the outset of a sea level fall which maximum regression is near the Callovian/Oxfordian boundary. Correlations are not easy: first on the North Tethyan margin between Boreal (Russian platform), Subboreal (North-Western and Central Europe) and Submediterranean-Tethyan realms (South-Western Europe, Scythian / Pericaspian / North Caucasus / Turan platforms); second between North and South margins (especially Middle-East, Arab-Nubian, Somalian and Iranian areas).

Correlations get more difficult in Upper Jurassic (increasing provincialism). A Late-Lower Kimmeridgian map (*sensu gallico* = Early-Lower Kimmeridgian *sensu anglico*; *circa* Cymodoce Subboreal zone - Hypselocyclum/Strombecki or Divisum/Herbichi Submediterranean-Tethyan zones; 144-146 Ma) corresponds to the outset of a sea level rise which peak transgression is in the Uppermost Kimmeridgian (*sensu gallico*). A previously selected interval (lowermost Kimmeridgian; Subboreal Baylei zone = Tethyan/Submediterranean Platynota zone) has been left because of a too marked provincialism, doubtful correlations between North/South areas, important gaps underlining the Oxfordian/Kimmeridgian boundary, unfavourable facies as "sequanian type" for fauna preservation. Moreover, the chosen Cymodoce zone interval appears better for correlations with the

Russian Platform ("Kitchini beds") owing to new data recovered through the Peri-Tethys Programme investigations.

The Lower Tithonian map (circa Hybonotum/Lithographicum zone of Submediterranean-Tethyan realm - Elegans zone of Subboreal realm; = Lowermost Upper Kimmeridgian *sensu anglico*; = Early-Lower Volgian of Boreal Realm; 138-141 Ma) coincides with a peak transgression. A previously chosen Upper Tithonian map, at an unfavourable eustatic situation, did not allow precise correlations between continental/shallow-brackish facies of North Western Europe (regressive episode in Lower Portlandian *sensu anglico* and "Purbeckian" facies), the marine deposits of the Russian platform and the South Tethyan margin.

C - Lithologies, facies and palaeoenvironments:

Jurassic lithologies and facies are represented by classic symbols, while colours are used for palaeoenvironments; these last must be explained.

On the continental parts, "exposed land with ascertained non-deposition" (dark grey) are denudation areas which have been surely sedimentless. As far as possible, they are distinguished from "exposed land with assumed non-deposition" (light grey) where Jurassic may existed but then eroded and "areas with no data" (white) which will be both finally interpreted according to the general features of the surrounding areas (cratonic parts of the Northern areas as Scandinavia during all Jurassic, Russian platform during Liassic and the major cratonic African areas during the whole Jurassic).

The "fluviatile, lacustrine and fluvio-lacustrine deposits" (light brown) extend on borders of emerged cratonic areas of Northern Europe / Scandinavia / Russia (Liassic-Dogger) and Africa (throughout Jurassic). Special colours exist for "eolian" (orange) and "glacial and fluvio glacial" (dark brown) complexes, but these deposits are unknown on the considered area during Jurassic.

The land to sea transition (from fresh water/lacustrine -hyposaline- through brackish and shallow marine to hypersaline) is explained by the "shallow environments with fluctuating salinities" (light green). These refer to the coastal-line deposits (supratidal to intertidal) which may be alternatively and temporarily below hyposaline (lagoonal) or hypersaline (coastal sebkha) or normal marine very shallow water conditions. In Late-Upper Jurassic, Western Europe "Purbeckian facies" are classified in such palaeoenvironments. On the other hand, "deep environments with salinities strongly deviating from normal" ("brackish marine" - dark green) have not been still noticed and should be exceptional or unusual in the Jurassic deposits.

The following marine environments are defined: "terrigenous or carbonate coastal marine, shallow marine" (yellow) and "carbonate build-ups, platform carbonates" (middle cyan - clear blue) concerns very shallow marine environments, respectively with or without significant siliciclastic or clayed supplies. They both refers to foreshore-shoreface situation (shallow subtidal; euphotic zone from 0m - lowest low tide - to 10 or about 25m - fair weather wave base). In the Jurassic, shallow carbonate build-ups are mainly generated by corals. However, sponges build-ups often exists but they install in low energy and deeper environments; they must integrate the "deep(er) carbonates (hemi)pelagic oozes" environments (lawn green - olive green); these are deposited in deep and low energy environments of offshore situation in basins and outer shelves (lower subtidal; from near 25m depth to 200m; below the euphotic zone and the fair weather wave base, including the storm weather wave base). Interbedded limestones, marly limestones and marls as "faciès dauphinois", "Terres noires", "Oxford Clays", "argovian facies", "Black shales", etc... may enter this category, as well as "chalk", "ammonitico rosso" or "maiolica" types. The "deep marine-bathyal/abyssal" (medium blue) concerns environments where are generated non-carbonate deposits (below CCD), like radiolarites and siliciclastic sediments (turbidites and deep-sea fan deposits, etc...); the "deep oceanic basins" (dark blue) refers to areas where the sea-floor was the oceanic crust. As they are rare enough, except on Turan and Arab platform, marine "hypersaline environments" (light magenta - pink) have been rarely figured in any Jurassic map.

Finally, "volcanics" - (red; alkaline - A and calcalkaline - C) and "island arc" (violet) data are figured as in the Tethys maps atlas published in 1993.

D - Jurassic maps: from basic data to Peri-Tethyan geological history.

Henceforth, from the point of view of the plate tectonics processes and among the factors which influence the palaeogeography, the maps allow to emphasise several effects of the Jurassic Tethyan geodynamic evolution on the Peri-Tethyan areas. Three main topics can be considered: the sea level changes as the consequences of the break-up of the Pangea; facies-palaeoenvironments diversity and distribution as the result of the complex interaction between clastics input, carbonate fabrics and ocean water chemistry; marine and land masses distributions, seaways and continental connections as the causes of faunas-floras exchanges.

1 - The Jurassic transgressive-regressive facies cycles on Western Europe: the signature of sea level changes as consequences of the break-up of the Pangea

At the whole Western European craton scale, two long-term (2nd order) transgressive-regressive facies cycles are recognised.

By successive phases of extension and subsidence, the "Ligurian cycle", which duration is approximately equivalent to the Early Jurassic, is mainly related to the rifting episodes linked to the development of the "Ligurian Tethys" and lesser by the nascent "North Atlantic" and "North Sea" rift system. Its onset is marked by the "Early-Cimmerian unconformity" dated as Latermost Norian. The peak transgression is located near the Lower/Middle Toarcian boundary. Its end corresponds to the "Mid-Cimmerian unconformity" dated as Late Toarcian, preceding the Late Aalenian-Early Bajocian major regression linked with the tectonic uplift known in many areas of Northern Europe. One of the results was the coeval rapid and major subsidence phase that allowed the accumulation of thick sediments successions in the half-grabens of the Tethyan margin.

The "North Sea cycle", which covers the Middle-Late Jurassic and the lowermost Early Cretaceous, coincides with the evolution of the North Sea rift system. It starts above the "Mid Cimmerian unconformity" which is related to the North Sea thermal doming. Its transgressive phase develops during the main episode of extensional tectonics in the North Sea, from the Late-Lower/Early-Upper Bajocian to the Mid-Upper Kimmeridgian *sensu anglico* (Mid-Lower Kimmeridgian *sensu gallico*) The peak transgression corresponds to the onset of the post-rift subsidence. During the overall regressive phase, most of the West European basins experienced a transpressional regime associated with the activation onset of the future North Atlantic Cretaceous rifting. The North Sea cycle ends with the "Late-Cimmerian unconformity" (Berriasian-Upper Volgian-Ryazanian), which belongs to phases of deformation that are related to the North Atlantic rifting (Norwegian-Greenland sea rift and Galicia-Atlantic opening).

2 - Facies and palaeoenvironments diversity and distribution: the complex interaction between clastics input, carbonate fabrics and ocean water chemistry

During the whole Jurassic, except on the Scandinavian shield, marine transgressions had a significant extent all over Western Europe which looks like an archipelago of emerged areas separated by more or less subsiding and deep basins and platforms with shoals; the Russian platform, emerged during the Liassic, is progressively invaded from Aalenian to Tithonian by a wide shallow epicratonic sea. As a rule, marine facies and palaeoenvironments are enough diversified; northwards, they are dominated by fine clastics inputs, sometimes organic rich (Toarcian, Callovian, Kimmeridgian), southwards, they are more carbonated with occasionally reef developments (Bajocian, Oxfordian, Kimmeridgian). Continental and fluvio-lacustrine areas are reduced to narrow fringes lying alongside the emerged areas, or in continental grabens, (Hettangian-Sinemurian to Bathonian).

On the contrary, on Africa, shoals, platforms and basins developed on a relatively narrow marine fringe from Morocco to Middle East, while Arabia and African corner are invaded as soon as Toarcian till Tithonian by a shallow epicratonic sea. Facies are less diversified and carbonate dominated. Clastics are often abundant at various times on Arabian platform. Continental and fluvio-lacustrine deposits largely developed in tectonically controlled basins extending far to the interior of Saharan-Libyan-Sudan cratonic areas.

Induced by continuing crustal extension, thermally driven basin subsidence and sea level fluctuations, the water chemistry shows major evolutionary trends. During Sinemurian and Pliensbachian, mostly saline-evaporitic depositional environments progressively shift to normal marine because of increased inflow from the Tethys of normal salinity ocean water. Such changes were illustrated by episodes of large extent of shallow water carbonates (Hettangian, Lower

Pliensbachian, Lower Aalenian, Middle Bajocian, Middle Bathonian, Upper Oxfordian, Upper Kimmeridgian), two times interrupted by fine clastic episodes and anoxic events (Middle Toarcian, Middle Callovian, Lower Kimmeridgian); these organic rich deposits, mainly developed in the interior of the North Peri-Tethyan platforms, also exist on narrow areas along the Tethyan margins. During Tithonian, the development of "Maiolica" calcareous ooze in place of calcareous-free clays (maximum in Upper Oxfordian) and radiolarites (maximum in Callovian), illustrates a drop of the CCD, not only on Tethyan areas, but also on the borders of the Peri-Tethyan continental slope.

3 - Seaways, marine and land masses distributions: the causes of marine faunas-floras exchanges

The wide East-West Tethyan oceanic hiatus and the "Mediterranean seuil lithosphérique" are main palaeogeographical features which separate the North and South Tethyan blocks all along the Jurassic; periodically, pelagic or deep water adapted organisms invade the Peri-Tethyan areas. In addition, North-South seaways settle at several time on the European craton while African-Arabian block remained ever uncrossed. However, the African passive margin is used as an "East-West platform seaway" proved by exchanges from Arabia to Moghreb.

The "Norwegian seaway" is a quite permanent feature which allow North-South Boreal-Tethyan marine exchanges (Sinemurian, Pliensbachian, Callovian, Oxfordian, etc....), except during the Middle Jurassic (Bajocian-Bathonian) when it filled up with fluvio-lacustrine deposits. Nevertheless, Boreal elements rarely reach the South Tethyan areas, while the Tethyan ones may invade far enough the North Peri-Tethyan areas. Partly superposed to the North Atlantic rift system, it remains ever narrow but some lateral branches which crossed the North-West European platforms. It was connected to the "Hispanic corridor" which classically allow exchanges between the Eastern-Central Tethys and the Pacific, through the Eastern Tethys and Gulf of Mexico, controversially either soon in the Jurassic (Pliensbachian), or later (Callovian).

On Russian platform, a wide North-South "epicontinental seaway" completely settled not before Callovian; beginning as a Tethyan growing embayment on Peri-Caspian basin and Caucasus foreland, it grew progressively northwards from Aalenian to Bathonian, reaching Central Russian platform. Maximum Boreal-Tethyan connections install during Callovian, Oxfordian and Kimmeridgian; they decreased in Lower Tithonian (Early-Lower Volgian) then ceased in Middle-Upper Tithonian (Late-Lower to Middle Volgian) when the seaway gets narrower and closed in correlation with the major Jurassic/Cretaceous boundary regression.

E - Jurassic maps developments and state of the art:

Until the begining of the Peri-Tethys Programme in 1994 Jurassic cartographers have worked either through stratigraphical or regional groups. As the five maps and the North and South Tethyan margins have run with different speeds, the state of the art first looked like a "space and time puzzle". Documents were prepared either at 1/5.000.000 or larger scale in order to represent a maximum of details; next, it was easier to simplify and reduce at the 1/10.000.000 definitive scale. Two separate documents were produced for each time-interval and mapping area: an "observation-map" with the basic symbols for lithologies, facies, tectonics, etc...; an "interpretative-map" with colour palaeoenvironments. Such drawing drafts and successive versions kept the present day parallels and meridians, sometimes main rivers and towns which play the part of reference mark. The basic map documents are the 800 validation points provided by each contributor and now stored in a data base.

To day, near the end of 1998, a quite complete first version of the 1/10.000.000 scale maps is ready. Each map, first hand drawn, has been digitalised. The half part of 1999 will be devoted to corrections and homogenisation of the several sets of maps, especialy between the Norian and the Hauterivian maps which respectively first constraint the Sinemurian and other Jurassic maps, and second the total Cretaceous maps set.

Such a result has been possible due to the fruitful cooperation of a staff of cartographers who gave their contribution in the form of regional 1/5.000.000 scale maps hand-drawn on present day geography, and sets of validation points. These maps has been reduced, interpreted and step by step puzzled on the palinspastic framework by the coordinator. I hope that I forget nobody in the list of contributors I give below; please excuse me:

4 - TRIASSIC/JURASSIC BOUNDARY WG

REPORT BY THE SECRETARY

G. WARRINGTON

1. Activities, 1998

The Secretary attended the 5th International Symposium on Jurassic Stratigraphy (5ISJS) in Vancouver in August, and convened and conducted a business meeting of the Triassic/Jurassic Boundary Working Group (TJBWG) there; he participated in pre- and post-conference field excursions which included visits to two of the candidate GSSPs for the base of the Jurassic. An update of TJBWG members' contact details and activities was conducted prior to the 5ISJS, and a questionnaire was prepared and distributed to the principal workers involved with the candidate GSSPs.

The Secretary continues as Secretary General of the IUGS Subcommission on Triassic Stratigraphy (STS) and reported on TJBWG activities at an STS business meeting held during the Epicontinental Triassic Symposium in Halle, Germany, in September.

2. TJBWG at the 5ISJS

2.1. Pre-conference field excursion, Nevada, USA (Leader: D. G Taylor)

This excursion afforded participants an opportunity to study the Gabbs and Sunrise formations of the Volcano Peak Group in the New York Canyon area of the Gabbs Valley Range; a candidate GSSP has been proposed from this area by Guex et al. (1997). The party visited exposures of the Triassic-Jurassic boundary succession immediately north of New York Canyon (section 2 of Guex, 1995) and to the south, at Ferguson Hill, in Muller Canyon (section 6 of Guex, 1995); in his response to the candidate GSSP questionnaire (see: *2.3*, **Item (b)**) Guex has specified the latter section as the candidate GSSP. The small group of participants in this excursion carried out intensive sampling of sections 2 and 6, with particular attention to the ammonite biostratigraphy and bivalve associations. The leader, Dave Taylor, is thanked for his good humour and patience throughout this excursion.

2.2. 5ISJS, University of British Columbia, Vancouver

Several lectures and poster displays presented during the symposium were relevant to the TJBWG; these included the following:

Bloos & Page - The ammonite sequence in the early Hettangian of north-west Europe.
Carter - Extinction and recovery of radiolarians at the Triassic-Jurassic boundary in Queen Charlotte Islands.
Cohen & Coe - Re-Os dating of organic-rich mudrocks and the Os isotope composition of seawater.
Copestake & Partington - Stratigraphic sequences in the Jurassic-lowermost Cretaceous (Hettangian to Ryazanian) of the North Sea Basin and adjacent areas of north west Europe.
Damborenea - Hispanic corridor: its evolution and the biogeography of bivalve molluscs.
Embry - Large-scale sequence boundaries in the Jurassic succession of the Sverdrup Basin, Arctic Canada.
Erlström & Guy-Ohlson - Distribution and evolution of the Triassic-Jurassic boundary sedimentation in Scania, southern Sweden.
Haggart - Fossils and faults: unravelling the history of Queen Charlotte Islands, British Columbia.
Hirsch & Katz - Mesozoic radiation and Tr/J extinction events.
Iglesia Llanos & Riccardi - Bio-magnetostratigraphic scale of the Lower Jurassic of the Neuquen Basin, Argentina.

Keisuke - Microfaunas in Triasso-Jurassic pelagic successions of the Chichibu Super Belt in East Shikoku, SW Japan.
McRoberts - The Triassic-Jurassic boundary and end-Triassic mass extinction.
Orchard - Decline and fall of conodonts at the Triassic-Jurassic boundary
Pálfry & Dosztály - A new marine Triassic-Jurassic boundary section in Hungary: preliminary results.
Pálfry & Smith - Timing of Early Jurassic recoveries and spacing of mass extinctions.
Pálfry, Smith & Mortensen - A U-Pb and ^{40}Ar-^{39}Ar time scale for the Jurassic.
Posen, Hounslow & Warrington - Magnetostratigraphy of the Hettangian/Rhaetian boundary section, St Audries Bay, UK
Taylor - The Triassic/Jurassic system boundary in the Gabbs Formation, Nevada
Tripathi - Palynological characteristics during Late Triassic-Early Jurassic time slot in India.
Warrington - St Audrie's Bay, Somerset, England: a candidate Global Stratotype Section and Point for the base of the Jurassic System.
Whalen, Carter & Orchard - Rhaetian radiolarians and conodonts near the Triassic-Jurassic boundary in Baja California Sur.

2.3. TJBWG Business Meeting, Vancouver, 20 August 1998

The TJBWG Chairman, Professor Mouterde, was unable to attend the 5ISJS but sent his good wishes to the group and, as at the 4ISJS in Mendoza, had asked the Secretary to conduct the business meeting in his absence. The Secretary mailed notice of the business meeting, together with copies of the following Agenda and the TJBWG report from ISJS Newsletter 25 (November 1997), to everyone listed as a TJBWG member in ISJS Newsletter 25:

Agenda:

(a) Apologies for absence
(b) Proposed candidate GSSPs
(c) Schedule for future TJBWG activity
(d) Future meetings
(e) Any other business

Together with this notice and Agenda, members were asked to confirm their contact details, and to indicate whether they remained active in relevant studies and whether they would attend the 5ISJS; those unable to attend were offered the opportunity to send written comments on Agenda items for consideration during the business meeting. These papers were mailed to 48 individuals and 30 responses were received, with 19 people indicating that they would not be attending; four people indicated that they are no longer active in the TJBWG field.

Item (a) - apologies were received from Boomer, Cirilli, Donovan, Furrer, Grant-Mackie, Guex, Hallam, Ivimey-Cook, Johnson, Lord, Michalik, Mouterde, Prinz-Grimm, Roniewicz and Vuks.
Michelsen, Smith, Vörös and Zeiss indicated that they are no longer active, or able to be active, in this field.

Item (b) - in ISJS Newsletter 25 (November 1997) the Secretary noted that four candidate GSSP proposals had been made or notified and, in the absence of any further clear indications of intentions to present proposals, these would be considered by the TJBWG before the 5ISJS. He requested urgent notification of any additional proposals but none had been received. The TJBWG is, therefore, considering the following candidate GSSPs (in alphabetical order):

Chilingote, Peru (Hillebrandt, 1997)
Ferguson Hill, Muller Canyon, Gabbs Valley Range, Nevada, USA (Guex et al., 1997)
Kunga Island, Queen Charlotte Islands, British Columbia, Canada (Carter & Tipper, 1998 (response to questionnaire); *see* Tipper et al., 1994, Carter et al., 1998).
St Audrie's Bay, Somerset, UK (Warrington et al., 1994).

The first three sections were referred to in lectures given during the 5ISJS, and the last was illustrated in two posters. The Secretary remarked that he had anticipated that the 5ISJS, with the associated field excursions including visits to the candidate GSSPs in Nevada and British Columbia, would provide a focal point for interest in the base of the Jurassic, and stimulate the TJBWG to make progress towards the selection of a preferred candidate GSSP for consideration by the ISJS executive. This anticipation was being fulfilled - the very productive excursion organised by Taylor had taken a small, hard-working group to the candidate section in Nevada, and the forthcoming excursion to the Queen Charlotte Islands was expected to prove equally valuable. Very useful discussion between workers involved with the candidate GSSPs had taken place during the Nevada excursion and in Vancouver, and was expected to continue on the post-conference excursion.

In the TJBWG report in ISJS Newsletter 25 (November 1997) the Secretary had referred to the uneven documentation evident in the proposals for the candidate GSSPs from Nevada, Peru and the UK, and stated his intention to ensure that all proposals cover fully the criteria contained in the revised ICS guidelines (Remane et al., 1996), are stated objectively, and are in a common format in order to facilitate comparison. For this purpose he prepared a questionnaire which was designed to elicit clear statements covering all the ICS guideline criteria and was sent to the principal worker concerned with each candidate section. The questionnaire required statements on the criterion proposed for the recognition of the base of the Hettangian, and the potential for correlation of the level recognized on that criterion. Then followed questions on the geological, biostratigraphic, and other attributes of the section, together with matters of access and conservation.

All workers have responded positively and constructively, and the Secretary is grateful for their cooperation in this exercise which has provided, for the first time, a dossier which forms a basis for the objective assessment and comparison of the attributes of the candidate GSSPs.

The Secretary asked for comments or questions on any aspect of Item (b); none were made.

Item (c) - it is now 36 years since the Hettangian Stage was recommended as the lowest Jurassic stage, and 14 years since that recommendation was confirmed at the ISJS meeting in Erlangen. The report in (**b**) (above) indicates that progress is now being made towards the selection of a preferred candidate GSSP for the base of the Jurassic. At the 4ISJS in Mendoza the Secretary proposed the year 2000 as the target date for the realisation of that objective; this can still be achieved, and the result referred to the ISJS executive for consideration by 2000. However, the momentum given to this process by the 5ISJS, and the completion of the questionnaire, must be maintained. The Secretary hoped to have the questionnaire results collated by the end of 1998 and, depending upon the response to those results, a preliminary postal vote to select a preferred candidate GSSP could be carried out early in 1999. The response could not be anticipated, of course, but, if positive, the TJBWG could submit its proposal to the ISJS by the end of 1999.

The Secretary asked for comments or questions on any aspect of Item (c); none were made.

Item (d) - The Chairman of the Sinemurian Working Group (SWG) (G. Bloos) has approached the Secretary concerning the organisation of a joint field meeting on the Hettangian and Sinemurian candidate GSSPs on the Somerset coast, UK (see: **5**, below). The meeting, to be held over 2 or 3 days in 1999 or 2000, already has support within the SWG.

Item (e) - there was no further business.

2.4. Post-conference field excursion, Queen Charlotte Islands, British Columbia (Leaders: H. Tipper, J. Haggart, E. Carter, R. Hall, G. Jakobs & J. Pálfry):

This excursion afforded the large group of participants the opportunity to study the Sandilands Formation in the candidate GSSP proposed by Carter et al. (see: **Item (b)**, above) on Kunga Island. The logistics of this visit were complicated, because of the numbers involved, but ensured that everyone was able to spend a short time on the candidate section. A limited amount of sampling

was permitted by the National Parks authority, and material was collected mainly for radiolarian studies and geochemistry; an intensive search was made for ammonites. The leaders are thanked for their considerable efforts in organising this excursion.

3. New publications

The following recent publications are relevant to the TJBWG:

Ainsworth, N. R., Braham, W., Gregory, F. J., Johnson, B. & King, C. 1998. A proposed latest Triassic to earliest Cretaceous microfossil biozonation for the English Channnel and its adjacent areas. *In*: Underhill, J. R. (ed.) *Development, Evolution and Petroleum Geology of the Wessex Basin*, Geological Society, London, Special Publication **133**, 87-102.

Ainsworth, N. R., Braham, W., Gregory, F. J., Johnson, B. & King, C. 1998. The lithostratigraphy of the latest Triassic to earliest Cretaceous of the English Channnel and its adjacent areas. *In*: Underhill, J. R. (ed.) *Development, Evolution and Petroleum Geology of the Wessex Basin*, Geological Society, London, Special Publication **133**, 103-164.

Carter, E. S., Whalen, P. A. & Guex, J. 1998. Biochronology and paleontology of Lower Jurassic (Hettangian and Sinemurian) radiolarians, Queen Charlotte Islands, British Columbia. *Geological Survey of Canada, Bulletin* **496**, 162pp.

Guex, J., Taylor, D. G., Rakus, M. & Bucher, H. 1998. Deux nouveaux genres et quatre nouveaux éspeces d'ammonites (Cephalopoda) du Lias inférieur. *Bulletin de la Société Vaudoise des Sciences Naturelles*, **86** (1), 73-85; (also in *Bulletin de Géologie Lausanne*, No.339, 73-85.)

Page, K. N. & Bloos, G. 1998. The base of the Jurassic System in west Somerset, south-west England - new observations on the succession of ammonite faunas of the lowest Hettangian Stage. *Geoscience in south-west England: Proceedings of the Ussher Society* **9** (3), 231-235.

Posen, P., Hounslow, M. W., Warrington, G. & Mørk, A. 1998. The magnetostratigraphy of the Rhaetian in the St Audries Bay section, north Somerset, UK (Abstract). *Hallesches Jahrbuch für Geowissenschaften, Reihe B*, Beiheft 5, 143.

Warrington, G. 1997. The Penarth Group-Lias Group succession (Late Triassic-Early Jurassic) in the East Irish Sea Basin and neighbouring areas: a stratigraphical review. *In*: Meadows, N. S., Trueblood, S. P., Hardman, M. & Cowan, G. (eds) *Petroleum geology of the Irish Sea and adjacent areas*, Geological Society, London, Special Publication **124**, 33-46.

4. TJBWG membership

The list has been compiled by the Secretary on the basis of responses to a circular issued in June 1998 to everyone in the list published in ISJS Newsletter 25 (November 1997), requesting confirmation of contact details and of interest and activity in Triassic-Jurassic boundary successions; those who did not respond, or who stated that they are no longer involved in relevant work, have not been included. Please advise the Secretary promptly of any errors in the details given, and of any changes which occur; please print or type information (name, title, full postal address, telephone and/or FAX numbers (with full national and regional codes), e-mail address) clearly. A number of people who are active in relevant work have been added to the list, following representations made to the Secretary; members who are aware of other workers who are active in the study of Triassic-Jurassic boundary successions, but are not in the following list, are asked to contact the Secretary.

