INTERNATIONAL UNION OF
GEOLOGICAL SCIENCES
COMMISSION ON STRATIGRAPHY

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SUBCOMMISSION ON DEVONIAN STRATIGRAPHY

NEWSLETTER No. 19

INTERNATIONAL MEETING:

DEVONIAN NERITIC-PELAGIC CORRELATION AND EVENTS

Morocco, March 1st to 10th 2004

See page 61 for details

I. U. G. S Subcommission on Devonian Stratigraphy

Newsletter No. 19, July 2003

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The *Newsletter* appears annually following SDS meetings. Contributions may be sent to the Editor at any time during the year for inclusion in the next issue. Guidelines for consideration in the preparation of contributions are presented on the inside of the back cover.

The printing of this issue is 120 copies with 92 mailed to titular and corresponding members, 8 to honorary members, Chairmen of the Carboniferous and Silurian Subcommissions, IUGS and ICS officers, friends of the Devonian, and libraries. Remaining copies are available from the Chairman, Secretary, or Editor. A portion of the cost of preparation, printing and postage for this issue of the *Newsletter* were shared equally by SDS and The Department of Geology, University of Texas at Arlington with the remaining costs supported through a grant from the Petroleum Research Fund of the American Chemical Society..

The *Newsletter* can also be viewed in electronic published format via the SDS World Wide Web site at URL **http://sds.uta.edu**.

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PROF. DR. DR. H.C. MICHAEL ROBERT HOUSE, 27TH AUGUST 1930 TO 6TH AUGUST 2002, SDS CHAIRMAN FROM 1992 TO 1996 – A PERSONAL GOODBYE

The last year has been disastrous for SDS since we lost within a short period three of our most outstanding members, Michael House, Willi Ziegler and Ivo Chlupac, who all have been leading authorities on Devonian stratigraphy for centuries, and all three have significantly shaped Devonian research not only in their countries, but on a global scale. Michael, as most of us knew him, was not only recognized as a most highly regarded scientific authority, and as a most active proponent of stratigraphic progress, but also as a prototype of British gentlemen whom everybody liked for his friendliness, humour, good spirit and individuality. For me, after he had been a postgraduate teacher and mentor, he was simply one of my closest friends – despite the age difference - and I still find it difficult to believe that he went so early.

I first met Michael at the International Cephalopod Symposium in Tübingen, in 1984, after a brief exchange of letters concerning early Famennian goniatites. In fact, my letters weren't really nice since I was upset that important results (a new genus) of my master thesis had been doubled, without knowledge, by his Ph.D. student John Price. And, as typical, he was just ahead of me in publishing things. So, I tried to tear their paper into pieces in a critical letter. But then I was so much surprised to find his relaxed answer, asking me to sit together at Tübingen and to talk about everything in leisure. My English was still rather poor at the time but we got on very well from the beginning and, to my luck, John Price just had left for a good job in the oil industry and Michael desperately needed a strong guy and good driver who could guard and accompany him at his forthcoming trip to Morocco. Perhaps I should praise the bad guys who had mugged him at his previous trip in Casablanca since this made him feel that he shouldn't just go on his own. Anyway, our, my first, Moroccan trip was most enjoyable and scientifically successful and, as a consequence, I still find myself in Morocco more or less every year. O.K., on my 25th birthday we almost got drowned in the suddenly swollen Oued Ziz just outside Erfoud, which we foolishly crossed on foot after our car couldn't make it any more. But it turned out that our different working styles in the field fitted perfectly: Michael always was doing sketches, logs and little maps for the stratigraphical overviews whilst he didn't have (any more) the patience and fossil hunter eyes to sit down in the hot sun to do the tedious bed-by-bed collecting. This share of working proved to be highly successful in all the various areas where we collaborated in the following almost twenty years: Montana, the Montagne Noire, southern Spain, Australia, the Timan, and also in parts of England and Germany. But, to be honest, in all these years I never found out how he managed to stay clean, well-dressed and looking almost accurate whilst I was covered in dirt and sweat after just a few hours in one of the sunny areas we had chosen for research.

Michael was born in Blandford Forum in Dorset and, as most people know, therefore was rooted in the Jurassic. After school on the Dorset coast, in Weymouth, where he also returned after retirement, and after service in the army, he went to study geology at Cambridge where he was taught, amongst others, by W.B.R. King. But the famous master of the British Jurassic, W.J.Arkell, has influenced him fundamentally from the beginning of his geological interests. Unfortunately, Arkell told Michael that "the Jurassic was full" and therefore asked him to chose another system. Michael often joked that he chose the Devonian since after a look on the geological map of the world he found that it crops out in many interesting countries which he would like to visit. In our times unthinkable is the fact that Michael had already secured (in 1954) a lectureship at Durham University before he finished his first degree at Cambridge. In 1955 Michael started to publish on Jurassic sediments near Weymouth, soon followed by his first brief paper on new findings of Devonian ammonoids in North Cornwall. Both, studies on the Dorset geology and on Middle Palaeozoic ammonoids, remained prime interests for the rest of his life. In 1958 his only partly published Ph.D. treated monographically the then known "Devonian goniatites of Devon and Cornwall".

Prof. Sir Kingsley Dunham at Durham encouraged Michael to cross the Atlantic – still on an ocean liner in those times – and spent 1958/59 as a Commonwealth Fellow at Harvard, Cornell University and at the US National Museum. At Cornell, the founder of the "Friends of the Devonian", J.W. Wells, became a major source of information and inspiration. Michael's investigations at American localities and in old collections proved to be highly successful. Soon he had doubled the number of American Devonian ammonoid genera. This period transformed him into a global thinker with a strong interest in international correlation – a research attitude which brought him to the forefront of Devonian knowledge, which enabled him to contribute so significantly to SDS, and which eventually influenced me so much. In 1963 he moved to Oxford University and during this time, in 1965, he married his wife Felicity, better known as Flic to everybody who had the pleasure to be looked after so well at one of their homes. His teaching abilities and steady output of significant Devonian publications eventually earned him in 1967, only thirteen years after graduation, the Chair of Geology at Hull University. The small department blossomed under his lead and Michael took responsibilities as Dean of Science and Pro-Vice-Chancellor. Besides this, and based on his leader skills, which he later also gave to our subcommission, he also acted as President of the Yorkshire Geological Society (1972-1974), President of the Paleontological Association, President of the British Association for the Advancement of Science, Section C (1977), President of the Systematics Association (1978-1981), and President of the Palaeontograqphical Society (from 1988).

In 1987 Michael offered me to join him as a postgraduate at Hull University but before this materialized, his life became badly affected by the brainless centralisation of British geology by the Thatcher government. This lead to the closure of well functioning small departments, such as Hull, and in the end Michael and his family, as well as myself, found themselves in Southampton, where, however, his Devonian and other stratigraphical research was well received. At least he was closer to the south coast where many of his family still lived. In this period we conducted our wonderful research trips to the Canning Basin of Western Australia and we assembled so many new faunal levels and taxa that it will still take some while to get all those published in detail. Many papers, on Australia, Morocco and on the various Devonian events, were still in preparation and I know from my last telephone call, ca. a week before his untimely death, that Michael wished so much he could finish all these – not to talk about the Treatise chapter on Devonian goniatites which he couldn't update.

Michael's long list of publication does not only consist of the famous papers on the Devonian or on the Jurassic of Dorset. But his "Guide to Dorset Geology", for example, has become a standard everybody interested in British regional geology. Most will also know his significant contributions on the use of Milankovitch Cyclicity for the establishment of a much more precise future absolute timescale. There is still much to do in the Devonian in this field and there are significant prospects for an interdisciplinary integration with graphic correlation, magnetostratigraphy, chemostratigraphy etc. In his time as SDS Chairman he made sure that several of our annual meetings concentrated on modern stratigraphic techniques and we best can honour him by continuing and increasing this line of research. Most may not know that Michael was also heavily involved in the geological mapping of Malta and Gozo. He found the time to write numerous book reviews and obituaries of important researchers, such as O.H. Schindewolf, Roman Kozlowski, Brian Hunter Mottram, and Samuel Crosbie Matthews. There are also general contributions to The Fossil Record, to books on evolution, the Encyclopaedia Brittanica, the Atlas of Macrofossils etc., not to mention the large number of books and volumes which he edited, some of which were published as SDS volumes.

When I returned to southern Morocco this spring, some of the localities we first visited back in 1984 didn't seem to be the same any more. The local fossil traders had produced even more scars in the otherwise superbly landscape but, of course, that wasn't the main loss. In the hotel rooms nobody is unpacking any more a little kettle in order to produce some good English tea, as a kind of civilized barrier against the wild world outside. Well, all who knew him will continue to miss Michael a lot. The best we can do is to carry on with the things he would have continued anyway.

MESSAGE FROM THE CHAIRMAN

DEAR SDS MEMBERS AND DEVONIAN FELLOWS,

In 2002 SDS lost in a short time span three of its most outstanding members, Willi Ziegler on August 8th, Michael House on August 13th and Ivo Chlupac on November 11th. The three of them were exceptionally gifted and active palaeontologists and stratigraphers and the results of their research have been of great influence on the definition of Devonian stages by our subcommission.

Willi Ziegler was the architect of Devonian conodont biostratigraphy and he was our vigorous chairman from 1976 to 1984. Michael House was very passionate about systematics and biostratigraphy of Devonian ammonoids and he was our inspiring chairman from 1993 to 1996. Ivo Chlupac, SDS vice-chairman from 1985 to 1992, was a masterly field guide for the Barrandian sections, a fundamental basis for Lower and Middle Devonian stratigraphy. The best way to honour the remembrance of these three most outstanding Devonian specialists is by bearing in mind the results of their scientific achievements in our own Devonian research.

The SDS Business Meeting of 2002 was held during the Eighth International Conodont Symposium in Europe (ECOS VIII) at the University Paul Sabatier - Toulouse III in a most pleasant southern France atmosphere. We express special appreciation for the work of Marie-France Perret, our host at Toulouse and doing an excellent job. The meeting was attended by about 50 people. The scientific discussions mainly dealt with the subdivision of the Givetian, Frasnian and Famennian. The minutes of which are given elsewhere in this Newsletter.

Five SDS members participated in the International Symposium on the Geology of the Devonian System held in Syktyvkar (Komi Republic, Russia) and organized by the Institute of Geology of Ural Division of RAS. The talks provided many data on the Devonian of the Timan-Pechora area and the Urals. From the discussions with the Russian Devonian specialists it emerged that most of them are still using the former Russian Devonian stage boundaries.

SDS organizes a session on « High-resolution stratigraphy for the subdivision of the Devonian stages » at the International Geological Congress in Florence, August 20-28, 2004 (General Symposium on Stratigraphy). In agreement with former formal SDS decisions on the substages and considering the data presented at this session, the Emsian, Givetian, Frasnian, Famennian substages programme will be finalized. Definition of substage boundaries will not be based on a GSSP, but on its potential for correlation that has to be substantiated by recognition of the lower boundary in a series of reference sections situated in different areas and representing important Devonian environments. More information on the General Symposia will be given in the second circular of the IGC and will be on the web from May 01, 2003 (www.32igc.org).

ELECTION OF THE SDS MANAGING EXECUTIVE COMMITTEE 2005-2008.

The current ICS statutes for terms, elections and votings are given herewith.

9.1. Terms of Office for Officers

The terms of office for the officers of the Executive Committee, the Subcommisssions, Committees and Working Groups shall be the period between two IGC's, normally four (4) years. All officers can be re-elected for one additional term of four (4) years. If circumstances necessitated the term of office to begin in the interval between two IGC's, the period of office will not be extended beyond the second IGC after the officer started in his/her function.

The Secretary General of ICS and the secretaries of Subcommissions are appointed by the elected chairpersons of these bodies.

9.2. Terms of Office for Voting Members

The terms of office for the Voting Members of Subcommissions and/or Working Groups shall be the period between two IGC's, normally four (4) years and can be extended for a maximum of two additional four (4) year periods. At the end of each term, at least 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.

9.4. Election of the managing committee of Subcommission

A chair and one or two optional vice chairs of a Subcommission of ICS are proposed to ICS after appropriate ballot within each Subcommission with the names submitted to the ICS General Secretary not later than twelve (12) months prior to the next IGC. These officers-elect are subsequently ratified by the ICS Executive Committee no less than nine (9) months prior to the next IGC. The elected Chair of a Subcommission will select a Secretary who will be a voting member of the Subcommission's Executive Committee for that term of office.

9.6. Voting Members of Subcommissions and Working Groups

Voting Members of a Subcommission are elected by its executive, and confirmed by the Executive Commission of ICS.

Voting Members of Working Groups are elected by its executive, and confirmed by the Executive of the ICS body under which the Working Group resides.

9.7. Voting Procedures in ICS

The members of the Full Commission, Subcommissions and Working Groups 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. In cases where no quorum is attained the first time around, a second round of voting is organized. Elections with more than one candidate will require the winner of a relative majority of less than 60% to pass a second ballot listing only him/herself, where he/she has to receive a 60% confirmation.

Voting is generally conducted by postal ballot, or can be received electronically (e-mail), giving a deadline of sixty (60) calendar days for the receipt of the votes. Voting Members may vote « yes », « no » or « abstain ». In case of electronic voting confirmation may also be requested on paper by postal ballot.

Formal meetings of ICS, that attain a quorum of 60%, can arrange in-session ballots.

CONCLUSION: SDS 2005-2008 will have a quite new look !

SDS BUSINESS MEETING 2003.

According to the response of SDS members to the circular sent out by our secretary Thomas Becker an SDS meeting including a field trip in the Ardennes, the Aachen area, the Eifel Hills and the northern and eastern Sauerland and a Business Meeting in Brussels may be organized between September 15th-25th or after the 4th October.

P. Bultynck,
Chairman.

MINUTES OF THE SDS BUSINESS MEETING, TOULOUSE, JUNE 2002

The Annual Business Meeting for 2002 was held in conjunction with the 8th International Conodont Symposium held in Europe (ECOS VIII), on 24th June, 9-12 a.m., at the University Paul Sabatier in Toulouse. It was arranged with the help of Marie-France PERRET MIROUSE, the principal organizer of the symposium. At the meeting, 18 Devonian contributions were presented in the form of lectures and posters. Abstracts are published in Strata, Série 1: Communications, vol. 12, 110 pp. In addition, there are three important excursion guides on "Palaeozoic Conodonts from Northern Spain" (GARCÍA-LÓPEZ, S. & BASTIDA, F., Eds.), Publicaciones del Instituto y Minero de Espana, Serie Cuadernos del Museo Geominero, No. 1, 438 pp., on "The Paleozoic of the Montagne Noire, Southern France" (R. FEIST, Ed., 85 pp.) and on "Pyrenees Field Trip, Guidebook" (CYGAN, C. DERAMOND, J., MENJOULAS, C.M., JOSEPH, J. & PERRET MIROUSE, M.-F., 88 pp.). These volumes include new and significant data on Devonian stratigraphy. Especially the Spanish volume is recommended as a major source of information for the Cantabrian Mountains and for the Pyrenees. All excursions were well attended by SDS members.

ATTENDANCE

A total of 37 people came to the business meeting which is only about half of 2001 but still a good result allowing sufficient discussions.

Present: Chairman P. BULTYNCK, secretary R.T. BECKER; TMs W.T. KIRCHGASSER, K. WEDIGGE, G. KLAPPER; CMs A.R. ASHOURI, D. BRICE, P. CARLS, M. GINTER, M. MURPHY, J. OVER, N. OVNATANOVA, M.C. PERRI, P. SARTENAER, E. SCHINDLER, I. SCHÜLKE, L. SLAVIK, C. SPALETTA, M. STREEL, N. VALENZUELA-RIOS; Guests S.Z. ABOUSSALAM, R. BROCKE, C. CORRADINI, C. DERYCKE, S. GARCÍA-LOPEZ, S. GOUWY, A.G. HARRIS, M. HECKER, L. JEPPSON, M. JOACHIMSKI, B. KAUFMANN, P. KÖNIGSHOF, H.R. LANE, LIAO, JAN-CHYN, H. MATYJA, B. MISTIAEN, K. NARKIEWICS, J.-P. NICOLLIN, X. SANZ-LOPEZ.

1. INTRODUCTION AND APOLOGIES

The CHAIRMAN opened the Annual Meeting and thanked Marie-France PERRET MIROUSE for hosting SDS at the occasion of ECOS VIII. He underlined the past success of joint ECOS and SDS meetings.

Recorded apologies: TMs I. CHLUPAC, R. CRICK, R. FEIST, J. GARCIA-ALCALDE, A. EL HASSANI, HOU, HONGFEI, C.A. SANDBERG, J. TALENT, T.T. UYENO, W. ZIEGLER; CMs A. BLIECK, G. BROCK, J. EBERT, C. HARTKOPF-FRÖDER, J. HLADIL, A. IVANOV, U. JANSEN, S. KRUCHEK, H. LELIEVRE, MA, XUEPING, E. MARK-KURIK, R. MAWSON, G. RACKI, C. VERSTRAETEN, A. WRIGHT, M. YAZDI. CM M.R. HOUSE was on his way but had to return home due to his illness which was then not yet known to be so fatal.

A TOTAL OF TWELVE DOCUMENTS WERE PRESENTED WHICH WERE NUMBERED AS FOLLOWS:

1. TALENT, J.A. & FEIST, R.: Should SDS continue to play the „Stratotype Game"? – 1 p. (see SDS Newsletter 18, p. 14)
2. BECKER, R.T.: The importance of Devonian substages: A commentary. – 2 pp. (see SDS Newsletter 18, p. 13-14)
3. BULTYNCK, P.: News from the Givetian Working Group. – 3 pp. (see SDS Newsletter 18, p. 26-27)
4. BULTYNCK, P. & GOUWY, S.: Towards a standardization of global Givetian substages. – 6 pp.
5. ABOUSSALAM, Z.S. & BECKER, R.T.: The base of the *hermanni* Zone as the base of an Upper Givetian substage. – 10 pp.
6. PIECHA, M. & SCHINDLER, E.: Frasnian and Famennian subdivisions – results of the German Late Devonian Working Group sessions 2001. - 2 pp.
7. SCHÜLKE, I., KORN, D., POPP, A. & ZIEGLER, W.: Potential reference section for the Early/Middle Famennian boundary at the Beringhauser Tunnel (Rheinisches Schiefergebirge, NW Germany). – 9 pp.
8. TRAGELEHN, H. & HARTENFELS, S.: Köstenhof quarry (Frankenwald, Bavaria) – a potential reference section for the Early/Middle and the Middle/Late Famennian boundary. – 7 pp.
9. BECKER, R.T.: Famennian ammonoid zones of the eastern Anti-Atlas – implications for substage subdivision. – 5 pp.
10. STREEL, M., AVKHIMOVITCH, V.I., BERKOWSKI, B., DREESEN, R., DURKINA, A.V., HANCE, L., HERBIG, H.-G., KORN, D., MAMET, B., MAZIANE-SERRAJ, N., MISTIAEN, B., THOREZ, H.M., WEBER, H.M. & WEYER, D.: Biostratigraphic correlation at the late or/and latest Famennian from Western, Central and Eastern European sections. State of the art. – 6 pp.

11. NICOLLIN, J.-P. & BRICE, D.: Stratigraphic value of some Strunian (Devonian, Uppermost Famennian) Productidina, Rhynchonellida, Spiriferida brachiopods. – 1 p. (abstract).
12. ICS: PRESENT and Future Directions in ICS. – 3 pp.

A further contribution by CM VER STRAETEN on "K-Bentonites, ash bed preservation and implications for Lower to Middle Devonian volcanism, eastern North America" was also included in the ECOS Abstract Volume (Strata, Sér. 1, vol. 12, p. 64).

2. MINUTES OF THE 2001 ANNUAL MEETING AT FRANKFURT A.M., GERMANY

The Minutes have been distributed in spring 2002 by the Secretary via e-mail or by regular post. TM KLAPPER noted a small mistake in section 4.7 (see Newsletter 18, p. 7). The lower Rhinestreet Shale, of course, starts near the top of MN Zone 6, not with MN Zone 8.

3. CHAIRMAN'S BUSINESS

The CHAIRMEN explained the difficulties which have arisen from the fact that Newsletter 18 was not available prior to the meeting. As a consequence, several contributions submitted to No. 18 were also presented at Toulouse as documents. Since the VICE-CHAIRMAN could not attend the meeting, a letter explaining the situation was read. In this, it was promised to improve the situation and a call for new contributions for a Newsletter 19 was made. The CHAIRMAN awnd SECRETARY feared that members would hesitate to submit contributions as long as No. 18 has not been circulated. Several contributions in the latter have become outdated. It was announced to contact the VICE-CHAIRMAN again in order to secure a future more regular Newsletter distribution. Also, all members are asked to send their documents and reports timely.

The CHAIRMAN briefly informed about new trends and directions of ICS (see Document 12). He declared that the introduction of substages is encouraged if appropiate but that no GSSP's should be selected. Instead, several reference sections covering different facies realms and regions should be chosen. This gives some support for the current activities of SDS and will (hopefully) stimulate correlation.

In a review of SDS activities, the CHAIRMAN drew attention to the forthcoming (9th to 12th July) Syktyvkar meeting on "The Geology of the Devonian System" which will be attended by him and some other members. Roughly at the same time, other members will attend the 1st International Paleontological Congress organized by TM TALENT, CMs MAWSON, BROCK and many others in Sydney [both meetings have turned out to be very successful: The Syktyvkar abstract volume comprises 333 pages with many contributions by Russian colleagues, often both in Russian and English. The Sydney Congress included ca. sixty talks and posters dealing with Devonian fossils, and the Devonian of Queensland and of the Canning Basin were shown during two excursions. – Including the Guidebooks, there is plenty to read]

4. DEVONIAN SUBSTAGES

It was decided to deal first with the general substage discussion and then with the substages in a chronological order. This means a slight change of the originally circulated agenda.

4a. General substage discussion

Since TMs TALENT and FEIST were unable to attend, the SECRETARY briefly outlined their criticism of the search for more and more GSSPs (Document 1). He continued with his summary of eight points (of Document 2) which, in his opinion, strongly urge SDS to succeed with substage subdivisions. TM KLAPPER emphasized to separate the questions of substages and stratotypes. The CHAIRMAN remarked that the decision of ICS not to accept substage GSSPs more or less settles the question but that SDS should now search for suitable reference sections with significant consideration for cross-facies correlation. One of the reference sections has to be designated as "Principal Reference Section". TM WEDDIGE used the Pragian as an example to warn that different chronological contents can be hidden under the same name; therefore he prefers to use new names for newly/differently defined chronostratigraphic units.

4b. Emsian

The CHAIRMAN reported the outcome of the **formal vote** on the number and names of Emsian substages. An absolute (> 60 %) TM majority has voted **in favour of two substages, Lower and Upper Emsian**. There was one abstention but no vote against. However, several TMs did not respond.

The SECRETARY asked for contributions from German and Czech members concerning possible Upper Emsian substage levels in the sections they have been studying for some while. Unfortunately, progress seems to be slow. CM CARLS repeated his previous warnings that the base of the Emsian is still under dispute and should not be regarded as stable. The CHAIRMAN answered that following ICS statutes, there cannot be any changes in the forthcoming five years. CM SLAVIK also argued in favour of a future revision since the current Emsian definition left a much too short Pragian, especially in its classical region. Since most arguments have been exchanged at previous occasions, it was decided not to continue the debate. However, new data and opinions are welcomed at any time to be submitted to the Newsletter.

4b. Givetian

The CHAIRMAN summarized Document 4 on future Givetian substages. He recalls that pulses of the Taghanic Onlap or the subsequent transgression at the base of the *hermanni* Zone were proposed to define an Upper Givetian substage which roughly would comprise the *Pharciceras* Stufe, originally included by many authors in the Upper Devonian. Such practise would leave a much too long (and thick in Belgian successions) interval for a single Lower Givetian substage and, consequently, a threefold subdivision was advocated. Correlation of Belgian and Moroccon sections provide several potential conodont levels, partly associated with eustatic deepenings: the base of the *timorensis* Zone (former base of Lower *varcus* Zone), correlating with the Terres d'Haurs Formation and with the Centerfield Limestone, the base of the *rhenanus/varcus* Zone (upper part of former Lower *varcus* Zone), correlating with the New York Tichenor Limestone, and the base of the *ansatus* Zone (former Middle *varcus* Zone), correlating with the Upper *pumilio* Event and the Kashong Member of the New York Moscow Formation. He also stated that it seems difficult to trace the *hermanni* level in shallow platform facies of reefal belts which were prevailing at the time.

The SECRETARY summarized the joint Document 5 with Z.S. ABOUSSALAM which proposes the base of the *hermanni* Zone as base of an Upper Givetian substage. This level would lie significantly above the initial Taghanic Onlap but correlates with the eustatic and often hypoxic Geneseo Transgression (= upper part of Depophase IIa in the Johnson et al. curve). Its advantage lies in its easy recognition using different conodont lineages (polygnathids, *Schmidtognathus*) and in an important goniatite faunal change when associations of last Maenioceratidae and oldest *Pharciceras* or *Mzerrebites* were replaced by faunas with multilobed pharciceratids and advanced Eobeloceratidae. As an advance to former documents, two further Moroccan sections, Seheb el Rhassal and Ouidane Chebbi, were presented. Following a request by CM SARTENAER, TM KLAPPER briefly explained to the audience that the (Lower) *hermanni* Zone equals the former Lower *hermanni-cristata* Zone. CM MURPHY added that Nevada has good sections and conodont faunas of this interval which need to be documented in more detail. The SECRETARY asked present specialists to come forward with brachiopod data in order to improve the correlation into neritic facies. He also remarked that Rhenish sections show the incoming of new rugose coral taxa ca. in the *hermanni* Zone which gives prospects for the recognition of the boundary in reefal areas. Some results have been published by MAY & BECKER (1996: Berl. geowiss. Abh., ser. E). Other coral work is in progress by S. SCHRÖDER from Cologne.

4c. Frasnian

The CHAIRMAN reported the results of the **formal vote** on Frasnian substages. An absolute majority of TMs voted **in favour of three substages, Lower, Middle and Upper Frasnian.** There were two abstentions but no vote against; again, several TMs did not give their vote. There is not yet any formal decision on substage levels but a strong preference for boundaries based on the entries of *Pa. punctata* and *Pa. semichatovae*. CM OVER, the chairman of the Frasnian Working Group, admitted a lack of new contributions by its membership and called for further documentations of potential Frasnian reference sections. The Chut River document of 2001 could serve as an example. The SECRETARY emphasized the necessity to resample the MN 4/5 Zone boundary at Chut River by Russian colleagues and announced that he intends to resample, together with Z.S. ABOUSSALAM, the German Burgberg section which may have a good record of first *Pa. punctata*. Belgian sections should allow the correlation into the neritic realm. Any data on brachiopods, corals, stromatoporoids and palynomorphs etc. would be highly welcomed. The membership is asked to show activities in this regard.

4d. Famennian

The SECRETARY, in his function as Famennian Working Group leader, gave a brief introduction, emphasizing the positive role of the German Upper Devonian Working Group led by M. PIECHA from the Krefeld Survey and by CM SCHINDLER (see Document 6). The latter reminded the audience of the strong German preference for three substages. The poor outcome of the new preliminary ballot on the Famennian substage numbers prevents any conclusions since the given votes are not representative. But the strongly increasing number of non-SDS proponents of four stages, assembled by CM M. STREEL, especially amongst neritic and terrestrial workers, has to be recognized.

CM SCHÜLKE explained Document 7 on the Beringhauser Tunnel section in the eastern Rhenish Massive. It is rich to

extremely rich in pelagic conodonts and allows the recognition of all Famennian standard conodont zones. In addition, specific beds have plenty marker ammonoids. Other faunal groups present are trilobites, bivalves, gastropods, deep-water Rugosa, crinoids, ostracods, nautiloids, microvertebrates and brachiopods. In the latest *marginifera* Zone there is a short-termed regressive pulse, and the Annulata Event is well marked in the Late *trachytera* Zone. The base of the *marginifera* Zone, a main candidate level for the base of a Middle Famennian, is characterized by the incoming of the index species together with various other representatives of *Palmatolepis, Polygnathus*, and *Polylophodonta*. Thus, the level can be recognized with the help of different lineages. Famennian *Ancyrognathus* and *Icriodus alternatus* disappear at the base of the zone. The upper part of the Famennian is lost in an unconformity.

CM SCHÜLKE continued with a presentation of the Köstenhof section in Bavaria whose data, however, became available to him only very shortly before the meeting. The section is part of a large olistholithic block embedded in Carboniferous strata but within it the succession is undisturbed and rich in conodonts. Some levels have abundant ammonoids or ostracods. As at Beringhauser Tunnel, the base of the *marginifera* Zone is characterized by the entry of several species. The Annulata Event is indirectly indicated by a post-event goniatite packstone of the basal *postera* Zone. The base of the *expansa* Zone is not recognized by the index species but with the help of *Pseudopolygnathus brevipennatus*. The SECRETARY reminded that in case of four substages, levels near the Annulata Event, for example the base of the *postera* Zone, could become important. CM SCHÜLKE discouraged the use of *Pa. postera* since the species comes in gradually and does not seem to be a very precise zonal marker. The SECRETARY suspected that the classical zonal marker *Po. styriacus* could be a much better marker just above the Annulata Event. CM STREEL drew attention to the fact that the Köstenhof section becomes very condensed towards the top, with *Pa. gonioclymeniae* entering in the second last bed. CM SPALETTA commented on a similar poor reliability of *Pa. gracilis expansa* as marker for the base of the *expansa* Zone in the Carnic Alps. C. CORRADINI confirmed the use of *Ps. brevipennatus* in Sardinia, instead of *expansa*. The SECRETARY summarized the evidence in stating that it seems difficult to define a substage by *Pa. gracilis expansa*. It is not yet clear whether alternative taxa really enter the record at precisely the same level as oldest *expansa* and further data are needed. This conodont discussion has to continue once the substage number is decided.

The SECRETARY presented a new review of Moroccan Famennian ammonoid zonations (Document 9), based on sections in the Tafilalt and Maider. If the total of regional zones and subzones is divided into equal numbers, then a tripartite Middle Famennian should start with the *velifer* Zone (= Uppermost *marginifera* Zone, roughly = base of classical Upper Devonian III, *Prolobites* Stufe), and an Upper Famennian with the Lower or Middle *expansa* Zone (= base of classical Upper Devonian V, *Clymenia* Stufe). In a fourfold substage system, a Middle Famennian should begin with the base of the *marginifera* Zone (which just pre-dates a significant global transgression), an Upper Famennian with the base of the *styriacus* Zone (just above the Annulata Event), and an Uppermost Famennian with the entry of *Pa. gonioclymeniae* within the Upper *expansa* Zone (= ca. base of the traditional *Wocklumeria* Stufe).

In Document 10, CM STREEL outlined late Famennian (ca. Middle to Upper *expansa* Zone levels) correlations based on palynomorphs, conodonts, and foraminifers from northern France to the Timan of the Russian Platform. Sections such as Dzikowiecz of southwestern Poland, with new data by H.M. WEBER, D. WEYER, D. KORN, B. BERKOWSKI etc., play a significant role since they show the (Strunian) transgression of pelagic facies over shallow-water carbonates with foraminiferes (e.g., *Quasiendothyra kobeitusana* and *Q. communis radiata*) and corals. Biostratigraphic markers of their "Group 6" should be preferred to define an Uppermost Famennian. These are in ascending order: (6a) the clymenid *Muessenbiaergia sublaevis* (replacing the rare *Sphenoclymenia brevispina* as zone fossil at the base of the Wocklum Stufe), (6b) *Retispora lepidophyta* var. *minor*, (6c) *Palmatolepis gonioclymeniae*, and (6d) *Q. kobeitusana kobeitusana*. J.-P. NICOLLIN explained at some length the stratigraphic value of brachiopods at that time (Document 11). 14 genera of the Productida, five rhynchonellid genera and 17 spiriferid genera were considered which include many kosmopolitan forms. This provides an enormous potential for neritic correlations, especially since there is a focus on taxa which are correlated with the conodont or foraminifere succession. These presentations finished with the repeated plea for a forth uppermost Famennian substage.

The SECRETARY closed the Famennian debate with remarks that sufficient evidence has been compiled and that all arguments have been exchanged often enough to procede with a formal vote on the number of Famennian substages. This will be held by email/letter until the next meeting [All Famennian documents of the last four years have been distributed to all voting members in December 2002, together with a call for their formal vote. Unfortunately, the response is still so incomplete that no result can be presented by the end of May 2003]. The Chairmen asked specialists of neritic and terrestrial fossil groups to compile in 2003 correlation charts for their groups in different areas.

5. ICS NEWS

The Chairmen reported that ICS is strongly pressing all Subcommissions to complete the definitions of stages latest

by 2008, the date of the IGC following Firenze. For example, there are still nine stages left to be defined in the Cretaceous. Also, the base of the Silurian may have to be revised [opposition to this has just been published in Lethaia]. All Subcommissions were asked to hold their business meetings at the next IGC, at the end of August 2004. SDS will hold a special symposium on "High Resolution Stratigraphy for the Subdivision of Stages". It is expected that significant progress is reached until the date and that formal votes on substage level, including reference section, can procede right after Firenze. This means that SDS members should work towards this deadline.

The ICS statutes limit the number of voting members, including the Chairman, Vice-Chairman and Secretary, to 10-20. SDS has reached this upper limit and the election of new TMs should precede during the normal periodical change with each IGC. In consequence, there should be a change of TMs with the Firenze meeting, replacing older members by younger and active CMs. ICS also confirmed that inactive TMs who do not communicate with their Subcommissions should be eliminated from the list. The corresponding membership of subcommissions must allow diversity in terms of geographic regions and stratigraphical methods. Therefore, SDS should open itself even more to chemostratigraphy, sequence stratigraphy, cyclostratigraphy etc. However, in SDS there has already been a successful history of integrating leading researchers in such fields.

6. MEMBERSHIP

6a. Election of TMs

The Secretary reported that the proposals of A. EL HASSANI and ZHU Min to become TMs have been confirmed by a majority of TMs in a written ballot.

According to the guidelines of ICS and SDS, the position of A. HÜNICKEN has changed to CM status.

6b. Election of CMs

Three written nominations were submitted prior to the Business Meeting and were approved unanimously:

J.L. VALENZUELA RIOS, Dipartimento de Geologia, Facultad de Ciencias Biológicas, Universidad de Valencia, Campus de Burjasot, 46100 Valencia, Spain, jose.I.Valenzuela@uv.es; specialized in Lower to Middle Devonian conodonts of Iberia and the Pyrenees (proposed by TM GARCIA-ALCALDE, CMs CARLS and MURPHY)

N. IZOKH, Institute of Petroleum Geology, Russian Academy of Sciences, Siberian Branch, 630090 Novosibirsk, Russia, izokhn@uiggm.nsc.ru; specialized in conodonts from Siberia and the Rudnyi Altai (proposed by TMs YOLKIN and BECKER)

I. SCHÜLKE, Institut für Geologie und Paläontologie, Universität Hannover, Callinstr. 30, D-30167 Hannover, Germany, schuelke@mbox.geowi.uni-hannover.de; specialized in Upper Devonian conodonts from Europe (proposed by the German Upper Devonian Working Group, including CM SCHINDLER as well as TMs ZIEGLER and BECKER).

The Secretary asked the membership to come forward at the next meetings with nominations for non-conodont workers. The total number of CMs lies currently at 74 which gives restricted opportunities for additional candidates.

7. FINANCIAL REPORT

The available budget for 2002 lies at 1,365.58 US $. This consists of:

Carried forward from 2001	165.58 $
IUGS-ICS Subvention for 2002	1,200.00 $

Expenses until the meeting consist of:

Secretary expenses	300.00 $
Financial support for one active member to attend the meeting	300.00 $
Financial contribution to the Tolouse organisation	300.00 $
Bank commission	15.00 $
Balance	450.58 $

(The outstanding costs for Newsletter 18 (400 $) were not yet included since it had not appeared.)

8. Future Meetings

2003

CM ASHOURI repeated his invitation for a Business Meeting in Mashad, Iran, in connection with an International Symposium, and including excursions to the Devonian of eastern Iran (ca. 4 days) and to the eastern Elburz Mountains (3 days). The best time for such programme would be in November. This offer was welcomed and accepted by the present membership. [However, the political situation and the Irak war forced SDS to postpone this symposium to autumn 2004.]

2004

The SECRETARY read the letter of invitation by TM El HASSANI to come, once again, to Morocco. But this time, the formerly mostly inaccessible extensive Devonian successions of the Dra Valley will be the scientific focus and these are of high significance for neritic-pelagic correlation and include potential reference sections for Emsian, Givetian and Frasnian substages. The meeting will take place in March 2004 in form of an international symposium either in Agadir or in Marrakesch. Support will come from the Institute Scientifique and other Moroccan organisations. The field trip will be lead by TM BECKER and co-authors and by the Senckenberg Group (G. PLODOWSKI and co-authors). [In the meantime the latter venue has been decided and the complete programme is available on the homepage of TM EL HASSANI; see also this Newsletter. During the symposium there will be a short Business Meeting and an open forum on progress in substage definition and in neritic-pelagic correlation. Written documents, brief statements, opinions or correlation charts will be highly welcomed.]

The Annual Business Meeting 2004 will take place during the IGC in Firenze, 20-28th August, and in conjunction with the announced SDS Symposium on "High resolution stratigraphy for the subdivision of Devonian stages".

2005

Our Russian colleagues (TM Yolkin, CM Izokh) offered SDS to have a field trip to Siberia in summer 2005. With respect to the wide distribution of Devonian strata in that region and with their significance for global correlations, this initiative was welcomed.

9. Any other business

None. The Chairman thanked all members and guests for their interest in Devonian stratigraphic matters and asked attendants to remain active in our field. The session was closed in time for lunch.

CURRENT SDS MEMBERSHIP LIST

TMs

1. R.T. Becker
2. P. Bultynck
3. R. Crick
4. A. El Hassani
5. R. Feist (offered to step down in 2004)
6. Hou Hongfei
7. J. Garcia-Alcalde
8. W.T. Kirchgasser
9. G. Klapper (may wish to step down in 2004)
10. V. Menner (may wish to step down in 2004)
11. P. Morzadec (now retired, should be replaced in 2004)
12. J.B. Richardson (should be replaced in 2004)
13. C.A. Sandberg
14. J. Talent (offered to step down in 2004)
15. S. Turner (offered to step down in 2003/2004)
16. T.T. Uyeno
17. E.A. Yolkin
18. Zhu Min

CMs

1. G.K.B. Alberti
2. A.R. Ashouri
3. I. Bardashev
4. M. Bensaid
5. A.R.M. Blieck (should replace Sue Turner as TM: for microvertebrates/France)
6. M. Bradshaw
7. C.E. Brett (could become a TM: for sequence stratigraphy)
8. D. Brice
9. Brock, G.
10. P. Carls
11. Chen, Xiuqin (should eventually replace Hou as TM: for China/brachiopods)
12. S. Cherkesowa
13. M. Dastanpour
14. J. Day
15. J. R. Ebert
16. D. Edwards
17. M. El Benfrika
18. B. Elwood
19. M. Ginter
20. C. Hartkopf-Fröder
21. J. Hladil (should replace Chlupac as TM: for Czechia)
22. A. Hünicken
23. P.E. Isaacson
24. A.O. Ivanov

25. N. Izokh
26. U. Jansen
27. A. Kim
28. T.N. Koren
29. S. Kruchek
30. H. Lelievre
31. J. LeMenn
32. E. Luksevics
33. Ma, Xueping
34. E. Mark-Kurik
35. J.E.A.M Marshall (should replace Richardson as TM: for spores)
36. R. Mawson (nominated as TM, to be elected in 2003, pre-replacement for Talent)
37. E.M.A. Murphy
38. T. Obukhovskaya
39. W.A. Oliver
40. N. Ovnatanova
41. J. Over (should replace Klapper as TM)
42. F. Paris
43. M.C. Perri
44. J.F. Pickett
45. F. Rabbi Khan
46. P.R. Rachebeuf
47. G. Racki (could become TM: for Poland)
48. M.A. Rzhonsnitskaya
49. P. Sartenaer
50. E. Schindler
51. H.P. Schönlaub
52. I. Schülke
53. L. Slavik
54. M. Snigrieva (could become a Russian TM)
55. C. Spaletta
56. M. Streel (could become TM: for spores/Belgium)
57. R. Suarez-Soruco
58. V.K. Talimaa
59. Tong-Dzuy Thanh
60. J.N. Theron
61. M. Truyols-Massoni
62. Tsien Hsien-Ho
63. V.S. Tsyganko
64. J.I. Valenzuela-Rios
65. J. Valiukevicius
66. C.A. Ver Straeten
67. O.H. Walliser
68. Wang, Cheng-Yuan
69. Wang Niang-Zhong
70. A.J. Wright
71. Xian, Si-Yuan
72. G.C. Young

73. M. Yazdi
74. Yu, Chang-Min

PROPOSALS FOR NEW CMs

G. Baird (Freedonia)
J.P. Casier (Brussels)
Aung (Burma)
H. Matija (Warsaw)

TO BE DELETED FROM MEMBERSHIP

Bai, Shung-Liang (withdrew in 2001)
H. Blumenstengel (withdrew in 2002)
I. Chlupac (died in 2002)
M.R. House (died in 2002)
Ruan, Yiping (died in 1998)
W. Ziegler (died in 2002)
Cai, Chong-Yang (no response since more than five years)
D.L. Dineley (withdrew in 1999/2000)
D.K. Elliot (no response since more than five years)
G. Freyer (withdrew in 1999)
A. Fuchs (left geology completely)
W. Haas (retired, no contact since more than five years)
F.M. Hueber (no contact with SDS)
J.S. Jell (withdrew, confirmed in 2002)
A. Kuzmin (left geology completely)
H. Lardeux (retired, withdrew in 1998/1999)
O. Lebedev (no contact with SDS)
D.C. McGregor (withdrew in 1999)
A.W. Norris (withdrew in 1999/2000)
A.R. Ormiston (no contact with SDS)
Pan Jiang (long retired, no contact with SDS)
E. Paproth (long retired, not active any more in geology)
G.M. Philip (not in research any more)
E.B. Selwood (long retired, withdrew ca. in 1998)
R. Sinding-Larsen (no contact with SDS)
V.S. Sorokin (no contact with SDS)
Wang Shi-Tao (no contact with SDS)
Yatskov, S.V. (left geology completely)
K. Zagora (withdrew in 1998/1999)

SUBCOMMISSION ON DEVONIAN STRATIGRAPHY

International Geological Congress
Firenze - Italy - August 20-28, 2004

Dear SDS members,

ICS asked all subcommissions to organise a symposium-session at the 2004 IGC in Firenze.

In order to finalize our current substages program SDS organizes within the General Symposium on Stratigraphy (G-22) a session, entitled: « High-resolution stratigraphy for the subdivision of the Devonian stages ». Each session of a General Symposium will last approximately half a day (with eight or ten oral presentations). The submission of abstracts is open to all interested participants. Two conveners will be responsible for selecting the abstracts submitted for oral and poster presentations. More information is given in the second circular of the IGC and is on the web (http://www.32igc.org).

In Newsletter n°. 18 I informed you that the ICS Executive discourages formalization of outcrop-based GSSP's for stages, however encourages standardization of global substages using voted agreements on various correlation criteria. The most important guidelines for the establishment of global substages are summarized below.

GUIDELINES FOR CONTRIBUTORS (ORAL PRESENTATIONS OR POSTERS)

- Authors of contributions dealing with definition of substage boundaries should first and foremost consider that proposed boundary levels have to be recognizable in widespread geographical areas and in the neritic and pelagic facies and discuss the potential for correlation with continental facies.
- The proposed boundary levels should include precise biostratigraphic data on various fossil groups and other data e.g. magnetostratigraphy, sequence stratigraphy, chemostratigraphy, radioisotopic dating,...
- The correlation potential should be substantiated by positioning the proposed boundary levels in a series of reference sections on different continents and belonging to both the pelagic and neritic realm. One of these sections should be designated as « Principal reference section ».

I strongly hope that the leaders of the different working groups can be present at the session in Florence.

Please complete the appended preliminary registration form and don't forget also to complete the registration form of the second circular - IGC-Florence.

P. Bultynck,
SDS Chairman.
May 2003.

Subcommission on Devonian Stratigraphy

Preliminary registration form for the session on " High-resolution stratigraphy for the subdivision of Devonian Stages"

International Geological Congress-Florence, August 20-28, 2004

First name and surname: .....

E-mail address: .....

	yes	possibly	no
I will attend the special session at the I.G.C. Florence	☐	☐	☐
I will present an oral contribution	☐	☐	☐
I will present a poster	☐	☐	☐

Provisional title of poster or oral contribution:

This form should be returned as soon as possible (before October 2, 2003) to the SDS secretary or chairman: Pierre.Bultynck@naturalsciences.be

SUBCOMMISSION ON DEVONIAN STRATIGRAPHY

CALL FOR POTENTIAL SDS OFFICERS - TERM 2005-2008

DEAR SDS MEMBERS,

The term of the present SDS managing committee will expire after the IGC-Florence-2004.

The current ICS statutes for terms, elections and voting are given herewith.

9.1. Terms of Office for Officers

The terms of office for the officers of the Executive Committee, the Subcommisssions, Committees and Working Groups shall be the period between two IGC's, normally four (4) years. All officers can be re-elected for one additional term of four (4) years. If circumstances necessitated the term of office to begin in the interval between two IGC's, the period of office will not be extended beyond the second IGC after the officer started in his/her function.

The Secretary General of ICS and the secretaries of Subcommissions are appointed by the elected chairpersons of these bodies.

9.2. Terms of Office for Voting Members

The terms of office for the Voting Members of Subcommissions and/or Working Groups shall be the period between two IGC's, normally four (4) years and can be extended for a maximum of two additional four (4) year periods. At the end of each term, at least 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.

9.4. Election of the managing committee of Subcommission

A chair and one or two optional vice chairs of a Subcommission of ICS are proposed to ICS after appropriate ballot within each Subcommission with the names submitted to the ICS General Secretary not later than twelve (12) months prior to the next IGC. These officers-elect are subsequently ratified by the ICS Executive Committee no less than nine (9) months prior to the next IGC. The elected Chair of a Subcommission will select a Secretary who will be a voting member of the Subcommission's Executive Committee for that term of office.

9.6. Voting Members of Subcommissions and Working Groups

Voting Members of a Subcommission are elected by its executive, and confirmed by the Executive Commission of ICS.

Voting Members of Working Groups are elected by its executive, and confirmed by the Executive of the ICS body under which the Working Group resides.

9.7. Voting Procedures in ICS

The members of the Full Commission, Subcommissions and Working Groups 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. In cases where no quorum is attained the first time around, a second round of voting is organized. Elections with more than one candidate will require the winner of a relative majority of less than 60% to

pass a second ballot listing only him/herself, where he/she has to receive a 60% confirmation.

Voting is generally conducted by postal ballot, or can be received electronically (e-mail), giving a deadline of sixty (60) calendar days for the receipt of the votes. Voting Members may vote « yes », « no » or « abstain ». In case of electronic voting confirmation may also be requested on paper by postal ballot.

Formal meetings of ICS, that attain a quorum of 60%, can arrange in-session ballots.

CONCLUSION - PROCEDURE

1. All SDS members (voting and corresponding) are requested to complete the appended form « Call for potential SDS Officers - Term 2005-2008 » and to return it to the chairman before July 18, 2003.

2. All SDS members can propose candidates either SDS members or active Devonian specialists that are not SDS members at present.

3. These SDS members who feel themselves deeply involved in the problems the SDS has to deal with should not hesitate to put their candidacy forward.

4. A nominating committee will make a selection and organize the official ballot.

I will resign from SDS voting membership at the IGC in Florence.

P. Bultynck,
SDS Chairman.
May 2003.

Subcommission on Devonian Stratigraphy

Call for potential SDS officers
Term 2005-2008

First name and surname: .....

E-mail address: .....

1. I propose: .....

   Address: .....

   As a candidate chairperson ☐

2. I propose: .....

   Address: .....

   As a candidate vice chairperson ☐

3. I submit my candidacy for a chairperson position ☐

4. I submit my candidacy for a vice chairperson position ☐

Indicate your preference(s) by putting a "X" in the corresponding box(es).

Please, return this form before July 15th 2003) to the SDS chairman: Pierre.Bultynck@naturalsciences.be

Lethaia, an international journal of palaeontology and stratigraphy, long identified as the official journal of the International Palaeontological Association is now also **The Official Journal of the International Commission on Stratigraphy.**

As you are aware, following the ICS meeting in Urbino, the ICS executive has been exploring opportunities to develop a single, identified publication outlet for ICS products. I am pleased to announce that at a meeting in Copenhagen on 27 May the Board of Lethaia Foundation and the executive committee of the ICS agreed to a publication arrangement. A draft of the Memorandum of Understanding is attached.

The benefits to ICS of this arrangement are threefold. Subcommission activities generate a multitude of published products (scientific articles, proceedings volumes, thematic books, monographs, correlation charts, etc.) that are widely dispersed in the literature, involve a great variety of publishers, and differ greatly in format, distribution, and circulation. Although Subcommission products can still be produced by publishers other than Lethaia, publication in Lethaia will ensure a common, high quality format for ICS publications, a common place to find ICS products, and, in turn, a clearer identification, greater distribution, and increased visibility of ICS publications. Thus, the activities of the ICS Subcommissions will have greater visibility. And, should the publication arrangement result in increased subscriptions to Lethaia, ICS will receive royalties that will be returned to the Subcommissions as support for their scientific activities and publications. Lethaia, in turn, should benefit. With the increased scope of its publications, it will appeal to a wider audience and subscriptions are expected to increase significantly.

Felix Gradstein asked me to work with David Bruton of the Lethaia Foundation Board to develop this publication arrangement. Now that it is a reality, I call upon you, the leaders of the Subcommissions, to make it a success, that is, to generate products and to direct them to Lethaia for publication. After all, it is not the ICS executive but the members of Subcommissions that generate the science that results in published products, and it will be the activities and products of the members of the Subcommissions that will be highlighted and supported through publication in Lethaia. I request that you distribute this announcement to all members of your respective subcommissions and that you actively solicit and and promote publications in Lethaia. I will continue as a liaison between ICS and the Lethaia Foundation Board and Editorial Office, working to coordinate publication of ICS products in Lethaia. I request that you inform me of all submissions and ideas for potential submissions, although authors and editors of ICS publications will work primarily with the Lethaia editorial office and Editor-in-Chief Svend Stouge through the submission to publication process.

Stan Finney
2nd Vice-Chair of ICS

Memorandum of Understanding

between Lethaia Foundation and
International Commission on Stratigraphy

The Board of the Lethaia Foundation and the Executive Committee of the International Commission on Stratigraphy agreed on the following for a trial period of three (3) years.

1. Lethaia will be recognized as a *formal publication outlet for the International Commission on Stratigraphy (ICS).* This will be noted on the inside cover page of each issue. Papers accepted for publication can carry the ICS logo, preferably placed after the acknowledgements.
2. Papers sponsored by ICS will be subjected to the same review procedures as for other articles submitted to Lethaia.
3. A variety of papers will be submitted from ICS varying from typical science based journal articles, thematic series, discussion and news items or large monographs and proceedings volumes Some of the larger submissions may be published in Fossils & Strata, if full printing costs are provided by ICS.
4. An annual evaluation of the success of this joint venture will be made by the Lethaia Foundation. After three years, there will be a thorough evaluation that reports on anticipated increases in subscriptions (both individual and institutional), the standard of submitted manuscripts on stratigraphy and number of pages/issues published. Should the arrangement lead to a significant increase in numbers subscribing to Lethaia /Fossils & Strata, then ICS will receive a royalty the size of which is open to negotiation
5. At some stage, a membership category will be considered for individuals subscribing to Lethaia through ICS.

DOCUMENTS SUBMITTED TO THE SUBCOMMISSION

Document submitted to the International Subcommission on Devonian Stratigraphy, Annual Meeting, Toulouse 2002

A Contribution to the Famennian Working Group

FAMENNIAN AMMONOID ZONES OF THE EASTERN ANTI-ATLAS – IMPLICATIONS FOR SUBSTAGE SUBDIVISION

R. THOMAS BECKER, WWU MÜNSTER, INSTITUTE OF GEOLOGY AND PALAEONTOLOGY, CORRENSSTR. 24, D-48149 MÜNSTER, GERMANY

The Devonian of the Tafilalt and Maider regions in the eastern Anti-Atlas of southern Morocco has become world-famous for its rich, diverse and well-preserved faunas. In the Upper Devonian pelagic sedimentation prevailed which makes the area SW to SE of Erfoud one of the most important regions to be considered in the frame of the current search for meaningful Upper Devonian substage subdivisions. Preliminary new data were presented to SDS during the 1999 Morocco field meeting (see contributions in the Excursion Guidebook edited by A. EL HASSANI & A. TAHIRI, published as Notes et Mémoires du Service Géologique, No 399, Rabat 2000).

In the meantime field research and the study of faunas has continued. Previous results in combination with a rough analysis of all available Famennian faunas from 24 localities in the Maider (Mrakib, Rich Bou Kourazia, Lambidia) and Tafilalt (El Gara, Bine Jebilet, Jebel Ihrs, Jebel Amelane, Mdoura-East, Djebel Erfoud, Bou Tchrafine, Seheb el Rhassal, Rich Haroun, Hamar Laghdad, Hamar Laghdad East, Dar Kaoua, Achguig, Ouidane Chebbi, Mkarig, Ihmrane Znaigoi, Mfis, Hassi Nebech, El Atrous North, El Atrous South, Jebel Ouaouifilal) gives for the first time a detailed zonation for all of the stage (see Fig. 1). This incorporates significant collections made available by Michael HOUSE, Volker EBBIGHAUSEN (Odenthal), Jürgen BOCKWINKEL (Leverkusen), and by Z. Sarah ABOUSSALAM (Berlin). Results have just been published in BECKER et al. (2002).

A total of 26 zones and subzones can be recognized in the Anti-Atlas Famennian (Fig. 1), with two additional unfossiliferous intervals (topmost Nehdenian = UD II-H/I and Hangenberg Blackshale equivalent = UD VI-E). Due to the influence of the Upper Condroz Event (regression in the Upper *rhomboidea* Zone), causing widespread unconformities and faunal interruptions, there is also no reliable record of faunas from the *Paratornoceras* Genozone. In any case, the new scheme offers one of the most detailed Famennian ammonoid subdivision available and correlates relatively well with the classical German succession. Partly more detailed Australian sequences (BECKER & HOUSE 1997) only range from the middle Nehdenian (UD II-D) to the middle of the Hembergian (UD IV-B). Unfortunately, the conodont record of the Anti-Atlas shaly basin seems to be very poor (CORRADINI et al. 2002) whilst platform faunas have hardly been studied (BELKA et al. 1999, some work in progress by S. KAISER, Bochum).