Bloos, G. Staatlisches Museum für Naturkunde Stuttgart, Rosenstein 1, D-70191 Stuttgart, Germany. Ph: +49 (0)711 8936 143 FAX: +49 (0)711 8936 100
e-mail: bloos@gmx.de

Boomer, I. D. Department of Geography, University of Newcastle, Newcastle upon Tyne NE1 7RU, UK. Ph: +44 (0)191 2225111 FAX: +44 (0)191 2225421
e-mail: ian.boomer@ncl.ac.uk
Carter, E. S. 17375 Jordan Road, Sisters, Oregon 97759, USA
Ph: +1 541 504 0311 FAX: +1 541 504 9593 e-mail: ilec@odin.cc.pdx.edu
Cirilli, S. Dipartimento di Scienze della Terra, Università degli Studi di Perugia, Piazza dell'Università, 06100 Perugia, Italy Ph:+39 (0)75 5853231
FAX: +39 (0)75 5853203 e-mail: simocir@unipg.it
Donovan, D. T. Department of Geological Sciences, University College London, Gower Street, London WC1E 6BT, UK Ph: +44 (0)171 380 7082/7822
FAX: +44 (0)171 431 8314 e-mail: d.donovan@ucl.ac.uk
Furrer, H. Paläontologisches Institut und Museum der Universität Zürich, Karl Schmid-Strasse 4, CH-8006 Zürich, Switzerland Ph: +41 1 634 2323
FAX: +41 1 634 4923 e-mail: hfurrer@pim.unizh.ch
Grant-Mackie, J. A. The Geology Department, The University of Auckland, Private Bag 92019, Auckland, New Zealand Ph: +64 (0)9 3737599 (ext.7082)
FAX: +64 (0)9 3737435 e-mail: j.grant-mackie@auckland.ac.nz
Guex, J. Institut de Géologie, Université de Lausanne, BFSH 2, CH-1015 Lausanne, Switzerland. Ph: +41 21 692 4346 FAX: +41 21 692 4305
e-mail: jean.guex@igp.unil.ch
Hallam, A. School of Earth Sciences, University of Birmingham, PO Box 363, Birmingham, West Midlands B15 2TT, UK. Ph: +44 (0)121 414 6164
FAX: +44 (0)121 414 4942 e-mail: A.Hallam@bham.ac.uk
Hillebrandt, A. von. Technisches-Universität Berlin, Institut für Angewandte Geowissenschaften II, Ernst-Reuter-Platz 1, D-10587 Berlin, Germany
Ph: +49 30 314 23651 FAX: +49 30 314 79471
e-mail: abu0936@mailszrz.zrz.TU-Berlin.de
Hirsch, F. Geological Survey of Israel, 30 Malkhe Yisrael Street, 95501, Jerusalem, Israel.
Ph: +972 2 5314240 FAX: +972 2 5380688
e-mail: hirsch@mail.gsi.gov.il
Ivimey-Cook, H. C. 6 Lodwells Orchard, North Curry, Taunton, Somerset TA3 6DX, UK.
Ph: +44 (0)1823 490197 e-mail: hic@ncurry.demon.co.uk
Johnson, A. L. A. School of Environmental & Applied Sciences, Division of Earth Sciences, University of Derby, Kedleston Road, Derby DE3 1GB, UK
Ph: +44 (0)1332 622222 (ext.1721) FAX: +44 (0)1332 622747
e-mail: A.L.A.Johnson@derby.ac.uk
Lord, A. Department of Geological Sciences, University College London, Gower Street, London WC1E 6BT, UK Ph: +44 (0)171 380 7235
FAX: +44 (0)171 916 4653 e-mail: dean.maps@ucl.ac.uk
Michalik, J. Geological Institute, Slovakian Academy of Sciences, Dubravská Str. 9, 842 26 Bratislava, Slovakia. Ph: +4217 373 961
FAX: +4217 377 097 e-mail: geolmich@savba.savba.sk
Mouterde, R. Faculté des Sciences, Université Catholique de Lyon, 25 rue du Plat, F-69288, Lyon Cedex 02, France Ph: +33 4 72 32 50 37
FAX: +33 4 72 32 50 19
Orchard, M. Geological Survey of Canada, 101-605 Robson Street, Vancouver, British Columbia V6B 5J3, Canada. Ph: +1 604 666 0409
FAX: +1 604 666 1124 e-mail: morchard@gsc.nrcan.gc.ca
Page, K. N. English Nature, The Old Mill House, 37 North Street, Okehampton, Devon EX20 1AR, UK. Ph: +44 (0)1837 55045
FAX: +44 (0)1837 55046 e-mail: craig.dixon@english-nature.org.uk
Pálfry, J. Department of Paleontology, Hungarian Natural History Museum, Budapest, PO Box 137, H-1431, Hungary. Ph: +36 1 338 3905
FAX: +36 1 317 1669 e-mail: palfry@zoo.zoo.nhmus.hu

Prinz-Grimm, P. Institut für Geologie und Paläontologie der Philipps-Universität Marburg, Fachbereich 18 Geowissenschaften, Lahnberge, Hans-Meerwein-Strasse,
D-35032 Marburg, Germany. Ph: +49 6421 283461
FAX: +49 6421 288919 e-mail: prinzgri@mailer.uni-marburg.de
Riccardi, A. Facultad de Ciencias Naturales y Museo, Universidad National de la Plata, Paseo del Bosque, 1900 La Plata, Argentina. Ph: +54 21 234911
FAX: +54 21 530189 e-mal: riccari@museo.fcnym.unlp.edu.ar
Roniewicz, E. Instytut Paleobiologii P.A.N., ul. Twarda 51/55, PL-00-818 Warszawa, Poland.
Ph: +48 22 697 88 50 FAX: +48 22 620 62 25
e-mail: paleo@twarda.pan.pl
Stevens, G. R. Institute of Geological & Nuclear Sciences Limited, PO Box 30368, Lower Hutt, New Zealand. Ph: +64 4 5701444 FAX: +64 4 5704600
Tipper, H. W. Geological Survey of Canada, 101-605 Robson Street, Vancouver, British Columbia V6B 5J3, Canada. Ph: +1 604 666 0844
FAX: +1 604 666 1124 e-mail: htipper@gsc.nrcan.gc.ca
Tozer, E. T. Geological Survey of Canada, 101-605 Robson Street, Vancouver, British Columbia V6B 5J3, Canada. Ph: +1 604 666 9292
FAX: +1 604 666 1124 e-mail: ttozer@gsc.nrcan.gc.ca
Vuks, V. Ja. VSEGEI, Sredny pr. 74, St Petersburg, 199026, Russia
Ph: +7 812 218 9233 FAX: +7 812 321 3023
e-mail: vsegei@mail.wplus.net
Warrington, G. British Geological Survey, Keyworth, Nottingham NG12 5GG, UK
Ph: +44 (0)115 9363407 FAX: +44 (0)115 9363437
e-mail: gwar@wpo.nerc.ac.uk
Whalen, P. A. Wolf Ridge, 968-CR-206, Eureka Springs, Arkansas 72632, USA
Ph: +1 501 253 5011 FAX: +1 501 253 2031
e-mail: micropaw@ipa.net
Yin Jiarun
China University of Geosciences, 29 Xueyuan Lu, Beijing 100083, People's Republic of China.
e-mail: yjr@cugb.edu.cn

5. Field excursion: Somerset, UK

TJBWG members are asked to advise the Secretary of their interest in participating in a field excursion to the Somerset coast, UK, to visit the candidate GSSP for the base of the Jurassic at St Audrie's Bay (Warrington et al., 1994), with the option of also seeing that for the base of the Sinemurian at East Quantoxhead (Page 1995). The meeting would be held jointly with the Sinemurian Working Group and involve two to three days fieldwork on coastal outcrops. Please contact the Secretary as soon as possible to register your interest and receive further information.

6. References

Carter, E. S., Whalen, P. A. & Guex, J, 1998. Biochronology and paleontology of Lower Jurassic (Hettangian and Sinemurian) radiolarians, Queen Charlotte Islands, British Columbia. *Geological Survey of Canada, Bulletin* **496**, 162pp.

Guex, J. 1995. Ammonites hettangiennes de la Gabbs Valley Range (Nevada, USA). *Mémoires de Géologie (Lausanne)*, No.27, 131pp.

Guex, J., Rakus, M., Taylor, D. & Bucher, H. 1997. Proposal for the New York Canyon area, Gabbs Valley Range (Nevada) USA. *ISJS Newsletter* No.24, 26-30.

Hillebrandt, A. von. 1997. Proposal for the Utcubamba sections in northern Peru. *ISJS Newsletter* No.24, 21-25.

Page, K. N. 1995. East Quantoxhead, Somerset, England; a potential Global Stratotype Section and Point (GSSP) for the base of the Sinemurian Stage (Lower Jurassic). *Proceedings of the Ussher Society* **8** (4), 446-450.

Remane, J., Bassett, M. G., Cowie, J. W., Gohrbrandt, K. H., Lane, H. R., Michelsen, O. & Wang Naiwen. 1996. Revised guidelines for the establishment of global chronostratigraphic standards by the International Commission on Stratigraphy (ICS). *Episodes* **19** (3), 77-81.

Tipper, H. W., Carter, E. S., Orchard, M. J. & Tozer, E. T. 1994. The Triassic-Jurassic (T-J) boundary in Queen Charlotte Islands, British Columbia defined by ammonites, conodonts and radiolarians. *Geobios* **M.S. 17**, 485-492.

Warrington, G., Cope, J. C. W., Ivimey-Cook, H. C. 1994. St Audrie's Bay, Somerset, England: a candidate Global Stratotype Section and Point for the base of the Jurassic System. *Geological Magazine* **131** (2), 191-200.

G. Warrington
Secretary, TJBWG

British Geological Survey, Keyworth, Nottingham NG12 5GG, UK
Ph: +44 (0)115 9363407
FAX: +44 (0)115 9363437 *or* 9363200
e-mail: gwar@wpo.nerc.ac.uk

5 - JURASSIC STAGE BOUNDARY WGS

5.1. REPORT OF HETTANGIAN - SINEMURIAN BOUNDARY WORKING GROUP

by
Gerd BLOOS
Convenor

Report on the 5th International Congress on the Jurassic System, August 12-25, 1998: Hettangian/Sinemurian boundary

The congress in Canada was of special significance for the Lower Lias, for the base of the Jurassic as well as for the base of the Sinemurian. This is true for the oral presentations in Vancouver (August 17-20) as well as for the excursions to Nevada (August 12-15) and to the Queen Charlotte Islands (August 21-25).

1. SESSION OF THE SINEMURIAN BOUNDARY WORKING GROUP, AUGUST 20TH 1998

a. The convenor (G. Bloos) reported on the activities since the last session, which had been held at Mendoza 1994. Significant progress has been achied on the boundary beds in Great Britain (K.N. Page and G. Bloos), North America (J. Guex and D. Taylor) and in South America (A. v Hillebrandt). In detail, there can be mentioned:

- 1995: The important work of J. Guex "Ammonites hettangiennes de la Gabbs Valley Range (Nevada, USA)" has appeared. It concerns the Hettangian/Sinemurian boundary by the desciption of the ammonite fauna below the boundary.
- 1996-1998: Field studies were made at the section of East Quantoxhead (at the coast of West Somerset, SW England) which has been proposed as GSSP for the Sinemurian Stage (Page, 1995). There could be recognized a detailed subdivision in the Upper Hettangian (upper Angulata Zone) for the first time, and the already existing subdivision of the Lower Bucklandi Zone could be considerably improved. In comparison with subdivisions on the European continent, the section is far more complete. The ammonite faunal horizons known from the continent, especially from Germany, can be recognized also at East Quantoxhead, intercalated between new ones. Studies on other fossil groups are still going on. Publications are expected in 1999.
- Study of the boundary in the Shoshone Mountains (section at First Canyon) by D. Taylor. The results were presented at Vancouver. The publication is in preparation.
- Study of the stage boundary in South America, especially in northern Chile, by A. v. Hillebrandt. The results were presented at Vancouver.
- Study of the Hettangian ammonites in Peru and Chile by A. v. Hillebrandt. This comprehensive work will appear in next time.
- The correlation between different regions by means of these ammonite faunas will be the next task.

b. The proposed GSSP "East Quantoxhead" was discussed on basis of the oral presentations of K.N. Page and G. Bloos two days before. - The stratigraphic results as well as the conditions of exposure at East Quantoxhead show that this section meets the requirements for a GSSP in almost every respect. No objection has been made against the choice of the proposed locality as GSSP and no other candidate has been proposed.

- The next steps towards the ratification of the locality as GSSP are the following:
- The papers on the proposed GSSP which were presented during the congress at Vancouver will be sent to the members of the Sinemurian Boundary Working Group.
- The members of the Working Group give their opinion and decide if they agree or not.
- If the majority of the members agrees to the proposal East Quantoxhead, the convenor submits this proposal to the International Subcommission on Jurassic Stratigraphy. Attached will be the publications concerning the locality and the votes of the Working Group members.
- If the proposal could be submitted to the ISJS by October 1999 it could be ratified during the next Geological Congress.

c. Field meeting. – Reasonably the WG members should have an opputunity to see the proposed GSSP at East Quantoxhead. A difficulty is that most probably a field meeting cannot be organized in

Field Trip in Yorshire (Whitby)

The field trip is open to all the persons interested in the Sinemurian-Pliensbachian Boundary. Already about 6 persons are interested in participating to the field trip. It will be probably organized in May (about one week) when the spring tides are at their lowest.

References of the text

DEAN W.T., DONOVAN D.T. & HOWARTH M.K. (1961) - The Liassic ammonite Zones and Subzones of the North West European Province. *Bull. Brit. Museum (Nat. Hist.) Geology* 4 (10) 435-505.

DOMMERGUES, J.-L., FERRETTI, A. & MEISTER C. (1994) - Les faunes d'ammonites du Sinémurien de l'Apennin Central (Marches et Toscane, Italie). *Boll. Soc. Paleont. Italiana*, 33(1) : 13-42.

DOMMERGUES J.-L. & MEISTER C. (1992) - Late Sinemurian and Early Carixian ammonites in Europe with cladistic analysis of sutural characters. *N. Jb. Geol. Paläont. Abh..*, 185 : 211-237.

FARAONI P., A. MARINI, G. PALLINI & VENTURI F. (1996) - New Carixian ammonite assemblages of Central Apennines (Italy), and their impact on Mediterranean Jurassic biostratigraphy. *Paleopelagos*, 6 : 75-122.

FEIST-BURKHARDT S. (1998) - Palynostratigraphic characterization of the Sinemurian-Pliensbachian transition of the potential GSSP section at Aubach/Aselfingen, Southwest Germany. *Abstract of the 5th International Symposium on the Jurassic System*, Vancouver: 29.

HARLOFF J. von (1993) - Ostracoden des Unter-Pliensbachiums in Baden-Württemberg. *Stuttgarter Beitr. Naturk.*, B, 191: 214 p.

HESSELBO S.P. & JENKYNS H.C. (1995) - A comparison of the Hettangian to Bajocian successions of Dorset and Yorkshire. *In Taylor P.D. (ed.), Field Geology of the British Jurassic. Geol. Soc.*, London: 105-150.

HESSELBO S.P., OATES M.J. & JENKYNS H.C. (in press) - The Lower Lias of the Hebrides Basin.

SCHLATTER R. (1991) - Biostratigraphie und Ammonitenfauna des Ober-Lotharingium und Unter-Pliensbachium im Klettgau (Kanton Schaffausen, Schweiz) und angrenzender Gebiete). *Mém. suisses Pal.*, 113: 1-133.

New members of the Pliensbachian Working Group (the list is given in the Newsletter n. 25)

CHANDLER R.B., 60 Mosslea Road, Whyteleafe, Surrey, CR3 ODQ, UK, phone: 081-668 5988.
FARAONI P., Via Sparapani 11c, 60100 Ancona, Italy
HART M.B., University of Plymouth, Department of Geological Sciences, Drake Circus, Plymouth, Devon, PL4 6AA, UK.
HYLTON M.D., University of Plymouth, Department of Geological Sciences, Drake Circus, Plymouth, Devon, PL4 6AA, UK.
MARINI A., via Venezia 42, Cagli (PS), Italy <AGMARINI@iol.it>
RIDING J., UK <JBRI@wpo.nerc.ac.uk>
ROCHA R. da, Universidada de Lisboa, Quinta da Torre, 2825 Monte da Caparica, Portugal. phone: 351 1 29 544 64, fax: 351 1 295 76 68.
VENTURI F., Dipartimento di Scienze della Terra, Universitá di Perugia, Italy

FOR COMMENTS, INFORMATIONS AND YOUR PARTICIPATION IN YORKSHIRE FIELD TRIP IN MAY 1999, PLEASE CONTACT: CHRISTIAN MEISTER, Muséum d'Histoire Naturelle, 1 rte de Malagnou, CP 6434, CH-1211 Genève 6, Switzerland. Tel. 0041 22. 418.63.46 Fax. 0041 22. 418.63.01 E-mail. christian.meister@mhn.ville-ge.ch

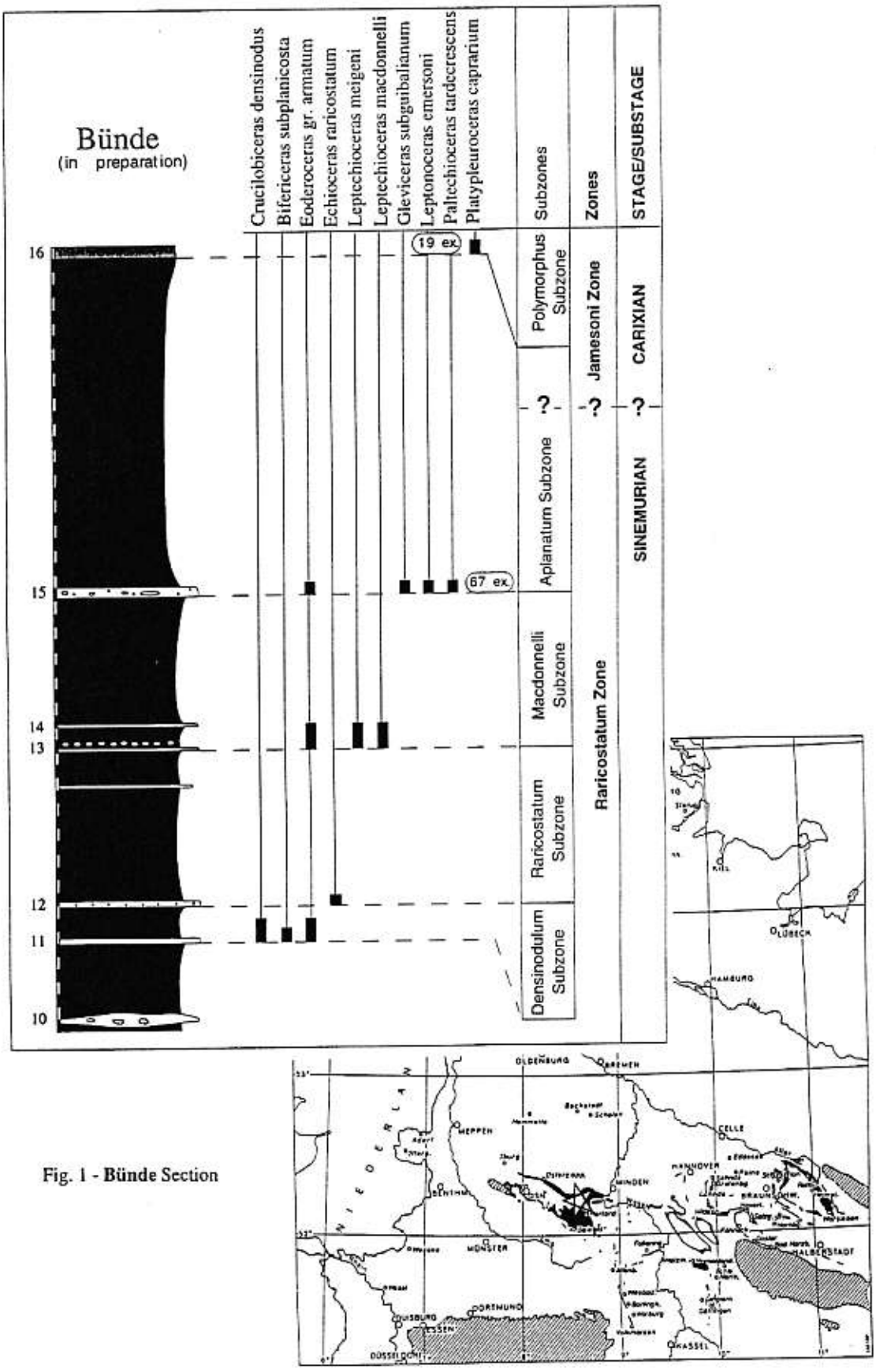


Fig. 1 - **Bünde Section**

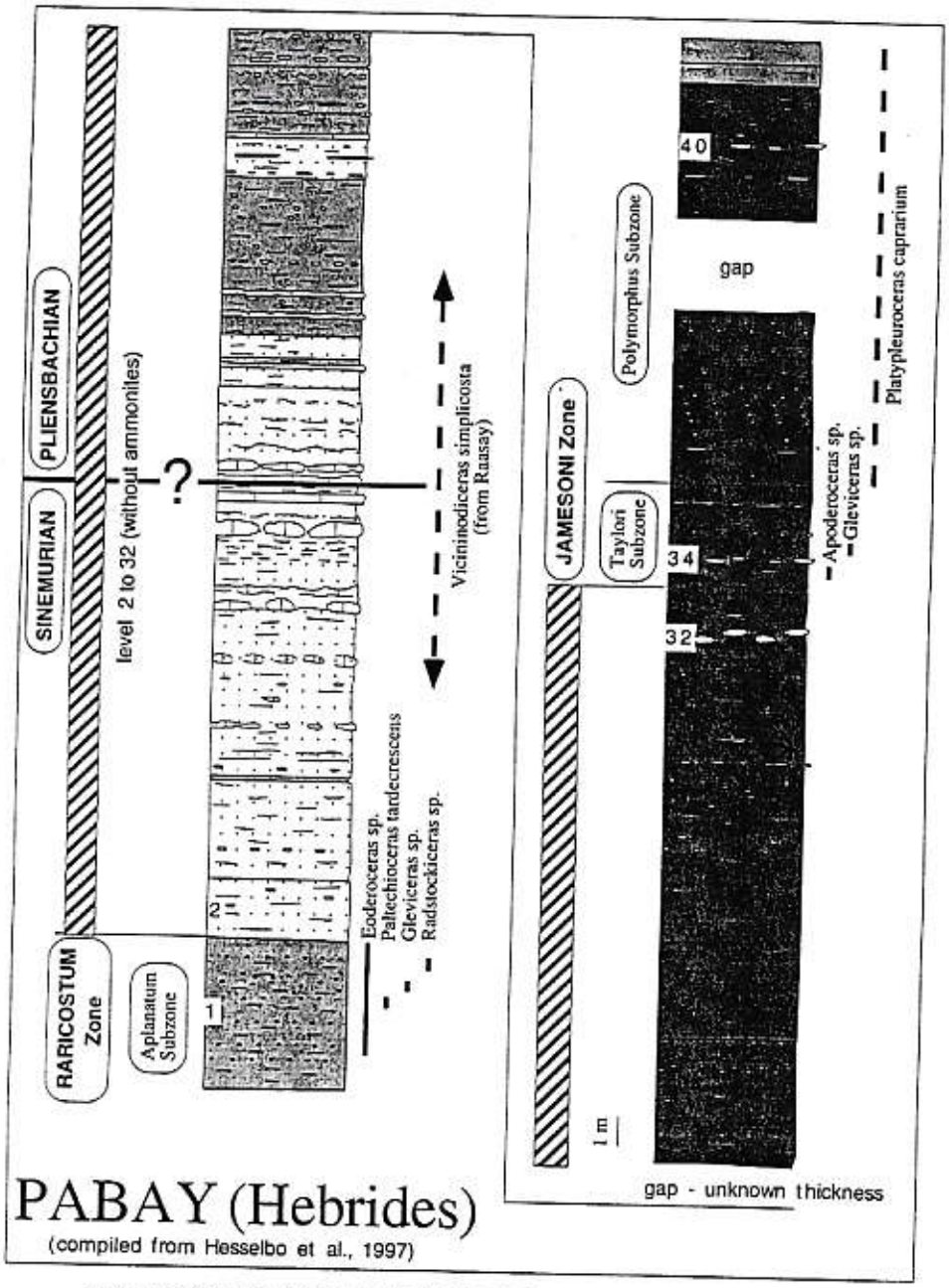
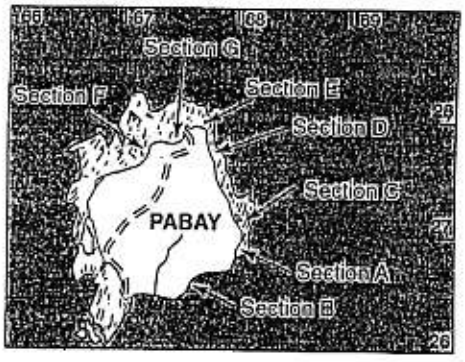


Fig. 2 - **Pabay** Section



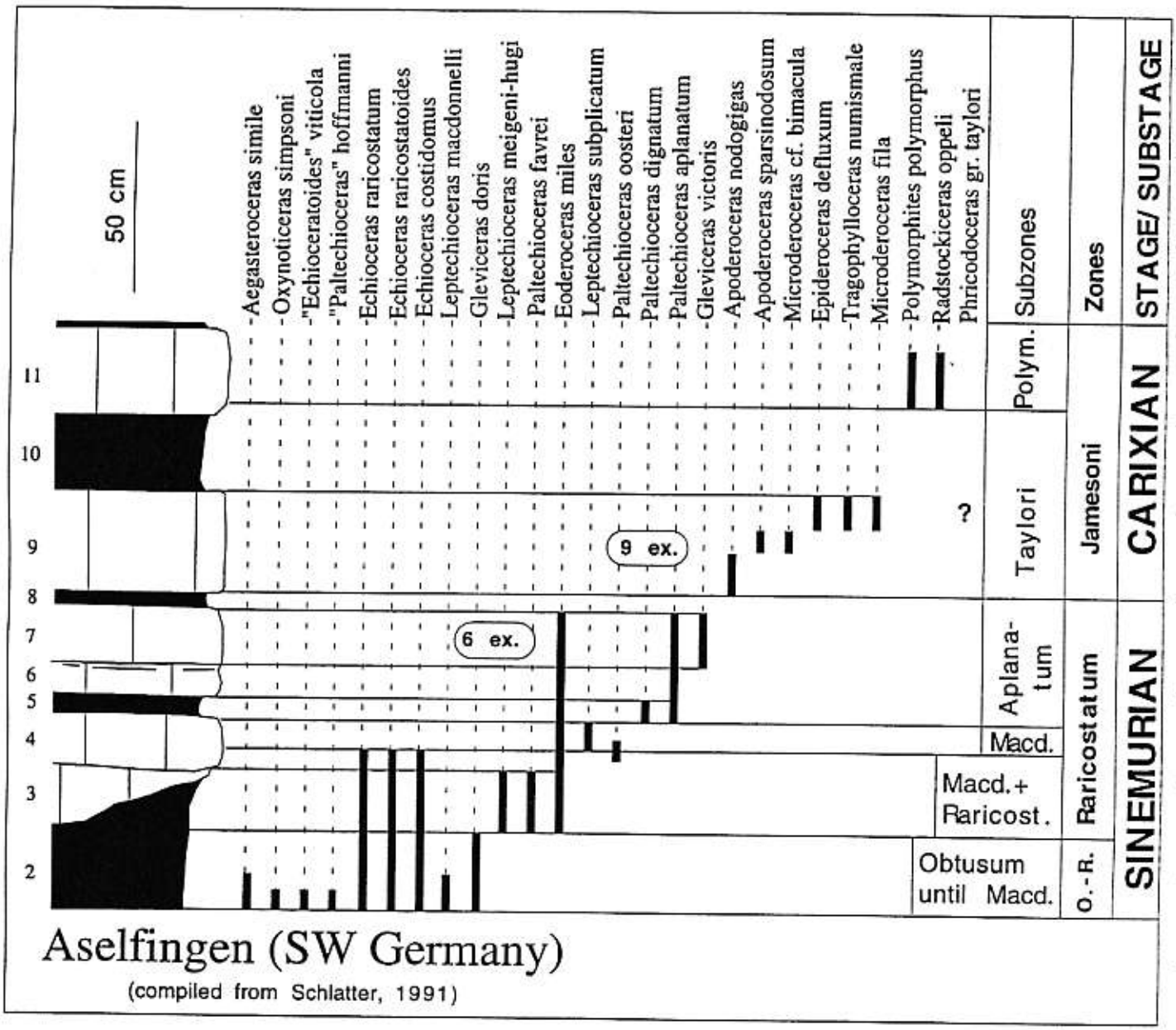


Fig. 3 - **Aselfingen** Section

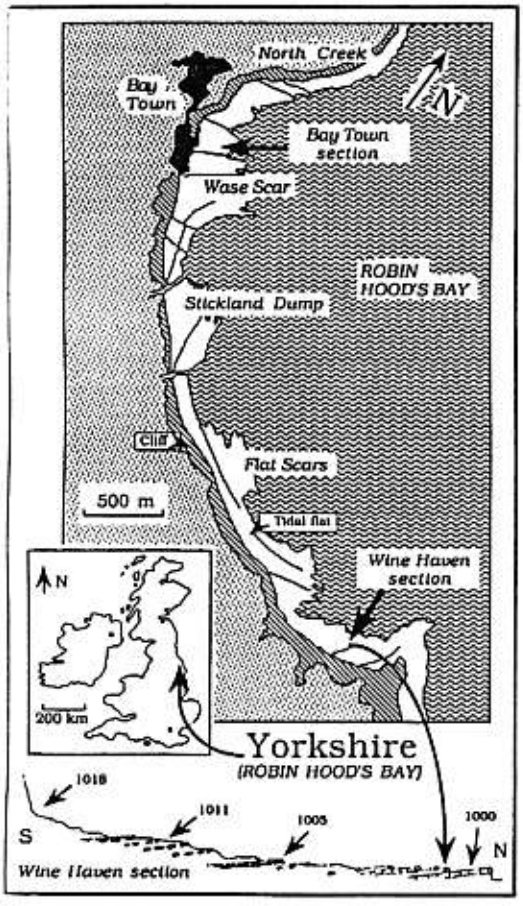
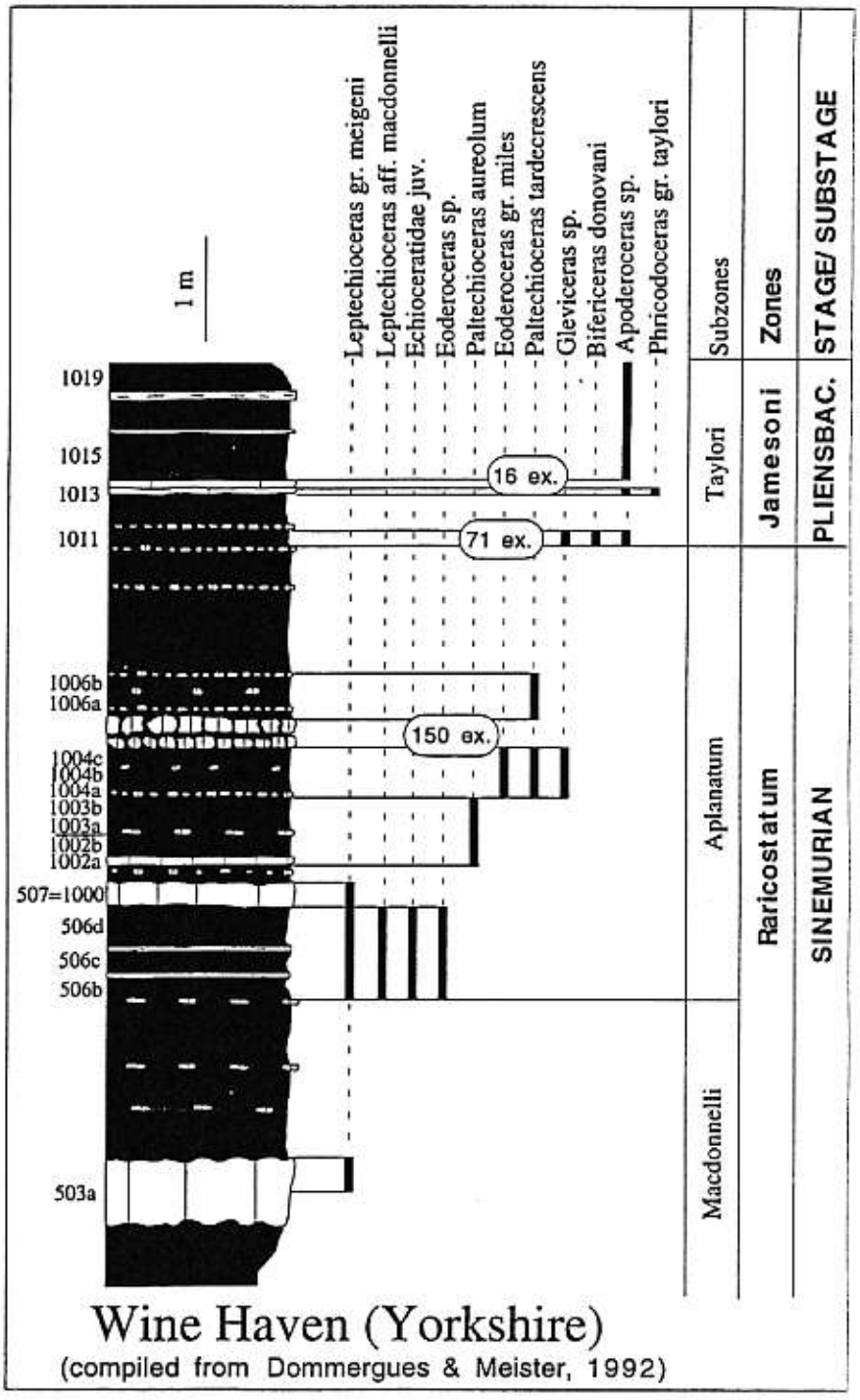


Fig. 4 - **Wine Haven** Section



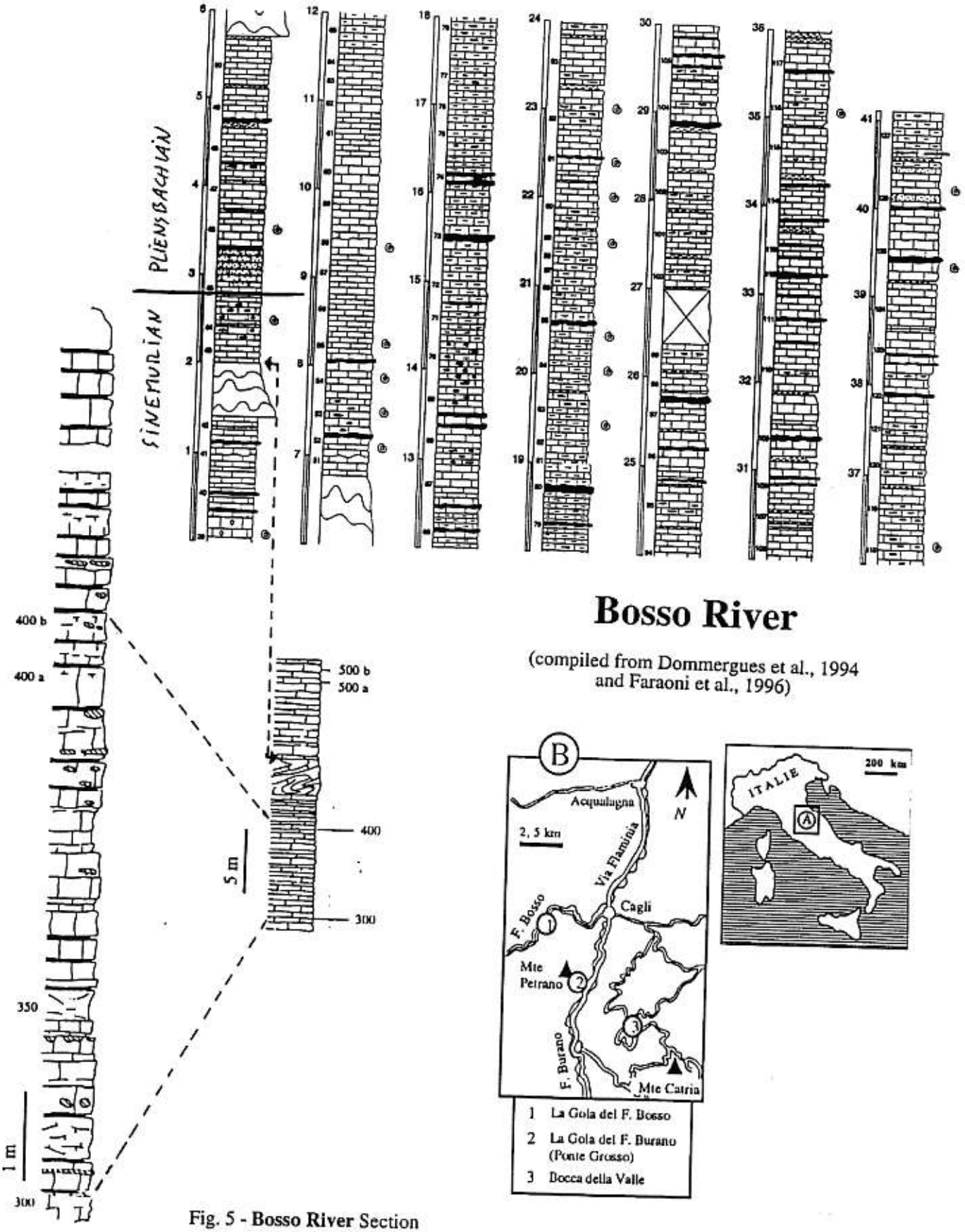
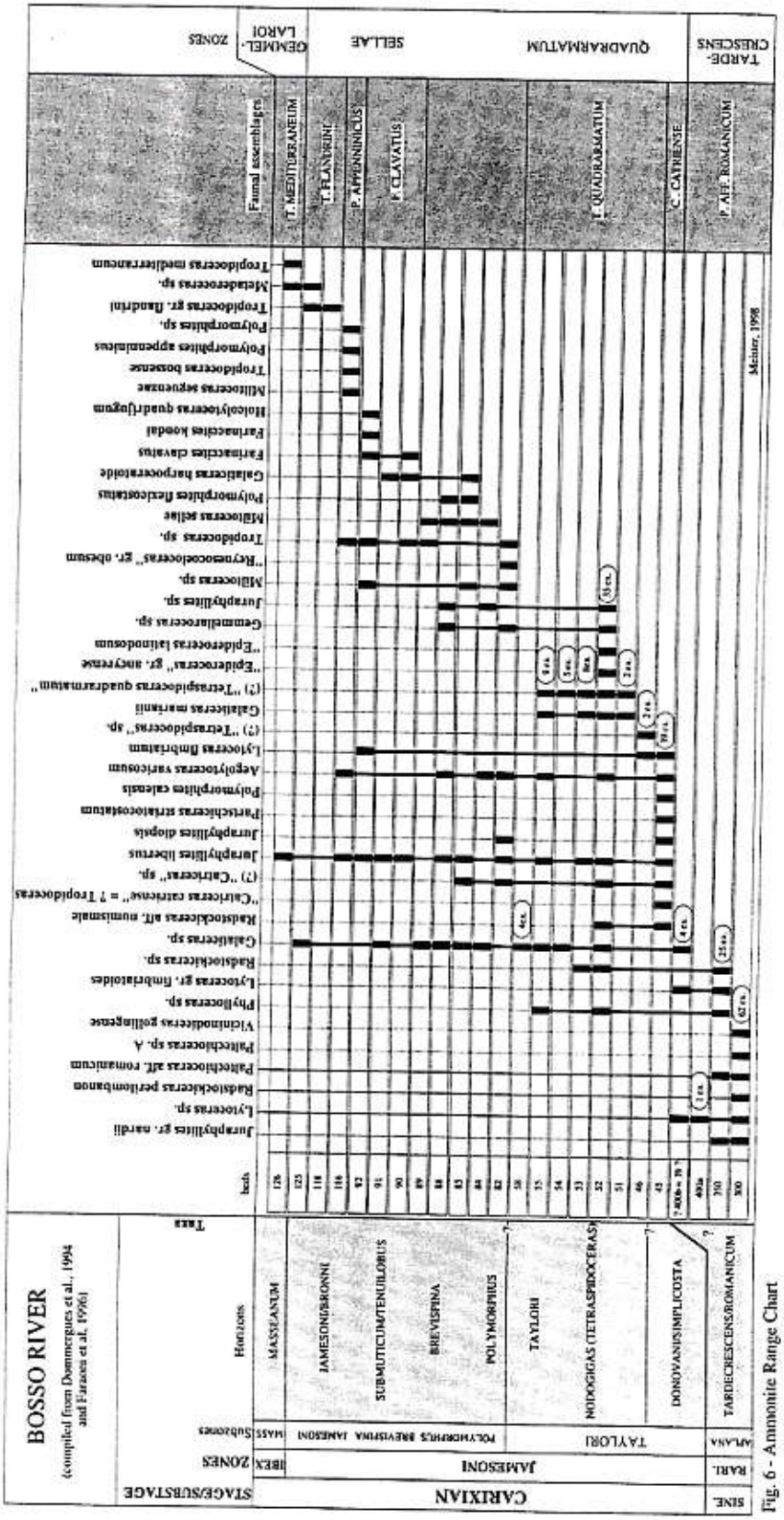


Fig. 5 - **Bosso River** Section


BOSSO RIVER
(compiled from Domeneghetti et al., 1994 and Farazzo et al. 1996)
Taxa
Horizons
STAGE/SUBSTAGE
ZONES
Subzones
Faunal assemblages
ZONES
CARIXIAN
JAMESONI
POLYMORPHUS BREVISPINA JAMESONI
TAYLORI
SELLAE
QUADRARMATUM
TARDE-CRESCENS
MASSEANUM
JAMESONI/BRONNI
SUBMUTICUMTENUILOBUS
BREVISPINA
POLYMORPHUS
TAYLORI
NODOGIGAS (TETRASPHINCTES)
DONOVANI/SIMPLICOSTA
TARDECRESCENS/ROMANICUM
T. MEDITERRANEUM
T. PLANORBE
P. APPENNINICUS
P. CLAVATUS
P. QUADRARMATUM
C. CATENENSE
P. AFF. ROMANICUM
Meister, 1998
Fig. 6 - Ammonite Range Chart

The requirements for a GSSP (ICS)	Hebrides (Pabay) (compiled from Hesselbo et al., in press)	Wine Haven, Yorshire (compiled from Dommergues & Meister, 1992)	Bünde, NW Germany (in preparation)	Aselfingen, SW Germany (compiled from Schlatter, 1991)	Bosso River, Central Apennine (Dommergues et al., 1994; Faraoni et al., 1996)
GEOLOGICAL REQUIREMENTS					
exposure over an adequate thickness	Yes	Yes	Yes	Yes	Yes
continuous sedimentation	Yes (2 gaps of observation)	Yes	Yes	Yes	Yes
rate of sedimentation	more than 65 m for the Aplanatum and Taylori Subzones	about 30 m for the Aplanatum and Taylori Subzones	2.70 m for the Aplanatum Subzone and the "assumed" Taylori Subzone	very low, 0.55 m for the Aplanatum and Taylori Subzones	Estimate ~ 20 m for the Aplanatum and Taylori Subzones
absence of synsedimentary and tectonic disturbances	Faulted ?	Yes	Yes	Yes	Important problems with slumps, often not obvious
absence of metamorphism and strong diagenetic alteration	---	Yes (for macrofauna)	Presence of the Pluton "Vlotho"	Yes	Yes
BIOSTRATIGRAPHIC REQUIREMENTS					
abundance and diversity of well-preserved fossils	Not very abundant ammonites and quite low diversity	Very abundant ammonite faunas and well preserved	Quite abundant ammonite faunas, but faunal gap for Taylori Subzone moreover the microfauna and microflora are very rare and poorly preserved (D. & J.).	Rather poor abundance of ammonites, in the opposite Ostracods and Dinoflagellates are abundant and diversified	Very rich and diversified ammonite faunas, but some problems of taxonomy occur
absence of vertical facies changes at or near the boundary	Important vertical facies changes at the boundary (shales and sandstones)	Yes	Yes	Yes	Yes
favourable facies for long-range biostratigraphic correlations	---	Yes	Yes	Yes	Yes
OTHER METHODS					
radioisotopic dating	no information	no information	no information	no information	no information
magnetostratigraphy	no information	no information	no information	no information	no information
chronostratigraphy	no information	no information	no information	no information	no information
sequence stratigraphy	Hesselbo et al., in press	Hesselbo et al., in press	no information	no information	no information
OTHER REQUIREMENTS					
the GSSP should be indicated by a permanent fixed marker					
accessibility	Difficult accessibility	Depending on the tide only	A quarry in work	Very easy	Very easy
free access for research	The island is privately owned and only the East coast has been studied	Yes	Yes	Yes	Yes
protection of the site	?	Good connections with English Nature	?	?	?
					Meister, 1998

Fig. 7 - Requirements of the ICS for Bünde, Pabay, Aselfingen, Wine Haven and Bosso River

5.3. REPORT OF THE PLIENSBACHIAN - TOARCIAN BOUNDARY WORKING GROUP

by
Serge ELMI
Convenor

The scientific sessions which have occurred during 1997 and 1998 have been very numerous and, in these conditions, I have not been able to plan a formal meeting after those organized by S. Cresta, A. Goy, S. Ureta and W. Ohmert in September 1996. However, the works and reflexions have progressed as it has been illustrated by the discussions during the Symposium held in Vancouver (August 1998) though time allowed to the Working Groups has been short.

The task primarily assigned by the Subcommission is to choose a GSP for the Pliensbachian-Toarcian (Pl - To) boundary. We must define the best reference for the beginning of the Toarcian stage. It must be a convenient reference and, if you want to obtain a good result, I want to stress that such a choice implics, obligatorily, a part of arbitrary associated with a good use of the priority rule... Theoretical methods to estimate the time (e.g. unitarian associations of Guex and Bucher) are useful to make the best choice for minor biostratigraphic units but it cannot be convenient to give a reference-point. From an other point of view, we must avoid the perturbations caused by gaps in the stratigraphical record. We can, however, choose a marker bed which must be well individualized and identifiable in the field and yielding a correctly abundant ammonite-fauna. The study of different palaeontologic groups (ammonites, foraminifera, ostracods, brachiopods...) shows another difficulty: the changes are not obligatorily of the same importance in the diverse groups.

For the Toarcian GSP, we are well and largely documented. Recent and ancient data are numerous and have been collected in a wide range of palaeogeographic settings. It is perhaps the reason why we are late to make a choice...

During September 1996 meetings, the Toarcian (and Aalenian) Working Groups have visited profiles in Spain (Aragon part of the Iberic Chain) and in SW Germany. In La Almunia de Doña Godina and Sierra Palomera (Spain) and at Dotternhausen (Germany), we have had good opportunities to discuss the problem of the FAD of the *"Eodactylites* fauna" and that of the diachronous appearance of the *Orthodactylites*. In SW Germany, in the Dotternhausen quarry (presented by W. Ohmert), the boundary Pliensbachian-Toarcian is situated within apparently continuous sequence of marlstones and marly limestones. However, there is no neat limit as there is no fossiliferous marker bed between the last Pleuroceras and the first *Orthodactylites*. The non dated interval has a thickness of 2-3 meters. This situation seems to be frequent in NW Europe where only a few *Eodactylites* have been found.

In Palomera (Rambla del Salto section presented by the Goy's team), the *Eodactylites* FAD is situated inside a monotonous succession of micrites (lower Turmiel Formation). It can be useful for local comparisons but the scarcity of ammonites is not convenient to establish a large faunal association, necessary for the correlations. According to spanish colleagues, the limit is better documented in Belchite or Ariño cf. (Goy et al., 1997; Comas-Rengifo, 1982; Comas-Rengifo et al., 1996). The recently published profile of Ariño shows that the *Eodactylites* fauna appears at the base of a stack of marly limestones separating marly dominated alternance. It could be a good marker, easily identifiable in the field.

In the present state of our works and of our formal (or informal) discussions, the diverse aspects of the choice of a GSP for the Pl/To boundary can be resumed as follows.

1- The majority of the classics outcrops of NW Europe are not convenient occurring to strong sedimentary perturbations. The lower limit of the Toarcian, as defined by d'Orbigny in Thouars, has been changed (improved ?) in order to take in account more thick and continuous sequences. In consequence, Thouars has become obsolete, in spite of his exhaustive revision by Gabilly and of his exemplary preservation owing to the Cariou's and Hantzpergue's efforts. The perturbation (gaps, reworkings, erosion, condensation) are important in classic areas: Yorkshire

and Dorset (United Kingdom), Poitou, Vendée (Western France), Lyon region (South East France where the thick subalpine profiles are poorly fossiliferous), etc...

During the Vancouver Symposium, Page has underlined the historic importance of the Yorkshire outcrops. However, the gaps seem to be important and no recent proposal has been made by modern authors and Howarth has not answered to our letters. In the same meeting, Hesselbo has stressed the importance of the dynamic events which have occurred near the Pl/To boundary. Sequence stratigraphy in the North Sea documents a maximum flooding surface at the base of the Tenuicostatum Zone. Transgressive and/or deepening events are really widespread at that time. But they cannot be accurate to give a good GSP. Similar dynamic events have been differently recorded in the world and we need a good and stable reference in order to estimate their importance. Moreover, it would be difficult to establish good macrofaunal references from boreholes data.

In conclusion, a large agreement has been obtained in order to choose the GSP in the perimediterranean domain (Western Tethys) because the gaps in the ammonite succession are less important. In several profiles the faunal relay seems to be satisfactorily continuous. We must now formalized this regional choice by a pool.

2- During the meeting in Spain (09-21-96), an agreement has been reached on the biostratigraphic place of the Pl/To boundary. In the Tethyan domain, the main lithostratigraphic change occurrs at the top of limestones capped by the first *Eodactylites* beds. In consequence, it has been attributed to the "Domerian" (Upper Pliensbachian) by the first authors [Fucini (1935) at Taormina (Sicily) and Termier (1936) in the Middle Atlas (Morocco)]. The usage has largely changed this interpretation and most of the authors placed now these *Eodactylites* beds in the Toarcian. However Venturi has defended the initial definition. During the meeting, he has admitted the general agreement and this is one of the positive results of the meeting. Hillebrandt, in Vancouver, has given also his agreement because the *Eodactylites* fauna gives a good marker for the comparison with South America.

However, the possible coexistence of *Pleuroceras* with isolated *Eodactylites* leads to precise that the Pl/To boundary must be marked by the FAD of a diversified *Eodactylites* fauna (Simplex horizon, *sensu* Goy et al., 1997) with the association *Paltarpites* - *Tiltoniceras* - *Eodactylites* as documented in Peniche (Portugal; see Elmi et al., 1996). This level can give a good correlation with the NW european Paltus Horizon.

3- The choice of a locality inside the Western Tethys is the future duty of the TWG. The best outcrops that I know are in Western Algeria, near Tiaret, in the Djebel Nador (Benia profiles, Elmi et al., 1977): stratigraphic micro and micropaleontologic, sedimentologic data are available (Ouared, 1987; Sebane, 1984). But, presently, it is a very "hot" region...

The historic locality of Taormina has not been recently revised and the tectonic setting is complicated inside the alpine "chaîne calcaire". In the Middle Atlas the conditions seem more appropriate, through the Termier's profiles are not the best, but the atlasic domain of the Western Maghreb offers plenty of good sections. During the Marrakech meeting of the Aalenian-Bajocian Working Groups, we have had the opportunity to visit the Talghemt pass on the northern rim of the Central High Atlas which has been presented by Sadki (Sadki, 1996). The first *Eodactylites* bed (n° 30) is at the top of the now Formation and under the marly Fm. It is well exposed along the main road but it seems to be discarded for several reasons: 1/ the proximity of volcanism, is not favourable for paleomagnetism studies, 2/ the superposed strata do not yield ammonites, 3/ the strata are perturbated by calciturbidites.

In the Middle-Atlas, we can tentitavilly selected the profiles of the "Immouza des Marmoucha" sector. They have been studied recently by Benshili (1989), Fedan (1993), Bassoullet et al. (1991). Integrated stratigraphic data are available. The *Eodactylites* levels are tectonically complicated in the main profile (Issouka). However, the same bed crops out very well in the nearby Aït Moussa profile along a permanent cliff situated along the bank of a river (oued Aït Bouzza). The first *Dactylioceras* bed (n° 74) is however poorly documented in this point and further collecting must be made. The Pl/To boundary is here situated inside the lithostratigraphic Issouka Formation.