As in conodont zones, there is no reason to assume that ammonoid levels had identical length. But the number of regional faunal levels gives a good indication about the limits for time discrimination by classical biostratigraphical methods within a stage. It is generally agreed that attempts should be made to establish substages of about equal duration. If the total number of faunal level is divided by three substages, each roughly should encompass ten Anti-Atlas or German ammonoid zones/subzones; if

four substages are taken into consideration, each substage should include seven or eight intervals (Fig. 1). In other words, in a tripartite Famennian, a lower substage should coincide with the Nehdenian (upper boundary at the base of *velifer* Zone, within UD III-A) whilst the base of an upper substage should lie at the base or within the Dasbergian (base of Lower or Middle *expansa* Zones). In the case of four substages, a lower substage should range until the base of *marginifera* Zone (first entry of *Acrimeroceras* in Germany, southern France and Australia, somewhat below a major transgression introducing first *Maeneceras* as the oldest member of the Sporadoceratidae), a middle substage should range until the top of the *Annulata* Event (until the base of the *styriacus* or *postera* Zones), and an uppermost stage should more or less coincide with the base of the Wocklumian ("Strunian", UD IV-A, e.g., defined by the entries of *Pa. gonioclymeniae* or of *Pseudopolygnathus trigonicus*).

The poor conodont record of most southern Moroccan sections argues against using the area for the selection of Famennian substage stratotypes/type sections. However, recent research showed that the *Annulata* Event(s) can be traced very easily in different facies settings (BECKER 1992, KORN et al. 2000, BECKER et al 2002). Fig. 2 shows new precise details of both Lower and Upper *Annulata* Shales at Mrakib in the southern Maider (superceding previous imprecise and incomplete section logs in KORN 1999 and BECKER et al. 2000). Fig. 3 shows a single *Annulata* Event level in a more condensed carbonate sequence of the southern Tafilalt.

Better, complete and fossiliferous sections are available in the Rhenish Massive, Franconia, in the Carnic Alps, Poland, perhaps in the Montagne Noire and Pyrennes (data still limited) and in the Canning Basin. Further documentation of these is strongly encouraged and should precede final decision on substage levels. Even more valuable would be sections which show the interfingering of pelagic and neritic facies and faunas, or a good input of terrestrial palynomorphs.

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			Eastern Anti-Atlas	Germany
WOCKLUMIAN	UD VI	F2	*Stockumites prorsus*	*Stockumites prorsus*
		F1	*Cymaclymenia involvens*	
		E		*Cymaclymenia evoluta*
		D	*Wocklumeria sphaeroides*	*Epiwocklumeria applanata*
				Wocklumeria sphaeroides
		C2	*Mayneoceras nucleus*	*Parawocklumeria paradoxa*
		C1	*Parawocklumeria patens*	*Kamptoclymenia endogona*
		B	*Mayneoceras lens*	*Mayneoceras lens*
		A	*Linguaclymenia similis*	*Kosmoclymenia parundulata*
				Muessenbiaergia sublaevis
DASBERGIAN	UD V	C	*Kalloclymenia subarmata*	*Piriclymenia piriformis*
		B	*Gonioclymenia hoevelensis*	*Ornatoclymenia ornata*
		A2	*Gonioclymenia subcarinata*	*Clymenia laevigata*
		A1	*Endosiphonites muensteri*	*Endosiphonites binodosus*
HEMBERGIAN	UD IV	C2	*Protoxyclymenia wendti*	*Franconiclymenia serpentina*
		C1	*Sporadoceras orbiculare*	*Protoxyclymenia dunkeri*
		B	*Cymaclymenia pudica*	
		A	*Platyclymenia annulata*	*Platyclymenia annulata*
	UD III	C2	*Sulcoclymenia sulcata*	*Prolobites delphinus*
		C1	*Afrilobites mrakibense*	
		B	*Planitornoceras euryomphalum*	*Pseudoclymenia pseudogoniatites*
		A	*Sporadoceras equalis*	*Pernoceras "dorsalum"*
NEHDENIAN	UD II	I		*Dimeroceras mamilliferum*
		H		*Posttornoceras contiguum*
		G	*Maeneceras latilobatum* *Maeneceras subvaricatum*	*Maeneceras latilobatum* *Maeneceras subvaricatum*
		F		*Acrimeroceras* sp. *Paratornoceras lentiforme*
		E2	*Kourazoceras elhassanii*	*Praemeroceras primaevum*
		E1	*Praemeroceras dahmanii* *Praemeroceras petterae*	*Praemeroceras petterae*
		D	*Paratorleyoceras globosum*	*Paratorleyoceras globosum*
		C	*Cheil. (Cheiloceras) subpartitum*	*Cheil. (Cheiloceras) subpartitum*
		B	*Cheil. (Compactoceras) verneuili*	*Cheiloceras* sp. indet.
		A	*Phoenixites frechi*	*Phoenixites frechi*

Fig. 1: Correlation of the Famennian ammonoid zones of the eastern Anti-Atlas and of the Rhenish Massive, showing also possible boundaries of substages of roughly equal duration in a tripartite or fourfold system. Three substages: base of Middle Famennian = base of *velifer* Zone, base of Upper Famennian = base of Lower or Middle *expansa* Zone. Four substages: base of Middle Famennian = base of *marginifera* Zone, base of Upper Famennian = base of *postera* (*styriacus*) Zone, Uppermost Famennian within Upper *expansa* Zone (ca. base of *Pa. gonioclymeniae* or of *Pseudopo. trigonicus*).

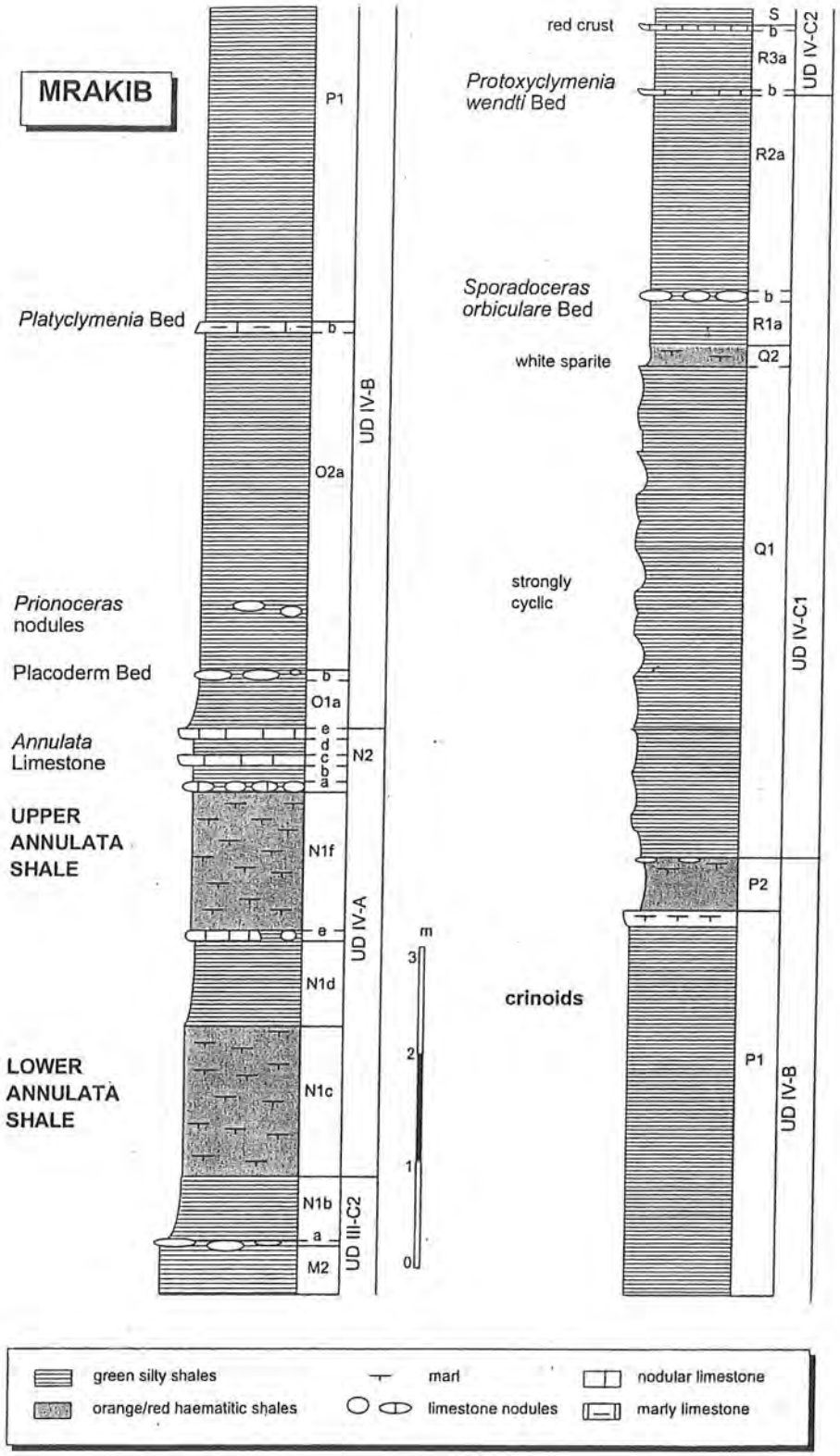

Fig. 2: Litho- and biostratigraphy of the shaly succession around the *Annulata* Events at Mrakib (see KORN, 1999, BECKER et al. 2000, 2002) in the basin of the southern Maider. The sections extends downwards to the uppermost Nehdenian and reaches upwards equivalents of the topmost Devonian Hangenberg Sandstone. Based on correlation with German sections, the base of the *postera* Zone can be expected to lie within Bed N2. The base of the *expansa* Zone may lie above Bed R. The Lower *Annulata* Shale carries a rich but small-sized haematitic fauna with *Platyclymenia, Prionoceras* and abundant *Gundolficeras bicaniculatum*. The Placoderm Bed is characterized by numerous giant-sized titanichthiyds.

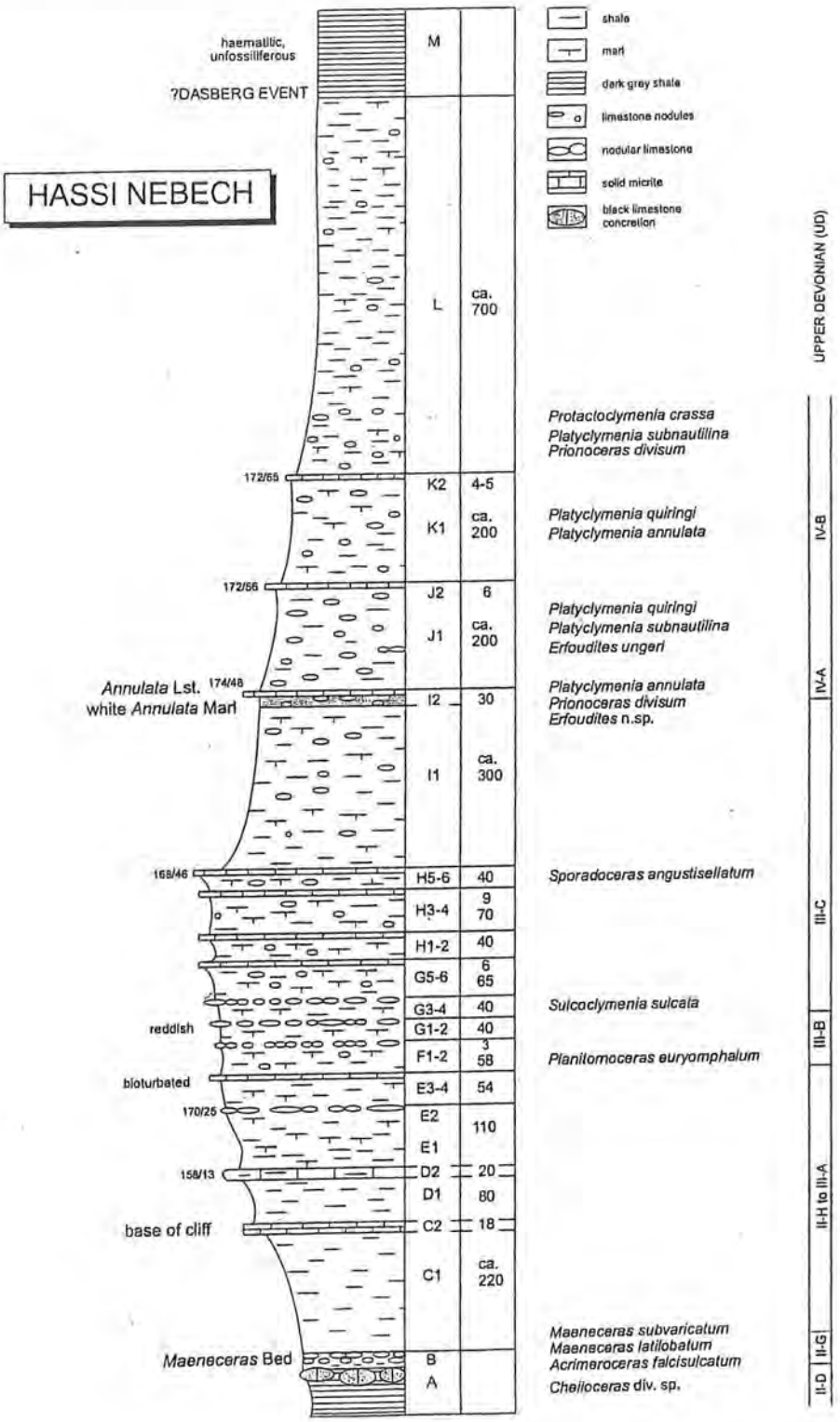

Fig. 3: Litho- and biostratigraphy of the Famennian at the western end of Hassi Nebech in the southern Tafilalt. Dark grey to black limestone concretions in the upper part of Bed A contain *Maeneceras* and fall in the *marginifera* Zone. The *Annulata* Event is characterized by a conspicuouse, white weathering marl with abundant *Platyclymenia*, followed by a solid limestone which, according to correlation with German sections, may fall in the basal *postera* Zone. Based on goniatite data, the basal *velifer* Zone can be expected within Beds D-E but conodont data are not yet available.

Document submitted to the International Subcommission on Devonian Stratigraphy, Annual Meeting, Toulouse 2002

THE BASE OF THE *HERMANNI* ZONE AS THE BASE OF AN UPPER GIVETIAN SUBSTAGE

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1. Substage levels

The definition of the Middle/Upper Devonian series boundary pushed most levels with the characteristic, multilobed pharciceratid goniatites (most of the *Pharciceras* Stufe of HOUSE 1985) into the Givetian although such faunas traditionally mostly had been regarded as typical for the basal Upper Devonian. This interval is clearly separated from typical Givetian successions and faunas by the global Taghanic Event which is currently under study in Europe and North Africa by one of the authors within the frame of a Ph.D. at the Museum für Naturkunde, Berlin (e.g., ABOUSSALAM 2000).

In previous contributions to SDS (BECKER & ABOUSSALAM 2001, ABOUSSALAM & BECKER 2001) we revised the conodont and ammonoid biostratigraphy around an extended Taghanic Event Interval, now referred to as Taghanic Biocrises, and discussed various levels which have to be considered for the definition of an Upper Givetian substage. These are in short:

1. Base of the Taghanic Onlap within the *ansatus* Zone (= Middle *varcus* Zone)

Advantage: Correlation with an extinction in ammonoids, trilobites, corals etc., correlation with the initial pulse of a significant transgression (base of Tully Limestone and international equivalents).

Disadvantage: No useful conodont, ammonoid or brachiopod marker taxon.

2. Base of the *semialternans* Zone (within topmost Middle *varcus* Zone)

Advantage: Defined by a widely distributed marker conodont and by the entry of oldest *Pharciceras* (*amplexum*, aff. *amplexum*, *tridens*), *Epitornoceras* and *Atlantoceras*, correlation with the transgressive third sequence of the Tully Limestone.

Disadvantage: Cryptogenic appearance of the index species, upper range of various trilobites and ammonoids (*Maenioceras, Afromaenioceras, Sellagoniatites*) which have been regarded as typical middle Givetian taxa.

3. Base of the Upper *varcus* Zone (defined by *Schmidtognathus latifossatus*)

Advantage: Defined by a widespread marker conodont which originated in a known phylogenetic lineage from *Ozarkodina semialternans*.

Disadvantage: No correlation with any eustatic pulse, not recognizable in the Montagne Noire, in Nevada (JOHNSON et al. 1985), Morocco and in several sections of the Rhenish Massive, still including the upper range of typical middle Givetian trilobites and goniatites, no entry of marker goniatites, brachiopods etc.

4. Base of the (Lower) *hermanni* Zone

Advantage: Entry of several widely distributed and easy recognizable marker conodonts which are part of known phylogenetic lineages, entry of some marker goniatites such as *Mzerrebites erraticus*, correlation with a significant eustatic deepening (base of Geneseo blackshale and oldest Leicester Pyrite), small-scale conodont extinction, final extinction of typical middle Givetian goniatites (Maenioceratidae), trilobites etc.

Disadvantage: Well above the initial Taghanic Onlap, excluding the oldest part of the *Pharciceras* Stufe (see ZIEGLER 1982).

Continuing work on Rhenish, French and Moroccan sections have provided additional data which suggest that the fourth level, even though it lies at the top of the extended event interval, may be more useful than the three older ones. Additional arguments are:

1. The discovery off additional and new marker polygnathids which seem to characterize the basal *hermanni* Zone.
2. The relative low number of conodonts encountered in beds of the *semialternans* Zone.
3. The rather strong condensation of the *semialternans* (or Upper *varcus*) Zone in most sections studied.
4. The occasional dominance of maenioceratids over pharciceratids in the *semialternans* Zone.
5. New evidence that *Afromaenioceras* enters lower than previously thought in pre-event beds (between Lower and Upper *Sellagoniatites* Limestones of the Anti-Atlas) which rules out that it can become a marker for the initial Taghanic Onlap.
6. The larger-scale transgression of the Geneseo Shale in comparison with the initial Taghanic Onlap (basal Tully transgression).

2. Possible type-sections

An Upper Givetian stratotype or more informal type section should not only have a good record of *semialternans* (Upper *varcus*) and (Lower) *hermanni* Zone conodont faunas but should yield other key fossil groups, such as ammonoids, brachiopods, trilobites, ostracods, corals, dacryoconarids etc. A palynomorph record also would be significant. The base of the *hermanni* Zone as defining level rules out most sections in eastern North America since the basal Geneseo Shale, apart from oldest Leicester Pyrite faunas (Cage Gully, HUDDLE 1981), has no documented conodonts. Belgium sections are in too shallow facies and the *hermanni* Zone is not recognized in the Fromelennes Formation (BULTYNCK et al. 2001). The same applies to the Boulonnais (BRICE et al. 1978) but both regions may hold significant clues for pelagic-neritic-terrestrial correlation. The interesting Oberbuchach section of the Carnic Alps (SCHÖNLAUB 1985) is now overgrown and not available any more for detailed sampling. Published Givetian sections on the Italian side of the Carnic Alps are in too shallow facies. New and detailed information would be welcomed from Iowa (Solon Quarry, Buffalo Quarry etc., JOHNSON et al. 1976, WITZKE et. al. 1989), Nevada (ZIEGLER et al. 1976, JOHNSON et al. 1985), South China (e.g., Maanshan, Liujing, Baqi; HOU et al., 1985, BAI et al. 1994, SU 1989), Tadzhikistan (Shishkat, BARDASHEV 1992), the Cantabrian Mountains (Barranco, Collado, HENN 1985) and Queensland (SD 15, SD 164, SD 216, MAWSON & TALENT 1989). There may be interesting sections as well in Malaysia (LANE et al. 1979).

Many Rhenish sections described by ZIEGLER et al. (1976) are not available any more and no macrofauna has been recorded from their critical time intervals. Other sections, such as Martenberg and Syring (Kellerwald), are discontinuous. The best sequence of the Montagne Noire seems to lie at Pic de Bissous (FEIST & KLAPPER 1985, ABOUSSALAM & BECKER 2001) but the macrofaunal record is still very poor above the *semialternans* Zone. New sampling will procede after the Toulouse meeting.

Currently the best documented but relative condensed section is Bou Tchrafine (ABOUSSALAM & BECKER 2001, giving all previous references) in the central Tafilalt of the eastern Anti-Atlas. Two lateral sections, Seheb el Rhassal and Ouidane Chebbi, have an equally good conodont and ammonoid record and also contain other fossil groups such as tentaculites, styliolinids, trilobites, deep-water Rugosa, tabulate corals, foraminifers, ostracods and bivalves. In thicker, more basinal and shaly facies of the southern Tafilalt (e.g., Hassi Nebech) and Dra Valley (e.g., Oued Mzerreb, Tiguisselt), conodont faunas are very poor and correlation has to rely on haematitic ammonoid faunas. Both in the southern Tafilalt (Amessou Syncline) and in the northern Maider, the facies increasingly becomes neritic. These areas have relative poor conodonts but may be of significance for correlation of the *hermanni* Zone into brachiopod and reefal facies.

2.1. Seheb el Rhassal

Seheb el Rhassal is the name for the ridge which forms the westward continuation of Bou Tchrafine on the western side of the Oued Amerbouh, ca. 11 km SW of Erfoud (x = 618.9, y = 481.3; GPS N 31° 21′ 22″, W 4° 10′ 47″). The main section (Section 2) lies ca. 60 W of the eastern end of the curved ridge which is characterized by a steep and sandy slope towards the dry valley.

The carbonate succession consists of solid to marly and nodular, micritic bioclastic wackestones with various contents of styliolinids, striatostyliolinids, thin- or thick-shelled ostracods, crinoids, deeper-water corals, trilobites, cephalopods and other mollusc shells. The top of the main ridge is formed by the thick and solid Lower *Sellagoniatites* Limestone (Bed A) which forms a wide, southward dipping exposure with several large *Sell. discoides*. It overlies the Upper *pumilio* Bed and falls in the *Maenioceras terebratum* Zone (MD II-C, *ansatus* Zone). As in all Tafilalt Platform sections, nodular *Maenioceras* marls with well-preserved *Maenioceras, Agoniatites, Sobolewia* and *Tornoceras* follow (Beds B to D1b). At least their upper part falls in the *Afromaenioceras sulcatostriatum* Zone (MD II-D) but the index species is relative rare in platform sections. Therefore, the lower base of the zone has not yet been established precisely.

Bed D2 and D3 (Fig. 1) represent the Upper *Sellagoniatites* Limestone and contain the name-giving goniatite and, especially Bed D2, a rich conodont fauna of the top part of the *ansatus* (Middle *varcus*) Zone (Tab. 1). Noteworthy are the dominance of *Po. linguiformis linguiformis*, various new species of *Tortodus*, the presence of *Po. ovatinodosus*, and the first North African record of *Po. alveoliposticus* (very rare, < 0.1 % of the fauna). The top of Bed D3 is irregular suggesting an erosive surface and unconformity. In fact, it seems that the lower to middle part of the Taghanic Event Interval (equivalents of Bed A4 of Bou Tchrafine = BT 32) are missing. Towards Section 1, Beds D3 to E3b are lost in this hiatus. Bed E2a falls in the *semialternans* Zone. Although the total conodont yield of the unit is small, the index species is well represented. The ammonoid fauna consists of a new, thick species of *Maenioceras* but, by contrast to Bou Tchrafine, *Pharciceras* has not yet been recovered. This points to some ecological differences over a relatively small lateral distance.

Bed E2b falls in the (Lower) *hermanni* Zone and contains several index conodont taxa of the zone: *Schm. hermanni, Schm. wittekindti, Schm. pietzneri, Po. dubius*, and *Po. limitaris*. The relative rich fauna is not dominated by any taxon and locally *Po. linguiformis linguiformis* has disappeared. To our surprise, the bed also produced various new polygnathids (Fig. 2), some of which may be related to *Po. limitaris* (but having transverse rows or nodes), *Po. ovatinodosus* (but having isolated platform nodes), and *Po. pennatus* (but with weaker transverse ridges). Similar forms may occur in Rhenish sections but never received proper taxonomic treatment. These taxa underline the rapid radiation occuring with transgression and illustrate that it affected polygnathids to the same extent as schmidtognathids. Bed E2b also has *Epitornoceras mithracoides* and first *Mzerrebites erraticus* (MD III-B1). The same goniatites, as well as loose *Pharciceras*, have been collected from the overlying Bed E2b which yielded only few conodonts.

Bed E2c is a reddish to yellow nodule level which is characterized by the entry of multilobed and evolute relatives of *"Stenopharciceras" lunulicosta*. There are also *Epit. mithracoides* and *Mz.* aff. *erraticus*. In the lateral section SER 1, this unit contains *Po. cristatus ectypus*, the marker of the classical Upper *hermanni* Zone. Therefore, the (Lower) *hermanni* Zone is locally only 13 cm thick (ca. 10 cm at Bou Tchrafine, if Bed E2c correlates with BT 33d = BT B4).

2.2. Ouidane Chebbi

The overall Devonian geology of the Ouidane Chebbi area of the eastern Tafilalt has been presented by BELKA et al. (1999). Their logs do not show much details of the late Givetian part of the succession which is

partly interrupted by thick Mesozoic dolerite sills. Extensive quarrying of the Lower and Upper Marker Beds of the *Pharciceras* Stufe seriously hamper detailed stratigraphic work along the ridge. However, we found one very good succession in natural outcrop which was saved from quarrying because the two marker units were not solid enough for the production of polished slabs and plates. This section (Fig. 3) lies ca. 1 km W of section OC II in BELKA et al. (1999), at GPS N 31° 14, 197′ and W 3° 49,242′. It is thicker and more marly than Bou Tchrafine from which it is separated by ca. 40 km distance. But most Bou Tchrafine beds still can be recognized and there must have been a hardly noticable paleoslope towards the east. The easternmost section of the Chebbi area, Mkarig, again is more condensed.

As elsewhere in the Tafilalt, the thick Lower *Sellagoniatites* Limestone forms extensive outcrop, dipping southwards. It is overlain by the *Maenioceras* Marls which contain some *Maenio. terebratum* in its upper part (Bed 0); *Afromaenioceras* has not yet been found. The Upper *Sellagoniatites* Limestone (Bed 1) consists of two subunits and has a much poorer conodont fauna (Tab. 2) than at Bou Tchrafine or Seheb el Rhassal. *Po. ovatinodosus* indicates the (higher part of the) *ansatus* (Middle *varcus*) Zone. At the top there is an erosive surface suggesting a minor break in sedimentation caused by regression and increased bottom turbulence. The transgressive, bluish-grey Bed 2 is taken to represent the lower Taghanic Event Interval. The conodont assemblage is still dominated by *Po. linguiformis linguiformis*. The macrofauna consists of phacopids and proetids (*Gerastos* cf. *serus*) but there are no ammonoids. This bed correlates with Bed A4 (BT 32) at Bou Tchrafine. At its top there is again a bioturbate hardground suggesting a small break in sedimentation caused by sealevel change.

Oldest *Pharciceras* enter abundantly together with a thick new *Maenioceras* in Bed 3. *Gerastos* ist still present. According to ist macrofauna, this unit clearly correlates with the *semialternans* Zone of Bou Tchrafine and Seheb el Rhassal, but despite resampling, the index species has not been found yet. Surprisingly, however, *Elsonella rhenana* was found. Previously, this unusual conodont genus has been first reported from the *hermanni* Zone. A shale unit between Beds 2 and 3 thickens westwards (Bed 3a) and becomes crowded by in-situ specimens of the cladochonid tabulate *Bainbridgia*. So far, this genus was last known from pre-Taghanic beds. It continues together with well-preserved phacopids of the *koeneni* Group into the main marly limestone part of Bed 3 (Bed 3b).

In the main section Bed 4 has only a very poor fauna, including few *Sch. pietzneri, Schm. latifossatus*, and *Oz. semialternans* but no goniatites. Some 20 m laterally, the base of the (Lower) *hermanni* is easily placed at the base of a thin, platy micritic limestone (Bed 3c) sandwiched between Beds 3 and 4. It contains no macrofauna apart from *Buchiola* but abundant *Schmidtognathus* and *Po. dubius*. Nodular and marly limestones between Bed 4 and the Lower Marker Bed (Bed 16) have only very small conodont faunas. *Mzerrebites erraticus* occurs in Bed 8, first oxyconic members of the Eobeloceratidae were found just below the Lower Marker Bed. As at Seheb el Rhassal, the Upper *hermanni* Zone (defined by *Po. cristatus ectypus*) may start at this level but conodont sampling is still incomplete. Marly limestones above the Lower Marker Bed are very rich in *Pseudoprobeloceras, Taouzites taouzensis, Epitornoceras, Synpharciceras* and other pharciceratids. Various petteroceratids and *Ponticeras* enter above the Upper Marker Bed (Bed 23) of the *dengleri* (Upper *disparilis*) Zone. The section has the richest pharciceratid succession of the Tafilalt Platform and includes many new forms which have not been found in the haematitic faunas of the Tafilalt Basin at Hassi Nebech.

3. Conclusions

Although well above the initial Taghanic Onlap, the base of the *hermanni* Zone is now preferred as defining level for an Upper Givetian substage since it seems have the best potential for easy and wide recognition and since it avoids discussions raised by replacing the classical Upper *varcus* Zone by an *Oz. semialternans* Zone with slightly altered lower range. The base of the *hermanni* Zone is characterized by the entry of numerous new *Polygnathus, Schmidtognathus* and *Oz. proxima*. A significant eustatic rise at its base (Geneseo Transgression or Upper Taghanic Onlap) should allow sequence stratigraphic correlation with neritic successions. *Mzerrebites erraticus* is a marker goniatite of the basal *hermanni* Zone in North Africa and Germany. "Multilobate pharciceratids" (*lunulicosta* Gp. = N. Gen.) seem to enter later, latest by the Upper *hermanni* Zone (see ZIEGLER 1982). According to MCGREGOR et al. (1985), the miospore *Laiphospora membrana* enters in the Lower *hermanni* Zone in North America.

Sections of the Tafilalt Platform have the best published faunal record of various fossil groups so far but many groups (ostracods, foraminifers, corals, trilobites) are not yet studied in much detail. The relative strong condensation with minor disconformities is a disadvantage and suggests that other successions should be (re-) studied before selecting a type section.

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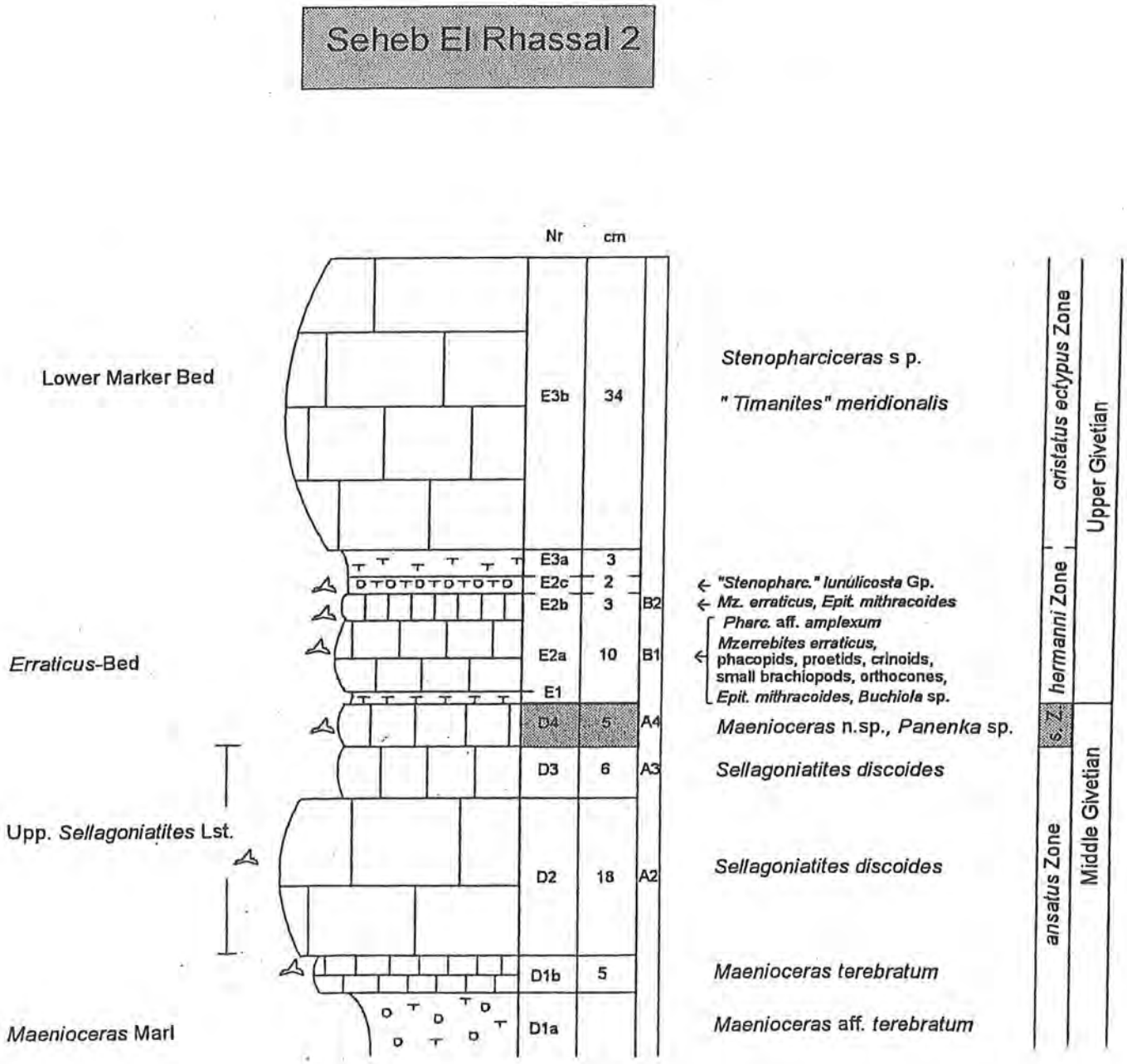

Fig. 1: Litho- and biostratigraphy around the Taghanic Events (shaded interval) at Seheb el Rhassal, Section 2, in the central Tafilalt.

Tab. 1: Late Givetian conodont ranges at Seheb el Rhassal, Sections 1 and 2.

	Seheb el Rhassal 2							SER 1
conodont zones	*ansatus* Zone			*sem.* Z.	*hermanni* Zone			*herm.* Z.
bed number	D1 Top	D2Top	D3	D4	E2a	E2b	E2c	E2
Po. ling. klapperi	1	115	4					
Po. ling. linguiformis	14	487	51	10				
Po. ling. mucronatus	2	5	*	*	1			
Tort. caelatus	1	2	1					
I. difficilis	1	9	*	*	12			3
Po. varcus		183	1	*	8	*	12	13
Po. alveolipostícus		1						
Po. ansatus		71	*	*	4			
Po. ling. weddigei		76	3					
Po. timorensis		29	*	*	1			2
I. brevis		2						
Tortodus n. sp. C		4	*	*	*	*	1	4
Tortodus n. sp. B.		3						
Tortodus n. sp. 1		1						
Tort. aff. *variabilis*		1						
Bryant. planus		1						
Tort. aff. *caelatus*		1						
Po. xylus		43	*	*	7			17
Po. ovatinodosus		10	*	*	10	1	8	31
Prioniodina sp.		3						
Oz. semialternans				3	*	*	3	3
Oz. proxima					1			
Oz. aff. *intermedia*					1			
Bryant. nitidus					2			
I. expansus					1			
Elsonella rhenana								1
Po. pseudofoliatus					2			3
Schm. latifossatus					2	*	1	
Schm. hermanni					1	1	1	10
Schm. wittekindti					13	*	6	6
Po. pennatus					1			
Po. limitaris					17			
Po. aff. *limitaris*					11			
Polygnathus n. sp.					1			
Po. aff. *pennatus*					1			
Po. aff. *ovatinodosus*					1			
Po. cf. *cristatus ectypus*					1			1
Po. dubius					5			5
Po. limitaris					10	1	1	13
Schm. cf. *pietzneri*					2			
Schm. pietzneri					13			2
Oz. sannemanni							1	2
number of specimens	19	1048	60	13	129	3	34	116

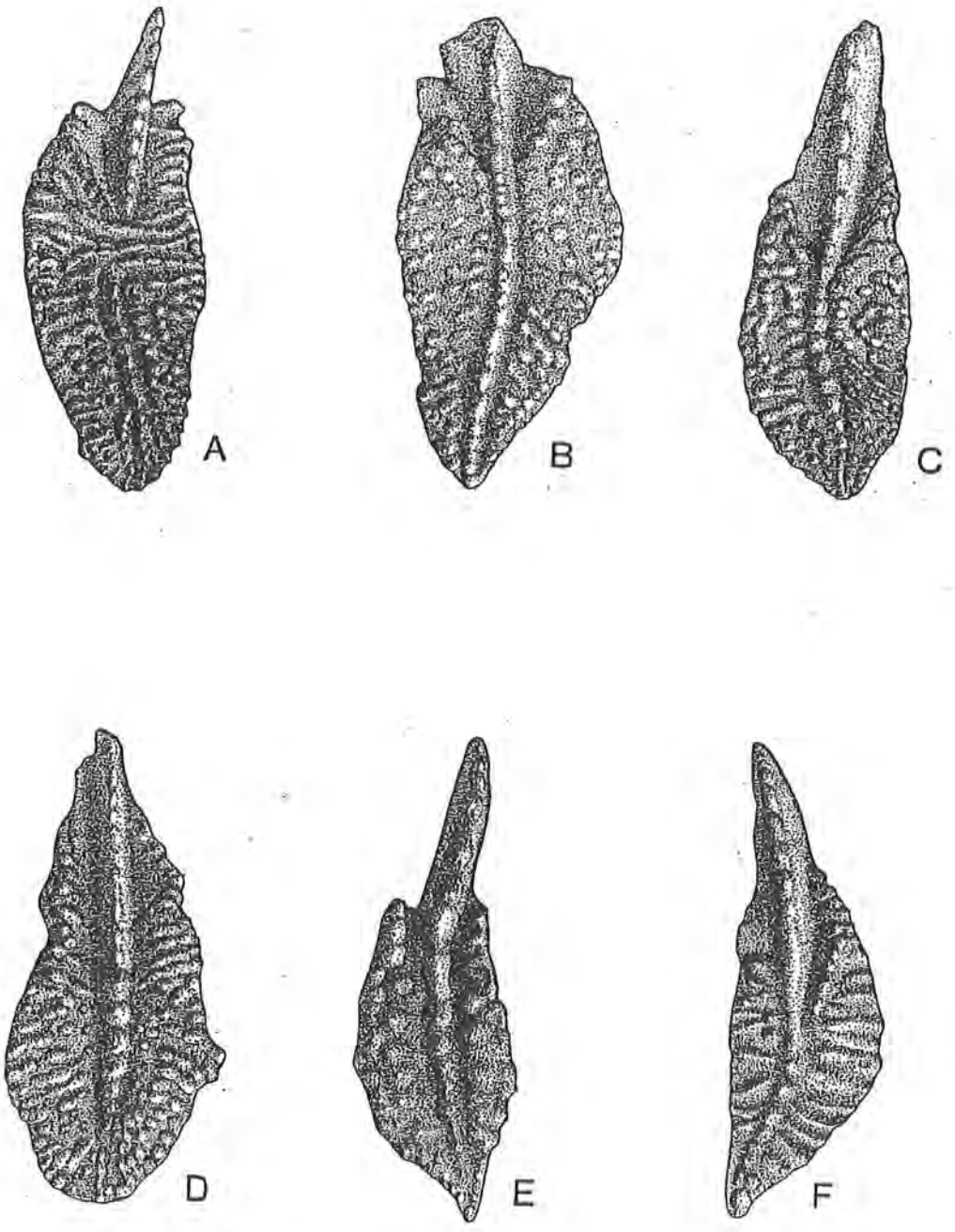

Fig. 2: New conodont species from the basal *hermanni* Zone at Seheb el Rhassal, Section 2. A-C, *Po.* aff. *limitaris*, D, *Polygnthus* n.sp., E, *Po.* aff. *ovatinodosus*, F, *Po.* aff. *pennatus*.

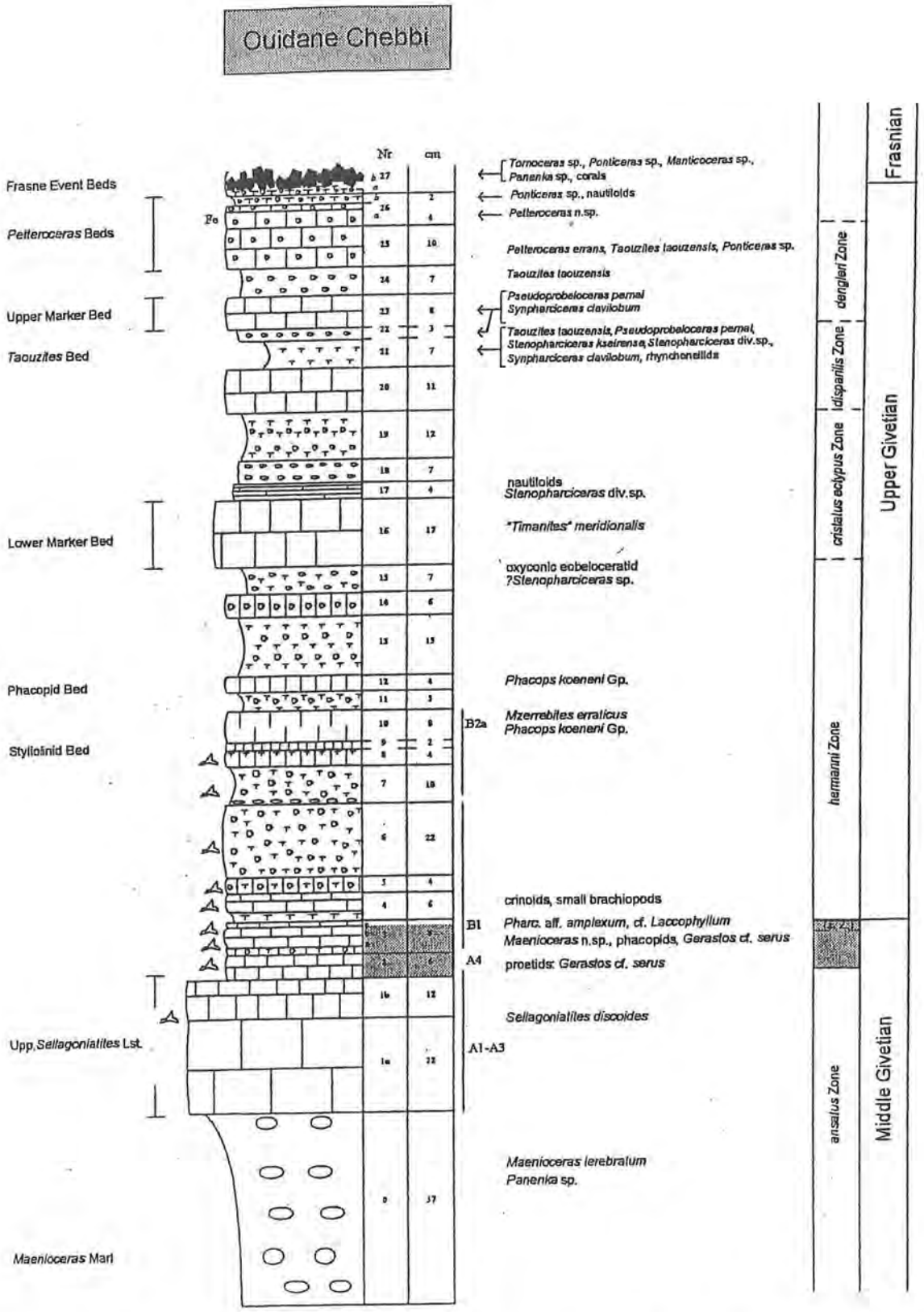

Fig. 3: Late Givetian to basal Frasnian (black Frasne Event beds at the top) litho- and biostratigraphy at Ouidane Chebbi. The base of the *hermanni* Zone lies at the base of a platy bed (Bed 3c) between Beds 3 and 4 which wedges out laterally.

Tab. 2: Conodont ranges around the Taghanic Events at Ouidane Chebbi.

Ouidane Chebbi									
conodont zones	*ans.* Z.		*sem.* Z.	*hermanni* Zone					
bed number	1	2	3	3c	4	5	6	7	8
Po. varcus	2	16	*	8	7	2			
Po. ovatinodosus	3	*	3	153	17	12	1	2	
Tortodus sp.	1	*	*	1					
I. difficilis		2	2	46	7	2			
Po. timorensis		1	*	6	1				
Po. xylus		3	1	19					
Po. ling. linguiformis		103	7	3	1	*	*	*	1
Po. ling. klapperi		6							
Po. ling. weddigei		3							
Tort. caelatus		2							
Tortodus n. sp. C			1						
Elsonella rhenana			2						
Po. ansatus				10					
I. expansus				3					
Palmatolepis sp.*				1*					
Schm. gracilis				9	1				
Oz. semialternans				2	1				
Oz. proxima				2					
Schm. latifossatus				18	1				
Schm. pietzneri				8					
Po. pennatus				3	*	*	*	2	
Schm. hermanni				1	*	1			
Po. limitaris				1	*	*	*	2	
Schm. wittekindti				4	1	*	*	2	
Po. dubius				51					
Schm. cf. *pietzneri*					1				
I. brevis					1				
Po. pseudofoliatus						1			
number of conodonts	6	136	30	350	40	18	1	8	1

**leak from above*

SUBMISSION TO THE SUBCOMMISSION ON DEVONIAN STRATIGRAPHY

Toulouse, June, 2002

DEVONIAN SUBSTAGES

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In this document I would like to clarify/correct my position on the substage division of the Devonian stages under discussion keeping in mind the SDS minutes and submissions for the last year. In general, my point of view is not changed basically (see Yolkin, 2000, SDS Newsletter 17; Yolkin & Izokh, 2001, Submission to the Frankfurt SDS meeting and others). Nevetheless it is the time to express it more clearly.

1. I joint to those SDS members who would like to divide the Emsian and Givetian stages into two substages each, the Frasnian Stage into three substages and Famennian into four substages.

2. **The base of the Upper/Late Emsian.** I agree with those who believe that now Barrandien is possibly the most appropriate place for location of the GSSP for this boundary. I support the proposals (see Bultynck, Lardeux & Walliser, 2000, SDS Newsletter 17): (a) to choose the Upper/Late Emsian boundary in coincidence with the Dalejan transgressive event that is well recognizable in many regions of the world, and (b) to investigate the interval from N. elegans to N. richteri (I would say, from N. barrandei to N. richteri) for the definition of the marker conodont taxon. In this case the conodont workers should reach the agreement on polygnathid taxonomy within mentioned interval (from Po. excavatus (gronbergi) to Po. serotinus). I call to pay attention to the "U Kaplicky" section where one can meet ranges of key taxa Po. e. gronbergi, Po. nothoperbonus and Po. inversus (Chlupac et al., 1980).

3. **The Givetian substages.** The Taghanic Onlap is well expressed also in Siberia (on the western margin of the Siberian Craton). Unfortunately there are no conodont evidences for the start of this event.

4. **The Frasnian substages.** As it was previously pointed out, mostly shallow water facies characterize the Siberian Upper Devonian. Traditionally the Frasnian is subdivided here into two substages with delimitive level that corresponds to the Pa. semichatovae transgression. Location of the base of the Upper Frasnian at this level permits to have in Siberia the good marker for interregional correlation. In this case three-fold division of the Frasnian Stage is quite acceptable.

5. **The Famennian substages.** Only four-fold division of the Famennian of our discussions permits to separate the transitional D/C interval ("Strunian") from the doubtless Devonian. This is very important for the shallow water facies.

Potential reference section for the Early/Middle Famennian boundary at the Beringhauser Tunnel (Rheinisches Schiefergebirge, NW Germany)

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Abstract

In this submission a potential reference section - the late Frasnian to late Famennian section at the Beringhauser Tunnel - for the Early/Middle Famennian boundary is proposed. Regarding the emphasized boundary interval at the basis of the Early *marginifera* Zone, an excellent conodont and ammonoid biostratigraphical record makes this section the first choice for a potential stratotype. The defining fossil group, conodonts, allow a very precise localization of the boundary level by the first appearances of as much as six conodont species. Also, the mid-Famennian ammonoid zones are well represented by the presence of most of the index species. Other faunal groups are also abundant and well preserved. Especially trilobites expose an almost complete and rich record, which is rather unusual in comparable cephalopod limestone settings.

1 Introduction

In the course of the decision process, into how many substages the Famennian should be subdivided and at which stratigraphical positions the respective substage boundaries should be situated, this proposal is aimed to emphasize the advantage of a potential Early/Middle Famennian boundary at the base of the Early *marginifera* Zone of the standard Late Devonian conodont zonation (ZIEGLER & SANDBERG, 1990). The position of the potential Early/Middle Famennian boundary and the usefulness of a threefold Famennian subdivision has been extensively discussed in the respective sub-missions of SANDBERG & ZIEGLER (1998) and PIECHA & SCHINDLER (2002), and will not be repeated herein. Instead, a potential stratotype section– the Beringhauser Tunnel section in the northern Rheinische Schiefergebirge - is presented which exposes the re-spective stratigraphical interval with no (obvious) corruption of the sedimentological record. Apart from a high resolution conodont record, a wide variety of other – micro- and macroscopic - faunal elements is abundantly present in the Famennian part of the succession at the Beringhauser Tunnel. In addition, the microfacies and cyclostratigraphical analysis (POPP in prep.) revealed a well developed sedimentological regression/transgression pattern that parallels the Late Devonian North American onlap curve (JOHNSON et al 1985).

2 The potential boundary interval

The basic chararacteristics for the position of a stage or substage boundary have not crucially altered, since Walliser (1985) summarized them. At first, such a boundary should be defined by a zonal fossil as part of a phylogentic lineage, while all other fossil taxa should only taken as subsidiary features for its characterization. In the Famennian, conodonts provide a comparatively strong tool for the stratigraphical subdivision and correlation of marine successions that almost exclusively bases on the phylogenetic lineages of rapidly evolving palmatolepids (e.g. ZIEGLER & SANDBERG 1984, 1990, 1994). Considering all natural constraints, to which all organisms – palmatolepids as well - are subjected concerning the choice of their habitat, we believe, that this animal group is best apted for a correlation of marine successions. Although the zones of the Late Devonian standard conodont zona-tion (e.g. ZIEGLER & SANDBERG 1990) have been recognized worldwide, the quality of their boundaries varies. Most of them are only based on the FAD of a single species while a few others are marked by major turnovers in the conodont record and consequently indicated by a variety of palmatolepid as well as other species.

Our proposal for the potential Early/Middle Famennian boundary is the base of the Early *marginifera* Zone of the Late Devonian standard condont zonation (ZIEGLER & SANDBERG, 1990). This conodont zonal boundary is almost coincidently indicated by a large variety of conodont species first appearance dates some of which are, for example, the nominal species *Palmatolepis marginifera marginifera, Pal. quadrantinodosa quadrantinodosa, Pal. perlobata sigmoidea* and others. Together with a number of other palmatolepid species (e.g. *Pal. stoppeli, Pal. klapperi*), which appear in a comparatively short stratigraphical interval around the base of the Early *marginifera* Zone, and additional FADs and LADs provided by other conodont groups – e.g. the extinction of *Icriodus alternatus* - , they mark one of the most significant conodont faunal turnovers during the Famennian. Therefore, this zonal – and potential substage – limit appears to be very precise and allows correlation even into facies conditions that do not comprise the complete faunal spectrum as mentioned above.

The conodont faunal turnover coincides and is partly triggered by (SCHÜLKE, in press) a 3rd order eustatic regression/ transgression couplet that is traceable al-most worldwide (e.g. JOHNSON et al. 1985). These global sealevel changes create a wide range of sedi-mentological features that allow the identification of the respective interval and horizon almost equally precise as conodonts. Although it can generally be expected, that the related facies changes in successions crossing the potential boundary horizon, form a kind of "natural boundary" as mentioned by WALLISER (1985), facies shifts are not as severe as is, for example, the case with the Kellwasser event below the Frasnian/Famennian boundary. The referred horizon therefore fullfills the demands of a "natural boundary" stated by WALLISER (1985) that can be traced nearly world-wide in the geological record, but does not produce dramatic facies shifts that represent large scale corruptions of the sedimentological record.

3 The proposed section

Geographic position

The Beringhauser Tunnel section is situated about 7 km southwest of the town of Marsberg in the northern part of the Rheinische Schiefergebirge, the "Sauerland", in Germany. The nominal village (Beringhausen) is positioned about 2.5 km to the Northeast.

The strata of the referred section crop out on a small mountaineous ridge on the northeastern slope of an unnamed mountain, that is crossed by a railroad tunnel.

The Gauss-Krüger-coordinates (topographic map-sheet: TK25 4518 Madfeld) are r 34789781 h 5696950 for the basis and r 3479793 h 5696927 for the top of the section.

Geological situation

The section is positioned on the southern flank of the "Messinghauser Sattel" (Messinghausen Anticline) between the so-called "Ostsauerländer Hauptsattel" and the "Briloner Sattel" (BÄR 1968, CLAUSEN et al. 1991) (Fig. 1).

The Late Devonian deposits are underlain by Givetian to basal Late Devonian reefal and debris limestones (STRITZKE 1989, 1991, CLAUSEN et al. 1991). The mid-Frasnian to late Famennian succession is about 35 m thick and consists of mainly well-bedded to subordinately nodular cephalopod limestones. The strata crop out in a variety of natural exposures starting from the late Frasnian (Early *rhenana* Zone), connected by short artificial trenches. The Famennian succession is ex-posed in two partial sections (Fig. 2) which are sepa-rated by a small thrust fault with a displacement ofonly a few decimeters. The individual beds can be easily correlated across this small thrust fault. Follow-ing another tectonic contact, the Late Devonian strata (Late *postera* Zone) are overlain by Early Carboniferous slaty deposits ("Alaunschiefer") (CLAUSEN et al. 1989, 1991).