In conclusion, the best profiles and areas presently known can be shortly listed.

- Ariño profile in Aragon (Iberic Chain).

- Umbria-Marche: several profiles in the Cagli sector (Monte Nerone chain) yield the *Eodactylites* fauna, but they are perturbed by several hard-grounds; the Perugia team has given detailed descriptions in Umbria.

- Peniche (Portugal) can be useful as an auxiliary profile but the first *Eodactylites* bed (n° 15E; Elmi et al., 1996) can be condensed since *Dactylioceras (Eodactylites) simplex* (Fucini) and *D. (E.) pseudocommune* (Fucini) occur together.

- Middle Atlas of Morocco. The Aït Moussa is a good "candidate" but it needs further collecting.

Provisionnaly, I estimate that the Ariño sector is a good profile, especially because the superposed beds are fossiliferous and give evidence that the *Eodactylites* are followed by the *Orthodactylites*, well known in NW Europe, particularily *D. (O.) crossbeyi* (Simpson).

4- This last remark leads me to expose the problem of the relative position of the *Eodactylites* and *Orthodactylites* faunas. In Peniche and Ari§o, we have evidences that the Crossbeyi Horizon is situated above the Simplex and Mirabile Horizons. It appears that the difference between NW Europe and the Western Tethys is not due to a palaeogeographic differentiation (or provincialism) but to a faunal (and often sedimentary) gap in NW Europe. A statistic work achieved by Besson (1998, with the collaboration of Bucher, Rulleau and Elmi) has used the unitarian association concept and it has concluded to the same conclusion.

It is also interesting to note that the *Eodactylites* fauna have appeared during a condensed (or "transgressive") interval which has begun during the domerian Emaciatum Zone and leading to a maximum flooding surface situated in the Semicelatum Subzone or at the base of the Serpentinum-Levisoni Zone according to the studied regions.

CONCLUSIONS :

* In order to formalize some of the previous results, I am anxious to have a large answer to 2 questions :

1- Do you agree with the use of the *Eodactylites* fauna as a biostratigraphic marker of the Pl/To boundary ? ˇ YES ˇ NO

2- Do you agree that the GSP will be choosen inside the Western Tethys (Iberian Peninsula, Morocco or Central Italy) ? ˇ YES ˇ NO

You can send me directly you answer:

Serge ELMI - UFR des Sciences de la Terre, Université Claude Bernard Lyon I,
27-43 Bd du 11 Novembre 1918, 69622 Villeurbanne Cedex
e-mail : elmi@univ-lyon1.fr.

The questions will be send to all the Toarcian workers that I can reach. **Deadline: June 31 st 1999.**

An extended and illustrated version of this report will be prepared during the first half of 1999 and presented at the Symposium of Lisbon. Remarks and/or contributions will be welcome.

REFERENCES

BASSOULLET et al. (1991) - Stratigraphie intégrée dans le Toarcien du Maroc (Rides sud-rifaines et Moyen Atlas). *Bull. Soc. géol. France*, Paris, n° 162 (5), p. 825-839, 8 fig., 3 tabl.

BENSHILI K. (1989) - Lias-Dogger du Moyen-Atlas plissé (Maroc). Sédimentologie, biostratigraphie et évolution paléogéographique. *Docum. Lab. Géol. Lyon*, n° 106, 285 p., 96 fig., 24 pl.

BESSON D. (1998) - Renouvellement faunique et corrélation biostratigraphique au passage Domérien-Toarcien (Téthys occidentale et NW Europe). *Diplôme d'Etudes approfondies*, Lyon, 50 p., 21 fig.

COMAS-RENGIFO M.J. et al. (1996) - The Toarcian in the Rambla del Salto (Sierra Palomera) Section. *in* S. URETA (coord.). *Guia de Excursiones a la Cordillera Iberica*, Dep. Paleont., Univ. Complutense Madrid, p. 27-48, 11 fig.

COMAS-RENGIFO M.J., (1982) - El Pliensbachiense de la Cordillera Ibérica. *Tesis doctoral, Univ. Complutense*, Madrid, 591 p.

ELMI S., ATROPS F. & MANGOLD C. (1974) - Les zones d'ammonites du Domérien-Callovien de l'Algérie occidentale. *Docum. Lab. Géol. Fac. Sci. Lyon*, n° 61, p. 1-83, 5 pl., 17 texte-fig.

ELMI S., MOUTERDE R., ROCHA R. (1996) - La limite Pliensbachien-Toarcien au Portugal : intérêt de la coupe de Péniche. Internat. Subcommission on Jurassic Stratigraphy, Meeting on Toarcian and Aalenian Stratigraphy, Fuentelsaz and Freiburg, *Aalenews*, n° 6, Roma, p. 33-35.

FARAONI P., MARINI A., PALLINI G. & VENTURI F. (1994) - Nuove faune ad ammoniti delle zone ad *E. mirabilis* ed *H. serpentinum* del F. Bosso (PS) e loro riflessi sulla biostratigrafia del limite Domeriano-Toarciano in Appennino. *Studi geol. camerti*, Camerino, vol. spec., p. 247-297, 2 fig., pl. 1-16.

FEDAN (1993) - Evolution géodynamique d'un bassin intraplaque sur décrochements : Le Moyen-Atlas (Maroc) durant le Méso-Cénozoïque. *Trav. Institut des Sciences de Rabat* (1989). Série Géologie Géographie Physique, 18, 142p., 94 fig.

FUCINI A. (1935) - Fossili domeriani di dintorni di Taormina. *Palaeont. Italica, Mem. Paleont.*, Pisa, vol. 35, p. 85-100, pl. 8-11.

GOY A., COMAS-RENGIFO M.J., ARIAS C., GARCIA JORAL F., GOMEZ J.J., HERRERO C., MARTINEZ G. & RODRIGO A. (1997) - El transito Pliensbachiense/ Toarciense en el sector central de la rama aragonesa de la Cordillera ibérica (Espana). *Cahiers Univ. Cathol.* Lyon, n° 10, p. 159-179, 7 fig.

OUARED O. (1987) - La transition "plate-forme carbonatée-bassin" dans le Jurassique inférieur et moyen des Monts du Nador (Tiaret, Algérie occidentale) : stratigraphie, sédimentologie et interprétation géodynamique. *Thèse Dipl. Doctorat*, Univ. Claude Bernard, Lyon I, 206 p., 59 fig.

SADKI D. (1996) - Le Haut Atlas central (Maroc). Stratigraphie et paléontologie du Lias supérieur et du Dogger inférieur. Dynamique du bassin et des peuplements. *Documents des Laboratoires de Géologie de Lyon*, 142 : 1-245, 50 fig., 10 pl.

SEBANE A. (1984) - Etude systématique et paléoécologique de la microfaune du Lias moyen et supérieur du Djebel Nador (Tiaret - Algérie). *Thèse 3ème Cycle, Univ. Claude Bernard, Lyon*, 135 p., 23 text. fig., 4 pl.

TERMIER H. (1936) - Etudes géologiques sur le Maroc central et le Moyen Atlas septentrionnal. 5ème partie : Paléontologie. *Notes et Mém., Serv. Mines Carte géol.*, Rabat, n° 33, p. 1083-1421, pl. 1-23.

5.4. REPORT OF THE TOARCIAN - AALENIAN BOUNDARY WORKING GROUP

by
Stefano CRESTA,
Convenor

DEFINITION OF THE TOARCIAN-AALENIAN STAGE BOUNDARY

INTRODUCTION. - Multidisciplinary research on the boundary stratotype, developed over many years by the Aalenian Working Group (AWG), was brought to a conclusion in 1998 with the nomination of the **Fuentelsalz section** at the Iberian Cordillera, Spain, as the best outcrop for the definition of the Global boundary Stratotype Section and Point (GSSP) of the Stage. After a positive ballot within the AWG, the resolution is now submitted to the voting members of the International Subcommission on Jurassic Stratigraphy (ISJS).

THE AALENIAN STAGE: DIVISION AND BOUNDARIES - Since the original definition of the Aalenian Stage, back to 1864 by Ch. MAYER, many papers dealt with usefulness, division and boundaries of this Stage. After the first "Colloque du Jurassique, Luxembourg" (1962) the term Aalenian is used generally. Concerning the different interpretations of the Aalenian, these can be referred to several papers which were published during the past 40 years by specialists.
On the basis of ammonite fossil assemblages, the European Aalenian presently comprises 4 "Standard Zones" (Fig. 1), which correspond to interval zones and to "assemblage zones"

(formerly OPPEL Zones) of the revised edition of the International Stratigraphic Guide (Salvador, 1994).

The very base of the Stage corresponds to the lower boundary of the *Leioceras opalinum* Zone and Subzone. For its definition, in many Jurassic colloquia, the evolution of the ammonite family Grammoceratinae has been recognised as providing the highest biostratigraphical resolution. In particular the first occurrence of species of the genus *Leioceras*, which is derived from *Pleydellia*, has been accepted by general consensus as being the biochronological event which best enables the recognition of the basal boundary of the Aalenian Stage.

STAGE	STANDARD EUROPEAN ZONES	SUBZONES
BAJOCIAN		
AALENIAN	CONCAVUM	*Formosum*
		Concavum
	BRADFORDENSIS	*Gigantea*
		Bradfordensis
	MURCHISONAE	*Murchisonae*
		Obtusiformis
		Haugi
	OPALINUM	*Comptum*
		Opalinum
TOARCIAN		

Figure 1

ACTIVITIES OF THE AALENIAN WORKING GROUP - Since 1991 the AWG members met three times (1991, 1994, 1996) both to discuss the biostratigraphical key to define the Aalenian basal boundary and to develop a common proposal for the Aalenian GSSP according to the Guideline of the ICS (REMANE *et alii*, 1996). The work concentrated on the Fuentelsaz and Wittnau sections, as no further proposals have been presented. A ballot was conducted within the AWG in winter 1997, and the results are now presented to the Jurassic Subcommission. Details of each step are summarized here.

Portree, Isle of Skye, Scotland, April, 1991 (MORTON, 1991) - During lectures, the Wittnau section (OHMERT *et alii*) and Fuentelsalz section (GOY & URETA) have been proposed as candidates for the GSSP of the Aalenian Stage.

Marrakech, Morocco, May 1994 (CRESTA & PAVIA, 1994) - During lectures both candidate sections were represented with new and up-to-date information useful for the selection of the basal boundary stratotype of the Aalenian Stage.

Nuevalos and Freiburg, September 1996 (*Aalenews* n.6) - On this occasion the candidate sections were visited by the AWG. Two field trip days have been spent to check and deepen the stratigraphic data collected from Fuentelsalz and Wittnau sections and it became evident that the information available is the best that we could obtain. Thirty-two workers attended the meeting and the following countries were represented: Algeria (1), Canada (1), France (3), Germany (6), Great Britain (1), Italy (7), Portugal (1), Spain (10), Switzerland (1). The discussion on GSSP took place in Freiburg on september 25 with the attendance of 26 AWG members and the session actually concentrated on Fuentelsalz and Wittnau sections already discussed twice (Skye 1991, Marrakesh 1993).

According to the discussion, the AWG fixed the lowest distinguishable, correlatable Aalenian faunal horizon: at Wittnau OHMERT's (1996, fig.22) *misera* horizon (bed 20b) with allegedly both

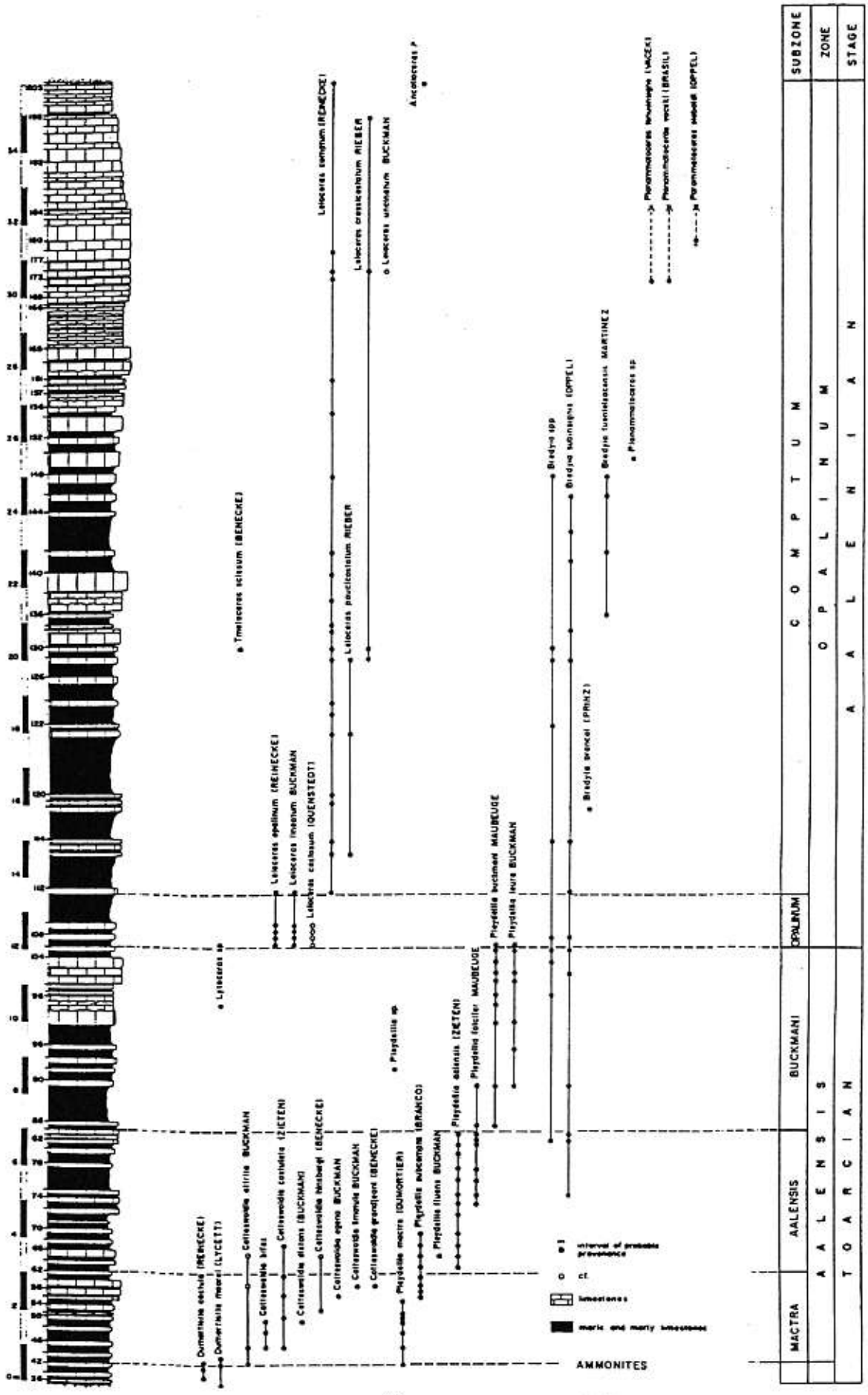

STAGE
ZONE
SUBZONE
TOARCIAN
AALENSIS
OPALINUM
COMPTUM
MACTRA
AALENIAN
BUCKMANI
OPALINUM
Dumortieria levesquei (RENEVIER)
Dumortieria moorei (LYCETT)
Lytoceras sp
Collenoidia elirnis BUCKMAN
Collenoidia bifax
Collenoidia costulata (ZIETEN)
Collenoidia discors (BUCKMAN)
Collenoidia hesbergi (BENECKE)
Collenoidia egena BUCKMAN
Collenoidia limnata BUCKMAN
Collenoidia grandjeani (BENECKE)
Pleydellia mactra (DUMORTIER)
Pleydellia aalensis (ZIETEN)
Pleydellia illueni BUCKMAN
Pleydellia foliceli MAUBEUGE
Pleydellia buckmani MAUBEUGE
Pleydellia levis BUCKMAN
Tmetoceras scissum (BENECKE)
Leioceras opalinum (REINECKE)
Leioceras lineatum BUCKMAN
Leioceras costosum (QUENSTEDT)
Leioceras tenuicostatum (BENECKE)
Leioceras crassicostatum RIEBER
Leioceras paucicostatum RIEBER
Leioceras undosum BUCKMAN
Ancolioceras sp
Bredyia sp
Bredyia subinsignis (OPPEL)
Bredyia grandi (PRINZ)
Bredyia tuxinielaensis MARTINEZ
Planammatoceras sp
Planammatoceras lotharingia (VACEK)
Planammatoceras mouki (BRASIL)
Planammatoceras mouki (OPPEL)
interval of probable development
cl.
limestones
marls and marly limestones
AMMONITES

Fig. 2

Leioceras opalinum and *Pleydellia misera* plus *P. buckmani*; at Fuentelsalz an *opalinum* horizon (bed 107), not so far expressly described as such, with *L. opalinum, L. lineatum* and *P. buckmani*. (This opinion has been also submitted through postal ballot to all the AWG directory, reaching a quite unanimously agreement).
After comments and discussions, no agreement on a single GSSP proposal was reached. The dilemma was that: (1) both sections are equally good to document the evolutionary lineage within the ammonite subfamily Grammoceratinae and the early development of *Leioceras*; (2) both sections are equally good in diversity of represented fossil groups; (3) geomagnetic measurements elaborated from the clay pit (1994) as well as from the corehole Wittnau (1996) failed to provide a well defined magnetostratigraphic record. Owing to this impasse, a postal vote was planned.

THE BALLOT WITHIN THE AALENIAN WORKING GROUP, WINTER 1997 - The vote involved the directory af the AWG. Voting papers were mailed to 46 colleagues (Europe 37: France 5, Germany 7, Italy 8, Polonia 1, Spain 8, England 4, Portugal 1, Switzerland 2, Svezia 1; North and South America 8: Argentina 3, USA 2, Canada 3; Africa 2 (Morocco), Asia 2 (Iran 1, Japan 1).
The ballot offered a triple choice: (1) selection of the Wittnau section for Aalenian GSSP; (2) selection of Fuentelsalz section for Aalenian GSSP; (3) abstention meaning that a different section would be proposed. Options (1) and (2) were documented by reports.
By the deadline for the ballot, 31 answers (70%) had been returned: 9 (30%) for Wittnau; 18 (60%) for Fuentelsalz; 4 (10%) abstentions.

CONCLUSIONS - The Fuentelsalz section at the Iberian Cordillera (Spain) is proposed as the GSSP of the Aalenian Stage (Fig. 2) as it fulfills the following requirements:
(1) Global scale correlation by means of ammonites; in particular, with the first occurrence of *Leioceras opalinum*. The *L. opalinum* Subzone in the Fuentelsalz section is characterized by the appearance of the first representatives of the genus *Leioceras*, that coexist with the last representatives of the genus *Pleydellia* (*P. buckmani,* and *P. leura*). The species *L. opalinum* and *L. lineatum* appear simultaneously. As to Hammatoceratinae, *Bredyia subinsignis* is still present.
This horizon is perfectly correlatable with the Wittnau section where the base of the *L. opalinum* biozone is defined by the *Pleydellia misera* biohorizon, characterized by *L. opalinum, L. subcostosum, L. subglabrum, L. partitum* and the last representatives of the genus *Plaeydellia* (*P. falcifera, P. misera, P. buckmani*).
(2) absence of unconformities in the interval from Upper Toarcian to Lower Aalenian in a section with continuous exposure from *P. aalensis* to *L. comptum* Subzones.
(3) The sediments corresponding to the uppermost Toarcian and Lower Aalenian are constituted by two main lithologies (total thickness 36 metres), which are organized in elemental sequences composed by marly and calcareous terms. These two lithologies irregularly alternate and constitute a rhythmic succession, except for the upper portion of the section (*L. comptum* Subzone) where limestones are predominant and marly components are very reduced in thickness. The *P. aalensis* Zone, as well as the base of the *L. opalinum* Zone, is characterized by the presence of shallowing-upward sequences, except for a small deepening episode localized at the limit between the *P. aalensis* and *P. buckmani* Subzones.
In the central part of the Iberian Range the sedimentation took place in a platform or external ramp environment, open and well communicated, under relatively undisturbed hydrodynamic conditions below the wave base but, at the same time, not at high depth. In general, the bottom must have been well oxygenated to allow colonization by benthic organisms, producing the high abundance and diversity of well preserved fossils.
(4) Studies on ammonites, bivalves, brachiopods, ostracods, palinomorphs, foraminifera and calcareous nannofossils have been completed.

The **ammonite** assemblages recorded are relatively rich in specimens. Generally they are in good state of preservation, and characterized by complete specimens, whith the peristome often preserved. This is indicative of the fact that most of them were accumulated, resedimentation being less common. No evidence of reworking has been found. It has been established that the subsequent assemblages are mainly made up of adult and young specimens of the macro- and

microconch forms, especially in the *P. aalensis* Zone and in the lower and middle part of the *L. opalinum* Zone.

Eleven different species of **brachiopods** have been distinguished in the *P. aalensis* and *L. opalinum* Zones. The stratigraphical distribution of these species basically coincides with what has been observed in other parts of the Iberian Range, although the more marly nature of the sediments of this section in the time interval considered, when compared to the other areas of the basin, probably serves to influence the distributions.

Several **bivalves** taxa are represented at the beginning of the succession in Toarcian sediments of the top of the *D. pseudoradiosa* Zone and the *P. mactra* Subzone. The maximum of abundance and diversity for the whole section occurs near the middle *P. mactra* Subzone. Diversity decreases slowly in the *P. aalensis* Subzone, but this trend is inverted in the *P. buckmani* Subzone. In the *L. opalinum* Zone bivalve taxa are very scarce.

The **foraminifera** assemblages consist largely of calcareous hyaline species dominated by lenticular forms of the family Vaginulidae. A total of 62 benthic taxa were recognized from the Upper Toarcian to the Lower Aalenian. Agglutinated foraminifera, mainly saccamminids and lituolids, were identified in most of the samples. Spirillinids are common throughout all the interval, while ophtalmidids and ceratobuliminids are present in small numbers.

In the the **ostracod** assemblages of the *P. aalensis* and *L. opalinum* Zones, the species of the genus *Praeschuleridea* are predominant. Therefore, and from a biostratigraphic point of view, the most important out of those described in our material: *P. bernierensis, P. angulata, P. ventriosa*, together with *Kinkelinella sermoisiensis* and *K. fischeri*, are present throughout the period studied.

A preliminary **palynological** study on samples from the Toarcian and Aalenian interval has been undertaken. The study has revealed the presence of a well preserved palynological assemblage consisting of spores, pollen grains, acritarch and other organic walled microplankton, such as Tasmanaceae. A total of 18 species has been recognised.

The **calcareous nannofossils** from the *P. aalensis* to *L. opalinum* Subzones show generally moderately preserved and rare to common assemblages.

(5) No structural complexities or metamorphism.

(6) Possible correlatable palaeomagnetic results with an inversion from reversed to normal polarity in the *P. aalensis* subzone.

The **magnetostratigraphy** of the section is characterized by the existence of a normal polarity interval at the base (N1) which extends between level FZ22 and level FZ54. This is followed by a reversed polarity interval (R1) comprising levels FZ56 to FZ76-86. The reversed interval is overlain by another interval of normal polarity (N2) defined by level FZ88 and FZ163 including however several gaps. The reversed magnetozone R1 extends between the *P. mactra* and *P. aalensis* Subzones and can be correlated with the reversed interval that appears in the Lower and Middle Jurassic magnetostratigraphic column proposed by Gradstein *et alii* (1994).

(7) Easy accessibility of the section well exposed on the cliff at Fuentelsalz.

5.5. REPORT OF THE BAJOCIAN - BATHONIAN BOUNDARY WORKING GROUP

by
Charles MANGOLD
Convenor

The work on the GSSP proposal in the Digne area is in progress and is entering into the last period of realization.

A recent field work was done at the La Palud section near Castellane in cooperation with G. Pavia and an italian team. In this section the aim was to state the Bomfordi-Convergens Subzones boundary below bed 39 (see Innocenti et al.,1988, p. 342, fig. 3). The collected ammonites seem

to set the boundary below bed 44. This section could be considered as an auxiliary one.

Ammonites collected in 1997 at the Ravin du Bès and Bas Auran sections (see Newsletter n° 25) are now in study.

The progress report on the GSSP proposal is summarized below.

1° Ammonite fauna (C. Mangold & G. Pavia)

During June 1999, G. Pavia and the convenor would reexamine in Torino the previous collectings made by C. Sturani, H.S. Torrens, M. Innocenti, G. Pavia and italian students. At the same time we want to determine our recent collected faunas. Then it should be possible to establish final biostratigraphic and biochronologic schemes for the Ravin du Bès-Bas Auran GSSP and the La Palud auxiliary section.

2° Ostracofauna (Dr. A.M. Bodergat, Lyon)

Preliminary results: Ostracods are present in all marly samplings, but they are badley preserved between bed 23 and bed 13 (Convergens and Macrescens Subzones). The marine taxa are different from those known in the Paris basin and England. The subalpine taxa, specially the genera Pontocyprella, Isobythocypris and Cardobairdia indicate deeper environments (more than 200 m).

3° Foraminifers (Dr. C. Ruget, Lyon)

I received no news about this microfauna.

4° Calcareous nannofossils (Dr. E. Erba, Milano)

Results and conclusions were published in the Lisboa Symposium volume (Innocenti et al., 1988, p. 344, fig. 4).

5° Dinoflagellate cysts, pollen and spores (Dr. N.E. Poulsen, Copenhagen)

Between layer 31/30 (Uppermost Bajocian) and the "terres noires", twenty-three samples were collected and studied by Dr. Poulsen. He concluded:

(1) All samples were barren of dinoflagellate cysts. The only organic material in the palynological slides was black coal particles.

(2) The carbonised organic material without any recognisable dinoflagellate cysts, pollens or spores, indicates that the section has been deeply buried. During the burial the organic material has been carbonised.

(3) The state of preservation of the palynomorphs in the section is disapproving. The section cannot, on this background, be recommended for as the Bathonian stage GSSP.

(4) If the section is proposed as GSSP disregarding the poor palynologic results, a nearby reference section with a good palynological fossil record has to be found.

6° Magnetostratigraphy (Pr. Dr. R. Lanza, Torino)

Thirty-three hand samples were collected at the section. Standard paleomagnetic specimens were cut from the samples and measured in the Rock Magnetism Laboratory of the Torino University. The conclusions of R. Lanza are:

(1) The high-T component could be tentatively regarded as the primary magnetization acquired during the rock deposition and the early diagenetic stages.