General lithology and facies (Figs. 3, 4)

The Famennian succession (Fig. 3, 4) is composed of well-bedded to nodular cephalopod limestones. These limestones are mainly mudstones with intercalated wacke-, grain- and floatstones. The Frasnian/Famennian boundary is developed as a erosional unconformity with basal Famennian silty mudstones overlying the latest Frasnian tentaculite-ostracod-grainstone. Features of this erosional contact are a scalloped bedding plane and small cavities in the Frasnian bed filled with calcite megacements and internal sediments from the basal Famennian. The following deposits are mud- to grainstones that are

partially enriched in fossil content. Especially bed 7 (Fig. 3, Middle *triangularis* Zone) is developed as a brachiopod floatstone with a extensively recrystallized matrix and marks the basal Famennian 3rd order lowstand (Fam1: SCHÜLKE in press).

The hanging succession is formed by an alternation of well-bedded and nodular limestones with the nodular limestone dominating the upper part and the well-bedded limestones dominating the lower part of the section (Fig. 3). Only a few horizons are charac-terized by a lithology different from the general mud- to wackestones. These are, for example, beds 28, 96 and 119 to 120. Bed 28 (upper part of the Early *crepida* Zone) represents the early mid-Famennian 3rd order lowstand (Fam2: SCHÜLKE in press) connected with the "Nehdenian Event", and is developed as a grain- to rudstone channel fill cutting into an underlying wackestone.

Bed 96 (Late *marginifera* Zone) is a heavily dolo-mitized bioclastic (crinoid) floatstone with reworked limestone clasts at its base. It is supposed to represent the lowstand phase connected with the "Enkeberg Event". The beds 119 and 120 (Upper part of the Late *trachytera* Zone) represent the "*annulata* Event" in this section. They are developed as dark greyish-green shale (119) and black shale with black limestone nodules (120).

A microfacies and cyclostratigraphical analysis is still in progress (POPP in prep.) and thus the interpretations are preliminary in this study. Generally, the Famennian sealevel forms a 2nd order regressive hemicycle (SCHÜLKE in press) after the end-Frasnian highstand. On 3rd order level a variety of cycles can be recognized. The basalmost Famennian 3rd order cycle (Fam1: SCHÜLKE in press) has its sequence boundary in the upper part of the Middle *triangularis* Zone. Coincidently, this lowstand is used by JOHNSON et al. (1985) as the base of the IIe cycle of the Middle and Late Devonian, but comprises as much as four 3rd order cycles. The next sequence boundary (basal limit of Fam2: SCHÜLKE in press) is positioned in the uppermost part of the Early *crepida* Zone and also well known as the "Nehdenian Event" (comp. SCHÜLKE 1999). As mentioned above, both these sequence boundaries are developed as a partially cross-bedded grain- to rudstone (bed 7) and a grain- to rudstone channel fill (bed 28). These sedimentological features are evidence for a water depth position above storm wave base. The Fam2 3rd order cycle is limited at its top by a sequence boundary that is positioned at uppermost part of the Late *rhomboidea* Zone. We interprete the presence of stromatactis float- to partly rudstones at bed 85 (Fig. 5) indicative for the respective lowstand. The Fam3 3rd order cycle is limited at its top by a sequence boundary positioned in the Latest *marginifera* Zone which is indicated by bed 96 (reworking, dolomitic grainstone) in the referred section (SCHÜLKE in press; comp. also SANDBERG et al. 1997). The following Fam4 cycle is not completely preserved at the Beringhauser Tunnel section, since its upper limit is a sequence boundary at the basis of the *expansa* Zone. A higher order cyclicity in this section is still not fully deciphered. The respective investigations are still in progress (POPP in prep.) and cannot be presented in this study.

The deposits are generally bioturbated (e.g. mottled texture) and expose a varying, but generally high fossil content that is typically composed of benthic elements as trilobites, bivalves, brachiopods, gastropods, crinoids, ostracods, and solitary rugose corals and nectonic elements as goniatites, orthocone nautiloids, conodonts, phyllocarids, and fishes.

The benthonic faunal elements usually dominate the fossil record, especially crinoids and ostracods are abundant throughout the whole section. The trilobite record appears to be the most promising in all known cephalopod limestone section worldwide (pers. comm. R. Feist, Montpellier), because trilobites (proetids and phacopids) are present in almost all parts of the suc-cession in considerable numbers. This allows the exact correlation of trilobite ranges to the conodont stratigra-phical record for the first time (pers. comm. R. Feist, Montpellier).

The general lithology (presence of reworking and winnowing phenomena) and the dominance of ben-thonic faunal elements places this section in a water depth interval considerably shallower than that of typical cephalopod limestones of outer shelf settings.

At least during lowstand phases water depth must have been above storm wave base, since the reworking, erosional and winnowing phenomena demand the presence of bottom currents and turbulence. The depositional environment is probably a drowned carbonate platform with a lateral extend of at least a few km. Water depth is estimated to vary between ca. 30 to 60 m. Throughout the Famennian the setting remained within this depth interval which indicates a subsidence taking pace with the generally regressive sealevel.

4 Ammonoid record

Two complexes of the section above the Beringhauser Tunnel yielded ammonoid faunas. The late Frasnian limestones contain a fauna consisting of *Beloceras tenuistriatum* (D'ARCHIAC & DE VERNEUIL 1842) and various species of *Manticoceras* (CLAUSEN et al. 1991). This fauna was collected from three horizons from the highest 1.2 metres of the light-grey Frasnian limestones and from a lower horizon 2.7 metres below the Frasnian-Famennian Boundary. Due to the lack of definitive index species, exact assignment of these assemblages to a particular ammonoid zone (sensu BECKER & HOUSE 2000) is not possible.

The early Famennian limestones are poor in ammonoids and yielded only indeterminable specimens. In contrast to this, the middle Famenian ammonoid zones are well-represented. Of the seven ammonoid zones of this timespan (*Paratornoceras lentiforme* Zone to *Protoxyclymenia dunkeri* Zone; KORN & ZIEGLER in press), five are recorded by their index fossils. Near the base of the conodont-defined middle Famennian, *Paratornoceras lentiforme* (Sandberger 1857) is very abundant in one particular bed (bed 69), which serves as an index horizon. The next following *Maeneceras meridionale* Zone is not well-represented by fauna, but the *Pernoceras dorsatum* Zone as well as the *Pseu-doclymenia pseudogoniatites* Zone were recognized by specimens of the nominal species.

The richest assemblage, composed of at least 15 species belonging to the genera *Sporadoceras*, *Prolobites*, *Protactoclymenia*, *Cyrtoclymenia*, *Pricella*, *Genuclymenia*, *Hexaclymenia*, *Rectoclymenia*, and *Platyclymenia* was recorded from an interval of 90 cm thickness (beds 100 to 10 8). This assemblage closely resembles the fauna of the *Prolobites delphinus* Zone, as known from the Enkenberg (WEDEKIND 1908).

Higher in the section, *Platyclymenia annulata* (MÜNSTER 1832) was found in two horizons approximately 100 cm above the highest record of *Prolobites delphinus* (SANDBERGER & SANDBERGER 1851), providing firm evidence for the *Platyclymenia annulata* Zone. It is not clear if the *Protoxyclymenia dunkeri* Zone is represented by faunas. 30 to 40 cm above *Platyclymenia annulata*, the highest ammonoid-bearing horizon contains a fauna that is composed of *Protoxy-clymenia* cf. *dunkeri* (MÜNSTER 1840), *Sporadoceras orbiculare* (MÜNSTER 1832), and *Nodosoclymenia cingulata* (GÜMBEL 1863).

5 Conodont record

The conodont content of the latest Frasnian to late Famennian is generally high and exceeds 500 conodonts per kg in all sampled horizons. The highest conodont abundances were observed in the latest Frasnian and the upper early (Middle *crepida* Zone) to lower middle Famennian (Latest *marginifera* Zone) exceeding 5000 Co./kg. Following this interval, the conodont content successively decreases, but is always higher than 500 Co./kg, save bed 96 (Latest *marginifera* Zone). In the samples of this horizon conodont yield is very low, and conodonts are thoroughly abraded due to reworking and dolomitization. All conodont zones of the Late Devonian standard conodont zonation have been recognized and are well developed.

The conodont faunas are highly diverse both at generic and specific level (Fig. 3, 4, 5). The mid-Famennian is characterized by the highest diversity - up to 15-20 contemporaneous species, especially considering the mostly disregarded ancyrognathid, „spathognathodontid", scaphognathid, and pseudopolygnathid species that become more and more important towards the end of the Famennian. In addition, the non-Pa-element content allows the reconstruction of several Famennian multielement species. Several new palmatolepid, polygnathid, and ancyrognathid multilement apparatuses have been reconstructed on the basis of the faunas from the Beringhauser Tunnel section, and will soon be published.

6 The proposed boundary interval

The part of the Beringhauser Tunnel section, that covers the potential boundary for the Early and Middle Famennian substages is shown in Fig. 5. The deposits are mainly formed by well-bedded mudstones with a few horizons with increased

fossil content (wackestones). Only beds 86 (middle part of *rhomboidea* Zone, that is developed as a floatstone at its base and its top, and bed 96 (Late *marginifera* Zone), a dolomitized crinoid grain- to rudstone, indicate major breaks in sedimentation due to bottom currents or condensation (3rd order sequence boundary as mentioned above). The other part of the considered interval bed 84-98 do not show any obvious corruption of the sedimentological record. Especially the proposed boundary level between beds 87 and 88 is characterized by typical pelagic mudstones and appears to reflect a rather continuous deposition during a 3rd order trans-gression or highstand.

The well preserved macrofossil content is rather high throughout the considered interval, and comprises abundant crinoids, ostracods, trilobites, bivalves, brachiopods, gastropods, corals, nautiloids, and ammonoids. Especially the trilobite record is almost complete in this part of the section and comprises the typical mid-Famennian proetids and phacopids. In addtion, phosphatic microfossils are also abundantly present, comprising phyllocarids, microvertebrate remains (Ostheichthyes, Placodermi, Acanthodii, and Chondrichthyes), scolecodonts, and abundant small inar-ticulate brachiopods.

Conodont stratigraphy of the boundary interval

The conodont record of the interval under consideration is the highest throughout the complete studied section (Fig. 5). The respective conodont zones of the Late Devonian standard conodont zonation following ZIEGLER & SANDBERG (1990: *rhomboidea* Zone, Early *marginifera* Zone, Late *marginifera* Zone) are recognized by their index fossils (*Pal. rhomboidea, Pal. marginifera marginifera, Pal. marginifera utahensis)*. The base of the Early *marginifera* Zone is defined by the FAD of *Pal. mar. marginifera.* It is one of the most precise zonal limits in the Late Devonian due to the (almost) contemporaneous FADs of a variety of other (not only palmatolepid) species.

In the studied section the basis of this zone is indicated by the co-appearance of *Pal. mar. marginifera, Pal. quadr. quadrantinodosa, Pal. klapperi, Pal. stoppeli, Polygnathus semicostatus*, and *Polyphodonta con-fluens* (Fig. 5). In addition, *Icriodus alternatus* and *Ancyrognathus rhomboideus* - formerly attributed to *„Polygnathus*" - have their LADs in bed 87. Some of the above species, e.g., *Pal. klapperi*, are supposed to enter the fossil record late in the Late *rhomboidea* Zone, but haven't yet been found in the respective considerably large samples below bed 88.

Apart from the loss of the last icriodid representative, *Icr. alternatus*, no other important shifts in the generic faunal composition have been recognized. This parallels the sedimentary record that also appears to be continuous across the potential boundary horizon.

7 Conclusions

The choice of the basal limit of the Early *marginifera* Zone as an Early/Middle Famennian boundary of a threefold Famennian appears appropriate due to the following reasons:

1. The limit is precisely indicated by the FADs of a variety of conodont species (see above).

2. In the context of a future role of sequence strati-graphy in the Devonian, that we presume to extensively sustain biostratigraphy in the nearer future, the pos-itioning of a substage boundary above a worldwide recognizable sequence boundary, that otherwise did not produce remarkable facies shifts in the immediate boundary level of the reference section, appears to be a anticipating and reasonable strategy.

The Beringhauser Tunnel section fullfills all demands for a stratotype section: an excellent biostratigraphical control by the defining fossil group, a continuous sedi-mentary record, a wide range of abundant other faunal components as subsidiary features, and a well re-cognizable sequence boundary below the referred hori-zon as additional stratigraphical marker.

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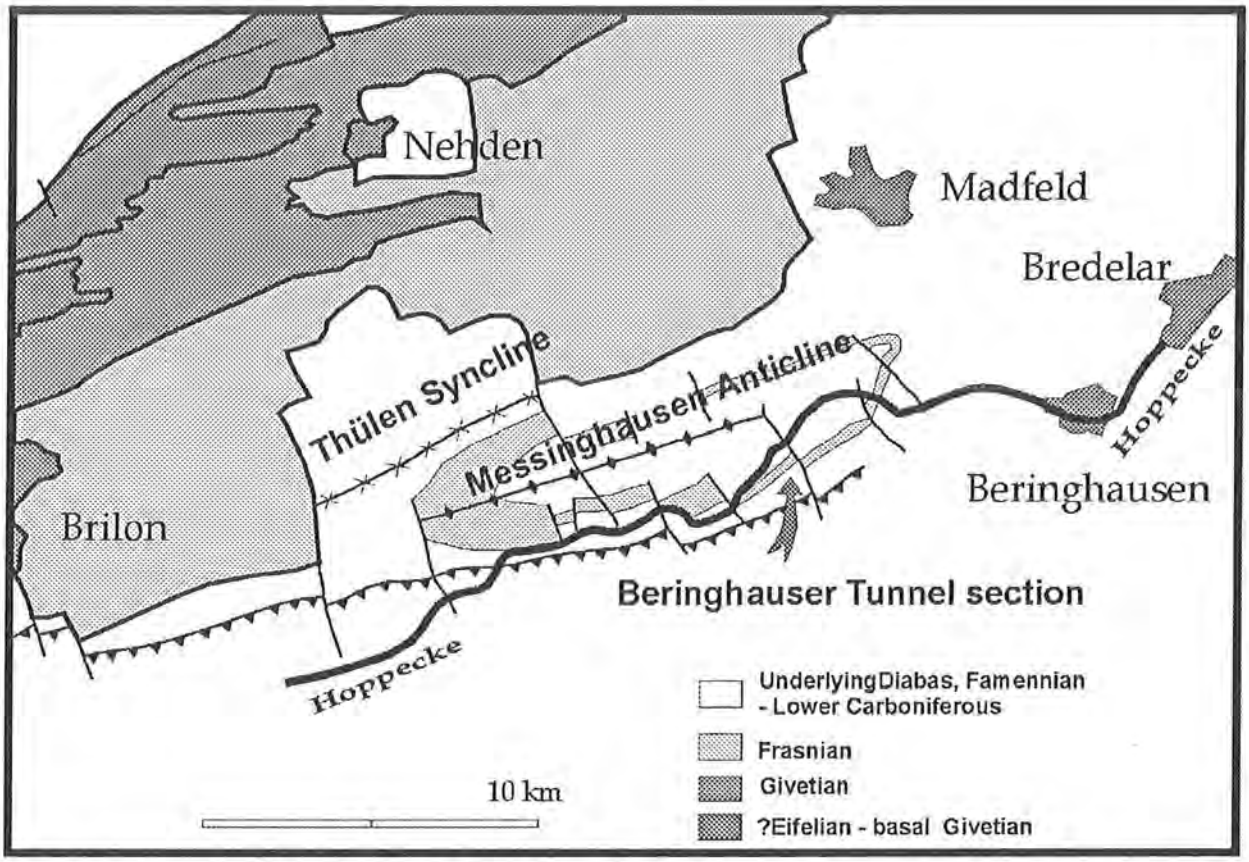

Fig. 1 - Geographic position and geological situation around the Beringhauser Tunnel section in the northern Rheinische Schiefergebirge, NW Germany.

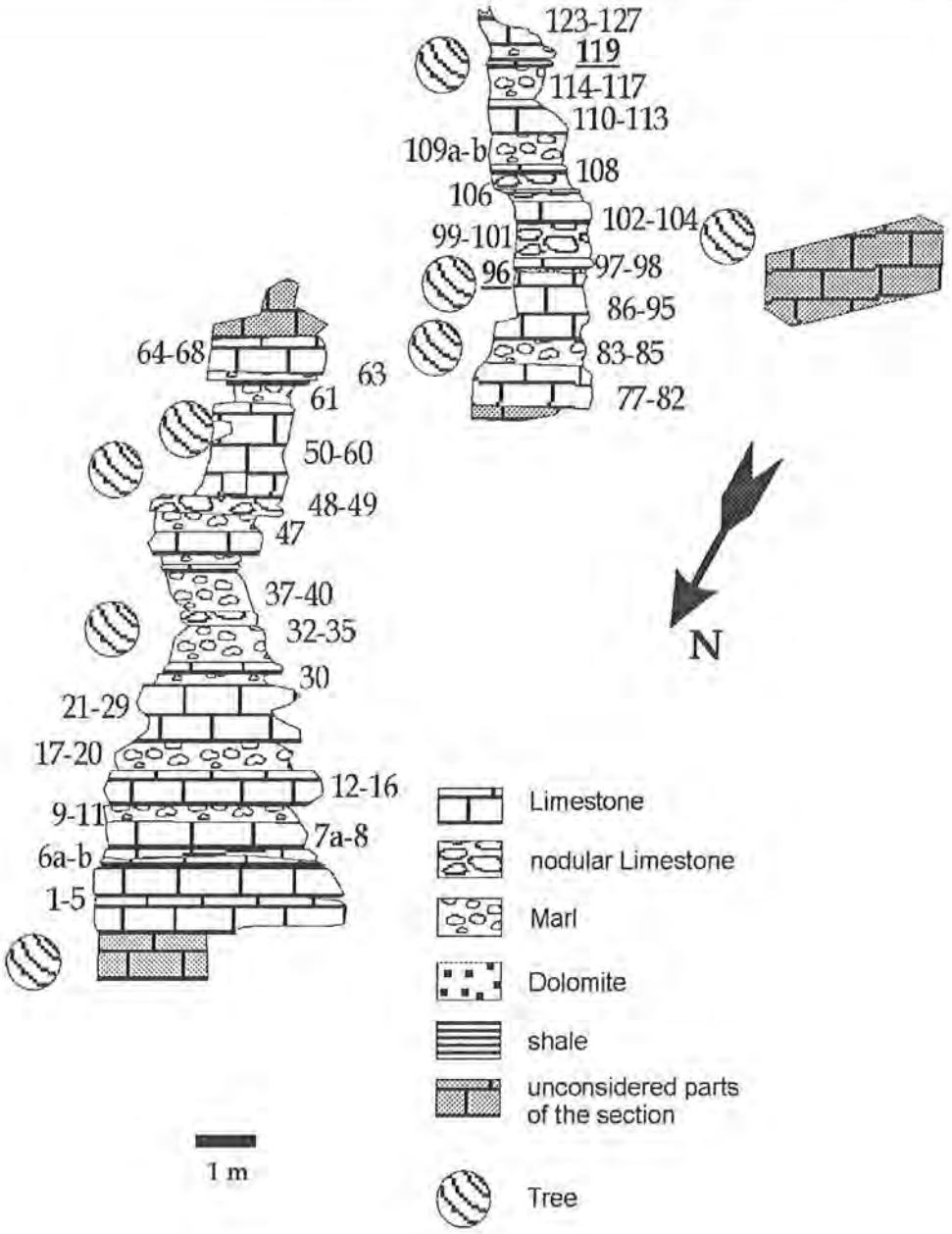

Fig. 2 - Sketch map of the Famennian exposure at the Beringhauser Tunnel.

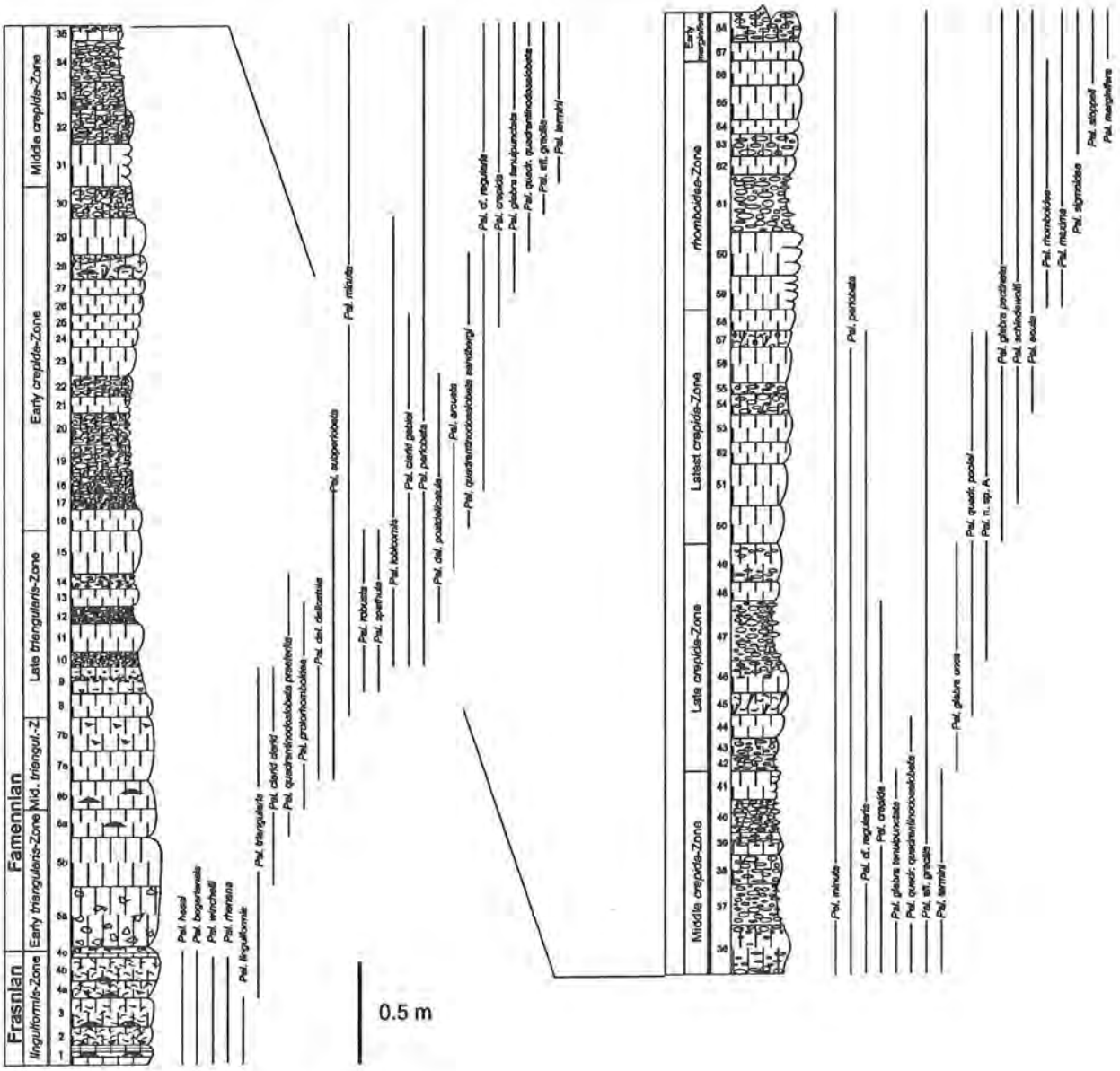

Fig. 3 - Northwestern part of the Beringhauser Tunnel section covering the stratigraphic interval from the Frasnian/ Famennian boundary to the mid-Early *marginifera* Zone (comp. Fig. 2).

On the right: Palmatolepid ranges. Other conodont genera not figured. For signatures see Fig. 4.

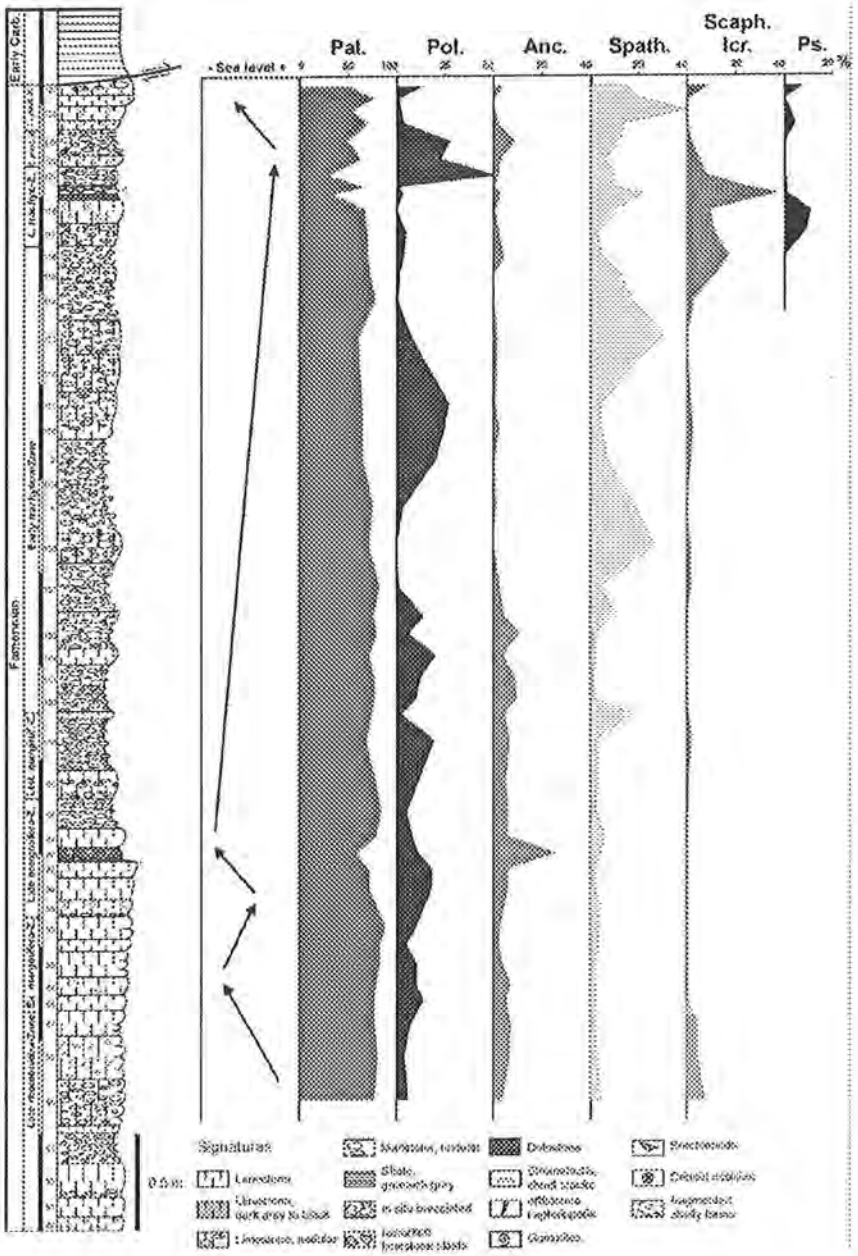

Fig. 4 - Southeastern (upper) part of the Beringhauser Tunnel section (comp. Fig. 2), covering the stratigraphical interval from the *rhomboidea* Zone to mid-Late *postera* Zone.

On the right: Conodont generic composition;

Pal.: *Palmatolepis*, Pol.: *Polygnathus*, Anc.: *Ancyrognathus* (former „*Polygnathus*" *nodocostatus* group), Spath.: Spathognathodids (polyphyletic), Scaph.: *Scaphignathus* (upper part of column), Icr.: *Icriodus* (lowermost part of column), Ps.: *Pseudopolygnathus*.

Remark the successive faunal turnover from Late Devonian Palmatolepid-dominated faunas towards Spathognathodid, Scaphignathid, and Pseudopolygnathid the descendants of which are characteristic to the Early Carboniferous.

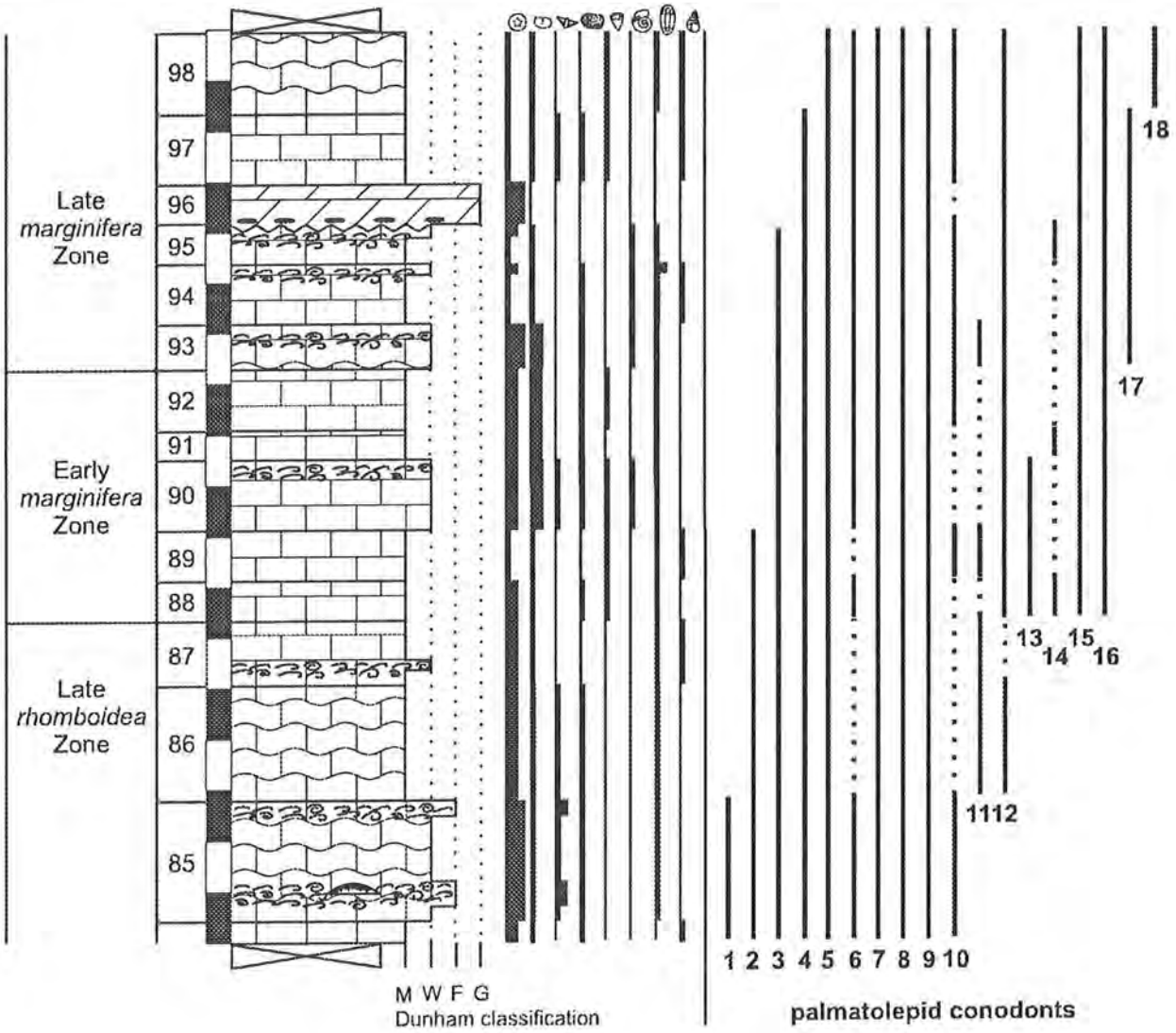

Fig. 5 - Detail of the northern part of the Beringhauser Tunnel section around the base of the Early *marginifera* Zone, a stratigraphical interval proposed as a potential Early to Middle Famennian boundary. The sedimentary succession is figured, recognizing the Dunham classification. It consists of mainly well bedded to subordinately nodular limestones, mainly mud- to wackestones typical to a drowned carbonate platform depositional environment. Fossil content is generally high and specimens are comparatively well preserved. Although cephala are not very frequent, especially the almost complete trilobite record underpins the importance of this section for the Famennian paleontology, since it provides an excellent opportunity for the stratigraphic correlation of conodonts and trilobites (pers. comm. R. Feist).

Far right: Palmatolepid ranges in the respective interval. 1: *Palmatolepis perlobata*; 2: *P. rhomboidea*; 3: *P. glabra unca*; 4: *P. helmsi*; 5: *P. acuta*; 6: *P. sigmoidea*; 7: *P. pectinata*; 8: *P. minuta* (s.l.); 9: *P. schindewolfi*; 10: *P. gracilis* (s.l.); 11: *P. glabra*; 12: *P. lepta*; 13: *P. quadrantinodosa*; 14: *P. stoppeli*; 15: *P. klapperi*; 16: *P. marginifera*; 17: *P. grossi*.

REPORTS FROM WORKING GROUPS

REPORT FROM THE INFORMAL "UPPERMOST FAMENNIAN WORKING SUBGROUP"

(M. STREEL, DECEMBER 2002)

UPDATED LIST OF PARTICIPANTS IS GIVEN AS APPENDIX 1.

SINCE THE MEETINGS HELD IN RIO (SEE SDS NEWSLETTER 17 (2000) 2001, P. 12-14 AND ADDENDUM) AND FRANKFURT (SEE SDS NEWSLETTER 18, (2001) 2002 P. 55-61), THE SUBGROUP HAS STRESSED THAT " A FOURFOLD DIVISION WAS JUSTIFIED WITH RESPECT TO A MUCH LONGER DURATION OF THE FAMENNIAN IN RELATION TO THE FRASNIAN AND THAT THE STRUNIAN CONTINUES TO BE USED IN MANY PUBLICATIONS AS CHRONOSTRATIGRAPHIC TERM INTERNATIONALLY (69 RECENT PAPERS, COMPILED BY BRICE ET AL.)" (SDS SECRETARY REPORT OF THE FRANKFURT MEETING, 2001).

Eighteen bio-markers belonging to acritarchs, ammonoids, conodonts, foraminifers, miospores and ostracods were grouped in 10 biostratigraphic levels , with emphasize on the Middle and Upper/Late *expansa* Zones interval. The best selected level to characterise an Uppermost Famennian lower limit around the world is level 6 with foraminifer *Quasiendothyra kobeitusana kobeitusana* and miospore *Retispora lepidophyta* var. *minor,* in the neritic facies and most probably conodont *Palmatolepis gracilis gonioclymeniae* and ammonoid *Kosmoclymenia sublaevis,* in the pelagic facies. In the Franco-Belgian area this level occurs soon after the "Epinette event" (the so-called Strunian transgression) when a regressive trend is starting in a Highstand Systems Tract (HST in Van Steenwinkel 1993), as demonstrated by a quantitative study of ecologically significant miospores.

Documents submitted by the Working Subgroup to the SDS at the annual meeting at Toulouse 2002. (See appendix 2, with 5 figures)

Biostratigraphic correlation at the late or/and latest Famennian from Western, Central and Eastern European sections. State of the art.

M.Streel(1), V.I.Avkhimovitch(2), B.Berkowski(3), R.Dreesen(4), A.V.Durkina(5), L.Hance(6), H.-G. Herbig(7), D.Korn (8), B.Mamet(9), N.Maziane-Serraj(1,10), B.Mistiaen(11), J.Thorez(1), H.M.Weber(12), D.Weyer(13).

(1)Liège, Belgium, (2) Minsk, Belarus, now in London, UK (3) Poznan, Poland, (4), Mol, Belgium, (5) Ukhta, Russia, (6) Louvain-la Neuve, Belgium, (7) Köln, Germany, (8) Tübingen, Germany, (9) Bruxelles, Belgium, (10) now in India, (11) Lille, France, (12) Bergisch Gladbach, Germany, (13) Berlin, Germany.

THE FIRST PART OF THIS PAPER DOCUMENTS FOUR TRANSGRESSIVE EVENTS IN NERITIC FACIES (NORTHERN FRANCE AND EASTERN BELGIUM) (IN ASCENDING ORDER, A LATE *TRACHYTERA =ANNULATA* EVENT, A POORLY DATED AND BADLY DEFINED (?) EARLY *EXPANSA* EVENT, A MIDDLE *EXPANSA* EVENT AND A MIDDLE/LATE *EXPANSA*= EPINETTE EVENT.) SUGGESTING THAT THEY MIGHT BE LINKED TO FOUR INTERGLACIAL EPISODES, OCCURRING BEFORE THE INTERGLACIAL/GLACIAL EPISODES OF THE MIDDLE *PRAESULCATA* HANGENBERG EVENT. THE MICROPALEONTOLOGICAL BIO-MARKERS AT AND ABOVE THE EPINETTE EVENT ARE SHOWN TO BE WIDELY USED IN HUGE AREAS IN BELARUS AND RUSSIA FOR CORRELATION.

The second part of this paper deals with a Late/Latest Famennian sharp succession of neritic and pelagic facies in Poland demonstrating that the base of the foraminifer *Quasiendothyra kobeitusana kobeitusana* Zone is more or less contemporaneous of the base of the ammonoid *Kosmoclymenia sublaevis* Zone which is said elsewhere to correspond with the first occurrence of the conodont *Palmatolepis gracilis gonioclymeniae*

OTHER RELATED DOCUMENTS SUBMITTED TO THE SDS AT THE ANNUAL MEETING AT TOULOUSE 2002:

- The Frasnian and Famennian subdivisions – results of German Late Devonian Working Group sessions 2001 by M. Piecha & E. Schindler ((17 participants).

Participants are in favor of a threefold subdivision of the Famennian, arguing that a Late Famennian should be linked

to the base of the Early *expansa* Zone (said to correspond with a globally recognizable transgression but see above!). Two reference sections are proposed: the Köstenhof section and the Effenberg section.

The Köstenhof Quarry (Frankenwald, Bavaria) is proposed (H. Tragelehn & S. Hartenfels) as a potential reference section for a Middle/Late Famennian Boundary.

The index fossil *P. gracilis expansa* is very rare in that section, the base of the *expansa* Zone being fixed by the first appearance of further genera like *Pseudopolygnathus. brevipennatus,* which is commonly occurring.

The same is true for the base of the Late *expansa* Zone (entry of *Bispathodus ultimus*) which is shown (their fig. 3), surprisingly, at the first occurrence of *Palmatolepis gracilis gonioclymeniae.*

Of interest also is the occurrence, in the upper third of the middle *expansa* Zone, of polygnathid/pseudopolygnatid elements rising up to 40 %, coinciding with a significant change in sedimentation. "Demonstrating regressive tendencies in the sea level, this faunal 'event' may probably indicate the establishment of 'Strunian'-type environments in other areas."

The description of the Effenberg Quarry (northeastern part of the Rheinisches Schiefergebirge) is said to be still in preparation.

Conodonts and clymeniids were described by D. Korn & F-W. Luppold (1987) showing the occurrence of *Palmatolepis gracilis gonioclymeniae* slightly above the first occurrence of *Sphenoclymenia brevispina* said to characterise the lower boundary of the Wocklumeria Stufe-VI (Becker & House 2000)

20 samples collected by D. Korn for miospore analysis prove to be barren (M. Streel, January 2001).

- Famennian ammonoid zones of the eastern Anti-Atlas. Implications for substage subdivision by R. T. Becker.

See also: The Mrakib section (Morocco) as possible Upper Famennian (Devonian) stratotype section: conodont data by C. Corradini, C. Perri & C. Spalletta in SDS Newsletter 18, p. 67-69. The poor conodont record of most southern Moroccan sections argues against using the area for the selection of Famennian substage stratotypes/type sections.

Miospores studied by C. Hartkopf-Froeder are also poorly present.

- Stratigraphic value of some Strunian (Devonian, Uppermost Famennian) Productidina, Rhynchonellida, Spiriferida brachiopods by J-P. Nicollin & D. Brice

Uppermost Famennian brachiopod bio-markers have been retained in 14 Productidina, 5 Rhynchonellida and 17 Spiriferida genera.

WORKS IN PROGRESS

C. Perri & C. Spalletta are engaged in a detailed study of conodonts in the upper/uppermost part of the Famennian in the Carnic Alps which might well contain a suitable reference section for pelagic facies. Indeed a recent paper in SDS Newsletter 18 (Subdivision and substages of the Famennian, an opinion and possible candidates for the upper part) by C. Spalletta & C. Perri, shows that the Malpasso section, displaying the biostratigraphic interval from the Upper *trachytera* to the Lower *praesulcata,* has a joint first occurrence of *Palmatolepis gracilis gonioclymeniae* and of *Pseudopolygnathus marburgensis trigonicus.*

See also the short note of D. Korn (Ammonoid stratigraphy of late Famennian rocks in the Carnic Alps) in Spec. Issue ECOS VII Southern Alps Field trip Guidebook, p. 123-124, 1998.

Dr. Hayduckiewic (Wroclaw university) has an unpublished diplom thesis under her guidance, proving the upper expansa + lower praesulcata zones for the Clymenia limestone in the Dzikowiec Quarry (Poland),

D. Korn and R. Feist are respectively working on ammonoids and trilobites from the same quarry with the hope of a better definition of the pelagic facies in this section.

Corals (D. Weyer, B. Berkowski) and miospores (V. Avchimovitch , M. Streel) are also studied in the neritic facies of the same quarry.

Corals are also currently studied in the Etroeungt area by E. Poty suggesting a twofold subdivision of the "Strunian" interval.

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APPENDIX 2

SDS Toulouse meeting 24/06/2002

Biostratigraphic correlation at the late or/and latest Famennian from Western, Central and Eastern European sections. State of the art.

M.Streel(1), V.I.Avkhimovitch(2), B.Berkowski(3), R.Dreesen(4), A.V.Durkina(5), L.Hance(6), H.-G. Herbig(7), D.Korn(8), B.Mamet(9), N.Maziane-Serraj(1,10), B.Mistiaen(11), J.Thorez(1), H.M.Weber (12), D.Weyer(13).

(1) Liège, Belgium, (2) Minsk, Belarus, now in London, UK (3) Poznan, Poland, (4), Mol, Belgium, (5) Ukhta, Russia, (6) Louvain-la Neuve, Belgium, (7) Köln, Germany, (8) Tübingen, Germany, (9) Bruxelles, Belgium, (10) now in India, (11) Lille, France, (12) Bergisch Gladbach, Germany, (13) Berlin, Germany.

Correlation charts are provided connecting sections in northern France (Etroeungt area), eastern Belgium (Ourthe Valley), south-west Poland (Dzikowiec Quarry), Belarus (Pripjatsky Depression) and eastern Russia (Timan-Pechora). They are based on key species of ammonoids, conodonts, foraminifers, and miospores (Streel 2002). The emphasize is placed on the time-range corresponding to the Middle and Upper/Late *expansa* conodont Zone. A tenth of bio-markers is used for that purpose. The most documented sections for neritic facies are in the Ourthe Valley in eastern Belgium **(Figs. 1 and 2)** which can be correlated using conodonts and regression/transgression scheme (Sandberg et al. 2000 and Streel 2002, fig.1) with western USA. It can be correlated with the type Etroeungt in northern France, but lack ammonoids. The latter are however available in the Dzikowiec Quarry in south-west Poland **(Figs. 3 and 4)** where a succession of neritic to pelagic facies (Weber 2000) is noted in the corresponding time-range. The early and middle part of the *Kalloclymenia-Wocklumeria* Genozone are well known (since Schindewolf 1937) in this Clymeniid Limestone (Middle Wapnica Fm, 3m) of this quarry. The older shallow water "Main Limestone" (Lower Wapnica Fm, 30-40m) yields calcareous foraminifers (Gorecka & Mamet 1970) of the *Quasiendothyra kobeitusana* and *Quasiendothyra communis radiata* Zones, Phillipsastraeid rugose corals and stromatoporoid colonies (Berkowski 2001) and in thin intercalated shale layers of its upper parts, a pre-*lepidophyta* miospore flora (VF Zone). These are the only known definitive late Famennian survivors of colonial corals abundant in the reef facies of the Frasnian. They survived the Upper Kellwasser Event (Frasnian-Famennian boundary) but became extinct at the D/C boundary. The pre-*lepidophyta* zone belongs to the northern euramerican miospore assemblages (Streel & Loboziak 1996) known from Poland, Belarus, and Russia. The miospore succession was extensively described in the Pripjatsky Depression, Belarus and correlated with central and eastern areas of Russia (Avkhimovitch et al 1993), where conodonts and foraminifers are also well known, mainly in the Timan-Pechora region (Durkina in press and Streel 2002, table 2, p. 58).

Three groups of bioevents range from the Upper/Late *expansa* Zone to the lower part of the *praesulcata* Zone **(Fig. 5)**. Group 6 provides excellent definitions of a base of late or latest Famennian and many geologists recommend it should correspond to the base of a latest subdivision in a four-fold Famennian.

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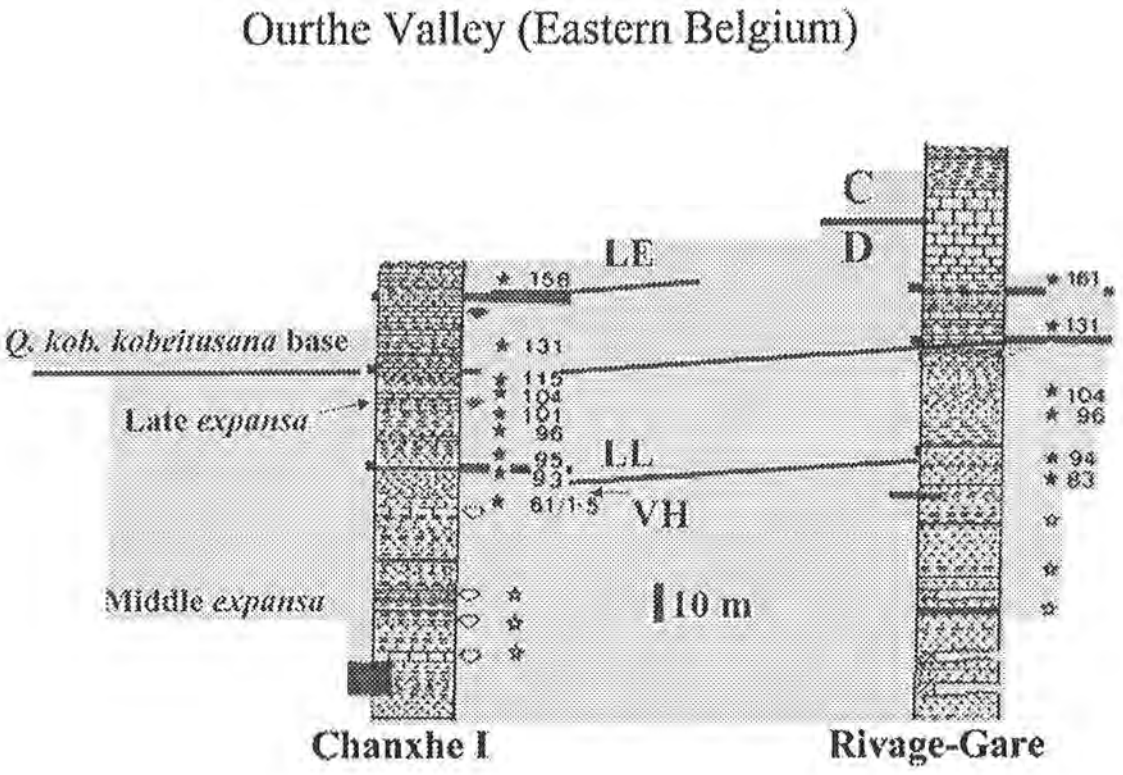

Fig. 1

Fig. 1 : Conodonts, foraminifers and miospores in the latest part of the Famennian in the Ourthe Valley (Eastern Belgium).

VH: *Apiculiretusispora verrucosa-Vallatisporites hystricosus* Zone ; LL : *Retispora lepidophyta-Knoxisporites literatus* Zone ; LE : *Retispora lepidophyta-Indotriradites explanatus* Zone.

Q.kob.kobeitusana : *Quasiendothyra kobeitusana kobeitusana* Zone, foraminifer which first occurs at the level of the entry of the miospore *Retispora lepidophyta minor*.

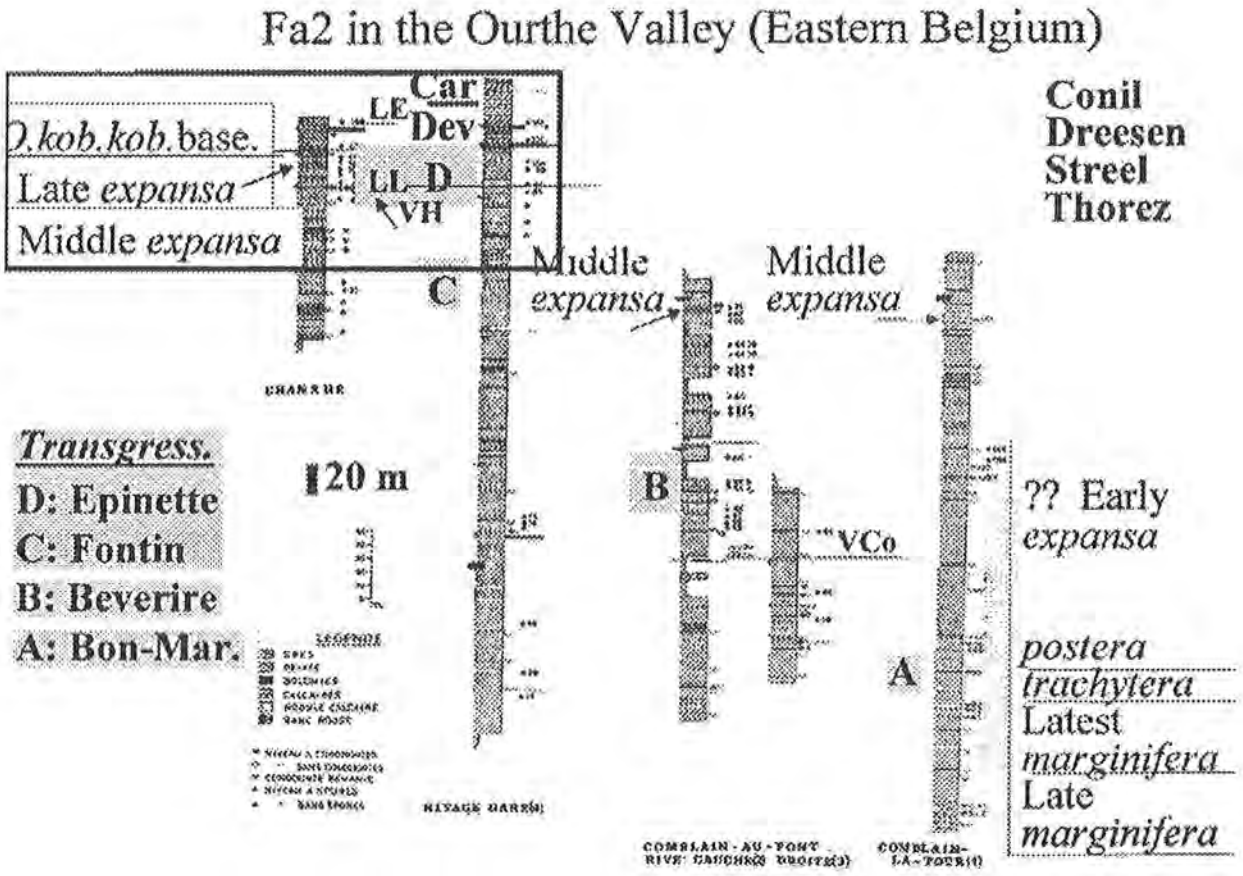

Fig. 2 : Conodonts, foraminifers and miospores in the late and latest part of the Famennian in the Ourthe Valley (Eastern Belgium), after several data from R. Conil, R. Dreesen, M. Streel and J. Thorez. VCo: *Diducites versabilis-Grandispora cornuta* Zone.

Other symbol as in fig. 1. Black rectangle refers to fig. 1; A/B/C/D: four transgressive pulses.

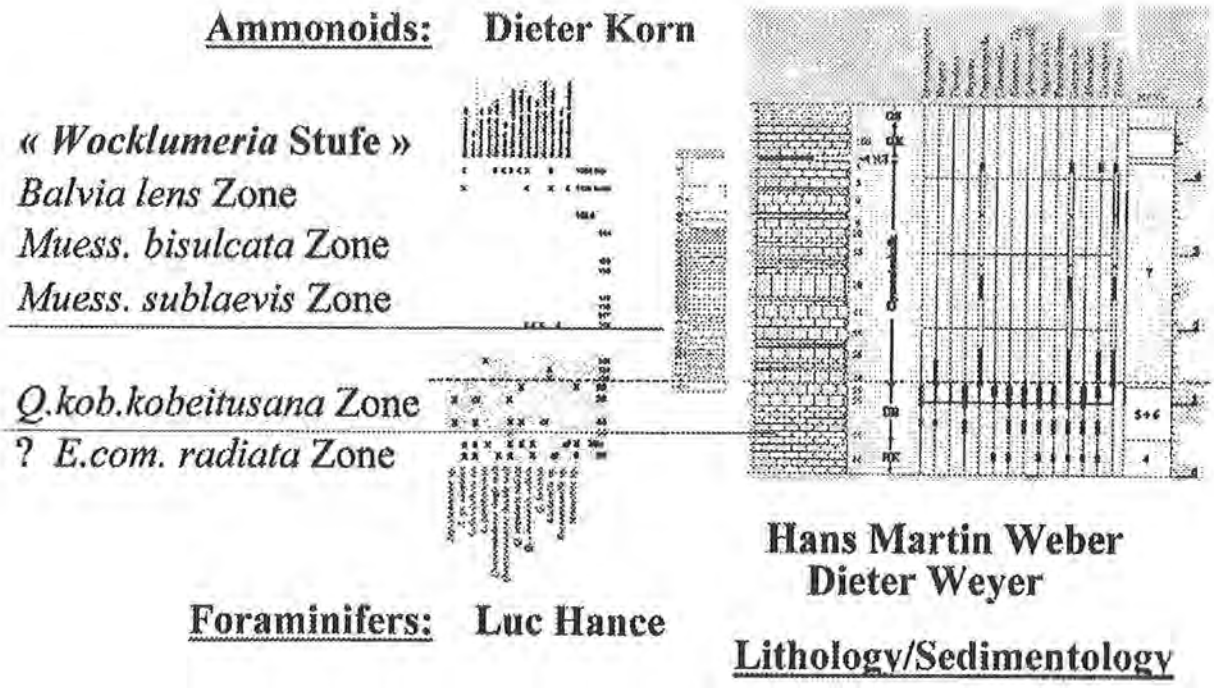

Fig. 3: Ammonoids and foraminifers zones in the latest part of the Famennian in the middle section of the Dzikowiec Quarry, Sudetes Mts, in Poland, after data from D. Korn and L. Hance. List of ammonoids and foraminifers to be published elsewhere.