(2) Its intensity is a very small fraction (few %) of the initial NRM. That means that to isolate a reliable section is very difficult. In the case the high-T polarity is normal, i.e. the same as that of the intermediate-T component, thermal demagnetization may be successful (and it was in about 30% of the investigated specimens); in the case the polarity is reverse, I think that to track the polarity change from normal (intermediate-T) to reverse (high-T) is probably impossible.

(3) The fact that the specimens yielded with intermediate-T component did not usually yield the high-T component means in my opinion that the remagnetization process did destroy and not overprint the primary magnetization. We do not isolate the primary magnetization simply because it does no longer exists.

(4) A magnetostratigraphic study of the bas Auran section can only give data very beneath the standard required.

7° Schedule

A new schedule is here proposed and it will be held!

+ Gathering of results: new dead line October 15, 1999

- The convenor is waiting for new results and data on the GSSP proposal at Digne for foraminifers, taphonomy, sedimentology and sequence stratigraphy. Please answer.

- During the end of 1999, the convenor will be able to prepare a provisional text of the proposal to be sent for correction to people involved with the boundary.

+Definitive proposal:

1st step: The final report will be submitted to the members of the Bt.B.WG. (see Newsletter n° 25) for approval or not by a postal ballot.

2d and 3d steps: are the submission of the final proposal to the ISJS and ICS.

8° MEETING - ! FIRST ANNOUNCEMENT !

The convenors of the Bajocian and the Bathonian Working Groups kindly inform everyone interested that to renewing and extending the activity of their Working Groups, a joint meeting will be organized in **Budapest, in the fall of 2000**.

The meeting, in September, 2000, will offer opportunities to discuss the following main topics:

Refined stratigraphic data on and around the proposed/accepted GSSP of the Bajocian and the Bathonian;

Ammonite stratigraphy and correlation of the Bajocian and Bathonian on zonal, subzonal, and faunal horizontal level;

Stratigraphy and correlation by means of any other fossil groups;

Non-biostratigraphic results on the Bajocian and Bathonian;

Any other data and informations relevant to Bajocian and Bathonian stratigraphy.

There will be two days for lectures with oral communications and poster sessions in Budapest, and three days of excursions to visit localities in South Hungary (Mecsek and Villány), Transdanubian Central Range (Bakony Mts and Gerecse Hills).

Abstracts will be published as a pre-congress volume, and the presented papers as a post-congress volume of *Hantkeniana*, the annual periodical of the Department of Palaeontology, Eötvös University.

The Meeting will be organized as a low-budget event, with reasonable prices and in good old Middle Jurassic mood!

First circular will be sent out in the first half of 1999, with detailed information on prices, dates and other technicalities.

András Galácz
Convenor of the Bajocian Working Group

Charles Mangold
Convenor of the Bathonian Working Group

5.6. REPORT OF THE BATHONIAN - CALLOVIAN BOUNDARY WORKING GROUP

by
John H. CALLOMON,
Convenor

The Bathonian-Callovian Boundary Stratotype (GSSP)

As many readers of the ISJS Newsletter may recall, work on a proposal for the designation of a GSSP had made good progress and was substantially complete at the time of the meeting of the Working-Group (CvWG for short) in Stuttgart and Albstadt, Germany, in 1990. It is a matter of regret that, for practical reasons, the conclusions reached at this meeting have not so far been taken forward as a formal presentation to the International Commission for Stratigraphy (ICS) with a request for ratification of the CvWG's proposals. The time has now come to revive these proposals and to bring the matter to a conclusion. There follows, therefore, a synopsis of The Story So Far and of what remains to be done.

A. Historical summary

(1) 1962, Luxembourg (CALLOMON 1964, in MAUBEUGE, ed, p.269-71): a review of the principles of standard chronostratigraphy as applied in the Jurassic, of its hierarchical structure with ultimate typological definitions at the lowest level - in the case of Jurassic Stages, at the base of the lowest standard Subzones.

These principles were then applied to the Callovian Stage: lowest Zone and Subzone at the time, Macrocephalus Zone and Subzone. Typological anchor: base of Macrocephalus Subzone. Type locality: Sutton Bingham, near Yeovil, Somerset, England. Basal boundary: base of bed 4 in a description of the section by ARKELL (1954).

This proposal could not be formally ratified by the ICS because that body had at the time neither a mission nor a mechanism for doing so. Neither was there a CvWG to give it collective support. But in the event, the Callovian Stage has had a de facto GSSP (CvSSP-64 for short) for 22 years before the ICS acquired these functions and published its Guidelines for procedure, both geological and organizational (COWIE et al., 1986). No objections to the choice of the basal boundary stratotype of 1964 has ever been voiced, probably because it coincided

within the limits of attainable precision of correlations (see more on this below) with the already generally accepted regional (European) level of this boundary. Its level also coincides, as closely as can be determined, with that of the revised choice now being proposed (CvSSP-90). And the only objection to this received so far (JORDAN 1993, see below) is on a technical point contained in the Guidelines, not on the choice of level - also further discussed

(2) 1984, Erlangen (CALLOMON 1985b, in MICHELSEN & ZEISS, eds, p.611): principles of standard chronostratigraphy as applied to the Jurassic again fully reviewed.

--- : CALLOMON 1985a (ibid., p.72): report of the first meeting of the newly-formed CvWG at Erlangen; extensive review of the status of the standard chronozonation of the Callovian and of its development and correlations world-wide.

(3) 1986: COWIE et al: Guidelines of the ICS etc.: standard chronostratigraphy of the Phanerozoic to be built on Stages as the lowest "Global" members of the hierarchy; Stages to be defined typologically in terms of basal boundary stratotypes (GSSP's); stipulation of requirements for selection of a GSSP, including "continuity of sedimentation through the boundary interval".

(4) 1980-89: intensive amplification and revision, based on new sections, of the stratigraphy around the Bathonian-Callovian boundary in the classical areas of Britain (PAGE, 1989), western France (CARIOU, 1980, -85), northern Germany (MÖNNIG, 1989), southern Germany (CALLOMON et al., 1989a); identification, enumeration and correlations of the biostratigraphically most closely time-diagnostic markers, the faunal horizons of the ammonites (CALLOMON et al., 1989b).

(5) 1987, Lisbon: CALLOMON (1989, in ROCHA & ZEISS, eds, p.19): report of CvWG meeting, with review of progress since 1984.

(6) 1990: CvWG Field Symposium in Swabia, Stuttgart and Albstadt, 16-21 September, to consider the proposals for the selection of a new GSSP (CvSSP-90) in a section near Albstadt-Pfeffingen and to examine this section. 18 members of the CvWG attended. The proceedings were supported by:

- a Field Guide (46p, compiled by G. DIETL);
- a detailed consultation paper ("Paper I": see references);
- an oral exposition (CALLOMON) covering biostratigraphy and world-wide correlations;
- a demonstration of the biostratigraphical basis for the selection of the proposed boundary, a basis in the immensely rich and uniquely diverse new collections of ammonites (now in Stuttgart) made in the region of the proposed type section.

The proceedings were concluded at a meeting of the Working-Group held in the "Museum im Kreuterkasten - a regional branch of the Staatl. Museum für Naturkunde Stuttgart - in Albstadt, to consider the proposals put forward during the Symposium and to decide whether they should be adopted. The proposals were put to the vote. They were adopted unanimously by those present, with no abstentions and no objections to any of the points raised during the proceedings, either of principle, or of fact, or of judgement in the choice among available alternatives.

(7) 1991: ISJS Newsletter 20: report (CALLOMON, p.5) of the Albstadt meeting and of the conclusions reached there.

(8) 1991, Poitiers:another full report (CALLOMON 1994b, in CARIOU & HANTZPERGUE, p.757) of the Albstadt meeting; and ibid (1994a, p.16): comparative review of guide-fossils as tools in chrono=stratigraphy: ammonites, and their faunal horizons, explained.

(9) 1991: R. JORDAN: objections to the conclusions reached at the Albstadt Symposium. These objections were first formulated in a manuscript in German and circulated privately. The sole grounds given were based on the "condensed" nature of the succession in the proposed stratotype, following the stipulation in the ICS Guidelines already referred to above. While a [chrono=stratigraphical] boundary should be biostratigraphically determined, it should be defined only in a thick succession laid down under conditions of as close as possible to continuous sedimentation, as exemplified by the 35 m of "(nearly) continu=ously-deposited" Bathonian clays of Hildesheim (N Germany) with their correspondingly continuous succession of ammonites. Dr JORDAN was neither a member of the CvWG, nor present at the Albstadt Symposium, nor apparently had seen the consultation document (Paper I) presented there. Neither did he apparently

appreciated the difference between "continuous" sedimentary successions and "apparently continuous" successions, a difference that has exercized the minds of stratigraphers for many years because of its bearing on the "completeness of the record". Nor did he tell us how he knew that the Hildesheimer Bathonian clays [- no mention of the Callovian -] and their ammonites were "continuous" (something that had eluded e.g. MÖNNIG). Neither, finally, did he put forward any alternative suggestions for the Callovian GSSP. A rebuttal of Dr JORDAN's objections was therefore composed and also circulated privately. An English translation of Dr JORDAN's objections were then published in 1993 (ISJS Newsletter 21, p.18). The rebuttal was not.

1995: CALLOMON: review of biostratigraphical methods of measuring geological time, with special reference to the time-scales determined by achievable time-resolution (here by the biostrati= graphy of guide-fossils), hence of the achievable precision of time-correlations set by such time-scales, and hence the precision with which a boundary time-plane, including a GSSP, can be located at any point other that the one at which it is defined; and, finally, the dependence of the apparent completeness of the geological record ("no gaps ...") on the time-scale used to test it.

(10) 1996: Revised Guidelines of the ICS (REMANE et al.): requirements (section 4.1) i.a. of "exposure over an adequate thickness of sediments", "continuous sedimentation: no gaps, no condensation in proximity of the boundary level", "rate of sedimentation sufficient that successive events can easily be separated" retained (but "adequate" and "successive events" not more closely specified).

(11) 1998, Vancouver: CALLOMON & DIETL (MS, Paper II): yet another review of the principles adopted in the selection of the proposed GSSP (still CvSSP-90), with particular emphasis on what the purpose of a GSSP is, hence what in the present context "adequate" implies, what the "successive events" for the purposes of a GSSP are, and hence what the minimum completeness of the record, including definition of "condensed deposit", has to be to qualify as "continuous". Thus more closely defined, and not unless, all the contentious requirements of the revised Guidelines are in fact fulfilled by CvSSP-90. Preprints of Paper II are

available on request. It is not the final submission of a complete proposal, but a contribution to the debate leading up to such a proposal.

B. Future developments

(1) Re-formation of the Callovian Working-Group (see below).

(2) Completion of the documentation of the basic data on CvSSP-90: description of the ammonites (DIETL, in progress); analysis of the geomagnetic polarity-stratigraphy (OGG & DIETL, measurements completed); publication of the strontium stable isotope-ratio stratigraphy (McARTHUR & THIRLWALL, measurements completed).

(3) Any further discussions of the proposals for the GSSP: objections, amendments, amplifications - even alternatives (!)

(4) Preparation of the final submission to the ISJS and thence the ICS.

(5) Supporting vote by the membership of the CvWG.

C. The membership of the Callovian Working-Group

The CvWG was founded at Erlangen in 1984. The list was last drawn up on that occasion and its aftermath and the time has come to bring it up to date. Two classes of membership were recognized, following the intentions expressed:
(1) Members actively engaged in work on some aspect of Callovian stratigraphy; and
(2) Members at the time not directly involved in Callovian stratigraphy but interested and wishing to be kept informed of developments.

The following are the names currently on List (1) ("S" indicates participation at the meeting in Stuttgart in 1990)

J.H. CALLOMON	(S)	(London)	J. KRISHNA	(S)	(Varanasi)
E. CARIOU	(S)	(Poitiers)	B. LAURIN		(Dijon)
Beris M. COX		(Nottingham)	C. MANGOLD	(S)	(Lyon)
G. DIETL	(S)	(Stuttgart)	D. MARCHAND	(S)	(Dijon)
S. ELMI		(Lyon)	G. MELENDEZ	(S)	(Zaragoza)
R. ENAY		(Lyon)	E. MÖNNIG	(S)	(Coburg)
R. GYGI	(S)	(Basel)	H.-J. NIEDERHÖFER	(S)	(Stuttgart)
A. GALACS	(S)	(Budapest)	K.N. PAGE		(Exeter)
B. GECZY	(S)	(Budapest)	G. PAVIA	(S)	(Torino)

[List (1), cont'd]

E. PROSOROVSKAYA	(S)	(St Petersburg)
A.C. RICCARDI		(La Plata)
L. SEQUEIROS		(Helva)
R. TARKOWSKI	(S)	(Krakow)
J. THIERRY	(S)	(Dijon)
A. VÖRÖS	(S)	(Budapest)
W. VOLKHEIMER		(Mendoza, Arg.)
G.E.G. WESTERMANN		(Hamilton, Ont.)
A. ZEISS	(S)	(Erlangen)

I should like to ask those on this list and other readers of this Newsletter, and any others interested in active membership of the Working-Group, to let me know (a) whether they wish to remain members or not, or to become members of, the "active" Working-Group (List (1)); and hence (b), whether they wish to take part in the vote whose outcome will support the application to the ISJS and ICS. Members wishing to receive copies of any of the documents referred to in the historical survey, section A above, are also invited to let me know. Finally, any comments or discussion that members may wish to contribute (section B(3) above) would be very welcome.

[Address: since retiring some years ago I retain only limited facilities at University College London. These do not, regrettably, include an e-mail address. Communication is however freely possible by fax or telephone, and incoming e-mail can be accepted via another address. Contacts, therefore, as follows:

J.H. Callomon, University College London,
20 Gordon Street, London WC1H 0AJ
Tel. [44] 171 504 4632; fax: [44] 171 380 7463
e-mail (incoming): s.r.brown@ucl.ac.uk

References

ARKELL, W.J. 1954. Three complete sections of the Cornbrash. Proceedings of the Geologists' Association, 65: 115-122.

CALLOMON, J.H. 1964. Notes on the Callovian and Oxfordian Stages. In: MAUBEUGE, P.L. (ed), Colloque du Jurassique à Luxembourg 1962. Publications de l'Institut grand-ducal, Séction sciences naturelles, physique et mathématique, 948p. Luxembourg.

CALLOMON, J.H. 1985a. Report of the Callovian Working Group. In: MICHELSEN, O. & ZEISS, A., eds, International Symposium on Jurassic Stratigraphy, Erlangen 1984, 1: 77-86. Geological Survey of Denmark, Copenhagen.

CALLOMON, J.H. 1985b. Biostratigraphy, chronostratigraphy and all that - again! Ibid., 3: 611-624.

CALLOMON, J.H. 1989. Reports of the Stage Working-Groups of the International Subcommission on Jurassic Stratigraphy: Middle Jurassic, Callovian Stage. In: ROCHA, R.B. & ZEISS, A., eds, 2nd International Symposium on Jurassic Stratigraphy, Lisboa 1987, 1: 19-26. Lisboa.

CALLOMON, J.H. 1994a. Palaeontological methods of stratigraphy and biochronology: some introductory remarks. Geobios, Mémoire spécial, 17: 16-30.

CALLOMON, J.H. 1994b. Reports of the Stage Working-Groups: Callovian. Ibid., 757-760.

CALLOMON, J.H. 1995. Time from fossils: S.S. Buckman and Jurassic high-resolution geochronology. In: LeBAS, M. ed, Milestones in Geology, Geological Society of London Memoir 16: 127-150.

CALLOMON, J.H. & DIETL, G. 1990. Proposed definition of the Callovian Stage. MS (unpublished) for Field Symposium in Swabia, Stuttgart/Albstadt, September 1990. iv + 20p., 7 Tables. [Paper I]

CALLOMON, J.H. & DIETL, G. 1998. On the proposed Basal Boundary Stratotype (GSSP) of the Middle Jurassic Callovian Stage. MS (submitted), 5th International Symposium on the Jurassic System, Vancouver, August 1998. 18p., 7 figs. [Paper II].

CALLOMON, J.H., DIETL, G. & NIEDERHÖFER, H.-J. 1989a. The ammonite faunal horizons at the Bathonian-Callovian boundary in the Swabian Jurassic and their correlation with those of western France and England. Stuttgarter Beiträge zur Naturkunde, B, 148: 13p., Table I.

CALLOMON, J.H., DIETL, G. & PAGE, K.N. 1989b. On the ammonite faunal horizons and standard zonations of the Lower Callovian Stage in Europe. In: ROCHA, R.B. & ZEISS, A., eds, 2nd International Symposium on Jurassic Stratigraphy, Lisboa 1987, 1: 359-376. Lisboa.

CARIOU, E. 1980. L'étage Callovien dans le centre-ouest de la France. Thèse, Docteur ès Sciences, Université de Poitiers, 1ère partie: stratigraphie et paléogéographie, 37p., 32 figs., pls.1,2. U.E.R. Sciences Fondamentales et Appliquées 325, Poitiers.

CARIOU, E. 1985. Biostratigraphic subdivision of the Callovian Stage in the Subtethyan province of ammonites, correlations with the Subboreal zonal scheme. In: MICHELSEN, O. & ZEISS, A. eds, International Symposium on Jurassic Stratigraphy, Erlangen 1984, 2: 315-326. Geological Survey of Denmark, Copenhagen.

COWIE, J.W., ZIEGLER, W., BOUCOT, A.J., BASSETT, M.G. & REMANE, J. 1986. Guidelines and Statutes of the International Commission on Stratigraphy (ICS). Courier Forschungs-Institut Senckenberg, 83: 1-14.

JORDAN, R. 1993. Objection to the proposed Callovian boundary stratotype, Macrocephalen-Oolith, Albstadt-Pfeffingen. Newsletter International Subcommission on Jurassic Stratigraphy, 21: 18-22. Lyon.

MÖNNIG, E. 1989. Stratigraphie und Fazies des Calloviums im Raum Porta-Hannover-Hildesheim. Clausthaler Geowissenschaftliche Dissertationen, 37: 183p., 37 tables, 3 plates. Geologisches Institut, Technische Universität Clausthal.

PAGE, K.N. 1989. A stratigraphical revision for the English Lower Callovian. Proceedings of the Geologists' Association, 100: 363-382.

REMANE, J., BASSETT, M.G., COWIE, J.W., GOHRBANDT, K.H., LANE, H.R., MICHELSEN, O. & WANG Naiwen. 1996. Revised guidelines for the establishment of global chronostratigraphic standards by the International Commission on Stratigraphy (ICS). Episodes, 19: 77-81. International Union of Geological Sciences.

5.7. REPORT OF THE CALLOVIAN - OXFORDIAN BOUNDARY WORKING GROUP

by
Guillermo MELENDEZ
Convenor

ISJS MEETING, VANCOUVER AUGUST 1998
REPORT OF THE OXFORDIAN WORKING GROUP

I. INTRODUCTION

The working session of the Oxfordian Working Group was held on Thursday 20th August afternoon, during the Jurassic Subcommission working sessions at the ISJS Symposium, Vancouver. Over 20 Jurassic/Oxfordian workers attended the session and a general feeling was perceived that we are now close to an agreement on the final submission of a formal proposal of a GSSP candidate for the Callovian-Oxfordian boundary.

The present report summarizes the data supplied by several authors, active OWG members, submitted at the Vancouver Meeting as a supplementary abstract and published in the Abstracts volume of the Symposium.

As a sharing text this contribution is also a measure of the certain degree of consensus reached on this matter. The authors are: G. MELENDEZ, F. ATROPS, D. FORTWENGLER, D. MARCHAND, J. OGG, K. PAGE N. POULSEN AND J.K. WRIGHT.

II. THE QUESTION OF THE CALLOVIAN-OXFORDIAN BOUNDARY

Problems concerning the definition of a proper candidate section for the Oxfordian basal boundary stratotype can be summarized as follows:

(1) The presence of widespread gaps and non-sequences at the Callovian-Oxfordian boundary mainly due to significant block tectonics in the Tethyan basins during this interval and eustatic fall at this point. This makes it virtually impossible to look for a favourable candidate in the basins across the Tethyan margins.

(2) The strong provincialism affecting the ammonite families as sharply distributed apart in the so-called boreal and mediterranean (or Tethyan) realms. Cardioceratids dominate in the boreal regions whilst Perisphinctids, Oppeliids and Peltoceratids do so in the mediterranean ones.

(3) The difficulty in finding both ammonite-rich pelagic successions with diverse benthic groups successions.

III. THE SEARCH FOR (AND THE DECISION ON) A GSSP CANDIDATE FOR THE CALLOVIAN-OXFORDIAN BOUNDARY

A historical review of the type area for the Callovian-Oxfordian boundary has already been presented in former reports. Candidate sections presenting a more or less continuous stratigraphic succession across the Callovian-Oxfordian boundary, i.e. the Lamberti and Mariae Zones are now considered both in Britain and in SE France. The former include the Osgodby Nab section at Cornellian Bay in Scarborough (NE England) and a second, more expanded sequence, at the South coast of England, in Weymouth, Dorset.

The second proposal include the already known twin sections of Thuoux and Savournon, near Serres in Provence (SE France), first discovered and described by F. Atrops and subsequently recorded by D. Marchand and D. Fortwengler. Upper Callovian-lower Oxfordian sequence at this area shows a well-expanded 300 m black shale, ammonite-rich interval allowing to establish a detailed biostratigraphic succession across the boundary.

The proposed succession, as presented by Fortwengler and Marchand at the Thuoux section (Fig. 1) includes a well-defined Paucicostatum Horizon (including ammonite assemblages 6A and

6B) at the top of the Lamberti Subzone, followed by the Thuouxensis (index species: *Brightia thuoxensis*) - Elisabethae (index species: *Peltoceras* sp, ex

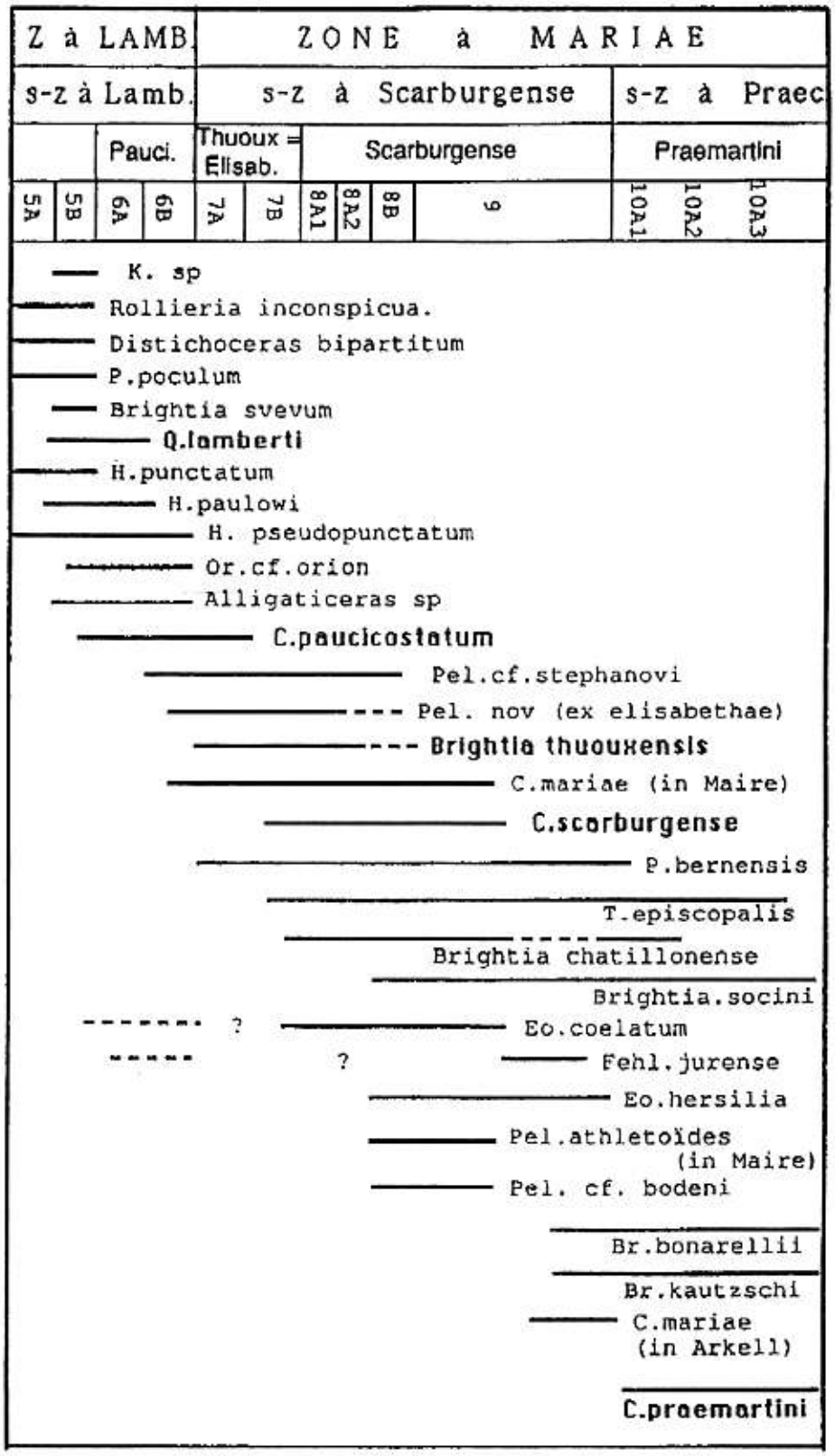


Fig. 1 - Vertical range of the major species found in the " Terres Noires " Formation at the Callovian - Oxfordian boundary. 5A to 10A3: field subdivisions.