Lithology, sedimentology and ranges of other faunas after data from H-M. Weber and D. Weyer.

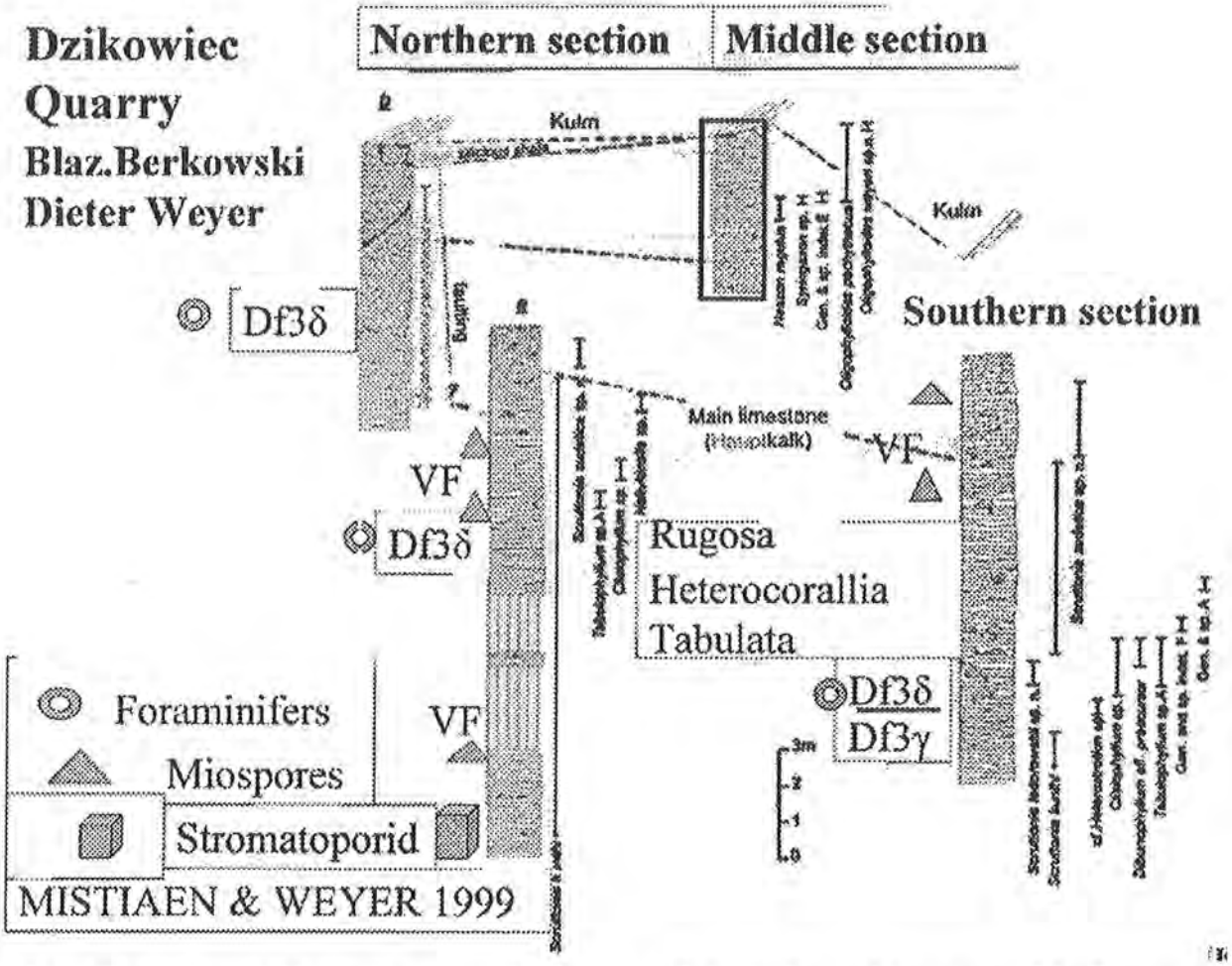

Fig. 4: Corals, foraminifers, miospores and stromatoporids in the late and latest part of the Famennian of the Dzikowiec Quarry, Sudetes Mts, in Poland, after data from B. Berkowski, L. Hance, B. Mistiaen, M. Streel and D. Weyer. Black rectangle refers to fig. 3

VF: *Diducites versabilis-Grandispora famenensis* Zone in Avchimovitch et al. 1993.

Df3δ : *Eoendothyra communis radiata* Zone

Df3γ : *Eoendothyra regularis regularis* Zone

*7a Entry of conodont *Siphonodella praesulcata*, lower boundary of the Lower/Early *praesulcata* Zone (Ziegler & Sandberg 1984).

*7b Entry of miospore *Tumulispora malevkensis* (Maziane et al. 1999).

*7c Entry of acritarch *Gorgonisphaeridium winslowiae* (Maziane & Vanguestaine 1997)

*7d Base of Thuringian ecotype ostracode zones 8 in Groos-Uffenorde et al. (2000, fig. 5) (see also Blumenstengel 1997)

***6a Entry of foraminifer *Quasiendothyra kobeitusana kobeitusana* (Df3ε Zone)**

***6b Entry of conodont *Palmatolepis gracilis gonioclymeniae* (Ziegler & Sandberg 1984).**

***6c Entry of miospore *Retispora lepidophyta* var. *minor* (Streel 1966, Maziane et al., 2002)**

***6d Entry of ammonoid *Muessenbiaergia sublaevis* replacing (Korn & Becker) the rather rare *Sphenoclymenia brevispinosa* to characterise the lower boundary of the Wocklumeria Stufe-VI (Becker & House 2000)**

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*5 Entry of conodont *Bispathodus ultimus*, lower boundary of the Upper/Late *expansa* Zone (slightly below the base of the former Middle *costatus* Zone) (Ziegler & Sandberg 1984), previously proposed as the lower boundary of an Uppermost Substage of a fourfold Famennian (Streel et al. 1998). *B. ultimus* being unknown in the Great Basin and Rocky Mountain regions of North America, the lower boundary of the Upper/Late *expansa* Zone was defined, there, by the lowest occurrence of *Pseudopolygnathus marburgensis trigonicus, Polygnathus vogesi,* or *Protognathodus meischneri* (Sandberg 1979, p.97)

Fig. 5: Groups of bioevents related to the base of an uppermost Famennian. (from Streel 2002, tab. 1, slightly modified)

STRATIGRAPHIC VALUE OF SOME STRUNIAN (DEVONIAN, LATEST FAMENNIAN) BRACHIOPODS

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In this paper, space of Devonian time considered would correspond to the Uppermost part of the Famennian or Latest Famennian as a fourfold subdivision of the stage, usually called Strunian by many authors in neritic facies and Wocklumeria Stufe or Wocklumian in pelagic facies (1). The lower boundary of this unit (close to the old Devonian/Carboniferous boundary) is defined by the entry of a conodont species and/or an ammonoid species and/or a foraminifer species and/or a miospore species (according to the report of the Uppermost Famennian Working Subgroup presented at the SDS Frankurt meeting in May, 2001).

We examine here the stratigraphic value and the geographic distribution of some Brachiopod genera and species as bio-markers of this Devonian unit. For us, the convenient selected taxa must 1) be precisely defined with a stratigraphic range established in correlation with the conodont biozones (Upper *expansa*, Early, Middle and Late *praesulcata*) or the ammonoid biozonation (do VI = "Wocklumeria Stufe") or the foraminifer biozones (*kobeitusana* zone) or the palynozones; 2) have an as large as possible geographic distribution.

The retained brachiopod bio-markers are mainly Productids, Rhynchonellids and Spiriferids. Productids species belong to *Hamlingella, Mesoplica, Sentosia, Spinocarinifera, Semiproductus, Whidbornella*, Rhynchonellids species to *Araratella, Novatiplatirostrum, Rozmanaria* and Spiriferids species to *Dichospirifer, Parallelora, Prospira, Sphenospira, Syringothyris, Tenisia* and *Voiseyella*. Some other genera and species could have been chosen but were eliminated because of a too indistinct definition or stratigraphic range.

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NEWS FROM THE GIVETIAN WORKING GROUP.

WRITTEN CONTRIBUTIONS DURING 2001

ABOUSSALAM, Z.S. & BECKER, R.T., 2002. The base of the *hermanni* Zone as the base of an Upper Givetian Substage. Document submitted to the Subcommission on Devonian Stratigraphy, Annual Meeting, Toulouse 2002, 10 pp.

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SUMMARY OF PROGRESS AND DISCUSSION

Aboussalam and Becker (2002) prefer the base of the *hermanni* Zone as defining level for the base of an Upper Givetian Substage. In the pelagic facies this level can be easily recognized by an important change in the conodont faunae, it also corresponds to the earliest occurrence of the goniatite *Mzerribites erraticus* and to a significant eustatic sea-level rise (Geneseo Shale of New York). The level is well above the initial Taghanic onlap and multilobate pharciceratids **seem** to enter above this level. Direct conodont based stratigraphic correlation with the neritic facies and especially with shallow-water platform carbonate successions is problematic. However, the eustatic rise occurring at the base of the *hermanni* Zone may allow sequence stratigraphic correlation with neritic successions.

A consequence of the definition of the lower boundary of an Upper Givetian Substage at the base of the *hermanni* Zone is that in most Givetian successions, pelagic and neritic, the Lower Givetian will represent a much longer-lasting period in comparison to the Upper Givetian and for this reason Bultynck & Gouwy (2002) recommended a threefold subdivision. On the basis of conodont data from the Givet Limestone in the Ardenne and Givetian successions in New York and the Moroccan Anti-Atlas a first prospect for a potential stratigraphic level defining the base of a Middle Givetian Substage has been made. In the Givet Limestone, mainly consisting of shallow-water platform carbonates, conodonts are generally sparse although icriodids can be abundant at some levels and some of the characteristic Givetian polygnathids occur in small number (*P. timorensis, P. varcus, P. rhenanus, P. ansatus*). Gouwy and Bultynck (2002) established regional composites for the Ma'der-Tafilalt region (with abundant and diversified conodont faunas) and for the Ardenne using the graphic correlation method. Projection of the Ma'der-Tafilalt data onto the Ardenne regional composite allows a more precise positioning of the Givetian conodont zones in the latter area (Fig.1). In this figure a correlation with the New York succession is also proposed. Currently the base of the *rhenanus/varcus* Zone is considered as a good potential level for the base of a Middle Givetian Substage.

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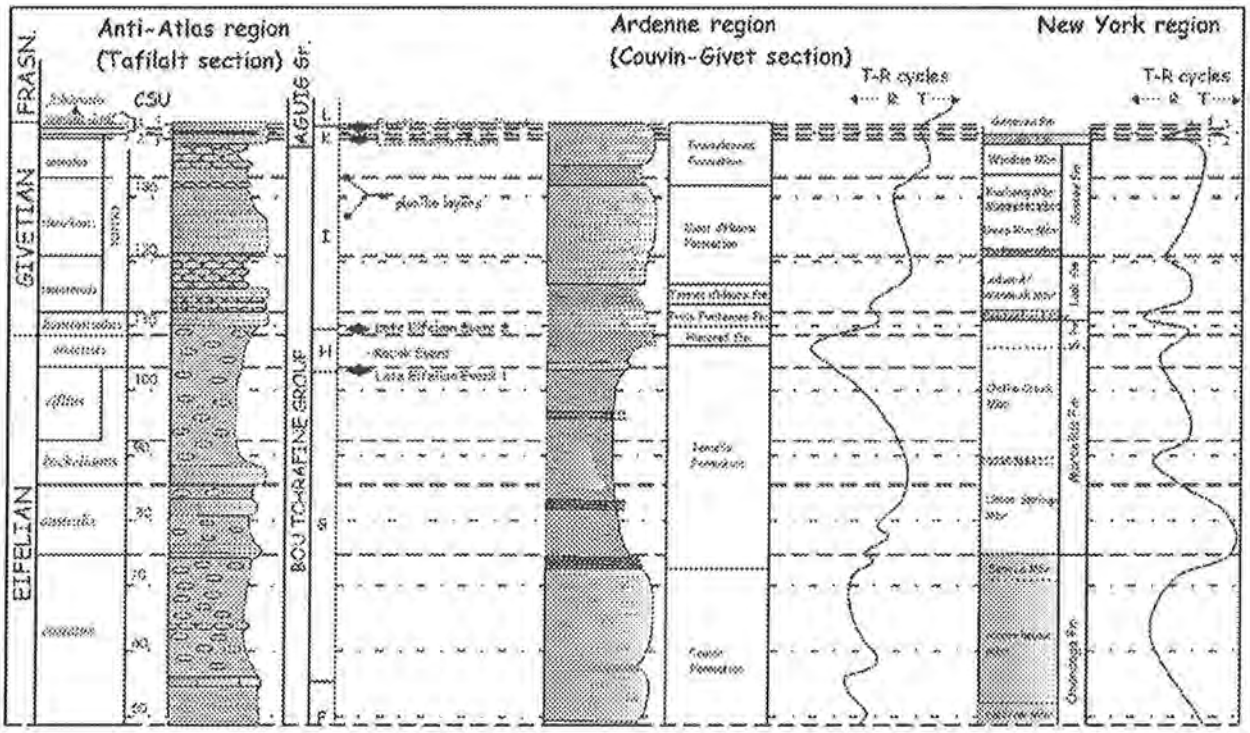

Fig. 1. Eifelian (pars) - Givetian Composite Standard based on the graphic correlation of the Ma'der-Tafilalt and the Ardenne regional composites. - Comparison with the New York succession.
Conodont zones above the ansatus Zone: 1 = *semialternans-latifossatus* Zone; 2 = *hermanni* Zone; 3 = *disparilis* Zone; 4 = *falsiovalis* Zone. CSU = composite standard units derived from the Jebel Ou Driss section for the Eifelian and the Bou Tchrafine section for the Givetian. Subdivisions F-L and events of the Tafilalt section according to Bultynck & Walliser (2002).

NEW MEETINGS

I. U. G. S. SUBCOMMISSION ON DEVONIAN STRATIGRAPHY (SDS)

&

INSTITUT SCIENTIFIQUE

Mohammed V - Agdal University Rabat, Morocco

INTERNATIONAL MEETING:

DEVONIAN NERITIC - PELAGIC CORRELATION AND EVENTS

Morocco, March 1st to 10th 2004

FIRST CIRCULAR

An international meeting hosted by SDS and the Institut Scientifique Rabat will take place in Marrakech, Morocco, on **March 1st & 2nd 2004** (sessions and conferences). It is devoted to the two significant and interrelated research fields of neritic - pelagic correlation and Devonian event stratigraphy. Contributions are welcomed both from SDS members and from other specialists with interest in the topics.

Marrakech is one of the famous Moroccan Imperial beautiful cities, accessible by international airports. The weather in March is very pleasant; the temperature is generally around 22°C but it may sometimes rain.

The field excursion (**March 3rd - 10th 2004**) connected with the joint meeting will focus primarily on Devonian sequences in the Western Anti Atlas (Dra Valley). This area is of great significance for the conference topics since there is a lateral and vertical interfingering of neritic and pelagic facies over several hundreds of kilometers of outcrop. Many Devonian eustatic and hypoxic events are well recognizable and provide important tools for correlation. Most sections are highly fossiliferous. The excursion program will demonstrate considerable recent and still unpublished research results but will also show that there is still a hugh potential for further studies.

Temperature in the Dra Valley at this time is around 30°C dry.

This excursion will start and finish at Marrakech and will be guided by:

Prof. Dr. Thomas BECKER and his Collaborators from the Westfälische Wilhelms-University, Münster, Germany.

Dr. Gerhard PLODOWSKI and his Collaborators from the Forschungsinstitut Senckenberg, Frankfurt a. M., Germany.

Prof. Dr. Ahmed EL HASSANI, Institut Scientifique, Mohammed V University, Rabat-Agdal, Morocco.

PROGRAM OVERVIEW:

1. Conference:

Sunday February 29th : Arrival of participants to Marrakech

17h00: Registration of the Participants

19h00: Welcome Party and dinner

Monday March 1st & Tuesday 2nd : Opening ceremony and scientific sessions

Nights: in Marrakech

N.B. Other scientific sessions and meeting groups can be arranged during the fieldtrip in Assa at the Province conference room. SDS will hold a short Business Meeting and an open discussion forum on "Devonian substages – progress and tasks"

2. Fieldtrip (March, Wednesday 3rd to Wednesday 10th)

Day 1: (Marrakech – Tata) transfer of participants to Tata, no special geological stop but crossing of the High Atlas.

Day 2: (Tata-Foum Zguid-Tata) Lower Devonian to lowermost Middle Devonian near Foum Zguid (guided by the Senckenberg Group)

What to see: Continuous succession (ca. 200 m thick) of sandstones, shales, marlstones and limestones from the Lower Emsian to Eifelian (Rich 3 and overlying formation) in neritic to hemipelagic facies. Very rich brachiopod faunas, trilobites, bivalves, ammonoids, gastropods, tentaculites, corals, conodonts. Daleje Event, Emsian/Eifelian boundary; sedimentary structures; dolerite.

Day 3: (Tata-Oued Mzerreb-Tata) Oued Mzerreb section SSE of Tata (Emsian to Famennian, guided by Becker & al.)

What to see: Continuous section from the late Eifelian to the top of Frasnian in mostly pelagic facies with neritic influence in some levels. Kacak Event, Upper *Pumilio* Event, Taghanic Event, Lower Rhinestreet Event, Kellwasser Events. Rich collecting of ammonoids, rugose corals, tentaculites, some trilobites, brachiopods, placoderms, tabulates, gastropods, conodonts.

Option: (Taghanic Event at Tiguisselt, SSW of Tata)

Day 4: (Tata-Oufrane-Assa) Oufrane section (Upper Emsian to latest Givetian, guided by Ebbighausen & al.)

Morning: What to see: Neritic Rich 3 sandstones, overlain by strongly condensed, pelagic late Emsian and lower Eifelian limestones and shales, Eifelian *Pumilio* layers; detailed ammonoid succession around the Taghanic Event. Rich collecting of brachiopods, ammonoids, tentaculites, solitary corals, gastropods, some bivalves, trilobites, conodonts, tabulates.

Afternoon: Drive to Assa, perhaps a stop near Akka (guided by Senckenberg group)

What to see: Short 'en route' stop for Rich 1 and 2 (compare Day 5). Brachiopods, trilobites; sedimentary structures.

Location: (one of several ridges along the road).

Day 5 : (Assa)

Morning: Pragian to ?Lower Emsian rocks E of Assa (Rich 1 + 2; guided by Senckenberg Group).

What to see: Lower to Upper Siegenian (Pragian to ?Lower Emsian "in the actual sense") sandstones, limestones, and shales; Rich 1 and 2, rhythmicity of "Rich" development. Collecting of brachiopods, trilobites, conodonts, corals, crinoids, bivalves, tentaculites, ostracodes. Phosphatic nodules and sedimentary structures present.

Afternoon: Kheneg El Khal (road to Zag): Latest Famennian and D/C boundary S of Assa (guided by Becker &

al.) : Latest Famennian ("Strunian") to Tournaisian in neritic siltstone and sandstone facies. Rich collecting of brachiopods, trace fossils, and bivalves; diverse sedimentary structures.

Day 6: (Assa-Bou Tserfine -Assa) Bou Tserfine section (15 Km E of Assa): Upper Emsian to Eifelian (guided by Becker & al.).

Continuous and very thick section from Lower Emsian (Rich 3) to middle Eifelian, mostly in neritic facies with pelagic intercalations. Daleje Event, hemipelagic *Sellanarcestes* limestone, Rich 4, Chotec Event, Eifelian *Pumilio* limestone; brief stop at shaly Upper Devonian. Rich collecting of phacopids, asteropygids, brachiopods, ammonoids, conodonts, tentaculites, solitary Rugosa. Diverses sedimentation structures including a late Emsian seismite and beautiful trace fossils.

Day 7: (Assa-Torkoz-Assa) Lower and Middle Devonian near Torkoz (Rich 1-4, guided by the Senckenberg group)

What to see: Continuous and thick section from the Pragian ("Lower Siegenian") to Eifelian, predominantly in neritic facies with hemipelagic to pelagic intercalations, Rich 1, 2 and 4 well developed. "Basal Zlichov" Event. Rich collecting of brachiopods, goniatites, trilobites (asteropygids, phacopids), tentaculites, conodonts, bivalves, gastropods, corals, fish remains.

Option: Rich Tamelougout (Becker & al) : Thick succession from the Early Emsian to the base of Eifelian in mostly neritic facies with late Emsian pelagic limestone intercalations. Rich collecting of trilobites, ammonoids, bivalves, brachiopods, and trace fossils.

Day 8: (Assa-Agadir-Marrakech) Transfer of the participants to Agadir (Lunch) and Marrakech (end of the trip)

FEES:

Registration: 100 Euros.

Accommodations:

- **in double rooms : 500 Euros.**
- **in single rooms (Marrakech only) : 650 Euros.**

Fieldtrip transportation (4WD only): 220 Euros

ACCOMMODATION:

Marrakech: Hotel Imperial Borj (5 stars hotel).
Tata: Hotel Relais des sables (3 stars hotel).
Assa : Hotel Nidaros (3 stars hotel).

DEADLINES: Answer to this Circular: *September 15th 2003.*
Second Circular will be sent: October 2003 (with all details)
Registration fee: *November 30th 2003*

CONTACT AND CORRESPONDENCE :

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This Circular (and forthcoming information) is viewed on the Institut Scientifique Rabat Homepage:

http://www.israbat.ac.ma/seminaires.htm

REGISTRATION FORM FOR SDS MEETING
Morocco, 2004

First name:

Surname:

Title:

Address:

(City) (State)

(Post or Zip code) (Country)

Phone: (office) (home)

E-mail address:

Fax:

I will attend the SDS meeting in Morocco: Yes No

I will present a paper: Yes No

Preliminary title:

I will present a poster: Yes No

Preliminary title:

I intend to publish the paper (s) in the meeting volume: Yes No

I am interested in participating in the excursion: Yes No

I shall travel with my own car (4WD) Yes No

If YES please indicate :

Names of colleagues who are going to travel with you in the same car.

This form should be returned as soon as possible **(before September 15th, 2003)** to:
Prof. Ahmed EL HASSANI, Institut Scientifique, B.P. 703 RABAT-AGDAL
10106 RABAT, MOROCCO
FAX: + 212 37 77 45 40
e-mail: elhassani@israbat.ac.ma

N. B. the Bank account Number for transferring participation fees will be given in the second circular.

BALTIC STRATIGRAPHIC ASSOCIATION

6TH BALTIC STRATIGRAPHIC CONFERENCE

St. Petersburg, Russia, August 22-26 , 2005

The 6th Baltic Stratigraphic Conference will be held in St. Petersburg, August 22-26, 2005 at the All-Russia Geological Research Institute (VSEGEI) and St. Petersburg State University. The proposed meeting will be dealing with aspects of stratigraphy in the Baltic Region and adjacent territories. All interested colleagues are cordially invited to attend the 6th Baltic Stratigraphic Conference. The scientific sessions are planned for August 22-26. The suggested pre- and post-conference field trips are the following:

- to the Cambrian – Ordovician of Leningrad District;
- to the Devonian of Leningrad, Pskov and Novgorod District*;
- to the Carboniferous of Leningrad and Novgorod District;
- to the Quaternary of Leningrad District.

If the field trips take place the terms of meeting will be prolongated.

The participants are invited to submit abstracts of both oral and poster presentations; the instruction will be sent in the first circular.

Organizing committee

Conference Chairman:	Dr. Tatyana Koren' (VSEGEI)
Vice-Chairmen:	Dr. Oleg Petrov (VSEGEI)
	Dr. Igor Buldakov (St Petersburg University)
Secretary:	Dr. Andrey Zhuravlev (VSEGEI)
Members:	Dr. Andrey Dronov (St Petersburg University)
	Irina Evdokimova (VSEGEI)
	Dr. Alexander Ivanov (St Petersburg University)
	Dr. Olga Kossovaya (VSEGEI)
	Dr. Yuri Savitsky (St Petersburg University)
	Dr. Tatyana Tolmacheva (VSEGEI)

Please, fill in and return the pre-registration form by e-mail not later than January 10th, 2004.

Please send correspondence to:

Secretary

Dr. Andrey Zhuravlev
All-Russian Geological Research Institute (VSEGEI)
74, Sredniy Pr., St Petersburg 199106
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E-mail: stratigr@mail.webplus.net
Tel.: +07 812 328 92 10

or Dr. Alexander Ivanov
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* - The Devonian field trip will include invertebrates the Givetian – Frasnian outcrops of the north-west East European Platform. The carbonate and terrigenous deposits yield the abundant and diverse invertebrates and vertebrates.

:

Pre-registration

Please, fill in and return

BALTIC STRATIGRAPHIC ASSOCIATION

6th Baltic Stratigraphical Conference

St. Petersburg, Russia, August 22-26 , 2005

First name: ..... Family Name: .....

Title: ..... Sex: (M/F) ....

Institution: .....

Adress (street): ..... City: .....

Postal code: ..... Country: .....State/Province .....

Phone: ..... Fax:..... E-mail: .....

Please tick:

I shall attend the Conference

possibly probably almost certainly

I intend to present oral presentation

I plan to present a poster

I intend to submit an abstract entitled: .....

.....

.....

I intend to field-trip:

- the Cambrian – Ordovician yes no
- the Devonian yes no
- the Carboniferous yes no
- the Quaternary yes no

I need an official invitation:

yes no

I intend to be accompanied by

yes no

Your proposals and suggestions on sessions and topics of symposia are highly welcome.

Proposals and suggestions.....

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Please feel free to copy and redistribute this form among your colleagues or other interested persons.

Date Signature

MEMBERSHIP NEWS

R. THOMAS BECKER (MÜNSTER)

ACTIVITY REPORT FOR 2002 TO SPRING 2003

In 2002 I gradually got used to my new position and to my new duties and responsibilities at Münster University. For anybody that has not yet noticed my new address and phone numbers, here they are, once again:

Prof. Dr. R. Thomas Becker
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Geologisch-Paläontologisches Institut
Corrensstr. 24
D-48149 Münster

rbecker@uni-muenster.de
-49-(0)251-83 339 51 phone
-49-(0)251-83 339 68 (secretaries: Mrs. Klaus or Mrs. Hanke)
-49-(0)251-83 339 74 fax

Apart from teaching all aspects of invertebrate palaeontology, I was given sufficient funds to renew all palaeontology rooms, buy microscopes, computers etc. and to build a brandnew conodont laboratory which is working fine in the meantime and which is run by my micropaleontology technician, Mrs. Eva Kuropka. In other words, Devonian guest researchers will be welcomed in my institute and will find a new active Devonian research group consisting of:

Sarah Aboussalam, who moved with me from Berlin to Münster, and who has completed her Ph.D. on the Taghanic Event in February (to be defended in June). Her work clearly shows that the name Taghanic Crisis is more appropriate since there were three event phases and extinction levels, starting with the basal Taghanic Onlap within the *ansatus* (= Middle *varcus*) Zone (pre-Tully regression and basal Tully transgression), a significant phase at the boundary of the *ansatus* and *semialternans* Zones (Middle/Upper Tully boundary re- transgressive cycle), and at the boundary of the *semialternans* (Upper *varcus*) and (Lower) *hermanni* Zone (top of the Tully Limestone, followed by the Geneseo Transgression). Her complete theses will appear – in German - as a volume of the Münstersche Forschungen zur Geologie und Paläontologie but important results will also be submitted in English to other journals. Our institute journal is open for Devonian contributions from outside. From time to time there will be a volume including just palaeontological articles and the publishers have worked hard to raise its standards (review system, plate quality etc.).