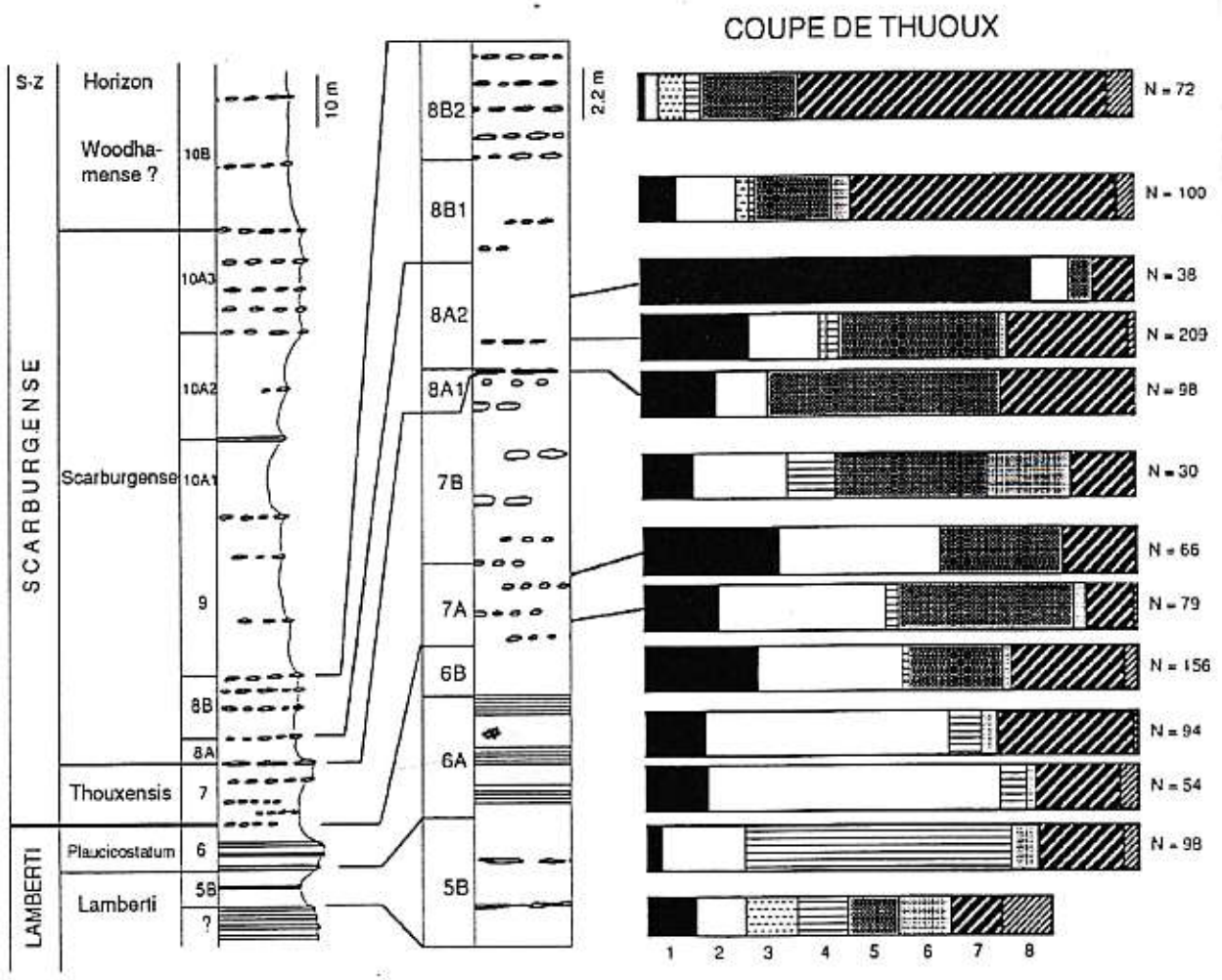


Fig. 2 - Lithostratigraphy, biostratigraphy and faunal spectra in Thuoux section (SE France). N: number pf specimens; 1: Cardioceratidae; 2: Hecticoceratinae; 3: Taramelliceratinae; 4: Perisphinctidae; 5: Peltoceratinae; 6: Euaspidoceratinae; 7: Phylloceratina; 8: Lytoceratina + Haploceratidae. 5A to 10B: field subdivision.

P.elisabethae) Horizon, including ammonite assemblages 7a and 7b, at the base of the Mariae Zone, Scarbugense Subzone. Such detailed ammonite succession was also remarked by slight changes in the ammonite families spectra at the turn of the Lamberti-Scarburgense Subzone, as shown by Fortwengler & Marchand, e.g. a sharp increase in the share of representatives of Peltoceratinae at the base of Thuouxensis Horizon (see figure 2). On the other hand, the recorded *Cardioceras* succession showed the sharp turnover of the species *C. paucicostatum* by *C. scarburgense* at the turn of assemblages 7a and 7b (i.e. *within* the Thuouxensis Horizon; yet the species *Cardioceras scarburgense* could confidently be regarded as a clear marker for the basal Oxfordian, Mariae Zone, Scarburgense Subzone, See Fig. 3). Therefore, the recorded ammonite succession at Thuoux section was tentatively assumed as representative of a good candidate as for the choice of the Oxfordian GSSP, the most confidential ammonite groups for marking the boundary at this point being representatives of Hecticoceratinae and Peltoceratidae, well beyond Cardioceratids and Perisphinctids. The Thuoux outcrop was completed by the nearby -twin outcrop- of Savournon, some 5 Km away from Thuoux, near the town of Serres, and showing a very similar, slightly clearer and richer, though slightly faulted stratigraphic succession.

Besides ammonite successions, Dinoflagellate cysts also show a remarkably precise succession, well enough to match ammonite species and to characterise the Lamberti - Scarbugense Subzone boundary at a precise point in both proposed sections (see Fig. 4). The specialist opinion (N. Poulsen) would in this case be more inclined towards considering Savournon as the reference

section due to the better paleontological record, state of preservation and higher precision of the Dinocyst taxa. Yet in both sections, a sharp turnover is recorded of some species, such as *Pareodinia prolongata* and others, by *Wanaea frimbiata*, at the very base of the Scarburgense Subzone.

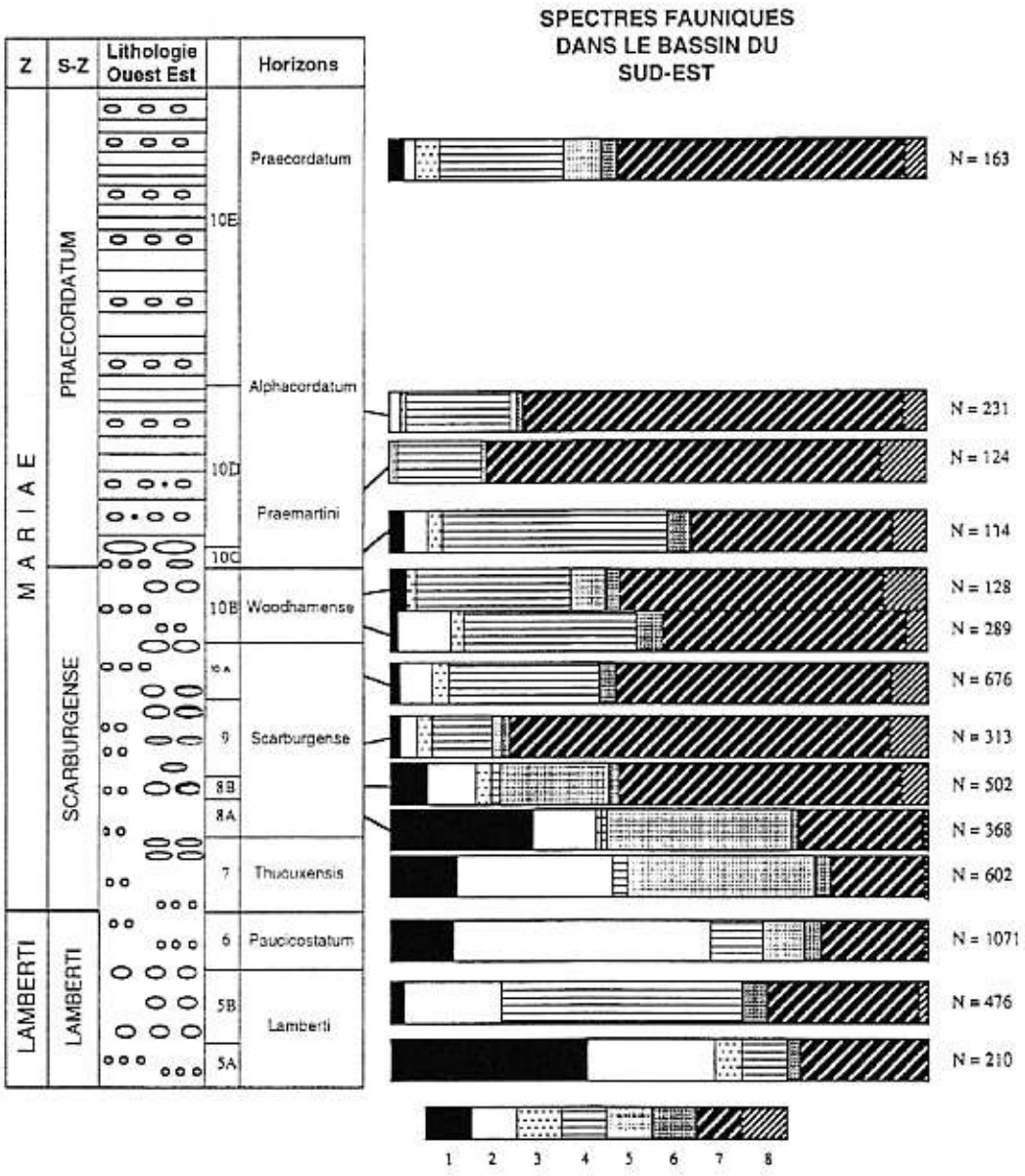


Fig. -3 - Faunal spectra in French South-Eastern basin. Faunals spectra and lithologic column are based on synthetic results of the Savournon - Thuoux area (from Lamberti Subzone to the top of the Praecordatum Subzone). N: number pf specimens; 1: Cardioceratidae; 2: Hecticoceratinae; 3: Taramelliceratinae; 4: Perisphinctidae; 5: Peltoceratinae; 6: Euaspidoceratinae; 7: Phylloceratina; 8: Lytoceratina + Haploceratidae. 5A to 10E: field subdivision.

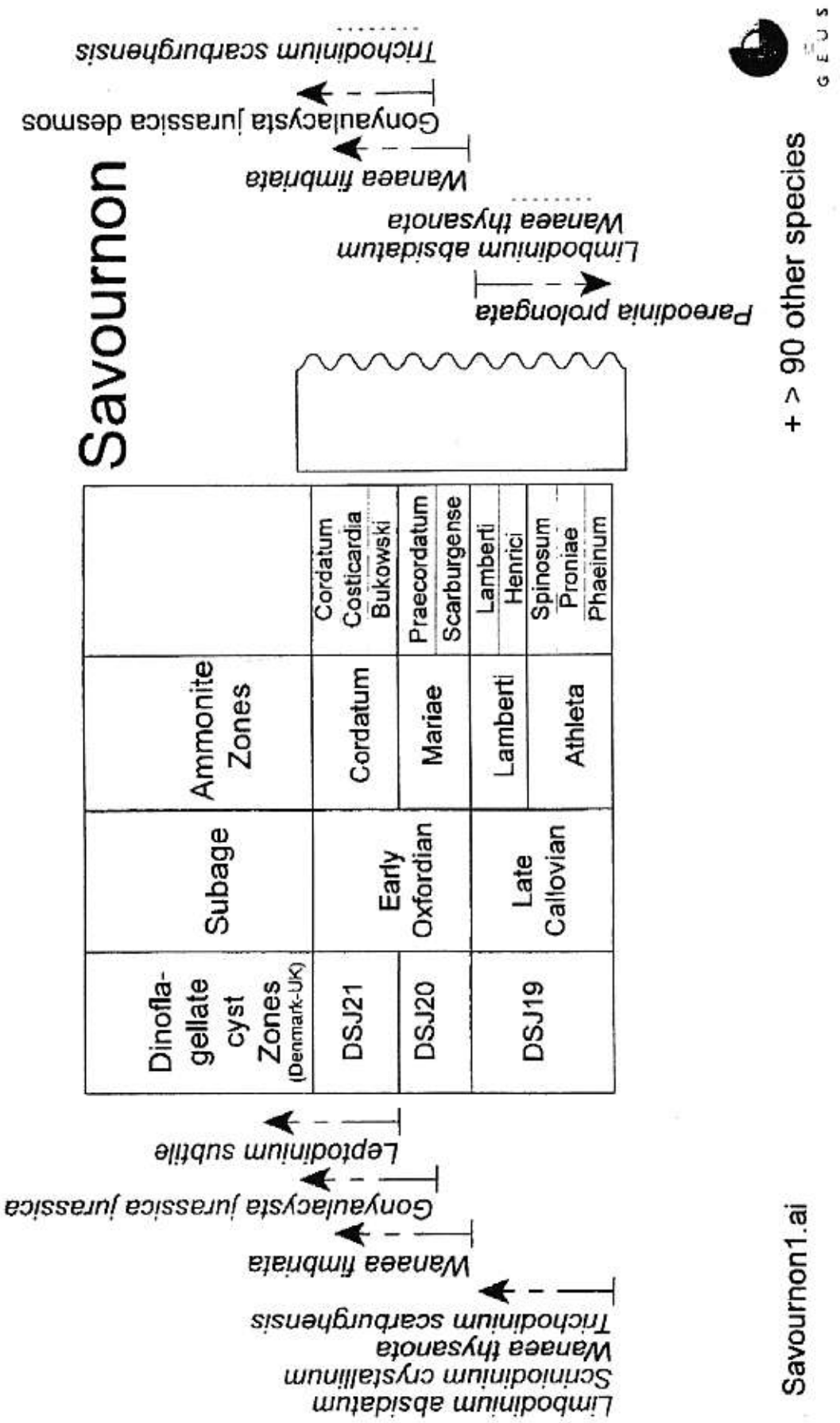


Fig. 4 - Dinoflagellate cyst distribution.

IV. CURRENT STATE OF THE QUESTION

The GSSP proposal of these two outcrops, approved by general votation amongst the members of the Oxfordian Group by July 1995, were sent to the former ISJS Chairman as a ready-to-go formal proposal to the ISC and presentation in the International Geological Congress. The proposal, however, was not definitively set or presented, on the grounds of being too 'rushy' at the last stages. Some objections have come out since, and are now still under discussion. They could be summarized as follows:

1. The ammonite succession itself could be objected on the grounds that,
a) - relative proportions of representatives of ammonite families are a poor biostratigraphic criterion. On the other hand, the state of preservation of ammonite associations in both sections, mainly as pirityzed nuclei, made them not always easy to identify.
b) - The classically known Cardioceratid succession slightly overlaps that of the still poorly known hecticoceratid and peltoceratid species here proposed as key taxa for tracing the lower boundary of the basal, lower Oxfordian, Thuouxensis Horizon.

2. Despite the fine Dinoflagellate recorded succession, little has still been said or reported about other fossil groups (brachiopods, bivalves, belemnites, foraminifera) which could serve as a supplementary support for this section as GSSP candidate. It should be had in mind, however, that pelagic and benthic groups are not always well-matched in the fossil record, especially when in basin facies. Yet a further effort to progress in the study of other fossil groups would always be welcome and surely make things easier as for the ISC requirements.

3. Magnetostratigraphic studies, although the subject of detailed tentative sampling in 1995 (J. Ogg; F. Atrops; G. Meléndez) are so far improductive, possibly due to the high clay content of the lithologic succession and the scarcity of favourable carbonate beds. Something similar can be said of other advisable research aspects, such as radiometric datings or others.

V. DISCUSSION AND RESULTS

From the above discussion the following points may be be stated:
(1) The Thuoux-Savournon area, first designated as Oxfordian GSSP candidate by the members of the OWG, offers excellent possibilities to be proposed and selected as the Callovian-Oxfordian boundary stratotype on the grounds of the detailed ammonite succession at the boundary, recorded at a subzone to horizon level and on the wide spectra of boreal and mediterranean ammonite families represented. Objections set at this point can be minimized since no other known section so far shows such an expanded lithological succession at this stratigraphic boundary and such a detailed ammonite succession.

A discussion might, however be open in order to decide whether to set the base of the Scarburgense Subzone, either at the base of the Thuouxensis Horizon, following the first occurence of the still poorly known Hecticoceratinae species *Brightia thuouxensis,* or at the turnover of the more widespread species *Cardioceras paucicostatum* by *C. scarburgense*.
(2) As stated above, besides ammonites and dinoflagellates, other fossil groups in these sections are poorly represented and/or studied. The years passed since the first delayed proposal have thrown no much light on this point. Therefore, further studies on other fossil groups, before the next International Geological Congress, would be welcome, although the general feeling is that, in this black shales basin facies, the established biostratigraphic frame would not be much altered by such new studies. Besides paleontological successions, magnetostratigraphic results or radiometric dating studies are blank or not much promising. This may be a further drawback as for the ISC commitee to take the present proposal into account. It should, however be noted that no other known section so far displays such expanded litho and ammonite succession and that other proposed possible alternative candidate points do not display better paleontologic and/or magnetostratigraphic successions either.

As a conclusion, an official proposal of Callovian-Oxfordian boundary Stratotype will be submitted to the ISJS for the Thuoux - Savournon twin sections, on the basis of the recently refined ammonite and dinoflagellate successions across the boundary. The definitive proposal will include the results of small debates on the most appropriate location of the boundary according to the widely recognized *Cardioceras* succession, and the possible new advances on the biostratigraphic results of other fossil groups. It will also include the supplementary proposal of the Weymouth (Dorset, S England) section as reference section for the Callovian-Oxfordian boundary in the subboreal-boreal region.

N.B. Figures 1-3 recently published by D. Marchand and D. Fortwengler, and kindly supplied by the authors for the Vancouver presentation. Fig. 4 published and kindly supplied by N. Poulsen, for the same presentation.

5. 8. REPORT OF THE OXFORDIAN-KIMMERIDGIAN BOUNDARY WORKING GROUP

by Guillermo MELENDEZ &
François ATROPS (Convenor)

ISJS MEETING, VANCOUVER AUGUST 1998
REPORT OF THE KIMMERIDGIAN WORKING GROUP

As for the Oxfordian Working Group Session, the Kimmeridgian Working Group Session was held on Thursday August 20th during the Subcommission working sessions. General circumstances and the number of Upper Jurassic specialists attending the session were very similar to the Oxfordian session just before. The convenor of the KWG, François Atrops being absent, the working session was convened by G. Meléndez, who has acted as secretary of the KWG convenor for the last years. The present report briefly summarizes the main results reached in the recent years since the last general synthetic report was issued (June 1995). At that time the main questions concerning the proposal of a general GSSP candidate for the Oxfordian-Kimmeridgian boundary were:

(1) The need for a further progress in correlation between boreal/subboreal and submediterranean/mediterranean areas. This is connected with the following points:

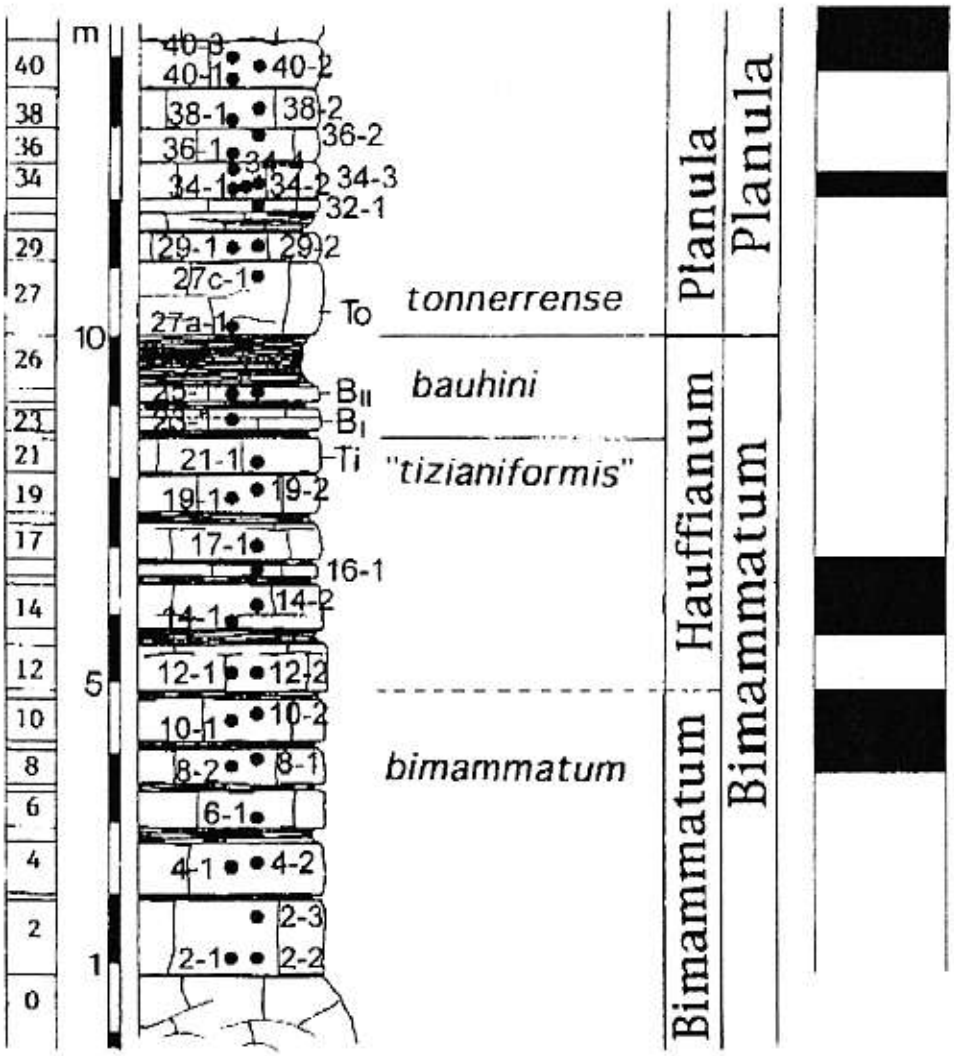
(2) The need for a further progress in the detailed knowledge of the stratigraphic succession at the turn of the Oxfordian and Kimmeridgian stages in Britain, at the type area (Dorset) and/or in other adequate areas (South Ferriby; Staffin Bay).

(3) The need for a similar progress in other areas in central – southern Europe and other provinces. The possible eventual proposal of reference sections in the submediterranean areas.

DATA FROM THE WIELUN UPLAND (POLAND)

Since the Oxfordian and Kimmeridgian Working Groups joint meeting held in Lyon - SE France in July 1994, a significant progress has been achieved by the many specialists working on different areas and bioprovinces. A further nice and rewarding joint meeting was organized in Warsaw and southern Poland (Wielun Upland - Polish Jura Chain) in May 1997 by our polish colleagues (A. Wierzbowski; B.A. Matyja and collaborators). This first stage in the further revision of the ammonite successions at the turn of the upper Oxfordian-lower Kimmeridgian showed the real possibility to correlate, at least partly, the submediterranean succession of the Hauffianum Subzone with the Bauhini interval and the lower Baylei Zone, Densicostata Subzone. This set of data were subsequently summarized and presented by the same authors (Matyja & Wierzbowski, 1998; Acta Geologica Polonica, v. 47; Fig, 3-4). There it was suggested that, across the Wielun Upland area, a sharp ammonite species turnover was recorded within the Hauffianum Subzone, at the base of the Litocerum Horizon. This line would be sharply marked by the first occurrence of such forms as

Taramelliceras (M.) litocerum and the first records of *Amoeboceras bauhini*, whilst the lower part of this subzone and the upper Bimammatum Subzone would be characterized by the recorded species: *Orthosphinctes lissowicensis* and *Ringsteadia* mediterranea. Some deepening and a precise correlation with other submediterranean areas is of course still required but this results bring the real possibility to delineate the Oxfordian-Kimmeridgian boundary within the Hauffianum Subzone, as understood today, if the first appearance of the species *Amoeboceras bauhini* is to be taken as the solid criterion for the base of the Kimmeridgian stage.



Settles, E., Schweigert, G. & Soffel, H.

Fig. 1 - Litho- biostratigraphic and magnetostratigraphic succession at the Hauffianum-Planula Zone boundary in Plettenberg (SW Germany, Swabian Jurassic).

DINOFLAGELLATE CYSTS SUCCESSIONS

According to the results recently published, and kindly supplied by N. Poulsen, data from Dinoflagellate cysts successions in the Wielun Upland sections would support the correlation of the Bimammatum-Planula Zone boundary in Poland with the Rosenkrantzi-Baylei Zone boundary in Britain. This is marked by the sharp turnover at that boundary of the species *C. ornatum* (LOD) by the FAD of species *D. chondra*. These results come close to those reached with ammonites, the difference between the two proposed scales being of less than a subzone (see above).

THE TYPE AREA OF *AMOEBOCERAS BAUHINI* OPPEL

Results recently presented by Schweigert and Settles from the locality of Plettenberg in southern Germany (W Swabia) have supplied new relevant information to the correlation of the Oxfordian-Kimmeridgian boundary in submediterranrean areas. According to these authors, "The ammonite fauna characteristic of the Hauffianum (Sub)zone was listed by Oppel (1862) from a section not far from Plettenberg, and all of hese diagnostic ammonite species of this zone, including the subboreal AMOEBOCERAS BAUHINI and the tethyan index Taramelliceras hauffianum are also recorded from his locality". A further step forward has been the confirmation of this last horizon of the Hauffianum Subzone, i.e. the Bauhini/Hauffianum Horizon, being also the type horizon of the species Orthosphinctes tiziani (OPPEL). This point, also confirmed in the Iberian Chain (Pérez-Urresti in prep.) shows an open door to reach a sound agreement for a precise correlation of the Oxfordian-Kimmeridgian boundary between the subboreal and submediterranean areas: The best solution would appear to dealineate the base of the Kimmeridgian stage at the base of the Haufianum/Bauhini/Tiziani Horizon, including it with the range of Subzone, at the lower part of the Planula Zone.

THE CURRENT SITUATION (SUBMEDITERRANEAN PROVINCE)

The remaining lower part of the Hauffianum Subzone would remain as an uppermost interval of the Oxfordian stage, either as an uppermost subzone of the Bimammatum Zone, or perhaps as a full, independent Zone. Whatever the final solution adopted, it seems clear that the intense work developed by all colleagues through these recent years in the effort to correlate the Oxfordian Kimmeridgian boundary between the Boreal and Mediterranean realms has proved fruitful, and we are beginning to see the light at the end of the tunnel. It appears therefore possible that in the near future, we are able to submit a solid proposal of GSSP candidate for the basal kimmeridgian. Yet, whatever the selected candidate section be, in the Subboreal or the Boreal Province, it should be always taken into account the need for a supplementary proposal of a reference section in the submediterranean area.

THE SEARCH FOR A GSSP CANDIDATE

According to some authors (K. Page, in: Atrops et al., 1998, Vancouver Meeting abstracts volume, p. 4) the implied historical type area of the Kimmeridgian stage is on the south coast of England, with the basal boundary being recognisable near Weymouth. Although including the type locality of the Subboreal basal Kimmeridgian Baylei Zone, the sequence at the boundary is very thin and the ammonite fauna of very low diversity with limited potential for international correlation, especially with Submediterranean areas. A more complete section near South Ferriby (NE England) is more complete and includes a more varied ammonite fauna and has been studied micropalaeontologically (Fig. 2). Correlation with Submediterranean areas is possible using widespread *Amoeboceras* faunas, which are extremely rare in southern England. Other opinions, though, would be rather inclined to consider the classical sections of Staffin Bay at Skye Island (at the exposure D5A at Point 2, Digg) as more suitable for stratotype candidate (J.K. Wright, progress Report; Fig. 2; 3). At these points, the Oxfordian-Kimmeridgian boundary can be precisely delineated at the base of bed 36 of Sykes and Callomon (1979) by the abundance of boreal *Amoeboceras*, the species *Am.*

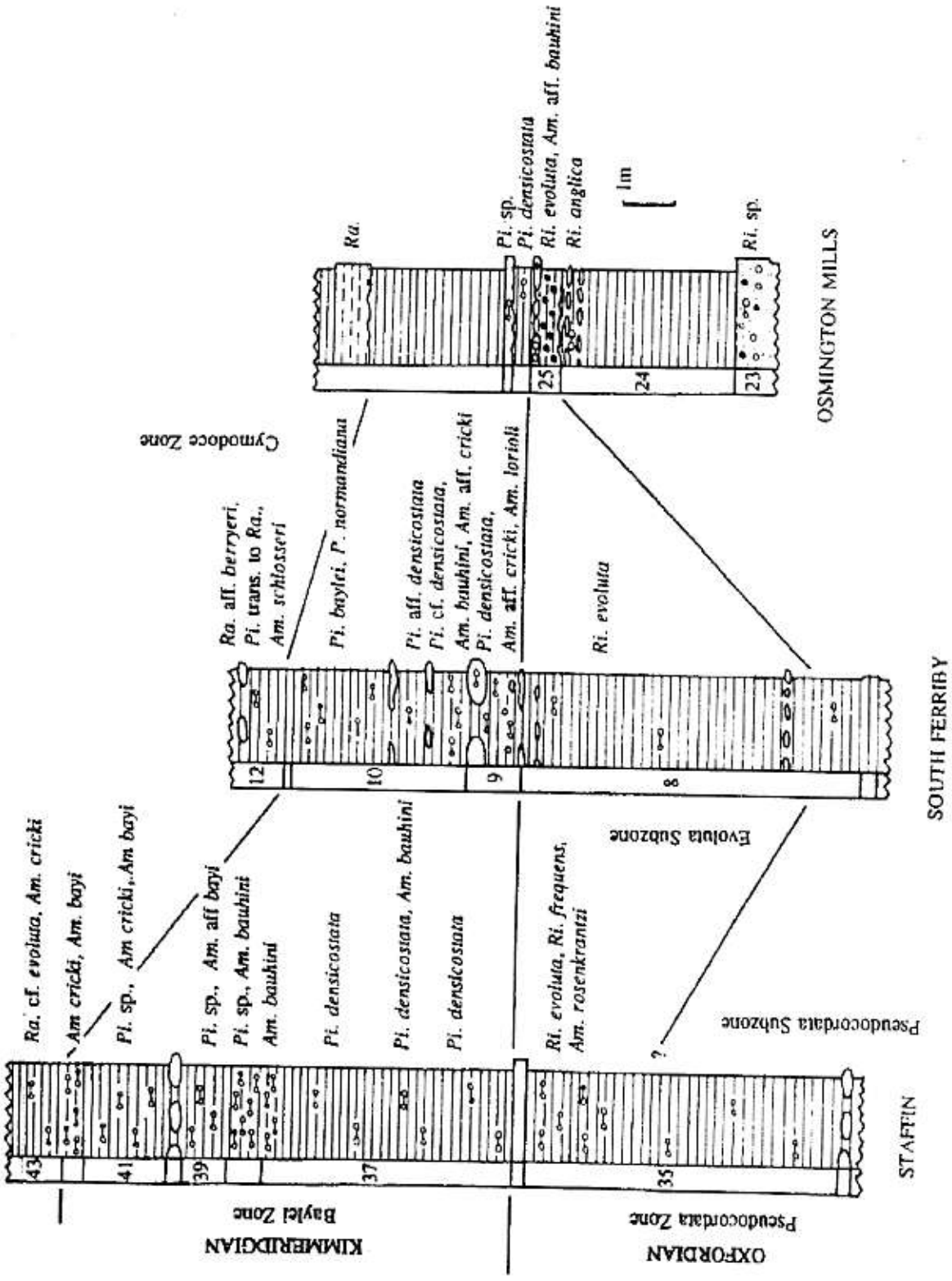


Fig. 2 - Correlation of the litho and biostratigraphic successions at the turn of the Oxfordian-kimmeridgian boundary in Staffin Bay (Skye Island, Scotland), South Ferriby (N. England), and Osmington Mills, in Dorset (Ringstead Bay, S England). Figure from J.K. Wright.

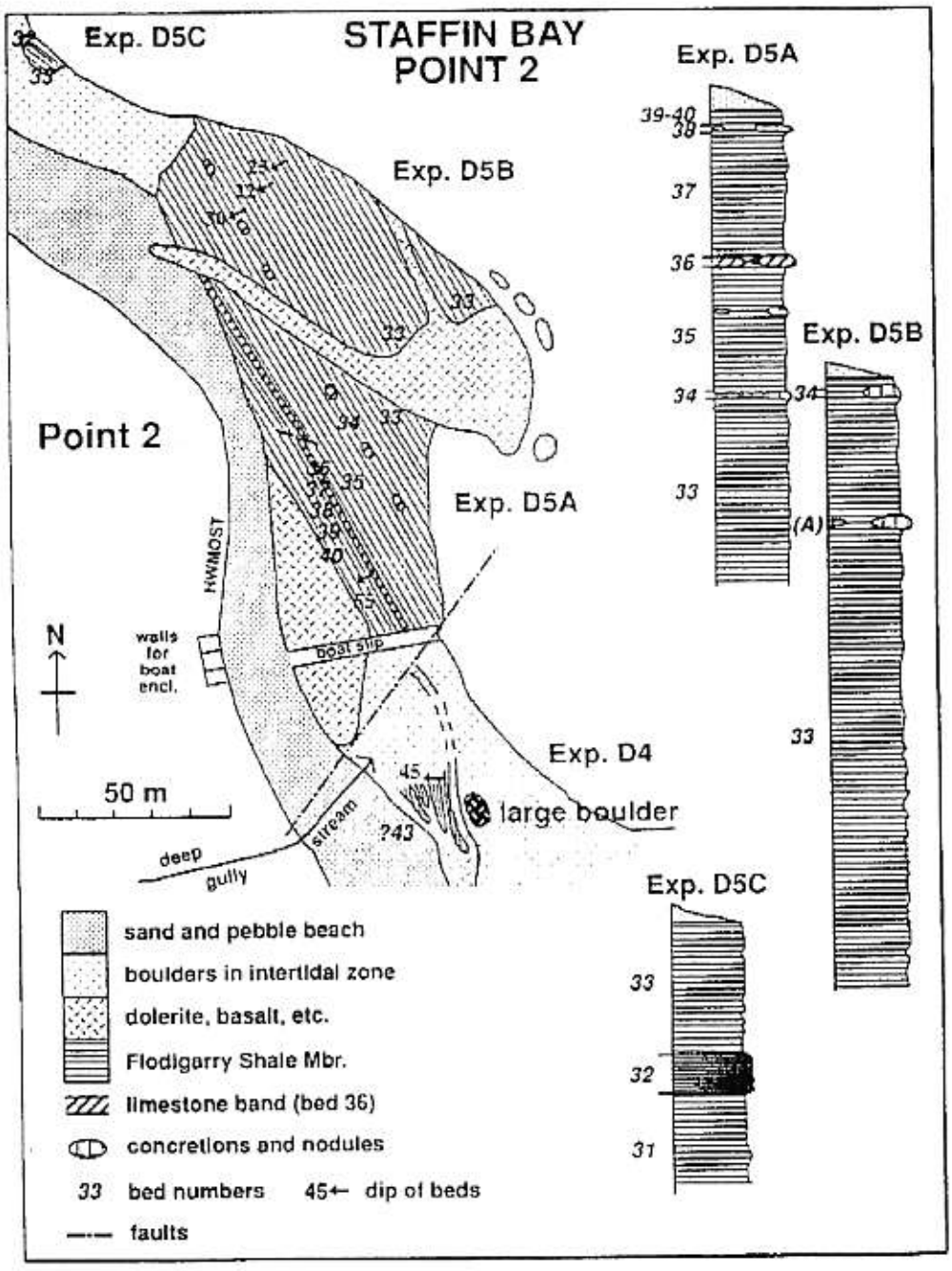


Fig. 3 - Geographic location and stratigraphic succession of the main upper Jurassic (upper Oxfordian-lower Kimmeridgian) units in Skye (Staffin Bay). Figure from J.K. Wright.

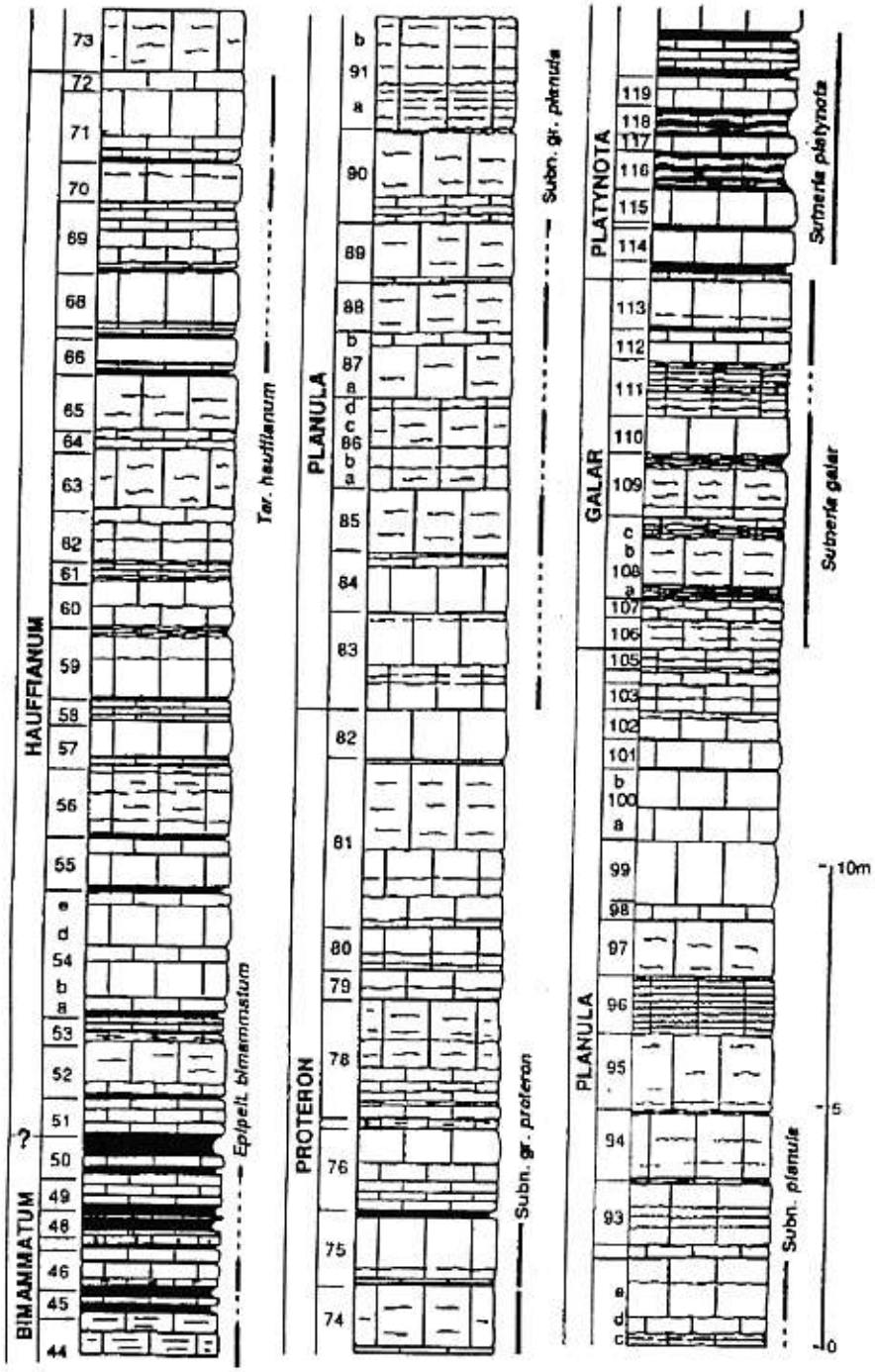


Fig. 4 - Detailed stratigraphic succession of upper Jurassic (upper Bimammatum to lower Platynota Zone levels) in the classical section of Crussol (SE France). Figure from F. Atrops.

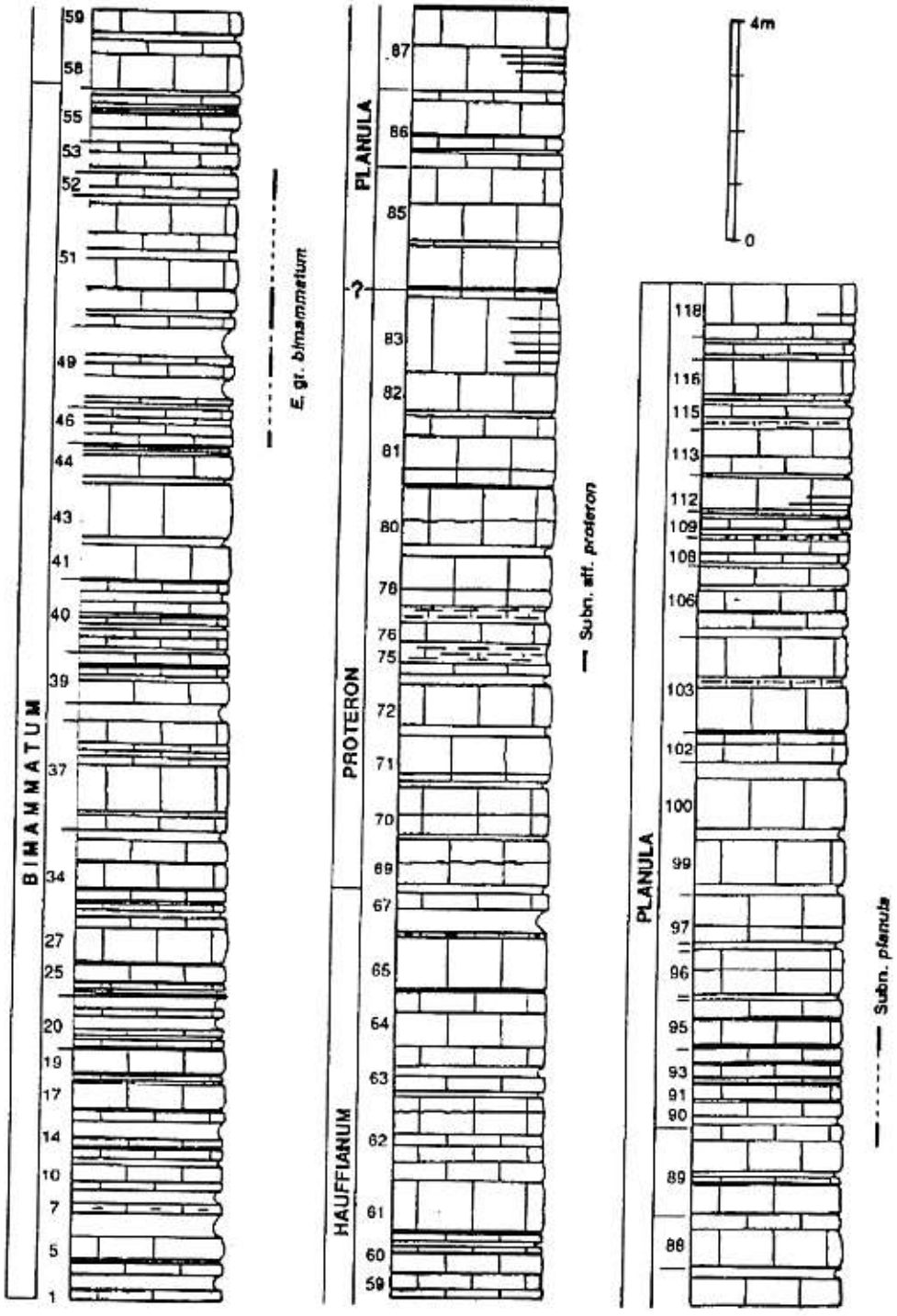


Fig. 5 - Detailed stratigraphic succession of the upper Oxfordian – lower Kimmeridgian intderval (Bimammatum to Planula Zone) in the section of Chateauneuf d' Oze (SE France). Figure from F. Atrops.

bauhini closely replacing *Am. rosenkrantzi*. According to this author, "the abundance of boreal *Amoeboceras* and sub-Boreal *Ringsteadia/ Prorasenia/ Pictonia* right through the Oxfordian-Kimmeridgian boundary sections in well-exposed, permanent exposures makes these excellent candidates for stratotype sections". The same opinion was expressed by B.A. Matyja and A. Wierzbowski during the Kimmeridgian session). This view was discussed by J. H. Callomon on the basis of the bad outcrop conditions of Staffin Bay sections.

The best reference sections in SE France are those of Crussol, near Valence (Fig. 4) and Châteauneuf d'Oze (Haute Provence; Fig. 5). The section of Crussol, besides displaying a remarkable continuous record of ammonites from the Bimammatum to Platynota Zone, has yielded excellent magnetostratigraphic results. Châteauneuf d'Oze, although less rich in ammonites and offering not so good results for magnetostratigraphy, has provided excellent results in microfossils (dinoflagelates, palynomorphs) and appears much promising for geochemical, chemostratigraphic studies, having been selected as reference section for an integrated stratigraphy project (still in progress). It stands as a possible future GSSP candidate.

ACKNOWLEDGEMENTS: Warm thanks are due to Drs. J.H. Callomon, B.A. Matyja, K. Page, N. Poulsen, G. Schweigert, A. Wierzbowski and J. K. Wright for kindly providing varied documentation (texts or figures) and opinions during the KWG session, which greatly contributed to the fruitful development of the session and helped preparing this report.

5.9. REPORT OF THE KIMMERIDGIAN-TITHONIAN BOUNDARY WORKING GROUP

by
Fabrizio CECCA
Convenor

The activities of this Working Group must be entirely re-organized. We was waiting for a field-trip in Southern France under the direction of François ATROPS (University of Lyon) in order to visit the sections of Canjuers and Crussol. These may be good candidates for the stratotype-section of the Kimmeridgian/Tithonian boundary.

But for numerous reasons it has been impossible so far to carry out this excursion.

Nevertheless, the excursion of the Working Group in Southern France, to visit the Canjuers and Crussol sections, **has been planned at new from 5 to 10 july 1999.**

I strongly hope that this time the excursion will take place.

However, the excursion in Southern France is not the real **central** problem.

We need to work on DIFFERENT section to select the GSSP and we also need DIFFERENT section to select the ASP, particularly in Boreal and Sub-Boreal areas.

With the next Newsletter of the WG I will try to stimulate the participants to send me suggestions for potential stratotypoe or auxiliary boundary sections.

Every suggestion is welcome.

6. JURASSIC THEMATIC WORKING GROUPS

6.1. WORKING GROUP ON SEQUENCE STRATIGRAPHY

by
Nicol MORTON
Convenor

NEWSLETTER 3: OCTOBER 1998

Convenor: Dr. Nicol Morton, Department of Geology, Birkbeck College, University of London, Malet Street. London WC1E7HX
tel 44 171 380 7714 fax 44 171 383 0008
Email nicol.morton@ucl.ac.uk

CONTENTS

A. Note from Convenor
B. Abstracts from Vancouver meeting
C. Plan for Field Workshop in Spain
D. Next Jurassic Symposium, Sicily
E. Changes of address or other details
F. New members

A. NOTE FROM CONVENOR

Dear Colleagues,
I've just realised that it is nearly a year since the 2nd Newsletter was distributed in December 1997. Most of my attention since then was concentrated on the 5th Jurassic Symposium in Vancouver, and especially on the special session on Sequence Stratigraphy. We tried a format for the session which was new to many - contributions by poster with only brief oral presentation. The purpose was to maximise discussion and exchange of ideas. It worked in part at least, with sometimes lively discussion in the public session, and probably a lot more in private. I would appreciate feedback from those of you who were able to attend as to the format and whether we should plan something similar for the next meetings.

Our Working Group is intended to be informal, so that anyone who is interested and may be able to contribute is welcome to be a member. Conversely, if you no longer wish to be involved please let me know.

For the next Newsletter I would like to receive any items of discussion, news about projects which are in progress or in an advanced stage of planning. The simplest way would be to send me a report as an Email message (rather than as an attachment, which can sometimes be difficult to access).

I look forward to hearing from you. All best wishes,

Nicol

B. ABSTRACTS OF PAPERS AND POSTERS PRESENTED AT SPECIAL SESSION ON SEQUENCE STRATIGRAPHY, 5th INTERNATIONAL SYMPOSIUM ON THE JURASSIC SYSTEM, VANCOUVER. WEDNESDAY 19th AUGUST 1998

17 abstracts and posters have been presented at this session. The titles are reproduced below.

1. Nicol MORTON - Sequence Stratigraphy in the Jurassic: introduction and principles.
2. Ashton F. EMBRY - Delineating sequence boundaries in conformable Lower Jurassic successions: T-R methodology of embry versus the Exxonian approach of Hesselbo and Jenkyns.
3. Sixto FERNANDEZ-LOPEZ - Ammonite taphocycles in carbonate epicontinental platforms.

4. Ashton F. EMBRY - Large-scale sequence boundaries in the Jurassic succession of the Sverdrup basin, Arctic Canada.
5. Finn SURLYK & Nanna NOE-NYGAARD - Sequence stratigraphy of the Jurassic intracratonic rift basin of East Greenland.
6. Serge ELMI - Early to Middle Jurassic events in the Western Tethys and their sequence stratigraphic significance.
7. Stephen HESSELBO, Michael OATES & Hugh JENKYNS - Sequence stratigraphy and lithostratigraphy of the Hettangian-Pliensbachian of the Hebrides basin.
8. P. Pamela ALVAREZ - Sequence stratigraphy analysis of the Lower and Middle Jurassic los Patillos Formation, La Ramada basin.
9. Angela L. COE & Reinhart GYGI - A comparison of the Oxfordian and Kimmeridgian between Northern Switzerland, Scotland and England using sequence stratigraphy.
10. Sandy W. SMITH - Shallow marine palynomorph assemblages and sequence development - a case study from Callovian to Early Oxfordian of Yorkshire, UK
11. A.S. HENDERSON & Malcolm B. HART - The distribution of foraminifera in the Oxfordian sequences of North Dorset, UK.
12. Marc AURELL, G. MELENDEZ, B. BADENSAS & J. RAMAJO - Sequence stratigraphy of the Callovian-Tithonian (Middle-Upper Jurassic) of the Iberian basin (NE Spain).
13. Philip COPESTAKE & Mark A. PARTINGTON - Stratigraphic sequences in the Jurassic - lowermost Cretaceous (Hettangian to Ryazanian) of the North Sea basin and adjacent areas of North West Europe.
14. R.P.B. PENA DOS REIS & A. CORROCHANO - Carbonate platform rupture, associated geometries and clastics input related with an extensional event climax in Upper Jurassic of Lusitanian basin (Portugal).
15. R.P.B. PENA DOS REIS, P.Proença CUNHA., J.L. DINIS. & P.R. TRINCÃO - Depositional controls and sequences in the Upper Jurassic of the Lusitanian basin (Portugal).
16. Luca MARTIRE, P. CLARI & Giulio PAVIA - Discontinuity surfaces in a mixed carbonate - siliciclastic ramp and their use in sequence stratigraphy (Antalo limestone, Upper Jurassic, North Ethiopia).
17. Shi XIAOYING - Sequence stratigraphy of latest Jurassic to Early Cretaceous in the Qomolongma area, South Tibet: with reference to the J/K boundary.

C. PLAN FOR FIELD WORKSHOP, EASTER 2000.

The next get-together planned for the Jurassic Sequence Stratigraphy Working Group is a field workshop. This will be organised by Marc Aurell and will be held at the Universidad de Zaragoza in Spain, with fieldwork in the nearby Iberian basin. The precise dates are not yet arranged, but we are aiming for late March or April (i.e. the Easter period) of the year 2000.

We have not yet finalised the format of the meeting, but the main activity will include fieldwork on the Jurassic of the area and discussion of interpretation of the succession in terms of sequence stratigraphy. We may also have a session with contributions on other areas, possibly on the same lines as at Vancouver.

Numbers of participants will have to be limited for logistic reasons, so pencil the approximate dates into your diary and let us know of your provisional interest. Further details will be circulated as soon as possible.

D. NEXT JURASSIC SYMPOSIUM

During the Vancouver Symposium the members of the Jurassic Subcommission present met to discuss, inter alia, the place and date of the next Jurassic Symposium. The invitation from Italy was accepted, and the 6th International Symposium on the Jurassic will be held in Sicily in September 2001.

E. CHANGES OF ADDRESS

Fabrizio CECCA now at
Centre de Sédimentologie et Paléontologie, Université de Provence, 3 place Victor Hugo, F-13331 MARSEILLE cedex 03, France.
Tel: 33 4 91 10 63 88 Fax. 33 4 91 64 99 64 Email: cecca@newsup.univ-mrs.fr

Stuart HARKER now at
Elf Aquitaine, Tour Elf, 2 Place de la Coupole, La Defence cedex 45, 92078 PARIS, France.
Tel 33 1 47 44 27 11
Giulio PAVIA new Email: pavia@dst.unito.it
Alberto RICCARDI new Email: riccardi@museo.fcnym.unlp.edu.ar
Driss SADKI now at
Département de Géologie, Facultédes Sciences, Université Moulay Ismaïl, BP 4010 Beni M'Hamed, MEKNES, Morocco
Tel. 212 5 53 88 70 ext. 233 fax 212 5 53 68 08 (or 53 68 09)

PLEASE INFORM ME OF ANY CHANGES

F. NEW MEMBERS

Philip COPESTAKE. IEDS Ltd., Enterprise House, Cirencester Rd., TETBURY, Gloucestershire GL8 8RX, UK Tel 44 1666 501210 Fax 44 1666 504704 Email: philip.copestake@ieds.com
Sequence stratigraphy, biostratigraphy, general stratigraphy and petroleum geology of the Jurassic of NW Europe (offshore and onshore) and Middle East

Marc FLOQUET, Centre de Sédimentologie et Paléontologie, Université de Provence, 3 place Victor Hugo F-13331 MARSEILLE cedex 03, France. Tel: 33 4 91 10 67 23 Fax. 33 4 91 64 99 64 Email: mfloquet@newsup.univ-mrs.fr

Carlos A. GULISANO, Petrolera Argentina San Jorge S.A., Tte.Gral. J.D. Rerón 925, piso 7, 1038 BUENOS AIRES, Argentina Fax 54 21 3258365. Jurassic sequence stratigraphy and petroleum geology, Neuquen Basin, Argentina

Malcolm B. HART, Department of Geological Sciences, University of Plymouth, PLYMOUTH, PL4 8AA, UK. Tel 44 1752 232156 Fax 44 1752 232155 Email: mhart@plymouth.ac.uk. Jurassic Foraminifera, biostratigraphy and sequence stratigraphy; analysis of global bioevents and the recovery patterns pf Foraminifera following events, based in UK and northernFrance.