Holger Nübel has started less then a year ago with a Ph.D. on the "Palaeoecology and Facies Development of Givetian to early Frasnian Reefs of the Rhenish Massive and Morocco". He will compare the ecological structures and cycles of various biostromes and massive bioherms of the two widely separate regions in order to disentangle local, regional and latitudinal factors. We found some interesting cryptic habitats under large-sized Moroccan rugose colonies and he is also interested in the competition of framebuilders. First results will be presented in autumn.

Judith Nagel has started in autumn 2002 a Ph.D. on "Givetian to Famennian Pelecypods in the pelagic realm of Westphalia, Germany". This fossil group has been almost ignored in the last hundred years and she is struggling hard with major taxonomic revisions. Help will come from her co-supervisor Michael Amler of Marburg. She also will have a look at the event-related opportunistic blooms of specific groups and on regional diversity changes. My collections of bivalves from Morocco, the Montagne Noire, Australia, and Germany will serve for comparisons.

Master students are mapping in the Rhenish Massive and some of them will do master thesis on facies, conodont stratigraphy and stable isotopes of neglected Rhenish sections. Jürgen Kappel plans to move into Devonian ichnofossils from Morocco; he finished a Ph.D. on the diverse ichnofauna of the Upper Cretaceous of the Münsterland.

The new position gives less time for my own research but, partly together with co-authors, several papers on goniatites of the Boulonnais and Morocco have been completed. Together with Oliver Hampe and Sarah there is a publication on Middle Devonian shark teeth from the Tafilalt in preparation. Eventually, a joint paper on the *Annulata* Event in the Shotori Range of Iran with Mehdi Yazdi and Ali Ashouri was submitted and hopefully will be out soon. Sandra Kaiser is busily continuing at Bochum her Ph.D. on oxygen isotopes in conodonts around the D/C boundary. We had another wonderful trip to Morocco in March 2003, with a lot help and field company by Ahmed El Hassani, Volker Ebbighausen, and Jürgen Bockwinkel. It is surprising how many new discoveries still can be made in the Tafilalt and Maider but a major aim was to get sufficient data for the sections which we will present to SDS during the Dra Valley field trip next March. We can promise significant progress in our understanding of the regional stratigraphy and good collecting sites. We also studied important Devonian ammonoid localities in the Meseta which are planned to become a focus within an interdisciplinary research programme, jointly with Ahmed and colleagues from Rabat.

Apart from the Moroccan studies, there is slow but steady progress on our huge Australian material. At this point I have to emphasize how much I miss Michael House as a close friend and collaborator in all these topics. Our unfinished joint studies now suffer from the lack of his impetus, ideas and enthusiasm. Times are especially hard in the field areas where we have worked together for so long. But his last phone call made it clear how much he wanted to carry on with his and our research and this gives me clear duties which I will be happy to fulfil.

REFERENCES SINCE THE LAST SDS NEWSLETTER ARE AS FOLLOWS:

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Becker, R.T. (2002): *Alpinites* and other Posttornoceratidae (Goniatitida, Famennian). – Mitteilungen aus dem Museum für Naturkunde Berlin, Geowissenschaftliche Reihe, **5**, 51-73.

Ebbighausen, V., Becker, R.T. & Bockwinkel, J. (2002): Morphometric Analyses and Taxonomy of oxyconic Goniatites (Paratornoceratinae n.subfam.) from the Early Famennian of the Tafilalt (Anti-Atlas, Morocco). – Abhandlungen der Geologischen Bundesanstalt, **57**, 167-180.

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Mistiaen, B., Becker, R.T., Brice, D., Dégardin, J.-M., Derycke, C., Loones, C. & Rohart, J.-C. (2002) : Données nouvelles sur la partie supérieur de la formation de Beaulieu (Frasnien de Ferques, Boulonnais, France). – Annales de la Société Géologique du Nord, **9** (2ème Série, 75-84.

Becker, R.T. (2002): Frasnian goniatites from the Boulonnais (France) as indicators of regional sealevel changes. – Annales de la Société Géologique du Nord, **9** (2ème série), 129-140.

Becker, R.T. & Aboussalam, Z.S. (2002): Extinctions and diversifications in conodonts and trilobites around the global Taghanic Biocrisis (Late Givetian). – Strata, **12**, Série 1: 19.

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Kaiser, S., Steuber, T. & Becker, R.T. (2002): Kohlenstoff-Isotopenvariationen und biofazielle Veränderungen an der Devon/Karbon-Grenze. - Schriftenreihe der Deutschen Geologischen Gesellschaft, Programme and Abstracts, **21**, 184-185.

Kaiser, S., Steuber, T. & Becker, R.T. (2002): Paläoklimatische und –ozeanographische Veränderungen im Oberdevon und Unterkarbon. – Berichtskolloquium des DFG-Schwerpunktprogramms 1054, 57.

Becker, R.T. (2002): Environments and Biofacies in the Devonian Pelagic Realm. – IPC 2002, Geological Society of Australia, Abstracts, 68: 16-17.

Becker, R.T. (2002): The Importance of Devonian Substages – a Commentary. – Doc. Internat. Dev. Subcomm., Ann. Meet., Toulouse, 2 pp.

Aboussalam, Z.S. & Becker, R.T. (2002): The base of the hermanni Zone as the base of an Upper Givetian substage. – Doc. Internat. Subcomm. Dev. Strat., Ann. Meet., Toulouse, 10 pp.

Becker, R.T. (2002): Famennian Ammonoid Zones of the eastern Anti-Atlas – Implications for Substage Subdivisions. – Doc. Internat. Subcomm. Dev. Strat., Ann. Meet., Toulouse, 5 pp.

Kaiser, S., Steuber, T. & Becker, R.T. (2003): Paläoklimatische und- ozeanographische Veränderungen an der Wende Devon/Karbon. – Berichtskolloquium des SPP 1054, 13-14.

ALAIN BLIECK

RESEARCH ACTIVITY

My last year research activity was mostly devoted to 1) Ordovician vertebrates (out of topic here), and 2) Devonian heterostracan faunas of Severnaya Zemlya, Russia. In September 2002, I spent a week in the Lithuanian Institute of Geology (now Institute of Geography and Geology), working with V.N. Karatajute-Talimaa on the Early and Middle Devonian heterostracans (Pteraspidomorphi) from the October Revolution Island of the Severnaya Zemlya archipelago, in the Russian Arctic; and participating in the 5th Baltic Stratigraphic Conference. This is the continuation of a project which began under the auspices of IGCP 406 (1996-2000). It was partly funded by the Cultural Center of the French Embassy in Vilnius, and partly by the UMR 8014 research unit of CNRS-USTL. This programme will be pursued under the auspices of the new IGCP project 491 "Middle Palaeozoic Vertebrate Biogeography, Palaeogeography, and Climate" (co-leaders Drs Zhu Min and Gavin C. Young). Another point is concerned with the discovery of a drepanaspid heterostracan in the Emsian of the Grand-Duchy of Luxembourg by Dr. D. Delsate (curator at the Natural History Museum of Luxembourg). This discovery fills a gap in the fossil record of Early Devonian psammosteids of Western Europe, because until now this group of heterostracans was known in the Pragian-Emsian of England in the west, and of the Rhenish Slate Massif, Germany, in the east, but not yet in between in the Ardenne allochthonous unit of the Ardenne Massif.

IGCP ACTIVITIES

Two new IGCP projects have been born in the recent months, and a French Group has been organised for each, that is, IGCP 471 "Evolution of Western Gondwana during the Late Palaeozoic" (co-leaders Drs C.O. Limarino & L.A. Buatois, Argentina ; http://www.limarino.org/IGCP/Home.htm), and IGCP 491 "Middle Palaeozoic Vertebrate Biogeography, Palaeogeography, and Climate" (co-leaders Drs Zhu Min, China, and Gavin C. Young, Australia; info soon on our Palaeozoic Vertebrate Web site http://www.biology.ualberta.ca/old_site/wilson.hp//Paleozoic.html).

PUBLICATIONS

papers

BLIECK, A.R.M., KARATAJUTE-TALIMAA, V.N. & MARK-KURIK, E. (2002).- Upper Silurian and Devonian heterostracan pteraspidomorphs (Vertebrata) from Severnaya Zemlya (Russia): a preliminary report with biogeographical and biostratigraphical implications.- *Geodiversitas*, **24** (4): 805-820, 5 fig.; Paris [also World Wide Web address: http://www.mnhn.fr/publication/geodiv/g02n4a6.html].

DELSATE, D. & BLIECK, A. (in press).- A psammosteid heterostracan (Vertebrata: Pteraspidomorphi) from the Emsian (Lower Devonian) of the Grand Duchy of Luxembourg.- *Geologica Belgica*.

WEHRMANN, A., BLIECK, A., BROCKE, R., HERTWECK, G., JANSEN, U., KÖNIGSHOF, P., PLODOWSKI, G., SCHINDLER, E., SCHULTKA, S. & WILDE, V. (in press).- Palaeoenvironment of an Early Devonian land-sea transition: a case study from the southern margin of the Old Red Continent (Mosel valley, Germany).- *Palaios*; Soc. Econ. Paleont. & Mineral. publ., Tulsa (OK, USA).

abstracts

BLIECK, A. & KARATAJUTE-TALIMAA, V.N. (2002).- Devonian heterostracan pteraspidomorphs (Vertebrata) from Severnaya Zemlya (Russia) – New data on tesseraspids.- *In*: SATKUNAS, J. & LAZAUSKIENE, J. (eds): The Fifth Baltic Stratigraphical Conference: Basin stratigraphy – Modern methods and problems (Vilnius, Sept. 22-27, 2002). Extended abstracts: 24-25; Geol. Surv. Lithuania, Vilnius.

BLIECK, A. & SERVAIS, T. (2002).- Du pôle sud à l'équateur : la région Nord – Pas-de-Calais au Paléozoïque inférieur et moyen.- *In*: BECKARY, S. (coord.) : Géologie, patrimoine et environnement en Nord-Pas-de-Calais (Colloque du Centenaire du musée Gosselet, Lille, 26-28 novembre 2002). Résumés : 22-23, 1 fig. ; Mus. Hist. Nat. Lille.

book review

BLIECK, A. (2002).- *New Perspectives on the Old Red Sandstone*. P.F. Friend et B.P.J. Williams (eds.), Geol. Soc. Spec. Publ., 180, London, 2000, 1 vol. rel. 25,5 x 17,5 cm, 623 p., ill..- *Géochronique*, **82**: 42-43; Paris.

MARGARET BRADSHAW (CHRISTCHURCH, NEW ZEALAND)

Several of the Lower Devonian projects mentioned in my last report have now been published. These include the depositional environment of Emsian coral limestones at Reefton, the relationship of Lochkovian sediments to older sediments at Baton River, and the sedimentology, ichnocoenoses and palaeoenvironments of a clastic Emsian sequence in Antarctica.

Fieldwork is continuing at Baton River (Northwest Nelson) on the late Silurian to Lochkovian "Ellis Formation", largely arenaceous, that lies below the fossiliferous and muddy Baton River Formation. Fieldwork has identified major folds, provided depositional information, and more importantly, some new fossil faunas have been collected. These are principally shelly faunas near the top of the formation. Graptolites and ammonoids have yet to be found in the Silurian/ Devonian sequence, while conodonts continue to be elusive in the limited limestones present. A new and relatively thick limestone unit may prove to be more productive.

Systematic descriptions of shelly fauna in the Baton Formation, mostly Pragian, are in preparation. A mudstone, close to what is believed to be the base of the formation, has yielded numerous pteropod remains and some dacryoconarids, and hopefully these can be used for dating and correlation with Australian sequences.

Systematic descriptions are almost complete for the trace fossils in the Emsian Horlick Formation, Ohio Range, Antarctica The ichnocoenoses in which they occur have already been published.

The University of Canterbury has begun provenance studies on Palaeozoic sediments in southern Victoria Land, Antarctica, to determine relationships between the Antarctic craton, eastern Australian and western New Zealand. Dependent upon funding, I hope to assist with those studies that relate to ?Silurian to early Devonian coarse clastic sequences north of the Dry valley region. These rocks have a similar age to sequences that I have studied in other areas of Antarctica. Writing up this work is still in progress.

PUBLICATIONS

2000

BRADSHAW, M.A. 2000. Base of the Devonian Baton Formation and the question of a pre-Baton tectonic event in the Takaka Terrane, New Zealand. *New Zealand Journal of Geology and Geophysics* **43**: 601-610

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2002

BRADSHAW, M.A., NEWMAN, J., AITCHISON, J.C. 2002. The sedimentary geology, palaeoenvironments and ichnocoenoses of the Lower Devonian Horlick Formation, Ohio Range, Antarctica. *Antarctic Science* **14**: 395-411.

BRADSHAW, M.A. 2002. A new ichnogenus *Catenarichnus* from the Devonian of the Ohio Range, Antarctica. *Antarctic Science* **14**: 422-424.

FAGERSTROM, J.A., BRADSHAW, M.A. 2002. Early Devonian reefs at Reefton: guilds, origin and paleogeographic significance. *Lethaia* **35**: 35-50.

TM PIERRE BULTYNCK (Brussels)

Preparing manuscript on conodont taxonomy and biostratigraphy of Emsian - early Eifelian conodonts mainly based on material from S. Morocco (Tafilalt, W. Dra Valley: Oufrane and El Anhsour) and Spain (Guadarrama).

Colaborative research with S. Gouwy (Geology, K.U. Leuven, Belgium) on conodont based graphic correlation of Middle Devonian sections from the Ardenne and S. Morocco. Implications for subdivision of the Givetian.

PUBLICATIONS

BULTYNCK, P., 2002. Devonian Icriodontidae: biostratigraphy and taxonomic, paleoecologic and paleogeographic considerations. *Strata, Série 1*, **12**: 23 (Toulouse) (abstract).

BULTYNCK, P. & DEJONGHE, L., 2002. Devonian lithostratigraphic units (Belgium). *Geologica Belgica*, **4** (1-2): 39-69.

BULTYNCK, P. & GOUWY, S., 2002. Towards a standardization of global Givetian substages. Proceedings of the International Symposium Geology of the Devonian System, Syktyvkar, Komi Republic, July 9-12, 2002, p. 142-144 (abstract).

GOUWY, S. & BULTYNCK, P., 2002. Graphic correlation of Middle Devonian sections in the Ardenne, Belgium: implications on stratigraphy and establishment of a regional composite. *Strata, Série 1*, **12**: 86 (Toulouse) (abstract).

GOUWY, S. & BULTYNCK, P., 2002. Graphic correlation of Middle Devonian sections in the Ardenne region (Belgium) and the Mader-Tafilalt region (Morocco): development of a Middle Devonian composite standard. *Aardkundige Mededelingen*, **12**: 105-108.

CM PETER CARLS (BRAUNSCHWEIG)

Since a year, I am enjoying retirement and having more freedom for research. I still have my conodont lab etc. Together with Mike Murphy and Nacho Valenzuela-Rios, we have started to run about 100 conodont samples from latest Ludlow through Pridoli and Early plus Middle Lochkovian from the Pozary section W of Prague; Ladislav Slavik is joining our team. Conodont faunas of the U Topolu section and others SW of Prague have furnished numerous new conodont taxa of Pridoli to mid-Lochkovian age. Observation of subtle morphologic differences combined to conodont apparatus reconstruction pays off in biostratigraphy! Joint manuscripts are under way.

I am going to start the acid preparation of a new early Givetian arthrodire from the Eastern Iberian Cordillera, the head plus trunk shield of which measure near 1.2 m. Elga Mark-Kurik will take the lead in the description. A joint paper on the presence of *Tityosteus* in the late Zlichovian of the same area is nearly ready.

Claudia Dojen is finishing her PhD thesis on Early Devonian (mainly mid-Lochkovian to late Zlichovian) benthic ostracods from the same area this summer. According to the habitual evaluations, beyrichiid ostracods would plead against oceanic reparations (Rheic) between Mauro-Ibero-Armorica and Rhenohercynicum at least from the Lochkovian onward.

Together with Miguel Pardo we have the phylogeny from *Globithris* toward *Rhenorensselaeria strigiceps* under work, using a succession from the Eastern Iberian Cordillera. This will reform correlations between eastern North America and the Rhenohercynicum at the Early/Middle Siegenian boundary, as the evolution was formerly supposed to progress in opposite direction.

CM ELGA MARK-KURIK (TALLINN, ESTONIA)

KURIK@GI.EE

During last years the published and/or submitted (& in prep.) papers by E. M.-K. (often with coauthors) concern mostly the Devonian fish paleontology. In Mark-Kurik & Carls (2002) a most extraordinary placoderm, *Carolowilhelmina geognostica* Carls, 1995 was described from the Middle Devonian of Spain. This long-snouted large arthrodire appeared to be a lonely wanderer near the sea surface under the algal floats. No relatives of the pieceful gigant are discovered so far. P. Carls also found another smaller arthrodire, *Tityosteus* in the Devonian of Spain (Mark-Kurik & Carls, in prep.). The fairly close relative of this Emsian form is *T. rieversae* Gross, 1960 from Hunsrück Shale, Germany. Note the emended species name of the latter. Mrs. Rievers was the kind lady who gave the holotype to Walter Gross for description. Spanish *Tityosteus* shows also similarity to the Early Devonian homostiid *Antineosteus* Lelievre, 1984 from Morocco, as far as one can conclude from the single marginal plate of *Tityosteus*, found in Aragon.

The Early Devonian buchanosteid arthrodires, once know from Australia only, are now discovered in many regions: Iran, Saudi Arabia, Kazakhstan, Uzbekistan, Siberian Arctic, Spitsbergen, South Urals. A new buchanosteid genus from the latter region will be described in the paper by Mark-Kurik& Young (in press). Two more buchanosteids, from Kazakhstan and Uzbekistan, respectively, are characterized in the submitted paper by Mark-Kurik. From Kazakhstan comes a new species of *Buchanosteus*. It is noteworthy that the genus occurs also in Tien Shan, in the Zinzilban Gorge section (bed no. 20).

In the paper by Blieck et al. (2002) the identifications of the psammosteid heterostracans from of Severnaya Zemlya, Siberian Arctic were given by E. M.-K. The age dating of the Middle Devonian units and the Emsian Albanov Fm includes her data on psammosteids and placoderms (see Mannik et al. 2002, Geodiversitas, 24: 99-122).

In Mark-Kurik (2002) a number of rare but important phlyctaenid arthrodire occurrences are listed, coming from different Early Devonian units of the Baltic area, Belarus and Kaliningrad Region (previous East Prussia). There are new taxa and some forms, resembling those known from Rhineland. The data indicate the contacts between Rhineland and the NW and W of the East European Platform during the Early Devonian. In Mark-Kurik& Karatajute-Talimaa (in press) distribution of chondrichthyan remains in the Devonian of the Baltic area is given and chondrichthyan buccopharyngeal scales described. The remains are not common in the above area.

Last year David K. Elliott (Flagstaff, Arizona) and E. M.-K. participated in a successful NRC project "Phylogeny, Biostratigraphy, and Distribution of Psammosteids (Agnatha, Heterostraci) from the Canadian Arctic and Baltic". The project included several research visits: D.K. Elliott's to Estonia and Latvia, and E. M.-K's to USA. As the Canadian psammosteids were collected by E.B. Daeschler and his colleagues, the Academy of Natural Sciences in Philadelphia was specially visited to study some more psammosteid specimens and the fossil fishes assemblages in general. The participants of the project hope to continue the study of the exciting material. Some results will be presented in the talk on the 2nd Gross symposium in autumn of 2003 in Riga (Elliott et al., in prep.).

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FLORENTIN PARIS, (GÉOSCIENCES-RENNES, UNIVERSITY OF RENNES I, FRANCE)

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I am being more active now on Devonian material as the activities of IGCP n° 410 dealing with Ordovician biodiversity ended in 2002 with the production of a final volume edited by B. Webby et al., now in press in Columbia University Press. My activities on Devonian material, including field work and study of chitinozoan bearing samples concern: 1) the Devonian of Bolivia (outcrops and subsurface material) in connection with hydrocarbon exploration carried out by TOTALFINAELF (leader of the project: J. DURAND), 2) the Devonian of south-eastern Algeria (outcrops of the Tassili area, and subsurface of the Illizi-Berkine basins) in connection with SONATRACH (National Algerian Oil Company) (leader of the project: Dr K. BOUMENDJEL).

For both projects, chitinozoans proved to be very useful tools for documenting the diachronism of various transgressions and sandy bodies. Several unpublished internal reports have been made for TOTALFINAELF and SONATRACH, and some biostratigraphic results are included in the PhD thesis of M. HENNICHE (Rennes University). Two papers dealing respectively with the biostratigraphy and with the biodiversity/palaeoenvironments of the Illizi basin during the Late Silurian and the Devonian are in are in preparation.

A long-term project on the Lower Devonian of a 700 m thick section in central north Brittany (Le Val, Gahard, and Bois Roux formations) is in progress (diverse and well preserved chitinozoan and spore assemblages).

LIST OF THE RECENT PUBLICATIONS RELATED TO DEVONIAN TOPICS

Jaglin J.C., Paris, F. 2002. Biostratigraphy, biodiversity and palaeogeography of Late Silurian chitinozoans from A1-61 borehole (north-western Libya). *Rev. Palaeobot. Palynol.* 118 : 335-358.

Paris, F. & Le Hérissé A. 2002. Early Palaeozoic strata and organic walled microfossils in Crozon Peninsula (Western Brittany, France). A geological excursion of the CIMP meeting (1-7 September, 2002). 42 p. (inédit).

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Kriz, J., J.-M. Degardin,A. Ferretti, W. Hansch, J. C. Gutiérrez Marco, F. Paris, J. M. Piçarra D-Almieda, M. Robardet, H.-P. Schönlaub, and E. Serpagli (in press). Silurian Stratigaphy and Paleogeography of Gondwanan and Perunican Europe. In E. Landing & M.E. Johnson eds. Silurian Lands And Seas—Paleogeography Outside Of Laurentia ; New York State Museum, Bulletin n° 493

CM EBERHARD SCHINDLER (FRANKFURT)

Besides continuing projects, new activities started in 2002. A co-operation with CM Chuck VER STRAETEN has been possible within an exchange program of the 'American Association of Museums' (AAM) called 'International Partnerships Among Museums' (IPAM). We focused on comparison and correlation between (mainly Lower to Middle) Devonian strata in the NE of the U.S. along a transect starting near Albany (NY) and running to Wytheville (WV) and central European sections in the German Rheinisches Schiefergebirge (Eifel and Rhine/Mosel areas) and in the Belgian Ardenne Mountains. In March, field work of the Senckenberg group together with CMs M. BENSAID, A. EL HASSANI and other regional geologists has been done in Southern Morocco. Research continued on siliciclastic sections in the Lower Devonian of the Rhein/Mosel area of the Rheinisches Schiefergebirge. Results have been presented at various meetings (see references below). Work also continued on material from trenches in the Eifel Hills area (Lower and Middle Devonian of the Eifel-Kalkmulden) that had been opened in connection with a Trans-European gas pipeline (TENP) together with other colleagues at the Senckenberg; manuscripts are ready for submission. Work on the Upper Devonian section at Kahlleite (Thueringisches Schiefergebirge) also continued. Contributions were made to the research program of Michael JOACHIMSKI and Werner BUGGISCH (Erlangen University) studying the oxygen isotope content of conodonts, in this case across the Frasnian/Famennian boundary (see references below). Together with other colleagues from the German SDS, the Devonian system has been compiled in a synoptic chart featuring the facies distribution in German key areas from the younger Proterozoic to the Quarternary (Stratigraphic Commission of Germany [ed.] [2002]: Stratigraphic Table of Germany 2002) that has been presented at the 'Geo2002' Conference held as joint meeting of the major German geological societies in October 2002 in Wuerzburg [the chart costs Euro 5,- (+ postage) and can be purchased from: GeoForschungsZentrum (GFZ) Potsdam, Bibliothek, Telegrafenberg A17, D-14473 Potsdam, Germany; phone: ++49-331-2881673, e-mail: bib@gfz-potsdam.de].

Additional to these activities editing of the proceedings volume of the 15th International Senckenberg Conference organized in May 2001 in Frankfurt has been done. Contributions to the work of the German SDS (as chairman) and the international SDS (including participation at the business meeting connected with the ECOS VIII Symposium in Toulouse and Albi, France) shall be mentioned.

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CM GAVIN C. YOUNG (CANBERRA)

Recent research has focused on documentation of new placoderm taxa (arthrodires) from the Early – Middle Devonian of eastern Australia (Pragian-Emsian of Burrinjuck, New South Wales; ?Emsian-Givetian of Broken River, Queensland), with five submitted manuscripts. Some of these new forms indicate ties across the northern Gondwanan margin, by showing close affinity with the arthrodires from the Emsian of Morocco described by Hervé Lelièvre.

Hervé, along with other placoderm experts (Daniel Goujet, Bob Carr) visited Canberra last year after the very successful IPC meeting and Palaeozoic fish field trip in July, for which a comprehensive guidebook was prepared (see references). Discussions we had then over the local arthrodire material has stimulated output. It seems the North Gondwana connections extend into the Urals (Mark-Kurik & Young 2003).

Other activities have involved the early shark material (Antarctilamna) from the Bunga Beds, on the NSW south coast, for which rare new specimens provide additional information on the palatoquadrate and shoulder-girdle, work on acanthodians (with Carole Burrow) from Antarctica, and the Cravens Peak Beds (Georgina Basin, central Australia). Fieldwork in April with Dr Brigitte Meyer-Berthaud (Botanique et BioInformatique, CIRAD, Montpellier) produced new collections of Devonian plant material from various localities in NSW. The vexed question of teeth in placoderm fishes has been addressed in a 'Rapid Communication' submitted to JVP. A Palaeozoic vertebrate proceedings volume from IPC-2002 is being edited for Fossils & Strata.

Fieldwork in western NSW (with Dr G. Neef, Univ. of NSW) has revealed some new fish localities and horizons in the Darling Basin. A major publication by Young & Goujet (2003) documents this early (?Early-Middle Devonian) vertebrate assemblage on the Australian craton for the first time (new placoderms and osteichthyans from the Georgina Basin). Some interesting relationships are indicated by this assemblage, with western north America, Spitsbergen, and China, in addition to the endemic East Gondwana form Wuttagoonaspis. Regarding such biogeographic questions (e.g. Young 2003), there is a lot to be learnt about the distribution in space and time of Devonian vertebrates in relation to palaeogeographic models, particularly the connections within Gondwana, and between Gondwana and the northern hemisphere (e.g. Young et al. 2000; Young & Moody 2002). This is the subject of a new IGCP Project 491 ('Middle Palaeozoic Vertebrate Biogeography, Palaeogeography and Climate') which aims to use early vertebrate biogeographic and biostratigraphic data to test competing Middle Palaeozoic palaeogeographic models. in relation to atmosphere composition, climate change, and extinction events. The first business meeting of the new project will be held at the Second Gross Symposium in Riga, September 2003.

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