Mark HYLTON, Department of Geological Sciences, University of Plymouth, PLYMOUTH, PL4 8AA, UK. Tel 44 1752 233121 Fax 44 1752 233117 Email: mhylton@plymouth.ac.uk. Foraminifera and biostratigraphy of the Lower Jurassic, including the effects of the Early Toarcian extinction event; base Sinemurian GSSP proposal for the East Quantoxhead succession in Somerset.

L. LEGARRETA, Petrolera Argentina San Jorge S.A., Tte.Gral. J.D. Rerón 925, piso 7, 1038 BUENOS AIRES, Argentina Fax 54 21 3258365. Jurassic sequence stratigraphy and petroleum geology, Neuquen Basin.

Melissa Jane OXFORD, Department of Geological Sciences, University of Plymouth, PLYMOUTH, PL4 8AA, UK Tel 44 1752 233121 Fax 44 1752 233117 Email: moxford@plymouth.ac.uk. Foraminifera, biostratigraphy and sequence stratigraphy of the Middle - Upper Jurassic in Dorset and Normandy

Mark PARTINGTON. Petroleum Development Oman, Area Code 113, MUSCAT< Sultanate of Oman. Tel 968 696866 Fax 968 696866 Email: parting@gto.net.om. NorthwestEuropean Jurassic stratigraphy and biostratigraphy

Rui PENA DOS REIS, Instituto Geológico e Mineiro, LISBOA, Portugal Email: pena.reis@igm.pt
Jurassic carbonates and sequence stratigraphy, Lusitanian Basin

Jürgen REMANE, Institut de Géologie, Université de Neuchâtel. 11 rue Emile-Argand, CH-2007 NEUCHATEL, Switzerland. Tel. 41 32 841 13 80 Fax 41 32 718 26 01; Email: jurgen.remane@geol.unine.ch. Chairman International Commission on Stratigraphy; multidisciplinary approaches to stratigraphy, including especiálly sequence stratigraphy; Jurassic- Cretaceous calpionellids.

Ivo SAPUNOV, Geological Institute, Bulgarian Avademy of Sciences, Acad. G. Boncev Str. Bl. 24, 1113 SOFIA, Bulgaria Tel 359 2 724638 or 359 2 9877493; Fax 359 2 7132250. Email: sapunov@geology.acad.bg. Jurassic bio- and lithostratigraphy, ammonites, sequence stratigraphy

SHI Xiaoying, Department of Geology and Mineral Resources, China University of Geosciences, 29 Xueyuan Rd., BEIJING 100083, China. Tel 86 10 62312244-2352 or 62317778 Fax 86 10 62310897; Email: shixy@sky.cugb.edu.cn. Mesozoic palaeontology and sequence stratigraphy in southern Tibet.

Platon TCHOUMATCHENKO, Geological Institute, Bulgarian Avademy of Sciences, Acad. G. Boncev Str. Bl. 24, 1113 SOFIA, Bulgaria. Tel 359 2 724638 or 359 2 550294; Fax 359 2 7132250; Email: vpt@vmei.acad.bg. Jurassic brachiopods and brachiopod stratigraphy, palaeoecology; ichnofossils; sequence and cyclostratigraphy

Carlos ZAVALA, Departamento de Geología, Universidad Nacional del Sur, San Juan 670, BAHIA BLANCA, Argentina - Email: czavala@criba.edu.ar. Middle Jurassic facies and stratigraphy in Neuquen basin, Argentina

6.2. JURASSIC MICROFOSSIL GROUP

by Susanne FEIST-BURKHARDT
Convenor

At the Jurassic Symposium held in August 1998 in Vancouver, Canada, I took over as convenor, secretary and newsletter editor of the Jurassic Microfossil Group (JMG) from Niels Poulsen. Niels fulfilled this position for the last 4 four years. He is obliged now to concentrate his research activities to the Late Neogene and Quaternary and therefore did not want to continue in this position without further research in the Jurassic. Niels edited a substantial newsletter each year in order to keep microfossil workers informed on what is going on in the International Subcommission on Jurassic Stratigraphy. With his help, at the beginning at least, I will try to carry on with this service.

Most important is the distribution of information. Because of the great number of interested people - there are more than 150 names on the members list - conventional distribution of the newsletter as a hard copy by mail became expensive. Therefore a fee had to be introduced for those who wanted to receive the printed newsletter. We are now looking for a cheaper method to allow quick and easy access to these information for everybody.

I plan to set up a homepage where the newsletter can be downloaded or read directly using the web browser. For free of course. For those few, who do not have access to the internet, the newsletter may be sent out by mail. In this case, I have to ask for the same subscription fee as before, that is Euro 8.- per year (equivalent to ‰ US $ 10.-). There is also a computer database of the research directory of the members of JMG and a publications index, that we want to update in the near future. More details will be available on the web page.

Once the web page is installed I will send a message containing the url to different listservers, such as paleonet
(http://spider.nhm.ac.uk/hosted_sites/paleonet/).
If there are any questions, new ideas or contributions, please contact me.

With best wishes

Susanne Feist-Burkhardt
Institute of Geology and Palaeontology
Darmstadt University of Technology
Schnittspahnstrasse 9
D-64287 Darmstadt
Germany

Tel.: +49 6151 162771
Fax: +49 6151 166539
Email: feist@bio.tu-darmstadt.de
http://www.tu-darmstadt.de/fb/geo/gpi/sfb_paly.htm

7 - UP-DATED DIRECTORY OF THE ISJS

BUREAU 1996-2000

Chairperson: Prof. Giulio PAVIA, Torino University
Vice Chairperson: Dr. Dorothy GUY-OHLSON, Stockholm N.H.M.
Secretary: Prof. Fabrizio CECCA, Marseille University

VOTING MEMBERS

CALLOMON J. H., Department of Chemistry, University College London, 20 Gordon Street WC1H OAJ London, UNITED KINGDOM. Phone 44 171 387 7050 Fax 44 171 380 7463

CECCA F., Centre de Sédimentologie et Paléontologie - Université de Provence, 3, place Victor Hugo Case 67 F-13331 Marseille Cedex 03 - FRANCE.
Phone: +33-4-91106388; Fax: +33-4-91649964 E-mail: cecca@newsup.univ-mrs.fr

DIETL G., Staatl. Museum für Naturkunde Rosenstein 1, D-70191 Stuttgart, GERMANY.
Phone49 711 89 36 146 Fax 49 711 89 36 100 E-mail: 100726.3375@compuserve.com

ENAY R., Centre des Sciences de la Terre, Université Claude Bernard - Lyon I, 27-43 Boulevard du 11 Novembre F-69622 Villeurbanne Cedex FRANCE. Fax 33 4 72 44 83 82

FERNANDEZ LOPEZ S. R., Departamento di Paleontologia, Facultad de Ciencias, Pabellon 3 Ciudad Universitaria, E-28040 Madrid - SPAIN Phone 34 1 394 48 66 Fax 34 1 394 48 49
E-mail sixto@eucmax.sim.ucm.es

GUY-OHLSON D., Naturhistoriska Riksmuseet, Roslagvägen 120, S-10405 Stockholm, SWEDEN.
Phone 46 86 66 41 42 E-mail rare-pp@algonet.se

KRISHNA J., Department of Geology, Banares Hindu University, 221005 Varanasi - INDIA
Phone 91 542 310 103 Fax 91 542 312 059 E-mail jkrishna@banaras.enet.in

LIU B., China University of Geosciences, 29 Xueyuan Road, Beijing 100083, PEOPLE REPUBLIC OF CHINA. Phone: 86-10-62312244 ext 2269(o), 2534 (o), Fax: 86-10-62014874 Email: liubp@cugb.edu.cn

MOUTERDE R., Laboratoire de Géologie, Facultés Catholiques de Lyon, 25 rue du Plat, F-69288 LYON Cedex 01 - FRANCE, Tel. 33 4 72 32 50 37 Fax: 33 4 72 32 50 19

PAGE K., English Nature, The Old Mill House, 37 North Street Okehampton, Devon EX20 1AR, UNITED KINGDOM. Phone 44 1837 55045 Fax 44 1837 55046

PAVIA G., Dipartimento di Scienze della Terra, Via Accademia delle Scienze 5, I - 10123 Torino - ITALY
Phone 39 011 562 8928 + 203 Fax 39 011 54 17 55 E-mail pavia@dst.unito.it

PESSAGNO E.A., Programs in Geoscience, The University of Texas at Dallas, P. O. Box 830688 75083-0688 Richardson (Texas), U S A Fax: 1-972-883-2537 Phone: 1-972-883-2430 (01) E-mail: pessagno@utdallas.edu

POULTON T. P., Institute of Sedimentology and Petroleum Geology, Geological Survey of Canada, 3303- 33 St. NW, T2L 2A7 Calgary(Alberta) - CANADA Phone 1-403-292 7096 Fax 1 403 292 6014 E-mail: poulton@gsc.nrcan.gc.ca

RICCARDI A. C., Facultad de Ciencias Naturales y Museo, Universitad Nacional de La Plata, Paseo de Bosque 1900 La Plata - ARGENTINA Phone: 54 21 39 125 Fax: 54 21 530 189 E-mail: riccardi@museo.fcnym.unlp.edu.ar

ROSTOVTSEV K. O., VSEGEI, Sredny prosp. 74, 199026 Saint Petersbourg, RUSSIA
E-mail: vsg@sovam.com

ROTH P. H., Dept. of Geology & Geophysics, College of Mines and Earth Sciences, University of Utah 717wc, Browning Building, 84112-1183 Salt Lake City (Utah) U. S. A.
Phone 1 801 581 6704 Fax 1 801 581 7065 E-mail: phroth@mines.utah.edu

SMITH P.L., Dept. of Geol. Sciences, University of Brit. Columbia, 6399 Stores Road V6T 2B4 Vancouver CANADA. Phone 1 604 822 6456 Fax 1 604 822 6088 E-mail: psmith@eos.ubc.ca

STEVENS G. R., Institute of Geological & Nuclear Sciences, PO Box 30368 Lower Hutt, NEW ZEALAND
Phone 64 4 569 90 59 Fax 64 4 569 50 16

WESTERMANN G. E. G., Department of Geology, McMaster University, L8S 4ML HAMILTON (Ontario) CANADA. Phone: 1-905-525 9140 Fax 1-905 522 31 41 E-mail: opperman@mcmaster.ca

WIERZBOWSKI A. Institute of Geology, Warszaw University, 92 Al. Zwirki i Wigury, 02-089 WARSZAWA - POLAND. Phone 48 22 22 30 51 Fax 48 22 22 02 48E-mail: bam@albit.geo.uw.edu.pl

CORRESPONDING MEMBERS

ATROPS F., Centre des Sciences de la Terre, Université Claude Bernard - Lyon I, 27-43 Boulevard du 11 Novembre 1918, F-69622 Villeurbanne Cedex FRANCE. Phone 33 4 72 43 13 41 Fax 33 4 72 44 83 82 E-mail Francois.Atrops@univ-lyon1.fr

BLOOS G., Staatl. Museum für Naturkunde, Rosenstein 1, D-70191 Suttgart GERMANY. Phone 49 711 89 36 143 Fax: 49-711-8936100 E-mail: bloos@gmx.de

CARIOU E., Lab. de Géologie stratigraphique et structurale, Université de Poitiers, 40 avenue du Recteur Pineau, F-86022 Poitiers FRANCE . Phone 33 5 49 45 39 87 Fax 33 5 49 45 40 17.

CARTER E. S., Department of Geology, Portland State University - 17375 Jordan Road PORTLAND, Oregon 97207-0751 USA. Phone 541-5040311 Fax 541-504-9593E-mail: i1ec@odin.cc.pdx.edu

COMAS-RENGIFO M.J., Departamento de Paleontologia, Facultad de Ciencias Geol., Ciudad Universitaria E-28040 Madrid SPAIN. E-mail: mjcomas@geo.ucm.es

CRESTA S., Provincia di Roma, Servizio Geologico e Difesa del Suolo, Ufficio 2, Via Tiburtina 691 I-00159 Roma - ITALIE Phone 39-06.67663326 Fax 39-06.4500164 E-mail scresta@hotmail.com

DAMBORENEA S. E., Dep. Paleontologia Invertebrados, Museo de Ciencias Naturales de la Plata, Paseo del Bosque s/n, 1900 LaPlata - ARGENTINA Fax: 54-21-721676 E-mail: susanad@mmance.cyt.edu.ar

ELMI S., Centre des Sciences de la Terre, Université Claude Bernard - Lyon I, 27-43 bd du 11 Novembre 1918 F-69622 VILLEURBANNE Cedex FRANCE, Phone 33 4 72 44 84 25 Fax 33 4 72 44 83 82 E-mail: Serge.Elmi@univ-lyon1.fr

ERBA E., Dip. Scienze della Terra, Via Mangiagalli 34, I-20133 Milano ITALY, Phone 39-02-23698257 Fax: 39-02-70638261 E-mail erba@imiucca.csi.unimi.it

ERNST W. A., Talstrasse 3, D-09623 - Kleinbobritzsch - GERMANY

GALACZ A., Department of Palaeontology, Eötvös L. University, Ludovika ter 2, H-1083 Budapest - HUNGARY. Phone 36 1 1344 555 Fax 36 1 13 40 553 E-mail: galacz@ludens.elte.hu

GRIGELIS A. A., Lithuanian Academy of Sciences, Institute of Geology, Sevcenkos str. 13, 2600 Vilnius - LITHUANIA. Phone 370 2 236 504 Fax 370 2 236408 E-mail: grigelis@geology.aiva.lt

GU Z. W., Nanjing Institute of Geology and Palaeontology, Academia Sinica, Eastern Bejing Road 39, Nanjing- PEOPLE REPUBLIC OF CHINA. E-mail: guzw@njnet.nj.ac.cn

GYGI R., Geologische Abteilung, Naturhistorisches Museum, Augustinergasse 2, CH-4001 Basel - SWITZERLAND. Phone 41 61 266 55 00 Fax 41 61 266 55 46

HALL R. L., University of Calgary, 2500 University Drive N.W., T2N 1N4 Calgary (Alberta) - CANADA. Phone 1-403-220 6678 Fax 1-403-284 0074 E-mail: rhall@geo.ucalgary.ca

HANTZPERGUE P., Centre des Sciences de la Terre, Université Claude Bernard - Lyon I, 27-43 Boulevard du 11 Novembre, F-69622 Villeurbanne Cedex FRANCE. Phone 33 4 72 44 38 28 Fax 33 4 72 44 83 82 E-mail: pierre.hantzpergue@univ-lyon1.fr

HERNGREEN G.F.W., Geological Survey of the Netherlands, P. O. Box 157, NL-2000 AD Haarlem - THE NETHERLANDS. Phone 31 23 5300359 Fax 31 23 5401754 E-mail: G.F.W.Herngreen@rgd.nl

HILLEBRANDT K. A., Institut für Geologie und Paläontologie, Hardenbergstrasse 42, D-10587 Berlin 12- GERMANY. Phone 49 30 314 23 650 Fax 49 30 314 21 107 E-mail: abuh0936@mailszrz.zrz.tu-berlin.de

KHUC D. V., Tong cuc Dia chat, 6 Pham Ngu Iao, Hanoi - VIETNAM. Phone 8448 266802 Fax 8448 254 734

LONGORIA J., Florida International University, University Park PC344 Miami FL 33199- USA E-mail: longoria@fiu.edu

MANGOLD C., Centre des Sciences de la Terre, Université Claude Bernard - Lyon I, 27-43 Boulevard du 11 novembre, F-69622 Villeurbanne Cedex, FRANCE. Phone 33 4 72 44 83 76 Fax 33 4 72 44 83 82 E-mail: Charles.Mangold@univ-lyon1.fr

MATSUOKA A. , Department of Geology, Faculty of Science, Niigata University, Niigata 950-2181, JAPAN. Phone 81-25-262-6376 Fax 81-25-262-7278 E-mail matsuoka@geobio.ge.niigata-u.ac.jp

MEISTER C. Departement de Géologie et de Paléontologie des Invertébrés, Muséum d'Histoire Naturelle, 1 Route de Malagnou, Case postale 6434 CH - 1211 Genève 6 - SWITZERLAND Phone 41 22 4 18 6 3 00 Fax 41 22 4 18 6 3 01 E-mail christian.meister@mhn.ville-ge.ch

MELENDEZ G., Lab. Paleontologia Dept. Ciencias de la Tierra, Universidad de Zaragoza, E-50009 Zaragoza-SPAIN. Phone 34 76 35 1209 Fax 34 76 56 58 52 E-mail gmelende@posta.unizar.es

MIZUTANI S., Dept. of Earth sciences Faculty of Science, Nagoya Univ.464 NAGOYA - JAPAN. Phone 81 52 789 2537 / 3032 Fax 81 52 789 3033 E-mail: jiro@handy.n-fukushi.ac.jp

MORTON N., Department of Geology, Birkbeck College, University of London, Malet Street, London WC1E 7HX - United Kingdom. Phone 44-171-380 7714 Fax 44-171-383 0008 E-mail: nicol.morton@ucl.ac.uk

OHMERT W., Geologisches Landesamt Baden-Württemberg, Albertstrasse 5, D-79104 Freiburg i. Br.- GERMANY. Fax 49-761-5590 225 E-mail: DEBWLHJ9@IBMMAIL.COM

POULSEN N. E., Geological Survey of Denmark, Thoravej 8, DK - 2400 Kobenhavn, DENMARK. Phone 45 38 14 23 66 Fax 45 38 14 20 50 E-mail nep@geus.dk

ROCHA R. da, Universidada de Lisboa, Quinta da Torre, 2825 Monte da Caparica - PORTUGAL. Phone 351 1 29 544 64 ext. 0204 Fax 351 1 295 76 68 (294 8556)

SADKI D., Département de Géologie, Faculté des Sciences BP 4010 Beni M'Hamed Meknès - MOROCCO. Phone. 212-5-538870.233Fax: 212-5-536808

SANDOVAL G. S., Departamento de Estratigrafia y Paleontologia, Facultad de Ciencias Universidad de Granada Campus de Fuentenueva, E-18002 Granada - SPAIN. Phone 34 58 243 203 Fax 34 58 243 201 E-mail: sandoval@goliat.ugr.es

SARJEANT W. A. S., Department of Geological Sciences, University of Saskatchevan, S7N OWO Saskatoon-CANADA. Phone 1 306 966 5722 Fax 1 306 966 8593 E-maqil: ldietz@pangea.usask.ca

SCHLATTER R., Naturkundemuseum, Lortzingstrasse 3, D-04105 Leipzig - GERMANY. Phone 341-982210 Fax 341 9822122

SEYED-EMAMI K., Faculty of Engineering, University of Teheran, P. O. Box 11365-4563, Teheran - IRAN Fax 009821-661024

SHURYGIN B., Institute of Geology, University of Novosibirsk, University Av. 3, 630090 Novosibirsk 90 - RUSSIA. Phone 383 2 351 350 Fax 383 2 351 351 E-mail: shurygin@uiggm.nsc.ru

TCHOUMATCHENKO I., Bulgarian Academy of Sciences, Geological Institute, UL Akad G. Bonchev, block 24, 1113 Sofia-BULGARIA. E-mail: vpt@vmei.acad.bg

THIERRY J., Institut des Sciences de la Terre, Université de Bourgogne, 6 Boulevard Gabriel, F - 21100 Dijon-FRANCE. Phone 33 3 80 39 63 62 Fax 33 3 80 39 50 66 E-mail jthierry@satie.u-bourgogne.fr

WARRINGTON G., British Geological Survey, Keyworth, Nottingham NG12 5GG-UNITED KINGDOM. Phone 44 115 936 3407 Fax 44 115 936 34 37; E-mail: gwar@wpo.nerc.ac.uk

ZAKHAROV V., Institutre of Geology, University of Novosibirsk, University Av. 3, 630090 Novosibirsk 90-RUSSIA. E-mail: zakharov@uiggm.nsc.ru

Honorary Members

ZEISS A., Institute für Paläontologie, Universität Erlangen-Nürnberg, Lowenichstrasse 28, D-91054 Erlangen-GERMANY. Phone: 49 91 31 852 701 Fax 49 91 31 852 690

TINTANT H., Institut des Sciences de la Terre, Université de Dijon, 6 boulevard Gabriel, F-21100 Dijon-FRANCE Phone 33 4 80 39 63 55 Fax 33 4 80 39 50 66

Working Group Leaders

TRIASSIC-JURASSIC BOUNDARY: **Chairman** MOUTERDE R. **Secretary** WARRINGTON G.
SINEMURIAN: BLOOS G.
PLIENSBACHIAN: MEISTER C.
TOARCIAN: ELMI S.
AALENIAN: CRESTA S.
BAJOCIAN: GALACZ A.
BATHONIAN: MANGOLD Ch.
CALLOVIAN : CALLOMON J. H.
OXFORDIAN: MELENDEZ G.
KIMMERIDGIAN: Chairperson ATROPS F. Vicechairperson HANTZPERGUE P.
TITHONIAN: CECCA F.

SEQUENCE STRATIGRAPHY: MORTON N.
MICROFOSSIL WG: FEIST-BURKHARDT S.

8 - INFORMATION ON SYMPOSIA

6th Symposium on Jurassic Stratigraphy

PALERMO, ITALY
September 2002

The first circular is scheduled for the end of 1999

CONTACT:

Prof. G. PAVIA E-mail: pavia@dst.unito.it

1st National Colloquium on Jurassic of Morocco

RABAT, MOROCCO
September, 1999

CONTACT:

B. FEDAN, Institut Scientifique Rabat
Phone: 212-7-774548 or 4549 or 4550 Fax: 212-7-774540

Life and Environment in Purbeck Times

DORCHESTER, ENGLAND
March 19th-22nd, 1999

CONTACT:

Dr. Andrew Milner, Birkbeck College a.milner@biology.bbk.ac.uk

ADDENDA

COMPARISON RESEARCH OF TERRESTRIAL LIFE AND ENVIRONMENTS BETWEEN WESTERN AND EASTERN EURASIA DURING PURBECK TIMES

LIU, BENPEI
Faculty of Earth Sciences, China University of Geosciences,
Beijing 100083, P R China - email: liubp@cugb.edu.cn

This paper introduces recent achievements of Chinese palaeontologists and stratigraphers concerning the well-known Rehol Biota of the Yixian Formation in western Liaoning, northeast China. The main fossil list of representative palaeontologic kinds is as follows.

Aves: Confuciusornis sanctus, C. sunae, C. chuanzhous, S. sp. (Sauriurae);
Liaoningorins longiditris (Ornithurae)
Feathered dinosaur or Aves: Protoarchaeopteryx robusta, Caudipteryx zoui
Reptile: Sinosauropteryx prima (Theropoda)
Psittacosaurus liangi (Ceratopsia)
Eosipterus yangi (Pterosauria)
Yabeinosaurus tenuis (Lacertilia)
Manchurochelys liaoxiensis (Testudines)
Sauropoda indet., Theropoda indet.
Amphibia: Anura indet.
Mammalia: Zhangheotherium quinquecuspidens
Pisces: Lycoptera sinensis, L. sp., Peipiaosteus pani, Sinamia sp.
Like-Angiosperm: Liaoxia chenii, Eragrosite changii, Chaoyangia liangii and Monocotyledon leaf
Insect: Ephemeropsis trisetas ect.
Bivalvia: Ferganoconcha sp., Sphaerium sp.
Gastropoda: Probaicalia vitiemensis, Ptychostylus sp.
Conchostracans: Eosestheria sp. etc.
Ostracoda: corresponding to Cypridea granulosa assemblage of typical Purbeck section
Sporopollen: corresponding to Harris's assemblage B of typical Purbeck section

Above fossils mainly occured in the lacustrine interbeds of the lower part of volcanogenic Yixian Formation. Especially, all the vertebrate specimens condensed in the lower part of the lower vertebrate-bearing horizon only 84cm in thickness. Obviously, the enrichment of terrestrial biota reflected a great explosion event and mass mortality event near the Juro-Cretaceous boundary.

It is very interesting that the advanced and original features of the Aves fossil exist simultaneously and show typical mosaic evolution of the vertebrate. Serious disagreements exist still among different palaeontologists and geologists regarding the age on whether Late Tithonian or Early Cretaceous of the Yixian Formation.

It is necessary to make a comparison research in the viewpoint of multidiciplinary chronostratigraphy between Purbeck and Yixian formations, and then we can make clear the evolutionary history of terrestrial life and environments across the Juro-Cretaceous boundary.

References

Liu Benpei, 1998. On terrestrial Jurassic-Cretaceous boundary at typical region of eastern Asia in the viewpoint of multidisiplinary chronostratigraphy. Abstracts and Program, 5th International Symposium on the Jurassic System, Vancouver, Canada, 53.

Liu Benpei, Zhang Shihong, 1997. Rhythms of different geospheres and their relations in Middle Jurassic-Early Cretaceous. Earth Science Frontiers (China University of Geosciences, Beijing), 4 (3-4):65-74 (in Chinese with English abstract).

Ji Qiang, Philip J Currie et al, 1998. Two feathered dinosaurs from northeastern China. Nature, 393:753-761.

Smith P E, Evensen N M, York D et al, 1995. Dates and rates in ancient lakes: 40Ar-39Ar evidence for an Early Cretaceous age for the Jehol Group, northeast China. Can J Earth Sci, 32: 1426-1431.

Wang Xiaolin, Wang Yuanqing, Wang Yuan et al, 1998. Stratigraphic sequence and vertebrate-bearing beds of the lower part of the Yixian Formation in Sihetun and neighboring area, western Liaoning, China. Vertebrata PalAsiatica, 36 (2):81-101 (in Chinese with English summary).

Research supported by the Ninth Five-year's Climbing Project
of Ministry of Science and Technology of China (SSER).